Sterling Environmental Engineering, P.C.

May 10, 2021

Ms. Jennifer A. Andaloro, Esq.
Office of General Counsel
Remediation Bureau Chief
NYS Department of Environmental Conservation
625 Broadway, 14th Floor
Albany, New York 12233-1500

Subject: Orange County Landfill – Site No. 336007
May 2021 Periodic Progress Report
STERLING File #2010-15 (Task 230)

Dear Ms. Andaloro,

In accordance with NYSDEC's letter issued November 25, 2016, this monthly Periodic Progress Report addresses the progress in implementing the approved Remedial Action Work Plan (RAWP). The work is authorized by NYSDEC letters dated March 9, 2017 and March 20, 2017.

As outlined in the Pilot Program Work Plan (July 2020) approved by NYSDEC, STERLING is reviewing the data to evaluate the effectiveness of the operating system and to serve as the basis to assess options for long-term management of the recovered groundwater. The status of this evaluation is summarized by letter dated May 3, 2021 (copy attached).

For the balance of 2021, the following activities are planned:

	Item	Projected Completion Date
1.	Recovery Well Pumping Rate	Completed
2.	Remote Sensor Evaluation / Installation	Evaluation In Progress
3.	Data Evaluation and Completion of Long Term Groundwater Management Plan (Per the Approved July 9, 2020 Groundwater Recovery System Pilot Program Work Plan)	July 1, 2021. Evaluation underway. Refer to attached letter.
4.	Design & Construction of Groundwater Management System (Based on Long-Term Groundwater Management Plan Approved by NYSDEC)	Evaluations underway for sewer connections. Refer to attached letter.
5.	Final Engineering Report (FER) (Per December 19, 2016 Remedial Action Work Plan)	TBD, following implementation of Long-Term Groundwater Management Plan
6.	2021 Landfill Sampling Event	Fourth Quarter, 2021
7.	2021 Periodic Review Report Submission	By December 31, 2021

The Data Evaluation and Completion of the Long-Term Groundwater Management Plan (Item 3 noted above) will culminate in the submission of specific recommendations for groundwater treatment,

conceptual design, and supporting materials for NYSDEC consideration and approval. The Long-Term Groundwater Management Plan will be implemented by the County once approved by the NYSDEC.

The Final Engineering Report (Item 5 above) will provide the documentation and certification of completion of the following corrective measures:

- Horizontal recovery well installation
- Sediment removal
- Stream bank armoring
- Groundwater treatment

In addition to the above, Orange County will make the necessary arrangements to transport the accumulated pilot test water for offsite disposal.

Please contact me should you have any questions.

Very truly yours,

STERLING ENVIRONMENTAL ENGINEERING, P.C.

Mark P. Millspaugh, P.E.
President
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MPM/bc
Email
Attachment

cc: Payson Long, NYSDEC
Robert J. Gray, P.E., Orange County Department of Public Works
Gary L. Polhemus, Jr., Orange County Department of Public Works
Anthony R. Griffin, P.E., Orange County Department of Public Works
Stacy Butler, Esq., Senior Assistant County Attorney
Christine Voorhis, NYSDOH
Maureen Schuck, NYSDOH Region Chief
Stephen Lawrence, NYSDOH Site Project Manager

Sterling Environmental Engineering, P.C.

May 3, 2021

Mr. Robert Gray, P.E. via email (RGray@orangecountygov.com)
Deputy Commissioner
Orange County Department of Public Works
P.O. Box 509, 2455-2459 Route 17M
Goshen, New York 10924-0509

Subject: Orange County Landfill
NYSDEC Site No. 336007
Groundwater Recovery System Pilot Program
STERLING File #2010-15

Dear Mr. Gray,

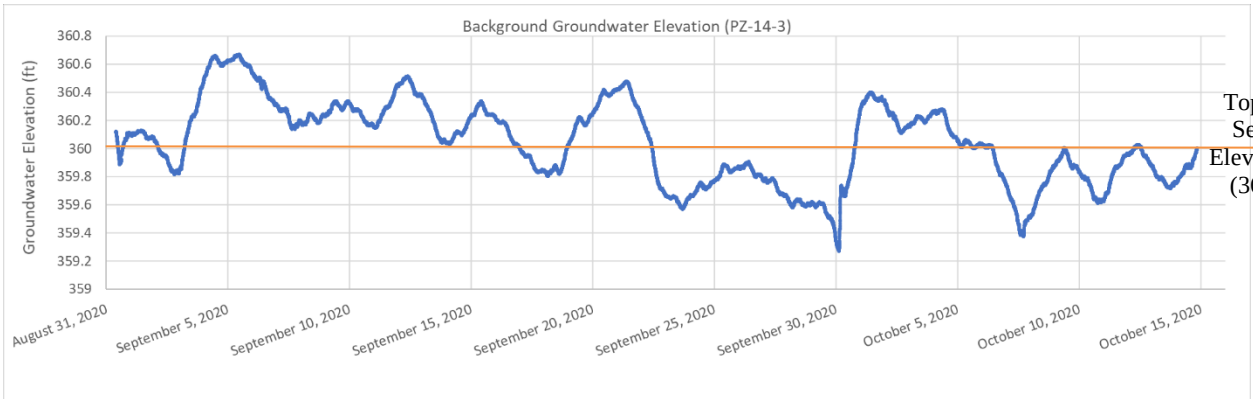
Sterling Environmental Engineering, P.C. (STERLING) provides this progress letter as an update on implementation of the July 9, 2020 Groundwater Recovery System Pilot Program Work Plan (the "Work Plan") approved by the NYSDEC. The piston pump was installed in the horizontal groundwater recovery well beginning on July 20, 2020, and a concrete vault was installed over the well riser pipe to house the piston pump assembly. Electrical conduit and water force main were installed in a trench from the concrete vault across the landfill gravel access road to a control panel and holding tank (see attached Figures 1 and 2).

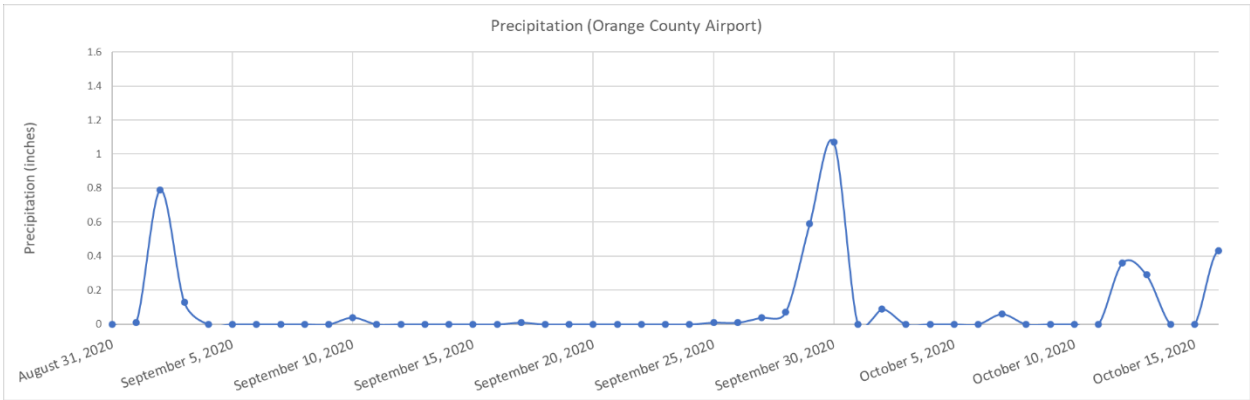
Following the completion of the pump installation, the pump was turned on to initiate startup testing on July 31, 2020. During startup testing, a manufacturer defect was detected with the control panel that required replacement. Fabrication of the replacement control panel was completed in late October 2020, and installation was completed on November 17, 2020. Startup testing was again initiated; however, a small leak was observed on December 4, 2020 in the aboveground portion of the force main from the pump to the holding tank that required pump shut down for repair. The force main was repaired on January 4 and 5, 2021, and the pump was restarted for groundwater elevation response monitoring in accordance with the Work Plan.

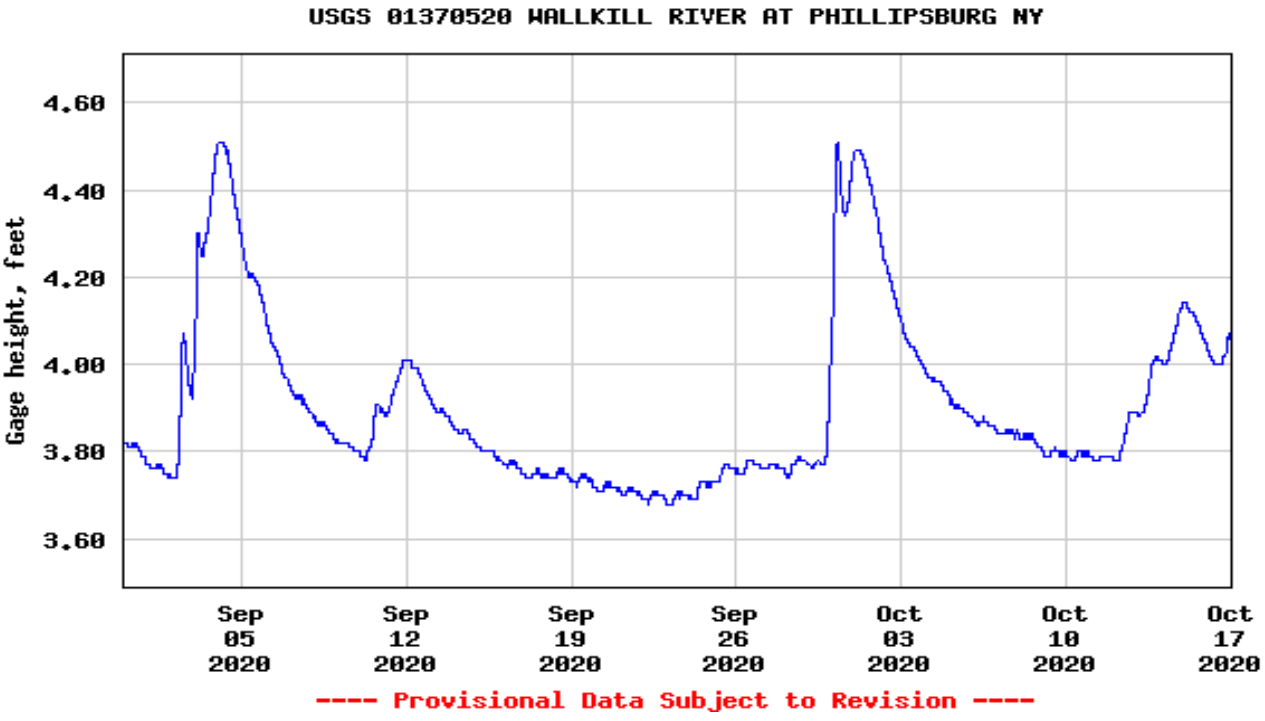
The pump operated continuously from January 5 to February 25, 2021. During this time, a pressure transducer was installed in piezometer PZ-14-3 for groundwater elevation monitoring. STERLING performed weekly onsite inspections to check the pump flow rate, record manual groundwater elevations, download transducer data, and observe the canal water elevation. Throughout the monitoring duration, the pump maintained a flow rate of at least 0.5 gallons per minute (gpm). No appreciable groundwater drawdown was observed in the transducer data, which is attributed primarily to the local groundwater flow condition and direct influence of the water elevation in the canal. During weekly inspections, the canal was observed to be above the top seep elevation of 360 feet. STERLING also observed that stormwater is being retained within the drainage swale along the north side of the access road immediately upgradient of the horizontal well.

The following pages graphically represent the groundwater elevation in piezometer PZ-14-3 along with precipitation data from the Orange County Airport and stream gauge data from the Wallkill River U.S. Geological Survey gauging station at Phillipsburg approximately 4.5 miles downstream of the landfill. As shown in the graphical data, the groundwater at the extraction location is directly influenced by precipitation events and the water level in the canal.

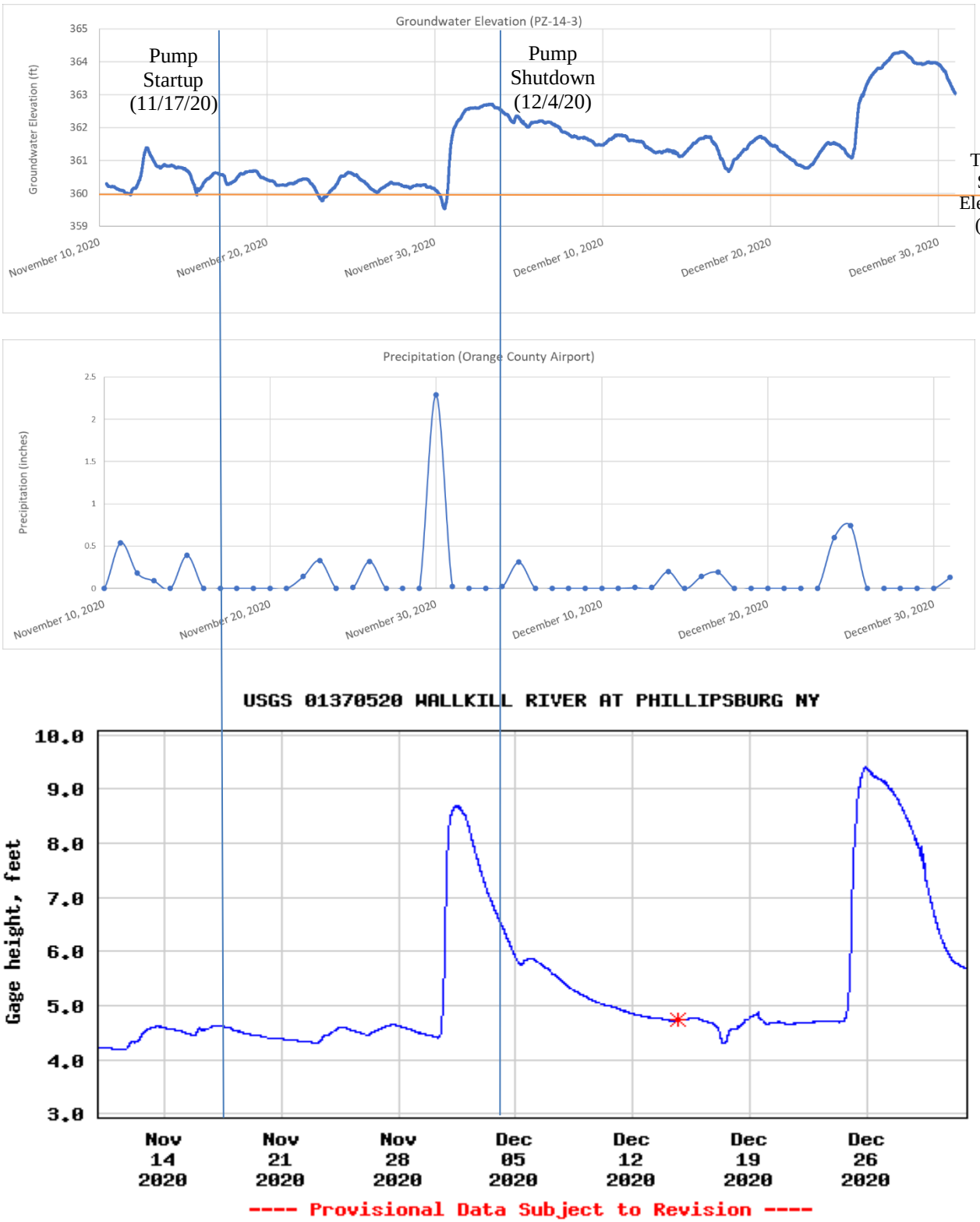
Background Groundwater Elevation (August 31 to October 15, 2020)



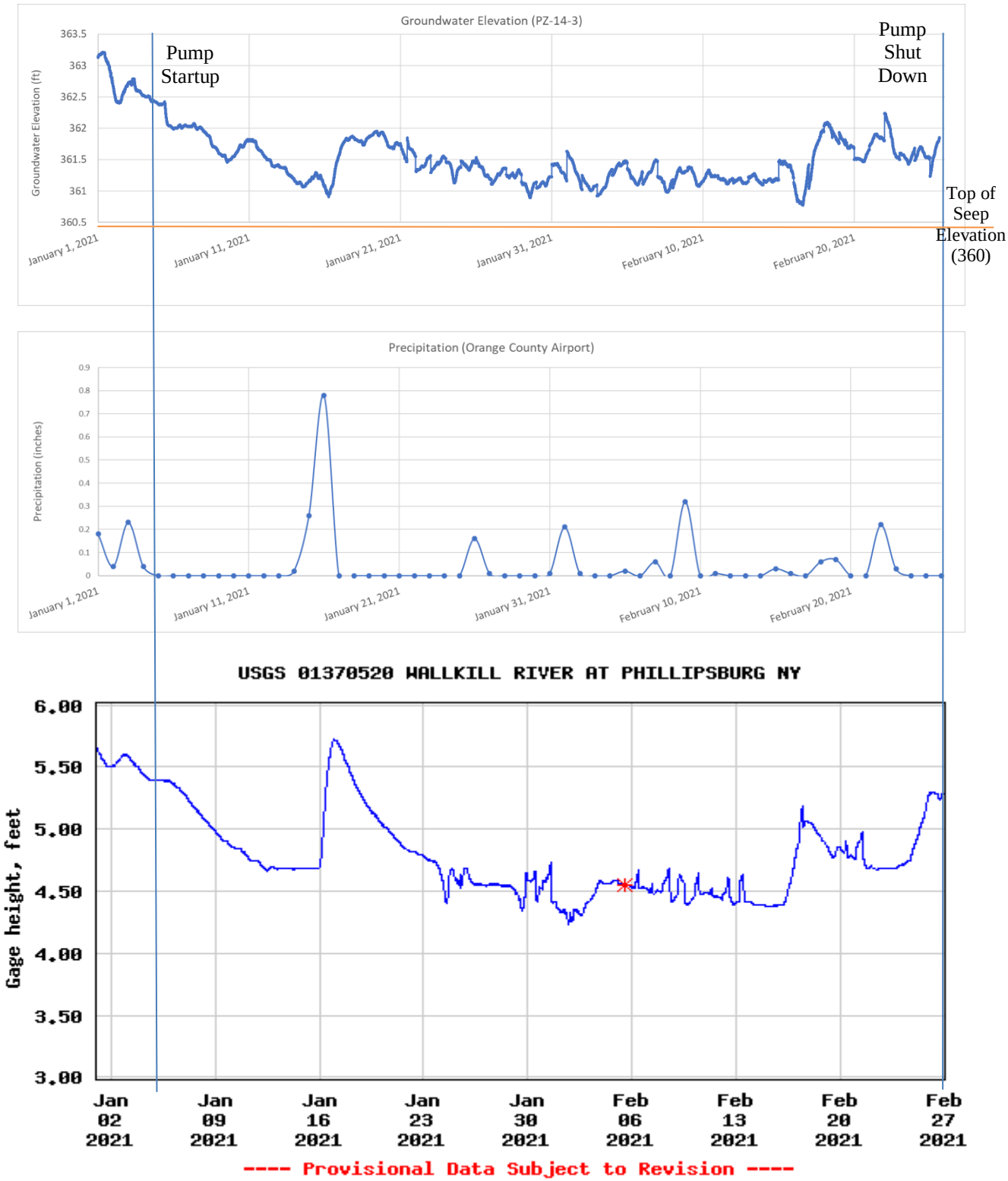




Initial Startup (November 10 to December 31, 2020)



Continuous Operation (January 5 to February 25, 2021)



Analytical Data:

In accordance with the Pilot Program Work Plan, STERLING collected three samples of extracted groundwater for analytical testing. Sample results are provided in the attached table, which indicates low concentrations of only two typical leachate parameters. The only reported exceedances of the New York State Ambient Water Quality Standards for groundwater were for ammonia and total dissolved solids.

Observations:

The startup testing confirmed the proper function of the pump for maintaining a constant groundwater extraction rate of 0.5 gpm. Review of groundwater elevation, precipitation, and canal water level data confirms direct influence of the canal on groundwater elevations at the extraction area. The local groundwater condition without the influence of the canal results in groundwater daylighting from the slope at an elevation of 355.5 to 360 ft (i.e., the range of observed seeps). When the canal is above elevation 360 ft, the groundwater gradient at the extraction area may be approaching a static condition with competing pressure heads from the landfill and the canal (see attached Figures 1 and 2).

Based on the analytical data, the extracted groundwater has low concentrations of typical leachate parameters. The data have been provided to the Dormitory Authority of the State of New York (DASNY) for their wastewater treatment feasibility study associated with the New York State Office of Mental Health (NYSOMH) Psychiatric Center to evaluate the potential to accommodate the County landfill leachate and seep remediation water at the proposed treatment works for the Psychiatric Center.

Recommendations:

Based on the Pilot Program startup testing, STERLING has the following recommendations:

- The County should perform routine maintenance on the drainage swale along the north side of the access road in the vicinity of the horizontal well to remove vegetative growth and prevent prolonged accumulation of ponding water that could contribute to the seep location.
- Following swale maintenance, an additional 1 to 2 week pumping test is recommended for a period of extended dry conditions when the seeps have historically been observed (i.e., when the canal is below elevation 360 ft). This pumping test should be conducted in the same manner with a pressure transducer installed in PZ-14-3 for real-time groundwater monitoring.
- STERLING is coordinating with the pump vendor for potential sensor control of the pump based on the canal elevation as described in the Pilot Program Work Plan. Review of historic seep monitoring observations indicates that the canal is typically above the seep elevation from October/November to May/June of each year. Accordingly, long-term operation should consider an annual operating schedule that runs the pump continuously from approximately May through November.
- The County should continue coordinating with DASNY on the feasibility of the sewer connection for long-term leachate and seep water management.
- A summary of these recommendations should be provided to NYSDEC in a monthly progress letter. Upon completion of the recommendations, the findings of the Pilot Program will be summarized in a final report.

Please contact me should you have any questions.

Very truly yours,

STERLING ENVIRONMENTAL ENGINEERING, P.C.

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MPM/am
Email
Attachments: Figures 1 & 2
Table

cc: Gary L. Polhemus, Jr., Orange County Department of Public Works
Anthony R. Griffin, P.E., Orange County Department of Public Works
Stacy Butler, Esq., Senior Assistant County Attorney

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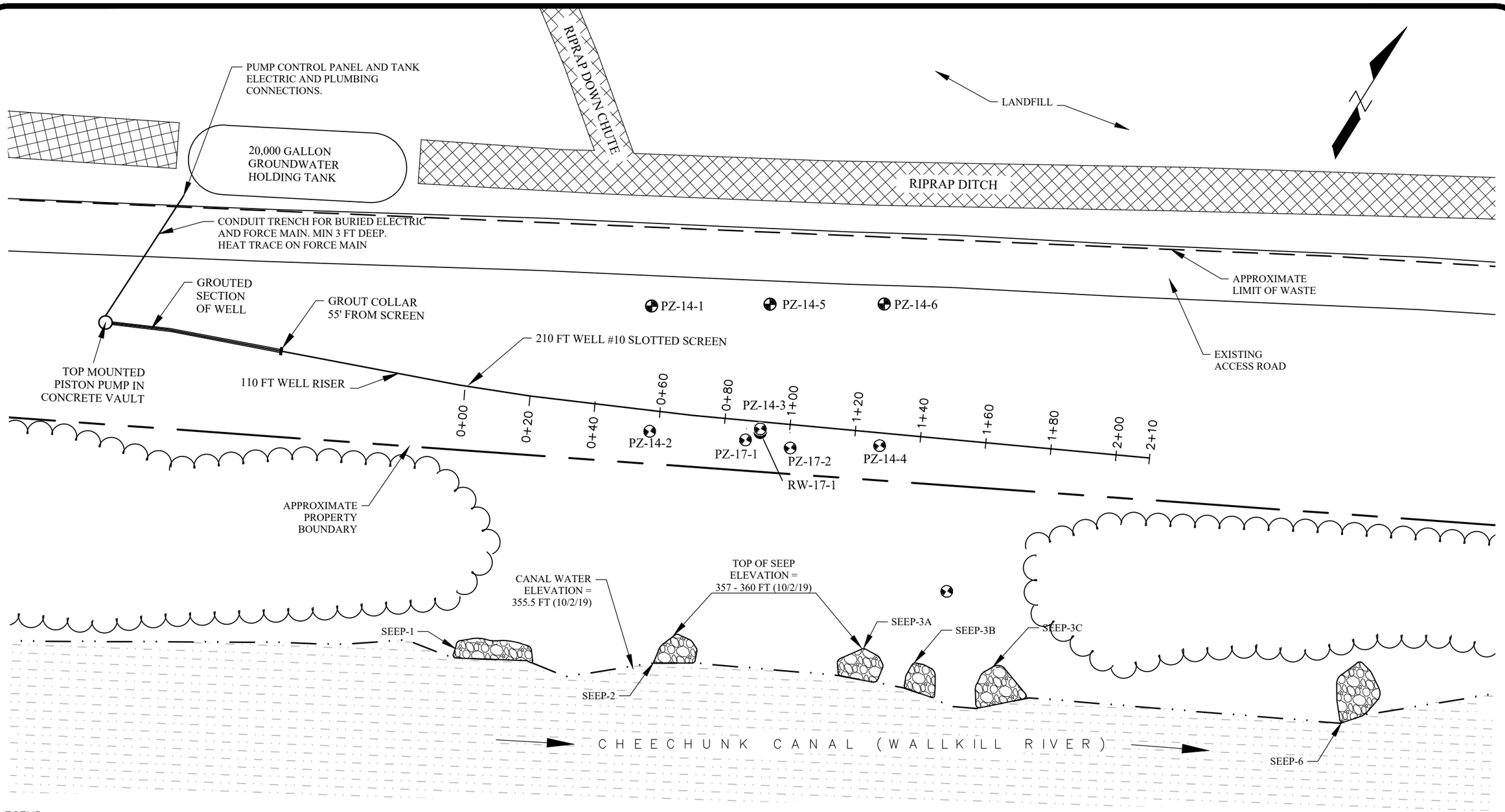

LEGEND:

- PILOT RECOVERY WELL
- BANK EROSION CONTROL RIPRAP ARMORING
- PZ-14-1 — EXISTING PIEZOMETER LOCATIONS
- SEEP-1 — STABILIZED SEEP LOCATIONS
- PROPERTY BOUNDARY
- LIMIT OF WASTE
- EDGE OF STREAM
- TREE LINE

0 15 30 60

(IN FEET)
1 inch = 30 ft.

MAP REFERENCES:
1. PROPERTY BOUNDARY AND LIMIT OF WASTE FROM DRAWINGS ENTITLED "OVERALL PLAN AND RESTRICTED PARCEL," BY THOMAS J. BARRY, DATED FEBRUARY 14, 2013.

SURVEY REFERENCE:
1. WATER LEVEL AND SEEP ELEVATIONS COLLECTED WITH TRIMBLE RTK GPS AND REPORTED IN NAD83 VERTICAL DATUM.

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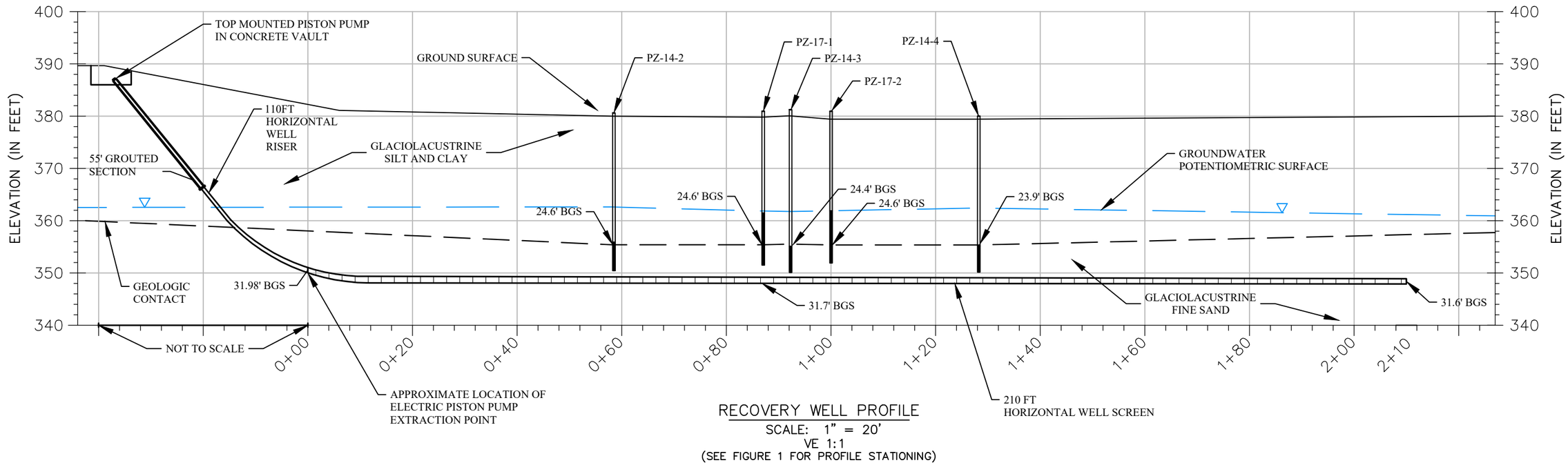
GROUNDWATER RECOVERY SYSTEM
PLAN VIEW
ORANGE CO. DEPT. OF PUBLIC WORKS
ORANGE COUNTY LANDFILL
TOWN OF GOSHEN ORANGE CO., NEW YORK

PROJ. No.: 2010–15	DATE: 5/19/2020	SCALE: 1" = 30'	DWG. NO. 2010–15094	FIGURE 1

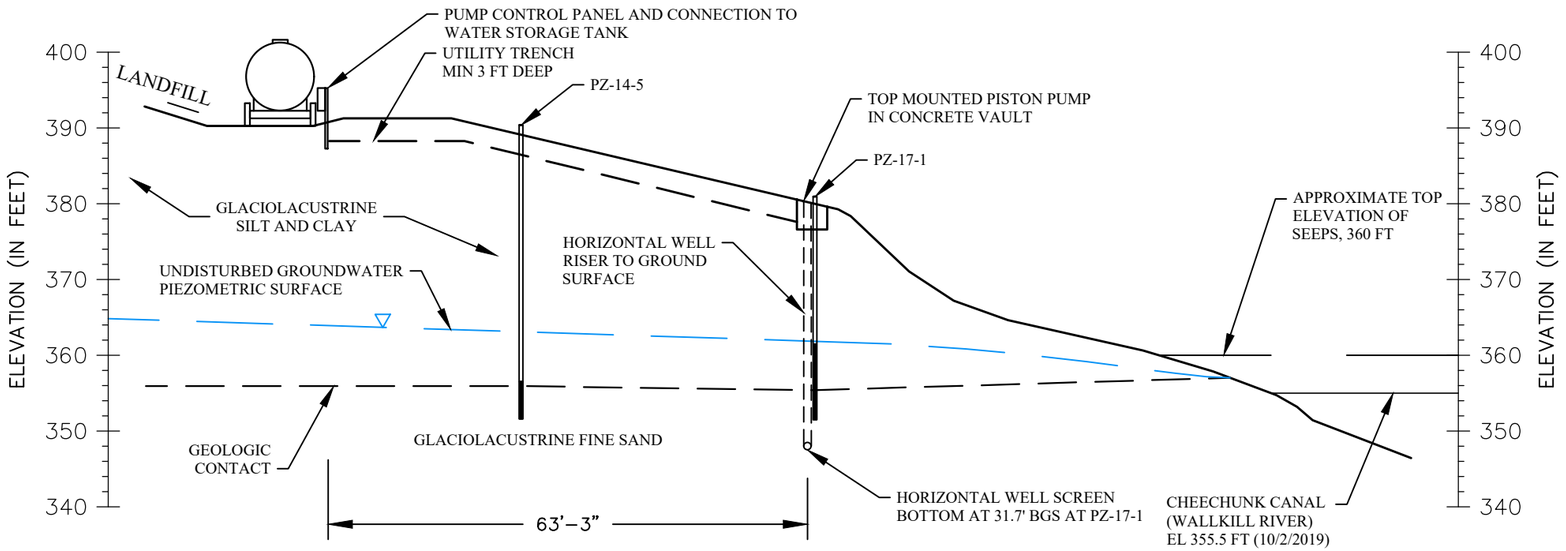
S:\Sterling\Projects\2010 Projects\Orange County – 2010-15\Drawings-Maps-Figures\ACAD\2010-15094_F-3 – Horizontal Recovery Well Plan_As Built.dwg CAD 5/19/2020 10:34 AM



RECOVERY WELL PROFILE
SCALE: 1" = 20'
VE 1:1
(SEE FIGURE 1 FOR PROFILE STATIONING)

A NORTHWEST

A' SOUTHWEST



RECOVERY WELL SECTION
SCALE: 1" = 20'
VE 1:1

SURVEY REFERENCE:
1. WATER LEVEL AND SEEP ELEVATIONS COLLECTED WITH TRIMBLE RTK GPS AND REPORTED IN NAD83 VERTICAL DATUM.

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HORIZONTAL RECOVERY WELL PROFILE AND SECTION
ORANGE COUNTY DEPT. OF PUBLIC WORKS
ORANGE COUNTY LANDFILL
TOWN OF GOSHEN ORANGE CO., NEW YORK

PROJ. No.:	DATE:	SCALE:	DWG. NO.	FIGURE
2010-15	5/19/2020	AS NOTED	2010-15093	2

Summary of Groundwater Analytical Results
HDD Pilot Study (February 2021)
Orange County Landfill, New Hamnpton, New York

ANALYSIS	NY-AWQS	Units	HDD-1	HDD-2	HDD-3
			2/4/2021	2/10/2021	2/10/2021
Water Quality Parameters					
Dissolved Oxygen	---	mg/l	12.65	13.28	13.28
Oxidation-Reduction Potential	---	mV	201.6	224.0	224.0
pH	---	S.U.	7.65	7.64	7.64
Specific Conductance @ 25° C	---	mS/cm	1.133	1.152	1.152
Temperature		° C	1.9	0.4	0.4
Turbidity	---	NTU	1.05	1.42	1.42
Leachate Indicator Parameters					
Alkalinity (Total)	---	mg/l	531	505	508
BOD, 5 day	---	mg/l	ND	ND	ND
Bromide	2	mg/l	0.755	0.68	0.728
Chemical Oxygen Demand	---	mg/l	5.7 J	7.4 J	9.9 J
Chloride	250	mg/l	83.5	77.8	77.8
Chromium (Hexavalent)	0.05	mg/l	0.003 U	0.003 U	0.003 U
Color, Apparent	15	A.P.C.U.	5 U	13	13
Cyanide, Total	200	mg/l	0.001 U	0.001 U	0.001 U
Hardness	---	mg/l	571.3	546.4	528.8
Nitrogen, Ammonia	2	mg/l	0.043 J	**3.75**	**3.80**
Nitrogen, Nitrite	1.0	mg/l	0.014 U	0.016 J	0.014 U
Nitrogen, Total Kjeldahl	---	mg/l	4.54	3.86	3.89
Phenolics, Total	0.001	mg/l	0.006 U	0.006 U	0.006 U
Solids, Total Dissolved	500	mg/l	**630**	**660**	**680**
Sulfate	250	mg/l	45.6	43.8	44.3
Total Organic Carbon	---	mg/l	2.7	2.8	2.8

Notes:

Groundwater samples collected from holding tank after extraction by horizontal recover well.

NY TOGS 1.1.1: Water Quality Standards & Guidance Values (June 2004): Class GA

'--- = No designated standard available.

Bold = Value indicates reported concentration exceeds applicable water quality standard.

U = Compound was not detected at or above the laboratory method detection limit.

ND = Not Detected and No available Method Detection Limit (MDL) for this analyte.

J = Result is less than the reporting limit but greater than or equal to the method detection limit.