



**Department of
Environmental
Conservation**

PETERSBURGH LANDFILL

ADDENDUM TO SITE CHARACTERIZATION REPORT

WORK ASSIGNMENT D007622-36.1

PETERSBURGH LANDFILL
PETERSBURGH

SITE NO. 442054
RENSSELAER COUNTY, NY

Prepared for:
NEW YORK STATE
DEPARTMENT OF ENVIRONMENTAL CONSERVATION
625 Broadway, Albany, New York

Basil Seggos, Commissioner

DIVISION OF ENVIRONMENTAL REMEDIATION
Remedial Bureau B

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Final
October 2018

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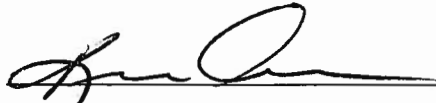
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OCTOBER 2018

SITE CHARACTERIZATION REPORT CERTIFICATION

I, Kevin Connare, certify that I am currently a Qualified Environmental Professional and that this Addendum to Site Characterization Report was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10) and that all activities were performed in full accordance with the DER-approved work plan and any DER-approved modifications.

 10/17/18

Kevin Connare, P.G.

Date

P.G. # 000427

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LIST OF ACRONYMS AND ABBREVIATIONS

°	degrees
Baker	Baker Corp.
BOD ₅	biological oxygen demand
bgs	below ground surface
Ca-HCO ₃	calcium-bicarbonate
CAMP	community air monitoring program
Ca-Na-HCO ₃	calcium-sodium-bicarbonate
Clark	Clark Engineering, Inc.
COC	chain-of-custody
COD	chemical oxygen demand
CP	Commissioner Policy
DER	Division of Environmental Remediation
DI	direct injection
DOT	Department of Transportation
DUSR	Data Usability Summary Report
EAC	Energy Answers Corporation
EC	electrical conductivity
ELAP	Environmental Laboratory Approval Program
EPS	Environmental Products and Services of Vermont
ft	foot/feet
FRes	Fluid Resistivity
FTemp	Fluid Temperature
GAI	Geophysical Applications, Inc.
HSA	hollow stem auger
HDPE	high density polyethylene
ICP-AES	Inductively Coupled Plasma - Atomic Emission Spectroscopy
ID	inside diameter/identification
IDW	investigation-derived waste
Inc	incorporated
kg	kilograms
MCL	maximum contaminant level
MDL	method detection limit
mg/kg	milligram per kilogram (parts per million)
mS/cm	millisiemens per centimeter
MW	monitoring well
MSL	mean sea level
Na-Cl	sodium-chloride
NAD 83	North American Datum 1983
ng/L	nanograms per liter (parts per trillion)
NGVD 29	National Geodetic Vertical Datum of 1929
NTU	nephelometric turbidity units
NYCRR	New York Codes, Rules, and Regulations
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
PAH	polycyclic aromatic hydrocarbons
PCB	polychlorinated biphenyl
PFAS	per- and polyfluoroalkyl substances
PFHxS	perfluorohexanesulfonic acid
PFNA	perfluorononanoic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctane sulfonate

LIST OF ACRONYMS AND ABBREVIATIONS

(continued)

PID	photoionization detector
ppb	parts per billion
ppt	parts per trillion
PVC	polyvinyl chloride
QA/QC	quality assurance/quality control
RQD	rock quality designation
SC	Site Characterization
SCO	Soil Cleanup Objective
SCR	Site Characterization Report
SCG	standards, criteria and guidance
SIM	selected ion monitoring
SJB	SJB Services Inc.
SOP	standard operating procedure
SUNY	State University of New York
SVOC	semi-volatile organic compound
TAL	target analyte list
TCL	target compound list
TDS	total dissolved solids
TKN	total Kjeldahl nitrogen
TIC	tentatively identified compound
TOC	total organic carbon
TOGS	Technical and Operational Guidance Series
µg/L	micrograms per liter (parts per billion)
µg/kg	microgram per kilogram (parts per billion)
URS	URS Corporation - New York
USEPA	United States Environmental Protection Agency
VOC	volatile organic compound
WA	work assignment

1.0 INTRODUCTION

This Addendum to the Site Characterization (SC) Report has been prepared to summarize the field activities and analytical results associated with the investigation of the Petersburg landfill (Site), New York State Department of Environmental Conservation (NYSDEC) Site Number 442054, located in the Town of Petersburg, Rensselaer County, New York (**Figure 1-1**). The work for the SC investigation was issued to URS Corporation - New York (URS) as NYSDEC Work Assignment (WA) No. D007622-36 on October 14, 2016, henceforth referred to as Phase I. On September 26, 2017, the NYSDEC requested additional SC investigation activities, henceforth referred to as Phase II. An amendment to the WA for Phase II (D007622-36.1) was approved by the NYSDEC on December 7, 2017.

The investigations were performed to determine if materials disposed at the Site pose a significant threat to public health or the environment, specifically in relation to suspected contamination from per- and polyfluoroalkyl substances (PFAS). PFASs are chemicals that were used to make household and commercial products that resist heat and chemical reactions and repel oil, stains, grease, and water. Perfluorooctanoic acid (PFOA) is a PFAS that was widely used in nonstick cookware, stain-resistant carpets and fabrics, and paper and cardboard as well as many products in the aerospace, automotive, building, and electronic industries. Perfluorooctane sulfonic acid (PFOS) is used in fire-fighting foam.

In May 2016, the United States Environmental Protection Agency (USEPA) published a drinking water health advisory for PFOA and PFOS. Effective April 25, 2016, the NYSDEC added PFOA and PFOS to the New York State 6 New York Codes, Rules, and Regulations (NYCRR) Part 597 list of hazardous substances, thereby making it a hazardous waste pursuant to New York State Environmental Conservation Law Article 27, Title 13 (New York's State Superfund Program) and 6 NYCRR Part 375 (the Superfund regulations). The NYSDEC declared that the Petersburg landfill [also referred to as the Berlin/Petersburg(h) landfill] as a potential State Superfund Site due to the suspected presence of PFASs in the landfill.

1.1 Site Location and Description

1.1.1 Site Location

The 22.47-acre Site is located on Jones Hollow Road approximately two miles southeast of the center of the Town of Petersburg, Rensselaer County, New York (**Figure 1-1**). The Site is comprised of portions of two parcels located within the Town of Petersburg (**Figure 1-2**). Parcel 1 (Tax ID # 109-1-45) is 16.47 acres and parcel 2 (Tax ID # 109-1-44) is six acres. The approximate center of the landfill is at 42.72502 N, -73.325607 E.

1.1.2 Zoning and Land Use

The Site is zoned as a landfill/dump. The area surrounding the Site is primarily wooded rural vacant land and rural residential properties. Additionally, there is a small cemetery located in the east portion of the Site, just east of the landfill (**Figure 1-3**).

1.1.3 Site Background

Approximately eight acres in the southern portion of the Site were used for solid waste disposal for the residents of the Towns of Berlin and Petersburg. The two towns began joint operation of the Site in 1982. Initially, the landfill operations in the early 1980s consisted of infilling of a ravine. Energy Answers Corporation (EAC) took over landfill operations in 1990 with the intent to work toward landfill closure. EAC accepted municipal solid waste for approximately two years to establish closure grades and promote drainage away from the landfill. The landfill stopped accepting waste in July 1991. A cover was constructed over the landfill and the construction certification report was completed in April 1997.

On August 29, 2016, the NYSDEC declared the Petersburg landfill to be a Potential State Superfund Site, based on suspected disposal of PFASs in the landfill. In November 2016, the NYSDEC issued a Fact Sheet providing the public with information on the SC.

1.1.4 Topography and Drainage

Elevations at the Site range from 1,250 feet (ft) to 1,350 ft above mean sea level (MSL). The highest elevations are in the north-central portion of the Site and topography slopes radially downhill from the high point. The slopes are more gradual on the east side and steeper on the west. Runoff from the Site flows down the slopes of the landfill into a perimeter trench at the toe of the slope to a discharge point on the western side of the landfill.

The Site lies in the Hoosic River Watershed. The nearest surface water body is a small unnamed west tributary to Jones Hollow Brook on the western side of the landfill (**Figure 1-4**). Most drainage from the landfill flows into this stream and then north to the Little Hoosic River. A small intermittent stream to the south of the landfill was diverted via culvert piping to a man-made swale on the southwestern side of the landfill and then connecting back to the unnamed west tributary of Jones Hollow Brook. There is also a stream east of the landfill on the east side of Jones Hollow Road. This unnamed east tributary to Jones Hollow Brook flows north and west to the confluence with Jones Hollow Brook, which discharges into the Little Hoosic River.

1.1.5 Geology/Hydrogeology

Regional surface deposits in the Site area consist of glacial till composed of sands and gravels. The Site area is underlain by as much as 34 ft of non-cohesive glacial till composed of fine to coarse sand with cobbles, gravel, silt, and a trace of clay. Deposits are generally thicker in the south and west and thinner in the eastern and northern portions of the Site. The till directly overlies phyllite bedrock. The hilly topography in the Site area generally reflects the variation in the bedrock elevations.

Depth to groundwater ranges from approximately 1 ft to 24 ft below ground surface (bgs), although, as discussed later in Section 3, artesian conditions exist in some areas. Due to a groundwater divide on the north side of the landfill, groundwater flows radially to the east, south and west.

1.2 Previous Investigations/Records Search

The following presents a discussion of previous Site investigations and records reviewed for the Site.

1.2.1 Clark Engineering, January 1990

In January 1990, the Towns of Berlin and Petersburg authorized the installation of new monitoring wells and preparation of a topographic and property survey of the Site. A report was prepared by Clark Engineering, Inc. (Clark) for NYSDEC review and comment of the locations and specifics regarding proposed monitoring wells.

The available version of the Clark report is incomplete – the figures and attachment(s) are missing. The document does not provide much information without these items. It is also more a proposal than a report. Text pertaining to the hydrogeology includes a very limited discussion based on two brief field visits and review of regional geology information.

The report does indicate that two wells existed at the Site prior to Clark's involvement. No information was available for these preexisting wells.

1.2.2 Berlin/Petersburgh Landfill Final Closure Plan, July 1991

A Site investigation was completed by Smith and Mahoney, P.C. to determine and evaluate the extent of potential impacts from the landfill and assess the potential release or migration of contaminants. The investigation was summarized in a report titled *Berlin/Petersburg Final Closure Plan*, dated July 1991.

During the field investigation in 1990/1991, eight borings were completed as monitoring wells (MW-01, MW-01A, MW-02, MW-02S, MW-03, MW-04, MW-05, and MW-06, see **Figure 1-4**). Groundwater samples were collected in April 1991 from all the wells except MW-02 and MW-02S, which were apparently destroyed shortly after installation. MW-05 was destroyed sometime after the sampling.

Groundwater and Surface Water Sampling and Analyses

The 1990/1991 groundwater analytical results were compared to maximum contaminant levels (MCLs). Parameters that exceeded criteria in most wells were turbidity and common metals (e.g., iron, manganese, sodium). Other parameters detected at concentrations exceeding MCLs, but not in all wells, included pH, ammonia, and phenols. Other detections of note included benzene in MW-03 and dichlorodifluoromethane and methylene chloride in MW-05.

In May 1991, Smith and Mahoney collected one leachate sample and two surface water samples (one upgradient of the landfill and the other downgradient of the leachate seep). The sample results were compared to MCLs. The leachate sample included exceedances of turbidity, phenols, common metals, as well as exceedances of ammonia, boron, chromium, lead, selenium, zinc, benzene, chloroethane, ethylbenzene, methylene chloride, toluene, trichlorofluoromethane, and 1,1,1-trichloroethane. The report noted that the downgradient surface water sample exhibited increased concentrations of most parameters compared to the upgradient location.

It is noted that the Smith and Mahoney report includes results for metals analyses for two surface water samples that were collected by the NYSDEC in December 1989. The results show detections of antimony, barium, calcium, iron, manganese, potassium, sodium, and zinc. The sample locations were not identified.

Hydraulic Conductivity Testing

Groundwater flow in bedrock is primarily through a network of interconnecting bedding/foliation planes, joints, and fractures. The Smith and Mahoney investigation included bedrock hydraulic conductivity (permeability) testing at several depth intervals in the deep boring for well MW-03. The tests revealed that there was little or no flow in the formation between 36 ft and 150 ft (i.e., very low permeability). The weathered bedrock interval from 13 ft to 36 ft had a much higher permeability with an average of 2.6×10^{-3} ft/second (7.9×10^{-2} centimeters per second).

Water Well Survey

The Smith and Mahoney investigation included a survey of public and private water supplies within one mile downgradient and one-quarter mile upgradient of the Site. Of the 72 requests mailed, 36 responses were received. The majority of respondents claimed both the quality and quantity of the well was good. Respondents typically cited hard water and sulfur odors.

1.2.3 Berlin/Petersburgh Construction Certification Report

The final cover system for the landfill is detailed in the *Berlin/Petersburg Construction Certification Report*, prepared by Smith and Mahoney, April 1997. The final cover system consists of a combination of soil and geosynthetic materials to minimize infiltration of water into the waste mass. Construction of the final cover system included the following:

- 12-inch thick gas venting soil layer;
- geotextile filter fabric layer;
- 18-inch thick low permeability barrier soil layer;
- 24-inch thick barrier protection soil layer;
- 6-inch thick topsoil layer; and
- vegetative layer.

1.2.4 NYSDEC Environmental Media Sampling - June 2016

On June 2, 2016, the NYSDEC collected groundwater and leachate seep samples from the Site. The leachate sample contained PFOA at a concentration of 4,200 nanograms per liter (ng/L, or ppt). The leachate seep discharges to the west tributary of Jones Hollow Brook and eventually discharges into Little Hoosic River.

1.2.5 NYSDEC Environmental Media Sampling - July 2016

Based on the levels of PFOA in the June 2, 2016 leachate sample, the NYSDEC conducted supplemental sampling on July 21, 2016 to assess PFOA in the west tributary of Jones Hollow Brook and near the discharge to Little Hoosic River. The assessment involved collecting four surface water samples and five sediment samples from the stream and two surface water samples from the Little Hoosic River (see **Figure 1-5**).

The July 2016 sampling results are provided in **Table 1-1**. The sediment PFOA and PFOS concentrations were well below NYSDEC's preliminary residential soil cleanup objective of 140

micrograms per kilogram (µg/kg). The surface water results were compared to the updated USEPA drinking water health advisory level of 70 ng/L for PFOA and PFOS (individually or combined). Only one location (stream sample PSL4) contained PFOA slightly above the health advisory level. Since the west tributary of Jones Hollow Brook is not used as a drinking water source and future activities are anticipated at the landfill to improve surface water quality, NYSDEC and the NYSDOH determined that no immediate action was warranted at that time.

1.2.6 NYSDEC Letter to Landfill Property Owners - August 29, 2016

On August 29, 2016, NYSDEC submitted a certified letter to representatives of the Towns of Berlin and Petersburg stating that the State is responsible for investigating active and inactive hazardous waste disposal sites and that the NYSDEC has information which leads them to suspect that hazardous waste, specifically PFOA, was disposed of at the Petersburg landfill. As the owners of the landfill, NYSDEC requested information from the towns that may be relevant to NYSDEC's investigation.

1.3 Site Characterization Objectives and Scope of Work

It is suspected that PFAS-containing materials generated by Tonoga, Inc. (Taconic Plastics Limited) have been placed in the Petersburg landfill and may be impacting Site groundwater and surface water.

The objective of the SC was to determine if the Site is a potential significant threat to public health and/or the environment. The SC was also performed to determine the presence/absence of contamination in soil, sediment, groundwater, surface water, and leachate at the Site and to evaluate the need for further actions. Tasks performed during the SC Phase I field investigation included:

- Advancing five borings (two shallow bedrock and three deep bedrock borings);
- Collecting the following samples for chemical analysis:
 - Three subsurface soil samples;
 - Six sediment samples;
 - Six surface water samples; and
 - One leachate seep sample.
- Rock coring;
- Installing three shallow bedrock monitoring wells and two deep bedrock monitoring wells;
- Developing the five new and five existing groundwater monitoring wells;
- Collecting one round of water levels;

- Collecting one round of groundwater samples from the ten wells for laboratory analysis;
- Installing a carbon sock at the leachate seep location;
- Completing a topographic survey, including locations and elevations of monitoring wells, surface water, sediment, and leachate sampling locations, as well as existing Site roads, fencing and other pertinent Site features; and
- Managing investigation-derived waste (IDW).

Tasks performed during the SC Phase II field investigation included:

- Advancing 11 borings (five shallow bedrock, five deep bedrock, one overburden);
- Rock coring;
- Downhole geophysical logging of the five new deep boreholes and five existing deep monitoring wells;
- Packer testing;
- Completing the 11 borings as monitoring wells (five shallow bedrock, five deep bedrock, and one overburden);
- Developing the 11 new groundwater monitoring wells;
- Collecting one round of groundwater levels;
- Collecting one round of groundwater samples from the 21 wells for laboratory analysis;
- Collecting the following samples for chemical analysis:
 - Ten surface waters (five previously sampled locations and five new locations); and
 - One leachate seep sample.
- Installing a carbon sock at the leachate seep location;
- Extending the topographic survey, including locations and elevations of new monitoring wells and surface water sampling locations; and
- Managing IDW.

1.4 Report Organization

This SC Report has six sections. Section 1 includes background information and a synopsis of previous Site investigations. Section 2 includes a description of field activities that occurred during each phase of the SC fieldwork. Section 3 includes a description of the subsurface conditions at the Site. Section 4 includes a description and summary of the analytical results for samples collected during Phases I and II the SC fieldwork. Section 5 consists of conclusions drawn from the investigation. Section 6 contains a list of references cited. Tables, figures, and appendices immediately follow the text.

2.0 FIELD ACTIVITIES

Phase I of the SC field investigation was performed during the period of November 30, 2016 through January 24, 2017 and Phase II of the SC field investigation was performed during the period of December 4, 2017 through March 20, 2018. The following subcontractors provided services during the SC:

- Drilling - SJB Services, Inc., (SJB), URS subcontractor;
- Geophysical logging - Geophysical Applications, Inc. (GAI), URS subcontractor, Phase II only;
- Surveying - C.T. Male Associates, URS subcontractor;
- IDW transportation and disposal - Environmental Products and Services of Vermont, Inc. (EPS), URS subcontractor; and
- Chemical laboratory analyses - TestAmerica Laboratories, Inc., NYSDEC call-out contractor.

Field activities were supervised by a URS geologist. Photographs of field activities are included in **Appendix A** and in URS' geologist's daily reports provided in **Appendix B**.

2.1 Mobilization

Extensive precautions were used to eliminate or minimize the occurrence of PFAS-containing materials used during the investigation. This included making sure that field staff used PFAS-free clothing, equipment, and supplies, and used certified PFAS-free water during drilling and sampling. PFAS-free water for drilling and decontamination was obtained from the Town of Petersburg. PFAS-free water for equipment rinse blank samples was received from the laboratory.

2.2 Subsurface Investigation Activities

2.2.1 Utility Clearance

Prior to commencing intrusive activities, SJB, arranged for utility mark-outs through New York State One-Call.

2.3 Drilling

Drilling during Phase I was performed during the period of November 30 through December 27, 2016 and Phase II drilling was performed during the period of December 5, 2017 through February 9,

2018. Drilling was accomplished using track- and all-terrain vehicle-mounted drill rigs with hollow stem auger (HSA), drive and wash (casing and roller bit), and rock coring capabilities.

2.3.1 Phase I Drilling

Two shallow and three deep borings were advanced and completed as wells MW-06D, MW-07S, MW-07D, MW-08S, and MW-08D. All wells were set into bedrock. The deep wells included the installation of a 4-inch diameter steel separation casing to isolate the lower water-bearing zone from the upper water-bearing zone. The upper water-bearing zone is considered to consist of saturated overburden and shallow weathered bedrock (approximately the upper 25 ft of bedrock). The lower water-bearing zone is considered to consist of groundwater with the interval of approximately 42 ft to 72 ft into bedrock. It is noted that there is no definitive hydrogeologic divide between the lower water-bearing zone and the upper water-bearing zone. The depth of the deep wells was determined based on an evaluation of the depths of other deep wells previously installed at the Site and on the presence of a relatively competent zone (e.g., minimal fractures or partings) at depths below 25 ft into bedrock.

At each deep well location, the deep well boring was advanced to bedrock using 4 1/4-inch inside diameter HSAs while continuously collecting soil samples with a 2-ft long by 2-inch diameter split- spoon sampler. Upon recovery, the soil samples were screened for volatile organic vapors with a photoionization detector (PID). No elevated PID readings were observed. One soil sample was retained for chemical analysis from each of the three deep borings. Locations MW-07D and MW-08D required advancing multiple boreholes in order to obtain the required soil volume for quality assurance/quality control (QA/QC) samples.

Upon reaching bedrock, the HSAs were removed and a 6-inch diameter temporary steel casing was advanced into the upper bedrock surface. A roller bit was then advanced approximately 5 ft into bedrock and a 4-inch diameter steel casing was then set into the rock socket and grouted in place. After the grout was allowed to cure for a minimum of 24 hours, the boring was advanced to the target depth using an HQ core bit. Rock cores were inspected to record information including core length recovery, lithology, and rock competency by calculating the rock quality designation (RQD).

The shallow well borings were advanced into the bedrock using the 6-inch temporary casing and roller bit drilling technique with no soil or rock sampling. Soil boring and rock coring logs are provided in **Appendix C**, monitoring well construction logs are provided in **Appendix D**, and copies of the daily field notes are provided in **Appendix E**. Photographs of rock cores are provided in **Appendix A** and **B**.

All soil samples were transported under chain-of-custody (COC) control to TestAmerica's Amherst, New York laboratory. TestAmerica is a NYSDOH Environmental Laboratory Approval Program (ELAP) accredited laboratory. Samples for PFAS analyses were sent by TestAmerica to their Sacramento, California laboratory for analysis. The soil samples were analyzed for the analytical parameters listed in **Table 2-1**. An equipment blank of the split-spoon was collected on December 1, 2016 at location MW-08D. The equipment blank was analyzed for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), pesticides, polychlorinated biphenyls (PCBs), metals and PFAS (six compounds). Acetone, alpha-BHC, calcium, iron, manganese nickel and zinc were detected in the equipment blank (see **Table 2-2**). PCBs and PFASs were not detected.

2.3.2 Phase II Drilling

During Phase II, 11 borings were advanced and completed as wells MW-09D, MW-09S, MW-10D, MW-10S, MW-11D, MW-11S, MW-12D, MW-12S, MW-13D, MW-13S, and MW-13O. The depths of the shallow wells were selected based on monitoring the upper water-bearing zone (i.e., overburden and shallow, weathered bedrock). No soil samples were selected for chemical analyses from the Phase II well borings. All wells were set into bedrock except MW-13O, which was set in the overburden. Permanent steel separation casing was used in the deep and shallow bedrock wells. The steel separation casing was used in the shallow bedrock wells to case off the overburden. The steel separation casing was used in the deep bedrock wells to case off the shallow overburden and the upper weathered bedrock. In addition, the screened intervals of the deep bedrock wells were determined based on an evaluation of the core samples, downhole geophysics, and packer testing.

The overburden well boring (MW-13O) was advanced with 4 ¼-inch HSA to the top of bedrock. The well was then installed through the augers as the augers were removed. This is the only Phase II location where the saturated overburden thickness was sufficient enough for installation of an overburden monitoring well. Soil boring and rock coring logs are provided in **Appendix C**, monitoring well construction logs are provided in **Appendix D**, and copies of the daily field notes are provided in **Appendix E**. Photographs of rock cores are provided in **Appendix A** and **B**.

2.3.3 Borehole Geophysical Survey

Borehole geophysical surveys were performed during the period of January 1 through 30, 2018. Prior to the beginning of the field work, URS collected equipment rinse blank samples of the logging cables, probes, and submersible pump on November 15, 2017 for PFAS analyses (six compounds). The testing was performed to confirm that the geophysical logging instrumentation was not introducing PFAS

contamination into the new or existing wells. Only perfluorononanoic acid (PFNA) was detected and only in the samples from the gamma probe, Grundfos pump, and large winch. PFNA concentrations ranged from 0.99 ng/L to 2.1 ng/L as shown in **Table 2-2**.

The geophysical surveys performed on the new well boreholes (i.e., MW-09D, MW-10D, MW-11D, MW-12D, and MW-13D) included natural gamma, caliper, fluid temperature, fluid resistivity, single-point resistance, optical and acoustic televiewer, and heat-pulse flowmeter testing. The flowmeter testing was performed during both ambient and pumping conditions. The testing took one to two days to complete at each location. Only natural gamma logging was performed at existing wells MW-01, MW-04, MW-06D, MW-07D, and MW-08D. The testing took one to two hours to complete at each well. At the conclusion of each test, the instrumentation was decontaminated as it was removed from the borehole/well. Decontamination consisted of an Alconox and water wash and a clean water rinse. The data gained from the surveys were used to identify fractures, joints, and water circulation within each of the boreholes/wells. GAI's Borehole Geophysics Logging Report is provided in **Appendix F**.

2.3.4 Packer Testing

SJB performed packer testing during the period of January 26 through February 1, 2018. Packer testing was conducted in the open borehole at MW-09D, MW-11D, MW-12D, and MW-13D. MW-10D was not packer tested. Based on the geophysical logging results and observation of rock cores, three to four discrete depth zones were chosen for packer testing in each borehole. SJB was responsible for installing the packer set up to each desired depth interval. The packer assembly consisted of two inflatable rubber bladders, each approximately 3.4 ft long separated approximately 10 ft apart. The pipe interval between the two packers was perforated to allow water to flow in and out of the isolated interval. Once installed to the target depth, the packers were inflated using nitrogen gas.

Following isolation of the target interval, URS used a Waterra Hydrolift II inertial lift pump and dedicated high density polyethylene (HDPE) tubing with check valves to purge water from the interval. Water level readings were recorded throughout the test to assess groundwater recharge. The water levels remained fairly steady, above the packer interval, and did not fluctuate significantly.

One groundwater sample was collected from each packer interval after the packer interval was purged dry and allowed to recharge, or after approximately three packer interval water volumes were removed. The groundwater samples were analyzed for a limited list of PFAS by USEPA Method 537 Modified PFAS-DI (direct injection) using an expedited turn-around time. The PFAS analytical results were evaluated, in conjunction with core observations and borehole geophysics, to determine the

appropriate depth for the deep well screen intervals. Therefore, construction of each monitoring well was delayed pending receipt of PFAS analytical results. An equipment blank of the packer test equipment was collected on January 30, 2018 at location MW-11D. The equipment blank was analyzed for PFASs (six compounds). No PFAS compounds were detected in the equipment blank (see **Table 2-2**).

2.3.5 Monitoring Well Construction

As previously described, screen intervals were selected based on a combination of bedrock core observations, packer test results, geophysical surveys, and previous well completions. Each monitoring well was constructed with a 10-ft length of 2-inch inside diameter (ID), 0.010-inch slot, Schedule 40 polyvinyl chloride (PVC) well screen and riser. A well construction summary is provided on **Table 2-3**.

Time-released bentonite was installed at MW-10D, MW-11D, and MW-13D to fill the void from the bottom of the borehole to 1 ft below the bottom of the screen. At MW-09D, #0 sand was used to fill the void from the bottom of the borehole because the driller did not have time-released bentonite on hand during the installation of this well.

A #0 sand pack was installed to approximately 1.5 ft to 2 ft above the top of the well screen. An additional 0.5 ft of #00 sand was placed on top of the #0 sand. Bentonite chips were then added to approximately 2 ft above the sand pack and then another 0.5 ft of #00 sand was placed on the bentonite to minimize the potential for grout intrusion. The remaining annular space was then filled with cement/bentonite grout to approximately 1 ft bgs. The remaining 1-ft was backfilled with concrete. A 5-ft length of stick-up protective casing was installed at wells MW-07S, MW-08S, and MW-13O. For the remaining wells, the 4-inch permanent steel casing was used as the protective casing. Keyed-alike locks were installed on all monitoring wells, including the five pre-existing monitoring wells.

2.3.6 Monitoring Well Development

URS developed the wells by the surge and pump method using a Waterra Hydrolift II inertial lift pump and dedicated HDPE tubing with check valves. During well development, water quality parameters of pH, specific conductivity, temperature and turbidity, oxidation reduction potential and dissolved oxygen were periodically measured using a YSI 556 multi-meter and HACH 210 turbidity meter. A monitoring well was considered developed when water quality parameters had stabilized, a total of 10 well volumes had been purged, or the well had purged dry after being sufficiently surged. Well development logs are provided in **Appendix G**.

During Phase I, well development water was collected into Department of Transportation (DOT) approved 55-gallon drums and staged on-site for eventual off-site disposal. During Phase II, drilling, well development, and purge water was collected and placed into a 21,000-gallon fixed-axle frac tank staged on-site.

2.4 Groundwater Level Measurements

Groundwater level measurements were collected on January 4 and 5, 2017 during Phase I and on February 12, 2018 during Phase II. Water levels were determined using a Heron electronic water level meter. Measurements were referenced to a mark on the north side of the top of each PVC well riser. At the time of water level measurements on February 12, 2018, wells MW-09D and MW-12D displayed artesian conditions (i.e., the water level was above the well riser), so static water levels were not able to be recorded from these two wells.

2.5 Groundwater Sampling

During Phase I, groundwater samples were collected from the ten Site monitoring wells on January 4 and 5, 2017 and during Phase II samples were collected from all 21 wells on February 27, 2018 through March 19, 2018. The extended duration of the Phase II sampling was due to adverse weather and Site conditions. Groundwater sampling was performed following the low-flow groundwater sampling procedure using a peristaltic pump, dedicated HDPE tubing, a YSI 556 multi-meter, and HACH 210 turbidity meter.

The groundwater samples were transported under COC to TestAmerica and analyzed for the analytical parameters as listed in **Table 2-1**. Groundwater sampling logs from Phase II are presented in **Appendix H**. An equipment blank of the low-flow sampling equipment was collected on March 1, 2018 at location MW-01 and on March 6, 2018 at location MW-07D. The equipment blanks were analyzed for PFASs (21 compounds). Only perfluorohexanesulfonic acid (PFHxS) (0.20 ng/L and 0.21 ng/L) was detected in the equipment blanks (see **Table 2-2**).

2.6 Surface Water, Sediment, and Leachate Seep Sampling

2.6.1 Phase I Sampling

Surface water samples SW-01/SED-01 through SW-06/SED-06 and the leachate seep sample (LC-01) were collected during two sampling events: the first event was performed during the period of

December 7, 8, 13, and 14, 2016 and the second on January 24, 2017. The samples collected on January 24, 2017 were only analyzed for an extended list of PFASs at the request of NYSDEC.

Sediment samples were collected from the surface water locations only during the December 2016 sampling event. Each sediment sample was collected after the associated surface water sample was collected. Surface water, sediment, and leachate sampling field forms are presented in **Appendix I**. The samples were transported under COC to TestAmerica and analyzed for the parameters as listed in **Table 2-1**.

2.6.2 Phase II Sampling

Surface water and leachate samples were collected on February 22, 23, and 26, 2018. Ten surface water samples (SW-01, SW-03 through SW-11) and one leachate seep sample (LC-01) were collected from locations shown on **Figure 1-4**. NYSDEC decided that it was unnecessary to sample SW-02 due to its close proximity to SW-03. Sediment samples were not collected during Phase II. Surface water and leachate sampling field forms are presented in **Appendix I**. The samples were transported under COC to TestAmerica and analyzed for the parameters as listed in **Table 2-1**.

2.7 Community Air Monitoring

A community air monitoring program (CAMP) was performed to provide real-time measurements of total VOCs and particulate (airborne dust) concentrations in air at the downwind perimeter of each designated work area when intrusive investigation activities were in progress at the Site. The procedures followed methods described in the NYSDOH Generic CAMP per Division of Environmental Remediation (DER) *Technical Guidance for Site Investigation and Remediation* (DER-10), Appendix 1A (NYSDEC, May 2010). Additionally, Site personnel monitored the perimeter stations to determine if any odors were being produced as a result of the intrusive activities. The monitoring was designed to provide protection for the downwind community from potential releases of airborne constituents resulting from the investigation activities.

Total VOCs and particulates were monitored with a PID and dust meter, respectively, located upwind and downwind of each work zone during Phase I drilling activities. Total VOCs were monitored with a PID during Phase II drilling activities. Action levels were not reached during intrusive investigation activities during the SC, so no response actions were necessary.

2.8 Investigation-Derived Waste Disposal

2.8.1 Phase I Activities

IDW generated from the investigation (e.g., soil cuttings, rock cores, decontamination fluids, development and purge water, plastic sheeting, and personal protective equipment) was containerized in 55-gallon drums.

Due to freezing temperatures, several drums bulged and needed to be placed into either 85-gallon or 95-gallon overpack drums in order to meet transportation requirements. Drum pick-up (eight containing solids and 18 containing liquids) occurred on February 2, 2017. The IDW was transported to Waste Recovery Solutions, located in Myerstown, Pennsylvania. A copy of the bill of lading is provided in **Appendix J**.

2.8.2 Phase II Activities

Solid IDW generated from the investigation (e.g., soil cuttings, plastic sheeting, and personal protective equipment) was containerized in 55-gallon drums. Liquid IDW (e.g., drilling water, decontamination fluids, development, and purge water) was containerized in a 21,000-gallon frac tank rented from Baker Corp of Oxford, Massachusetts (Baker), and staged on-site. Due to the freezing temperatures, SJB was unable to get all of the liquid IDW transferred into the frac tank. Therefore, some liquid IDW was containerized in six aluminum-framed plastic 275-gallon totes and three 55-gallon drums.

During transfer of drums from the drilling sites to the staging area, a few drums containing solids were dented and needed to be placed into either 85-gallon or 95-gallon overpack drums in order to meet transportation requirements. EPS performed the removal of seven drums from the Site on February 23, 2018 and the remaining six drums on February 28, 2018. The IDW was transported to Waste Recovery Solutions. A copy of each bill of lading is provided in **Appendix J**.

Liquid IDW generated during the Phase II field activities was treated on-site by the NYSDEC using an NYSDEC-owned mobile carbon treatment system. The treated water was discharged on-site. The six 275-gallon totes used to temporarily store liquids were cut apart after the liquids were removed and treated. The NYSDEC recycled the aluminum scrap and URS disposed of the plastic.

Treatment of the water in the frac tank was completed on July 13, 2018. On September 10, the frac tank was cleaned by a Baker subcontractor. The rock flour and remaining water were removed from the tank and placed into 55-gallon drums. Three drums of water and 13 drums of rock flour sludge were

removed from the Site on September 12, 2018 by EPS. Copies of the bills of lading are provided in **Appendix J**. The frac tank was removed from the Site on September 13, 2018 by Baker.

2.9 Carbon Sock Installation

On December 28, 2016, URS placed a carbon sock at the leachate seep near LC-01. On October 12, 2017, a second sock was placed just downstream of the original sock. The intent of the socks is to absorb organic compounds (including PFASs), thereby reducing organic contaminant migration into the stream.

2.10 Site Survey

At the conclusion of the Phase I, C.T. Male Associates completed a survey of all new and existing monitoring wells, surface water/sediment and leachate sampling point locations. The survey also included a topographic survey of the landfill that was sufficient to develop 2-ft contours conformant to the National Map Accuracy standard.

After the Phase II, C.T. Male Associates completed a survey of all new monitoring wells and surface water sampling point locations. C.T. Male Associates also surveyed points of reference near surface water sample locations to identify and gauge the surface water locations during future sampling events. The survey also included incorporating 2-ft Rensselaer County contours from Rensselaer County LiDAR: <https://gis.ny.gov/elevation/contours/contours-rensselaer.htm> for topographic mapping of the areas outside the landfill.

The locations of the monitoring wells were surveyed for ground surface, top of outer well casing, and top of riser elevations. The elevations were established within ± 0.01 ft. Vertical datum was referenced to the National Geodetic Vertical Datum of 1929 (NGVD 29). Horizontal datum was referenced to the North American Datum 1983 (NAD 83) New York East State Plane Coordinates. The Phase II survey map and copies of the survey point files are provided in **Appendix K**.

3.0 SUBSURFACE CONDITIONS

3.1 Regional Geology

The Site area is situated in the Taconic Mountains physiographic province of New York State (R.S. Tarr, 1902). This province is an upland area with elevations in the eastern portion generally between 1,500 ft and 2,800 ft MSL. The area is characterized by steep rocky ridges generally trending north – northeast. Rock types vary and include shales, limestones, sandstones, and metamorphosed phyllites that have been folded and faulted (Fenneman, et. al., 1946). In portions of the province along the valleys, there are undifferentiated glacial deposits of sands and gravels. Those deposits typically exhibit a fining upward sequence and overlie a complex mix of folded and faulted bedrock. The Hudson-Mohawk sheet of the Geologic Map of New York [State University of New York 1970] shows faults which generally trend north-south. The closest faults are located approximately 0.5 miles to the east and 1.5 miles to the west of the Site.

3.2 Site Geology

Natural unconsolidated deposits at the Site are composed of fine to coarse gray to brown sand with varying amounts of silt, clay, and gravel to varying depths. Drilling observations indicate that the thickness of the overburden ranges from approximately 3 ft to 34 ft. The deposits are typically thicker on the western side of the Site. **Figure 3-1** presents a cross section location map and **Figures 3-2, 3-3, 3-4, and 3-5** present generalized cross sections A-A', B-B', C-C', and D-D', respectively.

Bedrock stratigraphy was determined based upon observations of the characteristics of the rock cores and comparisons of these observations to geologic literature and geologic maps. The Hudson-Mohawk sheet of the Geologic Map of New York identifies bedrock in the landfill area as slate and phyllite (both metamorphic forms of shale) of the Nassau Formation. According to the geologic map, the Nassau Formation “south of 43 degrees” latitude, which includes the Site vicinity, is comprised of phyllite, slate, shale, and thin quartzite.

Rock core descriptions for well borings MW-09D, MW-10D, MW-11D, MW-12D, and MW-13D are summarized on **Table 3-1**. The maximum penetration at the Site was at MW-13D, which was advanced to a depth of 94 ft. The cores were visually examined to determine the composition of the rock unit(s), as well as identifying fractures within the rock. Inspection of the cores indicates that bedrock beneath the Site consists of gray phyllite with quartz veining and moderate to high angle bedding. The quartz seams were interspersed throughout the sequence and range in thickness from less than one inch to approximately 1 ft.

RQDs range from 0% to 100% with the lower values found in the shallow, more weathered bedrock. RQDs are summarized in **Appendix C** and **Table 3-1**. The predominant dip direction of the Site bedrock is 120 degrees (°) southeast, with the fractures generally at a high angle, averaging approximately 50°. The stipple pattern used to show the phyllite bedrock in cross sections A-A', B-B', C-C', and D-D' is angled to reflect the approximate dip observed in the rock cores.

3.2.1 Borehole Geophysics

Data from the borehole geophysical survey are summarized in **Table 3-1**. Observations from GAI's report (**Appendix F**) are summarized below. Note that only natural gamma surveys were conducted in existing wells (MW-01, MW-04, MW-06D, MW-07D, and MW-08D). Surveys on the new well boreholes included natural gamma, caliper, fluid temperature, fluid resistivity, single-point resistance, optical and acoustic televiewer, and heat-pulse flowmeter testing. The flowmeter testing was performed during both ambient and pumping conditions.

Planar features (fractures, bedding planes, joints) were identified as either open or less open based on their appearance on the acoustic televiewer and or optical televiewer images. In each borehole's geophysical survey plots, interpretations are summarized using rose diagrams to indicate the predominant down-dip azimuths of planar features in each new well. The rose diagram colors correspond to the planar-feature types (red for open features, black for less open features).

The GAI report includes combined rose and stereoplots that summarize the orientations of all planar features inferred in each well. The large number of planar feature poles that plot in the stereoplot's upper left quadrant represent bedding planes, tight fractures or joints and open fractures that dip down primarily toward the southeast and east-southeast at dip angles between 20° and 80° from horizontal. The approximate orientations of these open planar features are depicted in the cross sections. The stereoplot also shows the relative scarcity of planar features that plot in the lower right quadrant; these poles represent open and less open planes that dip toward the west-northwest, northwest, and north-northwest at dip angles ranging from 10° to more than 80° from horizontal.

Comparing the stereoplot diagrams from individual wells with the summary diagram shows how planar features inferred from a single well either resemble or differ from the features observed from all five new wells. For example, MW-09D shows open planar features that dip to the west, while, as mentioned above, most planar features dip to the southeast. MW-12D shows an increase in open planar features dipping to the south with some to the west and northwest.

3.3 Investigation Area Hydrology and Hydrogeology

3.3.1 Hydrology

Surface water drains radially off the landfill with drainage swales directing flow to the west. The drainage swale, and a leachate seep on the west side of the landfill, flow northwest to the unnamed west tributary of Jones Hollow Brook, and eventually discharges to Little Hoosic River. There is also an unnamed stream on the east side of Jones Hollow Road. This unnamed east tributary to Jones Hollow Brook flows north and west to the confluence with Jones Hollow Brook.

3.3.2 Hydrogeology

Monitoring wells were installed at the Site to monitor two hydrostratigraphic zones: the upper water-bearing zone and the lower water-bearing zone. The upper water-bearing zone consists of overburden and the upper 25 ft of bedrock. Borehole geophysical testing and visual observations including the presence of numerous fractures/open planar features, low RQD values, good groundwater recharge, coupled with moderate hydraulic conductivity values previously calculated, indicate that the predominant zone of groundwater flow at the Site is within the upper water-bearing zone. The lower water-bearing zone, considered as the interval from approximately 42 ft to 72 ft into bedrock, has significantly lower permeability as evidenced by few fractures, high RQD values, and low groundwater recharge as noted during borehole geophysical testing, packer testing, hydraulic conductivity testing, and sampling. A defined hydraulic barrier or aquiclude was not observed between the upper water-bearing zone and the lower water-bearing zone. The connection between the upper and lower water-bearing zones was also evidenced by similarities in the occurrence and concentrations of contaminants and ionic water chemistry, as described in Section 4-7 – Piper and Stiff Diagrams.

In general, bedrock wells yield low quantities of groundwater, however, localized zones of fractures and faulting could yield greater quantities of groundwater. Interconnectivity of open features between monitoring well locations was not readily evident. However, artesian conditions observed at wells MW-09D and MW-12D demonstrates that groundwater within these wells occurs under piezometric conditions due to fractures receiving recharge from higher elevations in the bedrock.

Excluding wells MW-09D and MW-12D, the depth to groundwater ranges from 0.8 ft bgs measured in MW-06S in February 2018, to 24 ft bgs measured in MW-01S in January 2017 (**Table 3-2**). **Figures 3-6** and **3-7** show the groundwater elevation contours using January 2017 data for the upper and lower water-bearing zones, respectively. **Figures 3-8** and **3-9** show the groundwater elevation contours using February 2018 data for the upper and lower water-bearing zones, respectively. All figures show a

high point at MW-01/MW-01A which results in an apparent north-south groundwater divide on the landfill with flow to the east, south, and west.

Comparison of groundwater elevations between paired shallow and deep wells indicates a downward hydraulic head in most of the wells at vertical hydraulic gradients ranging from 0.011 ft/ft to 0.301 ft/ft (**Table 3-3**). Based on the February 2018 groundwater contours presented in **Figures 3-8** and **3-9**, the horizontal hydraulic gradient to the west of the landfill was approximately 0.15 ft/ft to the northwest in both the upper and lower water-bearing zones. The maximum horizontal hydraulic gradient to the east of the landfill was approximately 0.12 ft/ft in the upper water-bearing zone and 0.02 ft/ft in the lower water-bearing zone. The hydraulic gradient flattens out significantly to the south.

4.0 ANALYTICAL RESULTS

The following sections discuss the results of the soil, groundwater, surface water, sediment, and leachate sample analyses.

The laboratory provided deliverable data packages that were equivalent to NYSDEC Analytical Services Protocol Category B requirements. Data Usability Summary Reports (DUSR) were prepared following the guidelines provided in DER-10 Appendix 2B - *Guidance for Data Deliverables and the Development of Data Usability Summary Reports* (NYSDEC, May 2010) and are located in **Appendix L** on compact disk. Data summary tables, Form I and Form Ie [tentatively identified compounds (TICs)] are provided in each DUSR and include the reporting limit (RL) for each non-detected compound.

Data validation was performed following the guidelines in the following USEPA Region II documents, along with the method and laboratory's standard operating procedures (SOPs) for PFASs:

- *Validating Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry*, SW-846 Method 8260B & 8260C, SOP HW-24, Rev. 4, October 2014;
- *Validating Semivolatile Organic Compounds by Gas Chromatography/Mass Spectrometry*, SW-846 Method 8270D, SOP HW-22, Rev. 4, August 2008;
- *Validating Pesticides By Gas Chromatograph*, SW-846 Method 8081B, SOP HW-44, Rev. 1, October 2006
- *Polychlorinated Biphenyl (PCB) Aroclor Data Validation*, SOP HW-37, Rev. 3, May 2013;
- *Inductively Coupled Plasma - Atomic Emission Spectroscopy (ICP-AES) Data Validation*, SOP HW-2a, Rev. 15, December 2012; and
- *Mercury and Cyanide Data Validation*, SOP HW-2c, Rev. 15, December 2012.

For Phase I samples, during the course of laboratory analysis the NYSDEC requested that the list of PFAS analytes be increased from six to 12. The surface water and groundwater samples were initially analyzed using a direct-injection technique, which identifies only six PFAS. Because the surface water samples were outside of holding time when the increase in the compound list was request was made, the surface water samples were recollected and analyzed for all 12 PFASs. The groundwater samples were still within the extraction holding time, so the samples were re-extracted and re-analyzed for the 12 PFAS analytes. As a result, two sets of analytical results are presented for the Phase I surface water and groundwater samples in the analytical tables. The soil and sediments samples did not require re-extraction or reanalysis because the 12 PFAS analytes were reported from the initial analysis. The figures presenting the analytical results, as discussed below, show the higher concentration of the two analyses. The Phase II list of PFAS analytes requested by the NYSDEC was increased to 21 compounds.

4.1 Standards, Criteria and Guidance Values

For each medium, detected concentrations of individual contaminants were compared to applicable standards, criteria, and guidance values (SCGs). The analytical results presented in the tables accompanying this section list only those parameters that were detected at least once in a sample. The results presented in the accompanying figures present only those parameters that exceeded the SCGs. The SCGs used for the individual media are identified below.

4.1.1 Soil

Two sources of soil SCGs are considered appropriate for this Site: 6 NYCRR Part 375, *Environmental Remediation Programs*, Subpart 375-6, *Remedial Program Soil Cleanup Objectives*, effective December 14, 2006; and NYSDEC Commissioner Policy (CP), CP-51/*Soil Cleanup Guidance*, effective October 21, 2010. Hereafter, mention of Part 375 includes incorporation of CP-51 supplemental soil cleanup objectives (SCOs). The soil analytical results are compared to Part 375 unrestricted use and protection of groundwater SCOs. Part 375 does not include SCOs for PFAS. However, under New York State Environmental Conservation Law, the State has established a preliminary residential SCO of 140 µg/kg for PFOA and PFOS.

4.1.2 Groundwater

The SCGs for groundwater are the Class GA standards and guidance values presented in Technical & Operational Guidance Series (1.1.1) *Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations* (TOGS 1.1.1), (NYSDEC, June 1998), including the January 1999 Errata Sheet, April 2000 Addendum, and June 2004 Addendum. PFOA and PFOS were compared to the USEPA Drinking Water Health Advisory (USEPA, May 2016) of 70 ng/L (individually or combined).

4.1.3 Surface Water and Leachate

Surface water and leachate results were compared to the NYSDEC TOGS 1.1.1 ambient water quality standards and guidance values for a Class A stream. Although Jones Hollow Brook is identified as a Class C stream, Class A criteria was selected because the historical well survey indicated that some nearby residences use spring water and/or shallow groundwater as a drinking water source. The results for PFASs were compared to the USEPA Drinking Water Health Advisory for PFOA and PFOS of 70 ng/L (individually or combined).

4.1.4 Sediment

Sediment results were compared to *Screening and Assessment of Contaminated Sediments*, (NYSDEC, June 2014) Freshwater Sediment Guidance Values for Classes B and C sediments [based on 2% total organic carbon (TOC)]. For PFOA/PFOS comparison of results in this report, the same concentration of 140 µg/kg for PFOA and PFOS that was used for soil was also used for sediment SCGs.

4.2 Soil Analytical Results

During the Phase I SC investigation, one soil sample was collected from each deep well boring (MW-06D, MW-07D, and MW-08D). A duplicate sample was collected from MW-07D. The soil analytical results are presented in **Table 4-1** and **Figure 4-1**. Soil samples for laboratory analyses were not selected during Phase II.

The soil VOC analytical results indicate that acetone was detected in MW-08D at a concentration of 0.06 mg/kg, which is just above the 0.05 milligrams per kilogram (mg/kg) criteria for unrestricted use and protection of groundwater. No other VOCs were detected in the soil samples.

The soil SVOC analytical results indicate that several compounds (i.e., polycyclic aromatic hydrocarbons [PAHs]) were detected above the method detection limit (MDL). However, no SVOC concentrations exceeded unrestricted use or protection of groundwater criteria.

The soil pesticide and PCB analytical results indicate that several pesticides were detected above the MDL. However, no pesticide concentrations exceeded unrestricted use or protection of groundwater criteria. PCBs were not detected in the soil samples.

The soil metals analytical results indicate that every metal analyzed for except antimony, silver and thallium was detected above the MDL. Aluminum (15,800 mg/kg to 20,000 mg/kg), boron (1.8 mg/kg to 2.4 mg/kg), and iron (29,400 mg/kg to 38,100 mg/kg) were detected above the unrestricted use criterion of 1,000 mg/kg, 0.5 mg/kg, and 2,000 mg/kg respectively, in all three soil samples. In addition, nickel was detected slightly above the unrestricted use SCO of 30 mg/kg in MW-07D and MW-08D (34.4 mg/kg to 35.3 mg/kg) and manganese was detected above the unrestricted use SCO of 1,600 mg/kg and the protection of groundwater use SCO of 2,000 mg/kg in MW-06D (3,550 mg/kg).

PFOA and PFOS were detected in the soil samples. However, the concentrations either individually (0.42 µg/kg to 9.5 µg/kg) or combined (0.48 µg/kg to 10.1 µg/kg) were an order of magnitude below the PFOS/PFOA SCO of 140 µg/kg in the soil samples.

4.3 Groundwater Analytical Results

Groundwater samples were collected from five existing and five newly installed monitoring wells during Phase I and from 21 monitoring wells (10 existing and 11 new) during Phase II. The groundwater analytical results are presented in **Table 4-2A**, **Table 4-2B**, and **Figure 4-2**.

Two VOCs were detected at a concentration above the groundwater criteria during Phase I. Benzene was detected in the sample from MW-03 at concentration of 1.5 µg/L, which is just above the 1 µg/L criterion. Acetone was detected in the sample from MW-07S at concentration of 360 µg/L, which is above the 50 µg/L criterion. Other VOCs detected below criteria include 1,1-dichloroethane, carbon disulfide, chlorobenzene, and chloroethane. Groundwater samples were not collected for VOC analyses during Phase II.

Phase I SVOC analytical results indicate that only dimethylphthalate was detected above the MDL. The concentration of dimethylphthalate (0.62 µg/L), detected only in MW-03, was almost two orders of magnitude below the 50 µg/L criterion. Groundwater samples were not collected for SVOC analysis during Phase II. However, 1,4-dioxane was analyzed by Method 8270D selected ion monitoring (SIM) during Phase II from monitoring wells MW-01, MW-01A, MW-03, MW-04, MW-12S and MW-12D. 1,4-Dioxane was detected in two monitoring well samples, MW-03 (6.9 µg/L) and MW-04 (4.5 µg/L). NYSDEC currently does not have an SCG for 1,4-dioxane in groundwater.

Pesticides (4,4'-DDD, alpha-BHC, and dieldrin) were detected in only one sample, MW-08S. Dieldrin was detected at a concentration of 0.027 µg/L, which is above the groundwater criterion of 0.004 µg/L. The concentration of 4,4'-DDD (0.014 µg/L) was an order of magnitude below the standards (0.3 µg/L), and alpha-BHC (0.0099 µg/L) was just below the standard (0.01 µg/L). Groundwater samples were not collected for pesticide analysis during Phase II.

PCBs were not detected above the MDL in the groundwater samples collected in Phase I. Groundwater samples were not collected for PCB analysis during Phase II.

The metals arsenic (87 µg/L), iron (380 µg/L to 40,800 µg/L), manganese (380 µg/L to 24,500 µg/L), sodium (25,200 µg/L to 97,000 µg/L) and thallium (10 µg/L to 17 µg/L) were detected above the groundwater criteria in all of the Phase I monitoring wells except MW-01. Other metals detected above the MDL, but below standard or guidance values include barium, boron, chromium, hexavalent chromium (chromium VI), copper, lead, magnesium, nickel, silver, and zinc. Aluminum, calcium, cobalt, potassium, and vanadium were also detected, but have no standard or guidance value.

The Phase II groundwater data, which includes all 21 wells, indicates that arsenic (86 µg/L), barium (2,100 µg/L), iron (310 µg/L to 39,900 µg/L), manganese (310 µg/L to 21,100 µg/L) and/or sodium (23,400 µg/L to 41,000 µg/L) were detected above Class GA groundwater criteria in 16 of 21 samples. There were no exceedances for metals in MW-01, MW-01A, MW-11D, MW-12S, and MW-13O.

Dissolved metals were collected from four monitoring wells during Phase II: MW-08D, MW-08S, MW-09D, and MW-09S. Dissolved metals were only to be analyzed if turbidity measurements [i.e., nephelometric turbidity units (NTU)] after purging were greater than 50 NTU. All turbidity measurements were below 50 NTU. However, the laboratory inadvertently performed the filtered metals analyses on these samples. The concentrations of dissolved iron (340 µg/L) and dissolved manganese (380 µg/L) in MW-08D; dissolved barium (2,000 µg/L), dissolved manganese (20,000 µg/L) and dissolved sodium (26,400 µg/L) in MW-08S; dissolved manganese (750 µg/L) in MW-09D; and dissolved sodium (32,700 µg/L) in MW-09S were detected above Class GA groundwater criteria. For those metals, none exceeded criteria in the dissolved fraction that did not exceed criteria in the total fraction. For metals that did exceed criteria, all dissolved metal concentrations were lower than the total concentration with the exception of dissolved sodium in MW-09S where the dissolved sodium concentration (32,700 µg/L) was 1,400 µg/L higher (4%) than the total sodium concentration (31,300 µg/L).

The groundwater PFAS analytical results (**Table 4-2B**) indicate that 16 of the 21 PFAS compounds were detected at least once in the groundwater samples. The USEPA health advisory level (70 ng/L) applies only to PFOA, PFOS, and combined total of PFOA and PFOS. The groundwater samples from MW-03, MW-04, MW-07S, MW-07D, MW-08S, MW-08D, MW-09S, MW-10S, and MW-10D exceeded the criteria. PFOA concentrations ranged from 0.8 ng/L to 1,800 ng/L. PFOS concentrations ranged from 2 ng/L to 130 ng/L. Total PFOA and PFOS concentrations ranged from 0.8 ng/L to 1,805 ng/L. It is noted that PFOA and PFOS were detected in well MW-13O, which is installed at a distance downgradient of the landfill. This was the only Phase II SC location that had a sufficient thickness of saturated overburden that warranted the installation of an overburden well.

The highest combined PFOA and PFOS concentrations in Phase I were detected in MW-07D (1,605 ng/L), MW-03 (1,330 ng/L), MW-04 (940 ng/L), and MW-08D (930 ng/L). The highest combined PFOA and PFOS concentrations in Phase II were detected in MW-07D (1,805 ng/L), MW-03 (1,220 ng/L), MW-10S (835 ng/L), MW-08D (807 ng/L), and MW-04 (790 ng/L).

4.4 Surface Water Analytical Results

Surface water samples were collected from six locations in Phase I (SW-01 through SW-06) for target compound list (TCL) VOCs, TCL SVOCs, TCL pesticides, TCL PCBs, target analyte list (TAL) total metals (plus boron), PFASs, and the landfill leachate parameters of color, total cyanide, hexavalent chromium, total dissolved solids (TDS), chemical oxygen demand (COD), biochemical oxygen demand-five day (BOD₅), total organic carbon (TOC), alkalinity, bromide, chloride, sulfate, hardness, total Kjeldahl nitrogen (TKN), ammonia as nitrogen, nitrate and total recoverable phenolics. Surface water samples were collected from ten locations in Phase II (SW-01 and SW-03 through SW-11). SW-01 and SW-03 through SW-06 were analyzed for TCL VOCs, TCL SVOCs, TCL pesticides, TCL PCBs, TAL total metals (plus boron), PFAS and the landfill leachate parameters listed above. SW-07 through SW-11 were only analyzed for PFAS and the landfill leachate parameters. The surface water analytical results are presented in **Table 4-3A, Table 4-3B, Table 4-3C, and Figure 4-3.**

VOCs (acetone, methyl tert-butyl ether and methylcyclohexane) and SVOCs (PAHs) were detected above the MDL in the surface water samples, but none were detected at concentrations above the Class A stream criteria.

PCBs were not detected in the surface water samples. The pesticides 4,4'-DDT, gamma-BHC (lindane) and gamma-chlordane were detected above the MDL in the surface water samples. Gamma-BHC (lindane) and gamma-chlordane exceeded Class A stream criteria at SW-06 (0.012 µg/L vs. 0.008 µg/L standard) and SW-04 (0.011 µg/L vs. 0.00002 µg/L standard), respectively in the Phase I samples. The pesticide 4,4'-DDT exceeded Class A stream criterion of 0.00001 µg/L at SW-05 (0.013 µg/L) in the Phase II sample.

The Phase I surface water metals analytical results indicates that aluminum, copper, iron and/or manganese were detected above Class A stream criteria one or more sample locations. Aluminum exceeded the criterion (100 µg/L) in SW-02 (590 µg/L); copper exceeded the calculated Class A stream criterion (5.8 µg/L) in SW-03 (7.9 µg/L); iron was above Class A stream criterion (300 µg/L) in SW-02, SW-03, and SW-04 (310 µg/L to 1,500 µg/L); and manganese was above criterion (300 µg/L) in SW-02, SW-03, and SW-05 (350 µg/L to 2,900 µg/L).

The Phase II surface water metals analytical results indicates that aluminum was detected above Class A stream criterion (100 µg/L) in SW-03, SW-04, SW-05, and SW-06 (140 µg/L to 1,600 µg/L); iron was above Class A stream criterion (300 µg/L) in SW-03, SW-05, and SW-06 (2,100 µg/L to 4,400 µg/L); lead exceeded the calculated Class A stream criterion (2 µg/L) in SW-03 (3 µg/L); and manganese was above criterion (300 µg/L) in SW-05 and SW-06 (both at 2,600 µg/L). Other metals detected above

the MDL but did not exceed Class A standard or guidance values in the Phase I or Phase II surface water samples include barium, boron, chromium VI, cobalt, magnesium, nickel, vanadium, and zinc.

The Phase I wet chemistry analytical results indicate ammonia (as nitrogen) was detected above the Class A stream criterion (2 mg/L) in SW-05 (95 mg/L). In the Phase II samples, ammonia (as nitrogen) exceeded the Class A stream criterion in SW-05 (5.1 mg/L) and SW-06 (3.7 mg/L). The proximity of these locations to the landfill and the decreased concentrations further downstream suggest the landfill is the source of the elevated ammonia.

The Phase I PFAS analytical results (**Table 4-3B**) show that eight of the 12 PFAS compounds were detected in surface water samples. Criteria are available only for PFOA, PFOS, and combined PFOA and PFOS. PFOA concentrations ranged from 3.6 ng/L to 2,000 ng/L; PFOS concentrations ranged from 1.5 ng/L to 48 ng/L; and total PFOA and PFOS concentrations ranged from 3.6 ng/L to 2,048 ng/L. The surface water samples from SW-05 and SW-06 exceeded the criteria for PFOA and combined PFOA and PFOS. The combined PFOA and PFOS concentrations were 2,048 ng/L (SW-05) and 165 ng/L (SW-06).

Review of the Phase II PFAS analytical results shows that 13 of the 21 PFAS compounds were detected. PFOA concentrations ranged from 3.1 ng/L to 1,700 ng/L; PFOS concentrations ranged from 0.47 ng/L to 41 ng/L; and total PFOA and PFOS concentrations ranged from 4.12 ng/L to 1,741 ng/L. The surface water samples from SW-05 and SW-06 again exceeded the criteria for PFOA and combined PFOA and PFOS. The combined PFOA and PFOS concentrations were 1,741 ng/L (SW-05) and 1,134 ng/L (SW-06). The Phase II PFOA and PFOS concentrations in SW-06 increased by almost an order of magnitude compared to the Phase I results.

4.5 Sediment Analytical Results

Sediment samples were collected from the six surface water locations during Phase I only. The analytical results are presented in **Table 4-4** and **Figure 4-4**. In **Table 4-4**, the results are compared to both Class B and Class C criteria.

VOC, SVOC, pesticide, PCB and metal analytical results indicate that only the VOCs chloroform, tetrachloroethene, and toluene, the pesticides 4,4'-DDE and delta-BHC, and metals were detected in the sediment samples. None of the VOCs or pesticides concentrations exceeded the Class B or C criteria. Each sediment sample location had at least one metal (arsenic, copper, lead, nickel, or zinc) that exceeded the Class B criteria. Only nickel in SED-03 and arsenic in SED-05 exceeded Class C criteria.

Review of the PFAS results shows that ten PFASs were detected at least once in the sediment samples. PFOA concentrations ranged from 0.24 µg/kg to 14 µg/kg; PFOS concentrations ranged from 0.31 µg/kg to 33 µg/kg; and total PFOA and PFOS concentrations ranged from 0.35 µg/kg to 35 µg/kg. No PFOA, PFOS, or total PFOA and PFOS were detected above the 140 µg/kg criterion.

4.6 Leachate Seep Analytical Results

Leachate samples were collected on December 14, 2016, January 24, 2017 and February 23, 2018 from the LC-01 location. The December 14, 2016 and February 23, 2018 samples were analyzed for VOCs, SVOCs, pesticides, PCBs, metals, PFASs, and landfill leachate parameters. The sample collected on January 24, 2017 was only analyzed for 12 PFASs. The analytical results, presented in **Table 4-3A**, **Table 4-3B**, **Table 4-3C**, and in **Figure 4-3**, are compared to TOGS 1.1.1 Class A criteria and the USEPA Drinking Water Health Advisory limits.

The VOC analytical results indicate that benzene was detected at 1.5 µg/L, which is just above the 1 µg/L criterion. The other detected VOCs (i.e., 1,4-dichlorobenzene, chlorobenzene, methyl tert-butyl ether, and methylene chloride) were not at concentrations above the criteria.

Benzaldehyde was the only SVOC detected, but there is no standard or guidance value. The only pesticide detected, 4,4'-DDD (0.015 µg/L), exceeded the criterion of 0.00001 µg/L in the February 23, 2018 sample. PCBs were not detected in the leachate samples.

Ten metals (aluminum, arsenic, barium, cobalt, copper, iron, lead, manganese, mercury, selenium, and vanadium) were detected above criteria. Several of these metals were detected at concentrations several orders of magnitude above the criteria. Metals that were detected above the MDL but did not exceed standard or guidance values include beryllium, boron, chromium, chromium VI, magnesium, nickel, and zinc.

The December 14, 2016 results show that each of the six PFASs analyzed for were detected. The January 24, 2017 PFAS results show that seven of the 12 PFASs analyzed for were detected and the February 24, 2018 PFAS results show that 14 of the 21 PFASs analyzed for were detected. PFOA concentrations ranged from 4,900 ng/L to 7,800 ng/L; PFOS concentrations ranged from 81 ng/L to 91 ng/L; and total PFOA and PFOS concentrations ranged from 4,981 ng/L to 7,891 ng/L. The individual PFOA, PFOS, and combined PFOA and PFOS criterion (70 ng/L) were exceeded in every sample.

The leachate seep samples were analyzed for the following leachate parameters: alkalinity, ammonia, BOD₅, bromide, chloride, COD, color, cyanide, hardness, nitrate-nitrogen, total recoverable phenolics, sulfate, TDS, TKN, and TOC. In several instances, the leachate had the highest results

followed by SW-05 and SW-06, which are located immediately downstream of the leachate seep. Concentrations drop significantly at distances farther away from the landfill.

4.7 Piper and Stiff Diagrams

Piper (1944) and Stiff (1951) diagrams of the water chemistry from the groundwater samples and surface water samples are provided in **Appendix M**. Using the 2018 data, the groundwater is generally of the calcium-bicarbonate (Ca-HCO_3)-type based on the Piper plot and Stiff diagrams. The Ca-HCO_3 -type waters represent recharge waters with short residence times. Ca-HCO_3 -type of water is likely caused by rainfall recharge processes associated with low electrical conductivity (EC) values. EC values ranged from 0.49 to 523 millisiemens per centimeter (mS/cm) in the upper water-bearing zone and from 0.048 to 0.28 mS/cm in the lower water-bearing zone. MW-07D and MW-10D located on the eastern side of the landfill are borderline calcium-sodium-bicarbonate (Ca-Na-HCO_3)-type. It is notable that the water types and Stiff diagram patterns are fairly similar for the upper and lower water-bearing zones, which supports the conclusion an aquiclude does not separate the two water-bearing zones.

The surface water exhibits two distinct water types. The leachate and surface water downstream of the leachate seep is of the Ca-HCO_3 -type based on the Piper plots. Surface water at the south side of the landfill is of the sodium-chloride (Na-Cl)-type.

In general, the Stiff diagrams show higher anion and cation concentrations in groundwater and surface water closer to the landfill. For example, the patterns of the Stiff diagrams for the wells and surface waters with elevated PFAS concentrations are similar to the patterns for the leachate. Conversely, Stiff patterns for wells and surface waters located a distance from the landfill and leachate seep show contrastingly different patterns.

4.8 Conceptual Site Model

A conceptual site model is used to understand Site conditions, contaminants of concern, sources of contamination, affected media (e.g., ground water, surface water), and transport and exposure pathways that could potentially impact human or ecological receptors. The conceptual site model synthesizes what is known to date into a snapshot that communicates the Site physical setting and contaminants of concern discharge and exposure mechanisms.

4.8.1 Description of Site Setting and Contaminant Source and Migration

The Site is located in a rural area in eastern New York State. The area is characterized by hilly topography with elevations ranging from 800 ft to 2,000 ft MSL. Land use is primarily farms and residences in the valleys and forests in the uplands. The Site is in the Taconic Mountain physiographic province and is underlain by bedrock that has been folded and faulted. Bedrock underlying the Site consists of phyllite with quartz veining and moderate to high angle bedding that dips to the southeast. Fractures occur primarily along the bedding planes, although some high angle (e.g., near vertical) fracturing is present. The bedrock is overlain by glacial till composed of sand, gravel, silt, and clay. Drilling observations at the Site indicate the thickness of the glacial till ranges from approximately 3 ft to 34 ft.

The predominant groundwater-bearing zone at the Site is the upper water-bearing zone consisting of overburden and shallow, weathered bedrock. Groundwater flow in bedrock is primarily through a network of interconnecting bedding/foliation planes, joints, and fractures. While phyllite has a low permeability, the presence of extensive fracturing in the upper bedrock results in a significant secondary permeability. Permeability decreases with depth in the bedrock due to the decreased frequency of fractures. There are no confining layers between the upper and the lower water-bearing zones. Groundwater level monitoring for both the upper and lower water-bearing zones show a high in the groundwater surface on the north side of the Site with flow to the east and west. Groundwater recharge occurs via infiltration through the overburden and into the fractured shallow bedrock. Bedrock structure does not appear to dictate groundwater flow direction. Rather, groundwater flow appears to follow the topography. However, the presence of artesian conditions in some Site wells suggests that those wells intersected fractures at depth that receive recharge from higher elevations.

The main feature at the Site is an approximately eight-acre closed landfill with a low permeability cover and no liner. Elevations of the landfill cover range from 1,250 ft to 1,350 ft MSL. Runoff flows radially from the landfill cover into a perimeter trench at the toe of the slope and then to a discharge point on the western side of the landfill. This flows into an unnamed west tributary to Jones Hollow Brook and then north to the Little Hoosic River. A leachate seep at the toe of the landfill also contributes flow to the discharge point.

During its operation, the landfill reportedly received solid waste containing PFAS from Taconic Plastics. In June 2016, sampling by the NYSDEC detected PFAS in leachate and groundwater samples collected from the Site. The site was declared a Potential State Superfund Site in August 2016. Subsequent SC activities have confirmed the presence of PFAS in the groundwater in both the upper and

lower water-bearing zones at concentrations above USEPA health advisory levels. PFAS impacts are highest in wells located near the landfill and dissipate with distance from the landfill. The distribution of PFAS impacts is consistent with the groundwater head observations, which show an apparent north-south divide at the landfill. PFAS impacts above criteria have been delineated to the north and south sides of the landfill. PFAS impacts to the southwest (cross gradient) and east (downgradient) of the landfill have not been delineated.

Leachate and surface water samples collected on-site and immediately downstream show elevated levels of PFAS and some metals, however, concentrations decrease to below criteria levels in surface water samples collected farther downstream.

Based on the findings of the SC, primary contaminants of concern consist of the following:

groundwater: PFAS and metals;

leachate: PFAS and metals;

surface water (on-site): PFAS and metals; and

sediment: metals.

4.8.2 Description of Contaminant Migration Pathways and Potential Receptors

The landfill has a low permeability cover and it is assumed that limited precipitation infiltrates through the cover system into the landfill. It is also assumed that because the landfill does not have a liner, groundwater is able to migrate up into the landfill. Contaminants of concern within the landfill are released into the groundwater and leachate. The impacted groundwater spreads following the direction of the shallow and deep groundwater gradients and through fractures in the rock. Leachate discharges through a seep on the western side of the landfill and into the unnamed west tributary of Jones Hollow Brook. As a result, leachate impacts are observed in surface water and sediment immediately downstream of the landfill.

Based upon the types of chemicals present at the Site and the media in which the chemicals are present, the following potential human exposure routes for contaminants of concern have been identified for the Site:

- dermal contact and ingestion of groundwater, inhalation of mist (e.g., through showering);
- dermal contact and ingestion of leachate and on-site surface water; and
- dermal contact with on-site sediment.

5.0 SUMMARY AND CONCLUSIONS

5.1 Summary and Conclusions

The following summary and conclusions are provided based upon the results of the SC and previous investigations.

5.1.1 General

Landfilling activities began in 1984 and ended in 1991. Installation of a low permeability cover was completed in 1996. The landfill covers approximately eight acres on the 22.47 acre property. It is suspected that some landfilled wastes may have included PFAS-containing materials from Taconic Plastics.

Investigations at the Site began with the installation of two test wells sometime prior to 1990. In 1991, additional investigations were performed in preparation for landfill closure. The 1991 landfill closure investigation included the installation of four shallow and two deep monitoring wells, and collection of subsurface soil, surface water, and groundwater samples. The deepest boring was advanced to a depth of approximately 150 ft bgs.

The Site was declared a Potential State Superfund Site in August 2016. SC activities were performed in two phases and included the installation of one overburden well, seven shallow bedrock wells and eight deeper bedrock wells. Based on the investigation findings, the Site contains up to 34 ft of glacial till consisting of sand with varying amounts of silt, clay, and gravel. The glacial till overlies phyllite bedrock, which has bedding planes, tight fractures or joints and open fractures that dip down primarily toward the southeast and east-southeast at dip angles between 20° and 80° from horizontal. The presence of occasional near-vertical dips and fractures reflects the impact of folding and faulting in the area. The upper, weathered portion of bedrock is highly fractured and permeable, but the bedrock becomes more competent and less permeable with depth. The predominant groundwater flow zone is within the upper water-bearing zone. However, there is no apparent confining layer separating this upper water-bearing zone from the lower water-bearing zone. Groundwater flows to the west and east from an apparent north-south divide at the landfill.

Because of the low permeability cover, a limited amount of precipitation is assumed to infiltrate through the cover system into the landfill. Surface water drains radially off the landfill with drainage swales directing flow to the west. A leachate seep on the western side of the landfill discharges to the

unnamed west tributary of Jones Hollow Brook, which discharges to Little Hoosic River located approximately 1.3 miles to the northwest.

5.1.2 Soil

Based upon the SC investigation, the subsurface soils investigated do not appear to have been impacted by PFASs at levels above the preliminary PFOS/PFOA health SCO. VOCs, SVOCs, pesticides, and PCBs are also not contaminants of concern in soil based upon the sampling results. Several metals (aluminum, boron, iron, manganese, and nickel), are above unrestricted use criteria.

5.1.3 Groundwater

Analytical results show that contaminants of concern in the groundwater are PFAS and metals. VOCs, SVOCs, PCBs, and pesticides are not considered contaminants of concern in groundwater based on the sampling results. The impacts most likely originate from groundwater contact with contaminated materials in the landfill. The distribution of PFAS impacts is consistent with the groundwater head observations, which show an apparent north-south divide at the landfill. Monitoring wells installed during the Phase II SC to the northwest (downgradient) of the landfill have delineated PFAS impacts above the criteria. PFAS impacts to the southwest (cross gradient) and east (downgradient) of the landfill have not been delineated.

5.1.4 Leachate Seep, Surface Water, and Sediment

The leachate seep exhibits PFAS and metals (including aluminum, arsenic, barium, cobalt, and lead) at concentrations well above standards. The leachate seep discharges directly to the surface waters of the unnamed west tributary of Jones Hollow Brook, resulting in elevated concentrations of PFAS and metals in two surface water samples collected approximately 500 ft or less downstream of the landfill. These impacts were not observed in surface water samples collected approximately one-half mile downstream of the landfill.

PFOA and PFOS were not detected above the 140 µg/kg soil criterion in the sediment samples. The sediment does show elevated metals, including arsenic, copper, and nickel, which were also detected in the leachate.

5.1.5 Piper and Stiff Diagrams

Piper and Stiff diagrams for the groundwater samples indicate the groundwater is generally of the Ca-HCO₃-type which is typically recharge water with short residence times. MW-07D and MW-10D located on the eastern side of the landfill are borderline Ca-Na-HCO₃-type.

The surface water exhibits two distinct water types. The leachate and surface water downstream of the leachate is of the Ca-HCO₃-type. Surface water at the south side of the landfill is of the Na-Cl-type. Water from the leachate seep most likely originates from groundwater beneath the landfill.

5.1.6 Contaminant Fate and Transport

The presence of elevated concentrations of PFASs and some metals detected in monitoring wells adjacent to the landfill, in the leachate seep, and downgradient surface water indicates that those contaminants are leaching from the landfill. PFASs are persistent in the environment and the reduction in PFAS concentrations in groundwater and surface water at locations more distant from the landfill is likely due to dilution rather than degradation.

5.1.7 Conceptual Site Model

The Site is located in a rural area in eastern New York State that is characterized by hilly topography where land use is primarily farms and residences in the valleys. The Site area is underlain by folded and faulted phyllite that is overlain by glacial till. The predominant groundwater-bearing zone at the Site is the upper water-bearing zone consisting of overburden and shallow, weathered bedrock. Groundwater flow in bedrock is primarily through a network of interconnecting bedding/foliation planes, joints, and fractures but overall flow appears to follow the topography. Groundwater level monitoring for both the upper and lower water-bearing zone shows a high in the groundwater surface on the north side of the Site with flow to the east and west. Permeability decreases with depth in the bedrock due to the decreased frequency of fractures and there are no confining layers between the upper water-bearing zone and the lower water-bearing zone.

The approximately eight-acre closed landfill at the Site is suspected to have received PFAS wastes from Taconic Plastics. The landfill has a low permeability cover, but no liner. Runoff flows radially from the landfill cover into a perimeter trench at the toe of the slope and then to a discharge point on the western side of the landfill. This flows into an unnamed west tributary to Jones Hollow Brook and then north to the Little Hoosic River. A leachate seep at the toe of the landfill also contributes flow to the discharge point.

Site investigations and sampling have confirmed the presence of PFAS and metals in leachate and in the groundwater in both the upper and lower water-bearing zones. PFAS impacts are highest in wells located near the landfill and dissipate with distance from the landfill. PFAS impacts have been delineated to the north and south sides of the landfill. PFAS impacts to the southwest (cross gradient) and east (downgradient) of the landfill have not been delineated.

Leachate and surface water collected on-site and immediately downstream show elevated levels of PFAS and some metals, however, concentrations decrease to below criteria levels in surface water samples collected farther downstream.

Based on the findings of the SC, primary contaminants of concern consist of the following:

- groundwater: PFAS and metals;
- leachate: PFAS and metals;
- surface water (on-site): PFAS and metals; and
- sediment: metals.

The following mechanisms for chemical transport are:

- leaching of contaminants from the landfill into groundwater and surface water;
- transport of contaminants in groundwater; and
- transport of contaminants in surface water.

The following potential human exposure routes for chemicals are:

- dermal contact and ingestion of groundwater and inhalation of mist (e.g., through showering), and
- dermal contact and ingestion of leachate and on-site surface water; and
- dermal contact with on-site sediment.

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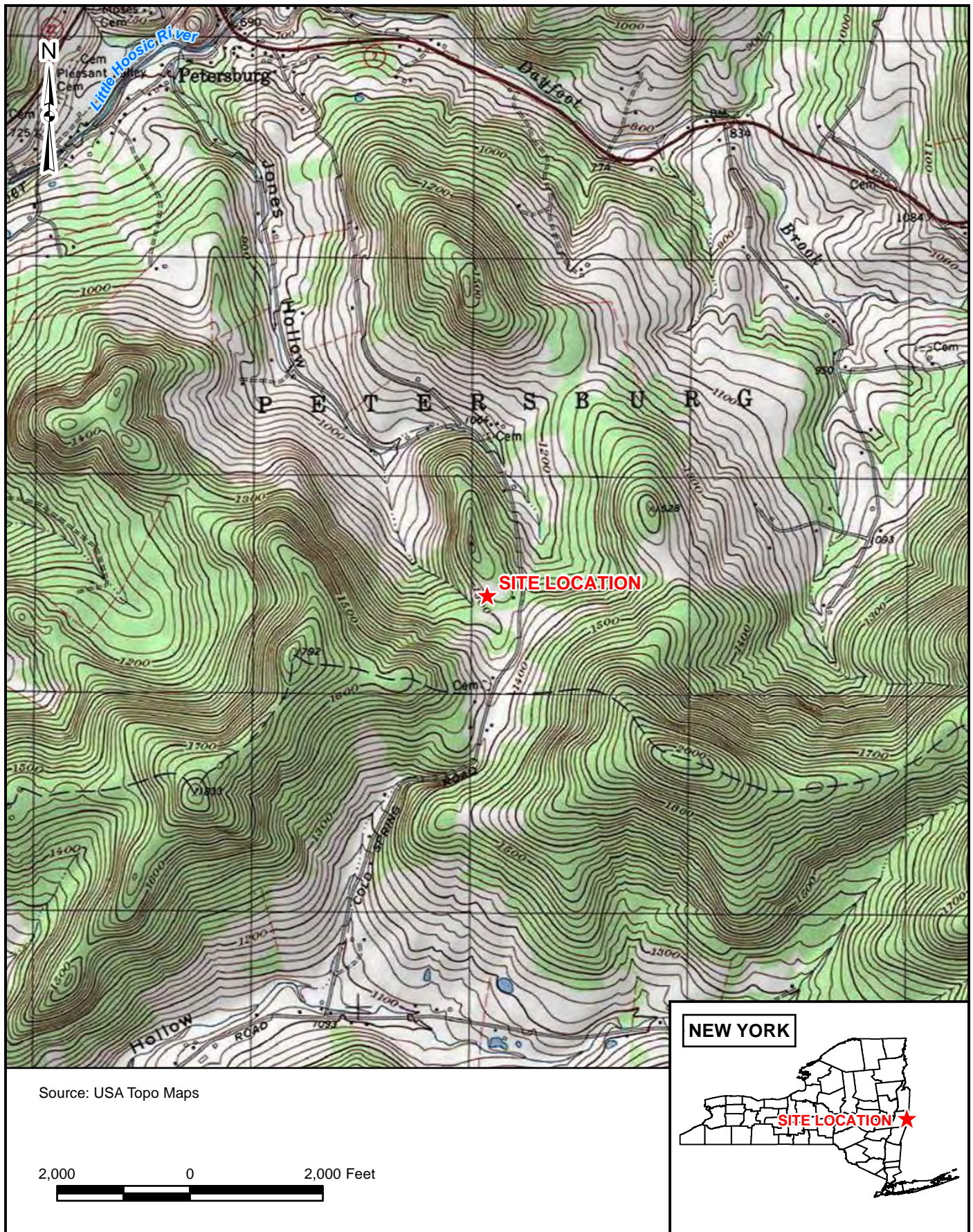
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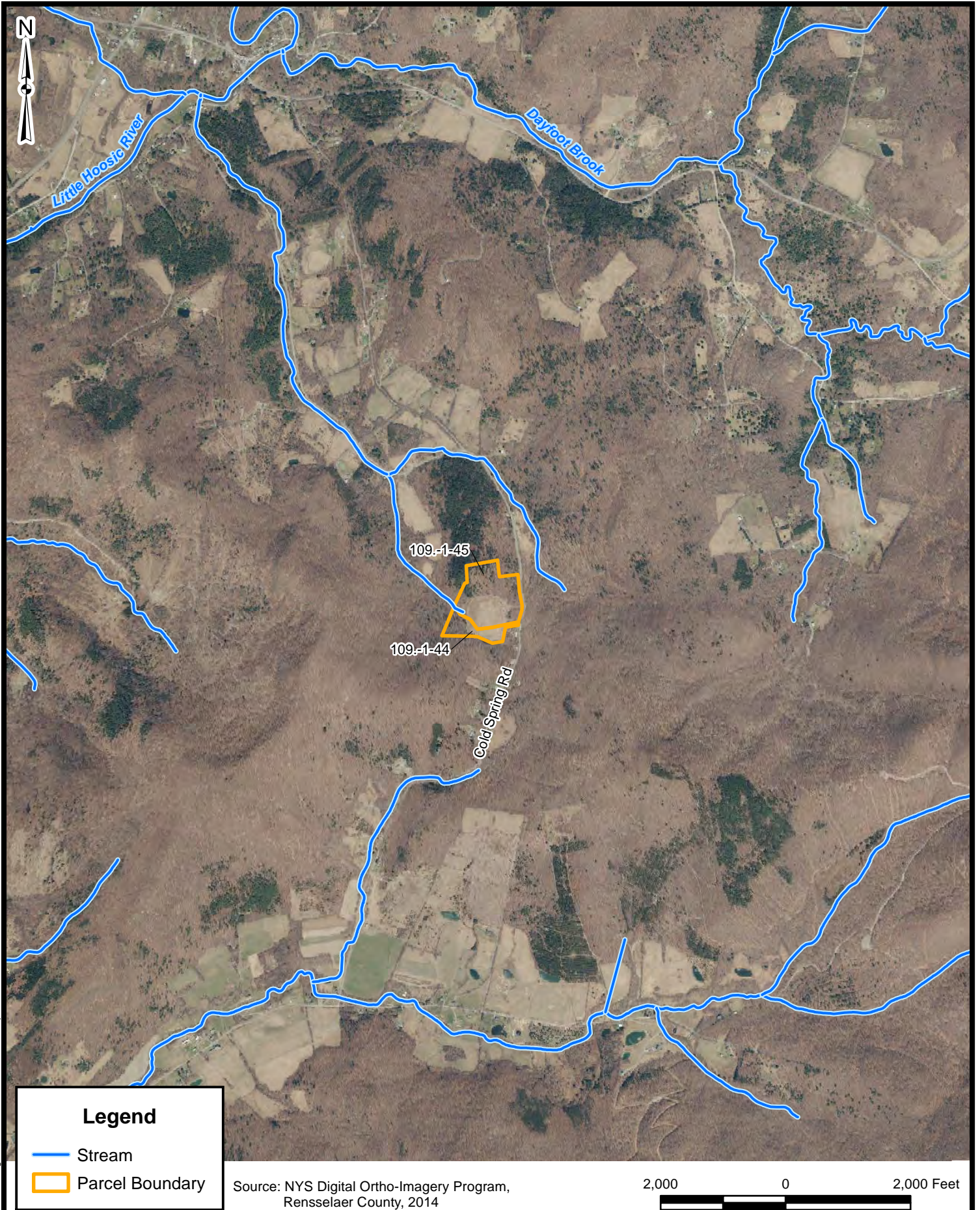
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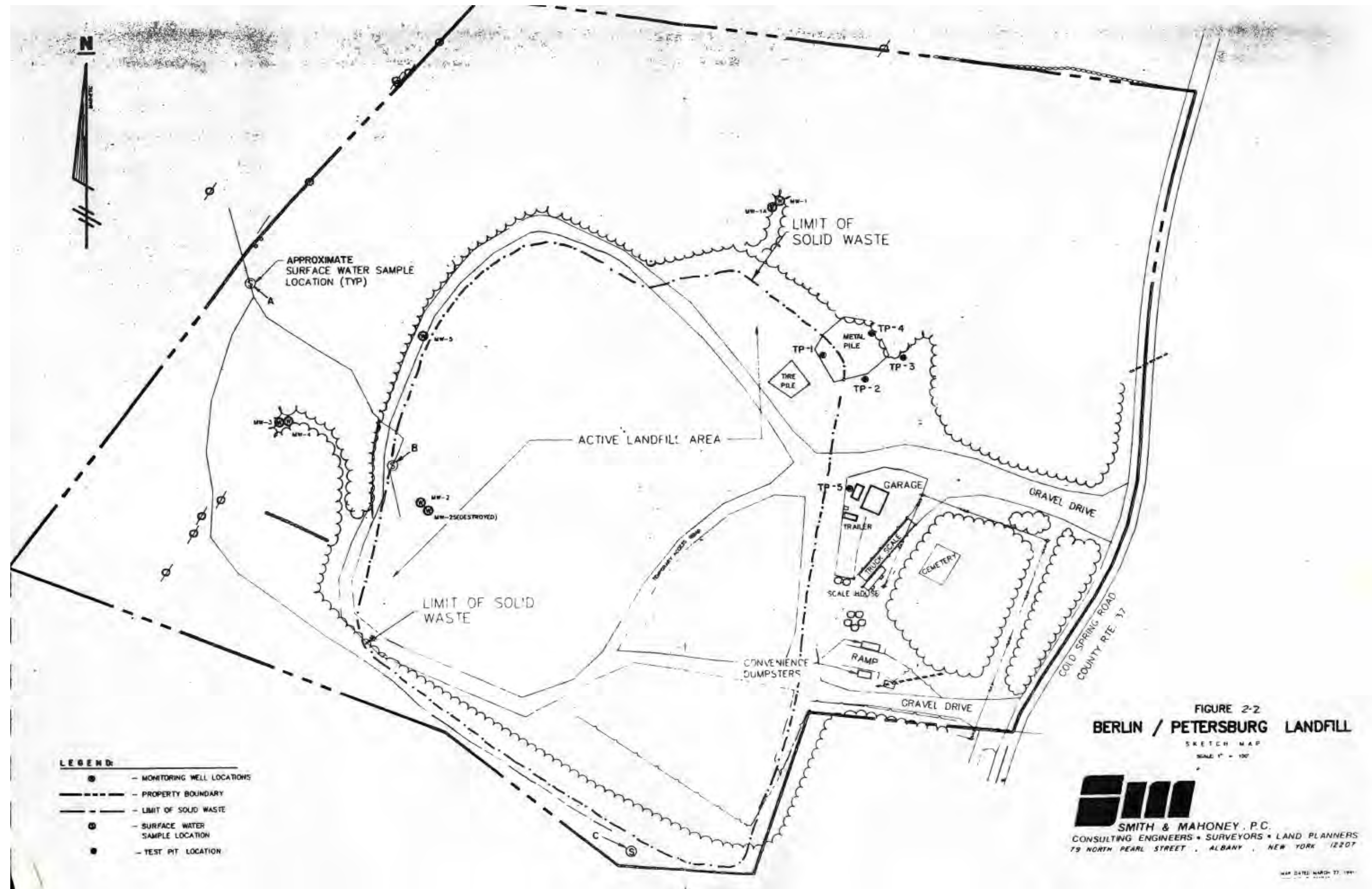
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FIGURES







Source: Final Closure Plan, July 1991,
Smith & Mahoney, P.C.

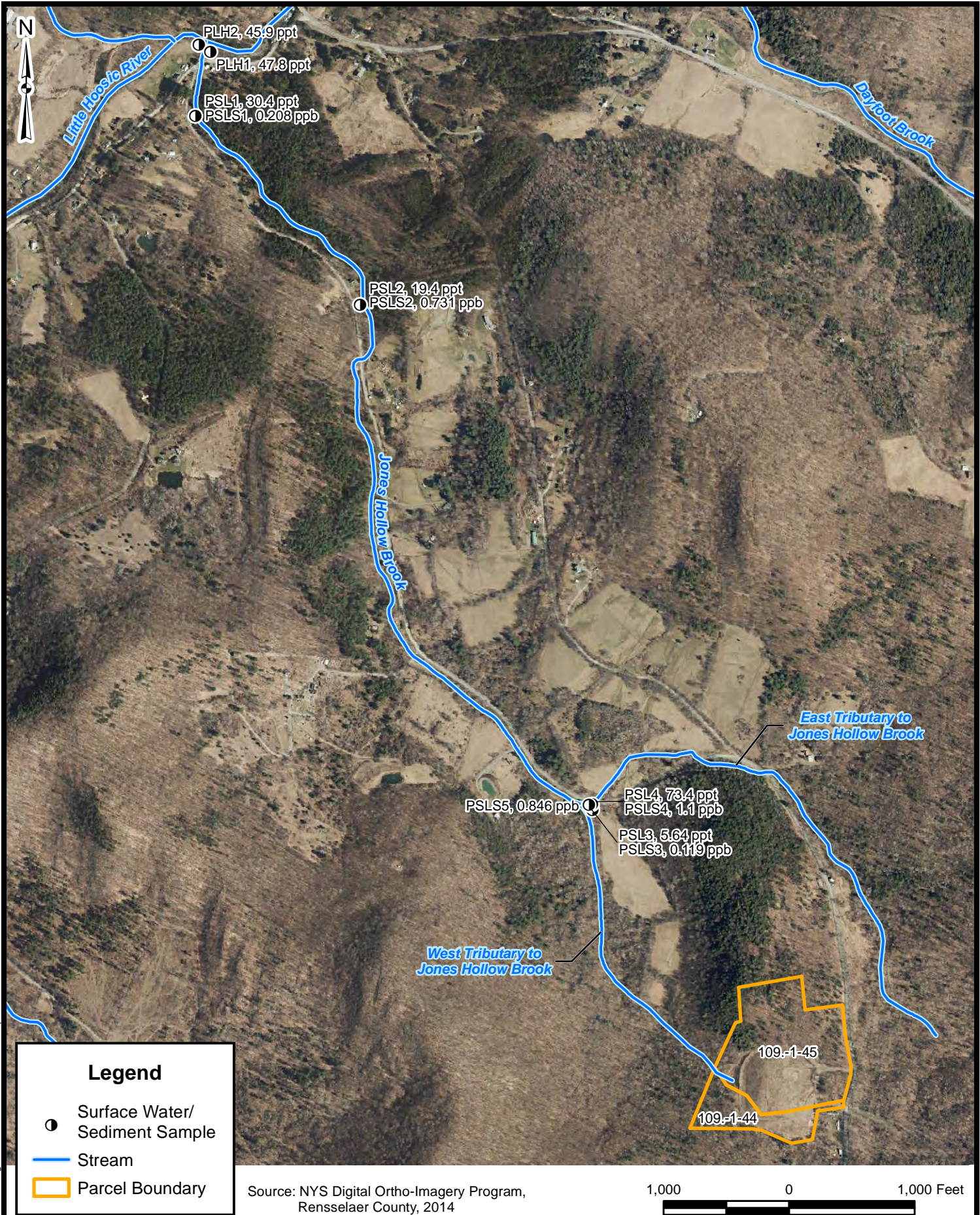
PETERSBURGH LANDFILL
HISTORICAL SITE CONDITIONS

URS

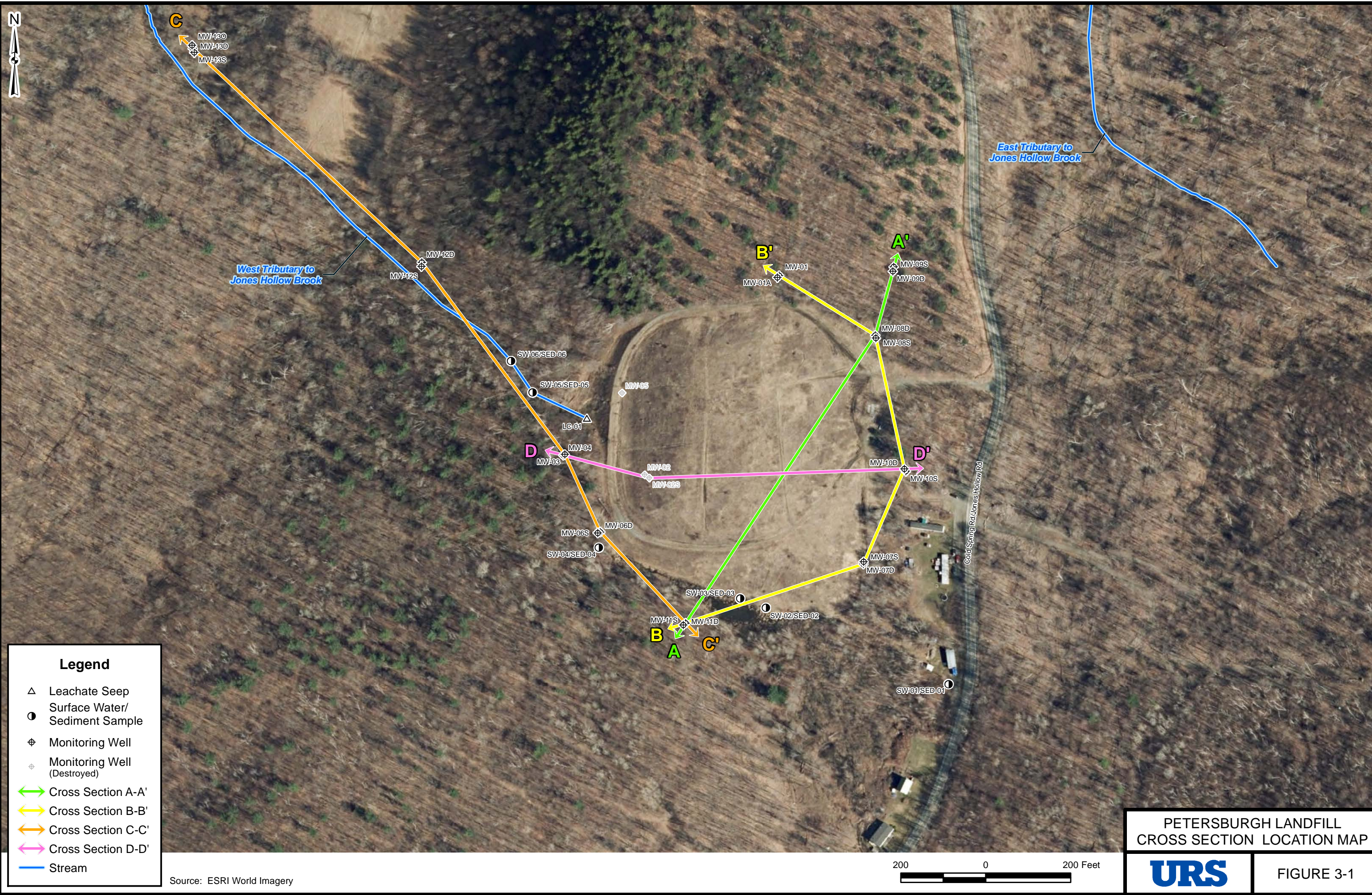
FIGURE 1-3

J:\Projects\60522130_Petersburg\900-CAD-GIS\920-GIS or Graphics\MAPS\SC REPORT\01-04 Investigation Location Map_REV.mxd 9/19/2018



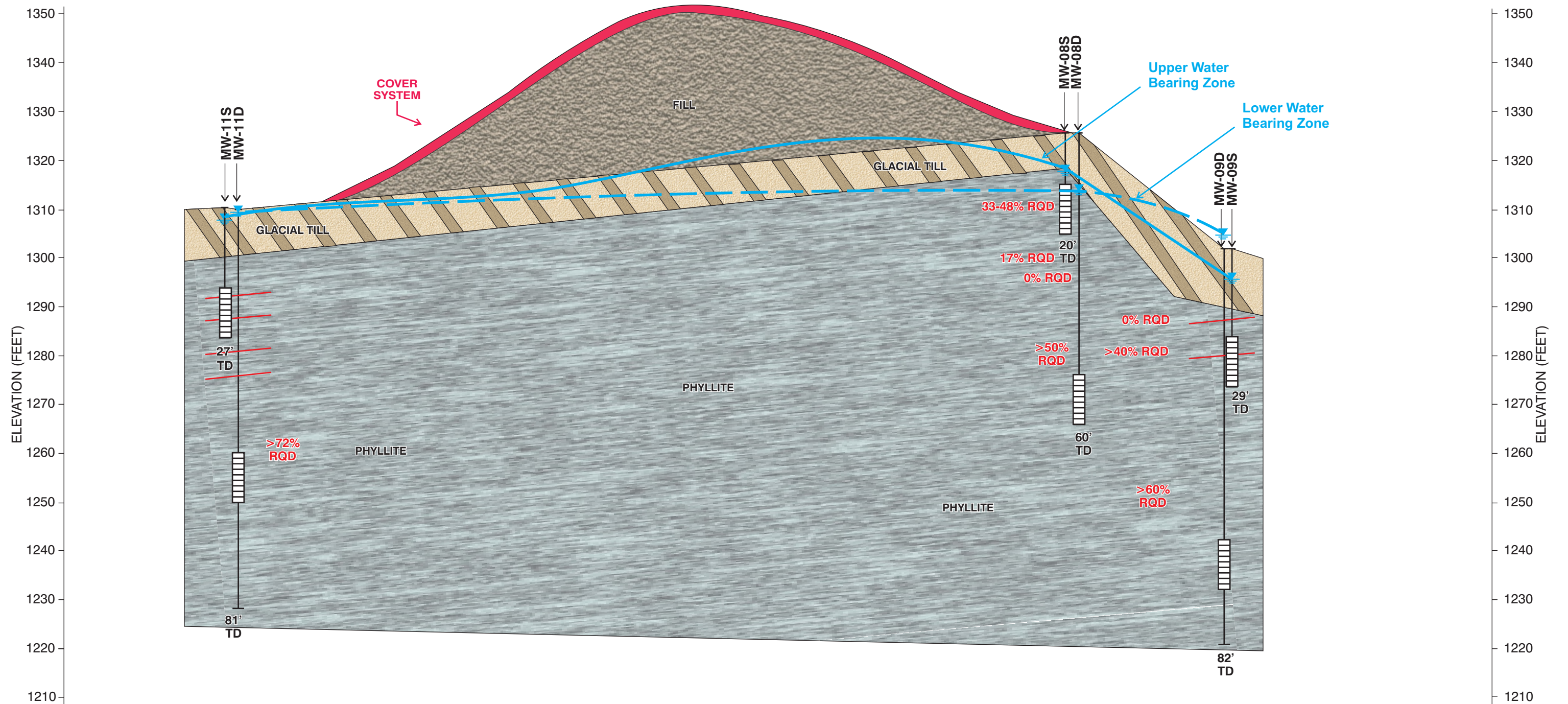


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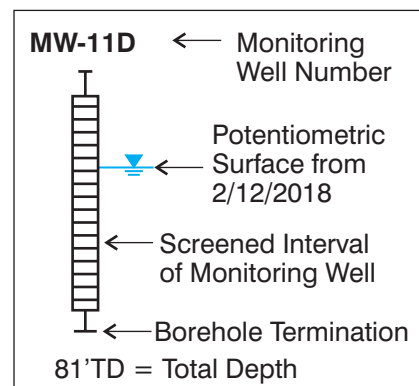
SOUTH
A

NORTH
A'



NOTES:

1. Geologic conditions shown are representative of conditions encountered at each boring location to the depth drilled. Extrapolations between borings have been interpreted using standardly accepted geologic practices and principles. Actual conditions may vary between borings from those shown.
2. Elevations based on National Geodetic Vertical Datum, 1929
3. Fractures are shown to illustrate fracture orientations and do not reflect actual locations.



Horizontal Scale: 1" = 100'
Vertical Scale: 1" = 20'
5x Vertical Exaggeration

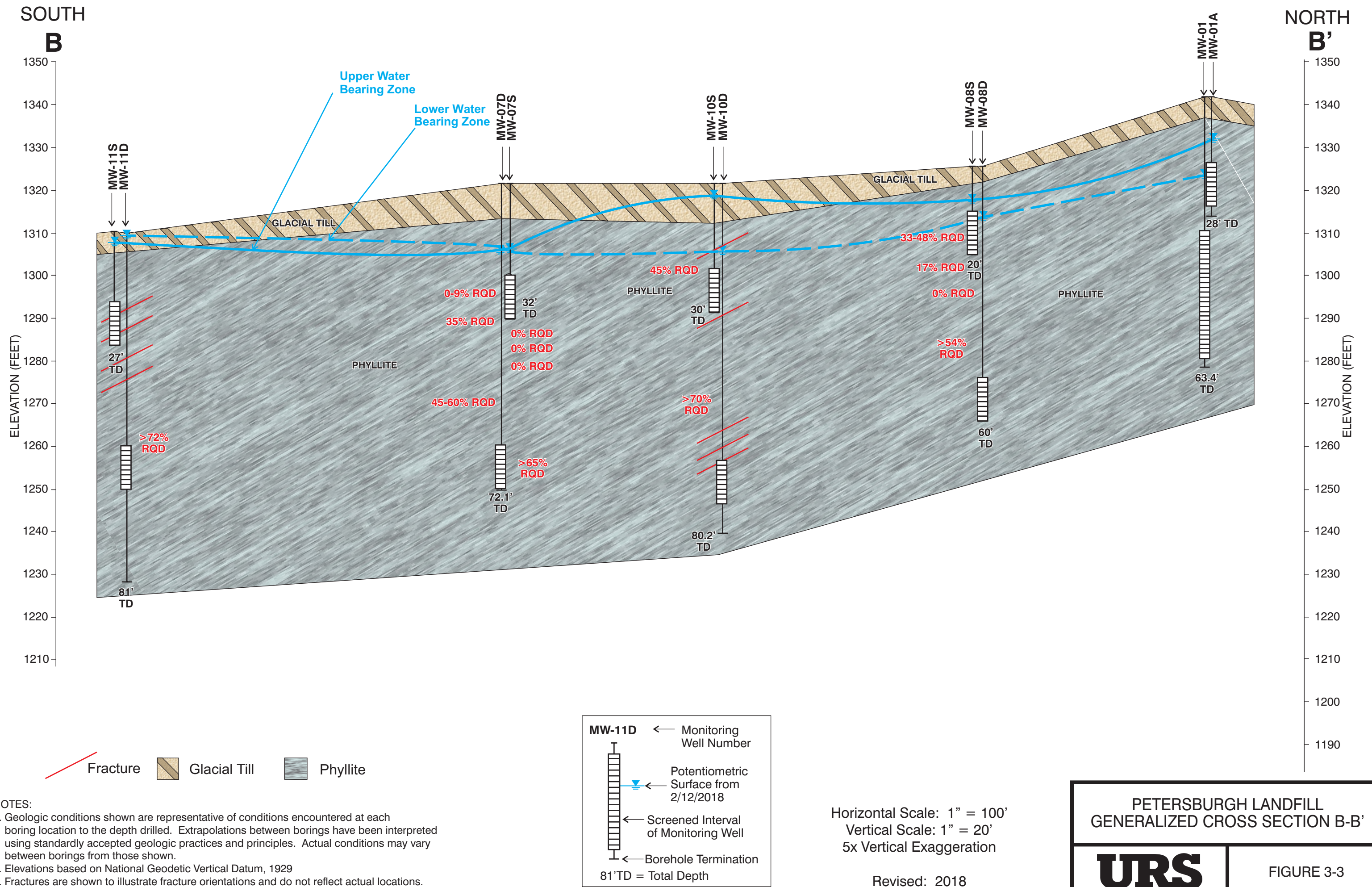
Revised: 2018

PETERSBURGH LANDFILL
GENERALIZED CROSS SECTION A-A'

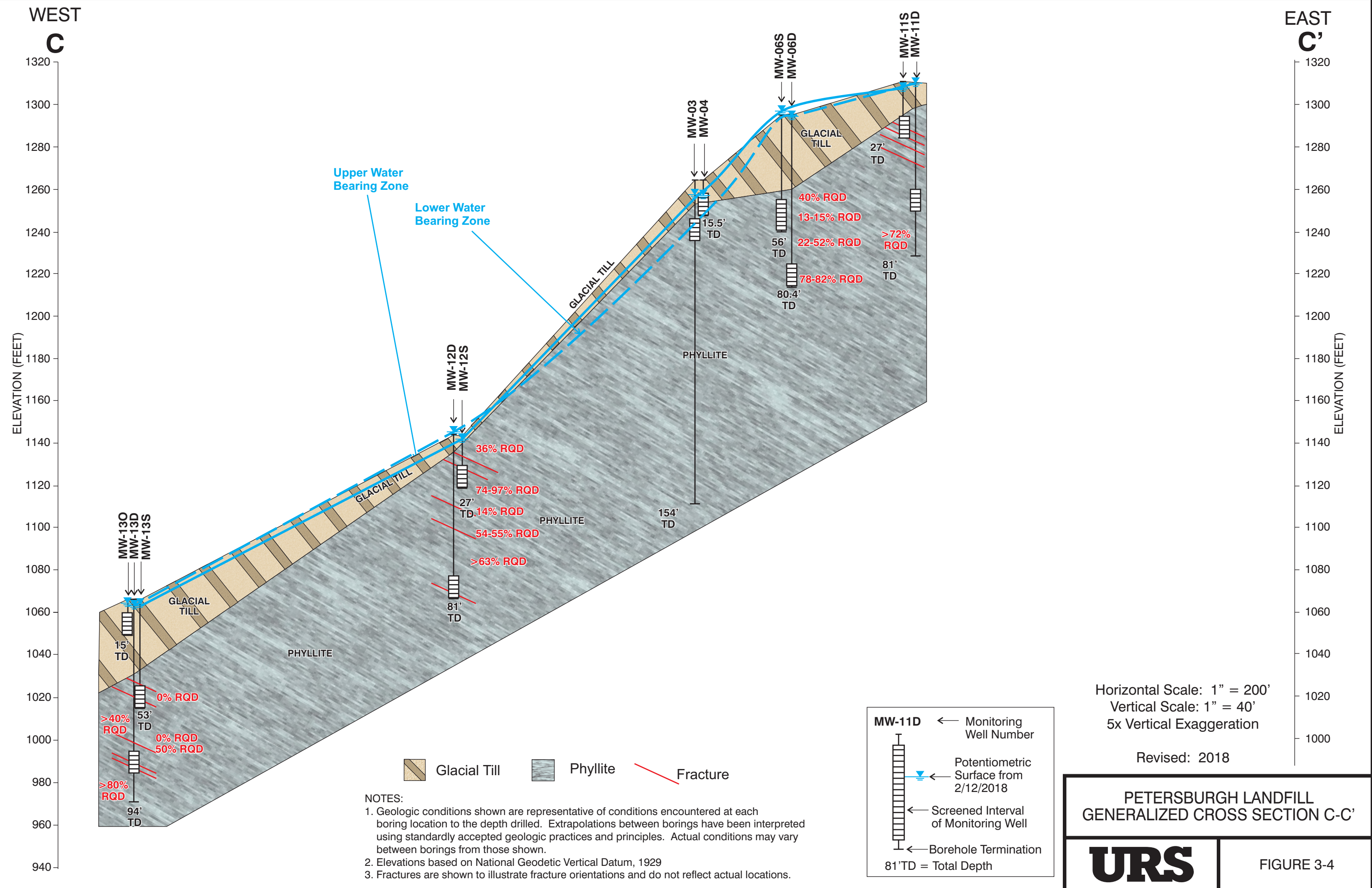
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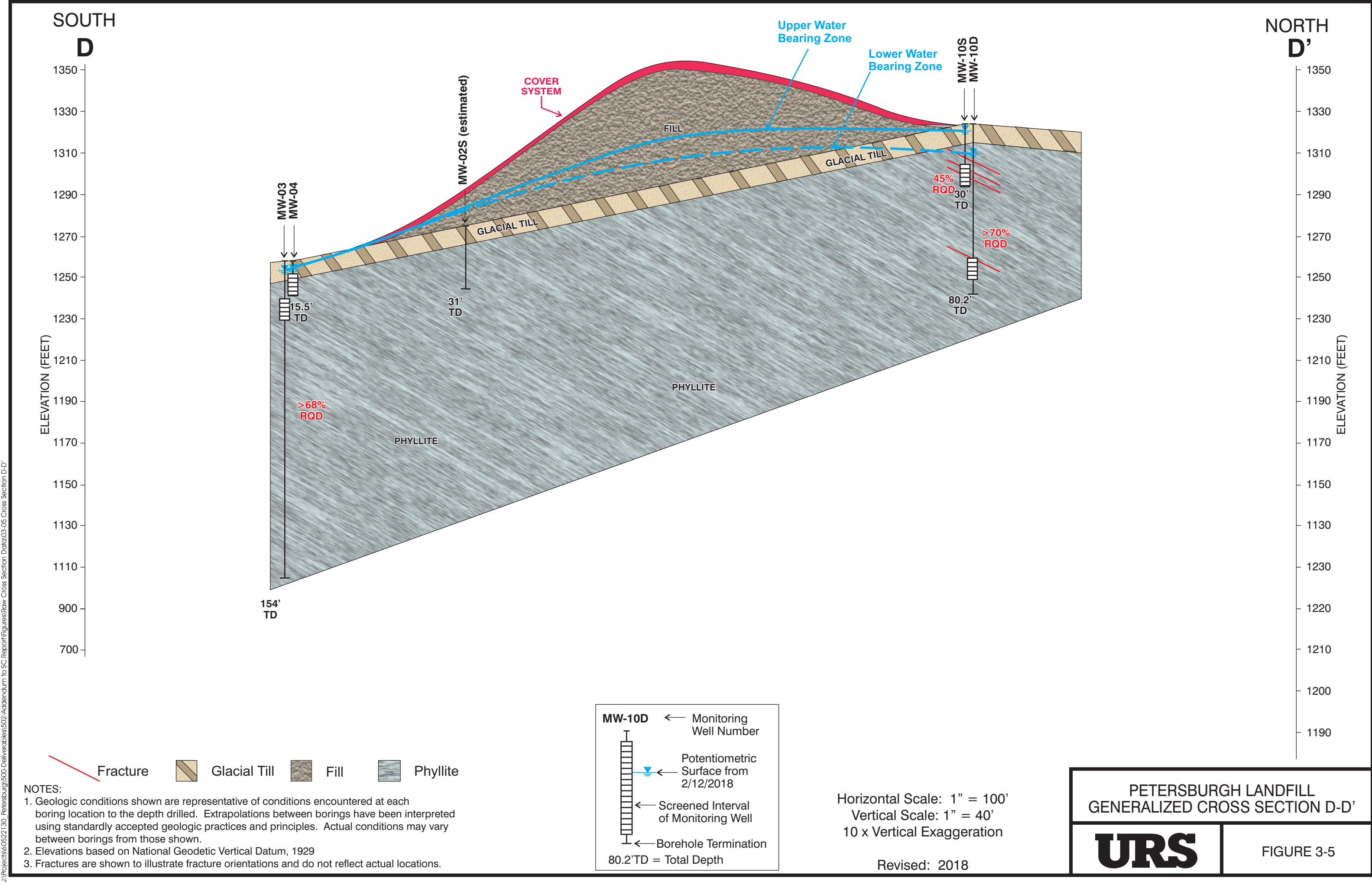
FIGURE 3-2

J:\Projects\60522130_Petersburg\600-Deliverables\502-Addendum to SC Report\Figures\Raw Cross Section Data\03-03Cross Section B-B'



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Legend

 Monitoring Well

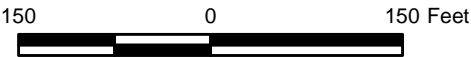
 Leachate Seep

 Groundwater Flow Direction

 Groundwater Elevation Contour

 Stream

Source: ESRI World Imagery



PETERSBURGH LANDFILL
UPPER WATER-BEARING ZONE
ELEVATION CONTOURS
(JANUARY 4 & 5, 2017)




FIGURE 3-6

J:\Projects\60522130_Petersburg\900-CAD-GIS\920-GIS or Graphics\MAPS\SC REPORT\03-07 GW Elevation Contours - Deep - 20170104.mxd 10/2/2018



Legend

Monitoring Well

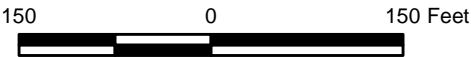
Leachate Seep

Groundwater Flow Direction

Groundwater Elevation Contour

Stream

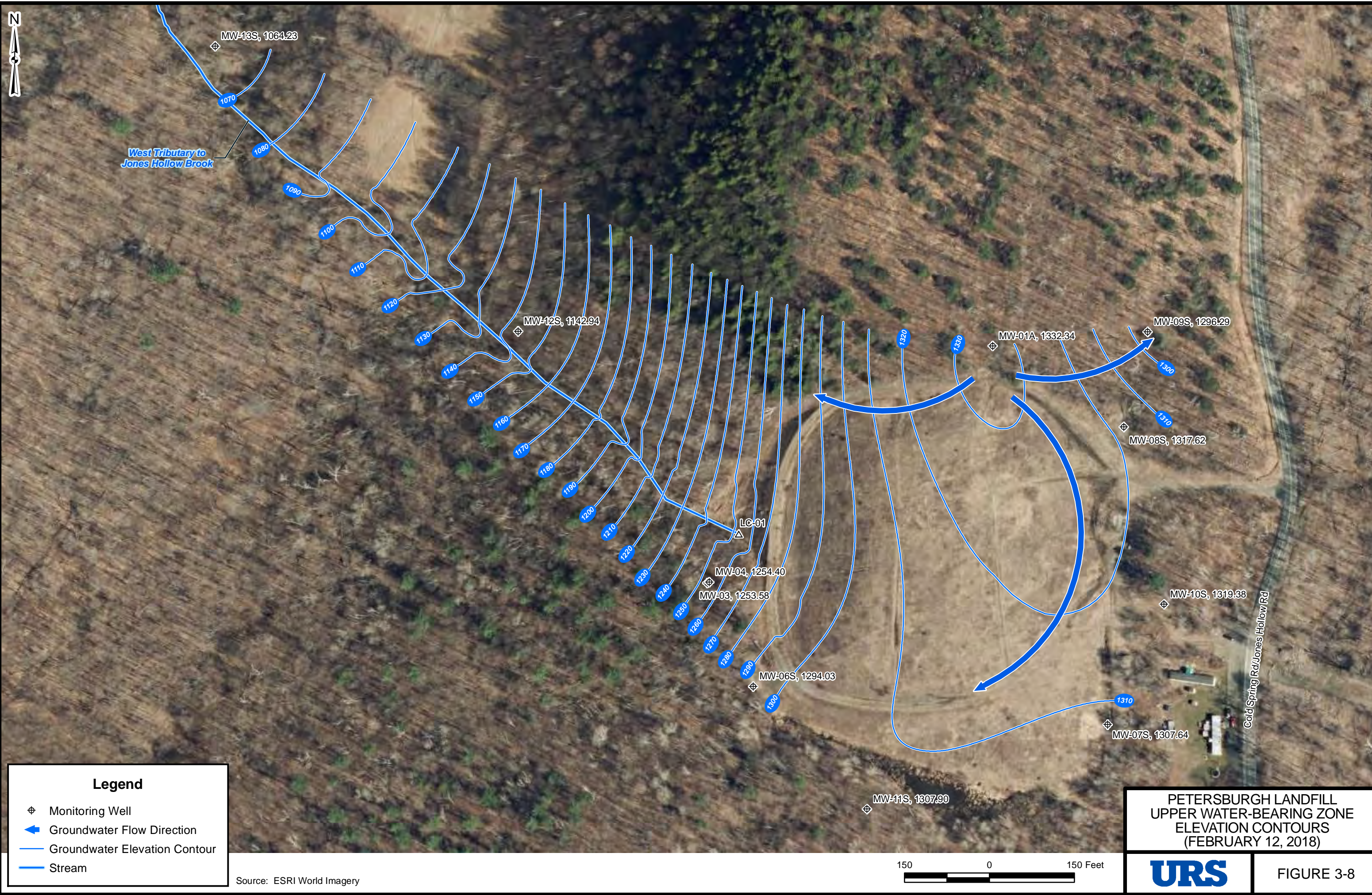
Source: ESRI World Imagery



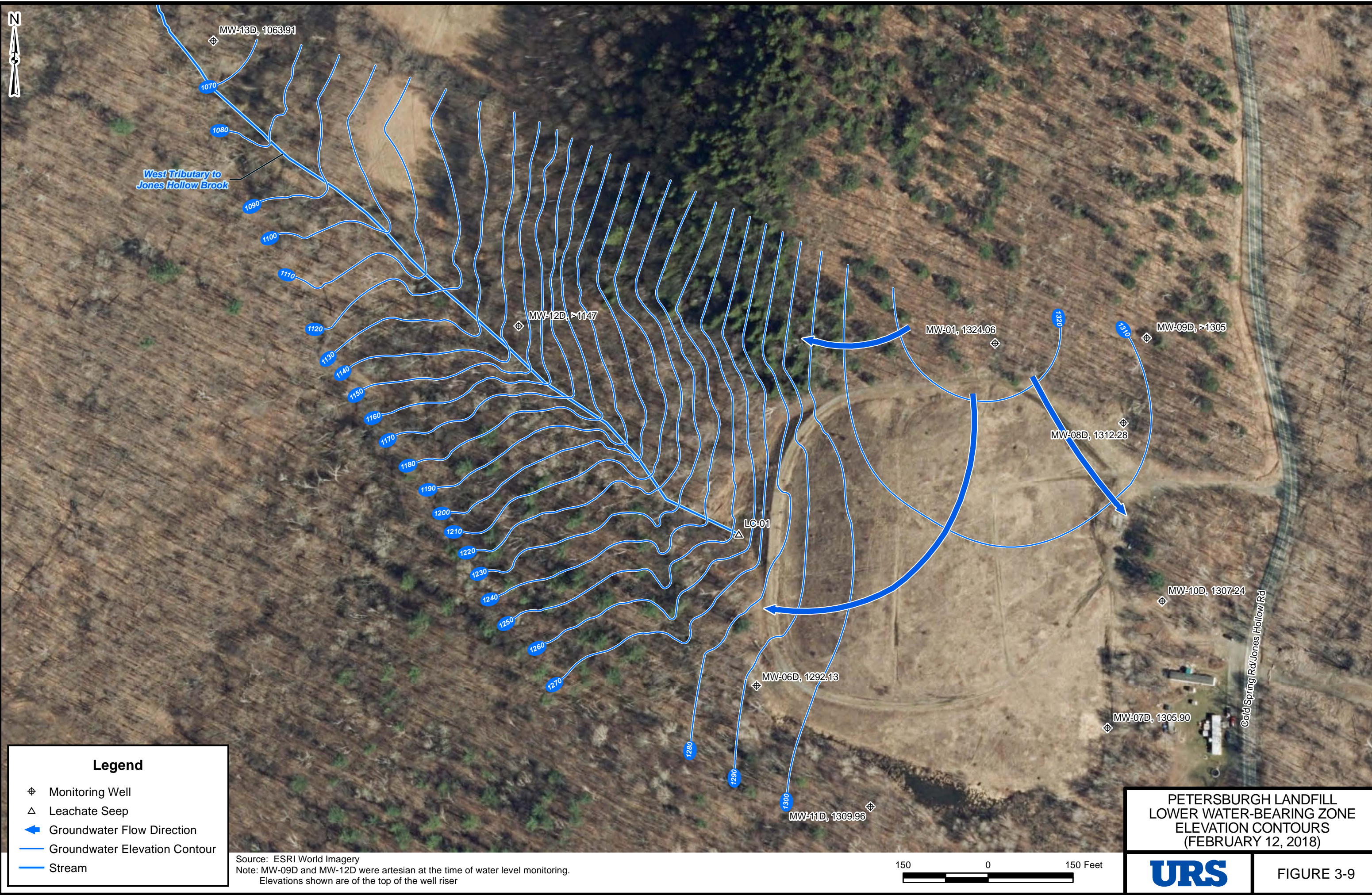
PETERSBURGH LANDFILL
LOWER WATER-BEARING ZONE
ELEVATION CONTOURS
(JANUARY 4 & 5, 2017)

FIGURE 3-7

J:\Projects\60522130_Petersburg\900-CAD-GIS\920-GIS or Graphics\MAPS\SC REPORT\03-08 GW Elevation Contours - Shallow - 20180212.mxd 10/2/2018



J:\Projects\60522130_Petersburg\900-CAD-GIS\920-GIS or Graphics\MAPS\SC REPORT\03-09 GW Elevation Contours - Deep - 20180212.mxd 9/27/2018



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MW-08D (0' - 0.5')				CRIT 1	CRIT 2	12/16
VOCs:						
Acetone				0.05	0.05	0.06
Metals:						
Aluminum				10000	--	20000
Boron				0.5	--	2.4
Iron				2000	--	38100
Nickel				30	130	35.3

MW-06D (0' - 3')				CRIT 1	CRIT 2	12/16
Metals:						
Aluminum				10000	--	16800
Boron				0.5	--	1.8
Iron				2000	--	29400
Manganese				1600	2000	3550

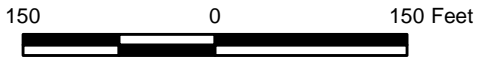
MW-07D (0' - 2')				CRIT 1	CRIT 2	12/16
Metals:						
Aluminum				10000	--	15800
Boron				0.5	--	1.8
Iron				2000	--	31100
Nickel				30	130	34.4

Legend

Monitoring Well

Stream

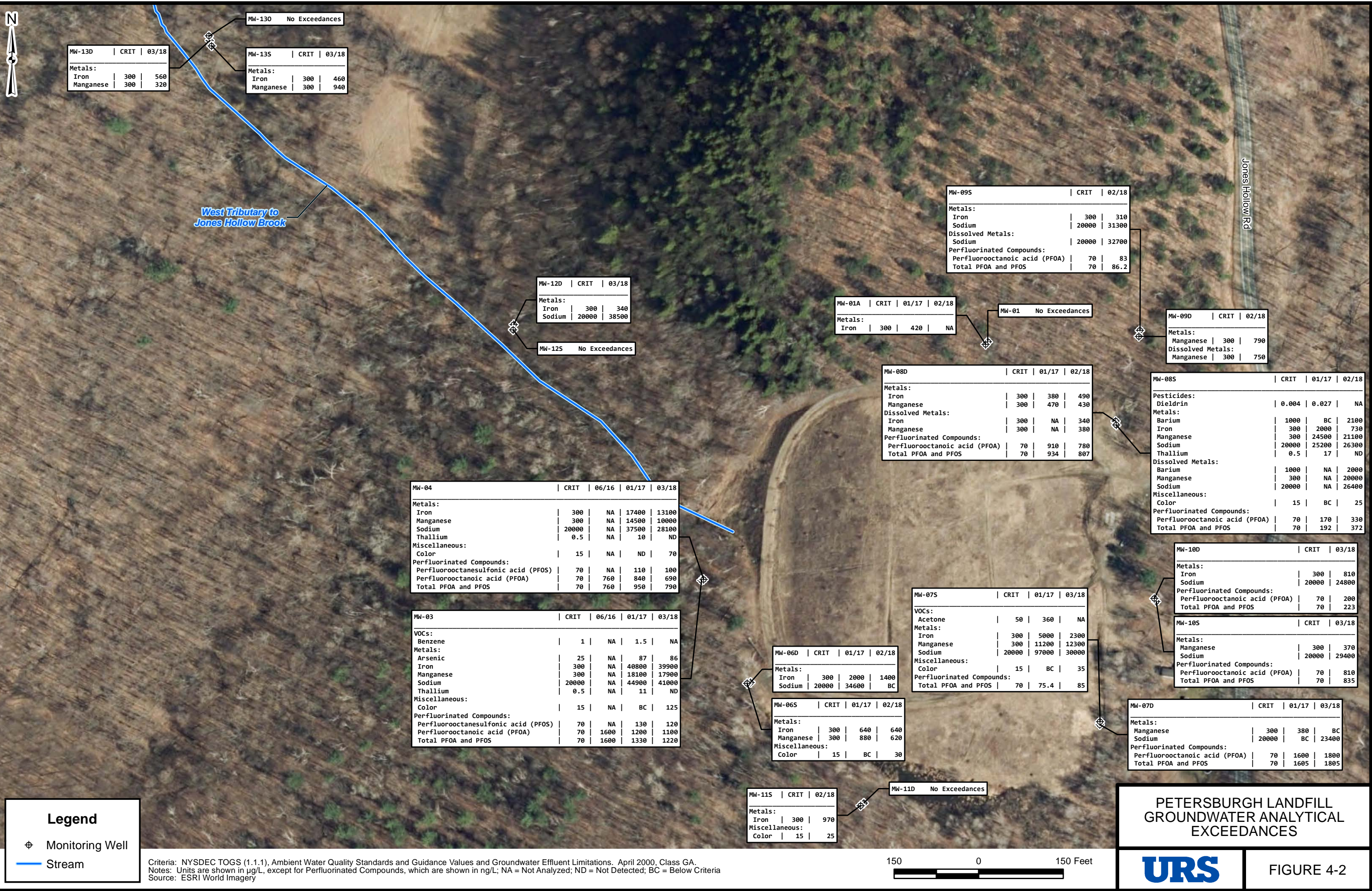
Criteria: CRIT 1 = 6 NYCRR Part 375.6, Remedial Program Soil Cleanup Objectives, Effective 12/14/06. Unrestricted Use, including CP-51 Table 1, Effective 12/2/10.
CRIT 2 = 6 NYCRR Part 375.6, Remedial Program Soil Cleanup Objectives, Effective 12/14/06. Restricted Use. Protection of Groundwater, including CP-51 Table 1, Effective 12/2/10.
Notes: Units shown in mg/kg
Source: ESRI World Imagery



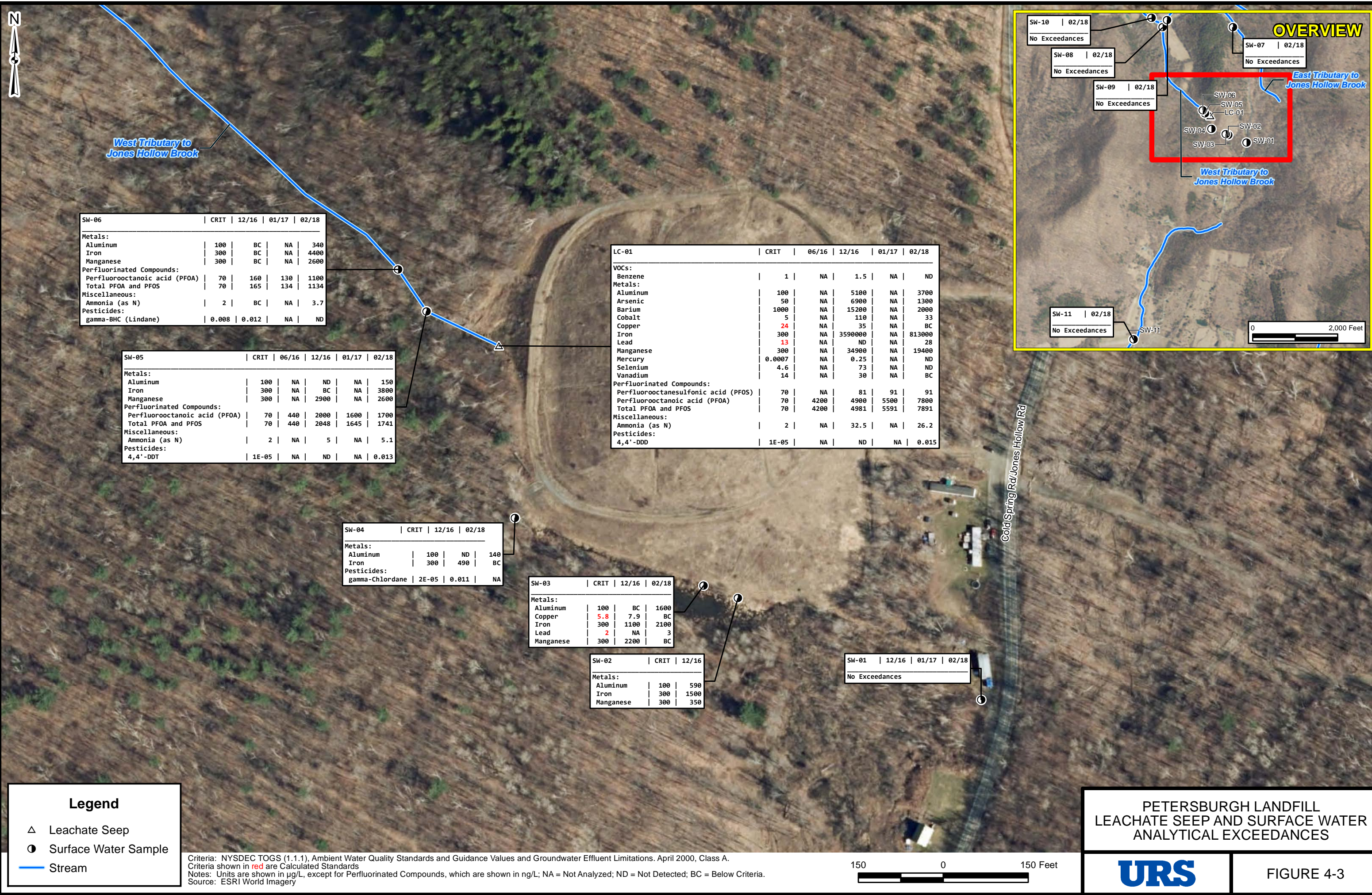
PETERSBURGH LANDFILL
SOIL ANALYTICAL EXCEEDANCES
(DECEMBER 2016)

FIGURE 4-1

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TABLES

Table 1-1
NYSDEC Groundwater, Surface Water and Sediment Sample Results - June 2, 2016 and July 21, 2016
Petersburgh, New York

Groundwater, Surface Water and Leachate Samples (ppt or ng/L)

Sample Location		MW-01	MW-01A	MW-03	MW-04	MW-06	Leachate	Stream ³
Date		6/2/2016	6/2/2016	6/2/2016	6/2/2016	6/2/2016	6/2/2016	6/2/2016
Analyte	Criteria ¹							
PERFLUOROOCTANOIC ACID (PFOA)	70	4.2	1.4	1,600	760	1.4	4,200	440

Surface Water Samples (ppt or ng/L)

Sample Location		PLH1	PLH2	PSL1	PSL2	PSL2	PSL3	PSL4
Sample ID		PLH1	PLH2	PSL1	PSL2	DUP2	PSL3	PSL4
Date		7/21/2016	7/21/2016	7/21/2016	7/21/2016	7/21/2016	7/21/2016	7/21/2016
Analyte	Criteria ¹							
PERFLUOROBUTANESULFONIC ACID (PFBS)	--	1.81 U	1.84 U	1.86 U	1.79 U	1.78 U	1.75 U	1.86 U
PERFLUOROHEPTAOIC ACID (PFHpA)	--	1.81 U	1.84	1.86 U	1.79 U	1.78 U	1.75 U	2.91
PERFLUOROHEXANESULFONIC ACID (PFHxS)	--	1.81 U	1.84 U	1.86 U	1.79 U	1.78 U	1.75 U	1.86 U
PERFLUORONONANOIC ACID (PFNA)	--	1.81 U	1.84 U	1.86 U	1.79 U	1.78 U	1.75 U	1.86 U
PERFLUOROOCTANE SULFONIC ACID (PFOS)	70	1.81 U	1.84 U	1.86 U	1.79 U	1.78 U	1.75 U	3.93
PERFLUOROOCTANOIC ACID (PFOA)	70	47.8	45.9	30.4	16.7	19.4	5.64	73.4
TOTAL PFOS and PFOA	70	47.8	45.9	30.4	16.7	19.4	5.64	77.3

Sediment Samples (ppb or ug/kg)

Sample Location		PSLS1	PSLS2	PSLS2	PSLS3	PSLS4	PSLS5
Sample ID		PSLS1	PSLS2	DUP1	PSLS3	PSLS4	PSLS5
Date		7/21/2016	7/21/2016	7/21/2016	7/21/2016	7/21/2016	7/21/2016
Analyte	Criteria ²						
PERFLUOROBUTANESULFONIC ACID (PFBS)	--	1.19 U	1.19 U	1.19 U	1.17 U	1.19 U	1.19 U
PERFLUOROHEPTAOIC ACID (PFHpA)	--	1.19 U	1.19 U	1.19 U	1.17 U	1.19 U	1.19 U
PERFLUOROHEXANESULFONIC ACID (PFHxS)	--	1.19 U	1.19 U	1.19 U	1.17 U	1.19 U	1.19 U
PERFLUORONONANOIC ACID (PFNA)	--	1.19 U	1.19 U	1.19 U	1.17 U	1.19 U	1.19 U
PERFLUOROOCTANE SULFONIC ACID (PFOS)	140	0.0949 J	0.177 J	0.200 J	1.17 U	0.315 J	0.387 J
PERFLUOROOCTANOIC ACID (PFOA)	140	0.208 J	0.731 J	0.708 J	0.119 J	1.10 J	0.846 J
TOTAL PFOS and PFOA	140	0.303	0.908	0.908	0.119	1.42	1.23

Notes:

1 - USEPA drinking water health advisory

2 - NYSDEC preliminary residential soil cleanup objective

3 - West tributary to Jones Hollow Brook

DUP: Duplicate

J: estimated value.

U: not detected at the reporting limit.

ppt: parts per trillion

ng/l: nanograms per liter (ppt)

ppb: parts per billion

ug/kg: micrograms per kilogram (ppb)

Page 1 of 2

J:\Projects\60522130 Petersburg\500-Deliverables\502-Addendum to SC Report\Tables\Table 2-1 Petersburg Landfill Summary of Analytical Parameters.xlsx

**TABLE 2-1
ANALYTICAL PARAMETERS
PETERSBURGH LANDFILL SITE CHARACTERIZATION**

		Parameter	Method Number
		TCL VOCs + TICs	8260C
		TCL SVOCs + TICs	8270D
		TCL Pesticides	8081B
		TCL PCBs	8082A
		TAL Metals + Boron	6010C/7470A/7471B
		Dissolved Metals	6010C/7470A
		Cyanide	9012B
		PFAS	537 Mod
		PFAS Short List	537 DI
		1,4-Dioxane	8270D SIM
		Alkalinity	310.2
		Ammonia	350.1
		BOD ₅	SM5210B
		Bromide	300.0
		Chloride	300.0
		COD	410.4
		Color	SM2120B
		Hardness	SM2340C
		Chromium ⁺⁶	SM3500CRB
		Nitrate	353.2
		Phenols	420.1
		Sulfate	300.0
		TDS	SM2540C
		TKN	351.2
		TOC	9060A
Groundwater			
MW-01	I	X	X
MW-01	II	-	-
MW-01A	I	X	X
MW-01A	II	-	-
MW-03	I	X	X
MW-03	II	-	-
MW-04	I	X	X
MW-04	II	-	-
MW-06S	I	X	X
MW-06S	II	-	-
MW-06D	I	X	X
MW-06D	II	-	-
MW-07S	I	X	X
MW-07S	II	-	-
MW-07D	I	X	X
MW-07D	II	-	-
MW-08S	I	X	X
MW-08S	II	-	-
MW-08D	I	X	X
MW-08D	II	-	-
MW-09S	II	-	-
MW-09D	II	-	-
MW-10S	II	-	-
MW-10D	II	-	-
MW-11S	II	-	-
MW-11D	II	-	-
MW-12S	II	-	-
MW-12D	II	-	-
MW-13O	II	-	-
MW-13S	II	-	-
MW-13D	II	-	-

NOTES:

BOD₅ - Biochemical Oxygen demand - 5 day
 COD - Chemical Oxygen Demand
 PCBs - Polychlorinated Biphenyls
 PFAS - Per- and Polyfluoroalkyl substances
 SVOCs - Semivolatile Organic Compounds
 TAL - Target Analyte List
 TCL - Target Compound List

TDS - Total Dissolved Solids
 TICs - Tentatively Identified Compounds
 TKN - Total Kjeldahl Nitrogen
 TOC - Total Organic Carbon
 TOC - Total Organic Carbon
 VOCs - Volatile Organic Compounds
 X - Sample analyzed for parameter
 - = not analyzed for parameter

TABLE 2-2
SUMMARY OF DETECTED COMPOUNDS IN EQUIPMENT BLANK AND FIELD BLANK SAMPLES
PETERSBURGH LANDFILL ADDENDUM TO SITE CHARACTERIZATION

Field Sample ID		Equipment Blanks															
		EB-SS-120116	Acoustic Televiwer	Caliper Probe	Fultz Pump	Gamma Probe	Grundfos Pump	Heat Pulse Flow Meter	HPF Centralizer	Large Winch	Optical Televiwer	Small Winch	Televiwer Centralizers	WL Meter	MW-11D EB (Packer)	EB 030118	EB 030618
Date Sampled		12/01/16	11/15/17	11/15/17	11/15/17	11/15/17	11/15/17	11/15/17	11/15/17	11/15/17	11/15/17	11/15/17	11/15/17	11/15/17	01/30/18	03/01/18	03/06/18
Parameter																	
Volatile Organic Compounds	Units																
Acetone	UG/L	4.2 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pesticide Organic Compounds																	
alpha-BHC	UG/L	0.012 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals																	
Calcium	MG/L	0.11 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron	MG/L	0.082	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	MG/L	0.00071 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	MG/L	0.0014 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	MG/L	0.0035 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Per - and Polyfluoroalkyl Substances																	
Perfluorohexanesulfonic acid (PFHxS)	NG/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.20 J	0.21 J
Perfluorononanoic acid (PFNA)	NG/L	--	--	--	--	2.1	0.99 J	--	--	1.8 J	--	--	--	--	--	--	--
Field Sample ID		Field Blanks															
		FB-120116	FB-120216	FB-120716	FB-120816	FB-121316	FB-121416	FB-010417-20170104	FB-010417-20170104	FB-010517-20170105	FB-010517-20170105	FB-012417	FIELD BLANK 022818	FIELD BLANK 030118	FIELD BLANK 030518	FIELD BLANK 030618	FIELD BLANK 031918
Date Sampled		12/01/16	12/02/16	12/07/16	12/08/16	12/13/16	12/14/16	01/04/17	01/04/17	01/05/17	01/05/17	01/24/17	02/28/18	03/01/18	03/05/18	03/06/18	03/19/18
Parameter																	
Per- and Polyfluoroalkyl Substances	Units																
Perfluorobutanoic acid (PFBA)	NG/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.35 J	0.34 J	--	--	0.39 J
Perfluorohexanesulfonic acid (PFHxS)	NG/L	--	--	--	--	--	--	--	--	--	--	--	0.21 J	0.17 J	0.22 J	0.21 J	0.30 J
Perfluorooctanesulfonic acid (PFOS)	NG/L	--	--	--	--	--	--	--	--	9.9	--	--	--	--	--	--	--
Perfluorotetradecanoic acid (PFTeA)	NG/L	NA	NA	NA	NA	NA	NA	0.45 J	NA	0.39 J	NA	0.68 J	--	--	--	--	--
Total PFOA and PFOS	NG/L	--	--	--	--	--	--	--	--	9.9	--	--	--	--	--	--	--

Flags assigned during chemistry validation are shown.

NA = Not analyzed

J = Estimated value

-- = Not detected

Only detected compound listed.

TABLE 2-3
MONITORING WELL CONSTRUCTION SUMMARY
PETERSBURGH LANDFILL SITE CHARACTERIZATION

Well ID	Date Installed	Groundwater Zone	Boring Depth (ft bgs)	Top of Rock (ft bgs)	Steel Casing Depth (ft bgs)	Well Depth (installed) (ft bsg)	Screen Length (feet)	Screen Interval (ft bgs)	Well Diameter (inches)	PVC Stickup Height (ft ags)	Outer Casing Height (ft ags)	Northing	Easting	Ground Elevation (ft)	Casing Elevation (ft)	Meas.point (Riser) Elev. (ft)
MW-1	6/22/1990	Deep	63.4	3.5	unknown	62.5	30	32.5-62.5	2	2.46	2.30	1420354.24	807792.36	1342.68	1344.98	1345.15
MW-1A	6/1/1990	Shallow	28	3.5	8.5**	25	10	15-25	2	2.35	2.22	1420349.73	807788.34	1342.67	1344.89	1345.02
MW-3	5/25/1990	Shallow	154*	14	2.4**	29	10	19-29	2	2.07	2.20	1419930.76	807284.48	1263.76	1265.96	1265.83
MW-4	6/22/1990	Shallow	15.5	14	unknown	15	10	5-15	2	2.34	2.72	1419932.46	807288.04	1263.69	1266.41	1266.03
MW-6D	12/20/2016	Deep	80.4	34.5	37.1	80	10	70-80	2	1.69	1.89	1419749.89	807371.38	1293.75	1295.64	1295.44
MW-6S	5/14/1991	Shallow	56	38	unknown	55	15	40-55	2	1.45	1.54	1419747.99	807365.38	1293.40	1294.93	1294.85
MW-7D	12/23/2016	Deep	72.1	16	18.4	72	10	62-72	2	2.11	2.30	1419674.62	807990.79	1319.80	1322.10	1321.91
MW-7S	12/23/2016	Shallow	32	16	2.4	32	10	22-32	2	2.31	2.57	1419680.19	807991.31	1319.94	1322.51	1322.26
MW-8D	12/14/2016	Deep	60	4.5	9.2	60	10	50-60	2	2.04	2.30	1420213.41	808018.92	1326.08	1328.38	1328.12
MW-8S	12/15/2016	Shallow	20	4.5	2.7	20	10	10-20	2	2.14	2.34	1420206.44	808020.14	1326.24	1328.58	1328.38
MW-9D	2/5/2018	Deep	82	8.75	13.8	70	10	60-70	2	2.02	2.22	1420363.98	808060.21	1303.05	1305.27	1305.07
MW-9S	1/25/2018	Shallow	29	8.75	13.5	29	10	19-29	2	2.19	2.48	1420374.43	808062.14	1302.29	1304.77	1304.48
MW-10D	1/10/2018	Deep	80.2	8.5	13.3	73	10	63-73	2	2.02	2.15	1419898.69	808087.51	1326.23	1328.38	1328.25
MW-10S	1/10/2018	Shallow	30	8.5	12.9	30	10	20-30	2	2.30	2.64	1419893.21	808090.98	1326.21	1328.85	1328.51
MW-11D	2/6/2018	Deep	81	6.4	12.3	59	10	46-59	2	2.06	2.23	1419535.60	807572.42	1309.87	1312.10	1311.93
MW-11S	1/29/2018	Shallow	27	6.4	12.3	27	10	17-27	2	2.09	2.24	1419531.16	807566.64	1310.89	1313.13	1312.98
MW-12D	2/8/2018	Deep	81	8	12.9	81	10	70.5-80.5	2	2.30	2.59	1420384.96	806951.22	1144.90	1147.49	1147.20
MW-12S	2/8/2018	Shallow	27	8	12.6	27	10	17-27	2	2.73	2.92	1420375.56	806950.33	1144.87	1147.79	1147.60
MW-13D	2/9/2018	Deep	94	34	38.8	81	10	71-81	2	2.54	2.71	1420888.87	806411.95	1067.23	1069.94	1069.77
MW-13O	1/24/2018	Overburden	16	--	3.8	16	10	6-16	2	2.10	2.19	1420896.75	806410.45	1067.22	1069.41	1069.32
MW-13S	2/2/2018	Shallow	53	34	38.9	53	10	43-53	2	2.44	2.59	1420879.63	806415.38	1068.24	1070.83	1070.68

Notes:

ft btgs - feet below ground surface

ft ags - feet above ground surface

*MW-3: Cored interval grouted from 30-154' bgs.

MW-1A also known as MW-1S; MW-6S formerly known as MW-6.

MW-1, MW-1A, MW-3, MW-4, and MW-6S data from the Berlin/Petersburg Landfill Final Closure Report (Sith & Mahoney, P.C., July 1991) and January 2017 survey data.

** - approximate depth of steel casing below ground surface, based on gamma log plot.

TABLE 3-1
BOREHOLE GEOPHYSICS AND PACKER TEST DATA SUMMARY
PETERSBURGH LANDFILL SITE CHARACTERIZATION

Well Boring ID	Depth (ft)	Overburden Interval (ft)	Screened Interval (ft)	Corresponding Core Run Information				Packer Test Data*					Borehole Geophysics Logging Data												
				Core Run (ft)	Recovery (%)	RQD (%)	On Site Geologist Observation	Depth Interval Packer Tested (ft)	Pumping Rate During Packer Test/ Duration/ Volume Removed	Recovery Time	Sample Collected For Analysis (Yes/No)	Notes	Caliper	Single Point Resistivity (ohms)	Heat Pulse Flow Meter	Predominant Dip Direction/ From Horizontal	Optical Televiwer Comments** (BG)	Acoustic Televiwer Comments** Dip Direction/Angle (BG)							
MW-09D	82.4	0-8.75	60-70	C-1 (14-18)	79	0	Medium gray PHYLLITE @ 14'-82.4'. Some staining @ 14' & 16; Quartz vein @ 16.5'-17'.	Steel Casing Set to 14'					Minor Enlargement (39'-40')		1690-1760			Fracture @ 14.6'-15.1'	265°/52° @ 16.5' (open feature)						
				C-2 (18-21)	100	35	Quartz vein @ 20.5'-21.4'.											No Packer Test							Quartz vein and fracture present @ 21.6'
				C-3 (21-23)	100	66																			
				C-4 (23-25.5)	100	50	Quartz vein @ 25.1'-25.5'.																		
				C-5 (25.5-28)	90	77																			
				C-6 (28-33)	100	93	Quartz vein @ 31'-31.5'																		
				C-7 (33-37.8)	100	96																			
				C-8 (37.8-38)	100	0																			
				C-9 (38-43)	100	98	Very jointed @ 38'.																		
				C-10 (43-48)	100	98																			
				C-11 (48-53)	100	100																			
				C-12 (53-57.4)	98	80	Crushed rock @ 56.9'-57.4'.	48.9-58.9	3 gpm/3 min 9 gallons	Not Recorded	Yes	-	Minor Enlargement (57.5'-59.5')		1626-1690		Quartz vein @ 61.6'-62.6'	56°/75° @ 67.4'							
				C-13 (57.4-58)	100	100																			
				C-14 (58-62)	90	90	Quartz vein @ 61.5'-62'.																		
				C-15 (62-63)	100	100																			
				C-16 (63-68)	100	97	Iron staining from 65'-68'.																		
				C-17 (68-70.8)	100	98																			
				C-18 (70.8-73)	97	84																			
				C-19 (73-76.6)	98	68	Quartz veins @ 73.3' and 75.9', Slight staining @ 74.4'-75.3'																		
				C-20 (76.6-78)	100	100	Slight staining @ 77.6'																		
				C-21 (78-82.4)	98	97		No Packer Test					Minor Enlargement (77'-79')	Approx. 1626			2°/68° @ 81.2; 4°/66° @ 81.3'; and 345°/48° @ 81.3'								

TABLE 3-1
BOREHOLE GEOPHYSICS AND PACKER TEST DATA SUMMARY
PETERSBURGH LANDFILL SITE CHARACTERIZATION

Well Boring ID	Depth (ft)	Overburden Interval (ft)	Screened Interval (ft)	Corresponding Core Run Information				Packer Test Data*					Borehole Geophysics Logging Data					
				Core Run (ft)	Recovery (%)	RQD (%)	On Site Geologist Observation	Depth Interval Packer Tested (ft)	Pumping Rate During Packer Test/ Duration/ Volume Removed	Recovery Time	Sample Collected For Analysis (Yes/No)	Notes	Caliper	Single Point Resistivity (ohms)	Heat Pulse Flow Meter	Predominant Dip Direction/ From Horizontal	Optical Televiewer Comments** (BG)	Acoustic Televiewer Comments** Dip Direction/Angle (BG)
MW-10D	80.2	0-8.5	63-73	C-1 (14-17)	100	45	Medium gray PHYLLITE @ 14"-80.5'.	Steel Casing Set to 14' <										

TABLE 3-1 BOREHOLE GEOPHYSICS AND PACKER TEST DATA SUMMARY PETERSBURGH LANDFILL SITE CHARACTERIZATION																			
Well Boring ID	Depth (ft)	Overburden Interval (ft)	Screened Interval (ft)	Corresponding Core Run Information				Packer Test Data*					Borehole Geophysics Logging Data						
				Core Run (ft)	Recovery (%)	RQD (%)	On Site Geologist Observation	Depth Interval Packer Tested (ft)	Pumping Rate During Packer Test/ Duration/ Volume Removed	Recovery Time	Sample Collected For Analysis (Yes/No)	Notes	Caliper	Single Point Resistivity (ohms)	Heat Pulse Flow Meter	Predominant Dip Direction/ From Horizontal	Optical Televiewer Comments** (BG)	Acoustic Televiewer Comments** Dip Direction/Angle (BG)	
MW-11D	81	0-6.4	49-59	C-1 (14-18)	100	85	Medium gray PHYLLITE@ 14'-81'.	Steel Casing Set to 14'					Small Enlargement @ 15.5'	3600-4200	Ambient inflow entered between 26.5' to 33', and flowed downward. Additional weak upward ambient inflow entered between 43' to 53', and flowed upward. Downward ambient flow from above, and upward ambient flow from below, exited at a zone of lower hydraulic head between 33' to 43'. Additional weak ambient inflow may have entered between 70' to 79', flowed upward, and exited at a zone of lower hydraulic head between 62' to 70'. Upward inflow while pumping originated between 70' to 79', and increased between the following depth intervals: 53' to 62', 33' to 43', and 17' to 26.5'.	Average = 140°/ 25° to 70° from horizontal	Staining & fracture @ 20.4'; Fracture @ 22'	350°/42° @ 19.7'	
				C-2 (18-23)	100	73	Staining @ 19.1'-23'. Extremely weathered @ 21'-23'.												
				C-3 (23-28)	96	96	Staining @ 23'-24.1'. Slight staining @ 26.5'-28' with minerals in fractures.							Sizeable Enlargement @ 23'; Small Enlargement @ 24'			3900-4200		Staining & mineral fracture @ 28'
				C-4 (28-33)	94	94	Staining @ 32.7'-33', 45° fractures. Minerals between fractures @ 32.7'-33'.												
				C-5 (33-38)	90	88	Staining @ 33'-33.8', 35'-35.2' & 36.1'-36.3'.							Small Enlargement @ 35.5'			3300-3600	Fracture @ 33.4'	
				C-6 (38-43)	100	100													
				C-7 (43-47.5)	82	85	Staining @ 46.3'-46.5'. Quartz vein @ 46'.	42.2-52.2	0.36 gpm/30 min 11 gallons	Not Recorded	Yes	-		Overall borehole diameter decreases slightly beginning @ 63.5'			3000-3300	Quartz vein @ 46.4'	195°/10° @ 60.4',
				C-8 (47.5-53)	100	100	Staining @ 49.8'. Mostly fresh rock.	51.5-61.5	0.29 gpm/53 min 15.5 gallons	Not Recorded	Yes	Purge water very turbid.						Quartz vein @ 56.4'	
				C-9 (53-57.5)	100	98	Slightly altered. Staining @ 54'-54.2'. Slight staining @ 56'-57.5'.												
				C-10 (57.5-63)	100	100	Staining @ 59'-59.4' & 61.5'-61.6'. 45° Fractures.	66-76	0.62 gpm/13 min 8 gallons	Recharged ≈0.97 feet in 133 minutes	No	Attempted to sample 66-76' @ 1010, interval still dry. Still dry @ 1030						Quartz vein @ 71.4'	
				C-11 (63-68)	100	100	Slight staining @ 67.8'.												
				C-12 (68-73)	100	100	Quartz veins @ 71.5'-71.7'.												
				C-13 (73-78)	98	97	Slight staining @ 73.9'-74'. 45°. Fractures. Quartz veins throughout.												
				C-14 (78-81)	100	100	Slight staining @ 78.4'-78.5'.	No Packer Test										224°/25° @ 74.9'	

Well Boring ID	Depth (ft)	Overburden Interval (ft)	Screened Interval (ft)	Corresponding Core Run Information				Packer Test Data*					Borehole Geophysics Logging Data					
				Core Run (ft)	Recovery (%)	RQD (%)	On Site Geologist Observation	Depth Interval Packer Tested (ft)	Pumping Rate During Packer Test/ Duration/ Volume Removed	Recovery Time	Sample Collected For Analysis (Yes/No)	Notes	Caliper	Single Point Resistivity (ohms)	Heat Pulse Flow Meter	Predominant Dip Direction/ From Horizontal	Optical Televiewer Comments** (BG)	Acoustic Televiewer Comments** Dip Direction/Angle (BG)
MW-12D	81	0-8	70.5-80.5	C-1 (14-16)	63	35	Dark gray PHYLLITE @ 14'-92'.	Steel Casing Set to 14'					Enlargement @ 17.5'	Approx. 500	Strong ambient upward inflow originated greater than 79'. Most of this upward ambient flow exited at a zone of lower hydraulic head between 16.7' to 22'; the remainder exited at a zone of lower head between the casing bottom and 16.7'. Upward flow while pumping also originated greater than 79'. Some upward flow while pumping may have exited at zones of lower head between 70' to 79' and 50' to 60'. Additional inflow while pumping may have entered between 47' to 50' and 37' to 47'.	Average = 105°/ between 25° to 80° from horizontal.	Fractures & staining @ 14'-16'	Open features at 27' to 17.4', strike varies from 5° to 180° and dips from 5° to 22° Strike angles are erratic between 16'-55', ranging from 5° to 351° 264°/45° @ 39.7' (open feature)
				C-2 (16-21)	92	78												
				C-3 (21-26)	95	95								Staining @ 21.1' & 24', with 30° fractures.				
				C-4 (26-31)	97	97	Staining @ 29.5' & 31'.											
				C-5 (31-36)	97	74		Staining @ 31.1'. Slight staining @ 31.5' & 32.9'.	31.7-41.7	1.15 gpm/16 min 18.5 gallons	Recharged ≈0.01 feet in 9 minutes	Yes	-	Minor Enlargements @ 36'-43'			Approx. 500	
				C-6 (36-41)	77	14	Staining in fractures 36'-41'. Very decomposed. 30° and vertical fractures.	<500 @ 36'-41'										
				C-7 (41-46)	100	54	Staining @ 41.8'-45.2'.	43.4-53.4	0.38 gpm/26 min 10 gallons	Not Recorded	Yes	Pumped dry.	Approx. 500					
				C-8 (46-51)	100	55	Slight staining & weathering @ 46.5'-47.5'. Quartz veins @ 46'-51'.						<500 @ 50' & 53'-56'				Fracture @ 45.8'; Quartz veins @ 43.3'-49.3'	
				C-9 (51-56)	100	80	Staining @ 51'-52'. Competent rock @ 52'-56'.						<500 @ 62'-67'					
				C-10 (56-61)	100	100	30° fractures.	58.5-68.5	0.625 gpm/12 min 7.5 gallons	Not Recorded	Yes	Pumped dry.	Approx. 500				Staining @ 59.3'-65.3'	
				C-11 (61-66.2)	100	95							<500 @ 67'-72'					
				C-12 (66.2-71)	100	95	Vertical fractures 66.2'-71'. Some pyrite observed @ 67'-68'.	68.4-78.4	0.44 gpm/18 min 8 gallons	Not Recorded	Yes	Pumped dry.	Minor Enlargements @ 77'-80'	<500 @ 72'				
				C-13 (71-76)	100	63	Vertical fractures throughout. Some pyrite observed @ 67'-68'.							Approx. 500				Fracture @ 77.3'
				C-14 (76-81)	95	57	Slight staining @ 81'.							Approx. 500			Open features at 80' with 174°/16° and 83' with 306°/62°.	

TABLE 3-1 BOREHOLE GEOPHYSICS AND PACKER TEST DATA SUMMARY PETERSBURGH LANDFILL SITE CHARACTERIZATION																				
Well Boring ID	Depth (ft)	Overburden Interval (ft)	Screened Interval (ft)	Corresponding Core Run Information				Packer Test Data*					Borehole Geophysics Logging Data							
				Core Run (ft)	Recovery (%)	RQD (%)	On Site Geologist Observation	Depth Interval Packer Tested (ft)	Pumping Rate During Packer Test/ Duration/ Volume Removed	Recovery Time	Sample Collected For Analysis (Yes/No)	Notes	Caliper	Single Point Resistivity (ohms)	Heat Pulse Flow Meter	Predominant Dip Direction/ From Horizontal	Optical Televiewer Comments** (BG)	Acoustic Televiewer Comments** Dip Direction/Angle (BG)		
MW-13D	94	0-34	71-81	C-1 (39-44)	50	0	Dark gray PHYLLITE @ 39'-94'.	Steel Casing Set to 39'					Enlargement @ 44'	500-725	Ambient inflow originated between 42.5' to 53', and flowed down toward zones of lower hydraulic head. Some ambient downward flow may have exited at a zone of lower head between 53' to 62', and additional downward inflow apparently entered between 68' to 72.5' feet. All measurable downward ambient flow exited at a zone of lower hydraulic head between 72.5' to 82'. Upward inflow while pumping originated between 72.5' to 82', and most inflow while pumping entered between 68' to 72.5'. Additional inflow while pumping entered between the following depth intervals: 53' to 62', 42.5' to 53', and also between the casing bottom and 42.5'.	Average = 120°/ between 30° to 60° from horizontal.	Fractures @ 39'-47.8'	Multiple open features from 41' to 50' with strikes ranging from 100° to 332° and dips from 38° to 62°		
				C-2 (44-49)	62	0	Frequent iron staining on foliation planes @ 44'-49'.													
				C-3 (49-51.5)	90	0	Light/dray gray banding @ 49'-49.8'. Some Quartz veining @ 50'.													
				C-4 (51.5-54)	97	40	Very light staining @ 51.5'-53'.													
				C-5 (54-58)	87.5	66	Slight staining @ 55'. Fairly decomposed/ not competent @ 57.1'-58'.	56.8-66.8	0.77 gpm/24 min 18.5 gallons	Not Recorded	Yes	-		Enlargement @ 73.5'			615-782	Fracture @ 65.3'	6°/74° @ 60.3'	
				C-6 (58-59)	92	33	Slight staining @ 58'.													
				C-7 (59-61.5)	93	70														
				C-8 (61.5-64)	100	100														
				C-9 (64-68.5)	85	69	Very fractured @ 67.8'-68.5'. Slight iron staining @ 68.7'-69'. Very fragmented.	66.5-76.5	1.7 gpm/5 min 8.5 gallons	Not Recorded	Yes	Pumped dry.					447-615		Fracture @ 68.8'	357°/52° @ 69.0', open feature at 69.4' : 116°/47° 349°/74° @ 70.4'; 346°/59° @ 70.5'. Open feature at 71.2': 304°/28° Open features @ 73.5' and 73.7'
				C-10 (68.5-69)	100	0	Slight staining @ 69'-69.7'. Decomposed, not very competent @ 71.6'-72.6'.													
				C-11 (69-72.8)	100	93														
				C-12 (72.8-74)	100	80														
				C-13 (74-79)	100	81	Large Quartz vein @ 86'-87'.	76.9-86.9	1.27 gpm/15 min 19 gallons	Not Recorded	Yes	-					447-615		Fracture @ 75.8'	343°/46° @ 73.7' and 64°/54° @ 74.2'
				C-14 (79-84)	100	92														
				C-15 (84-89)	98	88														
				C-16 (89-94)	100	100														
				No Packer Test																

*All Packer Tests were performed in 4-inch diameter open-rock wells.

** - Notable observations provided - open features identified. Dip angle is from horizontal. Values rounded.

BG - below grade

RQD - rock quality designation

TABLE 3-2
GROUNDWATER AND SURFACE WATER ELEVATIONS
PETERSBURGH LADFILL ADDENDUM TO SITE CHARACTERIZATION

Location ID	Northing	Easting	Ground Elevation (ft)	Casing Elevation (ft)	Meas.point (Riser)Elev.(ft)	Geol. Zone	Date	Depth to Water (ft)	Water Elev. (ft)	Remark
MW-01	1420354.236	807792.359	1342.683	1344.980	1345.148	B	1/4/2017	23.97	1321.18	
							2/12/2018	21.09	1324.06	
MW-01A	1420349.728	807788.339	1342.669	1344.887	1345.018	A	1/4/2017	16.08	1328.94	
							2/12/2018	12.68	1332.34	
MW-03	1419930.764	807284.479	1263.755	1265.955	1265.828	A	1/5/2017	12.39	1253.44	
							2/12/2018	12.25	1253.58	
MW-04	1419932.456	807288.037	1263.691	1266.407	1266.031	A	1/5/2017	11.81	1254.22	
							2/12/2018	11.63	1254.40	
MW-06D	1419749.888	807371.382	1293.751	1295.639	1295.439	B	1/5/2017	3.69	1291.75	
							2/12/2018	3.31	1292.13	
MW-06S	1419747.992	807365.379	1293.397	1294.932	1294.848	A	1/5/2017	2.37	1292.48	
							2/12/2018	0.82	1294.03	
MW-07D	1419674.621	807990.791	1319.804	1322.102	1321.912	B	1/5/2017	20.89	1301.02	
							2/12/2018	16.01	1305.90	
MW-07S	1419680.187	807991.309	1319.944	1322.511	1322.255	A	1/4/2017	16.39	1305.87	
							2/12/2018	14.62	1307.64	
MW-08D	1420213.407	808018.917	1326.083	1328.381	1328.120	B	1/4/2017	19.61	1308.51	
							2/12/2018	15.84	1312.28	
MW-08S	1420206.435	808020.143	1326.241	1328.581	1328.379	A	1/4/2017	17.19	1311.19	
							2/12/2018	10.76	1317.62	
MW-09D	1420363.981	808060.205	1303.050	1305.270	1305.070	B	2/12/2018	> MP	> 1305.07	Artesian well
MW-09S	1420374.431	808062.139	1302.290	1304.770	1304.480	A	2/12/2018	8.19	1296.29	
MW-10D	1419898.687	808087.510	1326.230	1328.380	1328.250	B	2/12/2018	21.01	1307.24	
MW-10S	1419893.214	808090.982	1326.210	1328.850	1328.510	A	2/12/2018	9.13	1319.38	
MW-11D	1419535.601	807572.418	1309.870	1312.100	1311.930	B	2/12/2018	1.97	1309.96	
MW-11S	1419531.155	807566.636	1310.890	1313.130	1312.980	A	2/12/2018	5.08	1307.90	
MW-12D	1420384.964	806951.218	1144.900	1147.490	1147.200	B	2/12/2018	> MP	> 1147.20	Artesian well
MW-12S	1420375.556	806950.334	1144.870	1147.790	1147.600	A	2/12/2018	4.66	1142.94	
MW-13D	1420888.872	806411.952	1067.230	1069.940	1069.770	B	2/12/2018	5.86	1063.91	
MW-13O	1420896.752	806410.454	1067.220	1069.410	1069.320	C	2/12/2018	4.13	1065.19	
MW-13S	1420879.632	806415.384	1068.240	1070.830	1070.680	A	2/12/2018	6.45	1064.23	
LC-01	1420017.278	807339.737	1253.120	--	--	--	2/26/2018	NM	--	
SW-01	1419391.620	808191.373	1331.898	--	--	--	2/26/2018	NM	--	
SW-02	1419571.478	807761.488	1301.298	--	--	--	2/26/2018	NM	--	
SW-03	1419593.382	807700.856	1303.849	--	--	--	2/26/2018	NM	--	
SW-04	1419713.037	807367.631	1290.959	--	--	--	2/26/2018	NM	--	
SW-05	1420078.575	807211.608	1223.407	--	--	--	2/26/2018	NM	--	
SW-06	1420152.445	807161.358	1198.287	--	--	--	2/26/2018	NM	--	
SW-07	1422114.197	807871.358	1092.382	--	--	--	2/26/2018	NM	--	
SW-08	1422114.617	806216.023	989.468	--	--	--	2/26/2018	NM	--	
SW-09	1422273.643	806322.448	988.129	--	--	--	2/26/2018	NM	--	
SW-10	1422336.399	805955.236	972.846	--	--	--	2/26/2018	NM	--	
SW-11	1414756.512	805533.243	1093.273	--	--	--	2/26/2018	NM	--	

MP - Measuring Point.
 NM - No Measurement.

MW - Monitoring Well
 LC - Leachate Seep
 SW - Surface Water

A Shallow Unconfined Aquifer
 B Deep Unconfined Aquifer
 C Till Water Bearing Zone

Table 3-3
Vertical Hydraulic Gradient Calculations
Petersburgh Landfill Addendum to Site Characterization

Location	Monitoring Well ID	Date	Groundwater Elevation (ft amsl)	Screen Setting feet bgs (ft amsl)	Ground Elevation (ft amsl)	Midpoint of Screen Elevation (ft amsl)	Vertical Separation (ft)	Phase 1 January 4-5, 2017 Gradient (ft)	Phase 2 February 12, 2018 Gradient (ft)
Well Pair MW-01	MW-01A	01/04/17 02/12/18	1328.94 1332.34	15 - 25 (1327.67 - 1317.67)	1342.67	1322.67 1322.67	27.49 27.49	0.282 (D)	0.301 (D)
	MW-01	01/04/17 02/12/18	1321.18 1324.06	32.5 - 62.5 (1310.2 - 1280.2)	1342.68	1295.18 1295.18			
Well Pair MW-03/ MW-04	MW-04	01/05/17 02/12/18	1254.22 1254.40	5 - 15 (1258.7 - 1248.7)	1263.69	1253.69 1253.69	13.93 13.93	0.056 (D)	0.059 (D)
	MW-03	01/05/17 02/12/18	1253.44 1253.58	19 - 29 (1244.8 - 1234.8)	1263.76	1239.76 1239.76			
Well Pair MW-06	MW-06S	01/05/17 02/12/18	1292.48 1294.03	40 - 45 (1253.4 - 1248.4)	1293.40	1250.90 1250.90	32.15 32.15	0.023 (D)	0.059 (D)
	MW-06D	01/05/17 02/12/18	1291.75 1292.13	70 - 80 (1223.8 - 1213.8)	1293.75	1218.75 1218.75			
Well Pair MW-07	MW-07S	01/04/17 02/12/18	1305.87 1307.64	22 - 32 (1297.9 - 1287.9)	1319.94	1292.94 1292.94	40.14 40.14	0.121 (D)	0.043 (D)
	MW-07D	01/05/17 02/12/18	1301.02 1305.90	62 - 72 (1257.8 - 1247.8)	1319.80	1252.80 1252.80			
Well Pair MW-08	MW-08S	01/04/17 02/12/18	1311.19 1317.62	10 - 20 (1316.2 - 1306.2)	1326.24	1311.24 1311.24	40.16 40.16	0.067 (D)	0.133 (D)
	MW-08D	01/04/17 02/12/18	1308.51 1312.28	50 - 60 (1276.1 - 1266.1)	1326.08	1271.08 1271.08			
Well Pair MW-09	MW-09S	02/12/18	1296.29	19 - 29 (1283.3 - 1273.3)	1302.29	1278.29	40.24		0.218 (U)
	MW-09D*	02/12/18	1305.07 top of riser	60 - 70 (1243.1 - 1233.1)	1303.05	1238.05			
Well Pair MW-10	MW-10S	02/12/18	1319.38	20 - 30 (1306.2 - 1296.2)	1326.21	1301.21	42.98		0.282 (D)
	MW-10D	02/12/18	1307.24	63 - 73 (1263.2 - 1253.2)	1326.23	1258.23			
Well Pair MW-11	MW-11S	02/12/18	1307.90	17 - 27 (1293.9 - 1283.9)	1310.89	1288.89	33.02		0.062 (U)
	MW-11D	02/12/18	1309.96	49 - 59 (1260.9 - 1250.9)	1309.87	1255.87			

Table 3-3
Vertical Hydraulic Gradient Calculations
Petersburgh Landfill Addendum to Site Characterization

Location	Monitoring Well ID	Date	Groundwater Elevation (ft amsl)	Screen Setting feet bgs (ft amsl)	Ground Elevation (ft amsl)	Midpoint of Screen Elevation (ft amsl)	Vertical Separation (ft)	Phase 1 January 4-5, 2017 Gradient (ft)	Phase 2 February 12, 2018 Gradient (ft)
Well Pair MW-12	MW-12S	02/12/18	1142.94	17 - 27 (1127.9 - 1117.9)	1144.87	1122.87	53.47		0.080 (U)
	MW-12D*	02/12/18	1147.20 top of riser	70.5 - 80.5 (1074.4 - 1064.4)	1144.90	1069.40			
Well Triplet MW-13	MW-13O	02/12/18	1065.19	6 - 16 (1061.2 - 1051.2)	1067.22	1056.22	35.98		0.027 (D)
	MW-13S	02/12/18	1064.23	43 - 53 (1025.2 - 1015.2)	1068.24	1020.24	29.01		0.011 (D)
	MW-13D	02/12/18	1063.91	71 - 81 (996.23 - 986.23)	1067.23	991.23	64.99		0.020 (D)

Notes:

ft - feet amsl - above mean sea level

(D) = DOWNWARD, (U) = UPWARD

Gradient = Difference in Groundwater Elevation Between Two Wells / The Vertical Separation Between the Midpoints of the Two Wells

* Artesian well. Gradient calculation based on measurement at the top of riser. Actual gradient is greater.

** Gradient in this row is between the overburden (MW-13O) and deep well (MW-13D).


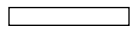
TABLE 4-1
SUMMARY OF DETECTED COMPOUNDS IN SOIL SAMPLES
PETERSBURGH LANDFILL ADDENDUM TO SITE CHARACTERIZATION

Location ID				MW-06D	MW-07D	MW-07D	MW-08D
Sample ID				MW-6-0-3	MW-7-0-2-20161202	MW-DUP-20161202	MW-8-0-6
Matrix				Soil	Soil	Soil	Soil
Depth Interval (ft)				0.0-3.0	0.0-2.0	0.0-2.0	0.0-0.5
Date Sampled				12/07/16	12/02/16	12/02/16	12/01/16
Parameter	Units	Criteria (1)	Criteria (2)			Field Duplicate (1-1)	
Volatile Organic Compounds							
Acetone	MG/KG	0.05	0.05				0.060 J
Semivolatile Organic Compounds							
Benzo(a)anthracene	MG/KG	1	1	0.079 J			
Benzo(b)fluoranthene	MG/KG	1	1.7	0.053 J			
Benzo(g,h,i)perylene	MG/KG	100	1000	0.035 J			
Benzo(k)fluoranthene	MG/KG	0.8	1.7	0.028 J			
Chrysene	MG/KG	1	1	0.089 J			
Fluoranthene	MG/KG	100	1000	0.15 J			
Indeno(1,2,3-cd)pyrene	MG/KG	0.5	8.2	0.029 J			
Phenanthrene	MG/KG	100	1000	0.13 J			
Pyrene	MG/KG	100	1000	0.14 J			
Pesticide Organic Compounds							
4,4'-DDD	MG/KG	0.0033	14			0.00061 J	
4,4'-DDE	MG/KG	0.0033	17				0.0011 J
4,4'-DDT	MG/KG	0.0033	136		0.00089 J		
delta-BHC	MG/KG	0.04	0.25		0.00089 J	0.00065 J	0.00065 J
Dieldrin	MG/KG	0.005	0.1				0.00080 J
Metals							
Aluminum	MG/KG	10000	-	16,800	15,400	15,800	20,000
Arsenic	MG/KG	13	16	8.0	5.3	5.7	5.7

Criteria (1)- 6 NYCRR Part 375.6, Remedial Program Soil Cleanup Objectives, Effective 12/14/06. Unrestricted Use, including CP-51 Table 1, Effective 12/2/10.

Criteria (2)- 6 NYCRR Part 375.6, Remedial Program Soil Cleanup Objectives, Effective 12/14/06. Restricted Use. Protection of Groundwater, including CP-51 Table 1, Effective 12/2/10.

Flags assigned during chemistry validation are shown.

 Concentration Exceeds Criteria (1)
 Concentration Exceeds Criteria (2)

- = No criteria. Criteria for PFAS = New York State Environmental Conservation Law preliminary residential SCO.

Empty cell = Not detected. J = The reported concentration is an estimated value.

Only Detected Results Reported.


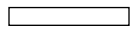
TABLE 4-1
SUMMARY OF DETECTED COMPOUNDS IN SOIL SAMPLES
PETERSBURGH LANDFILL ADDENDUM TO SITE CHARACTERIZATION

Location ID				MW-06D	MW-07D	MW-07D	MW-08D
Sample ID				MW-6-0-3	MW-7-0-2-20161202	MW-DUP-20161202	MW-8-0-6
Matrix				Soil	Soil	Soil	Soil
Depth Interval (ft)				0.0-3.0	0.0-2.0	0.0-2.0	0.0-0.5
Date Sampled				12/07/16	12/02/16	12/02/16	12/01/16
Parameter	Units	Criteria (1)	Criteria (2)			Field Duplicate (1-1)	
Metals							
Barium	MG/KG	350	820	114	53.3	74.3	61.9 J
Beryllium	MG/KG	7.2	47	0.43	0.41	0.57	0.45
Boron	MG/KG	0.5	-	1.8 J	1.4 J	1.8 J	2.4 J
Cadmium	MG/KG	2.5	7.5	0.29	0.080 J	0.11 J	0.13 J
Calcium	MG/KG	10000	-	2,780	1,200	1,490	1,950
Chromium	MG/KG	30	NS	18.0	15.3	16.1	29.0 J
Cobalt	MG/KG	20	-	18.8	15.3	13.5	18.5
Copper	MG/KG	50	1720	22.6	23.3	29.8	23.3
Iron	MG/KG	2000	-	29,400	29,300	31,100	38,100
Lead	MG/KG	63	450	22.2	13.6	15.0	17.0
Magnesium	MG/KG	-	-	5,120	5,780	6,440	7,120 J
Manganese	MG/KG	1600	2000	3,550	680	696	977 J
Mercury	MG/KG	0.18	0.73	0.038	0.014 J	0.012 J	0.028
Nickel	MG/KG	30	130	27.5	34.4	29.6	35.3
Potassium	MG/KG	-	-	1,360	1,230	1,770	1,610
Selenium	MG/KG	3.9	4				0.81 J
Sodium	MG/KG	-	-	68.4 J	64.7 J	56.2 J	72.8 J
Vanadium	MG/KG	39	-	17.0	14.0	15.9	18.1
Zinc	MG/KG	109	2480	82.6	84.8	75.9	103 J

Criteria (1)- 6 NYCRR Part 375.6, Remedial Program Soil Cleanup Objectives, Effective 12/14/06. Unrestricted Use, including CP-51 Table 1, Effective 12/2/10.

Criteria (2)- 6 NYCRR Part 375.6, Remedial Program Soil Cleanup Objectives, Effective 12/14/06. Restricted Use. Protection of Groundwater, including CP-51 Table 1, Effective 12/2/10.

Flags assigned during chemistry validation are shown.

	Concentration Exceeds Criteria (1)
	Concentration Exceeds Criteria (2)

- = No criteria. Criteria for PFAS = New York State Environmental Conservation Law preliminary residential SCO.

Empty cell = Not detected. J = The reported concentration is an estimated value.

Only Detected Results Reported.

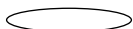
TABLE 4-1
SUMMARY OF DETECTED COMPOUNDS IN SOIL SAMPLES
PETERSBURGH LANDFILL ADDENDUM TO SITE CHARACTERIZATION

Location ID				MW-06D	MW-07D	MW-07D	MW-08D
Sample ID				MW-6-0-3	MW-7-0-2-20161202	MW-DUP-20161202	MW-8-0-6
Matrix				Soil	Soil	Soil	Soil
Depth Interval (ft)				0.0-3.0	0.0-2.0	0.0-2.0	0.0-0.5
Date Sampled				12/07/16	12/02/16	12/02/16	12/01/16
Parameter	Units	Criteria (1)	Criteria (2)			Field Duplicate (1-1)	
Per- and Polyfluoroalkyl Substances							
Perfluorodecanoic acid (PFDA)	UG/KG	-	-			0.090 J	0.37 J
Perfluorododecanoic acid (PFDoA)	UG/KG	-	-				0.16 J
Perfluorononanoic acid (PFNA)	UG/KG	-	-	0.11 J			0.10 J
Perfluorooctanesulfonic acid (PFOS)	UG/KG	140	-	2.2		0.48	9.5
Perfluorooctanoic acid (PFOA)	UG/KG	140	-	0.42			0.61
Perfluorotetradecanoic acid (PFTeA)	UG/KG	-	-				0.19 J
Perfluoroundecanoic acid (PFUnA)	UG/KG	-	-				0.18 J
Total PFOA and PFOS	UG/KG	140	-	2.62		0.48	10.1

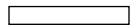
Criteria (1)- 6 NYCRR Part 375.6, Remedial Program Soil Cleanup Objectives, Effective 12/14/06. Unrestricted Use, including CP-51 Table 1, Effective 12/2/10.

Criteria (2)- 6 NYCRR Part 375.6, Remedial Program Soil Cleanup Objectives, Effective 12/14/06. Restricted Use. Protection of Groundwater, including CP-51 Table 1, Effective 12/2/10.

Flags assigned during chemistry validation are shown.



Concentration Exceeds Criteria (1)



Concentration Exceeds Criteria (2)

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Only Detected Results Reported.

TABLE 4-2A
SUMMARY OF DETECTED COMPOUNDS IN GROUNDWATER SAMPLES
EXCEPT PFAS
PETERSBURGH LANDFILL ADDENDUM TO SITE CHARACTERIZATION

Location ID			MW-01	MW-01	MW-01A	MW-01A	MW-03
Sample ID			MW-1-010417	MW-01 (UP-GRADIENT) 030118	MW-1A-010417	MW-01A (UP-GRADIENT) 030118	MW-3-010517
Matrix			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-	-	-
Date Sampled			01/04/17	03/01/18	01/04/17	03/01/18	01/05/17
Parameter	Units	Criteria*					
Volatile Organic Compounds							
1,1-Dichloroethane	UG/L	5		NA		NA	
Acetone	UG/L	50		NA		NA	
Benzene	UG/L	1		NA		NA	1.5
Carbon disulfide	UG/L	60		NA		NA	
Chlorobenzene	UG/L	5		NA		NA	4.4
Chloroethane	UG/L	5		NA		NA	0.74 J
Semivolatile Organic Compounds							
1,4-Dioxane	UG/L	-	NA		NA		NA
Dimethylphthalate	UG/L	50		NA		NA	0.62 J
Pesticide Organic Compounds							
4,4'-DDD	UG/L	0.3		NA		NA	
alpha-BHC	UG/L	0.01		NA		NA	
Dieldrin	UG/L	0.004		NA		NA	
Metals							
Aluminum	UG/L	-	170 J		270		310
Arsenic	UG/L	25					87
Barium	UG/L	1000	76	78	44	13	430
Boron	UG/L	1000	5.5 J		5.2 J		250
Calcium	UG/L	-	36,100	34,300	20,200	12,200	92,500
Chromium	UG/L	50					2.6 J
Chromium VI	UG/L	50					
Cobalt	UG/L	-					45

*Criteria- NYSDEC TOGS (1.1.1), Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations. April 2000, Class GA.

Flags assigned during chemistry validation are shown.

 Concentration Exceeds Criteria

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J = The reported concentration is an estimated value. J+ = Estimated value with a high bias. J- = Estimated value with a low bias.

Only Detected Results Reported.

TABLE 4-2A
SUMMARY OF DETECTED COMPOUNDS IN GROUNDWATER SAMPLES
EXCEPT PFAS
PETERSBURGH LANDFILL ADDENDUM TO SITE CHARACTERIZATION

Location ID			MW-01	MW-01	MW-01A	MW-01A	MW-03
Sample ID			MW-1-010417	MW-01 (UP-GRADIENT) 030118	MW-1A-010417	MW-01A (UP-GRADIENT) 030118	MW-3-010517
Matrix			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-	-	-
Date Sampled			01/04/17	03/01/18	01/04/17	03/01/18	01/05/17
Parameter	Units	Criteria*					
Metals							
Copper	UG/L	200		8.6 J		13	
Iron	UG/L	300	250	88	420	46 J	40,800
Lead	UG/L	25					4.2 J
Magnesium	UG/L	35000	7,400	7,100	3,900	2,400	25,600
Manganese	UG/L	300	42	58 J+	15	6 J+	18,100
Nickel	UG/L	100					10
Potassium	UG/L	-	750	860 J+	480 J	640 J+	15,900
Silver	UG/L	50					
Sodium	UG/L	20000	5,500	5,500	2,100	1,800	44,900
Thallium	UG/L	0.5					11 J
Vanadium	UG/L	-					
Zinc	UG/L	2000		11		10	
Dissolved Metals							
Arsenic	UG/L	25	NA	NA	NA	NA	NA
Barium	UG/L	1000	NA	NA	NA	NA	NA
Boron	UG/L	1000	NA	NA	NA	NA	NA
Calcium	UG/L	-	NA	NA	NA	NA	NA
Cobalt	UG/L	-	NA	NA	NA	NA	NA
Copper	UG/L	200	NA	NA	NA	NA	NA
Iron	UG/L	300	NA	NA	NA	NA	NA
Magnesium	UG/L	35000	NA	NA	NA	NA	NA
Manganese	UG/L	300	NA	NA	NA	NA	NA

*Criteria- NYSDEC TOGS (1.1.1), Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations. April 2000, Class GA.

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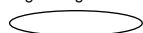
Only Detected Results Reported.

TABLE 4-2A
SUMMARY OF DETECTED COMPOUNDS IN GROUNDWATER SAMPLES
EXCEPT PFAS
PETERSBURGH LANDFILL ADDENDUM TO SITE CHARACTERIZATION

Location ID			MW-01	MW-01	MW-01A	MW-01A	MW-03
Sample ID			MW-1-010417	MW-01 (UP-GRADIENT) 030118	MW-1A-010417	MW-01A (UP-GRADIENT) 030118	MW-3-010517
Matrix			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-	-	-
Date Sampled			01/04/17	03/01/18	01/04/17	03/01/18	01/05/17
Parameter	Units	Criteria*					
Dissolved Metals							
Nickel	UG/L	100	NA	NA	NA	NA	NA
Potassium	UG/L	-	NA	NA	NA	NA	NA
Sodium	UG/L	20000	NA	NA	NA	NA	NA
Zinc	UG/L	2000	NA	NA	NA	NA	NA
Miscellaneous Parameters							
Alkalinity	MG/L	-	NA	NA	NA	NA	NA
Alkalinity, Bicarbonate (as CaCO ₃)	MG/L	-	NA	109	NA	45.4	NA
Alkalinity, Total (as CaCO ₃)	MG/L	-	117	109	57.3	45.4	444
Ammonia (as N)	MG/L	-					18.2
Biochemical Oxygen Demand (BOD)	MG/L	-					8 J
Bromide	MG/L	2			0.16 J		0.4 J
Chemical Oxygen Demand (COD)	MG/L	-				43.5	26.1
Chloride	MG/L	2.50E+05	1	1.2	1.7	1.2	58.3
Color	COLOR UNIT	15	5.00		5.00		5.00
Cyanide	MG/L	0.2					0.0067 J
Hardness (as CaCO ₃)	MG/L	-	140	124	68	40.0	530
Nitrate-Nitrogen	MG/L	10			0.045 J	0.073	
Phenolics, Total Recoverable	MG/L	1					0.0085 J
Sulfate (as SO ₄)	MG/L	250	22	25.1	5.6	6.2	1.7 J
Total Dissolved Solids	MG/L	-	156	141	71	81.0	582
Total Kjeldahl Nitrogen	MG/L	-				0.19 J	16.8
Total Organic Carbon (TOC)	MG/L	-	0.46 J		0.64 J	0.56 J	9.1

*Criteria- NYSDEC TOGS (1.1.1), Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations. April 2000, Class GA.

Flags assigned during chemistry validation are shown.



Concentration Exceeds Criteria

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Only Detected Results Reported.

TABLE 4-2A
SUMMARY OF DETECTED COMPOUNDS IN GROUNDWATER SAMPLES
EXCEPT PFAS
PETERSBURGH LANDFILL ADDENDUM TO SITE CHARACTERIZATION

Location ID			MW-03	MW-04	MW-04	MW-04	MW-06D
Sample ID			MW-3 (SOURCE) 030518	MW-4-010517	DUP 030518	MW-4 (SOURCE) 030518	DUP-010517
Matrix			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-	-	-
Date Sampled			03/05/18	01/05/17	03/05/18	03/05/18	01/05/17
Parameter	Units	Criteria*			Field Duplicate (1-1)		Field Duplicate (1-1)
Volatile Organic Compounds							
1,1-Dichloroethane	UG/L	5	NA		NA	NA	
Acetone	UG/L	50	NA		NA	NA	
Benzene	UG/L	1	NA	0.97 J	NA	NA	
Carbon disulfide	UG/L	60	NA		NA	NA	
Chlorobenzene	UG/L	5	NA	3.2	NA	NA	
Chloroethane	UG/L	5	NA		NA	NA	
Semivolatile Organic Compounds							
1,4-Dioxane	UG/L	-	6.9 J	NA	4.5 J	2.6 J	NA
Dimethylphthalate	UG/L	50	NA		NA	NA	
Pesticide Organic Compounds							
4,4'-DDD	UG/L	0.3	NA		NA	NA	
alpha-BHC	UG/L	0.01	NA		NA	NA	
Dieldrin	UG/L	0.004	NA		NA	NA	
Metals							
Aluminum	UG/L	-	140 J			180 J	1,700
Arsenic	UG/L	25	86 J-	21	17 J+	17 J-	9.5 J
Barium	UG/L	1000	370	310	170	140	110
Boron	UG/L	1000	220	200	130 J-	110	24
Calcium	UG/L	-	84,000	78,700	64,700	59,000	46,200
Chromium	UG/L	50		1.3 J			1.6 J
Chromium VI	UG/L	50					
Cobalt	UG/L	-	43	32	23	18	

*Criteria- NYSDEC TOGS (1.1.1), Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations. April 2000, Class GA.

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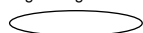
Only Detected Results Reported.

TABLE 4-2A
SUMMARY OF DETECTED COMPOUNDS IN GROUNDWATER SAMPLES
EXCEPT PFAS
PETERSBURGH LANDFILL ADDENDUM TO SITE CHARACTERIZATION

Location ID			MW-03	MW-04	MW-04	MW-04	MW-06D
Sample ID			MW-3 (SOURCE) 030518	MW-4-010517	DUP 030518	MW-4 (SOURCE) 030518	DUP-010517
Matrix			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-	-	-
Date Sampled			03/05/18	01/05/17	03/05/18	03/05/18	01/05/17
Parameter	Units	Criteria*			Field Duplicate (1-1)		Field Duplicate (1-1)
Metals							
Copper	UG/L	200	28		16	17	2 J
Iron	UG/L	300	39,900	17,400	13,100	11,300	2,000
Lead	UG/L	25	4 J	3.3 J	3.2 J	3.4 J	
Magnesium	UG/L	35000	22,800	21,800	17,700	16,400	2,800
Manganese	UG/L	300	17,900	14,500	10,000	8,000	44
Nickel	UG/L	100	8.7 J	8 J	5.1 J	4.7 J	1.5 J
Potassium	UG/L	-	13,500	11,900	7,100	5,800	15,100
Silver	UG/L	50					
Sodium	UG/L	20000	41,000	37,500	28,100	25,700	30,700
Thallium	UG/L	0.5		10 J			
Vanadium	UG/L	-					4.2 J
Zinc	UG/L	2000	21 J-		11	10 J-	
Dissolved Metals							
Arsenic	UG/L	25	NA	NA	NA	NA	NA
Barium	UG/L	1000	NA	NA	NA	NA	NA
Boron	UG/L	1000	NA	NA	NA	NA	NA
Calcium	UG/L	-	NA	NA	NA	NA	NA
Cobalt	UG/L	-	NA	NA	NA	NA	NA
Copper	UG/L	200	NA	NA	NA	NA	NA
Iron	UG/L	300	NA	NA	NA	NA	NA
Magnesium	UG/L	35000	NA	NA	NA	NA	NA
Manganese	UG/L	300	NA	NA	NA	NA	NA

*Criteria- NYSDEC TOGS (1.1.1), Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations. April 2000, Class GA.

Flags assigned during chemistry validation are shown.



Concentration Exceeds Criteria

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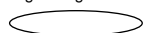
Only Detected Results Reported.

TABLE 4-2A
SUMMARY OF DETECTED COMPOUNDS IN GROUNDWATER SAMPLES
EXCEPT PFAS
PETERSBURGH LANDFILL ADDENDUM TO SITE CHARACTERIZATION

Location ID			MW-03	MW-04	MW-04	MW-04	MW-06D
Sample ID			MW-3 (SOURCE) 030518	MW-4-010517	DUP 030518	MW-4 (SOURCE) 030518	DUP-010517
Matrix			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-	-	-
Date Sampled			03/05/18	01/05/17	03/05/18	03/05/18	01/05/17
Parameter	Units	Criteria*			Field Duplicate (1-1)		Field Duplicate (1-1)
Dissolved Metals							
Nickel	UG/L	100	NA	NA	NA	NA	NA
Potassium	UG/L	-	NA	NA	NA	NA	NA
Sodium	UG/L	20000	NA	NA	NA	NA	NA
Zinc	UG/L	2000	NA	NA	NA	NA	NA
Miscellaneous Parameters							
Alkalinity	MG/L	-	NA	NA	NA	NA	NA
Alkalinity, Bicarbonate (as CaCO ₃)	MG/L	-	318	NA	250	242	NA
Alkalinity, Total (as CaCO ₃)	MG/L	-	318	373	250	242	87.8
Ammonia (as N)	MG/L	-	15.2	12.4 J	7.2 J	4.9 J	0.34
Biochemical Oxygen Demand (BOD)	MG/L	-		4.5 J			16.8 J
Bromide	MG/L	2		0.38 J	0.15 J	0.16 J	
Chemical Oxygen Demand (COD)	MG/L	-	20.9	18.3	24.5 J		12.1
Chloride	MG/L	2.50E+05	51.4	50.4	36.7	30.0	2.3
Color	COLOR UNIT	15	125		70.0	40.0	
Cyanide	MG/L	0.2		0.0074 J			
Hardness (as CaCO ₃)	MG/L	-	320	332	248	224	160
Nitrate-Nitrogen	MG/L	10	0.085	0.045 J	0.18	0.26	
Phenolics, Total Recoverable	MG/L	1	0.014 J-	0.012		0.0092 J-	0.0056 J
Sulfate (as SO ₄)	MG/L	250		2.3 J	2.5 J	3.6 J	10.6
Total Dissolved Solids	MG/L	-	534	499	365	321	139
Total Kjeldahl Nitrogen	MG/L	-	14.8	10.5	7.3 J	4.8 J	0.35 J
Total Organic Carbon (TOC)	MG/L	-	8.6	6.4	5.2	3.9	8.9 J

*Criteria- NYSDEC TOGS (1.1.1), Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations. April 2000, Class GA.

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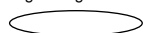
Only Detected Results Reported.

TABLE 4-2A
SUMMARY OF DETECTED COMPOUNDS IN GROUNDWATER SAMPLES
EXCEPT PFAS
PETERSBURGH LANDFILL ADDENDUM TO SITE CHARACTERIZATION

Location ID			MW-06D	MW-06D	MW-06S	MW-06S	MW-07D
Sample ID			MW-6D-010517	MW-6D 022818	MW-6S-010517	MW-6S 022818	MW-7D-010417
Matrix			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-	-	-
Date Sampled			01/05/17	02/28/18	01/05/17	02/28/18	01/04/17
Parameter	Units	Criteria*					
Volatile Organic Compounds							
1,1-Dichloroethane	UG/L	5		NA		NA	
Acetone	UG/L	50	3.1 J	NA		NA	5.3 J
Benzene	UG/L	1		NA		NA	
Carbon disulfide	UG/L	60		NA		NA	
Chlorobenzene	UG/L	5		NA		NA	
Chloroethane	UG/L	5		NA		NA	
Semivolatile Organic Compounds							
1,4-Dioxane	UG/L	-	NA	NA	NA	NA	NA
Dimethylphthalate	UG/L	50		NA		NA	
Pesticide Organic Compounds							
4,4'-DDD	UG/L	0.3		NA		NA	
alpha-BHC	UG/L	0.01		NA		NA	
Dieldrin	UG/L	0.004		NA		NA	
Metals							
Aluminum	UG/L	-	1,300 J	1,000	750	610	280
Arsenic	UG/L	25	9.5 J			6.4 J-	
Barium	UG/L	1000	120	80	39	30	160
Boron	UG/L	1000	25	15 J	7.1 J	7.1 J	37
Calcium	UG/L	-	50,900	14,000	25,200	25,100	33,800
Chromium	UG/L	50	1.5 J	1.6 J+		1.4 J+	
Chromium VI	UG/L	50				6.8 J	
Cobalt	UG/L	-				1.1 J	

*Criteria- NYSDEC TOGS (1.1.1), Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations. April 2000, Class GA.

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TABLE 4-2A
SUMMARY OF DETECTED COMPOUNDS IN GROUNDWATER SAMPLES
EXCEPT PFAS
PETERSBURGH LANDFILL ADDENDUM TO SITE CHARACTERIZATION

Location ID			MW-06D	MW-06D	MW-06S	MW-06S	MW-07D
Sample ID			MW-6D-010517	MW-6D 022818	MW-6S-010517	MW-6S 022818	MW-7D-010417
Matrix			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-	-	-
Date Sampled			01/05/17	02/28/18	01/05/17	02/28/18	01/04/17
Parameter	Units	Criteria*					
Metals							
Copper	UG/L	200		15	2 J	5.8 J	
Iron	UG/L	300	1,400	1,400	640	640	280
Lead	UG/L	25					
Magnesium	UG/L	35000	2,000 J	4,000	3,700	3,700	8,300
Manganese	UG/L	300	31	48	880	620	380 J
Nickel	UG/L	100	1.4 J		1.6 J	1.3 J	
Potassium	UG/L	-	17,200	1,900	1,200	4,200	3,800
Silver	UG/L	50					
Sodium	UG/L	20000	34,600	8,600	8,700	7,400	13,400
Thallium	UG/L	0.5					
Vanadium	UG/L	-	4.4 J				
Zinc	UG/L	2000		14		4.5 J	
Dissolved Metals							
Arsenic	UG/L	25	NA	NA	NA	NA	NA
Barium	UG/L	1000	NA	NA	NA	NA	NA
Boron	UG/L	1000	NA	NA	NA	NA	NA
Calcium	UG/L	-	NA	NA	NA	NA	NA
Cobalt	UG/L	-	NA	NA	NA	NA	NA
Copper	UG/L	200	NA	NA	NA	NA	NA
Iron	UG/L	300	NA	NA	NA	NA	NA
Magnesium	UG/L	35000	NA	NA	NA	NA	NA
Manganese	UG/L	300	NA	NA	NA	NA	NA

*Criteria- NYSDEC TOGS (1.1.1), Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations. April 2000, Class GA.

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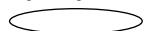
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TABLE 4-2A
SUMMARY OF DETECTED COMPOUNDS IN GROUNDWATER SAMPLES
EXCEPT PFAS
PETERSBURGH LANDFILL ADDENDUM TO SITE CHARACTERIZATION

Location ID			MW-06D	MW-06D	MW-06S	MW-06S	MW-07D
Sample ID			MW-6D-010517	MW-6D 022818	MW-6S-010517	MW-6S 022818	MW-7D-010417
Matrix			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-	-	-
Date Sampled			01/05/17	02/28/18	01/05/17	02/28/18	01/04/17
Parameter	Units	Criteria*					
Dissolved Metals							
Nickel	UG/L	100	NA	NA	NA	NA	NA
Potassium	UG/L	-	NA	NA	NA	NA	NA
Sodium	UG/L	20000	NA	NA	NA	NA	NA
Zinc	UG/L	2000	NA	NA	NA	NA	NA
Miscellaneous Parameters							
Alkalinity	MG/L	-	NA	NA	NA	NA	NA
Alkalinity, Bicarbonate (as CaCO ₃)	MG/L	-	NA	45.9	NA	93.1	NA
Alkalinity, Total (as CaCO ₃)	MG/L	-	86	45.9	86.8	93.1	75.6
Ammonia (as N)	MG/L	-	0.46	0.048			0.26
Biochemical Oxygen Demand (BOD)	MG/L	-	10.5 J		6.9 J		
Bromide	MG/L	2					0.11 J
Chemical Oxygen Demand (COD)	MG/L	-	27.4 J	7.7 J	8.5 J	9.0 J	43.5
Chloride	MG/L	2.50E+05	2.4	0.87	3.3	0.81	24.8
Color	COLOR UNIT	15		5.00 J	10.0	30.0 J	5.00
Cyanide	MG/L	0.2					
Hardness (as CaCO ₃)	MG/L	-	140	56.0	84	82.0	92
Nitrate-Nitrogen	MG/L	10				0.13	
Phenolics, Total Recoverable	MG/L	1	0.012 J		0.0065 J		0.019 J
Sulfate (as SO ₄)	MG/L	250	10.8	11.2	12.5	12.2	10.5
Total Dissolved Solids	MG/L	-	117	22.0	166	106	122
Total Kjeldahl Nitrogen	MG/L	-	0.48 J			0.17 J	0.25 J
Total Organic Carbon (TOC)	MG/L	-	6.5 J		2.5	0.81 J	5.5

*Criteria- NYSDEC TOGS (1.1.1), Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations. April 2000, Class GA.

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Only Detected Results Reported.

TABLE 4-2A
SUMMARY OF DETECTED COMPOUNDS IN GROUNDWATER SAMPLES
EXCEPT PFAS
PETERSBURGH LANDFILL ADDENDUM TO SITE CHARACTERIZATION

Location ID			MW-07D	MW-07S	MW-07S	MW-08D	MW-08D
Sample ID			MW-7D 030618	MW-7S-010417	MW-7S 030618	MW-8D-010417	MW-8D 022718
Matrix			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-	-	-
Date Sampled			03/06/18	01/04/17	03/06/18	01/04/17	02/27/18
Parameter	Units	Criteria*					
Volatile Organic Compounds							
1,1-Dichloroethane	UG/L	5	NA		NA	0.41 J	NA
Acetone	UG/L	50	NA	360	NA		NA
Benzene	UG/L	1	NA		NA		NA
Carbon disulfide	UG/L	60	NA		NA	0.19 J	NA
Chlorobenzene	UG/L	5	NA		NA		NA
Chloroethane	UG/L	5	NA		NA		NA
Semivolatile Organic Compounds							
1,4-Dioxane	UG/L	-	NA	NA	NA	NA	NA
Dimethylphthalate	UG/L	50	NA		NA		NA
Pesticide Organic Compounds							
4,4'-DDD	UG/L	0.3	NA		NA		NA
alpha-BHC	UG/L	0.01	NA		NA		NA
Dieldrin	UG/L	0.004	NA		NA		NA
Metals							
Aluminum	UG/L	-	140 J	2,400	180 J	340	68 J
Arsenic	UG/L	25					11 J+
Barium	UG/L	1000	81	260	190	220	220
Boron	UG/L	1000	34	31	27	15 J	17 J
Calcium	UG/L	-	13,400	29,300	25,100	74,000	75,900
Chromium	UG/L	50		2.5 J			
Chromium VI	UG/L	50	5.5 J		5.5 J		
Cobalt	UG/L	-		3.6 J	9.5		

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TABLE 4-2A
SUMMARY OF DETECTED COMPOUNDS IN GROUNDWATER SAMPLES
EXCEPT PFAS
PETERSBURGH LANDFILL ADDENDUM TO SITE CHARACTERIZATION

Location ID			MW-07D	MW-07S	MW-07S	MW-08D	MW-08D
Sample ID			MW-7D 030618	MW-7S-010417	MW-7S 030618	MW-8D-010417	MW-8D 022718
Matrix			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-	-	-
Date Sampled			03/06/18	01/04/17	03/06/18	01/04/17	02/27/18
Parameter	Units	Criteria*					
Metals							
Copper	UG/L	200	2.1 J	4 J	62		14
Iron	UG/L	300		5,000	2,300	380	490
Lead	UG/L	25		3.3 J	5 J		
Magnesium	UG/L	35000	5,600	12,200	11,100	14,000	13,900
Manganese	UG/L	300	43	11,200	12,300	470	430
Nickel	UG/L	100		8.3 J	12		
Potassium	UG/L	-	9,900	1,900	2,000	1,500	930
Silver	UG/L	50					
Sodium	UG/L	20000	23,400	97,000	30,000	11,800	8,200
Thallium	UG/L	0.5					
Vanadium	UG/L	-	2.1 J	1.8 J			
Zinc	UG/L	2000	8.3 J	15	33		15
Dissolved Metals							
Arsenic	UG/L	25	NA	NA	NA	NA	8.7 J
Barium	UG/L	1000	NA	NA	NA	NA	210
Boron	UG/L	1000	NA	NA	NA	NA	18 J
Calcium	UG/L	-	NA	NA	NA	NA	74,300
Cobalt	UG/L	-	NA	NA	NA	NA	
Copper	UG/L	200	NA	NA	NA	NA	6.8 J
Iron	UG/L	300	NA	NA	NA	NA	340
Magnesium	UG/L	35000	NA	NA	NA	NA	13,300
Manganese	UG/L	300	NA	NA	NA	NA	380

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TABLE 4-2A
SUMMARY OF DETECTED COMPOUNDS IN GROUNDWATER SAMPLES
EXCEPT PFAS
PETERSBURGH LANDFILL ADDENDUM TO SITE CHARACTERIZATION

Location ID			MW-07D	MW-07S	MW-07S	MW-08D	MW-08D
Sample ID			MW-7D 030618	MW-7S-010417	MW-7S 030618	MW-8D-010417	MW-8D 022718
Matrix			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-	-	-
Date Sampled			03/06/18	01/04/17	03/06/18	01/04/17	02/27/18
Parameter	Units	Criteria*					
Dissolved Metals							
Nickel	UG/L	100	NA	NA	NA	NA	
Potassium	UG/L	-	NA	NA	NA	NA	900
Sodium	UG/L	20000	NA	NA	NA	NA	8,200
Zinc	UG/L	2000	NA	NA	NA	NA	7.9 J
Miscellaneous Parameters							
Alkalinity	MG/L	-	NA	NA	NA	NA	NA
Alkalinity, Bicarbonate (as CaCO ₃)	MG/L	-	77.7	NA	110	NA	254
Alkalinity, Total (as CaCO ₃)	MG/L	-	77.7	98	110	244	254
Ammonia (as N)	MG/L	-		0.039	0.35		
Biochemical Oxygen Demand (BOD)	MG/L	-	32.8	50.6		6.9	
Bromide	MG/L	2	0.14 J				
Chemical Oxygen Demand (COD)	MG/L	-	42.8	79.1		6 J	
Chloride	MG/L	2.50E+05	26.9	77	63.3	9.4	5.1
Color	COLOR UNIT	15		5.00	35.0	5.00	10.0
Cyanide	MG/L	0.2		0.0086 J			
Hardness (as CaCO ₃)	MG/L	-	60.0	172	152	232	260
Nitrate-Nitrogen	MG/L	10		0.31	1.2		
Phenolics, Total Recoverable	MG/L	1				0.0059 J	
Sulfate (as SO ₄)	MG/L	250	9.6	16.6	12.6	15.3	15.5
Total Dissolved Solids	MG/L	-	142	291	240	359	295
Total Kjeldahl Nitrogen	MG/L	-			0.53		
Total Organic Carbon (TOC)	MG/L	-	10.1	18.9	1.9	3.2	1.3

*Criteria- NYSDEC TOGS (1.1.1), Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations. April 2000, Class GA.

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SUMMARY OF DETECTED COMPOUNDS IN GROUNDWATER SAMPLES
EXCEPT PFAS
PETERSBURGH LANDFILL ADDENDUM TO SITE CHARACTERIZATION

Location ID			MW-08S	MW-08S	MW-09D	MW-09S	MW-10D
Sample ID			MW-8S-010517	MW-8S 022718	MW-9D 022718	MW-9S 022718	MW-10D 030118
Matrix			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-	-	-
Date Sampled			01/05/17	02/27/18	02/27/18	02/27/18	03/01/18
Parameter	Units	Criteria*					
Volatile Organic Compounds							
1,1-Dichloroethane	UG/L	5		NA	NA	NA	NA
Acetone	UG/L	50	4.9 J	NA	NA	NA	NA
Benzene	UG/L	1		NA	NA	NA	NA
Carbon disulfide	UG/L	60		NA	NA	NA	NA
Chlorobenzene	UG/L	5		NA	NA	NA	NA
Chloroethane	UG/L	5		NA	NA	NA	NA
Semivolatile Organic Compounds							
1,4-Dioxane	UG/L	-	NA	NA	NA	NA	NA
Dimethylphthalate	UG/L	50		NA	NA	NA	NA
Pesticide Organic Compounds							
4,4'-DDD	UG/L	0.3	0.014 J	NA	NA	NA	NA
alpha-BHC	UG/L	0.01	0.0099 J	NA	NA	NA	NA
Dieldrin	UG/L	0.004	0.027 J	NA	NA	NA	NA
Metals							
Aluminum	UG/L	-	1,300	140 J		750	780 J-
Arsenic	UG/L	25	6 J		6.2 J-	12 J-	
Barium	UG/L	1000	810	2,100	170	86	100
Boron	UG/L	1000	27	23	8.5 J	41	
Calcium	UG/L	-	85,500	70,500	47,200	43,800	13,600
Chromium	UG/L	50	3.6 J				1.6 J
Chromium VI	UG/L	50					
Cobalt	UG/L	-	130	34 J-			1.6 J

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TABLE 4-2A
SUMMARY OF DETECTED COMPOUNDS IN GROUNDWATER SAMPLES
EXCEPT PFAS
PETERSBURGH LANDFILL ADDENDUM TO SITE CHARACTERIZATION

Location ID			MW-08S	MW-08S	MW-09D	MW-09S	MW-10D
Sample ID			MW-8S-010517	MW-8S 022718	MW-9D 022718	MW-9S 022718	MW-10D 030118
Matrix			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-	-	-
Date Sampled			01/05/17	02/27/18	02/27/18	02/27/18	03/01/18
Parameter	Units	Criteria*					
Metals							
Copper	UG/L	200	6.9 J	10	9.3 J	16	6.9 J
Iron	UG/L	300	2,000	730	130	310	810
Lead	UG/L	25	4.2 J				
Magnesium	UG/L	35000	16,700	13,200	11,100	9,800	15,200
Manganese	UG/L	300	24,500	21,100	790	180	280 J+
Nickel	UG/L	100	11	11 J-			
Potassium	UG/L	-	2,800	1,900	620	1,900	37,200 J+
Silver	UG/L	50	1.7 J				
Sodium	UG/L	20000	25,200	26,300	3,700	31,300	24,800
Thallium	UG/L	0.5	17 J				
Vanadium	UG/L	-	1.7 J			1.8 J-	
Zinc	UG/L	2000				13	6.1 J
Dissolved Metals							
Arsenic	UG/L	25	NA		5.7 J	6.3 J	NA
Barium	UG/L	1000	NA	2,000	150	71	NA
Boron	UG/L	1000	NA	24	9.2 J	43	NA
Calcium	UG/L	-	NA	69,800	45,200	39,400	NA
Cobalt	UG/L	-	NA	32			NA
Copper	UG/L	200	NA	15	20	12	NA
Iron	UG/L	300	NA	110	100		NA
Magnesium	UG/L	35000	NA	12,700	10,400	8,600	NA
Manganese	UG/L	300	NA	20,000	750	150	NA

*Criteria- NYSDEC TOGS (1.1.1), Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations. April 2000, Class GA.

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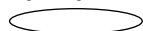
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TABLE 4-2A
SUMMARY OF DETECTED COMPOUNDS IN GROUNDWATER SAMPLES
EXCEPT PFAS
PETERSBURGH LANDFILL ADDENDUM TO SITE CHARACTERIZATION

Location ID			MW-08S	MW-08S	MW-09D	MW-09S	MW-10D
Sample ID			MW-8S-010517	MW-8S 022718	MW-9D 022718	MW-9S 022718	MW-10D 030118
Matrix			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-	-	-
Date Sampled			01/05/17	02/27/18	02/27/18	02/27/18	03/01/18
Parameter	Units	Criteria*					
Dissolved Metals							
Nickel	UG/L	100	NA	12			NA
Potassium	UG/L	-	NA	1,800	580	1,800	NA
Sodium	UG/L	20000	NA	26,400	3,600	32,700	NA
Zinc	UG/L	2000	NA	8.2 J	16	7.9 J	NA
Miscellaneous Parameters							
Alkalinity	MG/L	-	NA	NA	NA	NA	NA
Alkalinity, Bicarbonate (as CaCO ₃)	MG/L	-	NA	314	161	212	145
Alkalinity, Total (as CaCO ₃)	MG/L	-	361	314	161	212	145
Ammonia (as N)	MG/L	-	0.78	0.64		0.010 J	
Biochemical Oxygen Demand (BOD)	MG/L	-	8.2 J	4.6		3.6	13.9
Bromide	MG/L	2	0.082 J	0.27 J			
Chemical Oxygen Demand (COD)	MG/L	-	17	34.9	18.1	34.0	14.1
Chloride	MG/L	2.50E+05	11.4	2.9	1.5	14.7	7.9
Color	COLOR UNIT	15	10.0	25.0	5.00	5.00	
Cyanide	MG/L	0.2					
Hardness (as CaCO ₃)	MG/L	-		20.0	164	156	102
Nitrate-Nitrogen	MG/L	10		4.0			
Phenolics, Total Recoverable	MG/L	1	0.006 J	0.0062 J	0.0058 J-		
Sulfate (as SO ₄)	MG/L	250	16.4	23.1	14.0	18.6	18.9
Total Dissolved Solids	MG/L	-	432	410	205	257	206
Total Kjeldahl Nitrogen	MG/L	-	1	1.6		0.15 J	
Total Organic Carbon (TOC)	MG/L	-	6.3	10.9	0.67 J	2.9	6.3

*Criteria- NYSDEC TOGS (1.1.1), Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations. April 2000, Class GA.

Flags assigned during chemistry validation are shown.



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Only Detected Results Reported.

TABLE 4-2A
SUMMARY OF DETECTED COMPOUNDS IN GROUNDWATER SAMPLES
EXCEPT PFAS
PETERSBURGH LANDFILL ADDENDUM TO SITE CHARACTERIZATION

Location ID			MW-10S	MW-11D	MW-11S	MW-12D	MW-12S
Sample ID			MW-10S 030118	MW-11D 022818	MW-11S 022818	MW-12D (Down gradient) 030618	MW-12S (Down gradient) 030618
Matrix			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-	-	-
Date Sampled			03/01/18	02/28/18	02/28/18	03/06/18	03/06/18
Parameter	Units	Criteria*					
Volatile Organic Compounds							
1,1-Dichloroethane	UG/L	5	NA	NA	NA	NA	NA
Acetone	UG/L	50	NA	NA	NA	NA	NA
Benzene	UG/L	1	NA	NA	NA	NA	NA
Carbon disulfide	UG/L	60	NA	NA	NA	NA	NA
Chlorobenzene	UG/L	5	NA	NA	NA	NA	NA
Chloroethane	UG/L	5	NA	NA	NA	NA	NA
Semivolatile Organic Compounds							
1,4-Dioxane	UG/L	-	NA	NA	NA		
Dimethylphthalate	UG/L	50	NA	NA	NA	NA	NA
Pesticide Organic Compounds							
4,4'-DDD	UG/L	0.3	NA	NA	NA	NA	NA
alpha-BHC	UG/L	0.01	NA	NA	NA	NA	NA
Dieldrin	UG/L	0.004	NA	NA	NA	NA	NA
Metals							
Aluminum	UG/L	-	97 J-	180 J	1,300	130 J	110 J
Arsenic	UG/L	25					
Barium	UG/L	1000	85	29	46	56	30
Boron	UG/L	1000	43			82	22
Calcium	UG/L	-	51,700	13,200	12,800	29,700	30,200
Chromium	UG/L	50	2.6 J		2.1 J+		
Chromium VI	UG/L	50		6.8 J			
Cobalt	UG/L	-					

*Criteria- NYSDEC TOGS (1.1.1), Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations. April 2000, Class GA.

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TABLE 4-2A
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EXCEPT PFAS
PETERSBURGH LANDFILL ADDENDUM TO SITE CHARACTERIZATION

Location ID			MW-10S	MW-11D	MW-11S	MW-12D	MW-12S
Sample ID			MW-10S 030118	MW-11D 022818	MW-11S 022818	MW-12D (Down gradient) 030618	MW-12S (Down gradient) 030618
Matrix			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-	-	-
Date Sampled			03/01/18	02/28/18	02/28/18	03/06/18	03/06/18
Parameter	Units	Criteria*					
Metals							
Copper	UG/L	200	8 J	9.2 J	8.4 J		
Iron	UG/L	300	110	160	970	340	66
Lead	UG/L	25					
Magnesium	UG/L	35000	22,300	1,900	1,700	4,000	3,900
Manganese	UG/L	300	370 J+	25	29	170	55
Nickel	UG/L	100					
Potassium	UG/L	-	9,300 J+	320 J	740	460 J	850
Silver	UG/L	50					
Sodium	UG/L	20000	29,400 J+	1,900	2,100	38,500	12,100
Thallium	UG/L	0.5					
Vanadium	UG/L	-			1.6 J		
Zinc	UG/L	2000	5.8 J	7.9 J	5.9 J	2.7 J	2.3 J
Dissolved Metals							
Arsenic	UG/L	25	NA	NA	NA	NA	NA
Barium	UG/L	1000	NA	NA	NA	NA	NA
Boron	UG/L	1000	NA	NA	NA	NA	NA
Calcium	UG/L	-	NA	NA	NA	NA	NA
Cobalt	UG/L	-	NA	NA	NA	NA	NA
Copper	UG/L	200	NA	NA	NA	NA	NA
Iron	UG/L	300	NA	NA	NA	NA	NA
Magnesium	UG/L	35000	NA	NA	NA	NA	NA
Manganese	UG/L	300	NA	NA	NA	NA	NA

*Criteria- NYSDEC TOGS (1.1.1), Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations. April 2000, Class GA.

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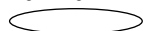
Only Detected Results Reported.

TABLE 4-2A
SUMMARY OF DETECTED COMPOUNDS IN GROUNDWATER SAMPLES
EXCEPT PFAS
PETERSBURGH LANDFILL ADDENDUM TO SITE CHARACTERIZATION

Location ID			MW-10S	MW-11D	MW-11S	MW-12D	MW-12S
Sample ID			MW-10S 030118	MW-11D 022818	MW-11S 022818	MW-12D (Down gradient) 030618	MW-12S (Down gradient) 030618
Matrix			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-	-	-
Date Sampled			03/01/18	02/28/18	02/28/18	03/06/18	03/06/18
Parameter	Units	Criteria*					
Dissolved Metals							
Nickel	UG/L	100	NA	NA	NA	NA	NA
Potassium	UG/L	-	NA	NA	NA	NA	NA
Sodium	UG/L	20000	NA	NA	NA	NA	NA
Zinc	UG/L	2000	NA	NA	NA	NA	NA
Miscellaneous Parameters							
Alkalinity	MG/L	-	NA	NA	NA	NA	NA
Alkalinity, Bicarbonate (as CaCO ₃)	MG/L	-	226	39.0	23.9	173	103
Alkalinity, Total (as CaCO ₃)	MG/L	-	226	39.0	23.9	173	103
Ammonia (as N)	MG/L	-	0.39		0.0090 J	0.078	
Biochemical Oxygen Demand (BOD)	MG/L	-					4.3 J
Bromide	MG/L	2					
Chemical Oxygen Demand (COD)	MG/L	-	10.2				15.7
Chloride	MG/L	2.50E+05	22.1	0.75	0.86	0.68	4.1
Color	COLOR UNIT	15			25.0	10.0	5.00
Cyanide	MG/L	0.2					
Hardness (as CaCO ₃)	MG/L	-	218	40.0	40.0	100	104
Nitrate-Nitrogen	MG/L	10	0.069	0.040 J	0.037 J		
Phenolics, Total Recoverable	MG/L	1					0.010 J-
Sulfate (as SO ₄)	MG/L	250	36.4	7.2	7.1	20.0	27.1
Total Dissolved Solids	MG/L	-	287	46.0	60.0	252	139
Total Kjeldahl Nitrogen	MG/L	-	0.57 J+				
Total Organic Carbon (TOC)	MG/L	-	1.5				1.9

*Criteria- NYSDEC TOGS (1.1.1), Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations. April 2000, Class GA.

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TABLE 4-2A
SUMMARY OF DETECTED COMPOUNDS IN GROUNDWATER SAMPLES
EXCEPT PFAS
PETERSBURGH LANDFILL ADDENDUM TO SITE CHARACTERIZATION

Location ID			MW-13D	MW-13D	MW-13O	MW-13S
Sample ID			DUP 031918	MW-13D 031918	MW-13O 031918	MW-13S 031918
Matrix			Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-	-
Date Sampled			03/19/18	03/19/18	03/19/18	03/19/18
Parameter	Units	Criteria*	Field Duplicate (1-1)			
Volatile Organic Compounds						
1,1-Dichloroethane	UG/L	5	NA	NA	NA	NA
Acetone	UG/L	50	NA	NA	NA	NA
Benzene	UG/L	1	NA	NA	NA	NA
Carbon disulfide	UG/L	60	NA	NA	NA	NA
Chlorobenzene	UG/L	5	NA	NA	NA	NA
Chloroethane	UG/L	5	NA	NA	NA	NA
Semivolatile Organic Compounds						
1,4-Dioxane	UG/L	-	NA	NA	NA	NA
Dimethylphthalate	UG/L	50	NA	NA	NA	NA
Pesticide Organic Compounds						
4,4'-DDD	UG/L	0.3	NA	NA	NA	NA
alpha-BHC	UG/L	0.01	NA	NA	NA	NA
Dieldrin	UG/L	0.004	NA	NA	NA	NA
Metals						
Aluminum	UG/L	-	300 J	510 J	120 J	450
Arsenic	UG/L	25				
Barium	UG/L	1000	37	41	6.5	13
Boron	UG/L	1000				
Calcium	UG/L	-	44,800	47,300	9,100	48,500
Chromium	UG/L	50				
Chromium VI	UG/L	50				
Cobalt	UG/L	-				

*Criteria- NYSDEC TOGS (1.1.1), Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations. April 2000, Class GA.

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 Concentration Exceeds Criteria

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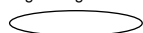
Only Detected Results Reported.

TABLE 4-2A
SUMMARY OF DETECTED COMPOUNDS IN GROUNDWATER SAMPLES
EXCEPT PFAS
PETERSBURGH LANDFILL ADDENDUM TO SITE CHARACTERIZATION

Location ID			MW-13D	MW-13D	MW-13O	MW-13S
Sample ID			DUP 031918	MW-13D 031918	MW-13O 031918	MW-13S 031918
Matrix			Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-	-
Date Sampled			03/19/18	03/19/18	03/19/18	03/19/18
Parameter	Units	Criteria*	Field Duplicate (1-1)			
Metals						
Copper	UG/L	200				
Iron	UG/L	300	350 J-	560 J-	120 J-	460 J-
Lead	UG/L	25				
Magnesium	UG/L	35000	6,800	7,000	1,200	5,900
Manganese	UG/L	300	310	320	170	940
Nickel	UG/L	100				
Potassium	UG/L	-	1,400	1,600	470 J	580
Silver	UG/L	50				
Sodium	UG/L	20000	11,700	10,800	4,300	9,300
Thallium	UG/L	0.5				
Vanadium	UG/L	-				
Zinc	UG/L	2000	2.6 J	3.9 J	2.5 J	2.3 J
Dissolved Metals						
Arsenic	UG/L	25	NA	NA	NA	NA
Barium	UG/L	1000	NA	NA	NA	NA
Boron	UG/L	1000	NA	NA	NA	NA
Calcium	UG/L	-	NA	NA	NA	NA
Cobalt	UG/L	-	NA	NA	NA	NA
Copper	UG/L	200	NA	NA	NA	NA
Iron	UG/L	300	NA	NA	NA	NA
Magnesium	UG/L	35000	NA	NA	NA	NA
Manganese	UG/L	300	NA	NA	NA	NA

*Criteria- NYSDEC TOGS (1.1.1), Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations. April 2000, Class GA.

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TABLE 4-2A
SUMMARY OF DETECTED COMPOUNDS IN GROUNDWATER SAMPLES
EXCEPT PFAS
PETERSBURGH LANDFILL ADDENDUM TO SITE CHARACTERIZATION

Location ID			MW-13D	MW-13D	MW-13O	MW-13S
Sample ID			DUP 031918	MW-13D 031918	MW-13O 031918	MW-13S 031918
Matrix			Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-	-
Date Sampled			03/19/18	03/19/18	03/19/18	03/19/18
Parameter	Units	Criteria*	Field Duplicate (1-1)			
Dissolved Metals						
Nickel	UG/L	100	NA	NA	NA	NA
Potassium	UG/L	-	NA	NA	NA	NA
Sodium	UG/L	20000	NA	NA	NA	NA
Zinc	UG/L	2000	NA	NA	NA	NA
Miscellaneous Parameters						
Alkalinity	MG/L	-	130	128	25.4	129
Alkalinity, Bicarbonate (as CaCO ₃)	MG/L	-	130	128	25.4	129
Alkalinity, Total (as CaCO ₃)	MG/L	-	NA	NA	NA	NA
Ammonia (as N)	MG/L	-	0.030	0.033		0.019 J
Biochemical Oxygen Demand (BOD)	MG/L	-		7.0 J		
Bromide	MG/L	2				
Chemical Oxygen Demand (COD)	MG/L	-	12.3			13.2
Chloride	MG/L	2.50E+05	1.9	2.0	1.6	1.2
Color	COLOR UNIT	15	5.00			5.00
Cyanide	MG/L	0.2				0.0088 J
Hardness (as CaCO ₃)	MG/L	-	140	140	24.0	140
Nitrate-Nitrogen	MG/L	10	0.030 J		0.28	
Phenolics, Total Recoverable	MG/L	1	0.013			
Sulfate (as SO ₄)	MG/L	250	25.2	25.7	5.4	25.7
Total Dissolved Solids	MG/L	-	181	162		146
Total Kjeldahl Nitrogen	MG/L	-			0.15 J	
Total Organic Carbon (TOC)	MG/L	-	0.45 J	0.69 J	0.88 J	0.92 J

*Criteria- NYSDEC TOGS (1.1.1), Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations. April 2000, Class GA.

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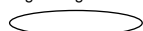
Only Detected Results Reported.

TABLE 4-2B
SUMMARY OF DETECTED PFAS COMPOUNDS IN GROUNDWATER SAMPLES
PETERSBURGH LANDFILL ADDENDUM TO SITE CHARACTERIZATION

Location ID			MW-01	MW-01	MW-01	MW-01A	MW-01A
Sample ID			MW-1-010417	MW-1-010417	MW-01 (UP-GRADIENT) 030118	MW-1A-010417	MW-1A-010417
Matrix			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-	-	-
Date Sampled			01/04/17	01/04/17	03/01/18	01/04/17	01/04/17
Parameter	Units	Criteria*	(2-1)				(2-1)
Per- and Polyfluoroalkyl Substances							
Perfluorobutanesulfonic acid (PFBS)	NG/L	-					
Perfluorobutanoic acid (PFBA)	NG/L	-	NA	NA		NA	NA
Perfluorodecanoic acid (PFDA)	NG/L	-		NA		NA	0.49 J
N-Ethyl perfluorooctanesulfonamidoacetic acid	NG/L	-	NA	NA		NA	NA
Perfluorododecanoic acid (PFDoA)	NG/L	-		NA		NA	
Perfluoro-1-heptanesulfonate (PFHPS)	NG/L	-	NA	NA		NA	NA
Perfluoroheptanoic acid (PFHpA)	NG/L	-					
Perfluorohexanesulfonic acid (PFHxS)	NG/L	-					
Perfluorohexanoic acid (PFHxA)	NG/L	-		NA		NA	
Perfluorononanoic acid (PFNA)	NG/L	-					
Perfluorooctane sulfonamide (FOSA)	NG/L	-	NA	NA		NA	NA
Perfluorooctanesulfonic acid (PFOS)	NG/L	70					
Perfluorooctanoic acid (PFOA)	NG/L	70			0.80 J	2.1	2.4
Perfluoropentanoic acid (PFPA)	NG/L	-	NA	NA		NA	NA
Perfluoroundecanoic acid (PFUnA)	NG/L	-		NA		NA	
8:2 Fluorotelomer sulfonate (82FTS)	NG/L	-	NA	NA		NA	NA
Total PFOA and PFOS	NG/L	70			0.80	2.1	2.4

*Criteria- USEPA Drinking Water Health Advisory (USEPA, May 2016)

Flags assigned during chemistry validation are shown.



Concentration Exceeds Criteria

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J = The reported concentration is an estimated value.

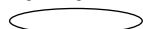
Only Detected Results Reported.

TABLE 4-2B
SUMMARY OF DETECTED PFAS COMPOUNDS IN GROUNDWATER SAMPLES
PETERSBURGH LANDFILL ADDENDUM TO SITE CHARACTERIZATION

Location ID			MW-01A	MW-03	MW-03	MW-03	MW-04
Sample ID			MW-01A (UP-GRADIENT) 030118	MW-3-010517	MW-3-010517	MW-3 (SOURCE) 030518	MW-4-010517
Matrix			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-	-	-
Date Sampled			03/01/18	01/05/17	01/05/17	03/05/18	01/05/17
Parameter	Units	Criteria*			(2-1)		
Per- and Polyfluoroalkyl Substances							
Perfluorobutanesulfonic acid (PFBS)	NG/L	-		2.2	2.2	2.5	2.8
Perfluorobutanoic acid (PFBA)	NG/L	-		NA	NA	18	NA
Perfluorodecanoic acid (PFDA)	NG/L	-		NA	1.1 J	1.1 J	NA
N-Ethyl perfluorooctanesulfonamidoacetic acid	NG/L	-		NA	NA	21	NA
Perfluorododecanoic acid (PFDoA)	NG/L	-		NA			NA
Perfluoro-1-heptanesulfonate (PFHPS)	NG/L	-		NA	NA	1.6 J	NA
Perfluoroheptanoic acid (PFHpA)	NG/L	-	0.26 J	44	36	36	32
Perfluorohexanesulfonic acid (PFHxS)	NG/L	-		16	15	12	14
Perfluorohexanoic acid (PFHxA)	NG/L	-		NA	47	44	NA
Perfluorononanoic acid (PFNA)	NG/L	-		2.1	2.1 J	2.3	1.8 J
Perfluorooctane sulfonamide (FOSA)	NG/L	-		NA	NA	4.4	NA
Perfluorooctanesulfonic acid (PFOS)	NG/L	70		120	130	120	100
Perfluorooctanoic acid (PFOA)	NG/L	70	0.99 J	1,200	1,100	1,100 D	840
Perfluoropentanoic acid (PFPA)	NG/L	-		NA	NA	10	NA
Perfluoroundecanoic acid (PFUnA)	NG/L	-		NA			NA
8:2 Fluorotelomer sulfonate (82FTS)	NG/L	-		NA	NA	4.0 J	NA
Total PFOA and PFOS	NG/L	70	0.99	1,320	1,230	1,220	940

*Criteria- USEPA Drinking Water Health Advisory (USEPA, May 2016)

Flags assigned during chemistry validation are shown.



Concentration Exceeds Criteria

- = No criteria. Empty cell = Not detected. NA = Not analyzed. D = Result reported from a secondary dilution analysis.

J = The reported concentration is an estimated value.

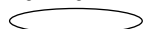
Only Detected Results Reported.

TABLE 4-2B
SUMMARY OF DETECTED PFAS COMPOUNDS IN GROUNDWATER SAMPLES
PETERSBURGH LANDFILL ADDENDUM TO SITE CHARACTERIZATION

Location ID			MW-04	MW-04	MW-04	MW-06D	MW-06D
Sample ID			MW-4-010517	DUP 030518	MW-4 (SOURCE) 030518	DUP-010517	DUP-010517
Matrix			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-	-	-
Date Sampled			01/05/17	03/05/18	03/05/18	01/05/17	01/05/17
Parameter	Units	Criteria*	(2-1)	Field Duplicate (1-1)		Field Duplicate (2-1)	Field Duplicate (1-1)
Per- and Polyfluoroalkyl Substances							
Perfluorobutanesulfonic acid (PFBS)	NG/L	-	2.4	2.6	2.6		
Perfluorobutanoic acid (PFBA)	NG/L	-	NA	15	9.8	NA	NA
Perfluorodecanoic acid (PFDA)	NG/L	-	0.96 J	0.86 J	0.46 J		NA
N-Ethyl perfluorooctanesulfonamidoacetic acid	NG/L	-	NA	13 J	10 J	NA	NA
Perfluorododecanoic acid (PFDoA)	NG/L	-					NA
Perfluoro-1-heptanesulfonate (PFHPS)	NG/L	-	NA	1.6 J	1.4 J	NA	NA
Perfluoroheptanoic acid (PFHpA)	NG/L	-	28	29	20		
Perfluorohexanesulfonic acid (PFHxS)	NG/L	-	14	10	9.1		
Perfluorohexanoic acid (PFHxA)	NG/L	-	33	33	25		NA
Perfluorononanoic acid (PFNA)	NG/L	-	1.9 J	1.8 J	1.2 J		
Perfluorooctane sulfonamide (FOSA)	NG/L	-	NA	2.2	1.7 J	NA	NA
Perfluorooctanesulfonic acid (PFOS)	NG/L	70	110	100	77		
Perfluorooctanoic acid (PFOA)	NG/L	70	810	690 D	490 D		
Perfluoropentanoic acid (PFPA)	NG/L	-	NA	7.2	6.1	NA	NA
Perfluoroundecanoic acid (PFUnA)	NG/L	-					NA
8:2 Fluorotelomer sulfonate (82FTS)	NG/L	-	NA	2.1 J		NA	NA
Total PFOA and PFOS	NG/L	70	920	790	567		

*Criteria- USEPA Drinking Water Health Advisory (USEPA, May 2016)

Flags assigned during chemistry validation are shown.



Concentration Exceeds Criteria

- = No criteria. Empty cell = Not detected. NA = Not analyzed. D = Result reported from a secondary dilution analysis.

J = The reported concentration is an estimated value.

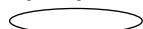
Only Detected Results Reported.

TABLE 4-2B
SUMMARY OF DETECTED PFAS COMPOUNDS IN GROUNDWATER SAMPLES
PETERSBURGH LANDFILL ADDENDUM TO SITE CHARACTERIZATION

Location ID			MW-06D	MW-06D	MW-06D	MW-06S	MW-06S
Sample ID			MW-6D-010517	MW-6D-010517	MW-6D 022818	MW-6S-010517	MW-6S-010517
Matrix			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-	-	-
Date Sampled			01/05/17	01/05/17	02/28/18	01/05/17	01/05/17
Parameter	Units	Criteria*		(2-1)			(2-1)
Per- and Polyfluoroalkyl Substances							
Perfluorobutanesulfonic acid (PFBS)	NG/L	-					
Perfluorobutanoic acid (PFBA)	NG/L	-	NA	NA		NA	NA
Perfluorodecanoic acid (PFDA)	NG/L	-	NA		0.38 J	NA	
N-Ethyl perfluorooctanesulfonamidoacetic acid	NG/L	-	NA	NA		NA	NA
Perfluorododecanoic acid (PFDoA)	NG/L	-	NA			NA	
Perfluoro-1-heptanesulfonate (PFHPS)	NG/L	-	NA	NA		NA	NA
Perfluoroheptanoic acid (PFHpA)	NG/L	-					
Perfluorohexanesulfonic acid (PFHxS)	NG/L	-					
Perfluorohexanoic acid (PFHxA)	NG/L	-	NA			NA	
Perfluorononanoic acid (PFNA)	NG/L	-					
Perfluorooctane sulfonamide (FOSA)	NG/L	-	NA	NA		NA	NA
Perfluorooctanesulfonic acid (PFOS)	NG/L	70					
Perfluorooctanoic acid (PFOA)	NG/L	70					
Perfluoropentanoic acid (PFPA)	NG/L	-	NA	NA		NA	NA
Perfluoroundecanoic acid (PFUnA)	NG/L	-	NA			NA	
8:2 Fluorotelomer sulfonate (82FTS)	NG/L	-	NA	NA		NA	NA
Total PFOA and PFOS	NG/L	70					

*Criteria- USEPA Drinking Water Health Advisory (USEPA, May 2016)

Flags assigned during chemistry validation are shown.



Concentration Exceeds Criteria

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J = The reported concentration is an estimated value.

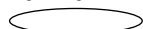
Only Detected Results Reported.

TABLE 4-2B
SUMMARY OF DETECTED PFAS COMPOUNDS IN GROUNDWATER SAMPLES
PETERSBURGH LANDFILL ADDENDUM TO SITE CHARACTERIZATION

Location ID			MW-06S	MW-07D	MW-07D	MW-07D	MW-07S
Sample ID			MW-6S 022818	MW-7D-010417	MW-7D-010417	MW-7D 030618	MW-7S-010417
Matrix			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-	-	-
Date Sampled			02/28/18	01/04/17	01/04/17	03/06/18	01/04/17
Parameter	Units	Criteria*			(2-1)		
Per- and Polyfluoroalkyl Substances							
Perfluorobutanesulfonic acid (PFBS)	NG/L	-	290	1.2 J		0.57 J	
Perfluorobutanoic acid (PFBA)	NG/L	-	42	NA	NA	11	NA
Perfluorodecanoic acid (PFDA)	NG/L	-		NA			NA
N-Ethyl perfluorooctanesulfonamidoacetic acid	NG/L	-		NA	NA		NA
Perfluorododecanoic acid (PFDoA)	NG/L	-		NA			NA
Perfluoro-1-heptanesulfonate (PFHPS)	NG/L	-		NA	NA	0.27 J	NA
Perfluoroheptanoic acid (PFHpA)	NG/L	-	16	20	21	26	2.8
Perfluorohexanesulfonic acid (PFHxS)	NG/L	-	3.6	2.3	2.4	2.4	1.7 J
Perfluorohexanoic acid (PFHxA)	NG/L	-	64	NA	40	39	NA
Perfluorononanoic acid (PFNA)	NG/L	-				0.34 J	
Perfluorooctane sulfonamide (FOSA)	NG/L	-		NA	NA		NA
Perfluorooctanesulfonic acid (PFOS)	NG/L	70		4.5	5.2	5.0	7.4
Perfluorooctanoic acid (PFOA)	NG/L	70	31	1,600	1,600	1,800 D	64
Perfluoropentanoic acid (PFPA)	NG/L	-	53	NA	NA	7.3	NA
Perfluoroundecanoic acid (PFUnA)	NG/L	-		NA			NA
8:2 Fluorotelomer sulfonate (82FTS)	NG/L	-		NA	NA		NA
Total PFOA and PFOS	NG/L	70	31	1,605	1,605	1,805	71.4

*Criteria- USEPA Drinking Water Health Advisory (USEPA, May 2016)

Flags assigned during chemistry validation are shown.



Concentration Exceeds Criteria

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J = The reported concentration is an estimated value.

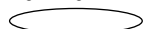
Only Detected Results Reported.

TABLE 4-2B
SUMMARY OF DETECTED PFAS COMPOUNDS IN GROUNDWATER SAMPLES
PETERSBURGH LANDFILL ADDENDUM TO SITE CHARACTERIZATION

Location ID			MW-07S	MW-07S	MW-08D	MW-08D	MW-08D
Sample ID			MW-7S-010417	MW-7S 030618	MW-8D-010417	MW-8D-010417	MW-8D 022718
Matrix			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-	-	-
Date Sampled			01/04/17	03/06/18	01/04/17	01/04/17	02/27/18
Parameter	Units	Criteria*	(2-1)		(2-1)		
Per- and Polyfluoroalkyl Substances							
Perfluorobutanesulfonic acid (PFBS)	NG/L	-		0.95 J	0.92 J		0.94 J
Perfluorobutanoic acid (PFBA)	NG/L	-	NA	4.9	NA	NA	14
Perfluorodecanoic acid (PFDA)	NG/L	-	0.87 J	0.66 J	0.68 J	NA	
N-Ethyl perfluorooctanesulfonamidoacetic acid	NG/L	-	NA		NA	NA	
Perfluorododecanoic acid (PFDoA)	NG/L	-				NA	
Perfluoro-1-heptanesulfonate (PFHPS)	NG/L	-	NA	0.39 J	NA	NA	0.71 J
Perfluoroheptanoic acid (PFHpA)	NG/L	-	2.8	4.3	20	20	16
Perfluorohexanesulfonic acid (PFHxS)	NG/L	-	1.8	1.9	4.5	4.1	3.9
Perfluorohexanoic acid (PFHxA)	NG/L	-	4.1	5.0	23	NA	18
Perfluorononanoic acid (PFNA)	NG/L	-	0.70 J	1.5 J	6.8	2.8	3.5
Perfluorooctane sulfonamide (FOSA)	NG/L	-	NA		NA	NA	
Perfluorooctanesulfonic acid (PFOS)	NG/L	70	8.4	23	24	20	27
Perfluorooctanoic acid (PFOA)	NG/L	70	67	62	890	910	780 D
Perfluoropentanoic acid (PFPA)	NG/L	-	NA	2.8	NA	NA	10
Perfluoroundecanoic acid (PFUnA)	NG/L	-			0.94 J	NA	
8:2 Fluorotelomer sulfonate (82FTS)	NG/L	-	NA		NA	NA	
Total PFOA and PFOS	NG/L	70	75.4	85	914	930	807

*Criteria- USEPA Drinking Water Health Advisory (USEPA, May 2016)

Flags assigned during chemistry validation are shown.



Concentration Exceeds Criteria

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J = The reported concentration is an estimated value.

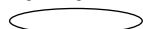
Only Detected Results Reported.

TABLE 4-2B
SUMMARY OF DETECTED PFAS COMPOUNDS IN GROUNDWATER SAMPLES
PETERSBURGH LANDFILL ADDENDUM TO SITE CHARACTERIZATION

Location ID			MW-08S	MW-08S	MW-08S	MW-09D	MW-09S
Sample ID			MW-8S-010517	MW-8S-010517	MW-8S 022718	MW-9D 022718	MW-9S 022718
Matrix			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-	-	-
Date Sampled			01/05/17	01/05/17	02/27/18	02/27/18	02/27/18
Parameter	Units	Criteria*		(2-1)			
Per- and Polyfluoroalkyl Substances							
Perfluorobutanesulfonic acid (PFBS)	NG/L	-		1.3 J	0.97 J	0.28 J	0.23 J
Perfluorobutanoic acid (PFBA)	NG/L	-	NA	NA	25	2.6	3.5
Perfluorodecanoic acid (PFDA)	NG/L	-	NA				
N-Ethyl perfluorooctanesulfonamidoacetic acid	NG/L	-	NA	NA			
Perfluorododecanoic acid (PFDoA)	NG/L	-	NA				
Perfluoro-1-heptanesulfonate (PFHPS)	NG/L	-	NA	NA	1.3 J		
Perfluoroheptanoic acid (PFHpA)	NG/L	-	18	17	24	1.7	3.1
Perfluorohexanesulfonic acid (PFHxS)	NG/L	-	5.7	5.7	6.9		
Perfluorohexanoic acid (PFHxA)	NG/L	-	NA	22	23	2.4	3.3
Perfluorononanoic acid (PFNA)	NG/L	-	1.8 J	2.1	4.9	0.24 J	0.39 J
Perfluorooctane sulfonamide (FOSA)	NG/L	-	NA	NA			
Perfluorooctanesulfonic acid (PFOS)	NG/L	70	20	22	42	2.8	3.2
Perfluorooctanoic acid (PFOA)	NG/L	70	170	170	330	33	83
Perfluoropentanoic acid (PFPA)	NG/L	-	NA	NA	15	1.5 J	1.6 J
Perfluoroundecanoic acid (PFUnA)	NG/L	-	NA				
8:2 Fluorotelomer sulfonate (82FTS)	NG/L	-	NA	NA			
Total PFOA and PFOS	NG/L	70	190	192	372	35.8	86.2

*Criteria- USEPA Drinking Water Health Advisory (USEPA, May 2016)

Flags assigned during chemistry validation are shown.



Concentration Exceeds Criteria

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J = The reported concentration is an estimated value.

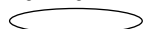
Only Detected Results Reported.

TABLE 4-2B
SUMMARY OF DETECTED PFAS COMPOUNDS IN GROUNDWATER SAMPLES
PETERSBURGH LANDFILL ADDENDUM TO SITE CHARACTERIZATION

Location ID			MW-10D	MW-10S	MW-11D	MW-11D	MW-11D
Sample ID			MW-10D 030118	MW-10S 030118	MW-11D Packer (42.2-52.2)	MW-11D Packer (51.5-61.5)	MW-11D 022818
Matrix			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	42.2-52.2	51.5-61.5	-
Date Sampled			03/01/18	03/01/18	01/30/18	01/30/18	02/28/18
Parameter	Units	Criteria*					
Per- and Polyfluoroalkyl Substances							
Perfluorobutanesulfonic acid (PFBS)	NG/L	-	0.54 J	1.1 J			
Perfluorobutanoic acid (PFBA)	NG/L	-	10	13	NA	NA	
Perfluorodecanoic acid (PFDA)	NG/L	-			NA	NA	
N-Ethyl perfluorooctanesulfonamidoacetic acid	NG/L	-			NA	NA	
Perfluorododecanoic acid (PFDoA)	NG/L	-		0.55 J	NA	NA	
Perfluoro-1-heptanesulfonate (PFHPS)	NG/L	-	0.55 J	0.86 J	NA	NA	
Perfluoroheptanoic acid (PFHpA)	NG/L	-	3.3	14			
Perfluorohexanesulfonic acid (PFHxS)	NG/L	-		2.5			
Perfluorohexanoic acid (PFHxA)	NG/L	-	7.1	13	NA	NA	
Perfluorononanoic acid (PFNA)	NG/L	-	0.88 J	0.95 J			
Perfluorooctane sulfonamide (FOSA)	NG/L	-		0.29 J	NA	NA	
Perfluorooctanesulfonic acid (PFOS)	NG/L	70	23	25			
Perfluorooctanoic acid (PFOA)	NG/L	70	200	810 D			
Perfluoropentanoic acid (PFPA)	NG/L	-	3.4	7.3	NA	NA	
Perfluoroundecanoic acid (PFUnA)	NG/L	-			NA	NA	
8:2 Fluorotelomer sulfonate (82FTS)	NG/L	-			NA	NA	
Total PFOA and PFOS	NG/L	70	223	835			

*Criteria- USEPA Drinking Water Health Advisory (USEPA, May 2016)

Flags assigned during chemistry validation are shown.



Concentration Exceeds Criteria

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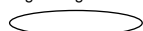
Only Detected Results Reported.

TABLE 4-2B
SUMMARY OF DETECTED PFAS COMPOUNDS IN GROUNDWATER SAMPLES
PETERSBURGH LANDFILL ADDENDUM TO SITE CHARACTERIZATION

Location ID			MW-11S	MW-12D	MW-12D	MW-12D	MW-12D
Sample ID			MW-11S 022818	MW-12D Packer (31.7-41.7)	MW-12D Packer (43.4-53.4)	MW-12D Packer (58.5-68.5)	MW-12D Packer (68.4-78.4)
Matrix			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	31.7-41.7	43.4-53.4	58.5-68.5	68.4-78.4
Date Sampled			02/28/18	01/31/18	01/31/18	01/31/18	01/31/18
Parameter	Units	Criteria*					
Per- and Polyfluoroalkyl Substances							
Perfluorobutanesulfonic acid (PFBS)	NG/L	-					
Perfluorobutanoic acid (PFBA)	NG/L	-		NA	NA	NA	NA
Perfluorodecanoic acid (PFDA)	NG/L	-		NA	NA	NA	NA
N-Ethyl perfluorooctanesulfonamidoacetic acid	NG/L	-		NA	NA	NA	NA
Perfluorododecanoic acid (PFDoA)	NG/L	-		NA	NA	NA	NA
Perfluoro-1-heptanesulfonate (PFHPS)	NG/L	-		NA	NA	NA	NA
Perfluoroheptanoic acid (PFHpA)	NG/L	-					
Perfluorohexanesulfonic acid (PFHxS)	NG/L	-					
Perfluorohexanoic acid (PFHxA)	NG/L	-		NA	NA	NA	NA
Perfluorononanoic acid (PFNA)	NG/L	-					
Perfluorooctane sulfonamide (FOSA)	NG/L	-		NA	NA	NA	NA
Perfluorooctanesulfonic acid (PFOS)	NG/L	70					
Perfluorooctanoic acid (PFOA)	NG/L	70					
Perfluoropentanoic acid (PFPA)	NG/L	-		NA	NA	NA	NA
Perfluoroundecanoic acid (PFUnA)	NG/L	-		NA	NA	NA	NA
8:2 Fluorotelomer sulfonate (82FTS)	NG/L	-		NA	NA	NA	NA
Total PFOA and PFOS	NG/L	70					

*Criteria- USEPA Drinking Water Health Advisory (USEPA, May 2016)

Flags assigned during chemistry validation are shown.



Concentration Exceeds Criteria

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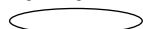
Only Detected Results Reported.

TABLE 4-2B
SUMMARY OF DETECTED PFAS COMPOUNDS IN GROUNDWATER SAMPLES
PETERSBURGH LANDFILL ADDENDUM TO SITE CHARACTERIZATION

Location ID			MW-12D	MW-12S	MW-13D	MW-13D	MW-13D
Sample ID			MW-12D (Down gradient) 030618	MW-12S (Down gradient) 030618	MW-13D Packer (56.8-66.8)	MW-13D Packer (66.5-76.5)	MW-13D Packer (76.9-86.9)
Matrix			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	56.8-66.8	66.5-76.5	76.9-86.9
Date Sampled			03/06/18	03/06/18	02/01/18	02/01/18	02/01/18
Parameter	Units	Criteria*					
Per- and Polyfluoroalkyl Substances							
Perfluorobutanesulfonic acid (PFBS)	NG/L	-					
Perfluorobutanoic acid (PFBA)	NG/L	-		0.40 J	NA	NA	NA
Perfluorodecanoic acid (PFDA)	NG/L	-			NA	NA	NA
N-Ethyl perfluorooctanesulfonamidoacetic acid	NG/L	-			NA	NA	NA
Perfluorododecanoic acid (PFDoA)	NG/L	-			NA	NA	NA
Perfluoro-1-heptanesulfonate (PFHPS)	NG/L	-			NA	NA	NA
Perfluoroheptanoic acid (PFHpA)	NG/L	-					
Perfluorohexanesulfonic acid (PFHxS)	NG/L	-					
Perfluorohexanoic acid (PFHxA)	NG/L	-		0.53 J	NA	NA	NA
Perfluorononanoic acid (PFNA)	NG/L	-					
Perfluorooctane sulfonamide (FOSA)	NG/L	-			NA	NA	NA
Perfluorooctanesulfonic acid (PFOS)	NG/L	70					
Perfluorooctanoic acid (PFOA)	NG/L	70					
Perfluoropentanoic acid (PFPA)	NG/L	-			NA	NA	NA
Perfluoroundecanoic acid (PFUnA)	NG/L	-			NA	NA	NA
8:2 Fluorotelomer sulfonate (82FTS)	NG/L	-			NA	NA	NA
Total PFOA and PFOS	NG/L	70					

*Criteria- USEPA Drinking Water Health Advisory (USEPA, May 2016)

Flags assigned during chemistry validation are shown.



Concentration Exceeds Criteria

- = No criteria. Empty cell = Not detected. NA = Not analyzed. D = Result reported from a secondary dilution analysis.

J = The reported concentration is an estimated value.

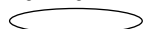
Only Detected Results Reported.

TABLE 4-2B
SUMMARY OF DETECTED PFAS COMPOUNDS IN GROUNDWATER SAMPLES
PETERSBURGH LANDFILL ADDENDUM TO SITE CHARACTERIZATION

Location ID			MW-13D	MW-13D	MW-13O	MW-13S
Sample ID			DUP 031918	MW-13D 031918	MW-13O 031918	MW-13S 031918
Matrix			Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-	-
Date Sampled			03/19/18	03/19/18	03/19/18	03/19/18
Parameter	Units	Criteria*	Field Duplicate (1-1)			
Per- and Polyfluoroalkyl Substances						
Perfluorobutanesulfonic acid (PFBS)	NG/L	-				
Perfluorobutanoic acid (PFBA)	NG/L	-				
Perfluorodecanoic acid (PFDA)	NG/L	-				
N-Ethyl perfluorooctanesulfonamidoacetic acid	NG/L	-				
Perfluorododecanoic acid (PFDoA)	NG/L	-				
Perfluoro-1-heptanesulfonate (PFHPS)	NG/L	-				
Perfluoroheptanoic acid (PFHpA)	NG/L	-			1.9 J	
Perfluorohexanesulfonic acid (PFHxS)	NG/L	-				
Perfluorohexanoic acid (PFHxA)	NG/L	-			2.2	
Perfluorononanoic acid (PFNA)	NG/L	-				
Perfluorooctane sulfonamide (FOSA)	NG/L	-				
Perfluorooctanesulfonic acid (PFOS)	NG/L	70			2.0	
Perfluorooctanoic acid (PFOA)	NG/L	70			46	
Perfluoropentanoic acid (PFPA)	NG/L	-			0.59 J	
Perfluoroundecanoic acid (PFUnA)	NG/L	-				
8:2 Fluorotelomer sulfonate (82FTS)	NG/L	-				
Total PFOA and PFOS	NG/L	70			48	

*Criteria- USEPA Drinking Water Health Advisory (USEPA, May 2016)

Flags assigned during chemistry validation are shown.



Concentration Exceeds Criteria

- = No criteria. Empty cell = Not detected. NA = Not analyzed. D = Result reported from a secondary dilution analysis.

J = The reported concentration is an estimated value.

Only Detected Results Reported.

TABLE 4-3A
SUMMARY OF DETECTED COMPOUNDS IN LEACHATE AND SURFACE WATER SAMPLES
EXCEPT PFAS
PETERSBURGH LANDFILL ADDENDUM TO SITE CHARACTERIZATION

Location ID			LC-01	LC-01	SW-01/SED-01	SW-01/SED-01	SW-01/SED-01
Sample ID			LC-1-121416	LC-1	SW-1-121316	DUP 022218	SW-1
Matrix			GW Seep	GW Seep	Surface Water	Surface Water	Surface Water
Depth Interval (ft)			-	-	-	-	-
Date Sampled			12/14/16	02/23/18	12/13/16	02/22/18	02/22/18
Parameter	Units	Criteria*				Field Duplicate (1-1)	
Volatile Organic Compounds							
1,4-Dichlorobenzene	UG/L	3	0.87 J				
Acetone	UG/L	50					
Benzene	UG/L	1	1.5				
Chlorobenzene	UG/L	5	2.3				
Methyl tert-butyl ether	UG/L	10	0.74 J	1.9 J			
Methylcyclohexane	UG/L	-					
Methylene chloride	UG/L	5		1.8 J			
Semivolatile Organic Compounds							
2-Methylnaphthalene	UG/L	4.7					
Acenaphthene	UG/L	5.3					
Benzaldehyde	UG/L	-	0.34 J	0.57 J			
Dibenzofuran	UG/L	-					
Fluoranthene	UG/L	50					
Fluorene	UG/L	0.54					
Naphthalene	UG/L	10					
Phenanthrene	UG/L	5					
Pyrene	UG/L	4.6					
Pesticide Organic Compounds							
4,4'-DDD	UG/L	1.00E-05		0.015 J			
4,4'-DDT	UG/L	1.00E-05					
gamma-BHC (Lindane)	UG/L	0.008					
gamma-Chlordane	UG/L	2.00E-05					

*Criteria- NYSDEC TOGS (1.1.1), Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations. April 2000, Class A.

Flags assigned during chemistry validation are shown.

 Concentration Exceeds Criteria

- = No criteria. Calc = Also has a calculated standard based on hardness concentration. See Table 4-3C for calculated standard.

Empty cell = Not detected. NA = Not analyzed.

J = The reported concentration is an estimated value. J+ = Estimated value with a high bias. J- = Estimated value with a low bias.

Only Detected Results Reported.

TABLE 4-3A
SUMMARY OF DETECTED COMPOUNDS IN LEACHATE AND SURFACE WATER SAMPLES
EXCEPT PFAS
PETERSBURGH LANDFILL ADDENDUM TO SITE CHARACTERIZATION

Location ID			LC-01	LC-01	SW-01/SED-01	SW-01/SED-01	SW-01/SED-01
Sample ID			LC-1-121416	LC-1	SW-1-121316	DUP 022218	SW-1
Matrix			GW Seep	GW Seep	Surface Water	Surface Water	Surface Water
Depth Interval (ft)			-	-	-	-	-
Date Sampled			12/14/16	02/23/18	12/13/16	02/22/18	02/22/18
Parameter	Units	Criteria*				Field Duplicate (1-1)	
Metals							
Aluminum	UG/L	100 ionic	5,100	3,700			
Arsenic	UG/L	50	6,900	1,300 J			
Barium	UG/L	1000	15,200	2,000 J-	7.0	7.7	8.1
Beryllium	UG/L	3	1.1 J	0.39 J			
Boron	UG/L	10000	590	530 J			
Calcium	UG/L	-	172,000	86,600	5,300	4,400	4,700
Chromium	UG/L	calc	11 J	12 J+			
Chromium VI	UG/L	11 dissolved		5 J-			
Cobalt	UG/L	5 acid soluble	110	33			
Copper	UG/L	calc	35 J	16			
Iron	UG/L	300	3,590,000	813,000			
Lead	UG/L	calc		28 J+			
Magnesium	UG/L	35000	29,900	26,200	1,000	770	810
Manganese	UG/L	300	34,900	19,400	3.6	1.9 J	2.1 J
Mercury	UG/L	7.00E-04 dissolved	0.25				
Nickel	UG/L	calc	44 J	16 J			
Potassium	UG/L	-	25,500	26,900	140 J		
Selenium	UG/L	4.6 dissolved	73 J				
Sodium	UG/L	-	61,200	82,900	12,400	13,800	14,300
Vanadium	UG/L	14 acid soluble	30	8.8 J			
Zinc	UG/L	calc	130	60 J			

*Criteria- NYSDEC TOGS (1.1.1), Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations. April 2000, Class A.

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Only Detected Results Reported.

TABLE 4-3A
SUMMARY OF DETECTED COMPOUNDS IN LEACHATE AND SURFACE WATER SAMPLES
EXCEPT PFAS
PETERSBURGH LANDFILL ADDENDUM TO SITE CHARACTERIZATION

Location ID			LC-01	LC-01	SW-01/SED-01	SW-01/SED-01	SW-01/SED-01
Sample ID			LC-1-121416	LC-1	SW-1-121316	DUP 022218	SW-1
Matrix			GW Seep	GW Seep	Surface Water	Surface Water	Surface Water
Depth Interval (ft)			-	-	-	-	-
Date Sampled			12/14/16	02/23/18	12/13/16	02/22/18	02/22/18
Parameter	Units	Criteria*				Field Duplicate (1-1)	
Miscellaneous Parameters							
Alkalinity, Bicarbonate (as CaCO ₃)	MG/L	-	NA	538	NA	10.2	9.4 J
Alkalinity, Total (as CaCO ₃)	MG/L	-	472	538	13.8	10.2	9.4 J
Ammonia (as N)	MG/L	2	32.5	26.2			
Biochemical Oxygen Demand (BOD)	MG/L	-	36.7	7.8			
Bromide	MG/L	2	0.41	0.22 J			
Chemical Oxygen Demand (COD)	MG/L	-	403	128			
Chloride	MG/L	250	78.0	27.5	17.6	26.4	25.3
Color	COLOR UNIT	-	20.0		10.0	10.0	10.0
Cyanide	MG/L	0.2	0.013				
Hardness (as CaCO ₃)	MG/L	-	320	308	28.0	44.0 J	20.0 J
Nitrate-Nitrogen	MG/L	10	0.23	2.6	0.65 J	0.10	0.10
Phenolics, Total Recoverable	MG/L	1	0.039	0.011			0.0075 J
Sulfate (as SO ₄)	MG/L	250	1.0 J	1.3 J	5.5	5.5	5.4
Total Dissolved Solids	MG/L	-	512	620	71.0	55.0 J	69.0 J
Total Kjeldahl Nitrogen	MG/L	-	46.6	38.6			
Total Organic Carbon (TOC)	MG/L	-	14.0	16.7	1.4	1.0	1.1

*Criteria- NYSDEC TOGS (1.1.1), Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations. April 2000, Class A.

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TABLE 4-3A
SUMMARY OF DETECTED COMPOUNDS IN LEACHATE AND SURFACE WATER SAMPLES
EXCEPT PFAS
PETERSBURGH LANDFILL ADDENDUM TO SITE CHARACTERIZATION

Location ID			SW-02/SED-02	SW-02/SED-02	SW-03/SED-03	SW-03/SED-03	SW-04/SED-04
Sample ID			SW-2-120816	SW-DUP-120816	SW-3-120816	SW-3	SW-4-120816
Matrix			Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
Depth Interval (ft)			-	-	-	-	-
Date Sampled			12/08/16	12/08/16	12/08/16	02/22/18	12/08/16
Parameter	Units	Criteria*		Field Duplicate (1-1)			
Volatile Organic Compounds							
1,4-Dichlorobenzene	UG/L	3					
Acetone	UG/L	50			3.5 J		
Benzene	UG/L	1					
Chlorobenzene	UG/L	5					
Methyl tert-butyl ether	UG/L	10					
Methylcyclohexane	UG/L	-					
Methylene chloride	UG/L	5					
Semivolatile Organic Compounds							
2-Methylnaphthalene	UG/L	4.7			0.69 J		
Acenaphthene	UG/L	5.3			0.73 J		
Benzaldehyde	UG/L	-					
Dibenzofuran	UG/L	-			0.57 J		
Fluoranthene	UG/L	50			0.47 J		
Fluorene	UG/L	0.54			0.50 J		
Naphthalene	UG/L	10			0.76 J		
Phenanthrene	UG/L	5			1.0 J		
Pyrene	UG/L	4.6			0.33 J		
Pesticide Organic Compounds							
4,4'-DDD	UG/L	1.00E-05					
4,4'-DDT	UG/L	1.00E-05					
gamma-BHC (Lindane)	UG/L	0.008					
gamma-Chlordane	UG/L	2.00E-05					0.011 J

*Criteria- NYSDEC TOGS (1.1.1), Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations. April 2000, Class A.

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TABLE 4-3A
SUMMARY OF DETECTED COMPOUNDS IN LEACHATE AND SURFACE WATER SAMPLES
EXCEPT PFAS
PETERSBURGH LANDFILL ADDENDUM TO SITE CHARACTERIZATION

Location ID			SW-02/SED-02	SW-02/SED-02	SW-03/SED-03	SW-03/SED-03	SW-04/SED-04
Sample ID			SW-2-120816	SW-DUP-120816	SW-3-120816	SW-3	SW-4-120816
Matrix			Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
Depth Interval (ft)			-	-	-	-	-
Date Sampled			12/08/16	12/08/16	12/08/16	02/22/18	12/08/16
Parameter	Units	Criteria*	Field Duplicate (1-1)				
Metals							
Aluminum	UG/L	100 ionic	78 J	590 J	87 J	1,600	
Arsenic	UG/L	50					
Barium	UG/L	1000	10 J	15 J	22	21	9.8
Beryllium	UG/L	3					
Boron	UG/L	10000				5.2 J	4.1 J
Calcium	UG/L	-	12,600	12,600	13,200	13,500	11,400
Chromium	UG/L	calc				2.5 J+	
Chromium VI	UG/L	11 dissolved		5.3 J	6.1 J		7.0 J
Cobalt	UG/L	5 acid soluble		0.85 J	4.1	1.4 J	
Copper	UG/L	calc		2.0 J	7.9 J	4.3 J	
Iron	UG/L	300	310 J	1,500 J	1,100	2,100	490
Lead	UG/L	calc				3 J-	
Magnesium	UG/L	35000	2,000	2,100	3,900	2,300	1,600
Manganese	UG/L	300	100 J	350 J	2,200	180	200
Mercury	UG/L	7.00E-04 dissolved					
Nickel	UG/L	calc		1.3 J		2.1 J	
Potassium	UG/L	-	1,000	1,100	360 J	1,200 J	910
Selenium	UG/L	4.6 dissolved					
Sodium	UG/L	-	45,600	45,700	6,500	63,000	32,900
Vanadium	UG/L	14 acid soluble				1.8 J	
Zinc	UG/L	calc	1.6 J	3.6 J	7.9 J	5.7 J	

*Criteria- NYSDEC TOGS (1.1.1), Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations. April 2000, Class A.

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TABLE 4-3A
SUMMARY OF DETECTED COMPOUNDS IN LEACHATE AND SURFACE WATER SAMPLES
EXCEPT PFAS
PETERSBURGH LANDFILL ADDENDUM TO SITE CHARACTERIZATION

Location ID			SW-02/SED-02	SW-02/SED-02	SW-03/SED-03	SW-03/SED-03	SW-04/SED-04
Sample ID			SW-2-120816	SW-DUP-120816	SW-3-120816	SW-3	SW-4-120816
Matrix			Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
Depth Interval (ft)			-	-	-	-	-
Date Sampled			12/08/16	12/08/16	12/08/16	02/22/18	12/08/16
Parameter	Units	Criteria*		Field Duplicate (1-1)			
Miscellaneous Parameters							
Alkalinity, Bicarbonate (as CaCO ₃)	MG/L	-	NA	NA	NA	11	NA
Alkalinity, Total (as CaCO ₃)	MG/L	-	30.4	29.6	54.0	11	21.9
Ammonia (as N)	MG/L	2				0.022	0.022
Biochemical Oxygen Demand (BOD)	MG/L	-		7.5 J	2.7		64.7
Bromide	MG/L	2					
Chemical Oxygen Demand (COD)	MG/L	-			53.1	22.7	
Chloride	MG/L	250	72.8	71.2	1.1	110	51.3
Color	COLOR UNIT	-	10.0		25.0	15.0	15.0
Cyanide	MG/L	0.2					
Hardness (as CaCO ₃)	MG/L	-	44.0	40.0	60.0	56.0	56.0
Nitrate-Nitrogen	MG/L	10	0.32	0.32	0.034 J	0.33	0.33
Phenolics, Total Recoverable	MG/L	1		0.0056 J		0.0050 J	
Sulfate (as SO ₄)	MG/L	250	6.9	6.8	1.8 J	12.0	6.4
Total Dissolved Solids	MG/L	-	232	209	120	210	176
Total Kjeldahl Nitrogen	MG/L	-	0.28	0.23	1.2	0.43	0.45 J
Total Organic Carbon (TOC)	MG/L	-	2.6	2.6	11.0	2.0	2.3

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EXCEPT PFAS
PETERSBURGH LANDFILL ADDENDUM TO SITE CHARACTERIZATION

Location ID			SW-04/SED-04	SW-05/SED-05	SW-05/SED-05	SW-06/SED-06	SW-06/SED-06
Sample ID			SW-4	SW-5-120716	SW-5	SW-6-120716	SW-6
Matrix			Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
Depth Interval (ft)			-	-	-	-	-
Date Sampled			02/22/18	12/07/16	02/23/18	12/07/16	02/23/18
Parameter	Units	Criteria*					
Volatile Organic Compounds							
1,4-Dichlorobenzene	UG/L	3					
Acetone	UG/L	50					
Benzene	UG/L	1					
Chlorobenzene	UG/L	5					
Methyl tert-butyl ether	UG/L	10		0.17 J	0.42 J		0.19 J
Methylcyclohexane	UG/L	-			0.49 J		
Methylene chloride	UG/L	5					
Semivolatile Organic Compounds							
2-Methylnaphthalene	UG/L	4.7					
Acenaphthene	UG/L	5.3					
Benzaldehyde	UG/L	-					
Dibenzofuran	UG/L	-					
Fluoranthene	UG/L	50					
Fluorene	UG/L	0.54					
Naphthalene	UG/L	10					
Phenanthrene	UG/L	5					
Pyrene	UG/L	4.6					
Pesticide Organic Compounds							
4,4'-DDD	UG/L	1.00E-05					
4,4'-DDT	UG/L	1.00E-05			0.013 J		
gamma-BHC (Lindane)	UG/L	0.008				0.012 J	
gamma-Chlordane	UG/L	2.00E-05					

*Criteria- NYSDEC TOGS (1.1.1), Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations. April 2000, Class A.

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EXCEPT PFAS
PETERSBURGH LANDFILL ADDENDUM TO SITE CHARACTERIZATION

Location ID			SW-04/SED-04	SW-05/SED-05	SW-05/SED-05	SW-06/SED-06	SW-06/SED-06
Sample ID			SW-4	SW-5-120716	SW-5	SW-6-120716	SW-6
Matrix			Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
Depth Interval (ft)			-	-	-	-	-
Date Sampled			02/22/18	12/07/16	02/23/18	12/07/16	02/23/18
Parameter	Units	Criteria*					
Metals							
Aluminum	UG/L	100 ionic	140 J		150 J	62.0 J	340
Arsenic	UG/L	50					
Barium	UG/L	1000	11	100	130 J+	12	120
Beryllium	UG/L	3					
Boron	UG/L	10000	4.3 J	NA	140 J	NA	130
Calcium	UG/L	-	11,900	42,400	40,600	12,400	39,400
Chromium	UG/L	calc					
Chromium VI	UG/L	11 dissolved		9.5 J	7.4 J	8.7 J	7.4 J
Cobalt	UG/L	5 acid soluble		2.3 J	2.6 J		2.9 J
Copper	UG/L	calc		1.7 J	2.7 J		3.4 J
Iron	UG/L	300	160	300	3,800 J-	210	4,400
Lead	UG/L	calc					
Magnesium	UG/L	35000	1,700	12,600	11,700	2,400	11,200
Manganese	UG/L	300	60	2,900	2,600	210	2,600
Mercury	UG/L	7.00E-04 dissolved					
Nickel	UG/L	calc		1.9 J	2.4 J		2.2 J
Potassium	UG/L	-	820 J	11,000	9,100 J-	1,800	8,900
Selenium	UG/L	4.6 dissolved					
Sodium	UG/L	-	55,600	27,300	21,900 J-	30,000	23,500
Vanadium	UG/L	14 acid soluble					
Zinc	UG/L	calc			2.3 J+	2.1 J	5.1 J

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EXCEPT PFAS
PETERSBURGH LANDFILL ADDENDUM TO SITE CHARACTERIZATION

Location ID			SW-04/SED-04	SW-05/SED-05	SW-05/SED-05	SW-06/SED-06	SW-06/SED-06
Sample ID			SW-4	SW-5-120716	SW-5	SW-6-120716	SW-6
Matrix			Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
Depth Interval (ft)			-	-	-	-	-
Date Sampled			02/22/18	12/07/16	02/23/18	12/07/16	02/23/18
Parameter	Units	Criteria*					
Miscellaneous Parameters							
Alkalinity, Bicarbonate (as CaCO ₃)	MG/L	-	6.4 J	NA	206	NA	166
Alkalinity, Total (as CaCO ₃)	MG/L	-	6.4 J	183	206	31.2	166
Ammonia (as N)	MG/L	2		5.0	5.1	0.21	3.7
Biochemical Oxygen Demand (BOD)	MG/L	-			2.5		5.9
Bromide	MG/L	2		0.16 J	0.21 J		0.18 J
Chemical Oxygen Demand (COD)	MG/L	-		11.6			29.7
Chloride	MG/L	250	97.3	34.5	27.7	43.9	48.8
Color	COLOR UNIT	-	20.0	25.0	25.0	25.0	25.0
Cyanide	MG/L	0.2					
Hardness (as CaCO ₃)	MG/L	-	48.0	188	160	44.0	164
Nitrate-Nitrogen	MG/L	10	0.27	3.7	2.6	0.61	2.2
Phenolics, Total Recoverable	MG/L	1	0.0056 J	0.011	0.0088 J		0.011
Sulfate (as SO ₄)	MG/L	250	6.8	2.5	1.4 J	7.7	4.1
Total Dissolved Solids	MG/L	-	182	274	219	135	209
Total Kjeldahl Nitrogen	MG/L	-		4.5	6.2	0.52	4.4
Total Organic Carbon (TOC)	MG/L	-	1.7	8.1	7.4	3.0	6.0

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SUMMARY OF DETECTED COMPOUNDS IN LEACHATE AND SURFACE WATER SAMPLES
EXCEPT PFAS
PETERSBURGH LANDFILL ADDENDUM TO SITE CHARACTERIZATION

Location ID			SW-07	SW-08	SW-09	SW-10	SW-11
Sample ID			SW-7	SW-8	SW-9	SW-10	SW-11
Matrix			Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
Depth Interval (ft)			-	-	-	-	-
Date Sampled			02/26/18	02/26/18	02/26/18	02/26/18	02/26/18
Parameter	Units	Criteria*					
Volatile Organic Compounds							
1,4-Dichlorobenzene	UG/L	3	NA	NA	NA	NA	NA
Acetone	UG/L	50	NA	NA	NA	NA	NA
Benzene	UG/L	1	NA	NA	NA	NA	NA
Chlorobenzene	UG/L	5	NA	NA	NA	NA	NA
Methyl tert-butyl ether	UG/L	10	NA	NA	NA	NA	NA
Methylcyclohexane	UG/L	-	NA	NA	NA	NA	NA
Methylene chloride	UG/L	5	NA	NA	NA	NA	NA
Semivolatile Organic Compounds							
2-Methylnaphthalene	UG/L	4.7	NA	NA	NA	NA	NA
Acenaphthene	UG/L	5.3	NA	NA	NA	NA	NA
Benzaldehyde	UG/L	-	NA	NA	NA	NA	NA
Dibenzofuran	UG/L	-	NA	NA	NA	NA	NA
Fluoranthene	UG/L	50	NA	NA	NA	NA	NA
Fluorene	UG/L	0.54	NA	NA	NA	NA	NA
Naphthalene	UG/L	10	NA	NA	NA	NA	NA
Phenanthrene	UG/L	5	NA	NA	NA	NA	NA
Pyrene	UG/L	4.6	NA	NA	NA	NA	NA
Pesticide Organic Compounds							
4,4'-DDD	UG/L	1.00E-05	NA	NA	NA	NA	NA
4,4'-DDT	UG/L	1.00E-05	NA	NA	NA	NA	NA
gamma-BHC (Lindane)	UG/L	0.008	NA	NA	NA	NA	NA
gamma-Chlordane	UG/L	2.00E-05	NA	NA	NA	NA	NA

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EXCEPT PFAS
PETERSBURGH LANDFILL ADDENDUM TO SITE CHARACTERIZATION

Location ID			SW-07	SW-08	SW-09	SW-10	SW-11
Sample ID			SW-7	SW-8	SW-9	SW-10	SW-11
Matrix			Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
Depth Interval (ft)			-	-	-	-	-
Date Sampled			02/26/18	02/26/18	02/26/18	02/26/18	02/26/18
Parameter	Units	Criteria*					
Metals							
Aluminum	UG/L	100 ionic	NA	NA	NA	NA	NA
Arsenic	UG/L	50	NA	NA	NA	NA	NA
Barium	UG/L	1000	NA	NA	NA	NA	NA
Beryllium	UG/L	3	NA	NA	NA	NA	NA
Boron	UG/L	10000	NA	NA	NA	NA	NA
Calcium	UG/L	-	NA	NA	NA	NA	NA
Chromium	UG/L	calc	NA	NA	NA	NA	NA
Chromium VI	UG/L	11 dissolved					
Cobalt	UG/L	5 acid soluble	NA	NA	NA	NA	NA
Copper	UG/L	calc	NA	NA	NA	NA	NA
Iron	UG/L	300	NA	NA	NA	NA	NA
Lead	UG/L	calc	NA	NA	NA	NA	NA
Magnesium	UG/L	35000	NA	NA	NA	NA	NA
Manganese	UG/L	300	NA	NA	NA	NA	NA
Mercury	UG/L	7.00E-04 dissolved	NA	NA	NA	NA	NA
Nickel	UG/L	calc	NA	NA	NA	NA	NA
Potassium	UG/L	-	NA	NA	NA	NA	NA
Selenium	UG/L	4.6 dissolved	NA	NA	NA	NA	NA
Sodium	UG/L	-	NA	NA	NA	NA	NA
Vanadium	UG/L	14 acid soluble	NA	NA	NA	NA	NA
Zinc	UG/L	calc	NA	NA	NA	NA	NA

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EXCEPT PFAS
PETERSBURGH LANDFILL ADDENDUM TO SITE CHARACTERIZATION

Location ID			SW-07	SW-08	SW-09	SW-10	SW-11
Sample ID			SW-7	SW-8	SW-9	SW-10	SW-11
Matrix			Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
Depth Interval (ft)			-	-	-	-	-
Date Sampled			02/26/18	02/26/18	02/26/18	02/26/18	02/26/18
Parameter	Units	Criteria*					
Miscellaneous Parameters							
Alkalinity, Bicarbonate (as CaCO ₃)	MG/L	-	11	20.5	11.3	10.6	11.5
Alkalinity, Total (as CaCO ₃)	MG/L	-	11	20.5	11.3	10.6	11.5
Ammonia (as N)	MG/L	2		0.020	0.015 J	0.030	0.015 J
Biochemical Oxygen Demand (BOD)	MG/L	-					
Bromide	MG/L	2					
Chemical Oxygen Demand (COD)	MG/L	-			8.6 J	5.6 J	
Chloride	MG/L	250	51.7	25.1	47.9	44.2	58.6
Color	COLOR UNIT	-	25.0	20.0	20.0	20.0	
Cyanide	MG/L	0.2					
Hardness (as CaCO ₃)	MG/L	-	20.0	28.0	28.0	28.0	44.0
Nitrate-Nitrogen	MG/L	10	0.19	0.25	0.15	0.20	0.25
Phenolics, Total Recoverable	MG/L	1			0.0054 J		
Sulfate (as SO ₄)	MG/L	250	5.3	5.7	5.5	5.6	5.8
Total Dissolved Solids	MG/L	-	78.0	55.0	70.0	103	105
Total Kjeldahl Nitrogen	MG/L	-	0.16 J	0.16 J		0.19 J	
Total Organic Carbon (TOC)	MG/L	-	0.93 J	1.1	1.1	1.1	0.83 J

*Criteria- NYSDEC TOGS (1.1.1), Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations. April 2000, Class A.

Flags assigned during chemistry validation are shown.

 Concentration Exceeds Criteria

- = No criteria. Calc = Also has a calculated standard based on hardness concentration. See Table 4-3C for calculated standard.

Empty cell = Not detected. NA = Not analyzed.

J = The reported concentration is an estimated value. J+ = Estimated value with a high bias. J- = Estimated value with a low bias.

Only Detected Results Reported.

TABLE 4-3B
SUMMARY OF DETECTED PFAS COMPOUNDS IN LEACHATE AND SURFACE WATER SAMPLES
PETERSBURGH LANDFILL ADDENDUM TO SITE CHARACTERIZATION

Location ID			LC-01	LC-01	LC-01	SW-01/SED-01	SW-01/SED-01
Sample ID			LC-1-121416	LC-1-012417	LC-1	SW-1-121316	SW-1-012417
Matrix			GW Seep	GW Seep	GW Seep	Surface Water	Surface Water
Depth Interval (ft)			-	-	-	-	-
Date Sampled			12/14/16	01/24/17	02/23/18	12/13/16	01/24/17
Parameter	Units	Criteria*		(2-1)			(2-1)
Per- and Polyfluoroalkyl Substances							
N-Methyl perfluorooctanesulfonamidoacetic acid	NG/L	-	NA	NA	8.2 J	NA	NA
Perfluorobutanesulfonic acid (PFBS)	NG/L	-	3.4		4.6		
Perfluorobutanoic acid (PFBA)	NG/L	-	NA	NA	54	NA	NA
Perfluorodecanoic acid (PFDA)	NG/L	-	NA	1.9	1.8 J	NA	
N-Ethyl perfluorooctanesulfonamidoacetic acid	NG/L	-	NA	NA	16 J	NA	NA
Perfluoro-1-heptanesulfonate (PFHPS)	NG/L	-	NA	NA	0.88 J	NA	NA
Perfluoroheptanoic acid (PFHpA)	NG/L	-	110	120	180		
Perfluorohexanesulfonic acid (PFHxS)	NG/L	-	16	22	29		
Perfluorohexanoic acid (PFHxA)	NG/L	-	NA	140	200	NA	
Perfluorononanoic acid (PFNA)	NG/L	-	3.3	3.8	4.4		
Perfluorooctane sulfonamide (FOSA)	NG/L	-	NA	NA	1.8 J	NA	NA
Perfluorooctanesulfonic acid (PFOS)	NG/L	70	81	91	91		
Perfluorooctanoic acid (PFOA)	NG/L	70	4,900	5,500	7,800 D		
Perfluoropentanoic acid (PFPA)	NG/L	-	NA	NA	27	NA	NA
Total PFOA and PFOS	NG/L	70	4,981	5,591	7,891		

*Criteria- USEPA Drinking Water Health Advisory (USEPA, May 2016)

Flags assigned during chemistry validation are shown.



Concentration Exceeds Criteria

- = No criteria. Empty cell = Not detected. NA = Not analyzed. D = Result reported from a secondary dilution analysis.

J = The reported concentration is an estimated value.

Only Detected Results Reported.

TABLE 4-3B
SUMMARY OF DETECTED PFAS COMPOUNDS IN LEACHATE AND SURFACE WATER SAMPLES
PETERSBURGH LANDFILL ADDENDUM TO SITE CHARACTERIZATION

Location ID			SW-01/SED-01	SW-01/SED-01	SW-02/SED-02	SW-02/SED-02	SW-02/SED-02
Sample ID			DUP 022218	SW-1	SW-2-120816	SW-DUP-120816	SW-2-012417
Matrix			Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
Depth Interval (ft)			-	-	-	-	-
Date Sampled			02/22/18	02/22/18	12/08/16	12/08/16	01/24/17
Parameter	Units	Criteria*	Field Duplicate (1-1)			Field Duplicate (1-1)	(2-1)
Per- and Polyfluoroalkyl Substances							
N-Methyl perfluorooctanesulfonamidoacetic acid	NG/L	-			NA	NA	NA
Perfluorobutanesulfonic acid (PFBS)	NG/L	-	0.19 J				
Perfluorobutanoic acid (PFBA)	NG/L	-		0.36 J	NA	NA	NA
Perfluorodecanoic acid (PFDA)	NG/L	-			NA	NA	
N-Ethyl perfluorooctanesulfonamidoacetic acid	NG/L	-			NA	NA	NA
Perfluoro-1-heptanesulfonate (PFHPS)	NG/L	-			NA	NA	NA
Perfluoroheptanoic acid (PFHpA)	NG/L	-					
Perfluorohexanesulfonic acid (PFHxS)	NG/L	-					
Perfluorohexanoic acid (PFHxA)	NG/L	-			NA	NA	
Perfluorononanoic acid (PFNA)	NG/L	-					
Perfluorooctane sulfonamide (FOSA)	NG/L	-			NA	NA	NA
Perfluorooctanesulfonic acid (PFOS)	NG/L	70			2.8	2.8	2.8
Perfluorooctanoic acid (PFOA)	NG/L	70			4.6	4.9	4.0
Perfluoropentanoic acid (PFPA)	NG/L	-			NA	NA	NA
Total PFOA and PFOS	NG/L	70			7.4	7.7	6.8

*Criteria- USEPA Drinking Water Health Advisory (USEPA, May 2016)

Flags assigned during chemistry validation are shown.



Concentration Exceeds Criteria

- = No criteria. Empty cell = Not detected. NA = Not analyzed. D = Result reported from a secondary dilution analysis.

J = The reported concentration is an estimated value.

Only Detected Results Reported.

TABLE 4-3B
SUMMARY OF DETECTED PFAS COMPOUNDS IN LEACHATE AND SURFACE WATER SAMPLES
PETERSBURGH LANDFILL ADDENDUM TO SITE CHARACTERIZATION

Location ID			SW-03/SED-03	SW-03/SED-03	SW-03/SED-03	SW-04/SED-04	SW-04/SED-04
Sample ID			SW-3-120816	SW-3-012417	SW-3	SW-4-120816	DUP-012417
Matrix			Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
Depth Interval (ft)			-	-	-	-	-
Date Sampled			12/08/16	01/24/17	02/22/18	12/08/16	01/24/17
Parameter	Units	Criteria*		(2-1)			Field Duplicate (2-1)
Per- and Polyfluoroalkyl Substances							
N-Methyl perfluorooctanesulfonamidoacetic acid	NG/L	-	NA	NA		NA	NA
Perfluorobutanesulfonic acid (PFBS)	NG/L	-		1.0 J	0.57 J		
Perfluorobutanoic acid (PFBA)	NG/L	-	NA	NA	0.80 J	NA	NA
Perfluorodecanoic acid (PFDA)	NG/L	-	NA			NA	
N-Ethyl perfluorooctanesulfonamidoacetic acid	NG/L	-	NA	NA		NA	NA
Perfluoro-1-heptanesulfonate (PFHPS)	NG/L	-	NA	NA		NA	NA
Perfluoroheptanoic acid (PFHpA)	NG/L	-	1.2 J	3.3	0.40 J		
Perfluorohexanesulfonic acid (PFHxS)	NG/L	-	2.0	2.0			
Perfluorohexanoic acid (PFHxA)	NG/L	-	NA	3.3		NA	
Perfluorononanoic acid (PFNA)	NG/L	-	0.96 J	1.4 J			
Perfluorooctane sulfonamide (FOSA)	NG/L	-	NA	NA		NA	NA
Perfluorooctanesulfonic acid (PFOS)	NG/L	70	12	31	1.6 J		1.5 J
Perfluorooctanoic acid (PFOA)	NG/L	70	9.5	14	3.1	4.5	3.7
Perfluoropentanoic acid (PFPA)	NG/L	-	NA	NA		NA	NA
Total PFOA and PFOS	NG/L	70	21.5	45	4.7	4.5	5.2

*Criteria- USEPA Drinking Water Health Advisory (USEPA, May 2016)

Flags assigned during chemistry validation are shown.



Concentration Exceeds Criteria

- = No criteria. Empty cell = Not detected. NA = Not analyzed. D = Result reported from a secondary dilution analysis.

J = The reported concentration is an estimated value.

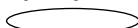
Only Detected Results Reported.

TABLE 4-3B
SUMMARY OF DETECTED PFAS COMPOUNDS IN LEACHATE AND SURFACE WATER SAMPLES
PETERSBURGH LANDFILL ADDENDUM TO SITE CHARACTERIZATION

Location ID			SW-04/SED-04	SW-04/SED-04	SW-05/SED-05	SW-05/SED-05	SW-05/SED-05
Sample ID			SW-4-012417	SW-4	SW-5-120716	SW-5-012417	SW-5
Matrix			Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
Depth Interval (ft)			-	-	-	-	-
Date Sampled			01/24/17	02/22/18	12/07/16	01/24/17	02/23/18
Parameter	Units	Criteria*	(2-1)			(2-1)	
Per- and Polyfluoroalkyl Substances							
N-Methyl perfluorooctanesulfonamidoacetic acid	NG/L	-	NA		NA	NA	
Perfluorobutanesulfonic acid (PFBS)	NG/L	-		0.44 J	2.2	1.7 J	1.8 J
Perfluorobutanoic acid (PFBA)	NG/L	-	NA	0.64 J	NA	NA	15
Perfluorodecanoic acid (PFDA)	NG/L	-			NA	0.67 J	0.80 J
N-Ethyl perfluorooctanesulfonamidoacetic acid	NG/L	-	NA		NA	NA	2.0 J
Perfluoro-1-heptanesulfonate (PFHPS)	NG/L	-	NA		NA	NA	0.71 J
Perfluoroheptanoic acid (PFHpA)	NG/L	-		0.28 J	58	35	42
Perfluorohexanesulfonic acid (PFHxS)	NG/L	-			13	10	9.0
Perfluorohexanoic acid (PFHxA)	NG/L	-			NA	48	45
Perfluorononanoic acid (PFNA)	NG/L	-			2.1	2.2	2.3
Perfluorooctane sulfonamide (FOSA)	NG/L	-	NA		NA	NA	0.42 J
Perfluorooctanesulfonic acid (PFOS)	NG/L	70		0.92 J	48	45	41
Perfluorooctanoic acid (PFOA)	NG/L	70	3.6	3.2	2,000	1,600	1,700 D
Perfluoropentanoic acid (PFPA)	NG/L	-	NA		NA	NA	8.6
Total PFOA and PFOS	NG/L	70	3.6	4.12	2,048	1,645	1,741

*Criteria- USEPA Drinking Water Health Advisory (USEPA, May 2016)

Flags assigned during chemistry validation are shown.

 Concentration Exceeds Criteria

- = No criteria. Empty cell = Not detected. NA = Not analyzed. D = Result reported from a secondary dilution analysis.

J = The reported concentration is an estimated value.

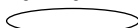
Only Detected Results Reported.

TABLE 4-3B
SUMMARY OF DETECTED PFAS COMPOUNDS IN LEACHATE AND SURFACE WATER SAMPLES
PETERSBURGH LANDFILL ADDENDUM TO SITE CHARACTERIZATION

Location ID			SW-06/SED-06	SW-06/SED-06	SW-06/SED-06	SW-07	SW-08
Sample ID			SW-6-120716	SW-6-012417	SW-6	SW-7	SW-8
Matrix			Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
Depth Interval (ft)			-	-	-	-	-
Date Sampled			12/07/16	01/24/17	02/23/18	02/26/18	02/26/18
Parameter	Units	Criteria*		(2-1)			
Per- and Polyfluoroalkyl Substances							
N-Methyl perfluorooctanesulfonamidoacetic acid	NG/L	-	NA	NA			
Perfluorobutanesulfonic acid (PFBS)	NG/L	-			1.1 J		
Perfluorobutanoic acid (PFBA)	NG/L	-	NA	NA	9.7	0.35 J	0.76 J
Perfluorodecanoic acid (PFDA)	NG/L	-	NA		0.58 J		
N-Ethyl perfluorooctanesulfonamidoacetic acid	NG/L	-	NA	NA	1.9 J		
Perfluoro-1-heptanesulfonate (PFHPS)	NG/L	-	NA	NA	0.54 J		
Perfluoroheptanoic acid (PFHpA)	NG/L	-	3.4	3.1	26	0.30 J	1.1 J
Perfluorohexanesulfonic acid (PFHxS)	NG/L	-	1.3 J	1.4 J	6.2		
Perfluorohexanoic acid (PFHxA)	NG/L	-	NA	4.5	30		0.97 J
Perfluorononanoic acid (PFNA)	NG/L	-			1.9		
Perfluorooctane sulfonamide (FOSA)	NG/L	-	NA	NA			
Perfluorooctanesulfonic acid (PFOS)	NG/L	70	4.6	4.1	34		2.0
Perfluorooctanoic acid (PFOA)	NG/L	70	160	130	1,100 D	8.9	39
Perfluoropentanoic acid (PFPA)	NG/L	-	NA	NA	5.7		
Total PFOA and PFOS	NG/L	70	165	134	1,134	8.9	41

*Criteria- USEPA Drinking Water Health Advisory (USEPA, May 2016)

Flags assigned during chemistry validation are shown.

 Concentration Exceeds Criteria

- = No criteria. Empty cell = Not detected. NA = Not analyzed. D = Result reported from a secondary dilution analysis.

J = The reported concentration is an estimated value.

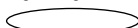
Only Detected Results Reported.

TABLE 4-3B
SUMMARY OF DETECTED PFAS COMPOUNDS IN LEACHATE AND SURFACE WATER SAMPLES
PETERSBURGH LANDFILL ADDENDUM TO SITE CHARACTERIZATION

Location ID			SW-09	SW-10	SW-11
Sample ID			SW-9	SW-10	SW-11
Matrix			Surface Water	Surface Water	Surface Water
Depth Interval (ft)			-	-	-
Date Sampled			02/26/18	02/26/18	02/26/18
Parameter	Units	Criteria*			
Per- and Polyfluoroalkyl Substances					
N-Methyl perfluorooctanesulfonamidoacetic acid	NG/L	-			
Perfluorobutanesulfonic acid (PFBS)	NG/L	-			
Perfluorobutanoic acid (PFBA)	NG/L	-	0.39 J	0.56 J	
Perfluorodecanoic acid (PFDA)	NG/L	-			
N-Ethyl perfluorooctanesulfonamidoacetic acid	NG/L	-			
Perfluoro-1-heptanesulfonate (PFHPS)	NG/L	-			
Perfluoroheptanoic acid (PFHpA)	NG/L	-	0.36 J	0.77 J	
Perfluorohexanesulfonic acid (PFHxS)	NG/L	-			
Perfluorohexanoic acid (PFHxA)	NG/L	-		0.61 J	
Perfluorononanoic acid (PFNA)	NG/L	-			
Perfluorooctane sulfonamide (FOSA)	NG/L	-			
Perfluorooctanesulfonic acid (PFOS)	NG/L	70	0.47 J	1.1 J	
Perfluorooctanoic acid (PFOA)	NG/L	70	7.6	20	
Perfluoropentanoic acid (PFPA)	NG/L	-			
Total PFOA and PFOS	NG/L	70	8.07	21.1	

*Criteria- USEPA Drinking Water Health Advisory (USEPA, May 2016)

Flags assigned during chemistry validation are shown.

 Concentration Exceeds Criteria

- = No criteria. Empty cell = Not detected. NA = Not analyzed. D = Result reported from a secondary dilution analysis.

J = The reported concentration is an estimated value.

Only Detected Results Reported.

TABLE 4-3C
LEACHATE AND SURFACE WATER ANALYTICAL RESULTS REQUIRING CALCULATION FOR CRITERIA
PETERSBURGH LANDFILL ADDENDUM TO SITE CHARACTERIZATION

Location ID		Calculated Standard	LC-01	Calculated Standard	LC-01	Calculated Standard	SW-02/SED-02	Calculated Standard	SW-02/SED-02	Calculated Standard	SW-03/SED-03	Calculated Standard	SW-03/SED-03
Sample ID			LC-1-121416		LC-1		SW-2-120816		SW-DUP-120816		SW-3-120816		
Matrix			GW Seep		GW Seep		Surface Water		Surface Water		Surface Water		
Date Sampled			12/14/16		02/23/18		12/08/16		12/08/16		12/08/16		
Parameter	Units								Field Duplicate (1-				
Metals													
Chromium	UG/L	192	11 J	186	12 J+	--	--	--	--	--	--	46	2.5 J+
Copper	UG/L	24	35 J	23	16	--	--	4.4	2.0 J	5.8	7.9 J	5.5	4.3 J
Lead	UG/L	--	--	13	28 J+	--	--	--	--	--	--	2	3 J-
Nickel	UG/L	139	44 J	135	16 J	--	--	26	1.3 J	--	--	32	2.1 J
Zinc	UG/L	222	130	215	60 J	41	1.6 J	38	3.6 J	54	7.9 J	50	5.7 J

Location ID		Calculated Standard	SW-05/SED-05	Calculated Standard	SW-05/SED-05	Calculated Standard	SW-06/SED-06	Calculated Standard	SW-06/SED-06
Sample ID			SW-5-120716		SW-5		SW-6-120716		SW-6
Matrix			Surface Water		Surface Water		Surface Water		Surface Water
Date Sampled			12/07/16		02/23/18		12/07/16		02/23/18
Parameter	Units								
Metals									
Chromium	UG/L	--	--	--	--	--	--	--	--
Copper	UG/L	15	1.7 J	13	2.7 J	--	--	14	3.4 J
Lead	UG/L	--	--	--	--	--	--	--	--
Nickel	UG/L	89	1.9 J	77	2.4 J	--	--	79	2.2 J
Zinc	UG/L	--	--	123	2.3 J+	41	2.1 J	126	5.1 J

*- NYSDEC TOGS (1.1.1), Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations. April 2000, Class A.

Only detections shown.


 Exceeds calculated standard.


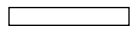
TABLE 4-4
SUMMARY OF DETECTED COMPOUNDS IN SEDIMENT SAMPLES
PETERSBURGH LANDFILL ADDENDUM TO SITE CHARACTERIZATION

Location ID				SW-01/SED-01	SW-02/SED-02	SW-03/SED-03	SW-03/SED-03	SW-04/SED-04
Sample ID				SED-1-121316	SED-2-120816	SED-3-120816	SED-DUP-120816	SED-4-120216
Matrix				Sediment	Sediment	Sediment	Sediment	Sediment
Depth Interval (ft)				-	-	-	-	-
Date Sampled				12/13/16	12/08/16	12/08/16	12/08/16	12/02/16
Parameter	Units	Criteria (1)	Criteria (2)				Field Duplicate (1-1)	
Volatile Organic Compounds								
Chloroform	UG/KG	-	-			5.3 J		
Tetrachloroethene	UG/KG	16000	57000					
Toluene	UG/KG	930	4500				4.5 J	
Pesticide Organic Compounds								
4,4'-DDE	UG/KG	44	48000					
delta-BHC	UG/KG	-	-					0.77 J
Metals								
Aluminum	MG/KG	-	-	12,900	19,000	22,200 J	31,600 J	21,400 J
Arsenic	MG/KG	10	33	26.1 J	5.0	8.8 J	17.2 J	9.4 J
Barium	MG/KG	-	-	150 J	25.5	87.8 J	145 J	86.9 J
Beryllium	MG/KG	-	-	0.36	0.25	0.34 J	0.55 J	0.42 J
Boron	MG/KG	-	-	10.1 J		2.3 J	3.4 J	1.2 J
Cadmium	MG/KG	1	5	0.43	0.11 J	0.27 J	0.33 J	0.12 J
Calcium	MG/KG	-	-	10,900	769	4,310 J	6,990 J	1,310 J
Chromium	MG/KG	43	110	30.1	19.3	23.4 J	36.0 J	22.0 J
Cobalt	MG/KG	-	-	8.9	16.3	26.6 J	36.6 J	20.8 J
Copper	MG/KG	32	150	45.4	21.4	50.2 J	81.8 J	27.0 J
Iron	MG/KG	-	-	22,800	38,300	42,400 J	60,400 J	45,700 J
Lead	MG/KG	36	130	30.6	9.3	61.0 J	38.5 J	18.3 J
Magnesium	MG/KG	-	-	4,570 J	7,780	7,130 J	9,680 J	7,870 J

Criteria (1)- NYSDEC Screening and Assessment of Contaminated Sediments, Class B (based on 2% TOC), June 24, 2014.

Criteria (2)- NYSDEC Screening and Assessment of Contaminated Sediments, Class C (based on 2% TOC), June 24, 2014.

Flags assigned during chemistry validation are shown.

 Concentration Exceeds Criteria (1)
 Concentration Exceeds Criteria (2)

- = No criteria. Criteria for PFAS = New York State Environmental Conservation Law preliminary residential SCO.

Empty cell = Not detected. J = The reported concentration is an estimated value. J- = Estimated value with a low bias.

Only Detected Results Reported.


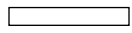
TABLE 4-4
SUMMARY OF DETECTED COMPOUNDS IN SEDIMENT SAMPLES
PETERSBURGH LANDFILL ADDENDUM TO SITE CHARACTERIZATION

Location ID				SW-01/SED-01	SW-02/SED-02	SW-03/SED-03	SW-03/SED-03	SW-04/SED-04
Sample ID				SED-1-121316	SED-2-120816	SED-3-120816	SED-DUP-120816	SED-4-120216
Matrix				Sediment	Sediment	Sediment	Sediment	Sediment
Depth Interval (ft)				-	-	-	-	-
Date Sampled				12/13/16	12/08/16	12/08/16	12/08/16	12/02/16
Parameter	Units	Criteria (1)	Criteria (2)				Field Duplicate (1-1)	
Metals								
Manganese	MG/KG	-	-	824 J	1,250	3,260 J	5,730 J	2,000 J
Mercury	MG/KG	0.2	1	0.033		0.063 J	0.068 J	
Nickel	MG/KG	23	49	19.3	31.7	33.6 J	50.4 J	39.6 J
Potassium	MG/KG	-	-	1,220	338	992 J	1,640 J	1,240 J
Selenium	MG/KG	-	-					1.3 J
Sodium	MG/KG	-	-	112 J			442 J	93.1 J
Thallium	MG/KG	-	-					
Vanadium	MG/KG	-	-	17.0	14.1	17.4 J	25.7 J	16.2 J
Zinc	MG/KG	120	460	153 J	98.2	104 J	147 J	107 J
Miscellaneous Parameters								
Chloride	MG/KG	-	-	10	16.0	17.6 J	64.6 J	27.0
Cyanide	MG/KG	-	-	0.63 J		2.5 J		
Nitrate-Nitrogen	MG/KG	-	-	1.0	NA	NA	NA	
Phenolics, Total Recoverable	MG/KG	-	-			2.4 J	3.6 J	
Total Kjeldahl Nitrogen	MG/KG	-	-	2,200	465	10,200 J	11,700 J	333
Total Organic Carbon (TOC)	MG/KG	-	-	68,300	7,050	199,000 J	272,000 J	12,400
Per- and Polyfluoroalkyl Substances								
Perfluorodecanoic acid (PFDA)	UG/KG	-	-			2.9 J	2.7 J	
Perfluorododecanoic acid (PFDoA)	UG/KG	-	-			1.1 J	0.91 J	
Perfluoroheptanoic acid (PFHpA)	UG/KG	-	-				0.61 J	

Criteria (1)- NYSDEC Screening and Assessment of Contaminated Sediments, Class B (based on 2% TOC), June 24, 2014.

Criteria (2)- NYSDEC Screening and Assessment of Contaminated Sediments, Class C (based on 2% TOC), June 24, 2014.

Flags assigned during chemistry validation are shown.

 Concentration Exceeds Criteria (1)
 Concentration Exceeds Criteria (2)

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Only Detected Results Reported.

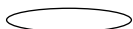
TABLE 4-4
SUMMARY OF DETECTED COMPOUNDS IN SEDIMENT SAMPLES
PETERSBURGH LANDFILL ADDENDUM TO SITE CHARACTERIZATION

Location ID				SW-01/SED-01	SW-02/SED-02	SW-03/SED-03	SW-03/SED-03	SW-04/SED-04
Sample ID				SED-1-121316	SED-2-120816	SED-3-120816	SED-DUP-120816	SED-4-120216
Matrix				Sediment	Sediment	Sediment	Sediment	Sediment
Depth Interval (ft)				-	-	-	-	-
Date Sampled				12/13/16	12/08/16	12/08/16	12/08/16	12/02/16
Parameter	Units	Criteria (1)	Criteria (2)				Field Duplicate (1-1)	
Per- and Polyfluoroalkyl Substances								
Perfluorohexanoic acid (PFHxA)	UG/KG	-	-	0.10 J		1.8 J	1.4 J	
Perfluorononanoic acid (PFNA)	UG/KG	-	-			1.3 J	1.2 J	
Perfluorooctanesulfonic acid (PFOS)	UG/KG	140		0.40	0.35	33 J	27 J	
Perfluorooctanoic acid (PFOA)	UG/KG	140		0.24 J		2.0 J	1.4 J	
Perfluorotetradecanoic acid (PFTeA)	UG/KG	-	-			0.34 J	0.40 J	
Perfluorotridecanoic acid (PFTriA)	UG/KG	-	-	0.27				
Perfluoroundecanoic acid (PFUnA)	UG/KG	-	-	0.15 J		2.0 J	3.4 J	
Total PFOA and PFOS	UG/KG	140		0.64	0.35	35.0	28.4	

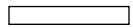
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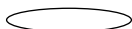
TABLE 4-4
SUMMARY OF DETECTED COMPOUNDS IN SEDIMENT SAMPLES
PETERSBURGH LANDFILL ADDENDUM TO SITE CHARACTERIZATION

Location ID				SW-05/SED-05	SW-06/SED-06
Sample ID				SED-5-120216	SED-6-120216
Matrix				Sediment	Sediment
Depth Interval (ft)				-	-
Date Sampled				12/02/16	12/02/16
Parameter	Units	Criteria (1)	Criteria (2)		
Volatile Organic Compounds					
Chloroform	UG/KG	-	-		
Tetrachloroethene	UG/KG	16000	57000		1.2 J
Toluene	UG/KG	930	4500		
Pesticide Organic Compounds					
4,4'-DDE	UG/KG	44	48000	1.3 J	
delta-BHC	UG/KG	-	-		
Metals					
Aluminum	MG/KG	-	-	17,300	21,300
Arsenic	MG/KG	10	33	54.0	14.4
Barium	MG/KG	-	-	356	48.3
Beryllium	MG/KG	-	-	0.42 J	0.39
Boron	MG/KG	-	-	6.3	1.2 J
Cadmium	MG/KG	1	5	0.20 J	
Calcium	MG/KG	-	-	4,690	1,450
Chromium	MG/KG	43	110	17.0	18.4
Cobalt	MG/KG	-	-	28.5	24.5
Copper	MG/KG	32	150	32.2	27.8
Iron	MG/KG	-	-	68,900	46,800
Lead	MG/KG	36	130	14.9	25.9 J-
Magnesium	MG/KG	-	-	5,840	8,420

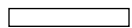
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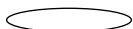
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SUMMARY OF DETECTED COMPOUNDS IN SEDIMENT SAMPLES
PETERSBURGH LANDFILL ADDENDUM TO SITE CHARACTERIZATION

Location ID				SW-05/SED-05	SW-06/SED-06
Sample ID				SED-5-120216	SED-6-120216
Matrix				Sediment	Sediment
Depth Interval (ft)				-	-
Date Sampled				12/02/16	12/02/16
Parameter	Units	Criteria (1)	Criteria (2)		
Metals					
Manganese	MG/KG	-	-	8,730	1,440
Mercury	MG/KG	0.2	1	0.025 J	
Nickel	MG/KG	23	49	29.0	40.1
Potassium	MG/KG	-	-	859	1,020
Selenium	MG/KG	-	-	3.2 J	
Sodium	MG/KG	-	-	128 J	67.7
Thallium	MG/KG	-	-	1.9 J	
Vanadium	MG/KG	-	-	15.2	16.5
Zinc	MG/KG	120	460	91.2	112 J-
Miscellaneous Parameters					
Chloride	MG/KG	-	-	34.7 J	8.9
Cyanide	MG/KG	-	-	1.0 J	
Nitrate-Nitrogen	MG/KG	-	-	0.61 J	
Phenolics, Total Recoverable	MG/KG	-	-		
Total Kjeldahl Nitrogen	MG/KG	-	-	3,180 J	253 J
Total Organic Carbon (TOC)	MG/KG	-	-	64,100	20,100
Per- and Polyfluoroalkyl Substances					
Perfluorodecanoic acid (PFDA)	UG/KG	-	-	0.23 J	
Perfluorododecanoic acid (PFDoA)	UG/KG	-	-		
Perfluoroheptanoic acid (PFHpA)	UG/KG	-	-	0.25 J	

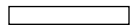
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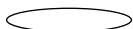
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PETERSBURGH LANDFILL ADDENDUM TO SITE CHARACTERIZATION

Location ID				SW-05/SED-05	SW-06/SED-06
Sample ID				SED-5-120216	SED-6-120216
Matrix				Sediment	Sediment
Depth Interval (ft)				-	-
Date Sampled				12/02/16	12/02/16
Parameter	Units	Criteria (1)	Criteria (2)		
Per- and Polyfluoroalkyl Substances					
Perfluorohexanoic acid (PFHxA)	UG/KG	-	-	0.49 J	
Perfluorononanoic acid (PFNA)	UG/KG	-	-		
Perfluorooctanesulfonic acid (PFOS)	UG/KG	140		6.4 J	0.31
Perfluorooctanoic acid (PFOA)	UG/KG	140		14 J	0.74
Perfluorotetradecanoic acid (PFTeA)	UG/KG	-	-		
Perfluorotridecanoic acid (PFTriA)	UG/KG	-	-		
Perfluoroundecanoic acid (PFUnA)	UG/KG	-	-	0.30 J	
Total PFOA and PFOS	UG/KG	140		20.4	1.05

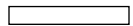
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