10 Park Place | Bldg 1A, Suite 504
Butler, NJ 07405
Ph.: 973.334.0003 Fax: 973.334.0928
www.firstenvironment.com

January 10, 2023

Ms. Greta White
Project Manager, Remedial Bureau C
Division of Environmental Remediation
New York State Department of Environmental Conservation (NYSDEC)
625 Broadway
Albany, NY 12233-7014

Re: NYSDEC Site No. 360174; BCP C361074
December 2022 – January 2023 Monthly Progress Report
Westchester County Airport, 240 Airport Road
Harrison, New York 10604

Dear Ms.White:

Actions Taken/Accomplishments (December 2022 – January 2023)

A schedule of completed and projected activities is included as Appendix A.

1. First Environment continued to monitor surface water flow and per- and polyfluoroalkyl substance (PFAS) concentrations leaving the end-of-pipe at Outfall 7 (OF-7) as well as New York City Department of Environment Projection (NYCDEP) gauging station (E-10). We concurrently recorded water level measurements in temporary wells along Airport Road and New King Street.
2. In December, groundwater water levels at monitoring wells increased slightly from those previously measured in November. In December, the flow rate measured at E-10 located downgradient from the Airport OF-7 was approximately five times higher than measured at OF-7, indicating the stream leading to E-10 had continued to gain groundwater increasing the flow rate. Water flow rates measured at OF-7, E-10, Trib 1, and Trib 2 are shown in Table 1. Figure 1 illustrates the locations where the water levels were measured. Hydrographs illustrating measured water-level below ground surface are included in Appendix B.
3. First Environment measured the end-of-pipe flow leaving the OF-7 storm sewer on November 29 at approximately 8 gallons per minute (gpm) and on December 28 at approximately 17 gpm compared to an average flow of 54 gpm measured from July 8 to 13, 2019. This reduced flow is the result of the new stormwater system installed at OF-7 despite the infiltration of groundwater into the storm sewer at 7015.1, 7014.2, 7013, 7008, and 7007, as shown in Figure 2 and the daylighting of groundwater into 7014.1, 7014.2, 7015.1.

4. On November 4, a FluxTracer™ was installed in FMW-13R to determine the precise depths of water movement and PFAS concentration within the saturated zone. Following retrieval of the FluxTracer™ on November 18, analysis for PFAS was performed. The results are presented as Table 2, and the report from Regenesis is included as Appendix C. A description of the FluxTracer™ is provided in Attachment 1.
5. The November 22 discrete groundwater samples collected from FMW-13R were analyzed for PFAS. This information will be used in combination with the FluxTracer™ data to target discrete injection depths where PFAS is concentrated in the saturated zone. The data is presented as Table 3.
6. First Environment oversaw the installation of the Fluoro-Sorb permeable reactive mat in areas where daylighting of groundwater to the surface is occurring as shown in Figure 3. The work activities began on December 5 and were completed December 13 (see photos in Appendix C). Groundwater daylighting to the ground surface and entering the stormwater drains at 7014.2 and 7016.1 was analyzed for PFAS before and after the mat was installed. It is apparent from the comparison that after the installation the Fluoro-Sorb is functioning effectively. At location 7016.1, PFOS was reduced from 1,030 ppt to 66.5 ppt and at 7014.2 ppt from 1,130 ppt to 4.4 ppt. The PFAS results are provided in Table 4
7. After completing placement of the Fluoro-Sorb mat, Pugni reportedly repaired subsurface stormwater inlets to prevent groundwater from entering the storm sewer at inlets 7015.1, 7014.2, 7013, 7008, and 7007, as shown in Figure 2. First Environment will evaluate if such repairs were successful in eliminating PFAS impacted groundwater from entering the stormwater system.
8. First Environment has transitioned from PFAS analysis using EPA modified method 537.1 in November to the EPA method 1633 in December. EPA method 1633 analyzes 40 PFAS while the former method analyzes 21.
9. First Environment recently observed increased water flow from headwall 7021.1 that is contributing to OF-7 that may have resulted in an increased PFAS concentrations at OF-7. As a result, First Environment will further evaluate the increase on water flow and PFAS levels during the 1st quarter of 2023. The PFAS results identified at OF-7 are presented in Table 5.

January & February Activities

1. First Environment intends to initiate the groundwater pilot test on January 18 and 19, 2023. The test is designed to evaluate the effectiveness of the Regenesis Plume Stop technology in reducing PFAS in groundwater. The test location is illustrated in Figure 4.
2. Evaluate the groundwater pilot test groundwater results.
3. Respond to comments in the NYSDEC December 29, 2022 letter addressing the March 2022 Site Characterization Report.

4. On October 5, 2022, the NYSDEC Invited Public Comment for the Draft Plan to Investigate Contamination at Brownfield Site on Airport Road, West Harrison. Upon workplan approval, First Environment will initiate the RIWP.
5. First Environment continues to provide environmental technical support to the County's engineering team during the bid process for the construction and installation of a water supply pipeline from Westchester Joint Water Works (WJWW).
6. Continue to evaluate the larger application of the Fluoro-Sorb mat and permeable reactive barrier for use at OF-4 to reduce PFAS in surface water.
7. Evaluating foam fractionation technology to reduce PFAS in surface and groundwater.
8. First Environment is working with the WCPWT to develop a permanent solution to correct the daylighting of groundwater to the storm sewer as shown in Figure 3

If you have any questions, please do not hesitate to call.

Regards,

FIRST ENVIRONMENT, INC.

Scott R. Green, P.G.
Director, Insurance Consulting
Service Group

David Luer
Project Manager/Field Team Leader

Att.

c: B. Tod Delaney, Ph.D., P.E., BCEE - First Environment, Inc.
Arthur Clarke, J.D. - First Environment, Inc.
Hugh Greechan, Jr. P.E. - Westchester County Public Works & Transportation
John Nonna - Westchester County Attorney
April Gasparri – Westchester County Airport Manager
John Inserra - Westchester County Airport Environmental
John Benvegna - WSP
M.Hubicki, NYSDEC
K.Thompson, NYSDEC
A. Guglielmi,NYSDEC
S. Crisafulli, NYSDEC
M. Murphy, NYSDEC
J. Brown, NYSDEC
K.Maloney, NYSDEC
D.Bendell/D.Pollock, NYSDEC

M. Doroski – NYSDOH
K. Kulow – NYSDOH

TABLES

TABLE 1
Surface Water Flow

Date/Location	OF-7	E-10	Trib 1	Trib 2
6/17/2022	5	20	2	0.5
6/27/2022	5	17	2	0.5
7/5/2022	1	10	1	0
7/27/2022	1.5	10	1	0
8/15/2022	3	3	0.1	0
8/30/2022	2	2	0	0
9/28/2022	2.6	9	1	0
10/26/2022	9.75	43	5	1
11/18/2022	12	56	4	5
11/22/2022	7	33	5	1
11/29/2022	8	42	5	5
12/28/2022	17	87	15	10

Note - Flow is in gallons per minute

Table 2.Flux Tracer Results

Site Name	Westchester County Airport
Location	120 Airport Road, White Plains, NY
Client	First Environment
Contact	Dave Luer
Well ID	MW-13R
Report prepared by:	Josh Moreno
Deployment length (ft)	17.48
Date deployed	11/4/22 10:14
Date recovered	11/18/22 10:15

Table 1. Darcy velocity and contaminant fluxes

	Well Interval - Depth Below Top of Well Casing (ft)				
Mass Flux (μg/m²/d)	**8 9**	**10 11**	**12 13**	**14 15**	**16 17**
Darcy velocity (cm/d)	**4.5**	**4.0**	**3.4**	**2.4**	**2.6**
PFBA	10	7	32	7	8
PFPeA	40	28	140	24	27
PFHxA	17	9	56	9	9
PFHpA	7	4	23	5	5
PFOA	3	1	11	2	2
PFNA	1	0	5	1	1
6:2 FTS	10	4	34	6	6
PFBS	1	ND	3	1	ND
PFHxS	11	4	46	8	9
PFHpS	ND	ND	ND	ND	ND
PFOS	7	3	35	7	8
PFDA	ND	ND	ND	ND	ND
PFUnA	1	ND	ND	1	ND
PFDoA	ND	ND	ND	1	1
PFTrDA	ND	ND	ND	ND	ND
PFPeS	6	2	14	3	4
PFECHS	ND	ND	ND	ND	ND
5:3 FTA	ND	ND	1	ND	ND
FBSA	ND	ND	2	ND	ND
FHxSA	2	1	6	1	1
8Cl-PFOS	ND	ND	ND	ND	ND

TABLE 2. Fluxed-derived concentrations

	Well Interval - Depth Below Top of Well Casing (ft)				
Concentration (ng/L)	**8 9**	**10 11**	**12 13**	**14 15**	**16 17**
PFBA	222	175	941	292	308
PFPeA	889	700	4,118	1,000	1,039
PFHxA	378	225	1,647	375	346
PFHpA	156	100	677	208	192
PFOA	67	25	324	83	77
PFNA	22	0	147	42	39
6:2 FTS	222	100	1,000	250	231
PFBS	22	N/A	88	42	N/A
PFHxS	244	100	1,353	333	346
PFHpS	N/A	N/A	N/A	N/A	N/A
PFOS	156	75	1,029	292	308
PFDA	N/A	N/A	N/A	N/A	N/A
PFUnA	22	N/A	N/A	42	N/A
PFDoA	N/A	N/A	N/A	42	39
PFTrDA	N/A	N/A	N/A	N/A	N/A
PFPeS	133	50	412	125	154
PFECHS	N/A	N/A	N/A	N/A	N/A
5:3 FTA	N/A	N/A	29	N/A	N/A
FBSA	N/A	N/A	59	N/A	N/A
FHxSA	44	25	177	42	39
8Cl-PFOS	N/A	N/A	N/A	N/A	N/A

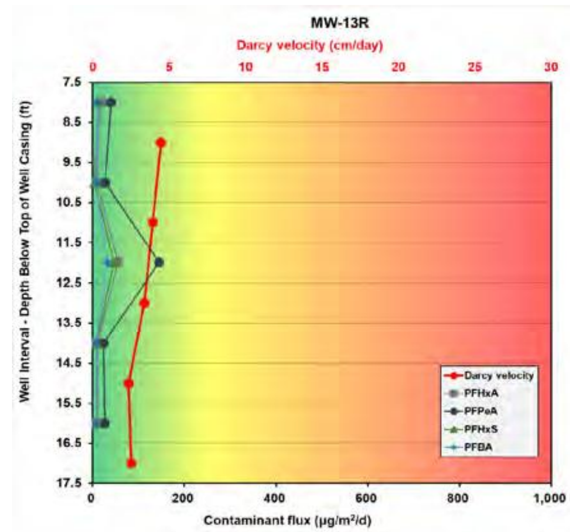

Table 3 - FMW-13R Discrete Sampling

Sample ID York ID Sampling Date Client Matrix		NYDEC Part 375 PFAS Remedial Program Water Oct 2020	FMW-13R Top 22K1238-01 11/22/2022 10:15:00 AM Water		FMW-13R Bottom 22K1238-02 11/22/2022 10:30:00 AM Water	
Compound	**CAS Number**		Result	Q	Result	Q
PFAS, NYSDEC Target List		ng/L	ng/L		ng/L	
Dilution Factor			10		20	
1H,1H,2H,2H-Perfluorodecanesulfonic acid (8:2 FTS)	39108-34-4	100	2.750		3.250	
1H,1H,2H,2H-Perfluorooctanesulfonic acid (6:2 FTS)	27619-97-2	100	**404**	D	**463**	D
N-EtFOSAA	2991-50-6	100		U		U
N-MeFOSAA	2355-31-9	100		U		U
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	100		U		U
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	100	25.400		71.100	
Perfluoro-1-octanesulfonamide (FOSA)	754-91-6	100		U		U
Perfluorobutanesulfonic acid (PFBS)	375-73-5	100	57.200		68.800	
Perfluorodecanoic acid (PFDA)	335-76-2	100		U	2.980	
Perfluorododecanoic acid (PFDoA)	307-55-1	100		U		U
Perfluoroheptanoic acid (PFHpA)	375-85-9	100	**458**	D	**527**	D
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	100	**785**	D	**2,360**	D
Perfluorohexanoic acid (PFHxA)	307-24-4	100	**891**	D	**822**	D
Perfluoro-n-butanoic acid (PFBA)	375-22-4	100	**433**	D	**405**	D
Perfluorononanoic acid (PFNA)	375-95-1	100	86.900		**148**	
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	10	**823**	D	**2,240**	D
Perfluorooctanoic acid (PFOA)	335-67-1	10	**172**	D	**224**	D
Perfluoropentanoic acid (PFPeA)	2706-90-3	100	**1,760**	D	**1,790**	D
Perfluorotetradecanoic acid (PFTA)	376-06-7	100		U		U
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	100		U		U
Perfluoroundecanoic acid (PFUnA)	2058-94-8	100		U		U

PFOA + PFOS			995	2,464
Total PFAS			5,898	9,125

NOTES:

Any Regulatory Exceedences are color coded by Regulation

Q is the Qualifier Column with definitions as follows:

D=result is from an analysis that required a dilution

J=analyte detected at or above the MDL (method detection limit) but below the RL (Reporting Limit) - data is estimated

U=analyte not detected at or above the level indicated

B=analyte found in the analysis batch blank

E=result is estimated and cannot be accurately reported due to levels encountered or interferences

P=this flag is used for pesticide and PCB (Aroclor) target compounds when there is a % difference for detected concentrations that exceed method dictated limits between the two GC columns used for analysis

NT=this indicates the analyte was not a target for this sample

~=this indicates that no regulatory limit has been established for this analyte

DISCLAIMER:

Table 4 - Fluoro-Sorb Pre and Post Placement

Sample ID York ID Sampling Date Client Matrix		NYDEC Part 375 PFAS Remedial Program Water Oct 2020	7016.1 Before 22L0405-01 12/6/2022 9:00:00 AM Water		7016.1 After 22L0670-01 12/9/2022 7:30:00 AM Water		7014.2 Before 22L0405-02 12/6/2022 12:00:00 PM Water		7014.2 After 22L0670-02 12/9/2022 7:40:00 AM Water	
Compound	**CAS Number**		Result	Q	Result	Q	Result	Q	Result	Q
	PFAS, NYSDEC Target List	ng/L	ng/L		ng/L		ng/L		ng/L	
	Dilution Factor		10		1		10		1	
1H,1H,2H,2H-Perfluorodecanesulfonic acid (8:2 FTS)	39108-34-4	100	20.8			U		U		U
1H,1H,2H,2H-Perfluorooctanesulfonic acid (6:2 FTS)	27619-97-2	100	24.8		6.4		6.0			U
N-EtFOSAA	2991-50-6	100		U		U		U		U
N-MeFOSAA	2355-31-9	100		U		U		U		U
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	100		U		U		U		U
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	100	21.4			U	33.9			U
Perfluoro-1-octanesulfonamide (FOSA)	754-91-6	100	3.5			U		U		U
Perfluorobutanesulfonic acid (PFBS)	375-73-5	100	21.1		5.6		43.2			U
Perfluorodecanoic acid (PFDA)	335-76-2	100		U		U	3.5			U
Perfluorododecanoic acid (PFDoA)	307-55-1	100		U		U		U		U
Perfluoroheptanoic acid (PFHpA)	375-85-9	100	41.4		9.8		73.6			U
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	100	299.0	D	52.1		488.0	D	4.5	
Perfluorohexanoic acid (PFHxA)	307-24-4	100	68.8		17.4		126.0		4.2	
Perfluoro-n-butanoic acid (PFBA)	375-22-4	100	25.5		8.9		43.0		7.3	
Perfluorononanoic acid (PFNA)	375-95-1	100	8.4			U	38.9			U
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	10	1,030.0	D	66.5		1,130.0	D	4.4	
Perfluorooctanoic acid (PFOA)	335-67-1	10	50.3		10.6		76.6			U
Perfluoropentanoic acid (PFPeA)	2706-90-3	100	47.7		23.2		116.0		10.5	
Perfluorotetradecanoic acid (PFTA)	376-06-7	100		U		U		U		U
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	100	2.1			U		U		U
Perfluoroundecanoic acid (PFUnA)	2058-94-8	100	3.2			U	9.9			U
PFOS + PFOA			1,080.3		77.1		1,206.6		4.4	
Total PFAS			1,667.9		200.5		2,188.6		30.9	

NOTES:
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DISCLAIMER:

York Analytical Laboratories, Inc. is providing this information as a convenience to you. York makes no representations or warranties that these data are accurate, complete or represent the latest regulatory authority limits or analytes. York is not responsible for any errors or omissions in these specific regulations. Your use of these data constitute your understanding of these limitations and you agree to hold York harmless from any and all action that may arise from use of said information. As regulations change often, we encourage the user to review the regulatory limits and lists of interest to confirm these data.

Table 5 - Fluoro-Sorb Pre and Post Installation at OF-7

Sample ID **York ID** **Sampling Date** **Client Matrix**		**OF-7** **22K1460-01** **11/29/2022 9:20:00 AM** **Water**		**OF-7** **22L0878-01** **12/14/2022 11:30:00 AM** **Water**	
Compound	**CAS Number**	Result	Q	Result	Q
PFAS, EPA 1633 Target List		ng/L		ug/L	
Dilution Factor		25		5	
11CL-PF3OUdS	763051-92-9	NT			U
1H,1H,2H,2H-Perfluorodecanesulfonic acid (8:2 FTS)	39108-34-4	66.3	D	16	
1H,1H,2H,2H-Perfluorohexanesulfonic acid (4:2 FTS)	757124-72-4	NT			U
1H,1H,2H,2H-Perfluorooctanesulfonic acid (6:2 FTS)	27619-97-2	280.0	D	95	
3-Perfluoroheptyl propanoic acid (FHpPA)	812-70-4	NT			U
3-Perfluoropentyl propanoic acid (FPePA)	914637-49-3	NT			U
3-Perfluoropropyl propanoic acid (FPrPA)	356-02-2	NT			U
9CL-PF3ONS	756426-58-1	NT			U
ADONA	919005-14-4	NT			U
HFPO-DA (Gen-X)	13252-13-6	NT			U
N-EtFOSA	4151-50-2	NT		1	B
N-EtFOSAA	2991-50-6		U		U
N-EtFOSE	1691-99-2	NT			U
N-MeFOSA	31506-32-8	NT			U
N-MeFOSAA	2355-31-9		U		U
N-MeFOSE	24448-09-7	NT			U
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	113507-82-7	NT			U
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3		U		U
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	190.0		36	
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	NT		6	
Perfluoro-1-octanesulfonamide (FOSA)	754-91-6	16.5		4	
Perfluoro-1-pentanesulfonate (PFPeS)	2706-91-4	NT		74	
Perfluoro-3,6-dioxaheptanoic acid (NFDHA)	151772-58-6	NT			U
Perfluoro-4-oxapentanoic acid (PFMPA)	377-73-1	NT			U
Perfluoro-5-oxahexanoic acid (PFMBA)	863090-89-5	NT			U
Perfluorobutanesulfonic acid (PFBS)	375-73-5	87.8		34	
Perfluorodecanoic acid (PFDA)	335-76-2	22.3		6	
Perfluorododecanesulfonic acid (PFDoS)	79780-39-5	NT			U
Perfluorododecanoic acid (PFDoA)	307-55-1		U		U
Perfluoroheptanoic acid (PFHpA)	375-85-9	414.0	D	144	
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1,210.0	D	3680	D
Perfluorohexanoic acid (PFHxA)	307-24-4	471.0	D	174	
Perfluoro-n-butanoic acid (PFBA)	375-22-4	169.0	D	61	
Perfluorononanoic acid (PFNA)	375-95-1	292.0	D	106	
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	3,420.0	D	6370	D
Perfluorooctanoic acid (PFOA)	335-67-1	997.0	D	266	
Perfluoropentanoic acid (PFPeA)	2706-90-3	490.0		258	
Perfluorotetradecanoic acid (PFTA)	376-06-7		U		U
Perfluorotridecanoic acid (PFTrDA)	72629-94-8		U		U
Perfluoroundecanoic acid (PFUnA)	2058-94-8	68.5		21	

PFOS + PFOA		4,417.0	6,636.0
Total PFAS		8,194.4	11,352.3

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NT=this indicates the analyte was not a target for this sample
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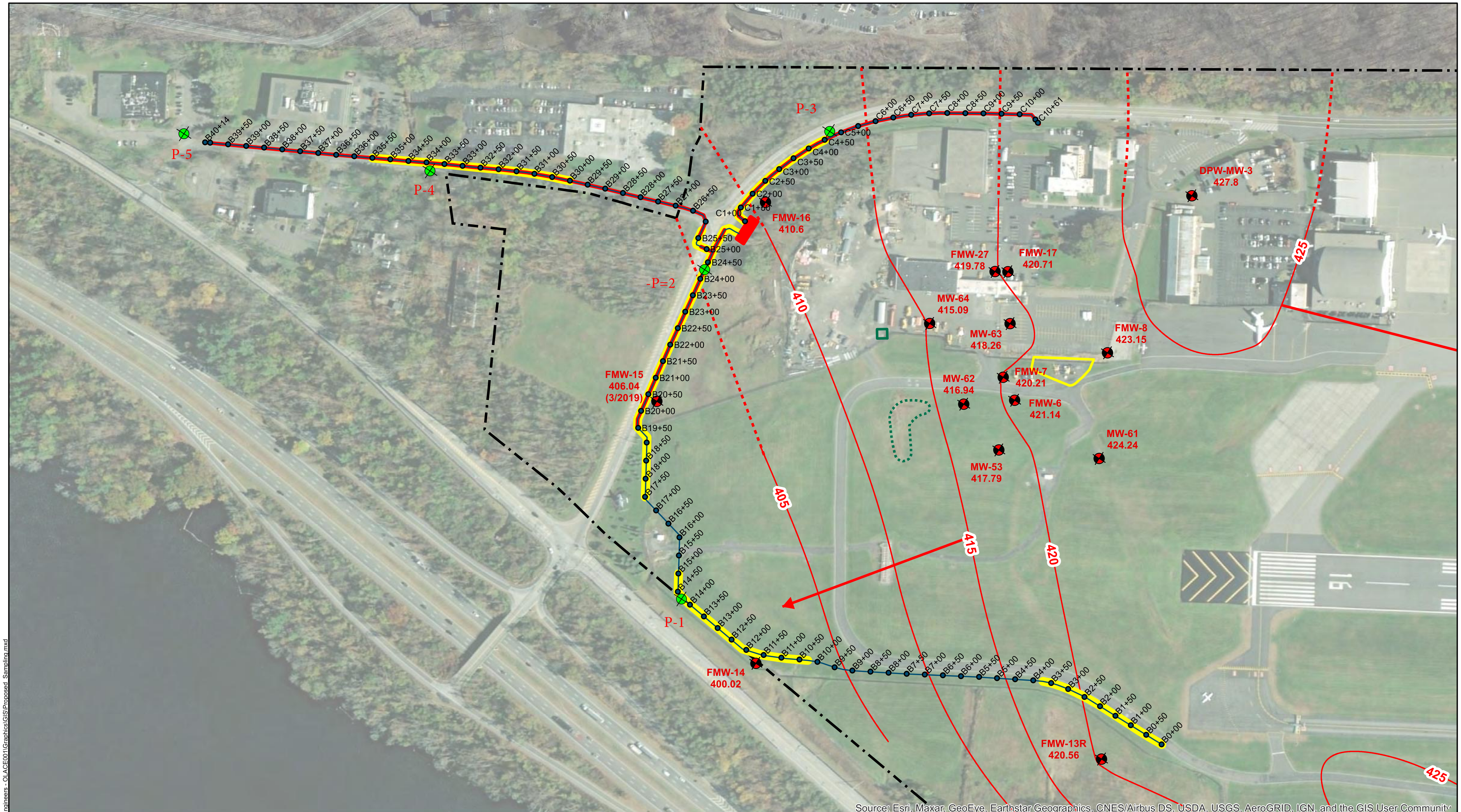
DISCLAIMER:

FIGURES



Legend

- Unconsolidated Groundwater Flow Direction
- Unconsolidated Groundwater Elevation Contour (feet) as of 5/20/2020
- Inferred Unconsolidated Groundwater Elevation Contour (feet)
- Unconsolidated Monitoring Well
- 411.82 Unconsolidated Groundwater Elevation (feet) as of 5/20/2020
- Proposed Temp Well
- Station
- Water Line
- Excavation Requiring Removal
- Area Requiring Dewatering & Treatment of Water
- Former AFFF Burn Pit
- Subsurface Catch Basin
- Open Catch Area
- Property Boundary

0 62.5 125 250 Feet

1 inch = 250 feet

N

FIRST ENVIRONMENT

10 Park Place, Bldg 1A, Suite 504
Butler, NJ 07405

NYSDEC SITE NO. 360174
WESTCHESTER COUNTY AIRPORT
White Plains, Westchester County, New York
FIGURE 1
GROUNDWATER MEASUREMENT LOCATIONS

Revised	Drawn	Checked	Approved	Date
	LS	DL	SG	1/28/2022

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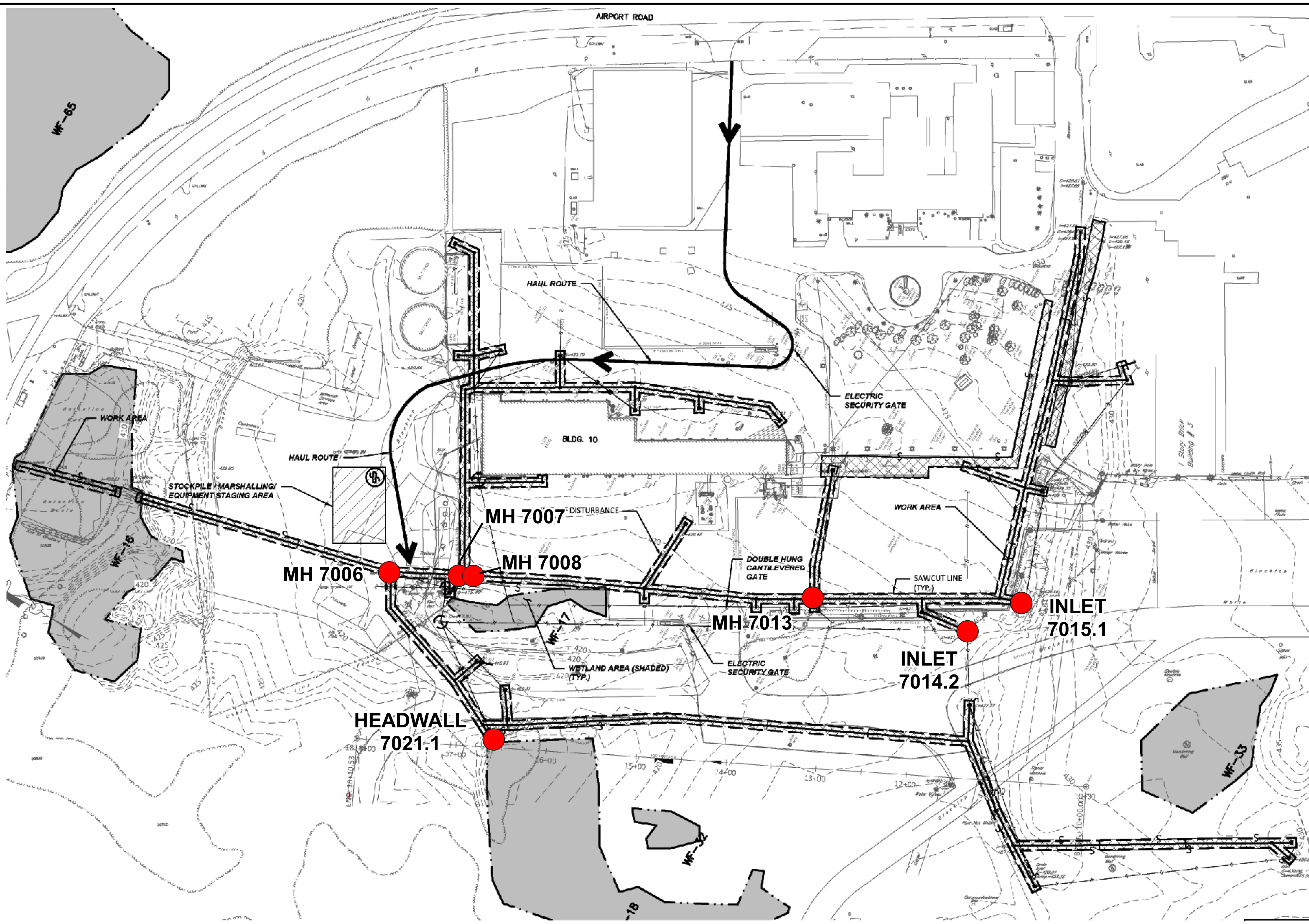

Legend

● Leaking Manhole Structures

WESTCHESTER COUNTY AIRPORT

FIGURE 2
SYSTEM LEAKS AS OF
JULY 28, 2022

FIRST ENVIRONMENT

10 Park Place, Bldg 1A, Suite 504
Butler, NJ 07405

Revised	Drawn	Checked	Approved	Date
	CL			8/2/2022

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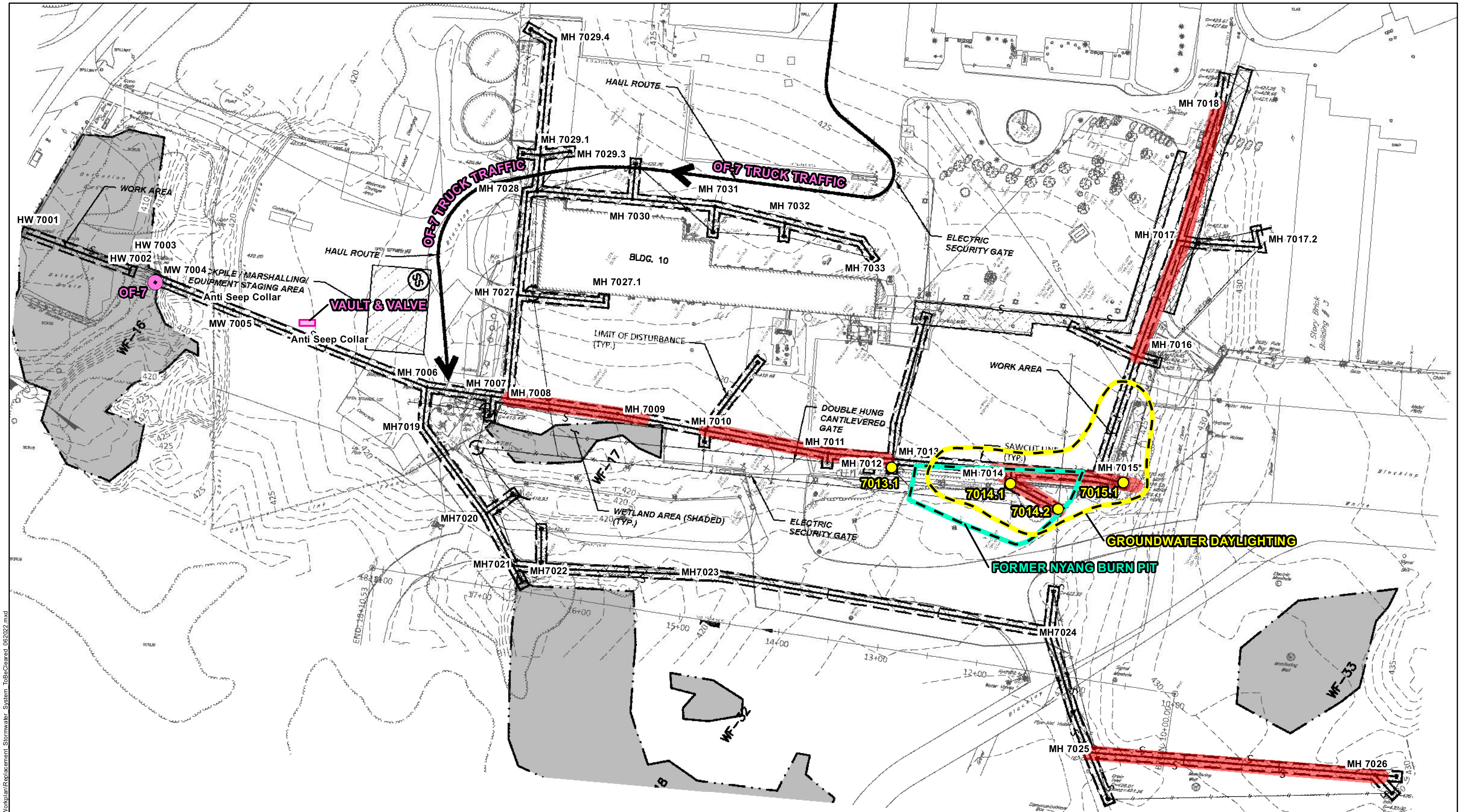

Legend

- Section of Pipe Requiring Clearing
- Wetland

0 22.5 45 90 Feet

1 inch = 90 feet

Source: Provident Design Engineering PLLC, 2020 100% OF-7 Storm Sewer Design

FIRST ENVIRONMENT

10 Park Place, Bldg 1A, Suite 504
Butler, NJ 07405

NYSDEC SITE NO. 360174
WESTCHESTER COUNTY AIRPORT
White Plains, Westchester County, New York
FIGURE 3
OF-7 STORM SEWER SEDIMENT CLEAN OUT

Revised	Drawn	Checked	Approved	Date
	ES	DL	SG	6/15/2022

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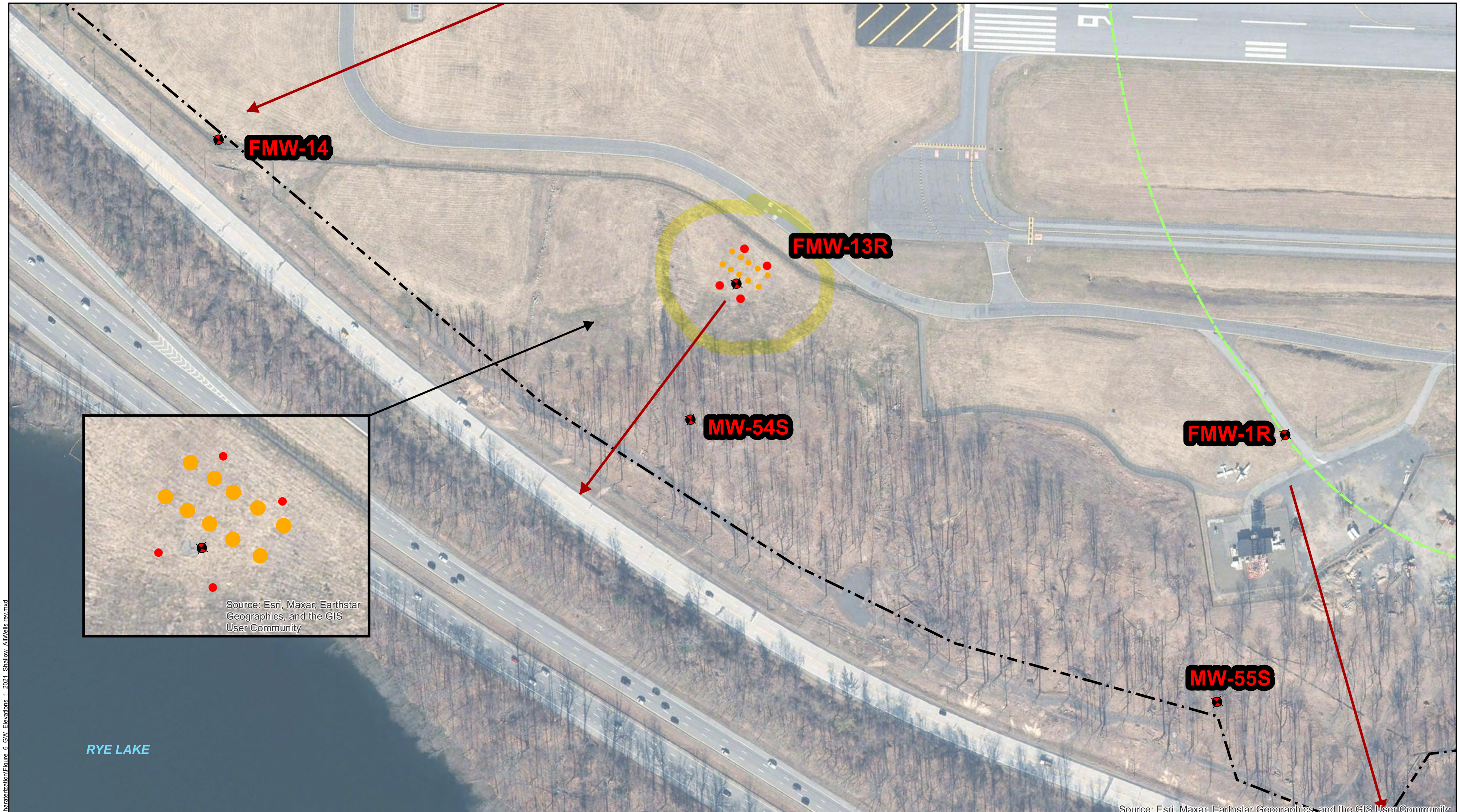


Legend

- Injection Gallery (5ft wide x 30 ft long)
- Proposed Upgradient & Downgradient Wells
- Monitoring Well Location (Unconsolidated Aquifer)
- Approximate Flow Direction
- Approximate Watershed Boundary
- Property Boundary

NM: Not Measured
NA: TOC Elevation not Available

0 100 200 Feet
1 inch = 167 feet
N

FIRST ENVIRONMENT
10 Park Place, Bldg 1A, Suite 504
Butler, NJ 07405

NYSDEC SITE NO. 360174
WESTCHESTER COUNTY AIRPORT
White Plains, Westchester County, New York
FIGURE 4
PILOT STUDY GROUNDWATER
TREATMENT PFOA-PFOS

Revised	Drawn	Checked	Approved	Date
	LS	DL	SG	8/29/2022

I:\WESCHESTER AIRPORT\Site Charaterization\Figure 6 GW Elevations 1 2021 Shallow AllWells rev.mxd

APPENDIX A

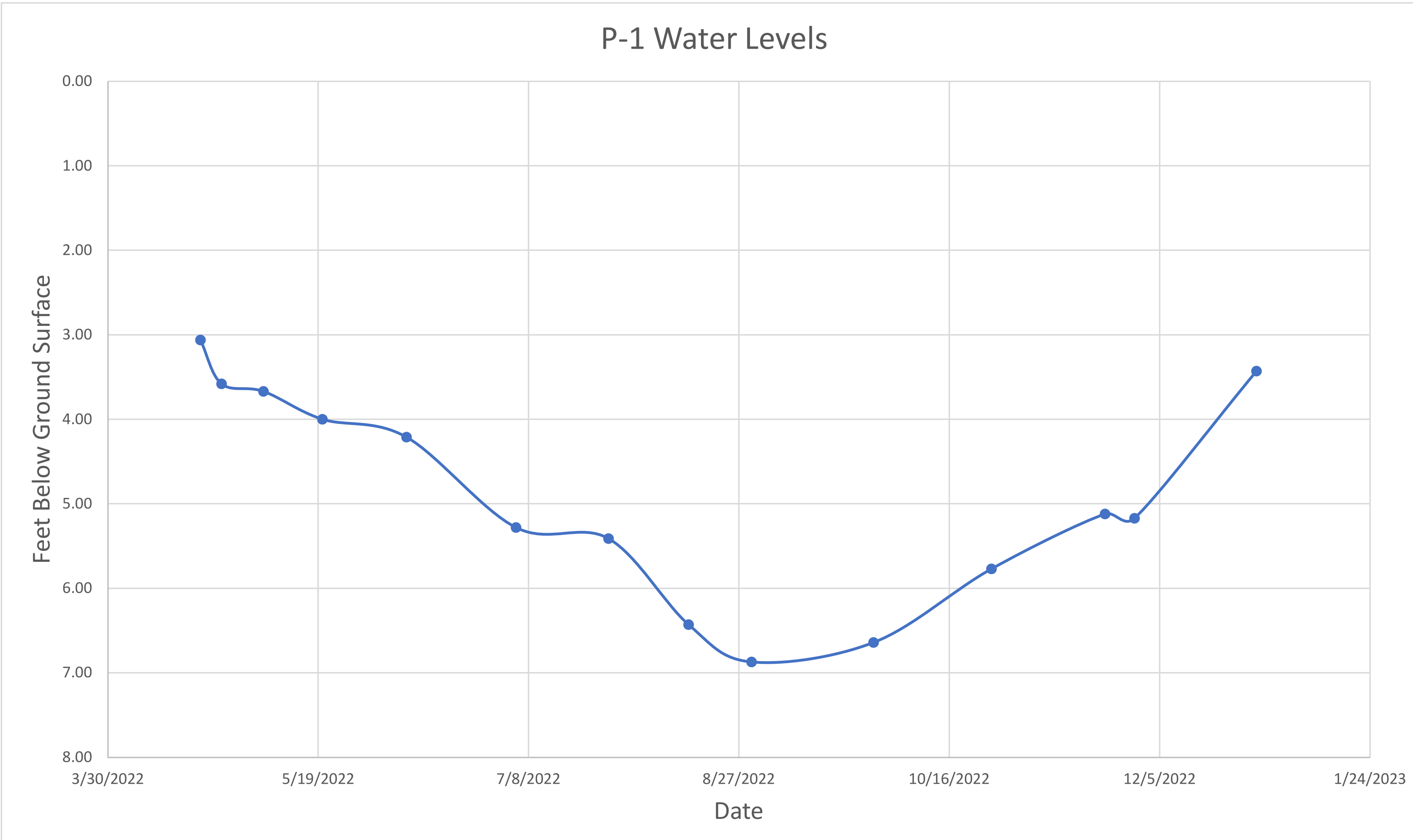
APPENDIX A
Work Activity Schedule
2022-2023

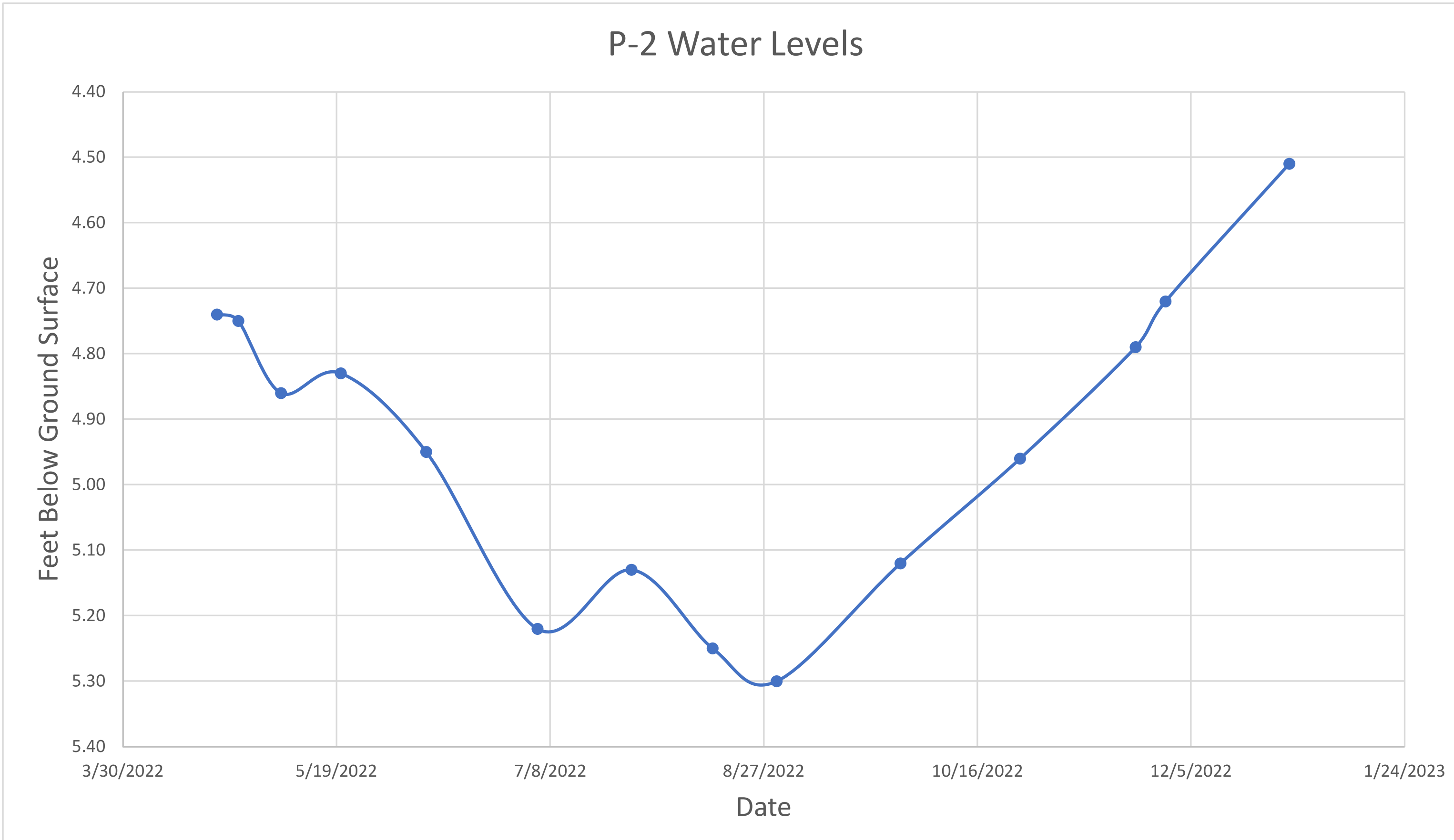
Milestone	Estimated Completion Date	Estimated Completion Percentage
OF-7 Storm Sewer Installation	May 13, 2022	100%
OF-7 Performance Monitoring	2nd Quarter 2023	90%
New King Street Workplan – Phase 1	January 24	100%
New King Street Workplan – Phase 2	April 2022	100%
Waterline Workplan	April 2022	100%
Waterline Completion	October 2024	0%
OF-4 IRM Pilot Test[1]	Winter 2022	50%
Remedial Investigation Workplan Submittal	July 2022	100%
GW Pilot Test Scope of Work[2]	Summer 2022	100%
GW Pilot Test	Winter 2022	60%
Execution of RI workplan[3]	Spring 2023	0%
Remedial Action Alternatives Evaluation	2023-2024	0%
Remedial Action Selection Report	TBD	0%
Certificate of Completion	TBD	0%

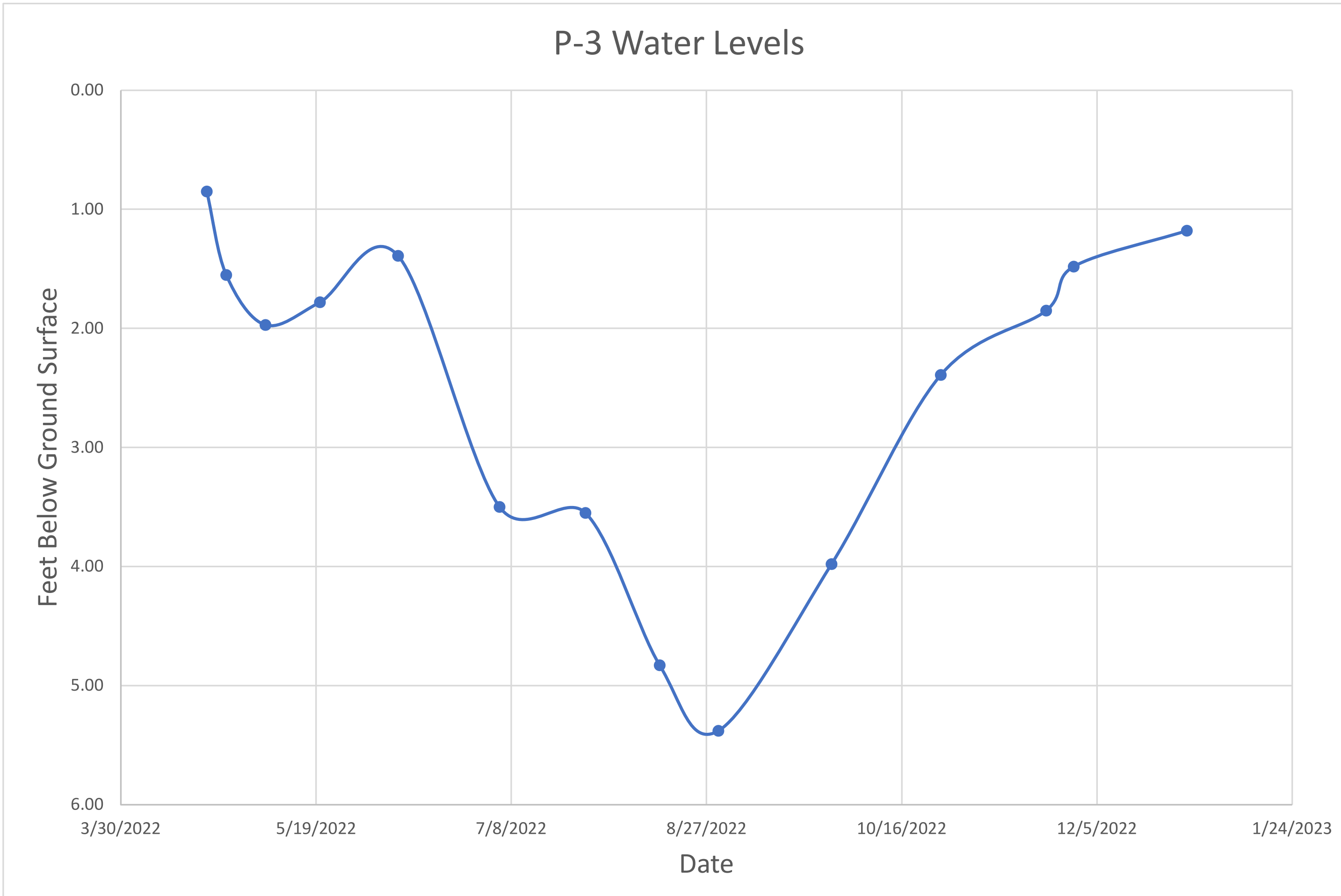
Estimated task durations and completions are tentative and are subject to modification based on site work, progress, weather delays, and other considerations such as contractor availability or Airport access.

[1] Pilot test CETCO Fluor sorb at OF-7 – Evaluate the effectiveness of Flour sorb reducing PFOS and PFOA in surface water. Pilot test CETCO Fluor sorb at OF-7 before testing at OF-4.
[2] Scope of work submitted to the County approved September 2022
[3] Start date dependent upon workplan approval.

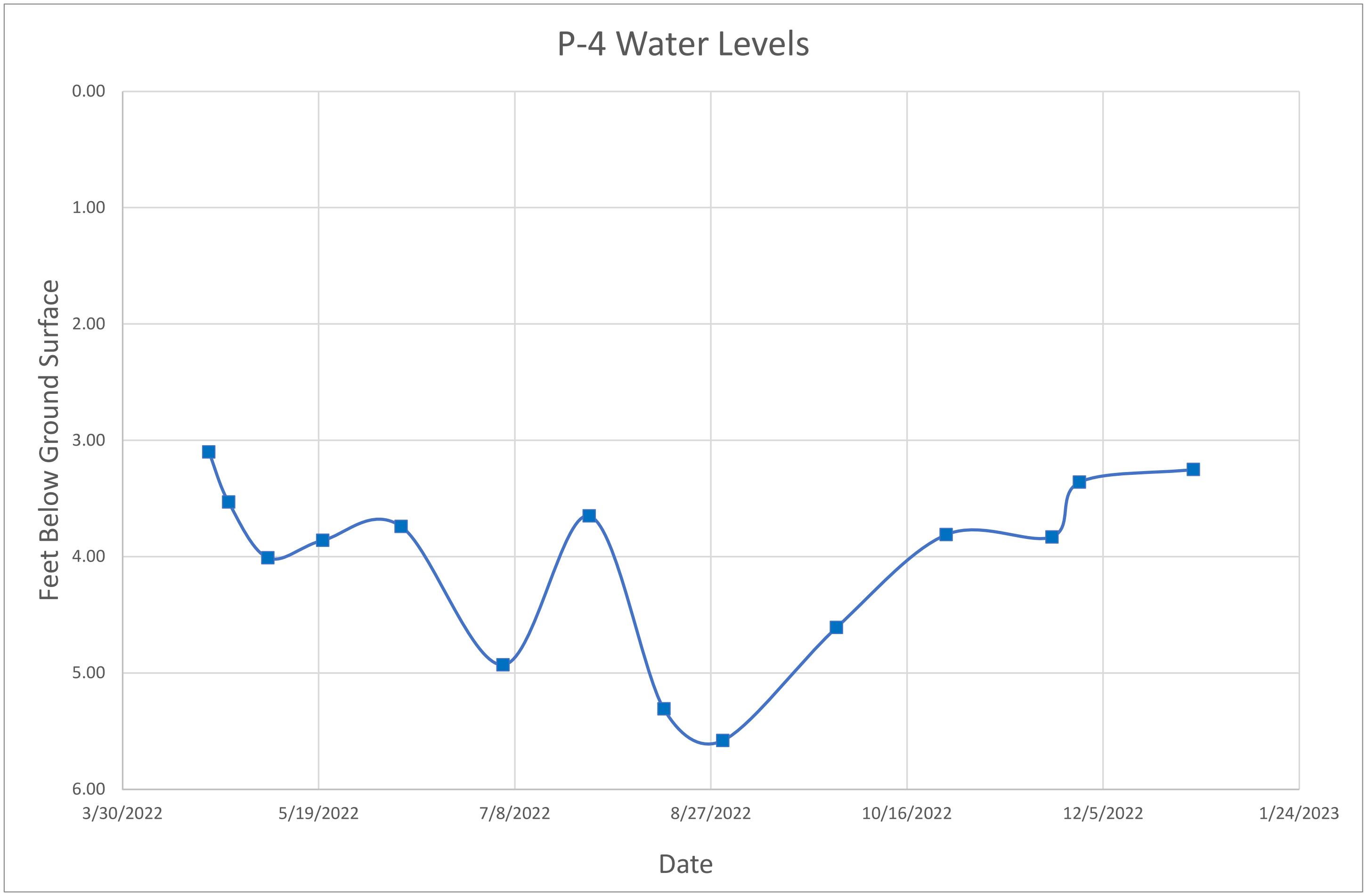
APPENDIX B


P-1 Water Levels
Feet Below Ground Surface
0.00
1.00
2.00
3.00
4.00
5.00
6.00
7.00
8.00
3/30/2022
5/19/2022
7/8/2022
8/27/2022
10/16/2022
12/5/2022
1/24/2023
Date

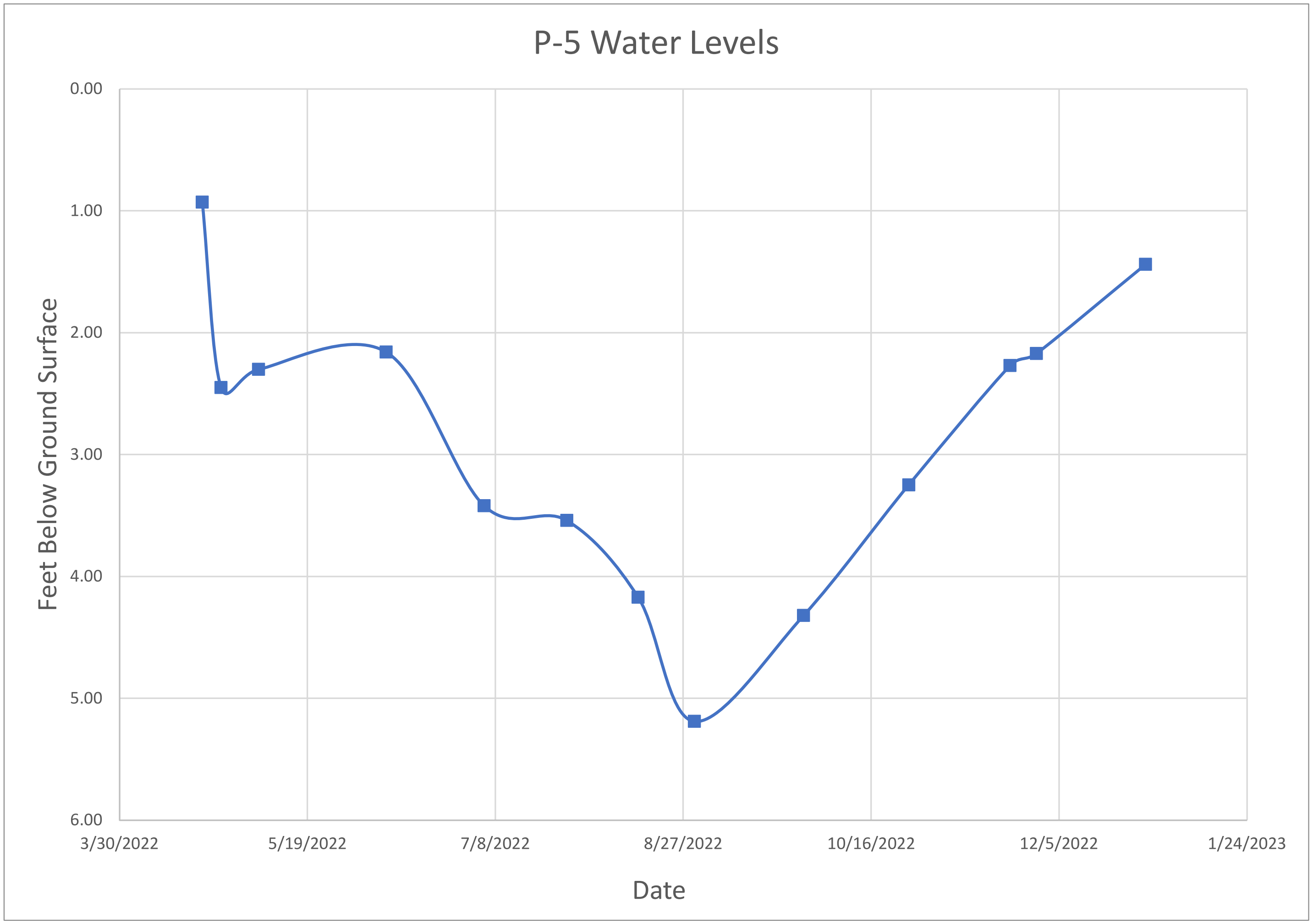

P-2 Water Levels
Feet Below Ground Surface
4.40
4.50
4.60
4.70
4.80
4.90
5.00
5.10
5.20
5.30
5.40
3/30/2022
5/19/2022
7/8/2022
8/27/2022
10/16/2022
12/5/2022
1/24/2023
Date


P-3 Water Levels
Feet Below Ground Surface
0.00
1.00
2.00
3.00
4.00
5.00
6.00
3/30/2022
5/19/2022
7/8/2022
8/27/2022
10/16/2022
12/5/2022
1/24/2023
Date

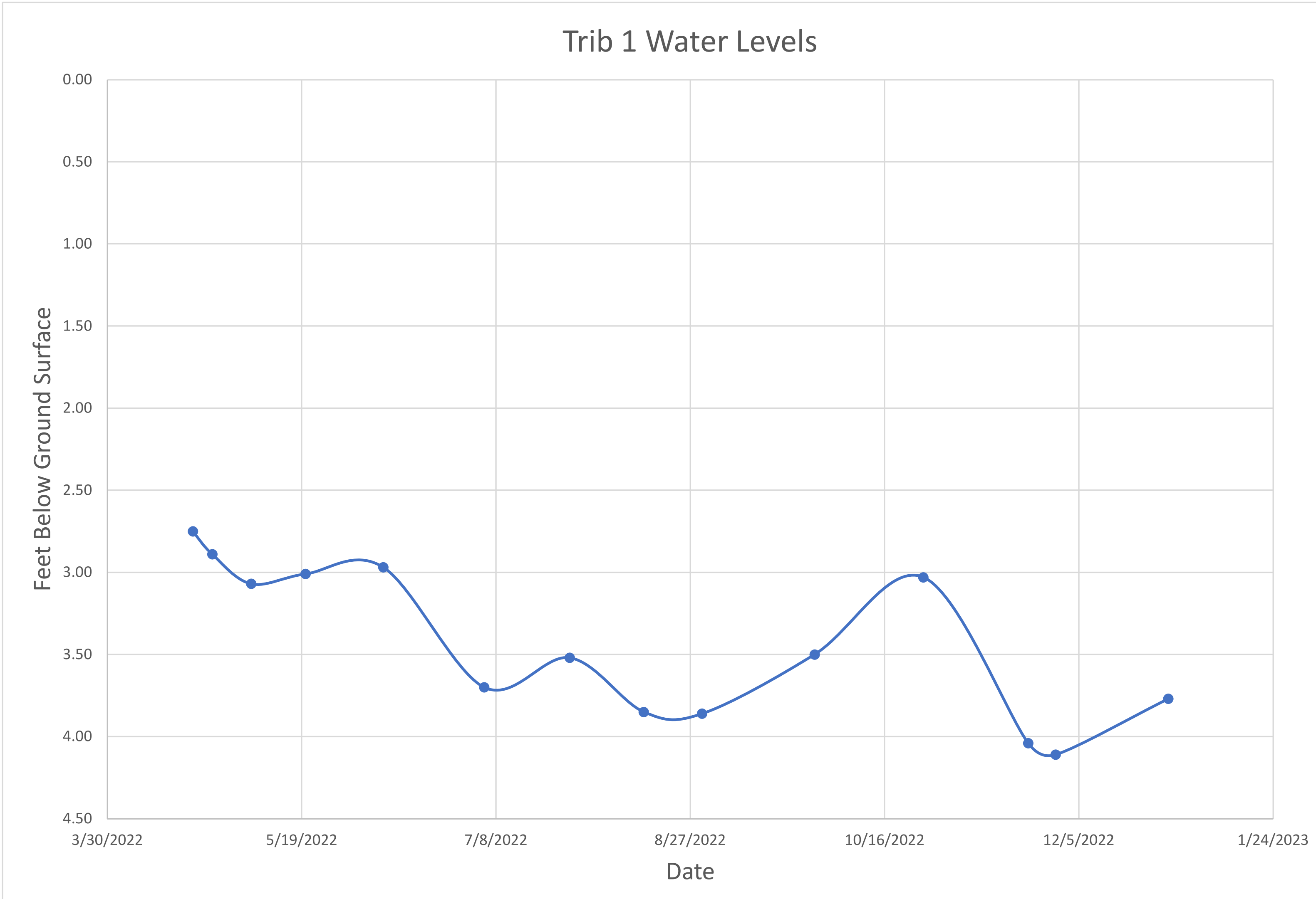
APPENDIX B



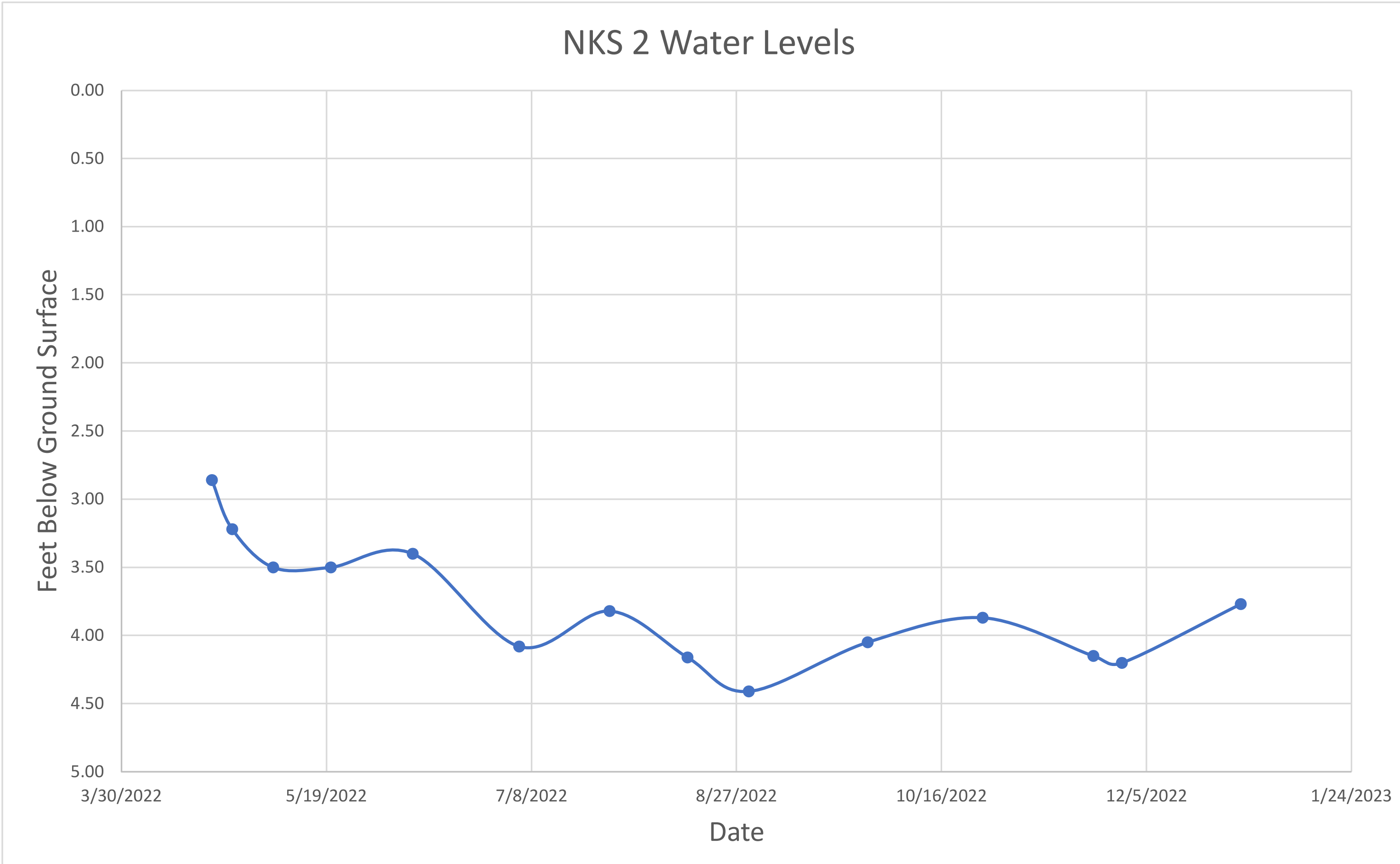
P-4 Water Levels
Feet Below Ground Surface
0.00
1.00
2.00
3.00
4.00
5.00
6.00
3/30/2022
5/19/2022
7/8/2022
8/27/2022
10/16/2022
12/5/2022
1/24/2023
Date


P-5 Water Levels
Feet Below Ground Surface
0.00
1.00
2.00
3.00
4.00
5.00
6.00
3/30/2022
5/19/2022
7/8/2022
8/27/2022
10/16/2022
12/5/2022
1/24/2023
Date

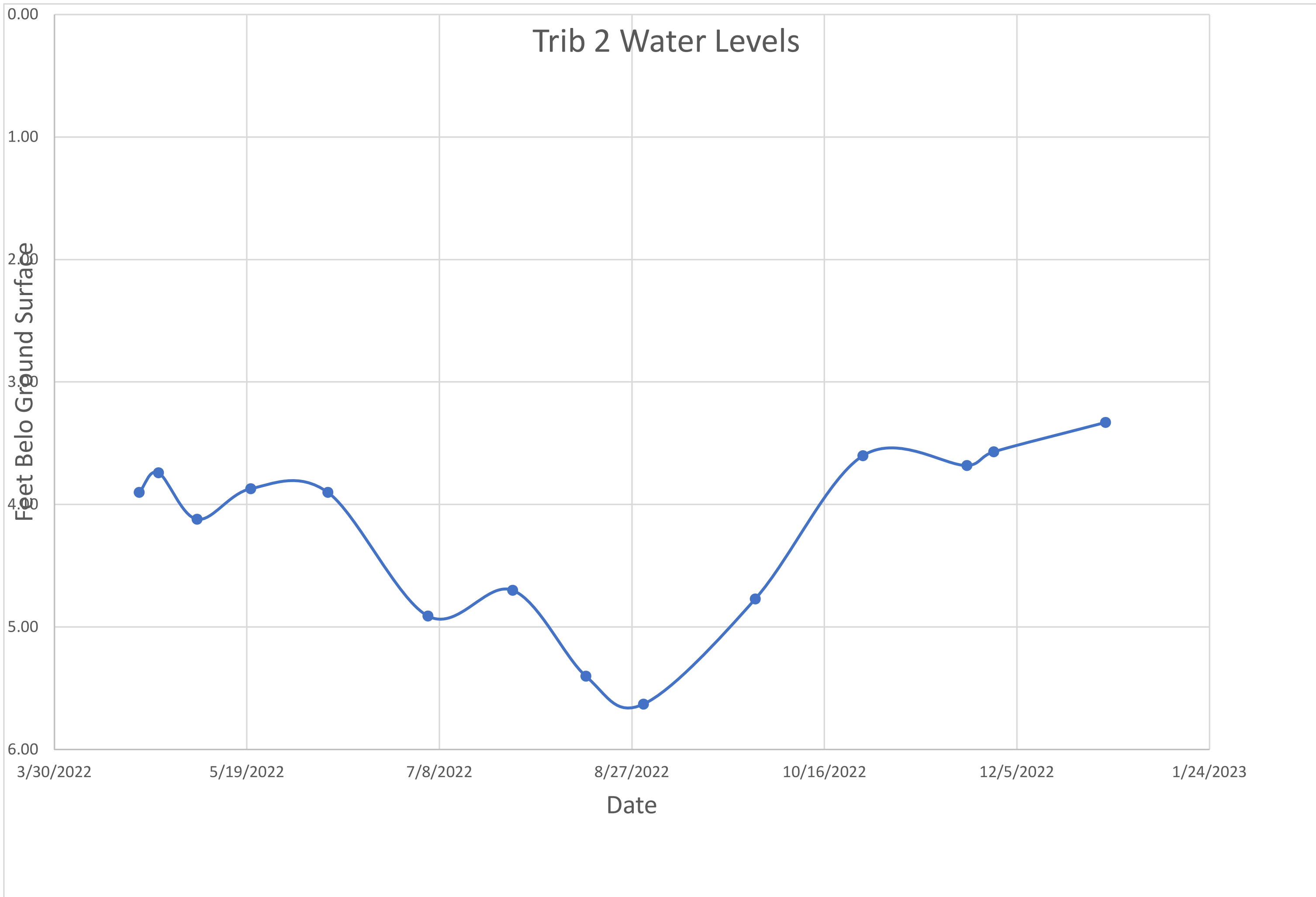
APPENDIX B



Trib 1 Water Levels
0.00
0.50
1.00
1.50
2.00
2.50
3.00
3.50
4.00
4.50
Feet Below Ground Surface
3/30/2022
5/19/2022
7/8/2022
8/27/2022
10/16/2022
12/5/2022
1/24/2023
Date

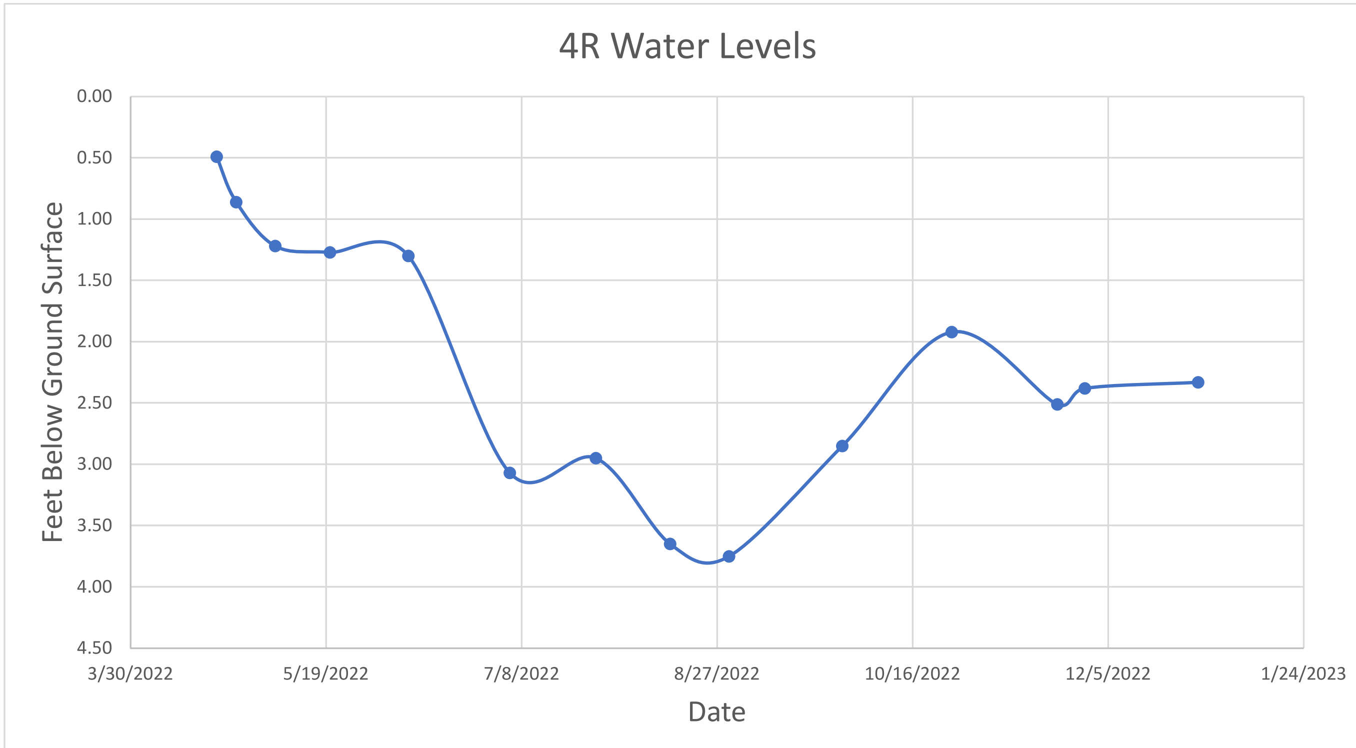

NKS 2 Water Levels
Feet Below Ground Surface
0.00
0.50
1.00
1.50
2.00
2.50
3.00
3.50
4.00
4.50
5.00
3/30/2022
5/19/2022
7/8/2022
8/27/2022
10/16/2022
12/5/2022
1/24/2023
Date

APPENDIX B



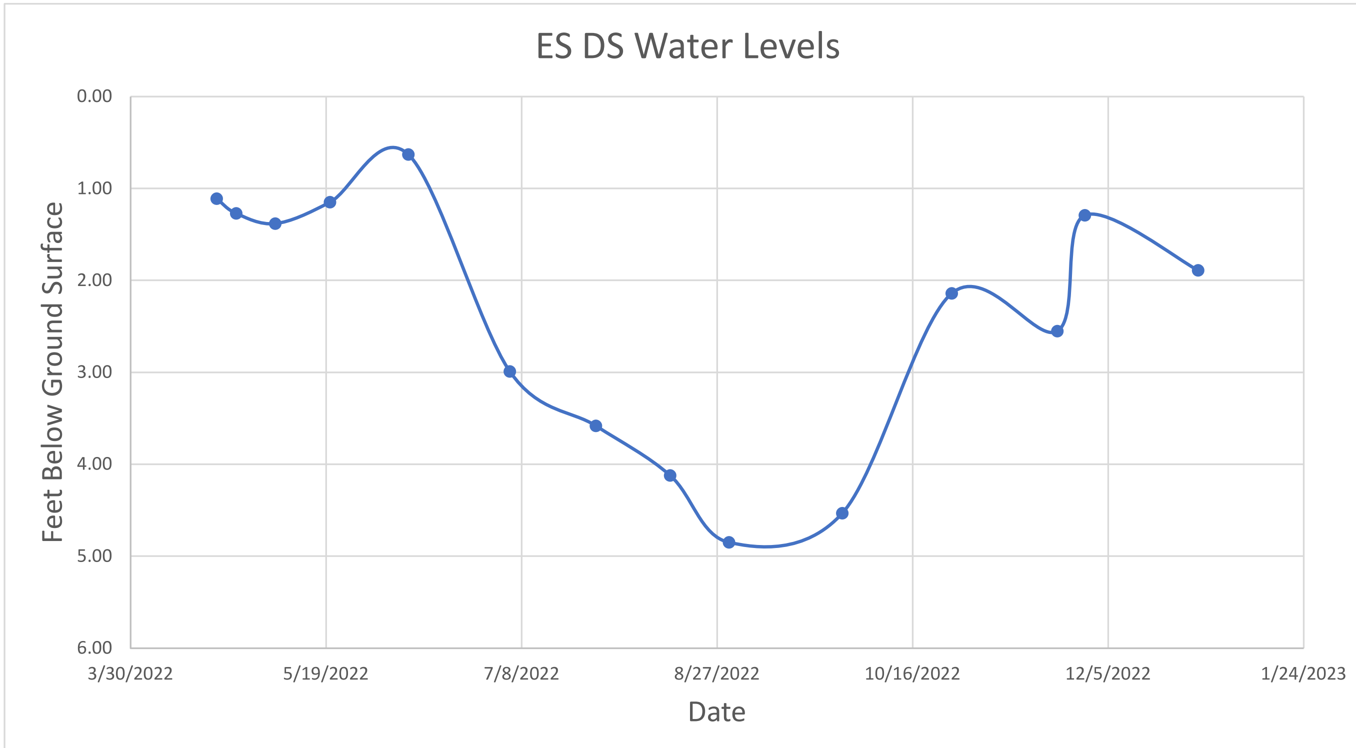
Trib 2 Water Levels
0.00
1.00
2.00
3.00
4.00
5.00
6.00
Feet Belo Ground Surface
3/30/2022
5/19/2022
7/8/2022
8/27/2022
10/16/2022
12/5/2022
1/24/2023
Date

APPENDIX B

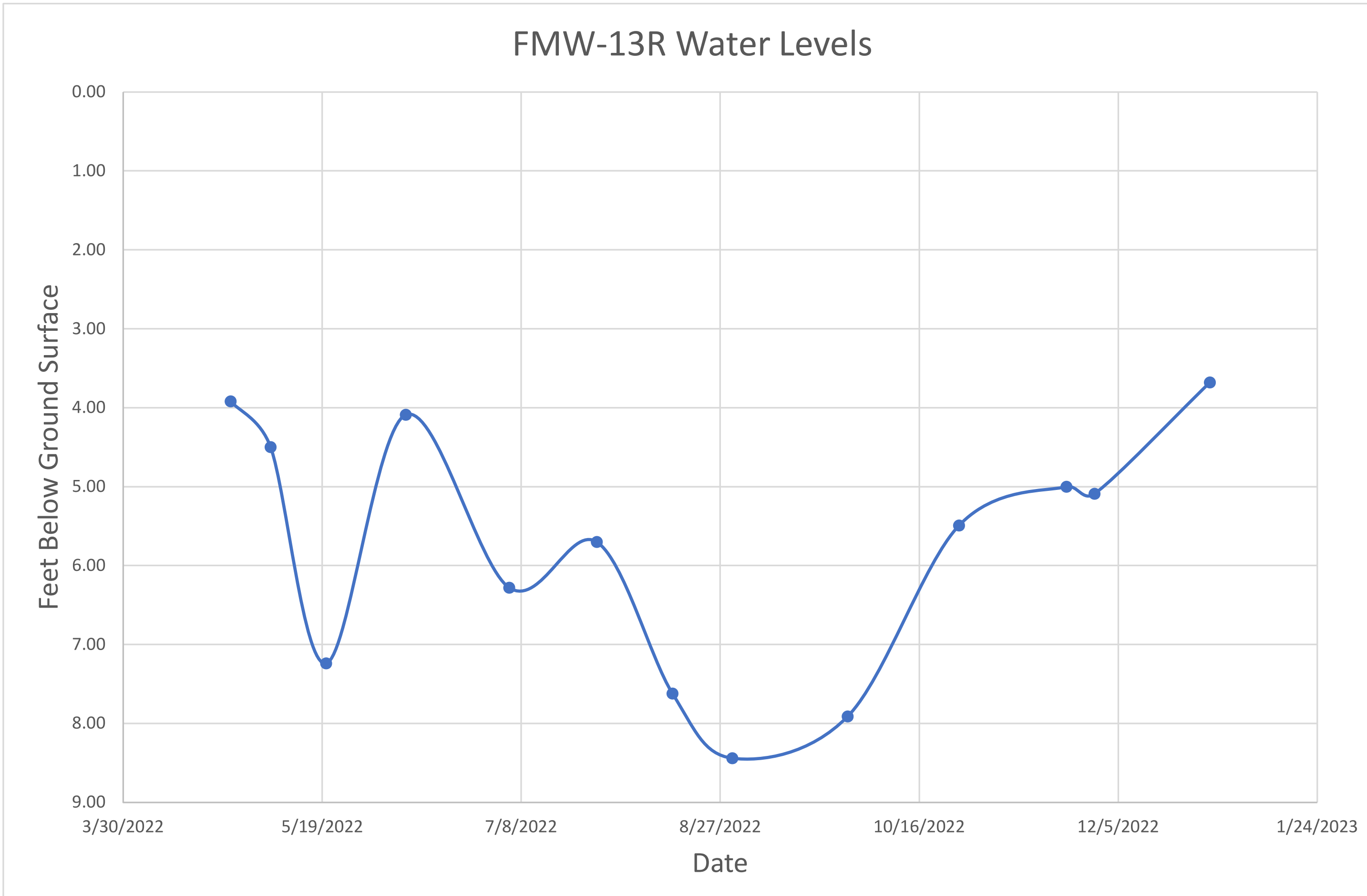


4R Water Levels
Feet Below Ground Surface
0.00
0.50
1.00
1.50
2.00
2.50
3.00
3.50
4.00
4.50
3/30/2022
5/19/2022
7/8/2022
8/27/2022
10/16/2022
12/5/2022
1/24/2023
Date

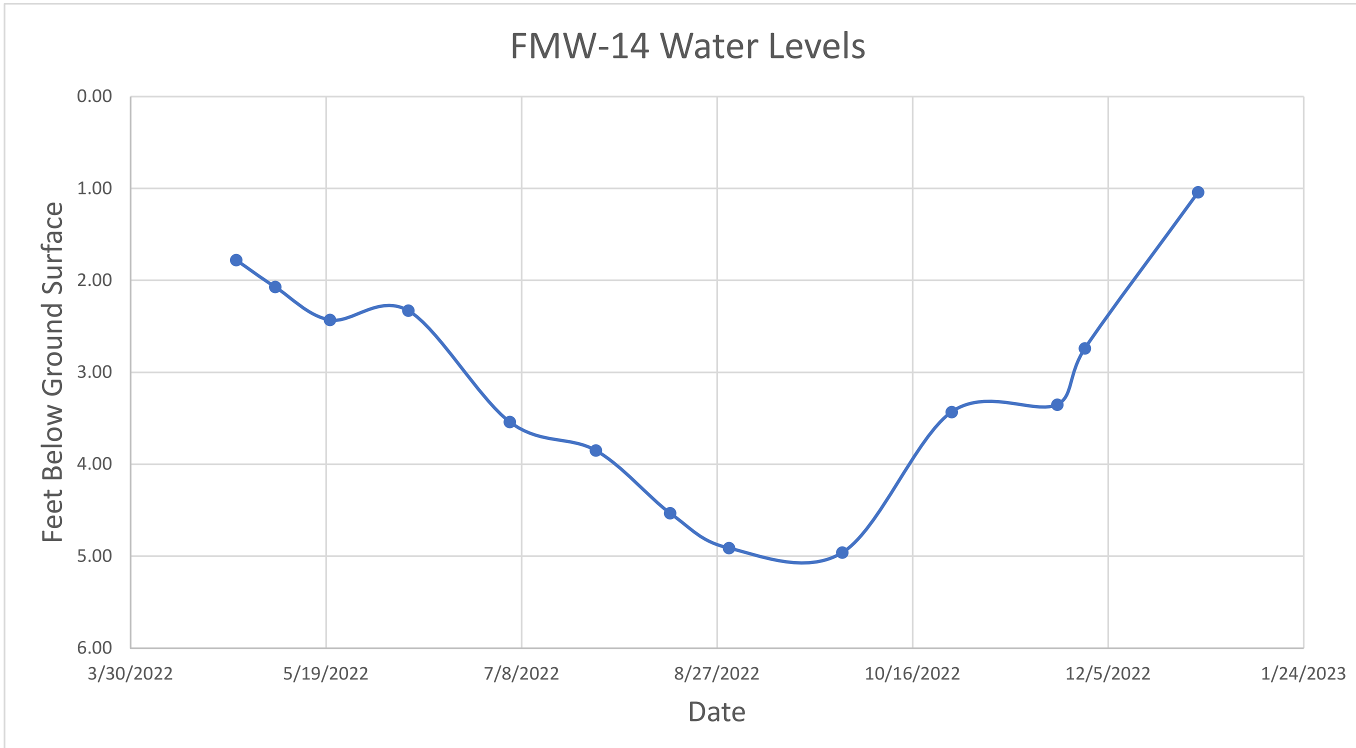
APPENDIX B


ES DS Water Levels
Feet Below Ground Surface
0.00
1.00
2.00
3.00
4.00
5.00
6.00
3/30/2022
5/19/2022
7/8/2022
8/27/2022
10/16/2022
12/5/2022
1/24/2023
Date

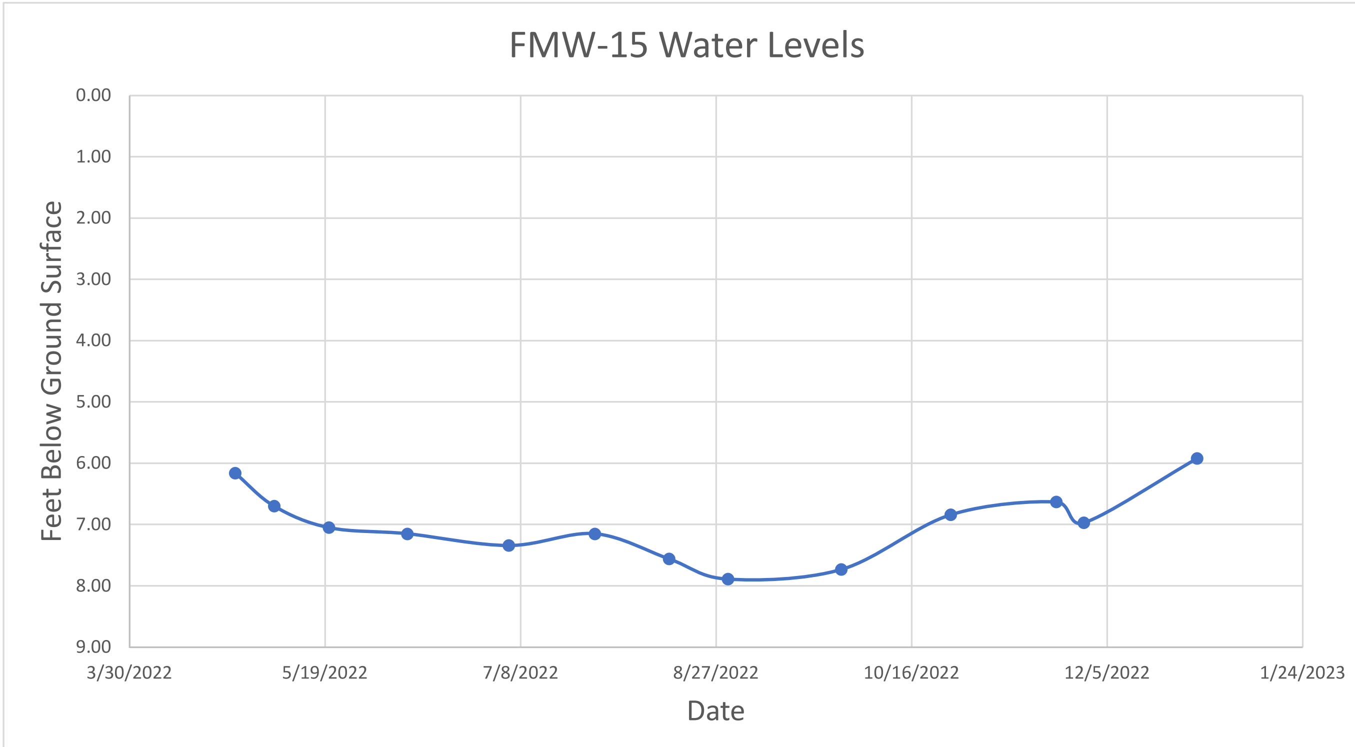
APPENDIX B



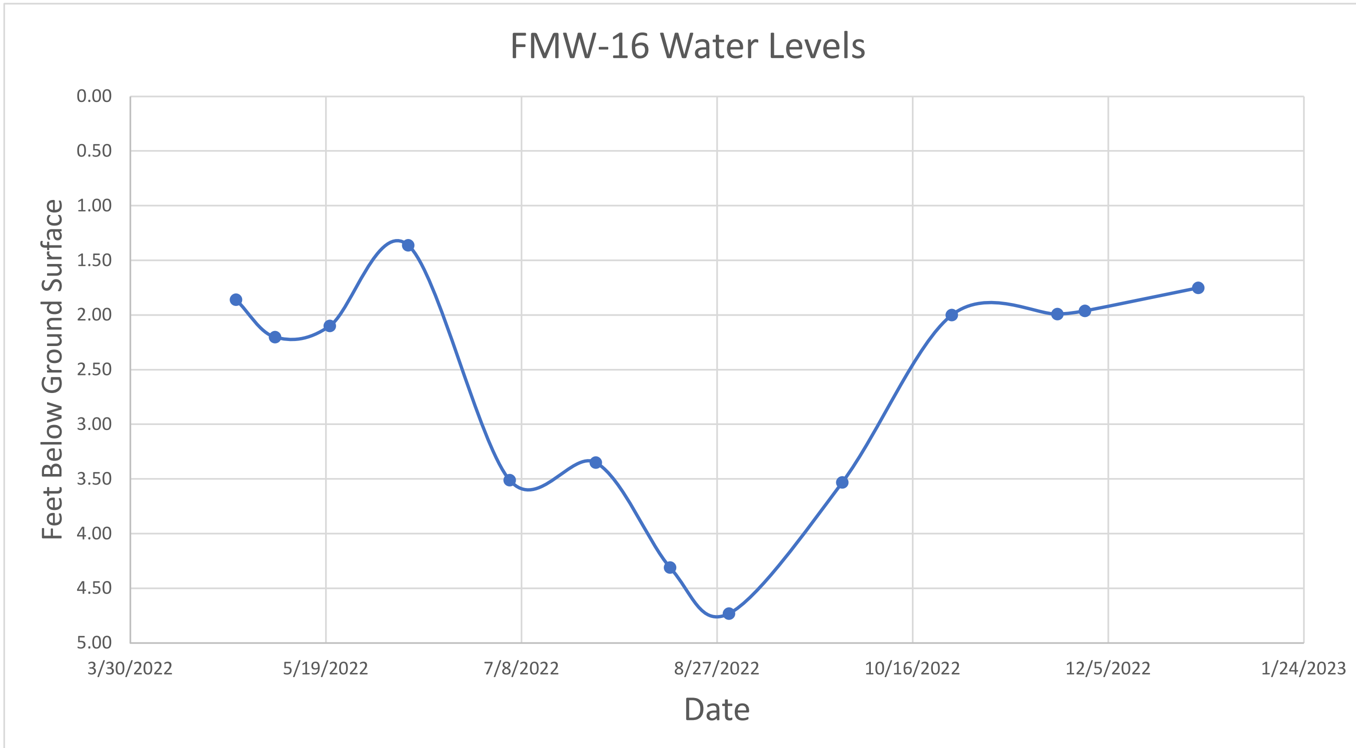
FMW-13R Water Levels
Feet Below Ground Surface
0.00
1.00
2.00
3.00
4.00
5.00
6.00
7.00
8.00
9.00
3/30/2022
5/19/2022
7/8/2022
8/27/2022
10/16/2022
12/5/2022
1/24/2023
Date


FMW-14 Water Levels
Feet Below Ground Surface
0.00
1.00
2.00
3.00
4.00
5.00
6.00
3/30/2022
5/19/2022
7/8/2022
8/27/2022
10/16/2022
12/5/2022
1/24/2023
Date

APPENDIX B



FMW-15 Water Levels
Feet Below Ground Surface
0.00
1.00
2.00
3.00
4.00
5.00
6.00
7.00
8.00
9.00
3/30/2022
5/19/2022
7/8/2022
8/27/2022
10/16/2022
12/5/2022
1/24/2023
Date


FMW-16 Water Levels
Feet Below Ground Surface
0.00
0.50
1.00
1.50
2.00
2.50
3.00
3.50
4.00
4.50
5.00
3/30/2022
5/19/2022
7/8/2022
8/27/2022
10/16/2022
12/5/2022
1/24/2023
Date

APPENDIX C

FluxTracer Flux Mapping Tool

FluxTracer® Results: Darcy Velocity, Mass Flux, and Contaminant Concentrations

January 5, 2023

TO: Dave Luer
First Environment
10 Park Place
Building 1A, Suite 504
Butler, NJ 07405

FROM: Joshua Moreno, REGENESIS
Glenn Iosue, REGENESIS

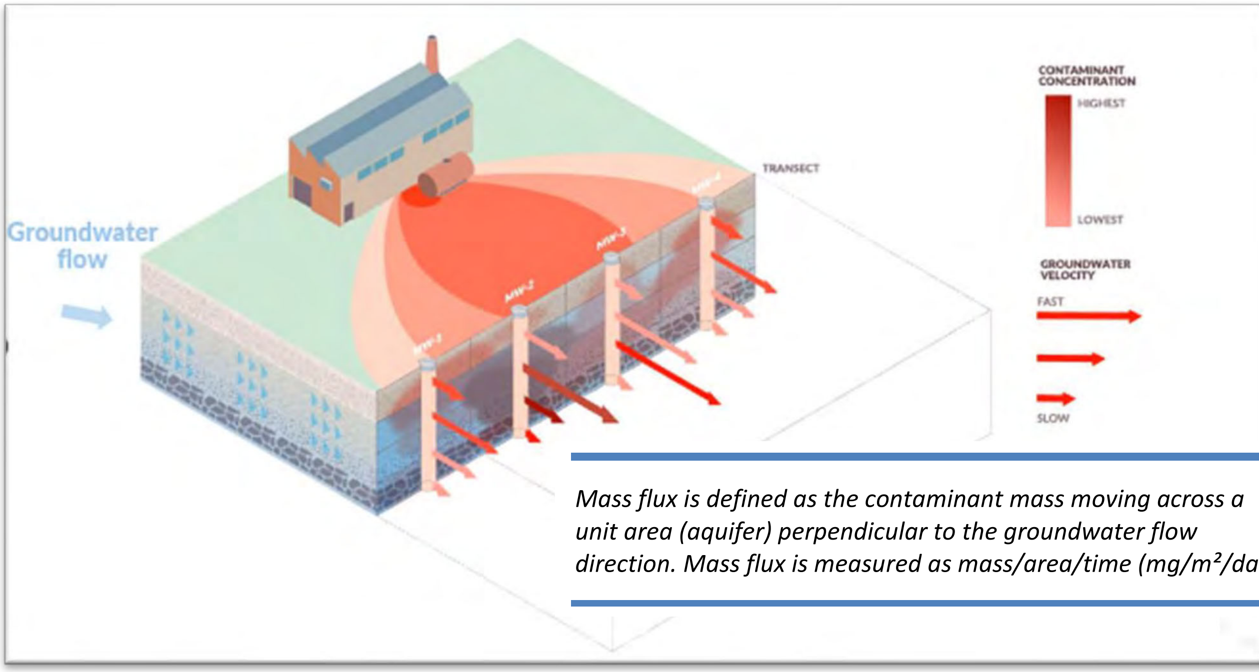
RE: Flux Tracer Results for Dave, Westchester County Airport Site

Scope of Work

FluxTracer® testing was conducted to assess groundwater velocity and contaminant mass flux within existing monitoring wells to aid in site characterization and remedial designs. REGENESIS received 1 set of 10' passive flux meter device from First Environment and performed FluxTracer analysis to determine Darcy flux, mass flux, and flux derived contaminant concentration. The quantitative FluxTracer test measures the amount of alcohol tracers that desorbed from the activated carbon due to groundwater passively flowing through the cylinder cannisters. Concurrently, contaminants present in the plume will adsorb to a sorptive media ideally suited for PFAS during the deployed period after which will be extracted from the adsorbent to quantify mass flux and flux derived contaminant concentration.

1011 Calle Sombra • San Clemente, CA 92673 • Tel: 949.366.8000 • www.regenesis.com

What is Mass Flux?



Mass flux is defined as the contaminant mass moving across a unit area (aquifer) perpendicular to the groundwater flow direction. Mass flux is measured as mass/area/time (mg/m²/day).

Conceptual site modeling overlaying hydraulic conductivity, groundwater velocity, and contaminant concentrations.

Mass flux refers to the movement of contaminant mass from one location to another, measured in units of mass per unit of time and area. Contaminant mass flux data is used in environmental remediation to identify the pathways through which contaminants are moving through the aquifer. This can involve the use of monitoring wells and various technologies to collect data on the flow of water and contaminants through the soil and rock formations. This information can help determine the locations of plumes and the direction of contaminant movement which is important for identifying the sources of contamination and designing remediation strategies.

Contaminant mass flux data can also be used to assess the potential risks to human and ecosystem health. By understanding the rate at which contaminants are moving through the groundwater and the concentrations at which they are present, it is possible to evaluate the potential impacts of environmental hazards on human and ecological receptors. Mass flux data can be used to prioritize remediation efforts and to develop risk management plans. For example, the use of permeable reactive barriers or in-situ bioremediation techniques may be more effective in certain locations based on contaminant mass flux data (ITRC, 2010). Contaminant mass flux data is an important tool in environmental remediation as it helps to understand and predict the movement of contaminants in the environment, assess potential risks to human and ecosystem, and design effective remediation strategies.

ITRC. (2010). Use and Measurement of Mass Flux and Mass Discharge. www.itrcweb.org.

Results

Table 1. MW-13R Darcy velocity and contaminant mass flux data

Mass Flux (ug/m²/day)	Well Interval - Depth Below Top of Well Casing (ft)				
	8 9	10 11	12 13	14 15	16 17
Darcy velocity (cm/day)	**4.5**	**4.0**	**3.4**	**2.4**	**2.6**
PFBA	10	7	32	7	8
PFPeA	40	28	140	24	27
PFHxA	17	9	56	9	9
PFHpA	7	4	23	5	5
PFOA	3	1	11	2	2
PFNA	1	0	5	1	1
6:2 FTS	10	4	34	6	6
PFBS	1	ND	3	1	ND
PFHxS	11	4	46	8	9
PFHpS	ND	ND	ND	ND	ND
PFOS	7	3	35	7	8
PFDA	ND	ND	ND	ND	ND
PFUnA	1	ND	ND	1	ND
PFDoA	ND	ND	ND	1	1
PFTrDA	ND	ND	ND	ND	ND
PFPeS	6	2	14	3	4
PFECHS	ND	ND	ND	ND	ND
5:3 FTA	ND	ND	1	ND	ND
FBSA	ND	ND	2	ND	ND
FHxSA	2	1	6	1	1
8Cl-PFOS	ND	ND	ND	ND	ND

Table 2. MW-13R Flux-derived concentrations

Concentration (ng/L)	Well Interval - Depth Below Top of Well Casing (ft)				
	8 9	10 11	12 13	14 15	16 17
PFBA	222	175	941	292	308
PFPeA	889	700	4,118	1,000	1,039
PFHxA	378	225	1,647	375	346
PFHpA	156	100	677	208	192
PFOA	67	25	324	83	77
PFNA	22	0	147	42	39
6:2 FTS	222	100	1,000	250	231
PFBS	22	N/A	88	42	N/A
PFHxS	244	100	1,353	333	346
PFHpS	N/A	N/A	N/A	N/A	N/A
PFOS	156	75	1,029	292	308
PFDA	N/A	N/A	N/A	N/A	N/A
PFUnA	22	N/A	N/A	42	N/A
PFDoA	N/A	N/A	N/A	42	39
PFTrDA	N/A	N/A	N/A	N/A	N/A
PFPeS	133	50	412	125	154
PFECHS	N/A	N/A	N/A	N/A	N/A
5:3 FTA	N/A	N/A	29	N/A	N/A
FBSA	N/A	N/A	59	N/A	N/A
FHxSA	44	25	177	42	39
8Cl-PFOS	N/A	N/A	N/A	N/A	N/A

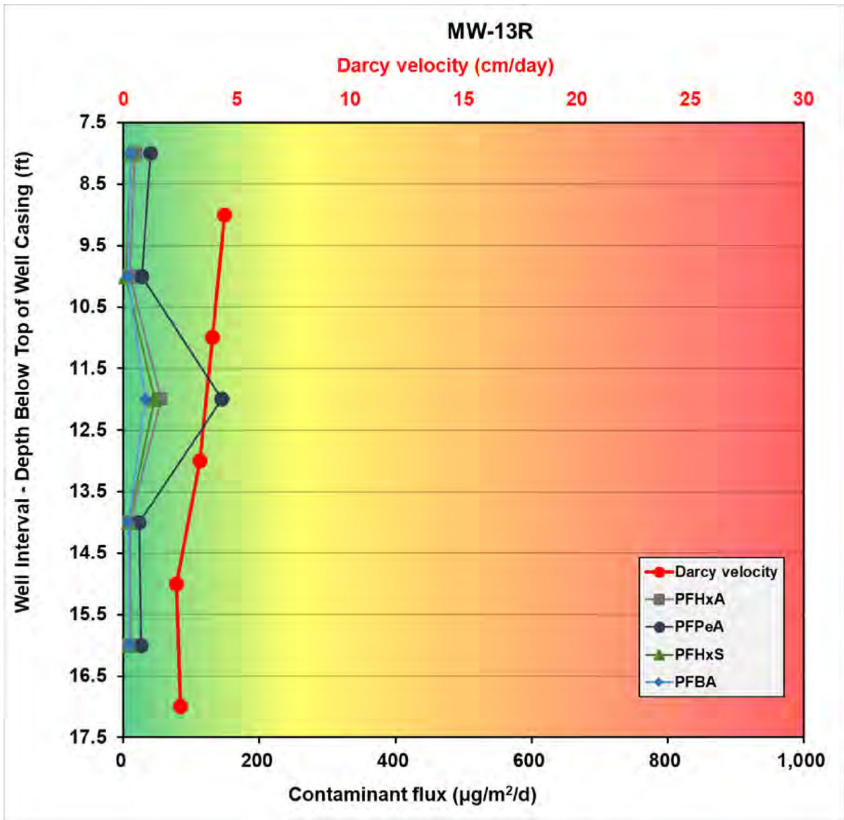


Figure 1. MW-13R Contaminant flux (µg/m^2/d), Darcy velocity, and depth below casing.

Data Validation:

Data validation was performed by comparing FluxTracer mass flux to its corresponding field estimated mass flux (Table 3). The purpose of this study is to validate FluxTracer data as it compares to field estimated data. The validated FluxTracer data shows that the difference between FluxTracer derived data and its corresponding field estimates are approximately within an order of magnitude which confirms the accuracy of the technology behind FluxTracer devices.

Table 3. York Analytical PFAS concentration in groundwater (ng/L) and the corresponding estimated mass flux derived from groundwater concentration and groundwater velocity (µg/m²/day).

	FMW-13R Top			FMW-13R Bottom		
PFAS Compounds	Groundwater Concentration (York Analytical) (ng/L)	Derived Mass Flux µg/m²/d	Darcy Velocity cm/d	Groundwater Concentration (York Analytical) (ng/L)	Derived Mass Flux µg/m²/d	Darcy Velocity cm/d
1H,1H,2H,2H-Perfluorodecanesulfonic acid (8:2 FTS)	2.750	0.117	4.25	3.250	0.081	2.50
1H,1H,2H,2H-Perfluorooctanesulfonic acid (6:2 FTS)	404	17.170	4.25	463	11.575	2.50
N-EtFOSAA	ND	ND	4.25	ND	ND	2.50
N-MeFOSAA	ND	ND	4.25	ND	ND	2.50
Perfluoro-1-decanesulfonic acid (PFDS)	ND	ND	4.25	ND	ND	2.50
Perfluoro-1-heptanesulfonic acid (PFHpS)	25.4	1.080	4.25	71.1	1.778	2.50
Perfluoro-1-octanesulfonamide (FOSA)	ND	ND	4.25	1.920	0.048	2.50
Perfluorobutanesulfonic acid (PFBS)	57.2	2.431	4.25	68.8	1.720	2.50
Perfluorodecanoic acid (PFDA)	ND	ND	4.25	2.980	0.075	2.50
Perfluorododecanoic acid (PFDoA)	ND	ND	4.25	ND	ND	2.50
Perfluoroheptanoic acid (PFHpA)	458	19.465	4.25	527	13.175	2.50
Perfluorohexanesulfonic acid (PFHxS)	785	33.363	4.25	2,360	59.000	2.50
Perfluorohexanoic acid (PFHxA)	891	37.868	4.25	822	20.550	2.50
Perfluoro-n-butanoic acid (PFBA)	433	18.403	4.25	405	10.125	2.50
Perfluorononanoic acid (PFNA)	87	3.693	4.25	148	3.700	2.50
Perfluorooctanesulfonic acid (PFOS)	823	34.978	4.25	2,240	56.000	2.50
Perfluorooctanoic acid (PFOA)	172	7.310	4.25	224	5.600	2.50
Perfluoropentanoic acid (PFPeA)	1,760	74.800	4.25	1,790	44.750	2.50
Perfluorotetradecanoic acid (PFTA)	ND	ND	4.25	ND	ND	2.50
Perfluorotridecanoic acid (PFTrDA)	ND	ND	4.25	ND	ND	2.50
Perfluoroundecanoic acid (PFUnA)	ND	ND	4.25	ND	ND	2.50

Interpretation of Results:

The PFAS FluxTracer test provides contaminant flux and Darcy velocity, alternating between each measurement type in 1-foot intervals. Contaminant flux and Darcy velocity are then used to estimate contaminant concentrations in the groundwater for comparisons sake.

Under these test conditions, the Darcy velocity of the groundwater passing through the well can be interpreted as follows shown below. We are currently developing guidance on PFAS mass flux interpretations, but tentatively this site is in the low range.

Indicator	Qualitative Interpretation	Darcy Velocity (cm/day)	*Seepage Rate (ft/yr)
Green to Yellow	Low	<2 - 5	<96 - 240
Yellow to Orange	Medium	5 - 15	240 - 719
Orange to Red	High	15- >30	719 - 1437

*Seepage rate assumes a 0.25 porosity

Flux derived concentration is derived using the following equation:

$$GW\ conventration\ (ng/L) = \frac{Mass\ flux\ (\mu g/m^2/d)}{Darcy(cm/d)*10} * 1000$$

A non-applicable (N/A) is applied to the intervals where either the Darcy velocity, contaminant of concern, or both is less than the reporting limit.

A value of ND <X indicates that the analyte of concern is NOT detected above the method detection limit (MDL) or the method reporting limit (MRL).

A J-value indicates that the analyte of concern was detected and that the analyte concentration is an estimated value which is between the method detection limit (MDL) and the method reporting limit (MRL).

Description of Experimental Methods

A batch reactor is filled with 10 grams of sample from each 1-foot interval and is extracted for alcohol tracers followed by extraction of chlorinated volatile organic solvents (CVOCs) using of isobutanol and acetone-hexane, respectively. Batch reactors are then placed on a shaker for 24 hours. A 1 ml extract from each batch reactor is transferred to a liquid gas chromatography vial and each sample is analyzed by a GC-FID for alcohol tracers and GC-MS for CVOCs. Mass flux is determined by quantitatively extracting off and analyzing the captured PFAS from the specialized media and combining with data on the device dimensions and length of time it was deployed.

APPENDIX D

APPENDIX D
Site Photos

Permeable Fabric Installation

Photo 1 – 7016.1 Area of installation prior to excavation.

Photo 2 – 7016.1 Post excavation and contouring

APPENDIX D
Site Photos

Permeable Fabric Installation

Photo 3 – 7016.1 Fabric Placement

Photo 4 – 7016.1 Post installation with gravel cover, erosion control and traffic control.

APPENDIX D
Site Photos

Permeable Fabric Installation

Photo 5 – 7014.2 Area of installation prior to excavation.

Photo 6 – 7014.2 Post excavation and contouring

APPENDIX D
Site Photos

Permeable Fabric Installation

Photo 7 – 7014.2 Fabric Placement

Photo 8 – 7014.2 Post installation with gravel cover and erosion control, part I.

APPENDIX D
Site Photos

Permeable Fabric Installation

Photo 9 – 7014.2 Post installation with gravel cover and erosion control, part II.