

MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY

INTEROFFICE COMMUNICATION

TO: Christiaan Bon, Project Manager, Gaylord District Office
Remediation and Redevelopment Division

FROM: Brian Eustice, Geologist, Hydrogeologic Unit, Geological Services Section
Remediation and Redevelopment Division

DATE: October 6, 2020

SUBJECT: Grayling Area PFAS, Crawford County, Site ID #20000099, GSS Job #1056
Per- and Polyfluoroalkyl Substances (PFAS) Investigation

Brian Eustice
(KZ)

This memorandum summarizes the methodology and findings of a PFAS investigation requested by the Department of Environment, Great Lakes, and Energy (EGLE), Remediation and Redevelopment Division's (RRD's), Gaylord District Office for the subject site. RRD's Geological Services Section (GSS), along with district personnel, performed porewater, surface water, and sediment sampling at the subject site on August 5-6, 2020. GSS received the final laboratory results on September 1, 2020.

The report includes the following:

- Site Location Map (Fig 1)
- Spring Recon Locations (Fig 2)
- Sample Locations (Fig 3)
- Sampling Summary (Table 1)
- Global Positioning System (GPS) Recordings of Sample Locations (Table 2)
- Surface Water Analytical Summary (Table 3)
- Porewater Analytical Summary (Table 4)
- Sediment Analytical Summary (Table 5)

The investigation area is located along the Au Sable River in Grayling Township, Sections 8 and 9, T26N-R3W, Crawford County, Michigan (Fig 1).

On August 5, 2020, springs and seeps discharging into the Au Sable River, within the study area, were identified during a reconnaissance trip both visually and by using submersible digital thermometers to measure changes in the surface water temperature. Overall, 18 spring locations were identified as potential sampling points (Fig 2).

On August 6, 2020, GSS and district staff collected 12 collocated porewater (PW), surface water (SW), and sediment (SD) samples at select spring locations identified during the reconnaissance trip (Fig 3).

The GSS used stainless steel, push point samplers with 4-inch long screens and overall lengths varying from 36-96 inches to collect porewater samples. The samplers were advanced by hand to depths ranging from 20-46 inches below the river bottom (based on refusal). Tubing was attached to the top of the sampler and porewater was pumped via a peristaltic pump until at least three system volumes had been purged and water quality parameters were stabilized.

To collect water quality parameters and ensure that the porewater sampler screen was isolated from the surface water, GSS used a YSI Pro Plus to monitor and compare water quality parameters (temperature, conductivity, dissolved oxygen, and pH) of the surface water prior to sampling and of the porewater during purging. After sampling, the static water level of the discharging porewater relative to the river surface was measured by holding the water filled tubing vertically and allowing the porewater level to stabilize (Table 1).

Surface water samples were collected by submerging the sample containers just below the river surface and allowing them to fill. Sediment samples were collected using stainless steel trowels to fill sample containers with sediment from the vicinity of the porewater sample locations. Sample location coordinates were recorded using a handheld GPS unit (Table 2).

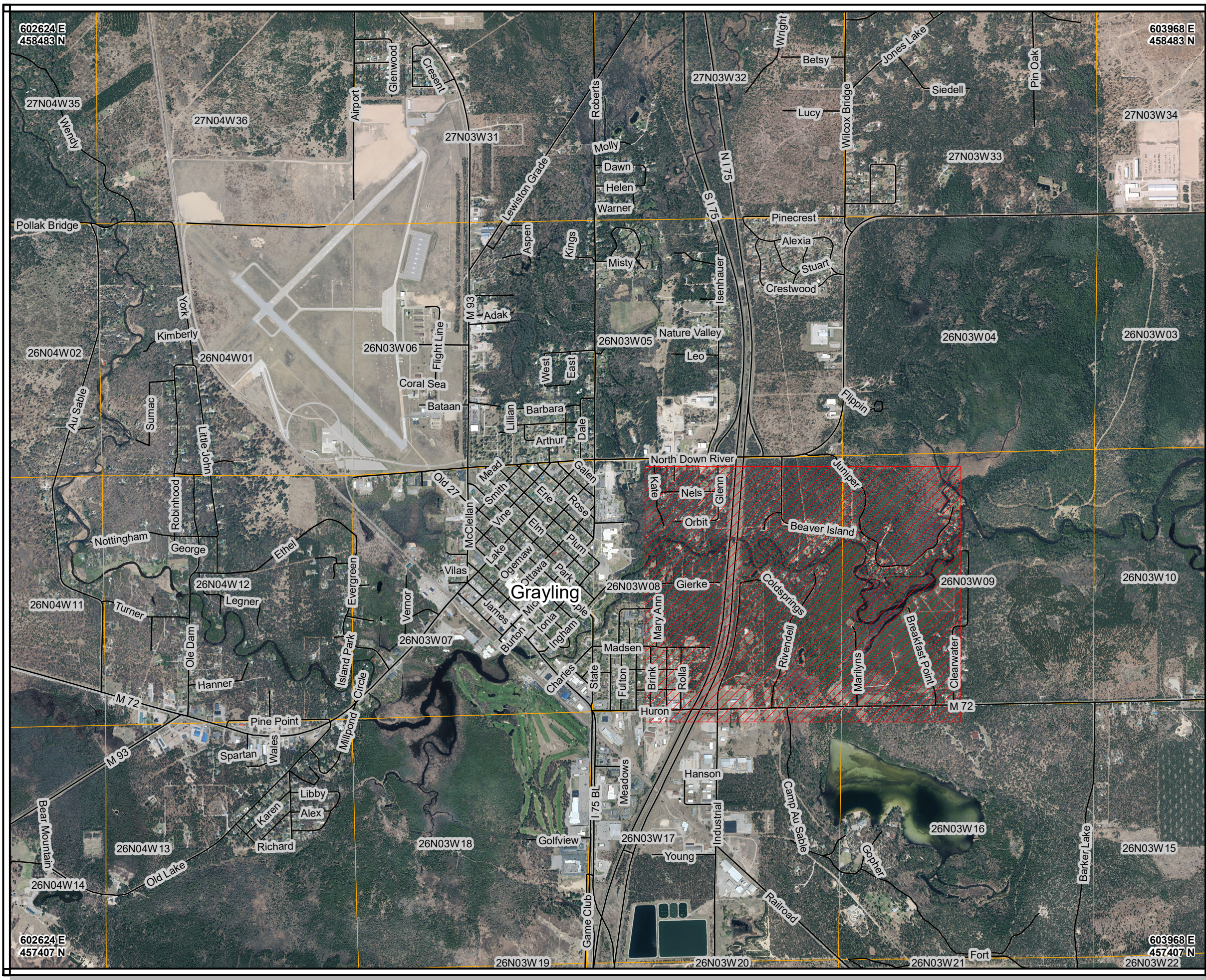
Three additional surface water samples were collected from tributaries of the Au Sable river (Fig 3). Samples SC-SW-1 and SC-SW-2 were collected from the Shellenbarger Creek and sample RC-SW-1 was collected from Robinson Creek. A duplicate sample of surface water (AS-SW-DUP-3-0820), porewater (AS-PW-DUP-3-0820), and sediment (AS-SD-DUP-3-0820) was collected at the AS-27 spring location.

Surface water, porewater, and sediment samples were submitted under Chain-of-Custody (COC) documentation to Vista Analytical Laboratories for analysis using the Modified EPA Method 537 (PFAS Isotope Dilution Method) (Table 3, Table 4, and Table 5). The laboratory results are included in Content Manager (Vista Analytical Laboratory – 2001684). Additional sediment samples were submitted to Merit Laboratories for total organic carbon analysis using the EPA Lloyd Kahn Method. The laboratory results are included in Content Manager (Merit Laboratories – 190-23842-1).




If you have any questions, contact me at 517-242-1170.

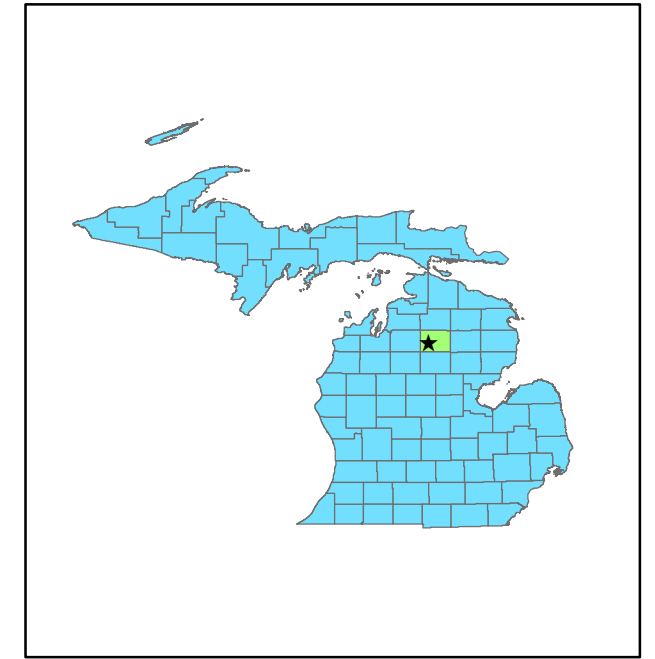
Attachments

cc: Burrell P. Shirey, EGLE
Jeff Pincumbe, EGLE
Scott Densteadt, EGLE



LEGEND

-  Study Area
-  Roads
-  Township, Range, Section



DATUM - NAD83
 PROJECTION: MICHIGAN GEOREF
 NORTHING AND EASTING COORDINATES (IN METERS)
 ARE IN CORNERS OF MAP

AERIAL PHOTO SOURCE: MICHIGAN IMAGERY


0 0.35 0.7 Miles

1 in = 0.38 miles

0 975 1,950 2,925 3,900 Feet

1 inch = 2,000 feet



Grayling Area PFAS		
SITE ID 20000099		
GRAYLING TOWNSHIP, CRAWFORD COUNTY T26N R3W SECTIONS 8 & 9		
SITE LOCATION MAP		
GEOLOGIST Brian Eustice Geological Services Section	 <small>MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY</small>	CREATION DATE September 2020
Remediation and Redevelopment Division		FIGURE 1



LEGEND

- Spring Temperature (°F)
- Roads
- Township, Range, Section

DATUM - NAD83
 PROJECTION: MICHIGAN GEOREF
 NORTHING AND EASTING COORDINATES (IN METERS)
 ARE IN CORNERS OF MAP

AERIAL PHOTO SOURCE: MICHIGAN IMAGERY


0 0.06 0.12 Miles

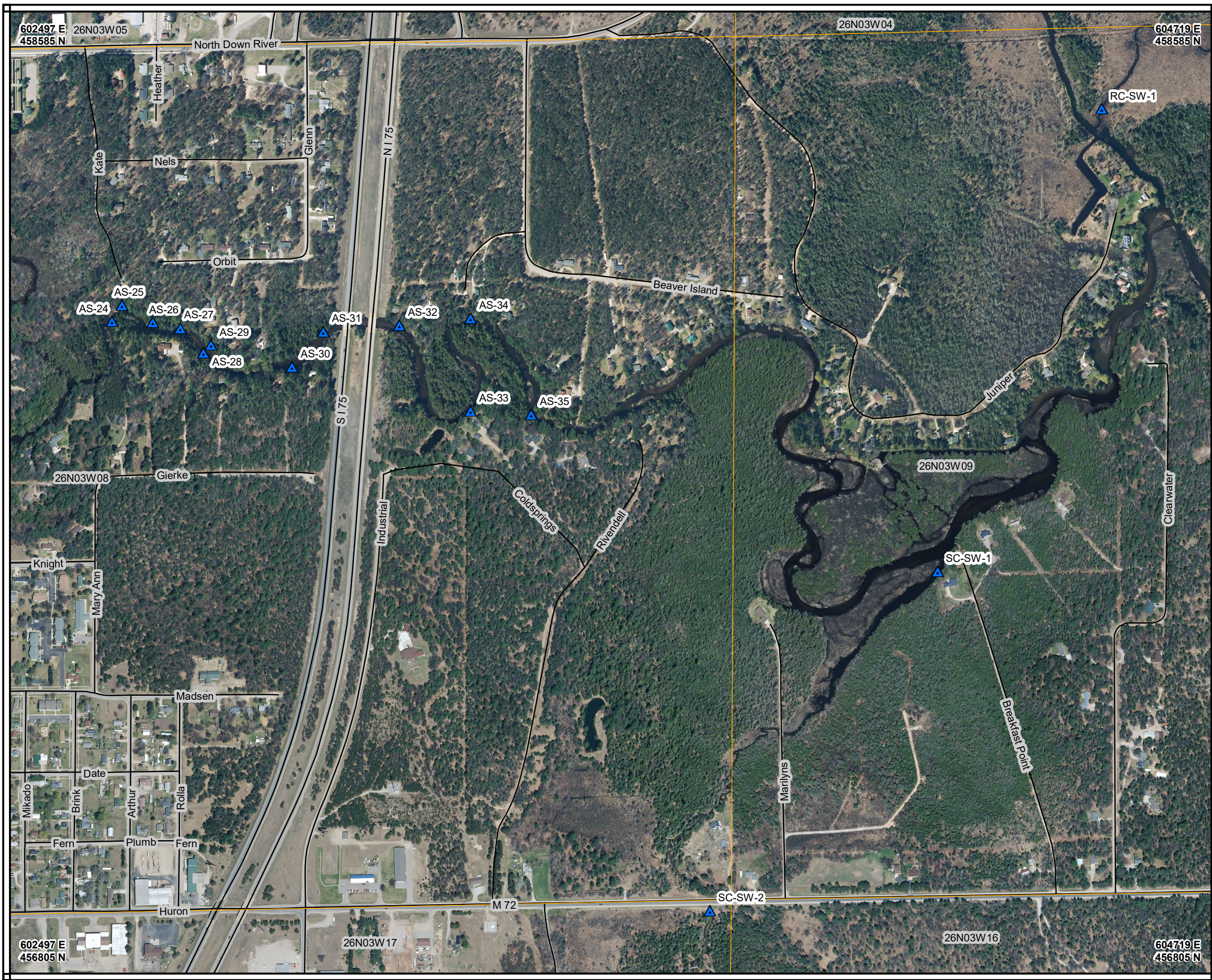
1 in = 0.067 miles

0 175 350 525 700 Feet

1 inch = 353 feet



Grayling Area PFAS		
SITE ID 20000099		
GRAYLING TOWNSHIP, CRAWFORD COUNTY T26N R3W SECTIONS 8 & 9		
AU SABLE RIVER SPRING/SEEP RECONNAISSANCE MAP		
GEOLOGIST Brian Eustice Geological Services Section	 <small>MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY</small>	CREATION DATE September 2020
Remediation and Redevelopment Division		FIGURE 2

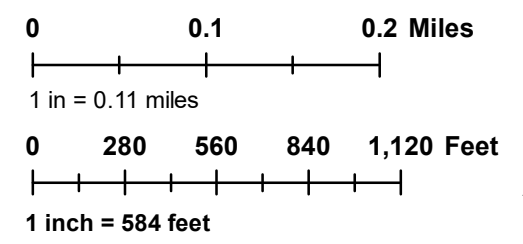


LEGEND

- ▲ Sample Locations
- Roads
- Township, Range, Section

DATUM - NAD83
 PROJECTION: MICHIGAN GEOREF
 NORTHING AND EASTING COORDINATES (IN METERS)
 ARE IN CORNERS OF MAP

AERIAL PHOTO SOURCE: MICHIGAN IMAGERY



Grayling Area PFAS		
SITE ID 20000099		
GRAYLING TOWNSHIP, CRAWFORD COUNTY T26N R3W SECTIONS 8 & 9		
AU SABLE RIVER SAMPLE LOCATION MAP		
GEOLOGIST Brian Eustice Geological Services Section	 <small>MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY</small>	CREATION DATE September 2020
Remediation and Redevelopment Division		FIGURE 3

	AS-PW-24-0820		AS-PW-25-0820		AS-PW-26-0820		AS-PW-27-0820		AS-PW-28-0820		AS-PW-29-0820		AS-PW-30-0820		AS-PW-31-0820		AS-PW-32-0820		AS-PW-33-0820		AS-PW-34-0820		AS-PW-35-0820	
Water Depth (inches)	4"		6.5"		0"		0"		2.5"		1"		0"		7"		0"		2"		0"		0"	
Bottom of 4" Screened Interval (inches below riverbed)	20"		36.5"		28.75"		27.5"		27.5"		23"		38.5"		34"		32"		36.5"		27.5"		46"	
Static Water Level (inches above surface water)	3"		7"		18.25"		10.5"		3.5"		10"		21"		5"		4"		6"		4"		21.5"	
Water Quality Measurements	Surface Water	Porewater	Surface Water	Porewater	Surface Water	Porewater	Surface Water	Porewater	Surface Water	Porewater	Surface Water	Porewater	Surface Water	Porewater	Surface Water	Porewater	Surface Water	Porewater	Surface Water	Porewater	Surface Water	Porewater	Surface Water	Porewater
Temperature (°F)	57.4	50.3	58.0	49.0	58.5	50.3	59.5	50.5	60.9	53.4	60.9	50.9	61.9	50.3	63.1	51.0	62.9	50.1	63.0	52.3	63.1	50.2	63.3	55.7
Dissolved Oxygen (%)	88.4	1.5	89.0	0.1	93.5	29.9	93.4	0.2	94.2	0.8	94.2	0.0	98.1	0.0	101.6	0.0	96.2	0.0	99.8	0.1	95.6	0.4	86.6	0.6
Dissolved Oxygen (mg/L)	9.01	0.16	9.06	0.01	9.47	3.36	9.35	0.03	9.21	0.07	9.21	0	9.54	0	9.83	0	9.32	0	9.6	0.01	9.17	0.03	8.31	0.07
Conductivity (mS/cm)	270.0	249.1	274.5	238.9	277.0	245.3	279.9	255.4	288.0	7.9	288.0	272.0	293.8	859.0	295.5	263.1	296.3	528.7	296.0	483.2	297.1	258.1	287.0	606.0
pH	8.16	7.75	8.14	7.40	7.96	6.92	7.90	7.13	7.11	7.17	7.11	7.20	7.76	7.11	8.15	7.40	7.99	7.25	8.19	7.28	7.94	7.49	8.20	7.62

Sample ID	Seep Recon ID	Latitude	Longitude
AS-24	SS-1	44.666356290	-84.702587860
AS-25	SS-2	44.666623920	-84.702353360
NA	SS-3	44.666378240	-84.702017790
AS-26	SS-4	44.666330960	-84.701635100
AS-27	SS-5	44.666227820	-84.700995220
NA	SS-6	44.666194880	-84.700819370
AS-28	SS-8	44.665806240	-84.700463500
AS-29	SS-7	44.665936000	-84.700294000
NA	SS-9	44.665536600	-84.700005800
AS-30	SS-10	44.665552970	-84.698405570
NA	SS-11	44.665838110	-84.698004020
AS-31	SS-12	44.666132270	-84.697668930
AS-32	SS-13	44.666214670	-84.695890200
NA	SS-14	44.664699230	-84.695228510
AS-33	SS-15	44.664769780	-84.694256220
AS-34	SS-16	44.666312820	-84.694223550
AS-35	SS-17	44.664691684	-84.692846525
NA	SS-18	44.665987100	-84.687222000
SC-SW-1	NA	44.661974000	-84.683421000
SC-SW-2	NA	44.656381000	-84.688863000
RC-SW-1	NA	44.669629220	-84.679419290

Sample ID	AS-SW-24-0820	AS-SW-25-0820	AS-SW-26-0820	AS-SW-27-0820	AS-SW-28-0820	AS-SW-29-0820	AS-SW-30-0820	AS-SW-31-0820
Analyte	Units	Method						
L-PFBA	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
L-PFPeA	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
L-PFBS	ng/L	Modified EPA Method 537	ND	ND	ND	12	ND	ND
L-4:2 FTS	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
L-PFHxA	ng/L	Modified EPA Method 537	ND	ND	ND	3.83 J	ND	ND
L-PFPeS	ng/L	Modified EPA Method 537	ND	ND	ND	9.72	ND	ND
HFPO-DA	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
L-PFHpA	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
ADONA	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
L-PFHxS	ng/L	Modified EPA Method 537	ND	ND	ND	31.9	ND	ND
Br-PFHxS	ng/L	Modified EPA Method 537	ND	ND	ND	8.11 Q	ND	ND
Total PFHxS	ng/L	Modified EPA Method 537	ND	ND	ND	40	ND	ND
L-6:2 FTS	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
L-PFOA	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
Br-PFOA	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
Total PFOA	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
PFecHS	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
L-PFHpS	ng/L	Modified EPA Method 537	ND	ND	ND	1.54 J	ND	ND
L-PFNA	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
L-PFOSA	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
L-PFOS	ng/L	Modified EPA Method 537	ND	ND	ND	28	ND	ND
Br-PFOS	ng/L	Modified EPA Method 537	ND	ND	ND	18.6	ND	ND
Total PFOS	ng/L	Modified EPA Method 537	ND	ND	ND	46.7	ND	ND
9Cl-PF3ONS	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
L-PFDA	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
L-8:2FTS	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
L-PFNS	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
L-MeFOSAA	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
Br-MeFOSAA	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
Total MeFOSAA	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
L-EtFOSAA	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
Br-EtFOSAA	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
Total EtFOSAA	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
L-PFUnA	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
L-PFDS	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
11Cl-PF3OUdS	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
L-PFDoA	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
L-PFTrDA	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
L-PFTeDA	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND

Grey indicates contaminant was detected.
 ND = Not Detected
 J = The amount detected is below the Reporting Limit/LOQ.
 Q = Ion ratio outside of the acceptance criteria.

Sample ID	AS-SW-32-0820	AS-SW-33-0820	AS-SW-34-0820	AS-SW-35-0820	AS-SW-DUP-3-0820	SC-SW-1-0820	SC-SW-2-0820	RC-SW-1-0820	
Analyte	Units	Method							
L-PFBA	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	
L-PFPeA	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	
L-PFBS	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	
L-4:2 FTS	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	
L-PFHxA	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	
L-PFPeS	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	
HFPO-DA	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	
L-PFHpA	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	
ADONA	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	
L-PFHxS	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	
Br-PFHxS	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	
Total PFHxS	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	
L-6:2 FTS	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	
L-PFOA	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	
Br-PFOA	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	
Total PFOA	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	
PFechS	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	
L-PFHpS	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	
L-PFNA	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	
L-PFOSA	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	
L-PFOS	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	
Br-PFOS	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	
Total PFOS	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	
9Cl-PF3ONS	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	
L-PFDA	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	
L-8:2FTS	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	
L-PFNS	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	
L-MeFOSAA	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	
Br-MeFOSAA	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	
Total MeFOSAA	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	
L-EtFOSAA	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	
Br-EtFOSAA	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	
Total EtFOSAA	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	
L-PFUnA	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	
L-PFDS	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	
11Cl-PF3OUdS	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	
L-PFDoA	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	
L-PFTrDA	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	
L-PFTeDA	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	

Grey indicates contaminant was detected.
 ND = Not Detected
 J = The amount detected is below the Reporting Limit/LOQ.
 Q = Ion ratio outside of the acceptance criteria.

Sample ID	Units	Method	AS-PW-24-0820	AS-PW-25-0820	AS-PW-26-0820	AS-PW-27-0820	AS-PW-28-0820	AS-PW-29-0820	AS-PW-30-0820
L-PFBA	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	ND
L-PFPeA	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	ND
L-PFBS	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	ND
L-4:2 FTS	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	ND
L-PFHxA	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	ND
L-PFPeS	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	ND
HFPO-DA	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	ND
L-PFHpA	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	ND
ADONA	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	ND
L-PFHxS	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	ND
Br-PFHxS	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	ND
Total PFHxS	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	ND
L-6:2 FTS	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	ND
L-PFOA	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	ND
Br-PFOA	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	ND
Total PFOA	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	ND
PFecHS	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	ND
L-PFHpS	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	ND
L-PFNA	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	ND
L-PFOSA	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	ND
L-PFOS	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	ND
Br-PFOS	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	ND
Total PFOS	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	ND
9CI-PF3ONS	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	ND
L-PFDA	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	ND
L-8:2FTS	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	ND
L-PFNS	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	ND
L-MeFOSAA	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	ND
Br-MeFOSAA	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	ND
Total MeFOSAA	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	ND
L-EtFOSAA	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	ND
Br-EtFOSAA	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	ND
Total EtFOSAA	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	ND
L-PFUnA	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	ND
L-PFDS	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	ND
11CI-PF3OUdS	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	ND
L-PFDoA	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	ND
L-PFTrDA	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	ND
L-PFTeDA	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	ND

Grey indicates contaminant was detected.
 J = The amount detected is below the Reporting Limit/LOQ.
 Q = Ion ratio outside of the acceptance criteria.

Vista Analytical Laboratory
 Work Order: 2001684/2001685
 Report Date: August 31, 2020
 Client: EGLE-RRD-GAYLORD
 Attention: Christiaan Bon
 Project Name: Grayling Area PFAS

Sample ID	AS-PW-31-0820	AS-PW-32-0820	AS-PW-33-0820	AS-PW-34-0820	AS-PW-35-0820	AS-PW-DUP-3-0820		
Analyte	Units	Method						
L-PFBA	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
L-PFPeA	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
L-PFBS	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
L-4:2 FTS	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
L-PFHxA	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
L-PFPeS	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
HFPO-DA	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
L-PFHpA	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
ADONA	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
L-PFHxS	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
Br-PFHxS	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
Total PFHxS	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
L-6:2 FTS	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
L-PFOA	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
Br-PFOA	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
Total PFOA	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
PFecHS	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
L-PFHpS	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
L-PFNA	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
L-PFOSA	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
L-PFOS	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
Br-PFOS	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
Total PFOS	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
9Cl-PF3ONS	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
L-PFDA	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
L-8:2FTS	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
L-PFNS	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
L-MeFOSAA	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
Br-MeFOSAA	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
Total MeFOSAA	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
L-EtFOSAA	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
Br-EtFOSAA	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
Total EtFOSAA	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
L-PFUnA	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
L-PFDS	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
11Cl-PF3OUdS	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
L-PFDoA	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
L-PFTrDA	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
L-PFTeDA	ng/L	Modified EPA Method 537	ND	ND	ND	ND	ND	ND

Grey indicates contaminant was detected.
 J = The amount detected is below the Reporting Limit/LOQ.
 Q = Ion ratio outside of the acceptance criteria.

Sample ID			AS-SD-24-0820	AS-SD-25-0820	AS-SD-26-0820	AS-SD-27-0820	AS-SD-28-0820	AS-SD-29-0820	AS-SD-30-0820
Analyte	Units	Method							
L-PFBA	ng/g	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	ND
L-PFPeA	ng/g	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	ND
L-PFBS	ng/g	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	ND
L-4:2 FTS	ng/g	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	ND
L-PFHxA	ng/g	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	ND
L-PFPeS	ng/g	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	ND
HFPO-DA	ng/g	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	ND
L-PFHpA	ng/g	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	ND
ADONA	ng/g	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	ND
L-PFHxS	ng/g	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	ND
Br-PFHxS	ng/g	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	ND
Total PFHxS	ng/g	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	ND
L-6:2 FTS	ng/g	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	ND
L-PFOA	ng/g	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	ND
Br-PFOA	ng/g	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	ND
Total PFOA	ng/g	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	ND
PFecHS	ng/g	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	ND
L-PFHpS	ng/g	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	ND
L-PFNA	ng/g	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	ND
L-PFOA	ng/g	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	ND
L-PFOS	ng/g	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	ND
Br-PFOS	ng/g	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	ND
Total PFOS	ng/g	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	ND
9CI-PF3ONS	ng/g	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	ND
L-PFDA	ng/g	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	ND
L-8:2FTS	ng/g	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	ND
L-PFNS	ng/g	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	ND
L-MeFOSAA	ng/g	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	ND
Br-MeFOSAA	ng/g	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	ND
Total MeFOSAA	ng/g	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	ND
L-EtFOSAA	ng/g	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	ND
Br-EtFOSAA	ng/g	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	ND
Total EtFOSAA	ng/g	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	ND
L-PFUnA	ng/g	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	ND
L-PFDS	ng/g	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	ND
11CI-PF3OUdS	ng/g	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	ND
L-PFDoA	ng/g	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	ND
L-PFTrDA	ng/g	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	ND
L-PFTeDA	ng/g	Modified EPA Method 537	ND	ND	ND	ND	ND	ND	ND

Grey indicates contaminant was detected.
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 Q = Ion ratio outside of the acceptance criteria.

Vista Analytical Laboratory
 Work Order: 2001684/2001685
 Report Date: August 31, 2020
 Client: EGLE-RRD-GAYLORD
 Attention: Christiaan Bon
 Project Name: Grayling Area PFAS

Sample ID	Units	Method	AS-SD-31-0820	AS-SD-32-0820	AS-SD-33-0820	AS-SD-34-0820	AS-SD-35-0820	AS-SD-DUP-3-0820
L-PFBA	ng/g	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
L-PFPeA	ng/g	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
L-PFBS	ng/g	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
L-4:2 FTS	ng/g	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
L-PFHxA	ng/g	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
L-PFPeS	ng/g	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
HFPO-DA	ng/g	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
L-PFHpA	ng/g	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
ADONA	ng/g	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
L-PFHxS	ng/g	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
Br-PFHxS	ng/g	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
Total PFHxS	ng/g	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
L-6:2 FTS	ng/g	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
L-PFOA	ng/g	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
Br-PFOA	ng/g	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
Total PFOA	ng/g	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
PFecHS	ng/g	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
L-PFHpS	ng/g	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
L-PFNA	ng/g	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
L-PFOSA	ng/g	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
L-PFOS	ng/g	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
Br-PFOS	ng/g	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
Total PFOS	ng/g	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
9CI-PF3ONS	ng/g	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
L-PFDA	ng/g	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
L-8:2FTS	ng/g	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
L-PFNS	ng/g	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
L-MeFOSAA	ng/g	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
Br-MeFOSAA	ng/g	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
Total MeFOSAA	ng/g	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
L-EtFOSAA	ng/g	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
Br-EtFOSAA	ng/g	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
Total EtFOSAA	ng/g	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
L-PFUnA	ng/g	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
L-PFDS	ng/g	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
11Cl-PF3OUdS	ng/g	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
L-PFDoA	ng/g	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
L-PFTDA	ng/g	Modified EPA Method 537	ND	ND	ND	ND	ND	ND
L-PFTeDA	ng/g	Modified EPA Method 537	ND	ND	ND	ND	ND	ND

Grey indicates contaminant was detected.
 J = The amount detected is below the Reporting Limit/LOQ.
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