Former Crown Vantage Facilities

Groundwater Monitoring Report

Cooper Township & Parchment, MI

January 3, 2024

Groundwater Monitoring Report

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1 Introduction

Arcadis of Michigan, LLC (Arcadis) has prepared this Groundwater Monitoring Report (GWMR) in accordance with the March 24, 2023 Groundwater Monitoring Work Plan submitted by Tetra Tech, Inc. on behalf of Georgia-Pacific, LLC (GP), to the Michigan Department of Environment, Great Lakes, and Energy (EGLE). This GWMR summarizes monitoring events conducted in 2023 at the Former Crown Vantage Facilities (Site) and areas within Cooper Township and Parchment, collectively referred to as the Study Area.

The groundwater monitoring event was conducted from July 26 through August 3, 2023. During the event, Arcadis measured static water levels and collected groundwater samples from monitoring wells within the Study Area. The samples were analyzed for EGLE's Per- and Polyfluoroalkyl Substances (PFAS) Minimum Laboratory Analyte List of 28 Compounds.

The State of Michigan promulgated rules that established Maximum Contaminant Levels (MCLs) for seven PFAS including PFOA and PFOS. EGLE updated the Michigan Part 201 Groundwater Criteria on October 23, 2023. The Residential Drinking Water (RDW) and Nonresidential Drinking Water (NDW) cleanup criteria default to those MCLs. The new Part 201 Generic Cleanup Criteria and Screening Levels for Residential and Nonresidential Groundwater also include new and updated Groundwater Surface Water Interface (GSI) criteria. These new GSI criteria are summarized in the table below. The PFAS RDW and NDW cleanup criteria are the same for all regulated compounds, and because the Kalamazoo River downstream of the Parchment site is not used for drinking water, only the "non-drinking water" values are presented for GSI. NA means that no standard has been established for a particular compound and pathway.

PFAS Compound	Abbrev.	Drinking Water	GSI
Perfluorobutane sulfonic acid	PFBS	0.42 (A)	670 (X)
Perfluorohexane sulfonic acid	PFHxS	0.051 (A)	0.21 (X)
Perfluorohexanoic acid	PFHxA	400 (A)	NA
Perfluorononanoic acid	PFNA	0.006 (A)	0.03 (X)
Perfluorooctanoic acid (DD)	PFOA	0.008 (A)	0.17 (X)
Perfluorooctane sulfonic acid (DD)	PFOS	0.016 (A)	0.012 (X)
Hexafluoropropylene oxide dimer acid	HFPO-DA	0.37 (A)	NA

Notes:

(A) -Criterion is the state of Michigan drinking water standard established pursuant to Section 5 of 1976 PA 399, MCL 325.1005.

(X) -Value not protective of surface water used as drinking water source

(DD) -Hazardous substance causes developmental effects. Residential direct contact criteria are protective of both prenatal and postnatal exposure. Nonresidential direct contact criteria are protective for a pregnant adult receptor.

NA – Not applicable

Concentrations are in micrograms per liter (µg/L).

The results and findings of this groundwater sampling event, as well as previous groundwater sampling events and investigations are being used to develop a more complete understanding of the PFAS impacts at the Site and

within the Study Area, assess delineation of impacts, and to evaluate temporal variations of PFAS in the groundwater and surface water.

1.1 Study Area Location

The Site/Study Area, shown in **Figure 1** and **Figure 2**, is located in Cooper Township and the City of Parchment in southwestern Michigan. The Study Area is adjacent to and immediately east of the Kalamazoo River, which flows to the north at this location. Residential, commercial, and industrial properties are present in the Study Area. The Site, which includes four Areas of Interest (AOIs), covers an approximate 203-acre area, and is made up of properties where former paper production took place (AOI 1 and AOI 2), associated landfills (AOI 3) and wastewater treatment facilities (AOI 4). Some commercial development has taken place on the Former Mill 1 property (AOI 1) and more recently on the northwest portion of the Former Mill 2 property (AOI 2).

2 Summary of Groundwater Monitoring Activities

This section details the groundwater monitoring activities completed as part of this event. All groundwater gauging and sampling activities were conducted in accordance with Tetra Tech's March 24, 2023 Groundwater Monitoring Work Plan (Tetra Tech, 2023). However, slight variations from the plan occurred due to wells AOI2MW19355C and PMMW-7 having been destroyed during construction activities in AOI 2. Additionally, MW1912A, AOI1MW19367A, and MW1914A were inaccessible due to complications with the access agreement and locating monitoring wells. No water level measurements or groundwater samples were collected from the aforementioned monitoring wells. Gauging and sampling activities are summarized below, and sample locations are provided in **Figure 2**. Interpretations of groundwater flow direction, the vertical and horizontal groundwater gradients, and the laboratory analytical results and related discussions are presented in **Section 3.0**.

2.1 Monitoring Well Gauging

During the groundwater monitoring events, static water level measurements were collected on July 26 and 27, 2023. All accessible locations were gauged within a 24-hour period. The static water levels were measured to the nearest tenth of an inch, with an electronic water level indicator (WLI), from the top-of-casing at each location. The WLI was decontaminated using Alconox detergent and distilled water between each location.

2.2 Groundwater Sampling

Groundwater samples were collected using minimal drawdown/low-flow techniques (low flow), which utilized a peristaltic pump (for shallow, unconfined aquifer wells), or a bladder pump (for deep, confined/semi-confined aquifer wells). In both cases, disposable, high-density polyethylene (HDPE) tubing was used.

Field water quality parameters were monitored during sample collection in accordance with industry standard low-flow procedures. A multi-parameter water quality meter and flow cell (YSI ProPlus) was used to monitor the temperature, pH, specific conductance, oxidation reduction potential (ORP), dissolved oxygen (DO), and turbidity of the groundwater purged from each monitoring well during sampling. The water quality parameters for each sample location were recorded every three to five minutes while the water in the monitoring wells stabilized,

allowing for hydraulic connectivity between the monitoring well screen and the aquifer. The groundwater quality parameters at the time of sample collection are presented in table format in **Table 1** and are summarized below:

- Temperature ranged from 12.2º Celsius (C) to 20º C;
- pH ranged from 6.6 to 7.92;
- Specific Conductance ranged from 0.32 microSiemens per centimeter (mS/cm) to 5.57 mS/cm;
- Redox potential ranged from -181.2 millivolts (mV) to 95.7 mV;
- DO ranged from 0.01 milligrams per liter (mg/l) to 7.2 mg/l; and
- Typical turbidity ranged from 0.35 Nephelometric Turbidity Unit (NTU) to 171 NTU; however, LFMW-8 had a turbidity of 455 NTU after low-flow purging for 2 hours.

Groundwater samples were collected directly into laboratory-prepared, pre-labeled, HDPE sample containers. Following sample collection, the sample containers were immediately placed on ice in coolers. Samples were submitted and shipped to Eurofins Lancaster Laboratories Environment Testing in Lancaster, Pennsylvania, (Eurofins) under proper chain-of-custody documentation. The analytes and method of analysis are summarized below:

- EGLE's 28 PFAS compounds minimum analyte list by United States Environmental Protection Agency (USEPA) Modified Environmental Protection Agency (EPA) Method 537 with isotopic dilution.

2.3 Quality Assurance/Quality Control (QA/QC) Samples

QA/QC samples were collected to verify that PFAS contamination was not introduced to the groundwater samples from the collection equipment or water used for equipment decontamination. QA/QC samples are also essential to assess the accuracy and reliability of the analytical results.

QA/QC sample collection methodology is provided below:

- Equipment blank samples were collected at a rate of at least one equipment blank sample per ten samples. Unused disposable equipment was used at the equipment blank sample location. Laboratory-provided reagent-free water was run through an unused length of tubing. The rinsate was collected into laboratory-supplied containers.
- Laboratory blind field duplicate samples (DUPs) were collected at a rate of at least one duplicate sample per ten samples.
- Duplicate samples were collected from the following monitoring well locations:
    - MW1809C
    - MW1809A
    - LFMW-4
    - AOIMW19310C
- Matrix Spike and Matrix Spike Duplicate (MS/MSD) samples were collected at a rate of at least one MS/MSD sample per twenty samples.

The Level II data package from Eurofins includes the QA/QC sample results and is provided in **Appendix A**.

3 Results

Hydrogeologic results for groundwater flow direction and vertical hydraulic gradients are included in this section, along with a discussion of the laboratory analytical results.

3.1 Hydrogeology

During this sampling event, water levels ranged from 1.1 feet to 62.67 feet below ground surface (bgs) (**Table 2**). These groundwater elevations were used to create groundwater elevation maps for the unconfined and semi-confined aquifers. The groundwater elevation maps for the unconfined and semi-confined aquifers are presented on **Figure 3** and **Figure 4**, respectively. The groundwater flow direction in both aquifers is generally to the west-northwest, towards the Kalamazoo River.

The horizontal groundwater gradient of the unconfined aquifer in July 2023 was approximately 0.009 feet/feet (ft/ft) in the eastern wells (MW1808A – MW1804A) and 0.003 ft/ft in the western wells (MW1920A – MW1911A). The horizontal groundwater gradient of the semi-confined aquifer in July 2023 was approximately 0.004 ft/ft, calculated between MW1807A and MW1917A.

An upward vertical hydraulic gradient was observed in paired wells MW1911A and MW1911B, 0.0047 ft/ft. A downward vertical gradient was observed in paired wells AOI3MW19310A and AOI3MW19310C (-0.03 ft/ft) and in the AOI3MW19311A-B-C well cluster (-0.0013 ft/ft between A and B wells and -0.014 ft/ft between the A and C wells).

3.2 Lab Analytical Results

The laboratory analytical results are presented in **Table 3**. The groundwater PFOA and PFOS analytical results are compared to the applicable EGLE Part 201 and Rule 57 Criteria. The laboratory analytical report is included in **Appendix A**.

4 Summary and Conclusions

PFOA and PFOS compounds in groundwater were again detected in the Study Area, within the unconfined, semi-confined and confined aquifers, at levels greater than Part 201 and Rule 57 Criteria.

Two eastern monitoring wells, MW1805A and MW1808A, detected concentrations of PFOA above the RDW cleanup criterion of 8 nanograms per liter (ng/L). These wells are located hydraulically upgradient of the Site and not in an area where impacted groundwater was used in the public water distribution system. Furthermore, the PFAS signature is different in the eastern wells compared to the wells downgradient of the former landfill. Other wells along the eastern boundary of the Study Area (MW1913A, MW1806A, and MW1807A) detected concentrations of PFOA and PFOS below the laboratory reporting limit and/or below Part 201 Criteria. The northern delineation of PFOA and PFOS is indicated by the non-detect results at MW1918A, MW1801A, MW1802A, and MW1803A.

The objective of this Groundwater Monitoring event was to evaluate the temporal variations of PFAS in groundwater at the Site. Concentrations of PFOA and PFOS have remained consistent during the Interim

Groundwater Monitoring Program and do not vary significantly from initial sampling events during implementation of the Hydrogeologic Study (Tetra Tech, 2019). In locations where concentrations decreased or increased over time, additional samples would be required to determine if these trends are significant or attributed to seasonal influences or other factors. A review of the analytical results for the groundwater samples collected during the 2023 groundwater monitoring event shows that the extent of PFOA and PFOS is generally delineated to the EGLE Part 201 Criteria.

4.1 Sampling Frequency in 2024

Based on the results in 2023 and previous sampling, trends were reviewed to determine a frequency to sample monitoring wells. The sample frequency rationale is presented in **Table 4**.

5 References

Tetra Tech (2019, May) Hydrogeologic Investigation Report, Parchment, Michigan.

Tetra Tech (2019, June) Site Investigation Work Plan, Former Crown Vantage Facilities.

Tetra Tech (2023, March) Groundwater Monitoring Work Plan, Former Crown Vantage Facilities.

Tables

Table 1
Groundwater Quality Parameters
Former Crown Vantage Facilities
Cooper Township Parchment, MI

Well Location	Date	Volume Purged (Liters)	DTW (feet)	Temperature (Celsius)	pH	Specific Conductance (mS/cm)	Redox Potential (mV)	DO (mg/L)	Turbidity (NTU)
MW1806A	7/31/2023	4.5	49.37	14.4	7.35	0.832	56.2	5.66	16.7
MW1806B	7/31/2023	6	49.56	16.5	7.42	0.634	6.3	1.15	43.7
MW1806C	7/31/2023	5.5	40.57	15.2	7.73	0.4842	-149.8	0.44	171
MW1807A	8/2/2023	5.5	55.5	17.4	7.5	0.679	-143.8	0.38	10.2
MW1808A	7/31/2023	6	39.03	15.2	7.28	1.001	78.7	6.99	9.69
MW1809A	8/2/2023	5	21.18	13.9	7.5	0.644	41.6	5.02	5.64
MW1809C	8/2/2023	4.5	12.96	14.4	7.58	0.615	-127.3	0.46	8.69
MW1810A	7/28/2023	3.5	9.27	15.2	7.33	0.838	50.6	5.03	12.6
MW1810B	7/28/2023	5.5	6.98	15.6	7.92	0.774	-181.2	0.52	9.35
MW1810C	7/28/2023	4	4.53	16	7.6	0.797	-113.8	0.39	9.95
MW1911A	8/1/2023	2.5	1.3	17.4	7.17	0.831	-103	0.29	8.78
MW1911B	8/1/2023	4	1.58	16.4	7.47	0.795	-133.8	0.25	6.69
MW1911C	8/1/2023	5	1.36	16.1	7.6	5.57	-83.7	0.3	9.05
MW1913A	7/31/2023	9	50.44	15.7	7.29	0.717	95.7	7.06	8.23
MW1916A	8/1/2023	6	1.92	15.8	7.38	1.048	-119.3	0.34	6.87
MW1917A	8/1/2023	4.5	1.1	14.4	7.24	0.986	24.3	0.29	9.52
MW1918A	7/27/2023	4	1.6	16.2	7.5	0.4289	44.6	0.31	9.19
MW1919A	8/2/2023	4.5	29.58	18.6	7.33	0.999	42.5	6.04	19.2
MW1920A	7/28/2023	2.5	8.81	14.8	7.39	0.665	53.4	3.62	8.31
MW1921A	7/27/2023	4	2.28	16.1	7.37	0.779	-17.5	1.2	11
MW1921C	7/27/2023	2.5	3.63	17	7.49	0.3759	-7.7	0.35	3.58
AOI1MW19368A	8/1/2023	5.5	16.52	14.8	7.31	1.005	46	6.19	9.61
LFMW-1	8/2/2023	6.8	7.82	12.2	6.81	1	-143.3	0.19	0.35
LFMW-4	8/2/2023	5.51	4.25	14.3	6.6	1.18	-140.2	0.3	5.99
LFMW-7E	8/2/2023	4.4	5.48	20	7.14	0.79	-106.4	0.24	22.9
LFMW-8	8/2/2023	14.6	3.59	15.3	7.12	0.528	-146.2	0.01	455
AOI3MW19310A	8/3/2023	6	8.93	15.5	6.68	1	-134.6	0.09	5.4
AOI3MW19310C	8/3/2023	6	8.09	16.2	6.96	1.11	-101.3	0.24	3.58
AOI3MW19311A	8/3/2023	3	10.51	18.6	7.32	0.869	-89.4	1.05	7.7
AOI3MW19311B	8/3/2023	5.5	10.08	16.4	7.3	0.908	14.6	0.21	0.8
AOI3MW19311C	8/3/2023	4.5	9.6	15.7	7.83	3.236	-180.1	0.23	8.77
AOI4MW20387A	8/3/2023	3.5	11.6	19.7	7.4	0.874	-124.9	0.47	6.58
AOI4MW20387C	8/3/2023	4.5	11.62	17.6	7.32	0.943	63.4	2.7	4.51

Notes:

DTW = Depth to Water

mS/cm = microSiemens per centimeter

mV = millivolts

mg/L = milligrams per liter

NTU = Nephelometric Turbidity Unit

Table 2
Groundwater Elevations
Former Crown Vantage Facilities
Cooper Township Parchment, MI

ARCADIS

Well Name	Soil Boring Name	Aquifer	Well Installation Date	Well Casing Diameter (inches)	Well Material	Northing (y)	Easting (x)	Ground Surface Elevation (ft amsl)	Top of Casing Elevation (ft amsl)	Well Depth (ft bgs)	Screen Length (ft)	Top of Screen (ft bgs)	Bottom of Screen (ft bgs)	Bottom of Screen Elevation (ft amsl)	Top of Screen Elevation (ft amsl)	7/26/2023 DTW Measurement (ft bgs)	7/26/2023 Groundwater Elevation (ft amsl)
MW1801A	SB1801A	U	11/30/18	2	PVC	312627.81	12801870.81	777.27	776.93	33	10	23	33	743.93	753.93	11.63	765.30
MW1802A	SB1802A	U	12/6/18	2	PVC	312991.59	12803249.14	772.40	772.05	22	10	12	22	750.05	760.05	4.25	767.80
MW1803A	SB1803A	U	12/3/18	2	PVC	311924.87	12803251.82	785.43	785.12	30	10	20	30	755.12	765.12	17.62	767.50
MW1804A	SB1804A	U	12/7/18	2	PVC	309858.57	12803469.42	838.95	838.60	80	10	70	80	758.60	768.60	62.61	775.99
MW1805A	SB1805A	U	11/29/18	2	PVC	308253.71	12803011.01	837.90	837.68	65	10	55	65	772.68	782.68	52.42	785.26
MW1806A	SB1806A	S	11/15/18	2	PVC	307591.48	12803015.64	839.95	839.56	63	10	53	63	776.56	786.56	49.34	790.22
MW1807A	SB1807A	S	11/13/18	2	PVC	307021.08	12802276.03	843.42	843.10	104	10	94	104	739.10	749.10	55.45	787.65
MW1808A	SB1808A	U	11/27/18	2	PVC	306050.62	12804487.58	852.40	852.02	80	10	70	80	772.02	782.02	38.99	813.03
MW1809A	SB1809A	U	12/11/18	2	PVC	308798.04	12801615.70	787.50	787.24	32	10	22	32	755.24	765.24	21.32	765.92
MW1810A	SB1810A	U	12/14/18	2	PVC	307290.75	12799907.06	773.20	772.89	20	10	10	20	752.89	762.89	9.50	763.39
MW1911A	SB1911A	U	3/4/19	2	PVC	309542.09	12797012.27	752.39	752.03	14	10	4	14	738.03	748.03	2.04	749.99
MW1911B	SB1911B	S	1/10/19	2	PVC	309542.24	12797006.64	752.39	751.94	48	10	38	48	703.94	713.94	2.11	749.83
MW1912A	SB1912A	S	2/28/19	2	PVC	308893.52	12796680.03	756.95	756.53	39	10	29	39	717.53	727.53	NM	NM
MW1913A	SB1913A	U	1/16/19	2	PVC	302924.68	12801152.35	846.78	846.34	61	10	51	61	785.34	795.34	50.41	795.93
MW1914A	SB19114A	U	1/14/19	2	PVC	301092.09	12797681.05	774.63	774.31	25	10	15	25	749.31	759.31	NM	NM
MW1915A	SB1915A	U	2/7/19	2	PVC	309599.55	12799898.20	775.40	774.89	30	10	20	30	744.89	754.89	NM	NM
MW1916A	SB1916A	S	1/17/19	2	PVC	310264.16	12797916.12	753.63	753.34	28	5	23	28	725.34	730.34	2.32	751.02
MW1917A	SB1917A	S	1/22/19	2	PVC	308005.59	12797900.66	756.58	756.24	32	10	22	32	724.24	734.24	1.10	755.14
MW1918A	SB1918A	U	2/5/19	2	PVC	311940.38	12799955.54	763.76	763.39	19	10	9	19	744.39	754.39	2.18	761.21
MW1919A	SB1919A	U	1/11/19	2	PVC	305687.33	12799504.61	800.98	800.60	50	10	40	50	750.60	760.60	29.57	771.03
MW1920A	SB1920A	U	1/23/19	2	PVC	308208.70	12800619.24	773.51	773.13	30	10	20	30	743.13	753.13	9.01	764.12
MW1921A	SB1921A	U	2/12/19	2	PVC	309569.70	12798609.18	757.17	757.00	20	10	10	20	737.00	747.00	2.83	754.17
AOI1MW19366A	AOI1SB19366A	U	9/12/19	2	PVC	301871.91	12797232.83	762.10	761.88	22	10	12	22	739.88	749.88	NM	NM
AOI1MW19367A	AOI1SB19367A	U	9/11/19	2	PVC	302062.57	12797321.16	764.02	763.91	18	10	8	18	745.91	755.91	NM	NM
AOI1MW19368A	AOI1SB19368A	U	9/10/19	2	PVC	303124.98	12797241.27	769.74	769.63	28	10	18	28	741.63	751.63	17.05	752.58
AOI2MW19355A	AOI2SB19355A	U	8/27/19	2	PVC	305696.89	12796691.89	759.29	762.35	10	5	5	10	752.35	757.35	NM	NM
AOI2MW19355C	AOI2SB19355A	S	8/27/19	2	PVC	305696.76	12796692.10	759.09	762.37	39	10	29	39	723.37	733.37	NM	NM
AOI2MW20386A	AOI2SB20386A	U	2/25/20	2	PVC	303678.13	12797091.58	768.14	767.84	30	10	20	30	737.84	747.84	NM	NM
AOI3MW19310A	AOI3SB19310A	U	7/24/19	2	PVC	307171.11	12795357.24	757.62	760.17	14	10	4	14	746.17	756.17	9.45	750.72
AOI3MW19310C	AOI3SB19310A	S	7/24/19	2	PVC	307170.99	12795357.01	757.46	760.17	50	10	40	50	710.17	720.17	8.41	751.76
AOI3MW19311A	AOI3SB19311A	U	7/30/19	2	PVC	306508.87	12795601.47	759.84	762.52	21	10	11	21	741.52	751.52	10.78	751.74
AOI3MW19311B	AOI3SB19311B	S	7/31/19	2	PVC	306504.08	12795601.68	759.77	762.08	45	10	35	45	717.08	727.08	10.31	751.77
AOI3MW19311C	AOI3SB19311A	C	7/30/19	2	PVC	306509.16	12795601.41	759.98	762.50	85	10	75	85	677.50	687.50	9.86	752.64
AOI4MW20387A	AOI4SB20387A	U	2/26/20	2	PVC	305615.13	12795657.25	758.85	762.92	20	10	10	20	742.92	752.92	11.85	751.07
AOI4MW20387C	AOI4SB20387A	C	2/26/20	2	PVC	305615.74	12795656.92	758.86	762.91	55	10	45	55	707.91	717.91	11.88	751.03

Notes:
Y-Coordinate = Northing in State Plane, Michigan South, feet
X-Coordinate = Easting in State Plane, Michigan South, feet
TOC = Top of Casing
NM = Not Measured
NA = Not Available
ft amsl = Feet Above Mean Sea Level
ft bgs = Feet Below Ground Surface
PVC =Polyvinyl chloride
-- = Not Applicable
MW = Monitoring Well
SB = Soil Boring
AOI = Area of Interest
U = Unconfined Aquifer; S = Semi-Confined Aquifer; C = Confined Aquifer

Table 3
Groundwater PFAS Analtyical Results
Former Crown Vantage Facilities
Cooper Township Parchment, MI

ARCADIS

Analyte	CAS Number	EGLE Drinking Water MCL	Groundwater Surface Water Interface Criteria	Well ID	LFMW-1		LFMW-4		LFMW-7E		LFMW-8		MW-1801A	
				Sample Date	8/2/2023		8/2/2023		8/2/2023		8/2/2023		7/27/2023	
				Units	Result	RL	Result	RL	Result	RL	Result	RL	Result	RL
Perfluorobutanoic acid (PFBA)	375-22-4	--	--	ng/l	**96**	1.8	**270 cn [240 cn]**	2.1 [19]	**9.3 cn**	1.8	**19 cn**	1.7	ND	1.7
Perfluoropentanoic acid (PFPeA)	2706-90-3	--	--	ng/l	**170**	1.8	**550 [560 cn]**	21 [19]	**8.8 cn**	1.8	**40 cn**	1.7	ND	1.7
Perfluorohexanoic acid (PFHxA)	307-24-4	400000	--	ng/l	**480**	18	**1700 [1700 cn]**	21 [19]	**15 cn**	1.8	**76 cn**	1.7	ND	1.7
Perfluoroheptanoic acid (PFHpA)	375-85-9	--	--	ng/l	**560**	18	**1700 [1700 cn]**	21 [19]	**15 cn**	1.8	**140 cn**	1.7	ND	1.7
Perfluorooctanoic acid (PFOA)	335-67-1	8	170	ng/l	**2000**	18	**7500 [7500]**	210 [190]	**110 cn**	1.8	**870 cn**	17	**0.45 J**	1.7
Perfluorononanoic acid (PFNA)	375-95-1	6	30	ng/l	**11**	1.8	**54 cn [55 cn]**	2.1 [19]	**1.2 Jcn**	1.8	**23 cn**	1.7	ND	1.7
Perfluorodecanoic acid (PFDA)	335-76-2	--	--	ng/l	**0.58 J**	1.8	**6.6 cn [6.6 Jcn]**	2.1 [19]	ND	1.8	**13 cn**	1.7	ND	1.7
Perfluoroundecanoic acid (PFUdA)	2058-94-8	--	--	ng/l	ND	1.8	**0.32 Jcn [19 Ucn]**	2.1 [19]	ND	1.8	**0.48 Jcn**	1.7	ND	1.7
Perfluorododecanoic acid (PFDoA)	307-55-1	--	--	ng/l	ND	1.8	ND cn [ND cn]	2.1 [19]	ND	1.8	ND	1.7	ND	1.7
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	--	--	ng/l	ND	1.8	ND cn [ND cn]	2.1 [19]	ND	1.8	ND	1.7	ND	1.7
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	--	--	ng/l	ND	1.8	ND cn [ND cn]	2.1 [19]	ND	1.8	ND	1.7	ND	1.7
Perfluorobutane sulfonic acid (PFBS)	375-73-5	420	670,000	ng/l	**43**	1.8	**250 cn [250 cn]**	2.1 [19]	**9.3 cn**	1.8	**3.8 cn**	1.7	**0.64 J**	1.7
Perfluoropentane sulfonic acid (PFPeSA)	2706-91-4	--	--	ng/l	**35**	1.8	**150 cn [150 cn]**	2.1 [19]	**5.1 cn**	1.8	**3.5 cn**	1.7	ND	1.7
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	51	210	ng/l	**78**	1.8	**320 cn [300 cn]**	2.1 [19]	**25 cn**	1.8	**35 cn**	1.7	**0.38 J**	1.7
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	--	--	ng/l	**20**	1.8	**69 cn [95 cn]**	2.1 [19]	**2.8 cn**	1.8	**29 cn**	1.7	ND	1.7
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	16	12	ng/l	**1300 Bcn**	18	**12000 Bcn [11000 Bcn]**	210 [190]	**58 Icn**	1.8	**4700 Bcn**	170	**1.3 JI**	1.7
Perfluorononane sulfonic acid (PFNS)	68259-12-1	--	--	ng/l	ND	1.8	**1.7 Jcn [19 Ucn]**	2.1 [19]	ND	1.8	**0.93 Jcn**	1.7	ND	1.7
Perfluorodecane sulfonic acid (PFDS)	335-77-3	--	--	ng/l	ND	1.8	ND cn [ND cn]	2.1 [19]	ND	1.8	ND	1.7	ND	1.7
4:2 Fluorotelomer sulfonate (4:2 FTS)	757124-72-4	--	--	ng/l	ND	1.8	ND cn [ND cn]	2.1 [19]	ND	1.8	ND	1.7	ND	1.7
6:2 Fluorotelomer sulfonic acid (6:2 FTSA)	27619-97-2	--	--	ng/l	**2.4**	1.8	**9.8 cn [9.4 Jcn]**	2.1 [19]	ND	1.8	ND	1.7	ND	1.7
8:2 Fluorotelomer sulfonic acid (8:2 FTSA)	39108-34-4	--	--	ng/l	ND	1.8	**8.5 cn [7.5 Jcn]**	2.1 [19]	ND	1.8	ND	1.7	ND	1.7
N-Methylperfluoroocatane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	--	--	ng/l	**3.5**	1.8	**17 cn [19 cn]**	2.1 [19]	ND	1.8	**6.2 cn**	1.7	ND	1.7
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	--	--	ng/l	**110**	1.8	**720 [790 cn]**	21 [19]	**0.86 Jcn**	1.8	**1300 cn**	17	ND	1.7
Perfluorooctane sulfonamide (PFOSA)	754-91-6	--	--	ng/l	**1.3 J**	1.8	**18 cn [18 Jcn]**	2.1 [19]	**0.28 Jcn**	1.8	**190 cn**	1.7	**0.40 J**	1.7
2,3,3,3-Tetrafluoro-2-(heptafluoropropoxy)propanoic acid (HFPO-DA)	13252-13-6	370	--	ng/l	**0.69 JI**	1.8	ND cn [ND cn]	2.1 [19]	ND	1.8	**0.83 Jcn**	1.7	ND	1.7
ADONA	919005-14-4	--	--	ng/l	ND	1.8	ND cn [ND cn]	2.1 [19]	ND	1.8	ND	1.7	ND	1.7
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9CL-PF3ONS)	756426-58-1	--	--	ng/l	ND	1.8	ND cn [ND cn]	2.1 [19]	ND	1.8	ND	1.7	ND	1.7
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (F-53B Minor)	763051-92-9	--	--	ng/l	ND	1.8	ND cn [ND cn]	2.1 [19]	ND	1.8	ND	1.7	ND	1.7

Notes:
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Table 3
Groundwater PFAS Analtyical Results
Former Crown Vantage Facilities
Cooper Township Parchment, MI

Analyte	CAS Number	EGLE Drinking Water MCL	Groundwater Surface Water Interface Criteria	MW-1802A 7/27/2023		MW-1803A 7/27/2023		MW-1804A 8/2/2023		MW-1805A 8/2/2023		MW-1806A 7/31/2023		MW-1806B 7/31/2023		MW-1806C 7/31/2023		MW-1807A 8/2/2023	
				Result	RL	Result	RL	Result	RL	Result	RL	Result	RL	Result	RL	Result	RL	Result	RL
Perfluorobutanoic acid (PFBA)	375-22-4	--	--	ND	1.7	ND	1.6	**3.3 cn**	1.7	**11 cn**	1.8	**2.7**	1.6	**1.4 J**	1.6	ND	1.6	ND cn	1.8
Perfluoropentanoic acid (PFPeA)	2706-90-3	--	--	ND	1.7	ND	1.6	**6.1 cn**	1.7	**40 cn**	1.8	**5**	1.6	**0.89 J**	1.6	ND	1.6	**0.65 Jcn**	1.8
Perfluorohexanoic acid (PFHxA)	307-24-4	400000	--	ND	1.7	ND	1.6	**6.2 cn**	1.7	**34 cn**	1.8	**4.9**	1.6	**1.1 J**	1.6	ND	1.6	ND cn	1.8
Perfluoroheptanoic acid (PFHpA)	375-85-9	--	--	ND	1.7	ND	1.6	**2.7 cn**	1.7	**5.0 cn**	1.8	**6.2**	1.6	**0.69 J**	1.6	ND	1.6	**5.1 cn**	1.8
Perfluorooctanoic acid (PFOA)	335-67-1	8	170	**0.49 J**	1.7	ND	1.6	**6.5 cn**	1.7	**12 cn**	1.8	**6.1**	1.6	**2.9**	1.6	ND	1.6	**0.45 Jcn**	1.8
Perfluorononanoic acid (PFNA)	375-95-1	6	30	ND	1.7	ND	1.6	ND cn	1.7	ND cn	1.8	**0.19 J**	1.6	ND	1.6	ND	1.6	ND cn	1.8
Perfluorodecanoic acid (PFDA)	335-76-2	--	--	ND	1.7	ND	1.6	ND cn	1.7	ND cn	1.8	ND	1.6	ND	1.6	ND	1.6	ND cn	1.8
Perfluoroundecanoic acid (PFUdA)	2058-94-8	--	--	ND	1.7	ND	1.6	ND cn	1.7	ND cn	1.8	ND	1.6	ND	1.6	ND	1.6	ND cn	1.8
Perfluorododecanoic acid (PFDoA)	307-55-1	--	--	ND	1.7	ND	1.6	ND cn	1.7	ND cn	1.8	ND	1.6	ND	1.6	ND	1.6	ND cn	1.8
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	--	--	ND	1.7	ND	1.6	ND cn	1.7	ND cn	1.8	ND	1.6	ND	1.6	ND	1.6	ND cn	1.8
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	--	--	ND	1.7	ND	1.6	ND cn	1.7	ND cn	1.8	ND	1.6	ND	1.6	ND	1.6	ND cn	1.8
Perfluorobutane sulfonic acid (PFBS)	375-73-5	420	670,000	**0.53 J**	1.7	**1.4 J**	1.6	**4.5 cn**	1.7	**14 cn**	1.8	**13**	1.6	**4.1**	1.6	ND	1.6	**0.94 Jcn**	1.8
Perfluoropentane sulfonic acid (PFPeSA)	2706-91-4	--	--	ND	1.7	ND	1.6	**0.45 Jcn**	1.7	**1.2 Jcn**	1.8	**0.79 J**	1.6	**0.26 J**	1.6	ND	1.6	ND cn	1.8
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	51	210	**0.56 J**	1.7	**0.27 J**	1.6	**13 cn**	1.7	**7.5 cn**	1.8	**4.3**	1.6	**1.5 J**	1.6	ND	1.6	**0.54 Jcn**	1.8
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	--	--	ND	1.7	ND	1.6	ND cn	1.7	ND cn	1.8	ND	1.6	ND	1.6	ND	1.6	ND cn	1.8
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	16	12	**3.0 I**	1.7	**0.59 JI**	1.6	**3.8 cn**	1.7	**1.7 JIcn**	1.8	**4.4**	1.6	**2.0 I**	1.6	ND	1.6	**1.1 JIcn**	1.8
Perfluorononane sulfonic acid (PFNS)	68259-12-1	--	--	ND	1.7	ND	1.6	ND cn	1.7	ND cn	1.8	ND	1.6	ND	1.6	ND	1.6	ND cn	1.8
Perfluorodecane sulfonic acid (PFDS)	335-77-3	--	--	ND	1.7	ND	1.6	ND cn	1.7	ND cn	1.8	ND	1.6	ND	1.6	ND	1.6	ND cn	1.8
4:2 Fluorotelomer sulfonate (4:2 FTS)	757124-72-4	--	--	ND	1.7	ND	1.6	ND cn	1.7	ND cn	1.8	ND	1.6	ND	1.6	ND	1.6	ND cn	1.8
6:2 Fluorotelomer sulfonic acid (6:2 FTSA)	27619-97-2	--	--	ND	1.7	ND	1.6	ND cn	1.7	ND cn	1.8	ND	1.6	**0.51 J**	1.6	ND	1.6	**92 cn**	1.8
8:2 Fluorotelomer sulfonic acid (8:2 FTSA)	39108-34-4	--	--	ND	1.7	ND	1.6	ND cn	1.7	ND cn	1.8	ND	1.6	ND	1.6	ND	1.6	ND cn	1.8
N-Methylperfluoroocatane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	--	--	ND	1.7	ND	1.6	ND cn	1.7	ND cn	1.8	ND	1.6	ND	1.6	ND	1.6	ND cn	1.8
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	--	--	ND	1.7	ND	1.6	ND cn	1.7	ND cn	1.8	ND	1.6	ND	1.6	ND	1.6	ND cn	1.8
Perfluorooctane sulfonamide (PFOSA)	754-91-6	--	--	**0.43 J**	1.7	**0.35 J**	1.6	**0.32 Jcn**	1.7	**0.39 Jcn**	1.8	**0.41 J**	1.6	**0.34 J**	1.6	**0.92 J**	1.6	**0.43 Jcn**	1.8
2,3,3,3-Tetrafluoro-2-(heptafluoropropoxy)propanoic acid (HFPO-DA)	13252-13-6	370	--	ND	1.7	ND	1.6	ND cn	1.7	ND cn	1.8	ND	1.6	ND	1.6	ND	1.6	ND cn	1.8
ADONA	919005-14-4	--	--	ND	1.7	ND	1.6	ND cn	1.7	ND cn	1.8	ND	1.6	ND	1.6	ND	1.6	ND cn	1.8
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9CL-PF3ONS)	756426-58-1	--	--	ND	1.7	ND	1.6	ND cn	1.7	ND cn	1.8	ND	1.6	ND	1.6	ND	1.6	ND cn	1.8
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (F-53B Minor)	763051-92-9	--	--	ND	1.7	ND	1.6	ND cn	1.7	ND cn	1.8	ND	1.6	ND	1.6	ND	1.6	ND cn	1.8

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Former Crown Vantage Facilities
Cooper Township Parchment, MI

Analyte	CAS Number	EGLE Drinking Water MCL	Groundwater Surface Water Interface Criteria	MW-1808A 7/31/2023		MW-1809A 8/2/2023		MW-1809C 8/2/2023		MW-1810A 7/28/2023		MW-1810B 7/28/2023		MW-1810C 7/28/2023	
				Result	RL	Result	RL	Result	RL	Result	RL	Result	RL	Result	RL
Perfluorobutanoic acid (PFBA)	375-22-4	--	--	**2.9**	1.6	**2.2 [2.2 cn]**	1.7 [1.7]	ND [ND]	1.6 [1.6]	**3.9**	1.6	ND	1.7	ND	1.7
Perfluoropentanoic acid (PFPeA)	2706-90-3	--	--	**2**	1.6	**2.8 [2.7 cn]**	1.7 [1.7]	ND [ND]	1.6 [1.6]	**5**	1.6	ND	1.7	ND	1.7
Perfluorohexanoic acid (PFHxA)	307-24-4	400000	--	**3.9**	1.6	**4.5 [4.2 cn]**	1.7 [1.7]	ND [ND]	1.6 [1.6]	**6.8**	1.6	ND	1.7	ND	1.7
Perfluoroheptanoic acid (PFHpA)	375-85-9	--	--	**1.7**	1.6	**1.6 J [1.6 Jcn]**	1.7 [1.7]	ND [ND]	1.6 [1.6]	**6.1**	1.6	ND	1.7	ND	1.7
Perfluorooctanoic acid (PFOA)	335-67-1	8	170	**12**	1.6	**6.4 [6.3 cn]**	1.7 [1.7]	ND [ND]	1.6 [1.6]	**31**	1.6	**0.33 J**	1.7	**0.26 J**	1.7
Perfluorononanoic acid (PFNA)	375-95-1	6	30	ND	1.6	**0.23 JI [0.28 Jcn]**	1.7 [1.7]	ND [ND]	1.6 [1.6]	**0.26 J**	1.6	ND	1.7	ND	1.7
Perfluorodecanoic acid (PFDA)	335-76-2	--	--	ND	1.6	ND [ND cn]	1.7 [1.7]	ND [ND]	1.6 [1.6]	ND	1.6	ND	1.7	ND	1.7
Perfluoroundecanoic acid (PFUdA)	2058-94-8	--	--	ND	1.6	ND [ND cn]	1.7 [1.7]	ND [ND]	1.6 [1.6]	ND	1.6	ND	1.7	ND	1.7
Perfluorododecanoic acid (PFDoA)	307-55-1	--	--	ND	1.6	ND [ND cn]	1.7 [1.7]	ND [ND]	1.6 [1.6]	ND	1.6	ND	1.7	ND	1.7
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	--	--	ND	1.6	ND [ND cn]	1.7 [1.7]	ND [ND]	1.6 [1.6]	ND	1.6	ND	1.7	ND	1.7
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	--	--	ND	1.6	ND [ND cn]	1.7 [1.7]	ND [ND]	1.6 [1.6]	ND	1.6	ND	1.7	ND	1.7
Perfluorobutane sulfonic acid (PFBS)	375-73-5	420	670,000	**5.7**	1.6	**6.3 [6.4 cn]**	1.7 [1.7]	ND [ND]	1.6 [1.6]	**8.8**	1.6	ND	1.7	ND	1.7
Perfluoropentane sulfonic acid (PFPeSA)	2706-91-4	--	--	**0.58 J**	1.6	**4 [3.7 cn]**	1.7 [1.7]	ND [ND]	1.6 [1.6]	**1.1 J**	1.6	ND	1.7	ND	1.7
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	51	210	**4.7**	1.6	**63 [63 cn]**	1.7 [1.7]	ND [ND]	1.6 [1.6]	**8.3**	1.6	ND	1.7	ND	1.7
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	--	--	ND	1.6	**4 [3.8 cn]**	1.7 [1.7]	ND [ND]	1.6 [1.6]	**0.43 J**	1.6	ND	1.7	ND	1.7
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	16	12	**3.9 I**	1.6	**630 [670 cn]**	17 [17]	ND [ND]	1.6 [1.6]	**15**	1.6	ND	1.7	ND	1.7
Perfluorononane sulfonic acid (PFNS)	68259-12-1	--	--	ND	1.6	**0.36 J [0.41 Jcn]**	1.7 [1.7]	ND [ND]	1.6 [1.6]	ND	1.6	ND	1.7	ND	1.7
Perfluorodecane sulfonic acid (PFDS)	335-77-3	--	--	ND	1.6	ND [ND cn]	1.7 [1.7]	ND [ND]	1.6 [1.6]	ND	1.6	ND	1.7	ND	1.7
4:2 Fluorotelomer sulfonate (4:2 FTS)	757124-72-4	--	--	ND	1.6	ND [ND cn]	1.7 [1.7]	ND [ND]	1.6 [1.6]	ND	1.6	ND	1.7	ND	1.7
6:2 Fluorotelomer sulfonic acid (6:2 FTSA)	27619-97-2	--	--	ND	1.6	ND [ND cn]	1.7 [1.7]	ND [ND]	1.6 [1.6]	ND	1.6	ND	1.7	ND	1.7
8:2 Fluorotelomer sulfonic acid (8:2 FTSA)	39108-34-4	--	--	ND	1.6	ND [ND cn]	1.7 [1.7]	ND [ND]	1.6 [1.6]	ND	1.6	ND	1.7	ND	1.7
N-Methylperfluoroocatane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	--	--	ND	1.6	ND [ND cn]	1.7 [1.7]	ND [ND]	1.6 [1.6]	ND	1.6	ND	1.7	ND	1.7
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	--	--	ND	1.6	ND [ND cn]	1.7 [1.7]	ND [ND]	1.6 [1.6]	ND	1.6	ND	1.7	ND	1.7
Perfluorooctane sulfonamide (PFOSA)	754-91-6	--	--	**0.37 J**	1.6	**1.2 J [1.3 Jcn]**	1.7 [1.7]	**0.38 J [0.33 Jcn]**	1.6 [1.6]	ND	1.6	**0.86 J**	1.7	**0.66 J**	1.7
2,3,3,3-Tetrafluoro-2-(heptafluoropropoxy)propanoic acid (HFPO-DA)	13252-13-6	370	--	ND	1.6	ND [ND cn]	1.7 [1.7]	ND[ND]	1.6 [1.6]	ND	1.6	ND	1.7	ND	1.7
ADONA	919005-14-4	--	--	ND	1.6	ND [ND cn]	1.7 [1.7]	ND[ND]	1.6 [1.6]	ND	1.6	ND	1.7	ND	1.7
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9CL-PF3ONS)	756426-58-1	--	--	ND	1.6	ND [ND cn]	1.7 [1.7]	ND[ND]	1.6 [1.6]	ND	1.6	ND	1.7	ND	1.7
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (F-53B Minor)	763051-92-9	--	--	ND	1.6	ND [ND cn]	1.7 [1.7]	ND[ND]	1.6 [1.6]	ND	1.6	ND	1.7	ND	1.7

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Table 3
Groundwater PFAS Analtyical Results
Former Crown Vantage Facilities
Cooper Township Parchment, MI

ARCADIS

Analyte	CAS Number	EGLE Drinking Water MCL	Groundwater Surface Water Interface Criteria	MW-1911A		MW-1911B		MW-1911C		MW-1913A		MW-1916A		MW-1917A		MW-1918A		MW-1919A	
				8/1/2023		8/1/2023		8/1/2023		7/31/2023		8/1/2023		8/1/2023		7/27/2023		8/2/2023	
				Result	RL	Result	RL	Result	RL	Result	RL	Result	RL	Result	RL	Result	RL	Result	RL
Perfluorobutanoic acid (PFBA)	375-22-4	--	--	**8.8**	1.6	**8.1**	1.7	ND	1.7	**2.1**	1.8	**5.3**	1.7	**5.5**	1.6	**1.2 J**	1.7	**3.7 cn**	1.6
Perfluoropentanoic acid (PFPeA)	2706-90-3	--	--	**7.3**	1.6	**8.6**	1.7	ND	1.7	**1.5 J**	1.8	**3.3**	1.7	**4.2**	1.6	ND	1.7	**2.1 cn**	1.6
Perfluorohexanoic acid (PFHxA)	307-24-4	400000	--	**12**	1.6	**16**	1.7	ND	1.7	**2.5**	1.8	**5.1**	1.7	**5**	1.6	ND	1.7	**3.2 cn**	1.6
Perfluoroheptanoic acid (PFHpA)	375-85-9	--	--	**12**	1.6	**18**	1.7	ND	1.7	**1.1 J**	1.8	**2.4**	1.7	**5.4**	1.6	ND	1.7	**3.4 cn**	1.6
Perfluorooctanoic acid (PFOA)	335-67-1	8	170	**81**	1.6	**130**	1.7	ND	1.7	**5.5**	1.8	**13**	1.7	**36**	1.6	**3**	1.7	**21 cn**	1.6
Perfluorononanoic acid (PFNA)	375-95-1	6	30	**1.1 J**	1.6	**0.88 J**	1.7	ND	1.7	**0.20 J**	1.8	ND	1.7	**0.35 J**	1.6	ND	1.7	**0.37 Jcn**	1.6
Perfluorodecanoic acid (PFDA)	335-76-2	--	--	ND	1.6	ND	1.7	ND	1.7	ND	1.8	ND	1.7	ND	1.6	ND	1.7	ND cn	1.6
Perfluoroundecanoic acid (PFUdA)	2058-94-8	--	--	ND	1.6	ND	1.7	ND	1.7	ND	1.8	ND	1.7	ND	1.6	ND	1.7	ND cn	1.6
Perfluorododecanoic acid (PFDoA)	307-55-1	--	--	ND	1.6	ND	1.7	ND	1.7	ND	1.8	ND	1.7	ND	1.6	ND	1.7	ND cn	1.6
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	--	--	ND	1.6	ND	1.7	ND	1.7	ND	1.8	ND	1.7	ND	1.6	ND	1.7	ND cn	1.6
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	--	--	ND	1.6	ND	1.7	ND	1.7	ND	1.8	ND	1.7	ND	1.6	ND	1.7	ND cn	1.6
Perfluorobutane sulfonic acid (PFBS)	375-73-5	420	670,000	**6.3**	1.6	**9**	1.7	ND	1.7	**5.9**	1.8	**2.3**	1.7	**7.4**	1.6	**1.5 J**	1.7	**4.9 cn**	1.6
Perfluoropentane sulfonic acid (PFPeSA)	2706-91-4	--	--	**3.9**	1.6	**4.9**	1.7	ND	1.7	**0.97 J**	1.8	**0.92 J**	1.7	**2.7**	1.6	**0.32 J**	1.7	**1.1 Jcn**	1.6
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	51	210	**10**	1.6	**15**	1.7	ND	1.7	**4.3**	1.8	**2.3**	1.7	**11**	1.6	**1.1 J**	1.7	**6.0 cn**	1.6
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	--	--	**1.9**	1.6	**2**	1.7	ND	1.7	ND	1.8	ND	1.7	**0.48 J**	1.6	ND	1.7	**0.49 Jcn**	1.6
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	16	12	**87 I**	1.6	**88 I**	1.7	ND	1.7	**11**	1.8	**2.8**	1.7	**22 I**	1.6	**6.6 I**	1.7	**27 cn**	1.6
Perfluorononane sulfonic acid (PFNS)	68259-12-1	--	--	ND	1.6	ND	1.7	ND	1.7	ND	1.8	ND	1.7	ND	1.6	ND	1.7	ND cn	1.6
Perfluorodecane sulfonic acid (PFDS)	335-77-3	--	--	ND	1.6	ND	1.7	ND	1.7	ND	1.8	ND	1.7	ND	1.6	ND	1.7	ND cn	1.6
4:2 Fluorotelomer sulfonate (4:2 FTS)	757124-72-4	--	--	ND	1.6	ND	1.7	ND	1.7	ND	1.8	ND	1.7	ND	1.6	ND	1.7	ND cn	1.6
6:2 Fluorotelomer sulfonic acid (6:2 FTSA)	27619-97-2	--	--	ND	1.6	**0.52 J**	1.7	ND	1.7	ND	1.8	ND	1.7	ND	1.6	ND	1.7	ND cn	1.6
8:2 Fluorotelomer sulfonic acid (8:2 FTSA)	39108-34-4	--	--	ND	1.6	ND	1.7	ND	1.7	ND	1.8	ND	1.7	ND	1.6	ND	1.7	ND cn	1.6
N-Methylperfluoroocatane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	--	--	ND	1.6	ND	1.7	ND	1.7	ND	1.8	ND	1.7	ND	1.6	ND	1.7	ND cn	1.6
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	--	--	ND	1.6	**0.70 J**	1.7	ND	1.7	ND	1.8	ND	1.7	ND	1.6	ND	1.7	ND cn	1.6
Perfluorooctane sulfonamide (PFOSA)	754-91-6	--	--	**0.62 J**	1.6	**0.43 J**	1.7	**0.77 J**	1.7	**0.30 J**	1.8	**0.62 J**	1.7	**0.53 J**	1.6	**0.29 J**	1.7	**0.25 Jcn**	1.6
2,3,3,3-Tetrafluoro-2-(heptafluoropropoxy)propanoic acid (HFPO-DA)	13252-13-6	370	--	ND	1.6	ND	1.7	ND	1.7	ND	1.8	ND	1.7	ND	1.6	ND	1.7	ND cn	1.6
ADONA	919005-14-4	--	--	ND	1.6	ND	1.7	ND	1.7	ND	1.8	ND	1.7	ND	1.6	ND	1.7	ND cn	1.6
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9CL-PF3ONS)	756426-58-1	--	--	ND	1.6	ND	1.7	ND	1.7	ND	1.8	ND	1.7	ND	1.6	ND	1.7	ND cn	1.6
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (F-53B Minor)	763051-92-9	--	--	ND	1.6	ND	1.7	ND	1.7	ND	1.8	ND	1.7	ND	1.6	ND	1.7	ND cn	1.6

Notes:
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Former Crown Vantage Facilities
Cooper Township Parchment, MI

Analyte	CAS Number	EGLE Drinking Water MCL	Groundwater Surface Water Interface Criteria	MW-1920A 7/28/2023		MW-1921A 7/27/2023		MW-1921C 7/27/2023		AOI3MW19310A 8/3/2023		AOI3MW19310C 8/3/2023		AOI3MW19311A 8/3/2023	
				Result	RL	Result	RL	Result	RL	Result	RL	Result	RL	Result	RL
Perfluorobutanoic acid (PFBA)	375-22-4	--	--	**2.2**	1.6	**5.3**	1.6	ND	1.7	**54 cn**	20	**26 cn [28 cn]**	1.7 [1.7]	**32**	1.6
Perfluoropentanoic acid (PFPeA)	2706-90-3	--	--	**2.5**	1.6	**5.1**	1.6	ND	1.7	**97 cn**	20	**48 cn [49 cn]**	1.7 [1.7]	**57**	1.6
Perfluorohexanoic acid (PFHxA)	307-24-4	400000	--	**2.8**	1.6	**5.5**	1.6	ND	1.7	**240 cn**	20	**130 cn [130 cn]**	1.7 [1.7]	**98**	1.6
Perfluoroheptanoic acid (PFHpA)	375-85-9	--	--	**1.4 J**	1.6	**3.3**	1.6	ND	1.7	**790 cn**	20	**260 cn [260 cn]**	1.7 [1.7]	**200**	1.6
Perfluorooctanoic acid (PFOA)	335-67-1	8	170	**4.5**	1.6	**16**	1.6	**0.33 J**	1.7	**5800 cn**	200	**1500 cn [1600 cn]**	17 [17]	**1600**	16
Perfluorononanoic acid (PFNA)	375-95-1	6	30	**0.16 J**	1.6	ND	1.6	ND	1.7	**170 cn**	20	**14 cn [16 cn]**	1.7 [1.7]	**33**	1.6
Perfluorodecanoic acid (PFDA)	335-76-2	--	--	ND	1.6	ND	1.6	ND	1.7	**29 cn**	20	**2.8 cn [2.9 cn]**	1.7 [1.7]	**15**	1.6
Perfluoroundecanoic acid (PFUdA)	2058-94-8	--	--	ND	1.6	ND	1.6	ND	1.7	ND cn	20	ND cn [ND Ucn]	1.7 [1.7]	**0.52 J**	1.6
Perfluorododecanoic acid (PFDoA)	307-55-1	--	--	ND	1.6	ND	1.6	ND	1.7	ND cn	20	ND cn [ND Ucn]	1.7 [1.7]	ND	1.6
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	--	--	ND	1.6	ND	1.6	ND	1.7	ND cn	20	ND cn [ND Ucn]	1.7 [1.7]	ND	1.6
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	--	--	ND	1.6	ND	1.6	ND	1.7	ND cn	20	ND cn [ND Ucn]	1.7 [1.7]	ND	1.6
Perfluorobutane sulfonic acid (PFBS)	375-73-5	420	670,000	**5**	1.6	**5.9**	1.6	ND	1.7	**8.2 Jcn**	20	**19 cn [19 cn]**	1.7 [1.7]	**11**	1.6
Perfluoropentane sulfonic acid (PFPeSA)	2706-91-4	--	--	**0.52 J**	1.6	**0.88 J**	1.6	ND	1.7	**8.1 Jcn**	20	**14 cn [15 cn]**	1.7 [1.7]	**7.5**	1.6
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	51	210	**3.3**	1.6	**5.7**	1.6	**0.18 J**	1.7	**70 cn**	20	**49 cn [50 cn]**	1.7 [1.7]	**46**	1.6
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	--	--	ND	1.6	**0.27 J**	1.6	ND	1.7	**140 cn**	20	**21 cn [21 cn]**	1.7 [1.7]	**38**	1.6
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	16	12	**9.9**	1.6	**7.5 I**	1.6	**1.6 J**	1.7	**58000 cn**	2000	**2600 cn [2900 cn]**	17 [17]	**10000**	160
Perfluorononane sulfonic acid (PFNS)	68259-12-1	--	--	ND	1.6	ND	1.6	ND	1.7	**14 Jcn**	20	ND cn [ND Ucn]	1.7 [1.7]	**4.5**	1.6
Perfluorodecane sulfonic acid (PFDS)	335-77-3	--	--	ND	1.6	ND	1.6	ND	1.7	**3.5 Jcn**	20	ND cn [ND Ucn]	1.7 [1.7]	ND	1.6
4:2 Fluorotelomer sulfonate (4:2 FTS)	757124-72-4	--	--	ND	1.6	ND	1.6	ND	1.7	ND cn	20	ND cn [ND Ucn]	1.7 [1.7]	ND	1.6
6:2 Fluorotelomer sulfonic acid (6:2 FTSA)	27619-97-2	--	--	ND	1.6	ND	1.6	ND	1.7	ND cn	20	**3.6 cn [3.9 cn]**	1.7 [1.7]	**2.9**	1.6
8:2 Fluorotelomer sulfonic acid (8:2 FTSA)	39108-34-4	--	--	ND	1.6	ND	1.6	ND	1.7	**6.1 Jcn**	20	**1.2 Jcn [1.1 Jcn]**	1.7 [1.7]	**15**	1.6
N-Methylperfluoroocatane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	--	--	ND	1.6	ND	1.6	ND	1.7	**39 cn**	20	**14 cn [15 cn]**	1.7 [1.7]	**60**	1.6
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	--	--	ND	1.6	ND	1.6	ND	1.7	**4000 cn**	20	**720 cn [710 cn]**	17 [17]	**2500**	16
Perfluorooctane sulfonamide (PFOSA)	754-91-6	--	--	ND	1.6	ND	1.6	**0.25 J**	1.7	**280 cn**	20	**12 cn [14 cn]**	1.7 [1.7]	**150**	1.6
2,3,3,3-Tetrafluoro-2-(heptafluoropropoxy)propanoic acid (HFPO-DA)	13252-13-6	370	--	ND	1.6	ND	1.6	ND	1.7	ND cn	20	ND cn [ND Ucn]	1.7 [1.7]	ND	1.6
ADONA	919005-14-4	--	--	ND	1.6	ND	1.6	ND	1.7	ND cn	20	ND cn [ND Ucn]	1.7 [1.7]	ND	1.6
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9CL-PF3ONS)	756426-58-1	--	--	ND	1.6	ND	1.6	ND	1.7	ND cn	20	ND cn [ND Ucn]	1.7 [1.7]	ND	1.6
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (F-53B Minor)	763051-92-9	--	--	ND	1.6	ND	1.6	ND	1.7	ND cn	20	ND cn [ND Ucn]	1.7 [1.7]	ND	1.6

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Former Crown Vantage Facilities
Cooper Township Parchment, MI

Analyte	CAS Number	EGLE Drinking Water MCL	Groundwater Surface Water Interface Criteria	AOI3MW19311B 8/3/2023		AOI3MW19311C 8/3/2023		AOI1MW19368A 8/1/2023		AOI4MW20387A 8/3/2023		AOI4MW20387C 8/3/2023	
				Result	RL	Result	RL	Result	RL	Result	RL	Result	RL
Perfluorobutanoic acid (PFBA)	375-22-4	--	--	**13**	1.7	ND	1.7	**3.7**	1.7	**13 cn**	1.7	**5.4 cn**	1.6
Perfluoropentanoic acid (PFPeA)	2706-90-3	--	--	**28**	1.7	**0.40 J**	1.7	**3.9**	1.7	**19 cn**	1.7	**6.5 cn**	1.6
Perfluorohexanoic acid (PFHxA)	307-24-4	400000	--	**50**	1.7	ND	1.7	**6.1**	1.7	**43 cn**	1.7	**13 cn**	1.6
Perfluoroheptanoic acid (PFHpA)	375-85-9	--	--	**82**	1.7	ND	1.7	**5.8**	1.7	**97 cn**	1.7	**14 cn**	1.6
Perfluorooctanoic acid (PFOA)	335-67-1	8	170	**350**	17	**0.37 J**	1.7	**31**	1.7	**780 cn**	17	**88 cn**	1.6
Perfluorononanoic acid (PFNA)	375-95-1	6	30	**3.7**	1.7	ND	1.7	**0.22 J**	1.7	**14 cn**	1.7	**0.92 Jcn**	1.6
Perfluorodecanoic acid (PFDA)	335-76-2	--	--	**0.68 J**	1.7	ND	1.7	ND	1.7	**4.4 cn**	1.7	ND cn	1.6
Perfluoroundecanoic acid (PFUdA)	2058-94-8	--	--	ND	1.7	ND	1.7	ND	1.7	**0.66 Jcn**	1.7	ND cn	1.6
Perfluorododecanoic acid (PFDoA)	307-55-1	--	--	ND	1.7	ND	1.7	ND	1.7	ND cn	1.7	ND cn	1.6
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	--	--	ND	1.7	ND	1.7	ND	1.7	ND cn	1.7	ND cn	1.6
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	--	--	ND	1.7	ND	1.7	ND	1.7	ND cn	1.7	ND cn	1.6
Perfluorobutane sulfonic acid (PFBS)	375-73-5	420	670,000	**7.9**	1.7	ND	1.7	**9.6**	1.7	**10 cn**	1.7	**9.9 cn**	1.6
Perfluoropentane sulfonic acid (PFPeSA)	2706-91-4	--	--	**3**	1.7	ND	1.7	**1.1 J**	1.7	**5.4 cn**	1.7	**3.5 cn**	1.6
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	51	210	**14**	1.7	ND	1.7	**6.2**	1.7	**33 cn**	1.7	**19 cn**	1.6
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	--	--	**6.4**	1.7	ND	1.7	**0.60 J**	1.7	**24 cn**	1.7	**2.7 cn**	1.6
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	16	12	**390**	17	**0.86 JI**	1.7	**24**	1.7	**4100 cn**	170	**160 cn**	1.6
Perfluorononane sulfonic acid (PFNS)	68259-12-1	--	--	ND	1.7	ND	1.7	ND	1.7	**2.2 cn**	1.7	ND cn	1.6
Perfluorodecane sulfonic acid (PFDS)	335-77-3	--	--	ND	1.7	ND	1.7	ND	1.7	**0.38 Jcn**	1.7	ND cn	1.6
4:2 Fluorotelomer sulfonate (4:2 FTS)	757124-72-4	--	--	ND	1.7	ND	1.7	ND	1.7	ND cn	1.7	ND cn	1.6
6:2 Fluorotelomer sulfonic acid (6:2 FTSA)	27619-97-2	--	--	ND	1.7	ND	1.7	ND	1.7	ND cn	1.7	ND cn	1.6
8:2 Fluorotelomer sulfonic acid (8:2 FTSA)	39108-34-4	--	--	ND	1.7	ND	1.7	ND	1.7	ND cn	1.7	ND cn	1.6
N-Methylperfluoroocatane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	--	--	**0.99 J**	1.7	ND	1.7	ND	1.7	**50 cn**	1.7	ND cn	1.6
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	--	--	**65**	1.7	**1.8**	1.7	ND	1.7	**4500 cn**	170	**47 cn**	1.6
Perfluorooctane sulfonamide (PFOSA)	754-91-6	--	--	**3.1**	1.7	**0.43 J**	1.7	ND	1.7	**580 cn**	17	**24 cn**	1.6
2,3,3,3-Tetrafluoro-2-(heptafluoropropoxy)propanoic acid (HFPO-DA)	13252-13-6	370	--	ND	1.7	ND	1.7	ND	1.7	ND cn	1.7	ND cn	1.6
ADONA	919005-14-4	--	--	ND	1.7	ND	1.7	ND	1.7	ND cn	1.7	ND cn	1.6
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9CL-PF3ONS)	756426-58-1	--	--	ND	1.7	ND	1.7	ND	1.7	ND cn	1.7	ND cn	1.6
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (F-53B Minor)	763051-92-9	--	--	ND	1.7	ND	1.7	ND	1.7	ND cn	1.7	ND cn	1.6

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Cooper Township Parchment, MI

Analyte	CAS Number	EGLE Drinking Water MCL	Groundwater Surface Water Interface Criteria	Equipment blank 7/27/2023		Equipment blank 7/31/2023		Equipment blank 8/2/2023		Equipment blank 8/3/2023	
				Result	RL	Result	RL	Result	RL	Result	RL
Perfluorobutanoic acid (PFBA)	375-22-4	--	--	ND	1.8	ND	1.7	ND	1.8	ND	#FIELD!
Perfluoropentanoic acid (PFPeA)	2706-90-3	--	--	ND	1.8	ND	1.7	ND	1.8	ND	1.8
Perfluorohexanoic acid (PFHxA)	307-24-4	400000	--	ND	1.8	ND	1.7	ND	1.8	ND	1.8
Perfluoroheptanoic acid (PFHpA)	375-85-9	--	--	ND	1.8	ND	1.7	ND	1.8	ND	1.8
Perfluorooctanoic acid (PFOA)	335-67-1	8	170	ND	1.8	ND	1.7	ND	1.8	ND	1.8
Perfluorononanoic acid (PFNA)	375-95-1	6	30	ND	1.8	ND	1.7	ND	1.8	ND	1.8
Perfluorodecanoic acid (PFDA)	335-76-2	--	--	ND	1.8	ND	1.7	ND	1.8	ND	1.8
Perfluoroundecanoic acid (PFUdA)	2058-94-8	--	--	ND	1.8	ND	1.7	ND	1.8	ND	1.8
Perfluorododecanoic acid (PFDoA)	307-55-1	--	--	ND	1.8	ND	1.7	ND	1.8	ND	1.8
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	--	--	ND	1.8	ND	1.7	ND	1.8	ND	1.8
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	--	--	ND	1.8	ND	1.7	ND	1.8	ND	1.8
Perfluorobutane sulfonic acid (PFBS)	375-73-5	420	670,000	ND	1.8	ND	1.7	ND	1.8	ND	1.8
Perfluoropentane sulfonic acid (PFPeSA)	2706-91-4	--	--	ND	1.8	ND	1.7	ND	1.8	ND	1.8
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	51	210	ND	1.8	**0.82 J**	1.7	ND	1.8	ND	1.8
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	--	--	ND	1.8	ND	1.7	ND	1.8	ND	1.8
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	16	12	ND	1.8	ND	1.7	ND	1.8	ND	1.8
Perfluorononane sulfonic acid (PFNS)	68259-12-1	--	--	ND	1.8	ND	1.7	ND	1.8	ND	1.8
Perfluorodecane sulfonic acid (PFDS)	335-77-3	--	--	ND	1.8	ND	1.7	ND	1.8	ND	1.8
4:2 Fluorotelomer sulfonate (4:2 FTS)	757124-72-4	--	--	ND	1.8	ND	1.7	ND	1.8	ND	1.8
6:2 Fluorotelomer sulfonic acid (6:2 FTSA)	27619-97-2	--	--	ND	1.8	ND	1.7	ND	1.8	ND	1.8
8:2 Fluorotelomer sulfonic acid (8:2 FTSA)	39108-34-4	--	--	ND	1.8	ND	1.7	ND	1.8	ND	1.8
N-Methylperfluoroocatane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	--	--	ND	1.8	ND	1.7	ND	1.8	ND	1.8
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	--	--	ND	1.8	ND	1.7	ND	1.8	ND	1.8
Perfluorooctane sulfonamide (PFOSA)	754-91-6	--	--	ND	1.8	ND	1.7	ND	1.8	ND	1.8
2,3,3,3-Tetrafluoro-2-(heptafluoropropoxy)propanoic acid (HFPO-DA)	13252-13-6	370	--	ND	1.8	ND	1.7	ND	1.8	ND	1.8
ADONA	919005-14-4	--	--	ND	1.8	ND	1.7	ND	1.8	ND	1.8
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9CL-PF3ONS)	756426-58-1	--	--	ND	1.8	ND	1.7	ND	1.8	ND	1.8
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (F-53B Minor)	763051-92-9	--	--	ND	1.8	ND	1.7	ND	1.8	ND	1.8

Notes:
All values are in nanograms per liter (ng/L).
Bold result denotes detection.
Shaded result denotes detection is above the EGLE Drinking Water Maximum Contaminant Limit (MCL) .
Red result denotes detection is above EGLE Groundwater Surface Water Criteria.
For combined PFOS and PFOA, detections of PFOA and PFOS were summed. If only one of the two analytes was detected, that result is provided as a detection. If both were not detected, the limits of quantitation are summed and the result is a non-detect.
For Total PFAS all detections were summed.
ND = Non-Detect
RL = Reporting Detection limit
-- = not applicable
a = Associated ID Standard outside control limits. Confirmed by batch QC, re-extraction and/or reanalysis.
b = Result is from Run #2
U = not detected
J = estimated value between the limit of quantitation and the method detection limit.
[ ] = duplicate sample detections
EGLE = Environment Great Lakes and Energy
B =Compound was found in the blank and sample
I = Value is EMPC (estimated maximum possible concentration).

Table 4
Sampling Frequency
Former Crown Vantage Facilities
Cooper Township Parchment, MI

Sample Collection Point	Sample Collection Point Rationale	Analysis	Frequency
Offsite Wells			
MW1801A	Location defines northern extent of area of interest. Concentrations consistently below DW and GSI criteria in five sampling events: December 2018, April 2019, November 2019, March 2020, and July 2023.	PFAs	Annual
MW1802A	Location defines northern extent of area of interest. Concentrations consistently below DW and GSI criteria in five sampling events: December 2018, April 2019, November 2019, March 2020, and July 2023.	PFAs	Annual
MW1803A	Location defines northern extent of area of interest. Concentrations consistently below DW and GSI criteria in five sampling events: December 2018, April 2019, November 2019, March 2020, and July 2023.	PFAs	Annual
MW1804A	Location defines eastern extent of area of interest. Concentrations consistently below DW and GSI criteria in five sampling events: December 2018, April 2019, November 2019, March 2020, and August 2023. However, concentrations of PFOA during August 2023 event of 6.5 ng/L are just below drinking water criterion of 8 ng/L.	PFAs	Quarterly
MW1805A	Location defines eastern extent of area of interest. Concentrations consistently below GSI criteria in five sampling events: December 2018, April 2019, November 2019, March 2020, and August 2023. However, concentrations of PFOA have been consistently above drinking water criterion of 8 ng/L during November 2019, March 2020, and August 2023.	PFAs	Quarterly
MW1806A	Location defines eastern extent of area of interest. Concentrations consistently below DW and GSI criteria in five sampling events: December 2018, April 2019, November 2019, March 2020, and August 2023. However, concentrations of PFOA during August 2023 event of 6.1 ng/L are just below drinking water criterion of 8 ng/L.	PFAs	Quarterly

Table 4
Sampling Frequency
Former Crown Vantage Facilities
Cooper Township Parchment, MI

Sample Collection Point	Sample Collection Point Rationale	Analysis	Frequency
MW1806B	Location defines eastern extent of area of interest. Concentrations consistently below DW and GSI criteria in three sampling events: December 2018, April 2019, and July 2023.	PFAs	Annual
MW1806C	Location defines northern extent of area of interest. Concentrations consistently below DW and GSI criteria in three sampling events: December 2018, April 2019, and July 2023.	PFAs	Annual
MW1807A	Location defines eastern extent of area of interest. Concentrations consistently below DW and GSI criteria in five sampling events: December 2018, April 2019, November 2019, March 2020, and August 2023.	PFAs	Annual
MW1808A	Location defines eastern extent of area of interest. Concentrations consistently below DW and GSI criteria, with the exception of PFOA. Concentrations consistent in five sampling events: December 2018, April 2019, November 2019, March 2020, and July 2023.	PFAs	Semiannual
MW1809A	This monitoring well location is installed in the first encountered aquifer and installed to evaluate concentrations detected in residential well with unknown screen depth. This location confirms elevated concentrations in first encountered aquifer. Concentrations exceed DW and GSI criteria for PFOS. Concentrations exceed only DW criteria for PFHxS.Concentrations consistent in five sampling events: January 2019, April 2019, November 2019, March 2020, and August 2023.	PFAs	Semiannual

Table 4
Sampling Frequency
Former Crown Vantage Facilities
Cooper Township Parchment, MI

Sample Collection Point	Sample Collection Point Rationale	Analysis	Frequency
MW1809C	This monitoring well location is installed in a confined aquifer to evaluate concentrations detected in residential well with unknown screen depth. Concentrations consistently below DW and GSI criteria. Concentrations consistent in three sampling events: January 2019, April 2019, and August 2023.	PFAs	Annual
MW1810A	This monitoring well location is installed in the first encountered aquifer and installed to evaluate concentrations detected in residential well with unknown screen depth. This location confirms elevated concentrations in first encountered aquifer. Concentrations exceed DW and GSI criteria for PFOA and PFOS, respectively. Concentrations consistent in five sampling events: January 2019, April 2019, November 2019, March 2020, and July 2023.	PFAs	Semiannual
MW1810B	This monitoring well location is installed in a confined aquifer to evaluate concentrations detected in residential well with unknown screen depth. Concentrations consistently below DW and GSI criteria. Concentrations consistent in three sampling events: January 2019, April 2019, and July 2023.	PFAs	Annual
MW1810C	This monitoring well location is installed in a confined aquifer to evaluate concentrations detected in residential well with unknown screen depth. Concentrations consistently below DW and GSI criteria. Concentrations consistent in three sampling events: January 2019, April 2019, and July 2023.	PFAs	Annual
MW1911A	This monitoring well location is installed in the shallow surface sand from 5 to 15 feet bgs and installed to evaluate concentrations detected in former municpal wells. This location confirms elevated concentrations. Concentrations exceed DW and GSI criteria for PFOA and PFOS, respectively. Concentrations consistent in five sampling events: March 2019, April 2019, November 2019, March 2020, and August 2023.	PFAs	Annual

Table 4
Sampling Frequency
Former Crown Vantage Facilities
Cooper Township Parchment, MI

Sample Collection Point	Sample Collection Point Rationale	Analysis	Frequency
MW1911B	This monitoring well location is installed was screened at a similar elevation as the former municipal wells within a semi-confined aquifer. This location confirms elevated concentrations. Concentrations exceed DW and GSI criteria for PFOA and PFOS, respectively. Concentrations consistent in five sampling events: March 2019, April 2019, November 2019, March 2020, and August 2023.	PFAs	Annual
MW1911C	MW1911C was installed in a confined aquifer with a well screen from 75 to 85 feet bgs. Concentrations consistently below DW and GSI criteria in three sampling events: February 2019, April 2019, and August 2023.	PFAs	Annual
MW1912A	MW1912A was installed within the water table aquifer with a well screen from 29 to 39 feet bgs, south of the former municipal wells. Concentrations exceed DW and GSI criteria for PFOA and PFOS in five events: March 2019, April 2019, November 2019 and March 2020.	PFAs	Semiannual
MW1913A	MW1913A is used to evaluate groundwater quality at the southeastern extent of the study area. MW1913A was installed in the water table aquifer with a well screen from 51 to 61 feet bgs. Concentrations consistently below DW and GSI criteria in five sampling events: December 2018, April 2019, November 2019, March 2020, and July 2023. However, concentration of PFOS during last event of 11 ng/L is just below GSI criteria of 12 ng/L.	PFAs	Quarterly
MW1914A	MW1914A is used to evaluate groundwater quality at the southeastern extent of the study area. MW1914A was installed in the water table aquifer with a well screen from 15 to 25 feet bgs. Concentrations consistently below DW and GSI criteria in four sampling events: February 2019, April 2019, November 2019 and March 2020.	PFAs	Annual

Table 4
Sampling Frequency
Former Crown Vantage Facilities
Cooper Township Parchment, MI

Sample Collection Point	Sample Collection Point Rationale	Analysis	Frequency
MW1916A	MW1916A is used to evaluate groundwater quality east of the municipal well field. MW1916A was installed within the water table aquifer with a well creen from 23 to 28 feet bgs. Concentrations consistently below GSI criteria. Concentrations exceed DW criteria for PFOA. Consistent concentations observed in five sampling events: February 2019, April 2019, November 2019, March 2020, and August 2023.	PFAs	Semiannual
MW1917A	MW1917A is used to evaluate groundwater quality southeast of the municipal well field. MW1917A was installed within the water table aquifer with a well screen from 22 to 32 feet bgs. Concentrations exceed GSI criterion for PFOS. Concentrations exceed DW criteria for PFOA and PFOS. Consistent concentations observed in five sampling events: February 2019, April 2019, November 2019, March 2020, and August 2023.	PFAs	Semiannual
MW1918A	MW1918A is used to evaluate groundwater quality north of the study area. MW1918A was installed within the water table aquifer with a well screen from 9 to 19 feet bgs. Concentrations consistently below DW and GSI criteria in five sampling events: February 2019, April 2019, March 2020, and July 2023.	PFAs	Annual
MW1919A	MW1919A is used to evaluate groundwater quality east of where EGLE identified a potential source of PFAS. MW1919A was installed within the water table aquifer with a well screen from 40 to 50 feet bgs. Concentrations exceed GSI criterion for PFOS. Concentrations exceed DW criteria for PFOA and PFOS. Concentrations consistent in five sampling events: February 2019, April 2019, November 2019, March 2020, and August 2023.	PFAs	Semiannual

Table 4
Sampling Frequency
Former Crown Vantage Facilities
Cooper Township Parchment, MI

Sample Collection Point	Sample Collection Point Rationale	Analysis	Frequency
MW1920A	MW1920A was installed to evaluate groundwater quaility in the central portion of the study area where EGLE identified a potential source of PFAS. MW1920A was installed within the water table aquifer with a well screen from 20 to 30 feet bgs. Concentrations consistently below DW and GSI criteria in five sampling events: February 2019, April 2019, November 2019, March 2020, and July 2023.	PFAs	Annual
MW1921A	MW1921A is used to evaluate groundwater quality in the western portion of the study area, hydraulically upgradient of the municipal well field where EGLE has identified a potential source of PFAS, and hydraulically downgradient from other potential sources of PFAS. MW1921A was installed within the water table aquifer with a well screen from 10 to 20 feet bgs. Concentrations consistently below GSI criteria. Concentrations exceed DW criterion for PFOA. Consistent concentations observed in five sampling events: February 2019, April 2019, November 2019, March 2020, and July 2023.	PFAs	Semiannual
MW1921C	MW1921C is used to evaluate groundwater quality in the western portion of the study area, hydraulically upgradient of the municipal well field where EGLE has identified a potential source of PFAS, and hydraulically downgradient from other potential sources of PFAS. MW1921C was installed within a confined aquifer with a well screen from 57 to 62 feet bgs. Concentrations consistently below GSI and DW criteria. Consistent concentations observed in three sampling events: February 2019, April 2019, and July 2023.	PFAs	Annual
AOI 1			
AOI1MW19367A	AOI1MW19367A is used to evaluate groundwater quality in the southern portion of AOI 1 Former Mill 1. Concentrations exceed GSI criterion for PFOS. Concentrations exceed DW criteria for PFOA and PFOS. Concentrations consistent in three sampling events: September 2019, November 2019, and March 2020.	PFAs	Semiannual

Table 4
Sampling Frequency
Former Crown Vantage Facilities
Cooper Township Parchment, MI

Sample Collection Point	Sample Collection Point Rationale	Analysis	Frequency
AOI1MW19368A	AOI1MW19368A is used to evaluate groundwater quality in the northern portion of AOI 1 Former Mill 1. Concentrations exceed GSI criterion for PFOS. Concentrations exceed DW criteria for PFOA and PFOS. Concentrations consistent in five sampling events: February 2019, April 2019, November 2019, March 2020, and August 2023.	PFAs	Annual
AOI 3			
LFMW-1	LFMW-1 is used to evaluate groundwater quality on the western portion of AOI 3 Landfill Area. Concentrations exceed both GSI and DW criteria for PFOA and PFOS. Concentrations exceed only DW criteria for PFNA and PFHxS. Concentrations consistent in two sampling events: September 2019 and August 2023.	PFAs	Semiannual
LFMW-4	LFMW-4 is used to evaluate groundwater quality on the northwest portion of AOI 3 Landfill Area. Concentrations exceed both GSI and DW criteria for PFOA, PFOS, PFNA, and PFHxS. Concentrations consistent in two sampling events: September 2019 and August 2023.	PFAs	Semiannual
LFMW-7E	LFMW-7E is used to evaluate groundwater quality on the northeast portion of AOI 3 Landfill Area. Concentrations exceed both GSI and DW criteria for PFOS. Concentrations exceed only DW criteria for PFOA. Concentrations consistent in two sampling events: September 2019 and August 2023.	PFAs	Semiannual
LFMW-8	LFMW-8 is used to evaluate groundwater quality on the northern portion of AOI 3 Landfill Area. Concentrations exceed both GSI and DW criteria for PFOA and PFOS. Concentrations exceed only DW criterion for PFNA. Concentrations consistent in two sampling events: September 2019 and August 2023.	PFAs	Semiannual

Table 4
Sampling Frequency
Former Crown Vantage Facilities
Cooper Township Parchment, MI

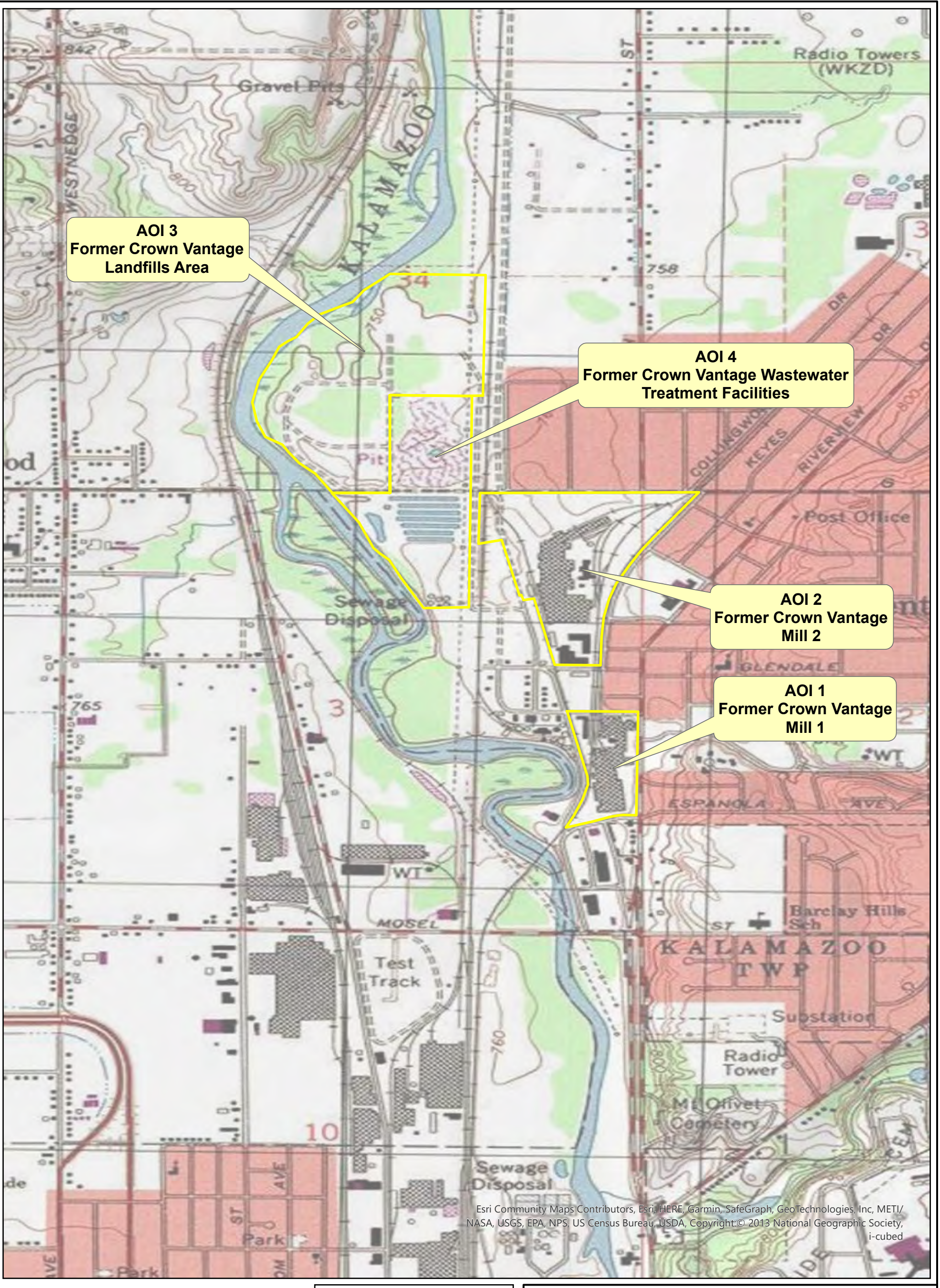
Sample Collection Point	Sample Collection Point Rationale	Analysis	Frequency
AOI3MW19310A	AOI3MW19310A is used to evaluate groundwater quality on the central portion of AOI 3 Landfill Area. Concentrations exceed both GSI and DW criteria for PFOA, PFOS, and PFNA. Concentrations exceed only DW criterion for PFHxS. Concentrations consistent in four sampling events: September 2019, November 2019, March 2020, and August 2023.	PFAs	Annual
AOI3MW19310C	AOI3MW19310C is used to evaluate groundwater quality on the central portion of AOI 3 Landfill Area. Concentrations exceed both GSI and DW criteria for PFOA, and PFOS. Concentrations exceed only DW criterion for PFNA. Concentrations consistent in four sampling events: September 2019, November 2019, March 2020, and August 2023.	PFAs	Annual
AOI3MW19311A	AOI3MW19311A is used to evaluate groundwater quality on the central portion of AOI 3 Landfill Area. Concentrations exceed both GSI and DW criteria for PFOA, PFOS, and PFNA. Concentrations consistent in four sampling events: September 2019, November 2019, March 2020, and August 2023.	PFAs	Annual
AOI3MW19311B	AOI3MW19311B is used to evaluate groundwater quality on the central portion of AOI 3 Landfill Area. Concentrations exceed both GSI and DW criteria for PFOA and PFOS. Concentrations consistent in four sampling events: September 2019, November 2019, March 2020, and August 2023.	PFAs	Annual
AOI3MW19311C	AOI3MW19311C is used to evaluate groundwater quality on the central portion of AOI 3 Landfill Area. Concentrations consistently below DW and GSI criteria, with the exception of PFOS exceeding DW and GSI criteria in March 2020 event. Concentrations consistent in three sampling events: September 2019, November 2019, and August 2023.	PFAs	Annual

Table 4
Sampling Frequency
Former Crown Vantage Facilities
Cooper Township Parchment, MI

Sample Collection Point	Sample Collection Point Rationale	Analysis	Frequency
AOI 4			
AOI4MW20387A	AOI4MW20387A is used to evaluate groundwater quality in the southern portion of AOI 4 Former Wastewater Treatment Facilities. Concentrations exceed both GSI and DW criteria for PFOA, and PFOS. Concentrations exceed only DW criterion for PFNA. Sampling events: March 2020, and August 2023.	PFAs	Semiannual
AOI4MW20387C	AOI4MW20387C is used to evaluate groundwater quality in the southern portion of AOI 4 Former Wastewater Treatment Facilities. Concentrations exceed both GSI and DW criteria for PFOS. Concentrations exceed only DW criterion for PFOA. Concentrations consistent in two sampling events: March 2020 and August 2023.	PFAs	Semiannual

Note: Frequencies are subject to change (most notably reduced frequency) if concentration trends hold or show reductions over time.

Figures



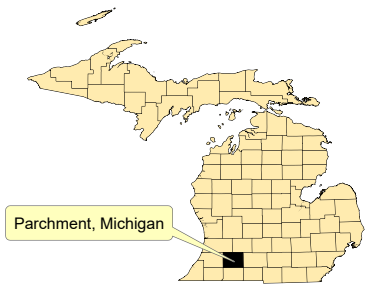
LEGEND:

Area of Interest (AOI)

N

0 1,000 2,000

GRAPHIC SCALE IN FEET



Kalamazoo County, Michigan

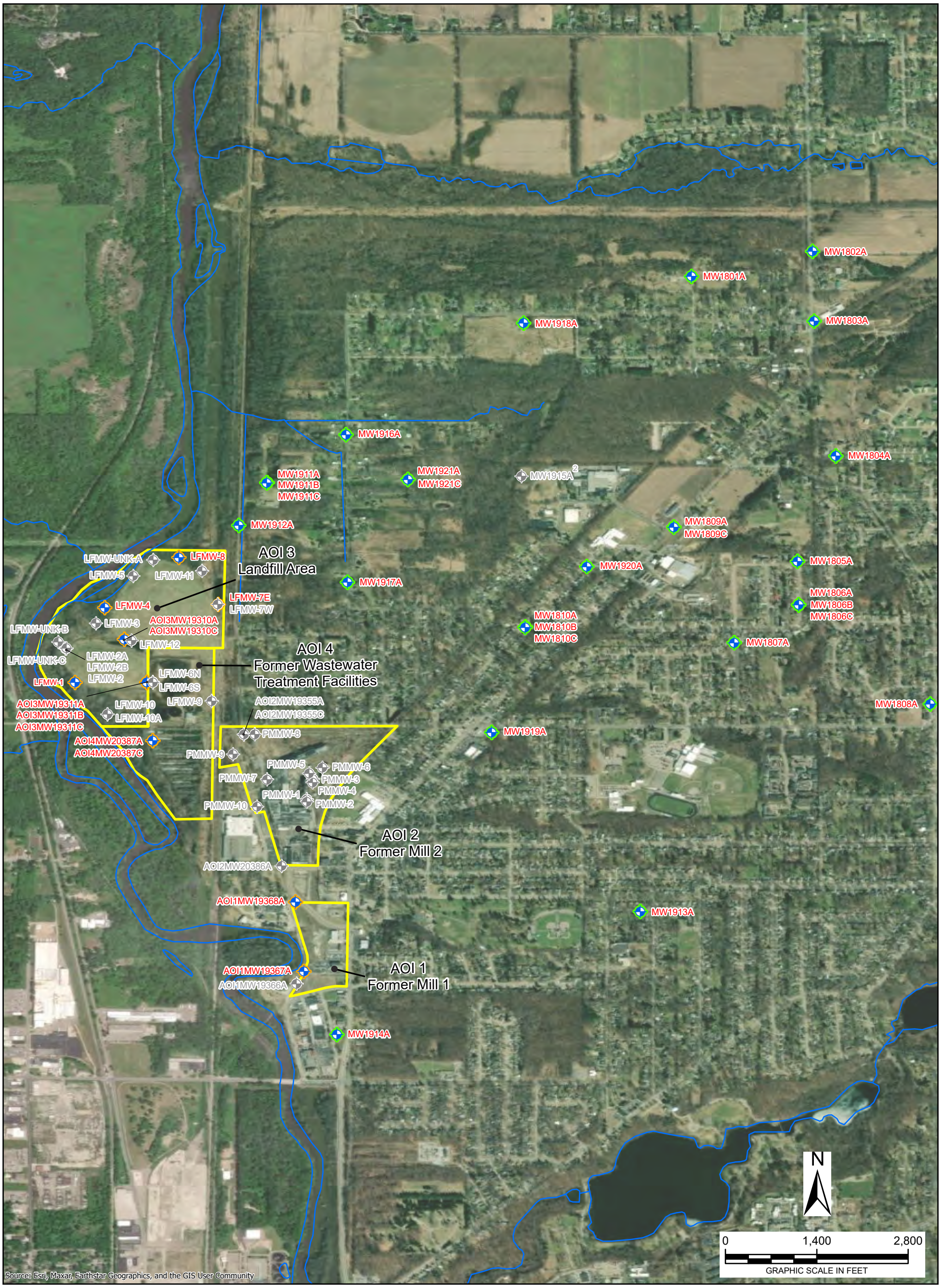
GROUNDWATER MONITORING REPORT
GEORGIA-PACIFIC
PARCHMENT, MICHIGAN

SITE LOCATION MAP

ARCADIS

FIGURE
1

Path: T:_ENV\Georgia-Pacific - Parchment\Parchment_GIS-TT\GEC\HYDROGEOLOGIC INVESTIGATION REPORT\MXD\GP Parchment Report.aprx



LEGEND:

- Offsite Sample Location
- Onsite Sample Location
- Groundwater Well
- Area of Interest (AOI)
- Surface Water

NOTES:

1. Locations in red font are proposed for sampling.
2. Monitoring well MW1915A is inaccessible.
3. AOI2 monitoring wells PMMW-7, PMMW-8, PMMW-9, AOI2MW19355A, and AOI2MW19355C no longer exist due to construction of warehouse on property.

GROUNDWATER MONITORING REPORT
GEORGIA-PACIFIC
PARCHMENT, MICHIGAN

GROUNDWATER MONITORING LOCATIONS

ARCADIS

FIGURE
2

Path: T:_ENV\Georgia-Pacific - Parchment\Parchment_GIS-TT\GEC\HYDROGEOLOGIC INVESTIGATION REPORT\MXD\GP Parchment Report.aprx

LEGEND:

- Monitoring Well - Unconfined Aquifer
- Groundwater Elevation Contour - Unconfined Aquifer

NOTES:

1. Contours generated with Surfer 15 software using default settings.
2. Contour interval = 5 feet.
3. Groundwater elevation in feet above mean sea level.
4. Water Table Aquifer data collected on July 26, 2023.

GROUNDWATER MONITORING REPORT
GEORGIA-PACIFIC
PARCHMENT, MICHIGAN

GROUNDWATER ELEVATION CONTOUR MAP - UNCONFINED AQUIFER

ARCADIS

FIGURE 3

Path: T:_ENV\Georgia-Pacific - Parchment\Parchment_GIS-TT\GEC\HYDROGEOLOGIC INVESTIGATION REPORT\MXD\GP Parchment Report.aprx

LEGEND:

- Monitoring Well - Semi-confined/ Confined Aquifer
- Groundwater Elevation Contour - Semi-Confined/Confined Aquifer

NOTES:

1. Contours generated with Surfer 15 software using default settings.
2. Contour interval = 5 feet.
3. Semi-Confined/Confined Aquifer elevation in feet above mean sea level.
4. Semi-Confined/Confined data collected on July 26, 2023, with the exception of MW-1917A (collected August 1, 2023) and MW-1807A (collected July 31, 2023).

GROUNDWATER MONITORING REPORT
GEORGIA-PACIFIC
PARCHMENT, MICHIGAN

GROUNDWATER ELEVATION CONTOUR MAP - SEMI-CONFINED/CONFINED AQUIFER

ARCADIS

FIGURE 4

Path: T:_ENV\Georgia-Pacific - Parchment\Parchment_GIS-TT\GEC\HYDROGEOLOGIC INVESTIGATION REPORT\MXD\GP Parchment Report.aprx