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March 10, 2025

Mr. Matthew Barch
Bureau of Waste Management, Department of Environmental Protection
Southwest Regional Office
400 Waterfront Drive
Pittsburgh, PA 15222

**RE: Westmoreland Sanitary Landfill
Response To Comments - GWMP Revision
Rostraver Township, Westmoreland County, Pennsylvania
Solid Waste Permit No. 100277
Noble Environmental, Inc.**

Dear Mr. Barch:

On behalf of Noble Environmental, Inc., Eagon & Associates, Inc. is submitting the attached revision to the Groundwater Monitoring Plan for the Westmoreland Sanitary Landfill located in Rostraver Township, Westmoreland County, Pennsylvania. The GWMP has been revised to incorporate the parameter list and sampling frequency.

Please contact me at (614) 888-5760 if you have any questions.



Sincerely,

A handwritten signature in black ink that reads "Shay Beanland".

Shay Beanland, PG
Hydrogeologist

SB/kj
encl.

cc: Brian Stewart, Westmoreland Sanitary Landfill, LLC, w/encl.

GROUNDWATER MONITORING PLAN

Prepared for:

WESTMORELAND SANITARY LANDFILL, LLC
Rostraver Township Westmoreland County, Pennsylvania



Prepared by:



November 22, 2024
(Revised March 10, 2025)

Eagon & Associates, Inc.
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1.0 INTRODUCTION

The purpose of this document is to present the Groundwater Monitoring Plan (GWMP) for the Westmoreland Sanitary Landfill (WSLF) in Belle Vernon, Pennsylvania (DEP Permit No. 100277). The groundwater sampling procedures described herein will help to ensure that representative and consistent samples for groundwater quality analyses are collected from the groundwater monitoring wells.

2.0 GROUNDWATER MONITORING SYSTEM

The groundwater monitoring system consists of a total of 15 wells that monitor the Benwood Limestone, Redstone Coal, Pittsburgh Coal, and Pittsburgh Limestone units (Figure 1). Three wells (MP-1RD, MP-2RD, and MP-3RD) are completed in the Benwood Limestone and are located downgradient of the landfill, as shown on the potentiometric surface map for the Benwood Limestone (Figure 2). The Redstone Coal is monitored by two wells (upgradient well PZ-6A and downgradient well W-14R) and the Redstone Coal rock/soil interface is monitored by one downgradient well (W-13D), as shown on Figure 3. There are five wells (one upgradient well W-1U and four downgradient wells W-2RD, W-3D, W-5D, and W-10R) completed in the Pittsburgh Coal unit as shown on the potentiometric surface map for the Pittsburgh Coal (Figure 4) and four wells (one upgradient well W-6U and three downgradient wells W-7RD, W-9R2, and W-11R) that monitor the Pittsburgh Limestone unit, as shown on Figure 5.

3.0 UPGRADIENT WELL EVALUATION

In 2019, the groundwater monitoring system was evaluated to determine if there were any upgradient wells in the Redstone Coal and Pittsburgh Coal. This evaluation consisted of determining whether piezometers located in the northern expansion area and upgradient of the current landfill warranted inclusion in the groundwater monitoring system. The findings were presented in a report titled Groundwater Monitoring System Evaluation submitted on August 26, 2019 to the Pennsylvania Department of Environmental Protection (PADEP). As a result of the evaluation, one upgradient well (PZ-6A) screened across the Redstone Coal and found to

produce a sufficient amount of water for monitoring, was added to the groundwater monitoring system with the third quarter 2019 sampling event.

The potential for another upgradient well in the Pittsburgh Coal was also evaluated since existing well W-1U has been dry since 1995. The 2000 Permit Modification submitted by The Hutchinson Group states that in the northwestern portion of the site the Pittsburgh Coal is dry, which is the up-dip direction of the Pittsburgh Coal and upgradient of the current landfill. The down-dip direction of the Pittsburgh Coal is to the southeast, where the groundwater in the Pittsburgh Coal drains and collects in a mine pool within the mine workings. Considering the hydrogeologic setting, it is unlikely that an upgradient monitoring well can be established in the Pittsburgh Coal.

4.0 GROUNDWATER SAMPLING PROCEDURES

The groundwater monitoring wells are equipped with dedicated sampling equipment. Bladder-style sampling pumps were installed in all but three monitoring wells (W-1U, W-7RD, and W-9R2) and the purging and sampling method was changed to low flow or minimum purge methods, concurrent with the pump installations, as noted on Table 1. Dedicated rigid PVC bailers were installed in very low-yielding wells W-7RD and W-9R2 because their water columns cannot support the use of a bladder pump. These wells do not recover enough over the course of a typical sampling event (four days) to collect even a partial sample set. Therefore, during the 2019 fourth quarter sampling event, the purging and sampling method for these wells was changed to a “no purge” sampling procedure with the 2019 fourth quarter event.

4.1 Low-Flow Procedure

Low-flow groundwater sampling procedures will be used for purging and sampling monitoring wells that are equipped with dedicated pumps and that can sustain pumping rates of at least 100 ml/min. Depth-to-water measurements and field water-quality parameters specific conductance, pH, and temperature collected during purging will be used as criteria to determine

when purging has been completed. Sample collection will be initiated immediately after purging at each well.

Prior to purging, a static water level will be measured and recorded on the Field Information Form for each well. Water-level measurements recorded during purging to verify water-level stabilization also will be recorded.

During purging, wells will be pumped at rates that allow the water level to stabilize as soon as practical. Purging rates in the range of 0.1-0.5 L/min (100-500 ml/min) typically will be used to achieve stabilization. Higher rates may be used early during purging only to facilitate water-level stabilization. Stabilization of the water column will be considered achieved when three consecutive water-level measurements fluctuate within a range of 0.3 feet or less at a pumping rate of 100 to 500 ml/min.

After evacuating the water in the pump system (i.e., pump and discharge tubing), depth-to-water measurements and water-quality parameter measurements of temperature, pH, and specific conductance typically will be made every 3-5 minutes (or less frequently) during purging. If a meter equipped with a flow cell is used, the volume of the flow cell will be purged between field measurements at a minimum. Stabilization will be considered achieved and purging will be considered complete when a minimum of three consecutive measurements of depth to water, pH, temperature, and specific conductance vary within the limits presented on Table 2. Dissolved oxygen, oxidation-reduction potential, and turbidity may also be measured during purging. Sample collection will begin after purging is complete at each well. Turbidity, in addition to depth-to-water, temperature, pH, and specific conductance will be measured at the end of purging. All field measurements will be recorded and documented on the field form for each well. The wells where low-flow sampling procedures are anticipated to be used are shown on Table 1.

4.2 Minimum Purge

The minimum purge (MP) procedure will be used for collecting samples from low-yielding wells with a water column height sufficient to support a bladder pump installation. A well will be considered low yielding if water-level stabilization cannot be achieved at a pumping rate of 100 ml/min. Low-yielding wells will be sampled after the volume of the pump system in the well has been evacuated. Low-yielding wells that will be sampled using the minimum purge (MP) method are identified on Table 1. If an insufficient volume of water is available to fill a completed sample set, the sampler will return up to a period of four days to collect additional sample volume.

4.3 No Purge

If a low-yielding well cannot be sampled with a bladder pump due to insufficient water column, the well will be sampled with a dedicated or disposable bailer using the no purge sampling method and will not require purging prior to sample collection. If the well goes dry during sample collection, the sampler will return during that quarter to attempt to obtain additional sample volume. Field parameters pH, specific conductance, temperature, and turbidity will be measured immediately after sample collection if there is sufficient volume for the analyses, and the results, including date and time of sample collection, will be recorded in the "Field Data" section of the Field Information Form. If field parameters are not collected in the field, pH, specific conductance, and turbidity will be measured at the laboratory.

4.4 Contingency Plan

If a well that is typically sampled using the low-flow procedure cannot achieve water-level stabilization at 100 ml/min during an event, the water level in the well will be allowed to recover, then sampled using the MP method described in the previous section. Also, wells with pumps that malfunction may be sampled using an alternative sampling procedure. Malfunctioning pumps will be repaired or replaced prior to the next sampling event. Any deviation from the anticipated method will be documented on the field forms and discussed in

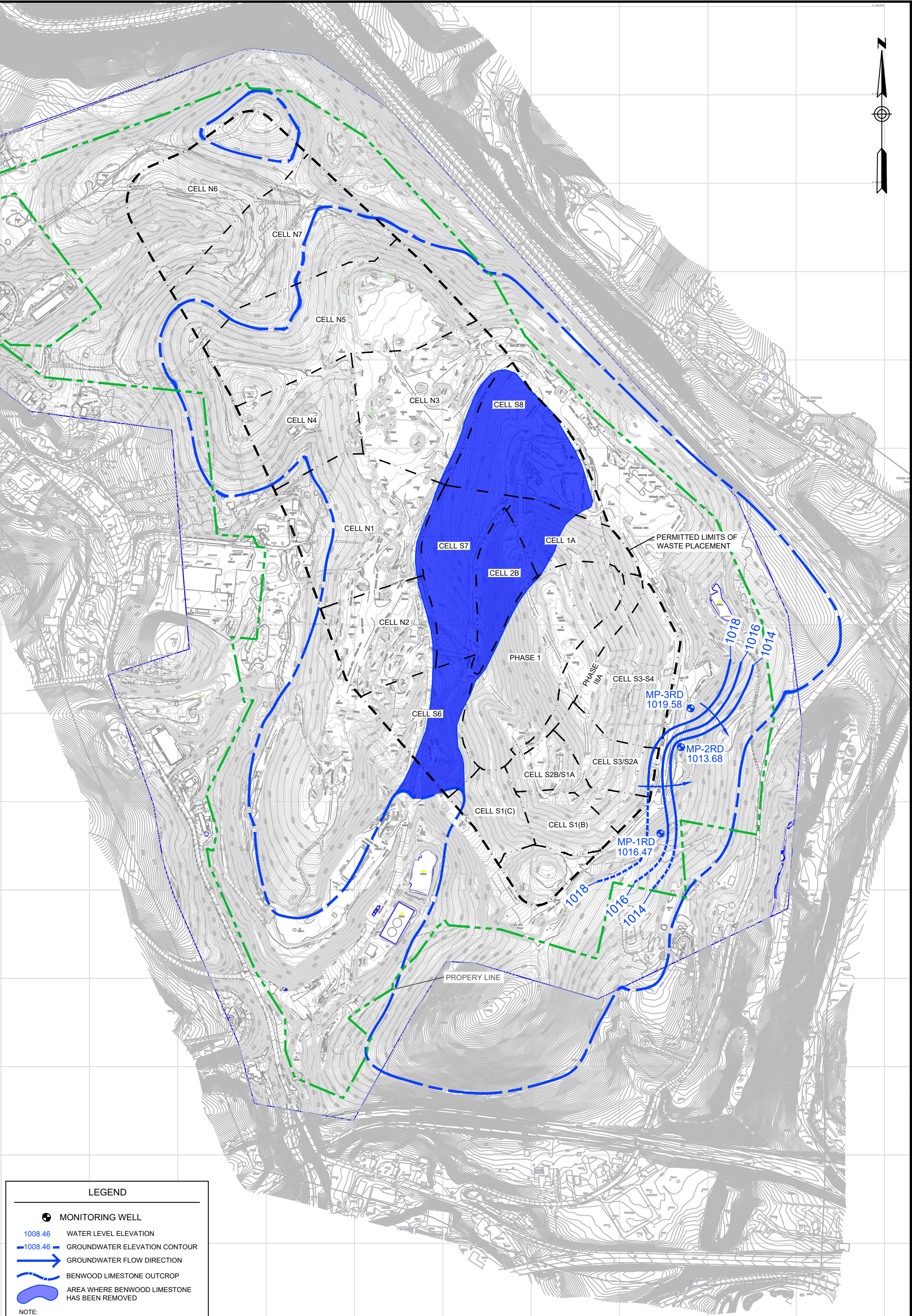
the quarterly reports. The anticipated procedure to be used at each well is presented on Table 1. Samples will be withdrawn as soon as practical from the wells with the same equipment used for purging.

Field measurements for depth-to-water, temperature, pH, specific conductance, and turbidity, at a minimum, will be made at each monitoring well. Grab samples of water will be placed directly into the field measurement sample container from the bladder pump discharge tubing or bailer. A flow cell is preferred where dedicated pumps are installed and necessary when dissolved oxygen or oxidation-reduction measurements are collected. Turbidity will be measured using grab samples of water only collected directly from the bailer or the pump's discharge tubing and not from the flow cell.

5.0 GROUNDWATER MONITORING PARAMETERS AND SCHEDULE

The groundwater monitoring system consists of a total of 15 wells that monitor the Benwood Limestone, Redstone Coal, Pittsburgh Coal, and Pittsburgh Limestone units (Table 1). The monitoring wells will be sampled quarterly for the parameters listed on Table 3 and will be sampled annually for the parameters listed on Table 4 pursuant to 25 Pa. Code § 273.284.

FIGURES



LEGEND

MONITORING WELL

1008.46

WATER LEVEL ELEVATION

1008.46

GROUNDWATER ELEVATION CONTOUR

GROUNDWATER FLOW DIRECTION

BENWOOD LIMESTONE OUTCROP

AREA WHERE BENWOOD LIMESTONE HAS BEEN REMOVED

NOTE:

BASE TOPOGRAPHY COMPILED FROM AERIAL PHOTOGRAPHY PREPARED BY: KEDDAL AERIAL MAPPING (12/20/2001), LAND & MAPPING SERVICES (12/22/2001), SOUTHERN RESOURCE MAPPING (4/30/2018).

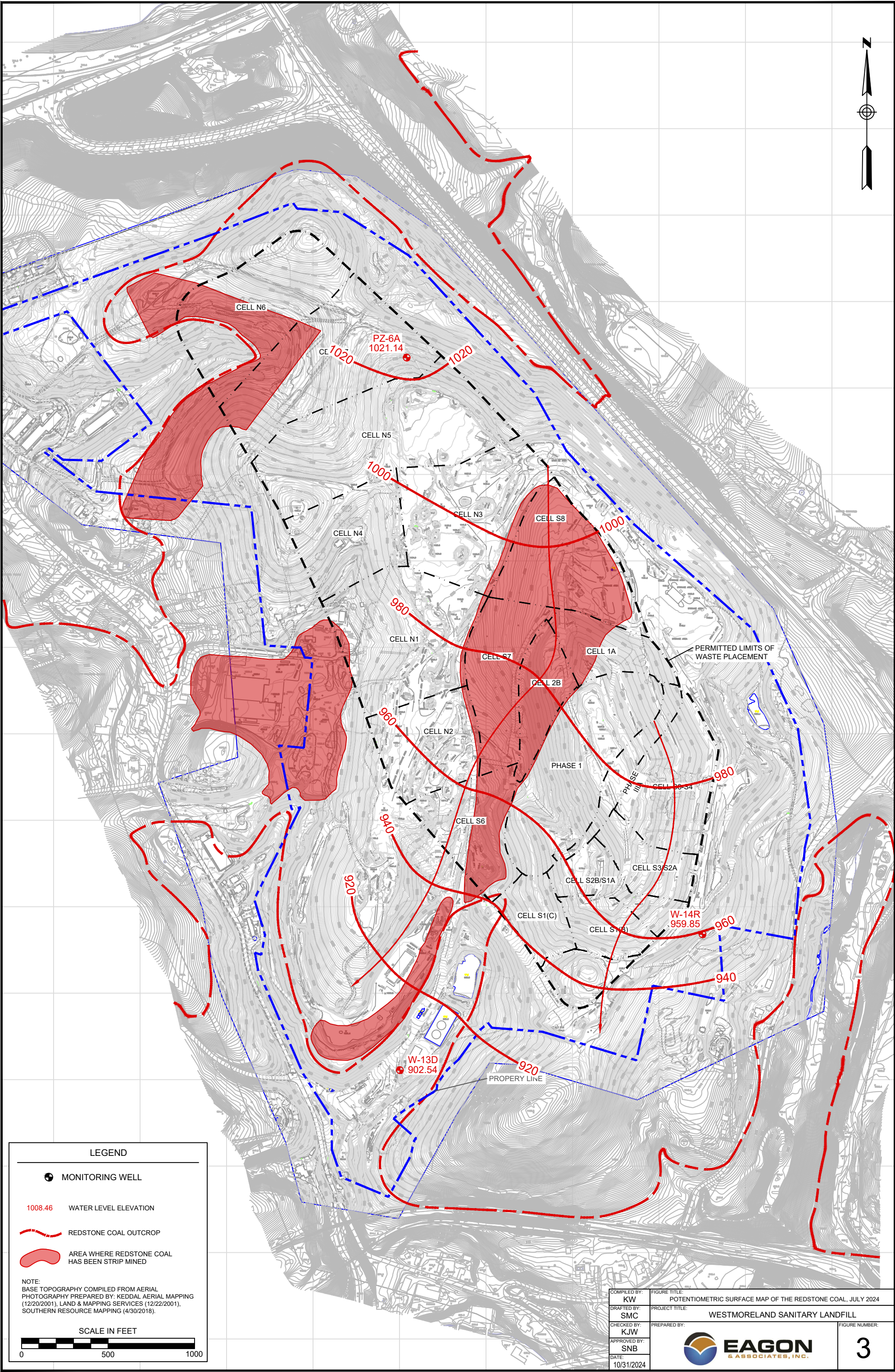
SCALE IN FEET

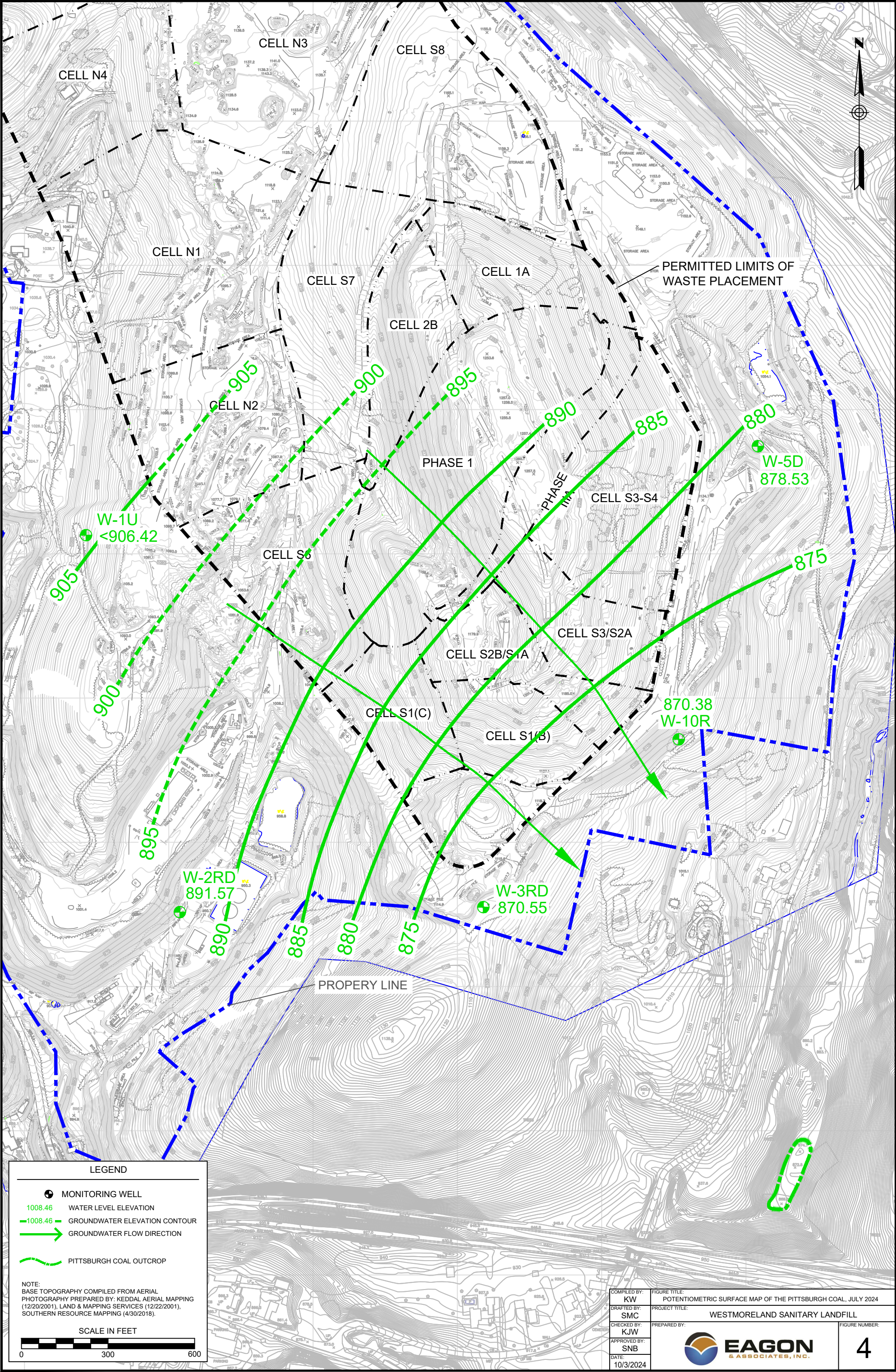
0

500

1000

COMPILED BY: KW	FIGURE TITLE: POTENTIOMETRIC SURFACE MAP OF THE BENWOOD LIMESTONE, JULY 2024
DRAFTED BY: SMC	PROJECT TITLE: WESTMORELAND SANITARY LANDFILL
CHECKED BY: KJW	PREPARED BY: EAGON & ASSOCIATES, INC.
APPROVED BY: SNB	FIGURE NUMBER: 2
DATE: 10/3/2024	





TABLES

TABLE 1.
MONITORING WELL CONSTRUCTION SUMMARY
WESTMORELAND SANITARY LANDFILL
PA DEP I.D. NO. 100277

Well ID	Well Completion Date	Measuring Point Elevation (ft., MSL)	Coordinates		Ground Surface Elevation (ft., MSL)	Boring Depth (ft., BGS)	Screened Interval Elevation (ft., MSL)			Screen Length (ft.)	Well Stickup (ft.)	Total Well Depth (ft., TOC)	Casing Diameter (in.)	Purging Method	Pump Intake Depth (ft, TOC)	Pump System Volume* (L)	Hydraulic Gradient Position
			Northing	Easting			Top	-	Bottom								
Benwood Limestone																	
MP-1RD	10/3/2002	1081.58	303319.77	1381231.52	1080.16	70.0	1028.73	-	1008.98	19.75	1.42	72.60	2	LF	64.0	0.4	Down
MP-2RD	10/3/2002	1126.67	303808.76	1381347.45	1123.36	111.6	1031.72	-	1011.97	19.75	3.31	114.70	2	MP	114.2	0.7	Down
MP-3RD	10/3/2002	1126.23	304027.98	1381402.61	1123.76	85.0	1033.48	-	1013.73	19.75	2.47	112.50	2	MP	112.1	0.7	Down
Redstone Coal																	
PZ-6A	3/5/1999	1096.87	306675.75	1379541.29	1095.72	83.5	1017.72	-	1012.72	5	1.15	85.35	2	MP	84.0	1.1	Up
W-13D	12/8/1989	939.16	302554.36	1379502.00	937.65	38.9	907.29	-	897.29	10	1.84	42.20	4	LF	40.0	0.6	Down
W-14R	5/25/2005	1088.49	303340.41	1381251.63	1086.43	133.0	973.49	-	953.49	20	2.06	135.00	2	LF	133.5	1.6	Down
Pittsburgh Coal																	
W-1U	9/22/1990	1057.20	304064.42	1379213.14	1055.68	153.0	917.00	-	907.00	10	1.52	150.20	4	--**	--	--	Up
W-2RD	3/6/1991	946.60	302757.74	1379538.13	944.61	59.0	896.50	-	886.50	10	1.99	60.10	4	LF	59.0	0.8	Down
W-3RD	4/25/2012	1105.78	302774.81	1380589.83	1103.21	238.3	878.58	-	868.58	10	2.57	237.20	2	LF	236.0	1.2	Down
W-5D	11/8/1989	1101.86	304372.84	1381541.41	1099.88	221.0	883.56	-	873.56	10	1.97	228.30	4	LF	226.0	2.5	Down
W-10R	5/24/2005	1090.50	303356.75	1381266.78	1087.77	232.0	876.00	-	856.00	20	2.73	234.50	2	LF	230.0	2.5	Down
Pittsburgh Limestone																	
W-6U	10/24/1989	1057.31	304062.46	1379189.97	1055.74	210.0	886.11	-	846.61	39.5	1.57	210.70	4	LF	186.0	2.1	Up
W-7RD	4/27/2012	1106.52	302783.37	1380607.28	1103.46	344.0	780.52	-	760.52	20	3.06	346.00	2	NP	--	--	Down
W-9R2	5/24/2005	1104.58	304322.74	1381591.01	1102.48	280.0	832.98	-	812.98	20	2.10	291.60	2	NP	--	--	Down
W-11R	5/24/2005	1092.12	303369.02	1381282.48	1087.71	301.0	808.72	-	788.72	20	4.41	303.40	2	LF	300.0	3.2	Down

LF - Low Flow; MP - Minimum Purge; NP - No Purge

Up - Upgradient; Down - Downgradient

* - Includes volume of pump and tubing: Solinst 407 - 1" Diam. Pumps (110 ml volume); 1.66" Diam. Pumps (200 ml volume); Tubing volumes: 1" Pumps = 4.5 ml/ft; 1.66" Pumps = 10 ml/ft.

**W-1U is consistently dry

TABLE 2.
LOW-FLOW PURGING STABILIZATION CRITERIA
WESTMORELAND SANITARY LANDFILL

Field Measurement	Maximum Change in Readings*	Units
Depth to Water	0.3**	feet
pH	0.2	S.U.
Specific Conductance	3 %	umhos/cm
Temperature	0.5	Degrees Celsius
Turbidity (optional)	10 % or < 10	NTUs
DO (optional)	10 % or 0.2	mg/L
ORP (optional)	20	mV

* - Minimum of 3 consecutive readings.

** - can be exceeded only if water level is recovering.

TABLE 3.
GROUNDWATER MONITORING PARAMETER LIST - QUARTERLY
WESTMORELAND SANITARY LANDFILL
PA DEP I.D. NO. 100277

Parameter List
Ammonia-Nitrogen* BiCarbonate (as CaCO ₃)* Calcium (Total)* Chemical Oxygen Demand* Chloride* Fluoride Iron (Total) Magnesium (Total)* Manganese (Total) Nitrate-Nitrogen pH (Field/Laboratory)* Potassium (Total)* Sodium (Total)* Specific Conductivity (Field/Laboratory)* Sulfate* Total Alkalinity* Total Dissolved Solids Total Organic Carbon* Total Phenolics Turbidity
Benzene 1,2-Dibromomethane 1,1-Dichloroethane 1,1-Dichloroethene 1,2-Dichloroethane cis-1,2-Dichloroethene trans-1,2-Dichloroethene Ethyl Benzene Methylene Chloride Tetrachloroethene Toluene 1,1,1-Trichloroethane Trichloroethene Vinyl Chloride Xylenes

* Indicator Analyte - For comparison with detection zone analytes

TABLE 4.
GROUNDWATER MONITORING PARAMETER LIST - ANNUAL
WESTMORELAND SANITARY LANDFILL
PA DEP I.D. NO. 100277

Parameter List
Arsenic (Total) Arsenic (Dissolved) Barium (Total) Barium (Dissolved) Cadmium (Total) Cadmium (Dissolved) Calcium (Dissolved)** Chromium (Total) Chromium (Dissolved) Copper (Total) Copper (Dissolved) Iron (Dissolved)** Lead (Total) Lead (Dissolved) Magnesium (Dissolved)** Manganese (Dissolved)** Mercury (Total) Mercury (Dissolved) Potassium (Dissolved)** Selenium (Total) Selenium (Dissolved) Silver (Total) Silver (Dissolved) Sodium (Dissolved)** Zinc (Total) Zinc (Dissolved)
Bromoform (Tribromomethane) Bromomethane (Methyl Bromide) Carbon tetrachloride Chlorobenzene Chloroethane (Ethyl Chloride) Dibromochloromethane (Chlorodibromomethane) Methyl Chloride (Chloromethane) 3-Chloro-1-propene 1,2-Dichlorobenzene (o-Dichlorobenzene) 1,3-Dichlorobenzene (m-Dichlorobenzene) 1,4-Dichlorobenzene (p-Dichlorobenzene) Dichlorodifluoromethane 1,2-Dichloropropane (Propylene Dichloride) Cis-1, 3-Dichloropropene Trans-1, 3-Dichloropropene Methyl Ethyl Ketone (2-Butanone) 4-Methyl-2-pentanone (Methyl Isobutyl Ketone) 1,1,1,2-Tetrachloroethane 1,1,2,2-Tetrachloroethane 1,1,2-Trichloroethane Trichlorofluoromethane (CFC-11) 1,2,3-Trichloropropane

*** Total analysis required in conjunction with additional quarterly metals sampling.*