

Site Characterization Sampling and Analysis Plan
Rocky Ledge Landfill
NYSDEC Site No. 360208
City of New Castle, Westchester County, New York
June 2021

Prepared for: New York State Department of Environmental Conservation (NYSDEC)

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1 Objective

This Sampling and Analysis Plan (SAP) was prepared for site characterization activities driven by the discovery of emerging contaminants during a site assessment under the Inactive Landfill Initiative in 2019. The site is a former landfill that was used primarily for spring clean-up debris until 1972; however, between 1987 and 1988 the landfill accepted construction and demolition debris. The landfill was consolidated in 2002 on the eastern side to accommodate nearby residential construction. In 2010, NYSDEC inspected the site and observed improper access controls, illegal dumping, and uncontrolled leachate discharge into surface water (Parsons 2018).

This SAP will be implemented during the site characterization at the Rocky Ledge Landfill site. All field activities listed below will be performed in accordance with E & E's Master Quality Assurance Project Plan (QAPP) (E & E 2020a) and Field Activities Plan (FAP) (E & E 2020b). Sampling and analysis for per- and polyfluoroalkyl substances (PFAs) shall be implemented in accordance with NYSDEC's January 2021 guidance, "Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAs)" (NYSDEC 2021).

The primary elements of the site characterization include:

- Installation of soil borings and construction of new monitoring wells. Surface and subsurface soil sampling will be conducted during soil boring installation outside the landfill footprint to determine if contamination is present in soil.
- Sampling of new and existing monitoring to determine if contamination is present in groundwater and to evaluate the extent of contamination in the vicinity of the landfill.
- Collection of surface water and sediment samples on the north and south sides of the landfill near the entrance/exit of a culvert pipe that runs under the landfill. Surface water/seep samples will also be collected from a pond north of the site and from an active seep on the northeast side of the landfill. The objective is to determine if contaminants are migrating to or off the site in surface water.
- A sample will be collected from an inactive leachate collection tank (if accessible) to determine contaminant concentrations in landfill leachate.

2 Pre-sampling Activities

Prior to initiating on-site activities, NYSDEC will attempt to contact the property owners to obtain signed access permission for site characterization activities. Only properties for which the owner has granted written access permission will be entered upon for sampling and surveying purposes.

New York State-licensed land surveyors from WSP USA, Inc. will perform site surveying activities. Following completion of monitoring well installation and sampling activities, the survey crew will collect locations and elevations. In addition, they will survey the locations of exposed liner material and/or wastes to aid in identification of the potential footprint of the landfill. All locations will be surveyed to a horizontal accuracy of 0.5 foot. Well and surface water sampling location elevations will be surveyed to a vertical accuracy of 0.05 foot.

E & E's subcontractor, Land, Air, Water Environmental Services (LAWES), will provide drilling and monitoring well installation services and will contact Dig Safely New York to request mark-outs of underground utilities prior to beginning intrusive activities in accordance with New York Code Rule 753.

3 Soil Boring/Monitoring Well Installation and Sampling

3.1 Surface and Subsurface Soil Sampling

Six soil borings will be installed by LAWES using hollow-stem auger drilling and split-spoon sampling (see Figure 1). Continuous split-spoon sampling will be conducted to a depth of approximately 10 feet below the water table (anticipated total depth of approximately 20 feet below ground surface). E & E will log results; screen soil for organic vapors with a photoionization detector (PID); and collect up to three soil samples per soil boring for laboratory analysis.

Nomenclature for soil sample identification will include the soil boring/well location named followed by the depth interval (example: OW-3-Z1). Samples will be collected from the following depth intervals at each soil boring:

- **Z1:** 0 to 2 inches
- **Z2:** 2 to 12 inches,
- **Z3:** at a depth determined in the field based on potential signs of contamination (based on observations and PID readings) or immediately above the water table.

Analytical parameters for soil sampling are shown in Table 1. All soil boring locations will be sampled at each interval shown above for 1,4 dioxane and PFAs. Three depth intervals at two boring locations, one upgradient (OW-9) and one downgradient of the landfill (at the discretion of the field geologist based on observations of potential contamination), will also be analyzed for full Target Compound List (TCL)/Target Analyte List (TAL) parameters that including volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), pesticides, herbicides, metals and cyanide.

Additional soil volume will also be collected from the Z2 interval (2 to 12 inches) at all six boring locations. These six additional samples will all be submitted to the lab for immediate pH analysis, and the lab will archive the remainder for possible later extraction and testing. Based on the preliminary results of the total PFAS analysis, E & E will consult with NYSDEC and select three of the samples to be tested for total organic carbon (TOC) and for which extracts shall be prepared using the Synthetic Precipitation Leaching Procedure (SPLP) procedure with subsequent analysis for PFAS. The remaining untested samples shall be discarded. If the initial PFAS results are not available from the lab prior to expiration of the holding time for TOC analysis and SPLP extraction, then samples will be chosen from one upgradient and two downgradient locations prior to expiration of the holding time.

3.2 Monitoring Well Installation

Six new monitoring wells will be installed at the soil boring locations and are expected to average approximately 20 feet in depth. Each will be constructed with up to a 10-foot-long, 2-inch-diameter, PVC screen. Screens will be set such that the bottom is approximately 8 feet below the water table (actual screen depth and length will be dependent on depth to groundwater). Figure 1 shows the general monitoring well locations, which are described below:

- Two monitoring wells will be installed along the southern portion of the landfill footprint: one near the southeast corner and one near the southwest corner.
- One monitoring well will be installed on the west side of the landfill.
- One monitoring well will be installed on the east side of the landfill.
- One monitoring well will be installed north of the landfill footprint.
- One monitoring well will be installed to replace existing damaged well, OW-3.

3.3 Monitoring Well Development

All new monitoring wells will be developed no sooner than 24 hours after completion of well construction. The wells will be developed by surging and over-pumping using a submersible, stainless-steel, well pump. Development will continue until water quality parameters (pH, temperature, conductivity, and turbidity) have stabilized and turbidity is less than 50 nephelometric turbidity units (NTU), not to exceed 2 hours.

3.4 Groundwater Sampling

Six new wells and three existing monitoring wells (OW-2, OW-3R, OW-5, OW-6, OW-7, OW-8, OW-9, BW-1 and BW-3) will be sampled no sooner than 48 hours after well development. Sampling will be performed using United States Environmental Protection Agency (EPA) low-flow purging and sampling techniques using a bladder pump equipped with dedicated polyethylene bladders and tubing. Upon stabilization of parameters, groundwater samples will be collected and filtered in the field if necessary, then submitted to the laboratory for TCL/TAL VOCs, SVOCs, PCBs, pesticides, herbicides, metals, cyanide, PFAS, and 1,4-dioxane (see Table 1).

One round of static groundwater level measurements will be collected from all monitoring wells in a single day prior to groundwater sampling. Groundwater levels will be measured with an electronic water-level indicator graduated to 0.01 foot. Measurement and sampling will be at least 24 hours after development of the new wells is complete.

4 Surface Water, Sediment, and Leachate Sampling

4.1 Surface water

Six surface water samples will be collected from stream, seep, and wetland locations. Specifics location are shown on Figure 1. One sample will be collected at the northern (upstream) and southern (downstream) ends of the culvert pipe that runs beneath the landfill and one in the wetland south of the landfill. Three additional surface water samples will be collected north of the landfill: one at a seep location, one in a wetland area upstream of the seep location, and one in a pond nearby that is upgradient of the seep location. Samples will be collected by directly dipping laboratory containers into the water.

A leachate sample will be collected from a leachate collection tank located on the south side of the landfill. If no water is present in the tank a sediment sample will be collected instead. Leachate will be collected using a dedicated polyethylene bailer.

The surface water and leachate samples will be analyzed for PFAS and 1,4-dioxane. The leachate sample and surface water sampling locations SW-1, SW-2, and SW-3 (co-located with sediment samples, see Figure 1) will also be analyzed for TCL VOCs, SVOCs, PCBs, pesticides, herbicides, TAL metals, and cyanide. Details of analyses are provided in Table 1.

4.2 Sediment

Three sediment samples will be collected and co-located with three surface water samples. The locations are at the northern and southern ends of the culvert pipe that runs beneath the landfill and the wetland south of the landfill. All samples will be analyzed for TCL/TAL VOCs, SVOCs, PCBs, pesticides, herbicides, metals, cyanide, PFAS, and 1,4-dioxane as detailed in Table 1.

5 Equipment Decontamination

The following procedures will be used for all non-dedicated equipment and tools including downhole equipment such as split spoons:

- Initially remove all foreign matter;
- Scrub with brushes in a laboratory-grade detergent solution;
- Rinse with potable water;
- Rinse with a 5-10% nitric acid solution (when sampling for metals); and
- Rinse with distilled water.

Prior to drilling activities, E & E will collect a sample of the water that will be used by the drillers for equipment decontamination and test the water for PFAs.

6 Quality Assurance/Quality Control

Quality assurance/quality control procedures will be performed in accordance with E & E's 2020 *Master Quality Assurance Project Plan for New York State Department of Environmental Conservation Projects*, Contract No. D009807. Specific quality assurance/quality control activities that apply to the implementation of this sampling plan include:

- Collect field duplicates at a rate of 1 per 20 samples per matrix.
- Collect additional volume for matrix spike/matrix spike duplicate (MS/MSD) analysis at a rate of 1 per 20 samples per matrix (note that the total number of samples in Table 1 does not include MS/MSDs because those samples are not chargeable by the laboratory).
- Collect at least one equipment rinse blank daily from sampling equipment. Typically, one sample per matrix will be collected for full TCL/TAL analysis. Additional rinse blanks will be collected for PFAS analysis only and shall include dedicated sampling equipment such as sampling pump bladders and tubing, bailers, etc. Laboratory-supplied, analyte-free water shall be used for rinse blanks.
- Document all data and observations on field data sheets and/or in the field logbooks.

- Operate and calibrate all field instruments in accordance with operating instructions as supplied by the manufacturer unless otherwise specified.
- Ensure all laboratory deliverables are validated by an E & E chemist prior to release.

7 Project Logbook and Photo-Documentation

Photos of the site will be taken, and associated notes will be recorded in the field logbook. A logbook will be maintained to record all on-site activities. Data from the sampling events will be forwarded to NYSDEC and summarized in the site characterization report.

8 Sample Packaging and Shipping

The sample containers will be placed inside sealed plastic bags as a precaution against cross-contamination caused by leakage or breakage. The samples will be placed in coolers with wet ice to begin the cooling process. If sample shipment by common carrier is required, inert packaging material such as bubble wrap will be added to the cooler to minimize the chance of breakage during transport.

Eurofins-TestAmerica Laboratories, Inc. will provide laboratory analytical services as a call-out laboratory under direct contract to NYSDEC. The call-out number shall be provided on all chain-of-custody documentation and related correspondence.

Delivery of sample containers and supplies to the field and return shipment of samples to the laboratory will be coordinated through Eurofins TestAmerica's service center at the following address or an alternative location to be determined in coordination with the lab:

Eurofins TestAmerica - Elmsford
200 Clearbrook Rd.
Elmsford, NY 10523
Attn: Junior Prasad
732-549-3900

The laboratory project manager is John Schove, 716-504-9838.

9 Investigation-Derived Waste Disposal

Four investigation-derived waste (IDW) streams are expected to be generated during sampling activities: expendable material solid wastes such as personal protective equipment, paper towels, etc.; excess soil from soil boring drilling; groundwater sample purge water; and decontamination water. Expendable materials generated during the investigation will be bagged and disposed of off-site as non-hazardous solid waste by E & E or the drilling subcontractor. Soil generated during installation of soil borings/monitoring wells will be observed and screened with a PID for signs of gross contamination (e.g., sheens, odors, PID readings greater than 5 parts per million). If gross contamination is not suspected, the soil will be spread on the ground around the area of generation. Similarly, liquid IDW (e.g., groundwater, decontamination water) will be discharged to the ground surface near the location of generation unless observations or PID screening shows signs of potential gross contamination. If potential gross contamination of soil or water is encountered, the waste will be stored in 55-gallon drums for characterization and off-site disposal.

10 Site-Specific Health and Safety Plan

A site-specific health and safety plan has been prepared for this fieldwork and is attached in Appendix B.

11 Reporting

E & E will document the details of daily field activities in a report to be submitted electronically to NYSDEC.

The laboratory shall provide “Category B” deliverables as described in Appendix 2B of NYSDEC's Technical Guidance for Site Investigation and Remediation, DER-10 (NYSDEC 2010). Lab deliverable will include a complete electronic (PDF) report and NYSDEC EQulS electronic data deliverable (EDD). An E & E chemist will review the report for completeness and process the EDD to assign appropriate location codes, sample matrices, parent sample codes, etc. The laboratory data will be validated by E & E and will include review of the deliverables, assessment of the validity and usability of the results, and preparation of data usability summary reports in accordance with Appendix 2B of DER-10 (NYSDEC 2010). The validator will update the EDDs with validator qualifiers, prepare and submit an EQulS EDD to NYSDEC, and prepare final report tables. Validated sample data will be presented in a table accompanied by site figures depicting the sampling locations.

Following completion of all sample analyses and completion of data validation, E & E will prepare a site characterization report that will include photos and a description of the activities performed, any deviations from proposed procedures, sampling locations depicted on site maps, and analytical results in tables. The draft report will be submitted electronically to NYSDEC for review, with a final electronic version of the report produced approximately two weeks after receiving draft report comments.

12 References

Ecology and Environment Engineering and Geology, P.C. (E & E). 2020a. *Master Quality Assurance Project Plan (QAPP) for New York State Department of Environmental Conservation Projects*, May 2020.

_____. 2020a. *Field Activities Plan (FAP) for the Division of Environmental Remediation Standby Engineering Services Contract D009807*, May 2020.

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

_____. 2021. *Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS) Under NYSDEC's Part 375 Remedial Programs*, January 2021.

Parsons Corporation. 2018. *Rocky Ledge Site Recon Report, Region 3, Westchester County, NY*, prepared for NYSDEC, October 17, 2018.

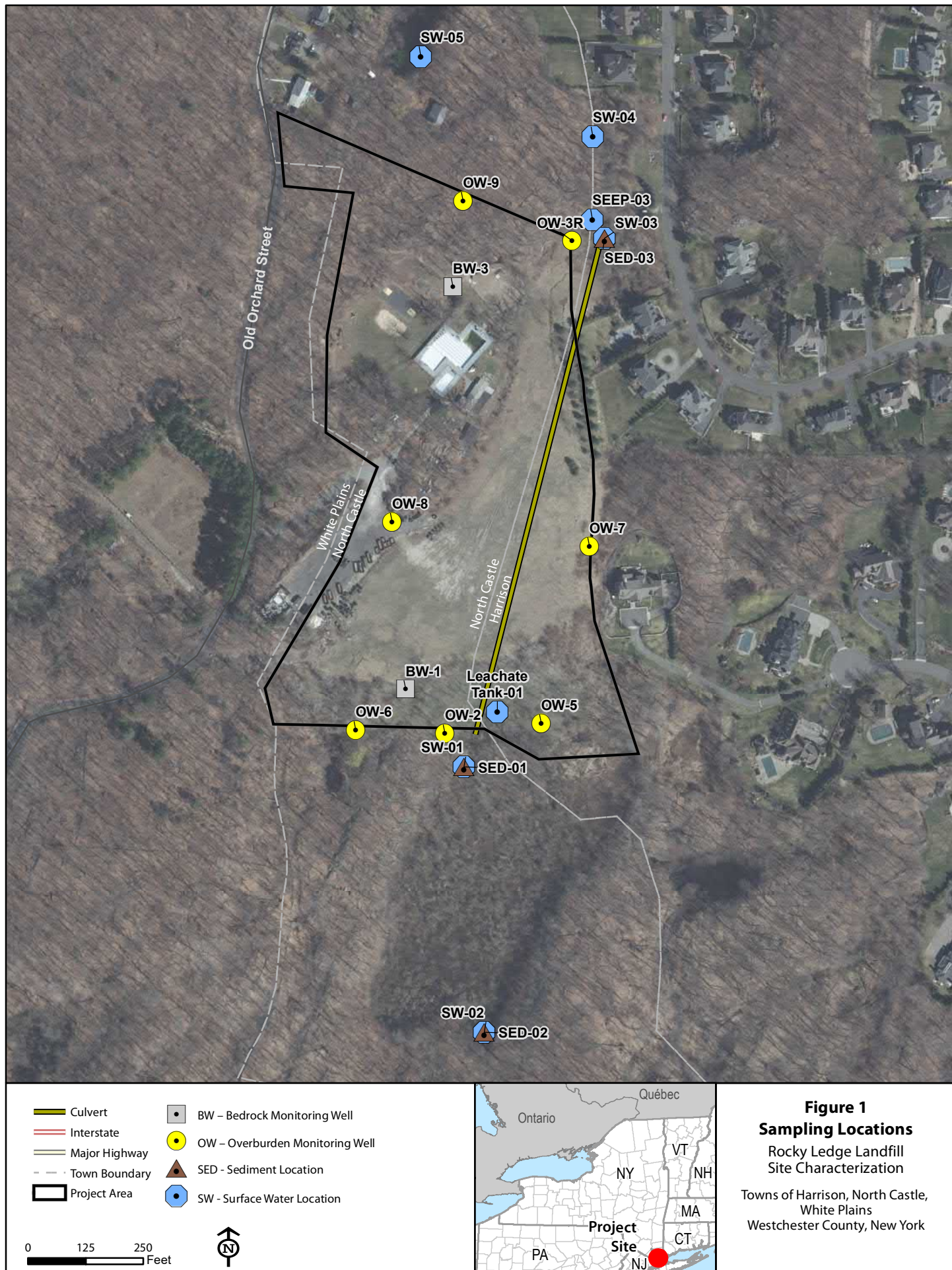


Figure 1
Sampling Locations
 Rocky Ledge Landfill
 Site Characterization

Towns of Harrison, North Castle,
 White Plains
 Westchester County, New York

Table 1 Analytical Summary for Rocky Ledge Landfill

Analytes	Method	Matrix	Sample Quantity	Container	Field Duplicates	MS/MSD	Rinse Blanks	Trip Blanks	Total
Soil Boring and Monitoring Well Installation (3 depth intervals at 6 locations)									
TCL VOCs	SW-846 8260C	SO	6	TerraCore Kit (1)	1	1	1	1	9
TCL SVOCs	SW-846 8270D	SO	6	8 oz. Glass Jar (1)	1	1	1	0	8
PCBs	SW-846 8082A	SO	6		1	1	1	0	8
Pesticides	SW-846 8081B	SO	6	8 oz. Glass Jar (1)	1	1	1	0	8
Herbicides	SW-846 8151A	SO	6		1	1	1	0	8
TAL Metals	SW-846 6010D & 7141A	SO	6	8 oz. Glass Jar (1)	1	1	1	0	8
Cyanide	SW-9012B	SO	6		1	1	1	0	8
1,4-Dioxane	SW-846 8270D	SO	18	8 oz. Glass Jar (1)*	1	1	1	0	20
PFAS	EPA Method 537.1	SO	18	8 oz HDPE (1)	1	1	3	0	22
pH	9045D	SO	3	8 oz. Amber Glass Jar (1)	1	1	0	0	4
TOC	Lloyd Khan	SO	3		1	1	0	0	4
SPLP PFAS	EPA Method 1312/537.1	SO	3	8 oz HDPE (1)	1	1	0	0	4
Surface Water/Leachate (6 surface water and 1 leachate location)									
TCL VOCs	SW-846 8260C	SW	4	40 mL VOA Vial (3)	1	1	1	1	7
TCL SVOCs	SW-846 8270D	SW	4	1 L Amber Glass (1)	1	1	1	0	6
PCBs	SW-846 8082A	SW	4	1 L Amber Glass (1)	1	1	1	0	6
Pesticides	SW-846 8081B	SW	4	1 L Amber Glass (1)	1	1	1	0	6
Herbicides	SW-846 8151A	SW	4		1	1	1	0	6
TAL Metals	SW-846 6010D & 7140A	SW	4	1 L HDPE w/ HNO ₃ (1)	1	1	1	0	6
Cyanide	SW-9012B	SW	4	250 mL Plastic w/NaOH (1)	1	1	1	0	6
PFAS	EPA Method 537.1	SW	7	250 mL HDPE (1)	1	1	1	0	9
1,4-Dioxane	SW-846 8270D-SIM	SW	7	1 L Amber Glass (1)	1	1	1	0	9
Sediment (3 locations)									
TCL VOCs	SW-846 8260C	SO	3	TerraCore Kit (1)	1	1	1	1	6
TCL SVOCs	SW-846 8270D	SO	3	8 oz. Glass Jar (1)	0	0	1	0	4
PCBs	SW-846 8082A	SO	3		0	0	1	0	4
Pesticides	SW-846 8081B	SO	3	8 oz. Glass Jar (1)	0	0	1	0	4
Herbicides	SW-846 8151A	SO	3		0	0	1	0	4
TAL Metals	SW-846 6010D & 7141A	SO	3	8 oz. Glass Jar (1)	0	0	1	0	4
Cyanide	SW-9012B	SO	3		1	1	1	0	5
PFAS	EPA Method 537.1	SO	3	8 oz HDPE (1)	1	1	1	0	5
1,4-Dioxane	SW-846 8270D-SIM	SO	3	8 oz. Glass Jar (1)*	1	1	1	0	5

Table 1 Analytical Summary for Rocky Ledge Landfill

Analytes	Method	Matrix	Sample Quantity	Container	Field Duplicates	MS/MSD	Rinse Blanks	Trip Blanks	Total
Groundwater (9 locations)									
TCL VOCs	SW-846 8260C	GW	9	40 mL VOA Vial (3)	1	1	1	2	13
TCL SVOCs	SW-846 8270D	GW	9	1 L Amber Glass (1)	1	1	1	0	11
PCBs	SW-846 8082A	GW	9	1 L Amber Glass (1)	1	1	1	0	11
Pesticides	SW-846 8081B	GW	9	1 L Amber Glass (1)	1	1	1	0	11
Herbicides	SW-846 8151A	GW	9		1	1	1	0	11
TAL Metals	SW-846 6010D & 7140A	GW	9	1 L HDPE w/ HNO ₃ (1)	1	1	1	0	11
Cyanide	SW-9012B	GW	9	250 mL Plastic w/NaOH (1)	1	1	1	0	11
PFAS	EPA Method 537.1	GW	9	250 mL HDPE (1)	1	1	3	0	13
1,4-Dioxane	SW-846 8270D-SIM	GW	9	1 L Amber Glass (1)	1	1	1	0	11
Decontamination Water									
PFAS	EPA Method 537.1	GW	2	250 mL HDPE (1)	0	0	0	0	2

Notes:

1. Detection limits must meet requirements of NYSDEC unrestricted soil cleanup objectives (Part 375-6.8) and Guidelines for Sampling And Analysis of PFAS (January 2020)
2. Rinse blanks will be collected once per day for equipment set for PFAS and one per equipment set for all other analytes.
3. All quantities and volumes are estimated.

* Separate jar not required when sampling for full TCL/TAL parameters.

APPENDIX A

FIELD ACTIVITIES PLAN PROJECT RELEVANT SOPs

APPENDIX B

SITE-SPECIFIC HEALTH AND SAFETY PLAN