GRFIA – Burger Goodwood Neighborhood Project Summary

Consolidation and Contamination Risk Reduction Grant Application

Project No. 210059
January 29, 2021

fishbeck
Engineers | Architects | Scientists | Constructors

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List of Abbreviations/Acronyms

City	City of Grand Rapids
C2R2	Consolidation and Contamination Risk Reduction
EGLE	Michigan Department of Environment, Great Lakes and Energy
GRFIA	Gerald R. Ford International Airport
Township	Cascade Charter Township

1.0 Project Need

Cascade Township's Burger and Goodwood neighborhoods became an official MPART Area of Interest in March 2019 due to their proximity to known potential PFAS sources and local geologic features. The "Cascade Township Residential Wells" Area of Interest, located east of the 36th Street exits off I-96 and west of the Thornapple River, are depicted in Figure 1

In addition, The Gerald R. Ford International Airport (GRFIA) is an MPART PFAS site located in Cascade Charter Township (Township) and depicted in Figure 2. As noted on the MPART website, this site has operated as an airport since the 1960s. Federally required firefighting training activities and annual equipment testing have utilized PFAS containing aqueous film forming foam.

To date, the Michigan Department of Environment, Great Lakes and Energy (EGLE) has requested to sample approximately 475 residential drinking water wells through five sampling phases. Samples were collected from only those properties where EGLE was given permission; 364 residential drinking water wells were sampled and compared to the new Part 201 cleanup criteria made effective August 3, 2020. As summarized in Table 1 and Table 2 below, PFAS chemical levels greater than one or more of the PFAS MCLs have been detected in samples from 40 individual residential wells and one or more PFAS compounds were detected in more than 60% of results indicating a need to pursue a long-term solution, protective of public health. Documented sample results are provided in Appendix 1.

Table 1 – PFOS, PFOA, and PFNA

	Non-Detect	Detected (no exceedance)	Exceedance: PFOA (>8 ppt) , PFOS (>16 ppt) or PFNA (>6 ppt)
Number of Results	204	120	40

Table 2 – Range Total Tested PFAS

	Non-Detect	>0 to <10	10 to <100	100 to <200
Number of Results	142	78	137	7

2.0 Project Plan

The City of Grand Rapids (City), in partnership with the Township, have identified a long-term solution to address PFAS contamination in residential wells. Consolidating residential wells onto the City domestic water main, which only partially serves the neighborhood at this time, has been identified by the Township as the most effective long-term solution. The proposed project will be accomplished in phases.

Phase 1, or the proposed project area for the Consolidation and Contamination Risk Reduction (C2R2) grant, is outlined in red on Figure 1. As summarized in Table 3 below, Phase 1 proposes the construction of 12,025 feet of water main and the connection of 256 residential wells to the City domestic water main. Within Phase 1, 61% of the parcels that were sampled had detectable levels of PFAS. Assuming an average of 2.62 people per household, Phase 1 will benefit approximately 671 people.

Table 3 – Proposed Phase 1 Activities

Activity	Unit	Quantity
Proposed Water Main	Feet	12,025
Proposed Water Main and Service Connection	Each	168
Proposed Service Connection to Existing Water Main	Each	88

Future phases, identified in blue on Figure 1, will include expanding the City's domestic water main and connecting additional residential wells. Proposed future activities are summarized below in Table 4. Assuming an average of 2.62 people per household, Phase 2 will benefit approximately 569 people.

Table 4 - Proposed Future Activities

Activity	Unit	Quantity
Future Water Main	Feet	18,050
Future Water Main and Service Connection	Each	217

3.0 Estimated Project Costs

Preliminary construction estimates, broken down by phases, are provided in Table 5 and Table 6 below. The applicant is requesting the maximum grant award of $5 million for the proposed Phase 1 activities. Detail schematic included in Appendix 5.

Table 5 – Phase 1 Estimated Project Costs

Item	Unit	Quantity	Unit Cost	Total
Phase 1				
Water Main, 12-inch	Feet	5,100	$165	$841,500
Water Main, 12-inch Creek Crossing	Feet	400	$300	$120,000
Water Main, 8-inch	Feet	6,275	$145	$909,875
Water Main, 8-inch Creek Crossing	Feet	250	$300	$75,000
Water Service, Residential, 1-inch	Each	168	$1,500	$252,000
Water Service Connection to Home	Each	256	$5,650	$1,446,400
Well Abandonment	Each	256	$750	$192,000
Residential Pressure Reducing Valves	Each	120	$500	$60,000
			Construction Sub-total	**$3,896,775**
			Contractor mobilization, overhead, and project costs (15%)	$584,500
			Construction and estimating contingency (20%)	$779,350
			Phase 1 Preliminary Construction Estimate	**$5,260,625**
			Survey, Engineering Des & CA (15%)	$789,100
			Phase 1 Estimated Project Cost	**$6,049,725**

Table 6 - Future Phases Estimated Project Costs

Item	Unit	Quantity	Unit Cost	Total
Water Main, 12-inch	Feet	2,800	$165	$462,000
Water Main, 12-inch Creek Crossing	Feet	300	$300	$90,000
Water Main, 8-inch	Feet	14,950	$145	$2,167,750
System Pressure Reducing Valve	Each	1	$125,000	$125,000
Water Service, Residential, 1-inch	Each	217	$1,500	$325,500
Water Service Connection to Home	Each	217	$5,725	$1,242,325
Well Abandonment	Each	217	$750	$162,750
Residential Pressure Reducing Valves	Each	100	$500	$50,000
			Construction Sub-total	**$4,625,325**
			Contractor mobilization, overhead, and project costs (15%)	$693,800
			Construction and estimating contingency (20%)	$925,075
			Future Phases Preliminary Construction Estimate	**$6,244,200**
			Survey, Engineering Des & CA (15%)	$936,600
			Future Phases Estimated Project Cost	**$7,180,800**

4.0 Proposal Evaluation Ranking/Scoring

The following section provides additional details to the ranking/scoring questions to accompany the grant application.

1. **Population benefitting as a result of the project:**
   The estimated population benefitting from all phases of the project is 1,240 people based on the Township average of 2.62 people per household.

2. **Has the applicant (or system) reported PFAS levels greater than one or more of the PFAS MCL's?**
   The Applicant (City of Grand Rapids) most current water test sample results (November 20, 2020) at the Lake Michigan Filtration Plant are non-detect for PFAS. Test results are included in Appendix 2.

3. **Do residential wells being connected as a result of this project have documented sample results indicating PFAS is present?**
   Residential wells within the project area have reported PFAS chemical levels greater than one or more of the PFAS MCLs including 40 residential wells exceeding either the PFOA limit of 8 ppt, the PFOS limit of 16 ppt, or the PFNA level of 6 ppt.

4. **Has the applicant (or system) had an MCL violation in the past three years?**
   The MCL violation other than PFAS criteria may not apply specifically to this type of consolidation of residential wells since it is not a public system. However, the Kent County Department of Health has reported residential wells in the project area have elevated levels of nitrates above the MCL. There is additional benefit to the residents in providing public water service beyond just reducing the exposure to PFAS compounds.

5. **Is consolidating systems a primary outcome of this grant?**
   The primary outcome of this grant is to consolidate 473 residential wells (All Phases) to the City water system.

6. Is the project area within or adjacent to an active or past MPART official site or area of interest?

   The project is within an active MPART official site/area of Interest.

7. Was the applicant's most recent Sanitary Survey completed with no deficiencies?
   The City's most recent sanitary survey (2017) identified three deficiencies. A copy of the communication from the DEQ to the City is included in Appendix 3 – City of Grand Rapids – 2017 Water System Sanitary Survey. The three items identified by DEQ have been addressed by the City and there are currently no outstanding deficiencies. A copy of the City response letter to DEQ is also included in Appendix 3.

5.0 Timeline

Phase 1 engineering would begin immediately following the executed grant agreement, currently estimated as mid-April in accordance with the provided guidance. Engineering would be complete by late 2021 with competitive bidding expected in early 2022 and construction beginning in Spring of 2022. At this time, we expect most of the water main construction and service connections would occur during the 2022 construction season with the possibility that some final connections would be made in 2023, contingent on property owner cooperation or other challenges outside the control of the project team.

Future phases are expected to be completed after Phase 1 is complete. Future phases will first prioritize the homes that have test results indicating the presence of PFAS compounds in the wells. Water system reliability and water quality will also be a consideration when determining the priorities of future phases.

6.0 Project Support

The project has received support from the following entities in addition to the City (Applicant):

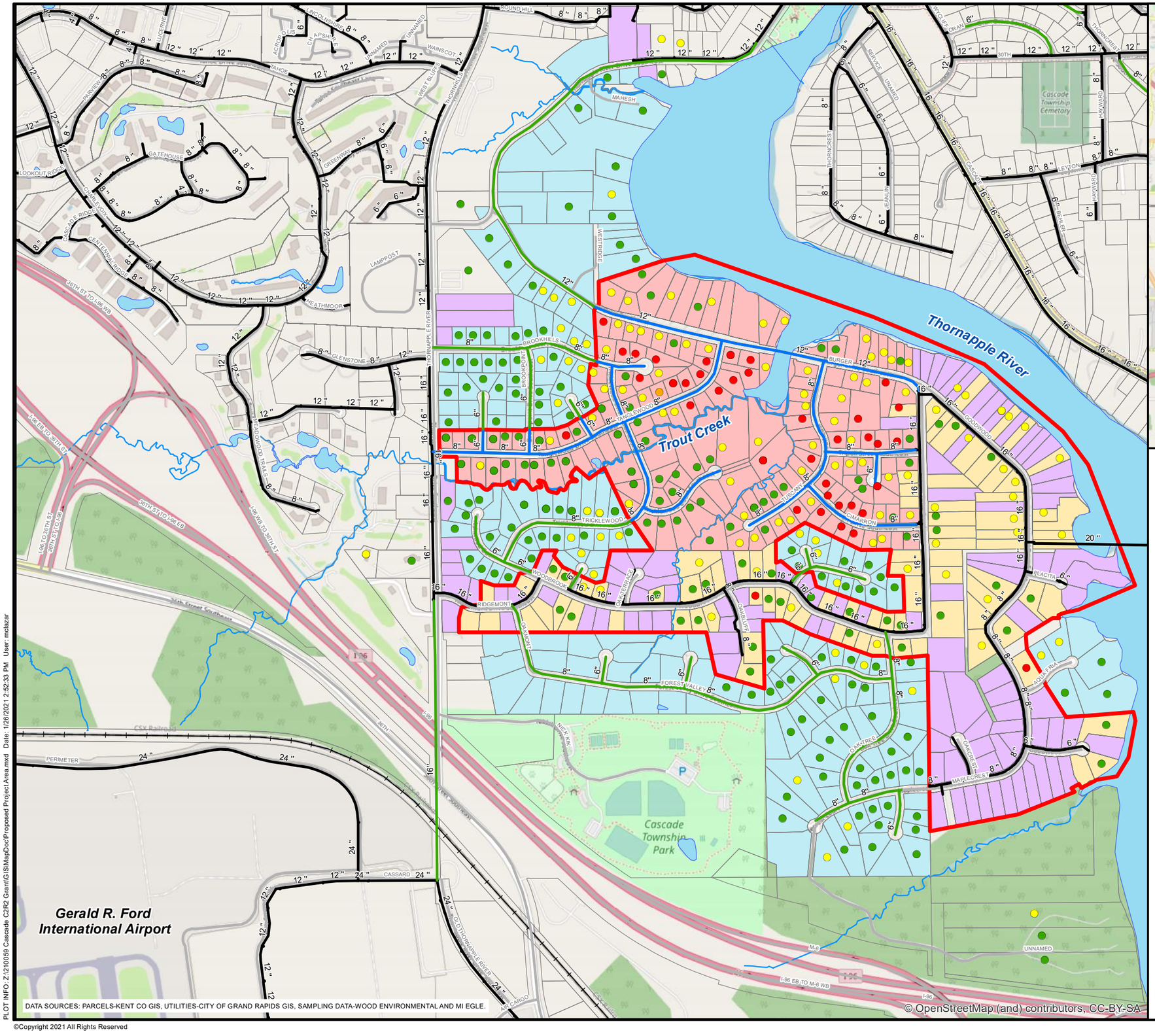
- Utility Advisory Board is a regional partnership with communities outside of the Grand Rapids city limits that are served by the City water and sewer system.
- Township
- State Senator Winnie Brinks and State Representative Thomas Albert

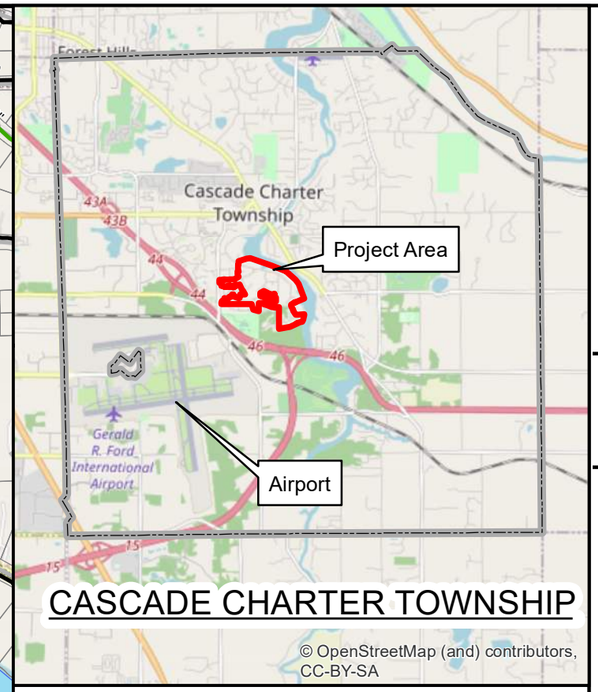
Copies of the Letters of Support are included in Appendix 4.

7.0 Conclusion

C2R2 grant funding will support the consolidation of residential wells in the MPART "Cascade Township Residential Wells" Area of Interest onto the City system. When completed, the proposed project will result in the connection of 473 residential wells to the City domestic water main, benefiting approximately 1,240 people. A grant award of $5 million from EGLE would result in approximately $8.23 million additional investment to address PFAS-contaminated residential wells.

Figures





CASCADE CHARTER TOWNSHIP

Legend

Residential Sampling PFOA+PFOS Phase 1, 2, 3, 4 & 5

- Non-detect for PFOA and PFOS
- Detection for PFOA or PFOS, but No Exceedance
- Concentration of a PFAS (other than PFOA/PFOS) Compound Exceeding an MCL
- Exceedance, PFOA>8ppt or PFOS>16ppt
- Proposed Water Main
- Future Water Main
- Existing Water Main
- Proposed Project
- Proposed Water Main and Service Connection (168)
- Proposed Service Connection to Existing Water Main (88)
- Future Water Main and Service Connection (217)
- Current City Water Customer

NORTH

0 400 800 FEET

PROPOSED PROJECT AREA

fishbeck
Engineers | Architects | Scientists | Constructors

Hard copy is intended to be 11"x17" when plotted. Scale(s) indicated and graphic quality may not be accurate for any other size.

Cascade Charter Township & City of Grand Rapids & Gerald R. Ford International Airport

GRFIA - Burger Goodwood Neighborhood

PROJECT NO.
210059

FIGURE NO.
1

PLOT INFO: Z:\210059 Cascade C2R2 Grant\GIS\MapDoc\Proposed Project Area.mxd Date: 1/26/2021 2:52:33 PM User: mclazar

Gerald R. Ford International Airport (GRFIA) PFAS Investigation

All locations are approximate

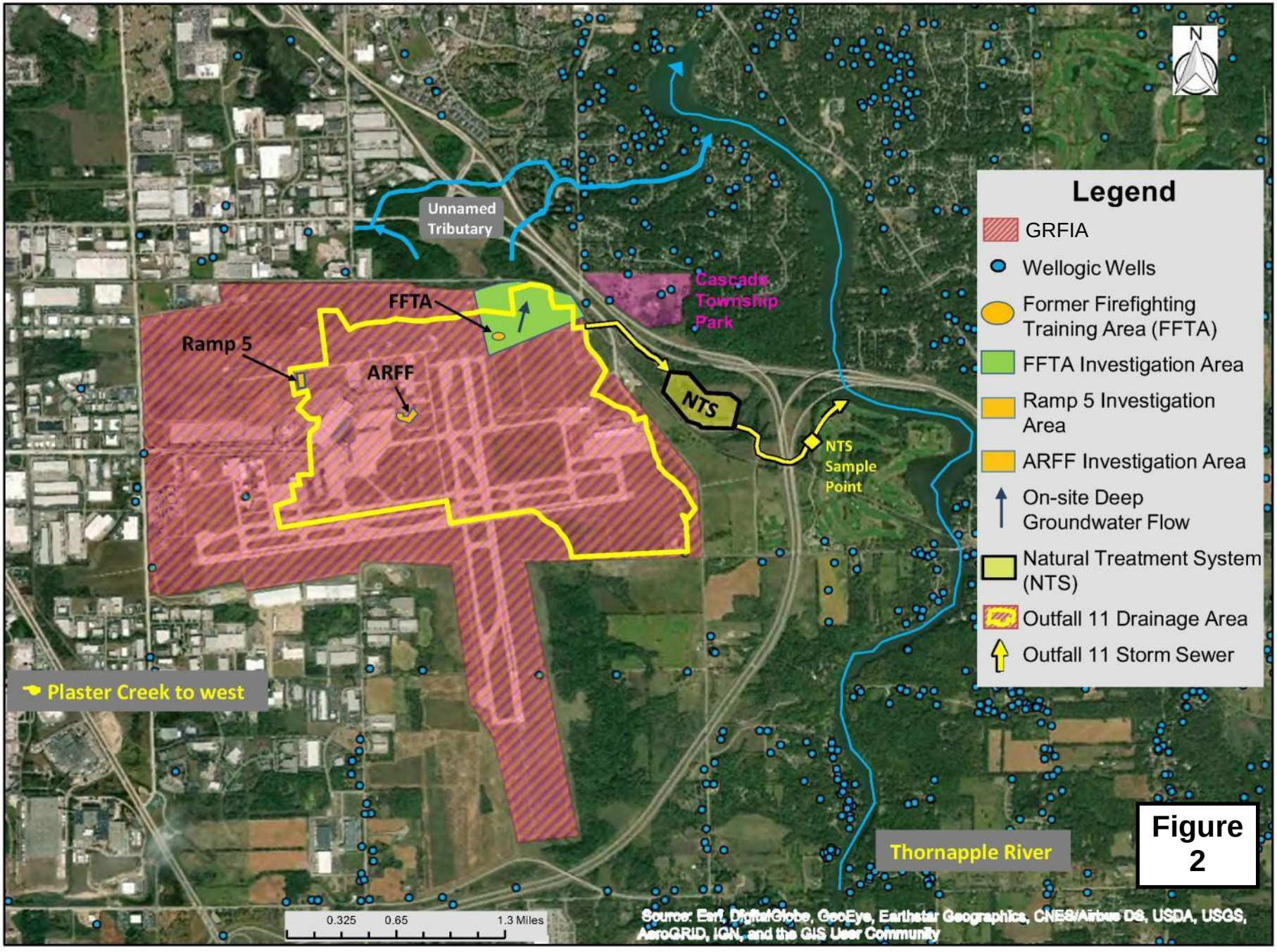


Figure 2

Appendix 1

Cascade Township Residential Sampling
PFAS Analytical Results
Phases 1-4

Client ID	Sample Date	ANALYTE	NEtFOSAA	NMeFOSAA	PFBS	PFDA	PFDoA	PFHpA	PFHxA	PFHxS	PFNA	PFOA	PFOS	PFTA	PFTrDA	PFUnA	TOTAL PFAS
		CAS #	2991-50-6	2355-31-9	375-73-5	335-76-2	307-55-1	375-85-9	307-24-4	355-46-4	375-95-1	335-67-1	1763-23-1	376-06-7	72629-94-8	2058-94-8	
		Carbon Chain Length	C8	C8	C4	C10	C12	C7	C6	C6	C9	C8	C8	C14	C13	C11	
		EGLE DW Criteria	NA	NA	420	NA	NA	NA	400,000	51	6	8	16	NA	NA	NA	NA
		Well Depth															
1006497	11/18/2019	115	ND	ND	ND	ND	ND	ND	**3.15J**	**4.07J**	ND	ND	ND	ND	ND	ND	**7.22**
1006511	11/18/2019	69	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1006529-BR	11/21/2019	65	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1006540	11/18/2019	54	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1006560-BR	11/18/2019	41	ND	ND	ND	ND	ND	ND	ND	**1.62J**	ND	ND	**11.4B**	ND	ND	ND	**13.02**
1006565-BR	11/18/2019	150	ND	ND	ND	ND	ND	**1.8J**	**4.58J**	**4.52J**	**3.47J**	**4.11J**	**9.59**	ND	ND	ND	**28.07**
1006581	11/18/2019	135	ND	ND	ND	ND	ND	**3.03J**	**6.83J**	**4.22J**	**4.21J**	**6.17J**	**13.4**	ND	ND	ND	**37.86**
1006617	11/18/2019	Unknown	ND	ND	ND	ND	ND	**2.82J**	**7.09J**	**3.87J**	**4.76J**	**5.44J**	**12.5**	ND	ND	ND	**36.48**
1006578	8/19/2019	Unknown	ND	ND	ND	ND	ND	ND	**2.40J**	**2.95J**	ND	**2.84J**	**1.58J**	ND	ND	ND	**9.77**
1006614	8/22/2019	Unknown	ND	ND	**4.18J**	ND	ND	ND	**6.26J**	**1.65J**	ND	**2.48J**	ND	ND	ND	ND	**14.57**
1006633	8/22/2019	96	ND	ND	**1.68J**	ND	ND	**5.79J**	**18.4**	**7.85J**	**3.85J**	**11.3**	**17.5**	ND	ND	ND	**66.37**
1006636	8/22/2019	Unknown	ND	ND	**1.27J**	ND	ND	ND	ND	**3.37J**	ND	ND	ND	ND	ND	ND	**4.64**
1006651	8/22/2019	91	ND	ND	**6.50J**	ND	ND	**6.64J**	**16.3**	**13.8**	ND	**10.4**	**3.84J**	ND	ND	ND	**57.48**
1006654	8/22/2019	Unknown	ND	ND	**1.88J**	ND	ND	**4.57J**	**13**	**10.1**	**4.60J**	**8.96**	**23.9**	ND	ND	ND	**67.01**
1006668-BR	8/22/2019	Unknown	ND	ND	**2.78J**	ND	ND	**4.66J**	**10.9**	**12.1**	**4.06J**	**7.78J**	**13.1**	ND	ND	ND	**55.38**
1006669	8/22/2019	Unknown	ND	ND	**8.86**	ND	ND	**9.65**	**22.2**	**14.6**	**2.01J**	**15.5**	**6.51J**	ND	ND	ND	**79.33**
1003446	5/14/2019	130'	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1003461	5/14/2019	40'	ND	ND	**5.82J**	ND	ND	ND	**1.73J**	ND	ND	ND	ND	ND	ND	ND	**7.55**
1003373	8/19/2019	85	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1003410	8/19/2019	67	ND	ND	ND	ND	ND	ND	**2.09J**	**2.62J**	ND	ND	ND	ND	ND	ND	**4.71**
1003430	8/22/2019	118	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1003370	12/4/2019	94	ND	ND	ND	ND	ND	ND	ND	**2.24J**	ND	ND	**1.99B**	ND	ND	ND	**4.23**
1006480	11/19/2019	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1006534	11/19/2019	NA	ND	ND	ND	ND	ND	ND	**3.19J**	**3.52J**	ND	**1.52J**	ND	ND	ND	ND	**8.23**
1006552	11/21/2019	88	ND	ND	**1.29J**	ND	ND	**1.59J**	**4.21J**	**5.32J**	ND	**3.25J**	**4.53J**	ND	ND	ND	**20.19**
1006575	11/19/2019	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1006576	11/19/2019	89	ND	ND	**2.28J**	ND	ND	**1.8J**	**5.36J**	**6.86J**	ND	**3.28J**	**1.88J**	ND	ND	ND	**21.46**
1006931-BU	11/19/2019	NA	ND	ND	**3.44J**	ND	ND	ND	ND	**1.41J**	ND	**1.96J**	**4.65J**	ND	ND	ND	**11.46**
1006937	11/19/2019	NA	ND	ND	**2.37J**	ND	ND	**2.75J**	**8.76**	**4.06J**	ND	**4.64J**	**7.47J**	ND	ND	ND	**30.05**
1006943	12/4/2019	99	ND	ND	ND	ND	ND	ND	**2.62J**	ND	ND	ND	**2.87B**	ND	ND	ND	**5.49**
1006953	12/4/2019	84	ND	ND	ND	ND	ND	ND	**3.34J**	ND	ND	ND	**3.59B**	ND	ND	ND	**6.93**
1006964	11/19/2019	45	ND	ND	**6.31J**	ND	ND	**7.22J**	**14.5**	**6.52J**	ND	**14.9**	**7.3J**	ND	ND	ND	**56.75**
1006965-BU	11/19/2019	77	ND	ND	ND	ND	ND	ND	**1.85J**	ND	ND	ND	ND	ND	ND	ND	**1.85**
1006985-BU	11/19/2019	119	ND	ND	**11.8**	ND	ND	**1.94J**	**5.92J**	**4.17J**	ND	**7.1J**	**9.09**	ND	ND	ND	**40.02**
1007031	11/20/2019	123	ND	ND	**3.42J**	ND	ND	**2.66J**	**6.85J**	**4.44J**	**1.48J**	**5.64J**	**4.41J**	ND	ND	ND	**28.9**
1007039	11/20/2019	NA	ND	ND	**3.76J**	ND	ND	**3.81J**	**10.3**	**4.96J**	ND	**8.12J**	**1.65J**	ND	ND	ND	**32.6**
1007070	11/20/2019	33	ND	ND	**4.04J**	ND	ND	ND	**1.82J**	**5.24J**	ND	ND	ND	ND	ND	ND	**11.1**
1007115	11/20/2019	125	ND	ND	**3.09J**	ND	ND	**1.86J**	**4.98J**	**3.72J**	ND	**1.75J**	**2.84J**	ND	ND	ND	**18.24**
1007150	11/20/2019	65	ND	ND	**18.5**	ND	ND	ND	**3.82J**	**7.32J**	ND	**2.25J**	ND	ND	ND	ND	**31.89**
1007160	11/20/2019	74	ND	ND	**1.76J**	ND	ND	ND	**4.52J**	**6.63J**	ND	ND	ND	ND	ND	ND	**12.91**
1007180	12/4/2019	NA	ND	ND	ND	ND	ND	ND	ND	**6.49J**	ND	ND	ND	ND	ND	ND	**6.49**
1007190	11/19/2019	102	ND	ND	**2.24J**	ND	ND	**1.66J**	**5.87J**	**3.54J**	ND	**3.6J**	**3.02J**	ND	ND	ND	**19.93**

Cascade Township Residential Sampling
PFAS Analytical Results
Phases 1-4

Client ID	Sample Date	ANALYTE	NEtFOSAA	NMeFOSAA	PFBS	PFDA	PFDoA	PFHpA	PFHxA	PFHxS	PFNA	PFOA	PFOS	PFTA	PFTrDA	PFUnA	TOTAL PFAS
		CAS #	2991-50-6	2355-31-9	375-73-5	335-76-2	307-55-1	375-85-9	307-24-4	355-46-4	375-95-1	335-67-1	1763-23-1	376-06-7	72629-94-8	2058-94-8	
		Carbon Chain Length	C8	C8	C4	C10	C12	C7	C6	C6	C9	C8	C8	C14	C13	C11	
		EGLE DW Criteria	NA	NA	420	NA	NA	NA	400,000	51	6	8	16	NA	NA	NA	NA
		Well Depth															
1007231	11/20/2019	NA	ND	ND	**1.32J**	ND	ND	ND	**2.72J**	**4.14J**	ND	ND	**2B**	ND	ND	ND	**10.18**
1007275	12/2/2019	72	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1007288	12/2/2019	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1007085	8/20/2019	67	ND	ND	**2.70J**	ND	ND	ND	**2.07J**	**4.33J**	ND	ND	ND	ND	ND	ND	**9.1**
1006522	8/21/2019	66	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1006608	8/21/2019	Unknown	ND	ND	**5.57J**	ND	ND	**5.29J**	**15.9**	**12.1**	ND	**9.66**	**3.11J**	ND	ND	ND	**51.63**
1006611	8/22/2019	Unknown	ND	ND	**1.37J**	ND	ND	ND	**4.95J**	**3.78J**	ND	ND	**2.19J**	ND	ND	ND	**12.29**
1006625	8/22/2019	Unknown	ND	ND	ND	ND	ND	ND	ND	**1.72J**	ND	ND	ND	ND	ND	ND	**1.72**
1006630	8/20/2019	Unknown	ND	ND	**2.53J**	ND	ND	**1.75J**	**4.93J**	**4.79J**	ND	**3.34J**	ND	ND	ND	ND	**17.34**
1006643	8/20/2019	Unknown	ND	ND	ND	ND	ND	ND	**2.98J**	**2.91J**	ND	ND	**2.31J**	ND	ND	ND	**8.2**
1006650-BU	8/22/2019	Unknown	ND	ND	**3.49J**	ND	ND	**2.31J**	**7.31J**	**7.83J**	ND	**4.76J**	**2.91J**	ND	ND	ND	**28.61**
1006668-BU	8/21/2019	109'	ND	ND	**5.01J**	ND	ND	**2.47J**	**7.96J**	**7.24J**	ND	**4.30J**	**2.73J**	ND	ND	ND	**29.71**
1006677	8/22/2019	Unknown	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1006681-BU	8/21/2019	138	ND	ND	**1.74J**	ND	ND	ND	**2.10J**	**3.15J**	ND	**1.59J**	**2.33J**	ND	ND	ND	**10.91**
1006684	8/21/2019	Unknown	ND	ND	**4.16J**	ND	ND	**2.06J**	**6.85J**	**5.31J**	ND	**3.89J**	**1.59J**	ND	ND	ND	**23.86**
1006704	8/21/2019	87	ND	ND	**1.73J**	ND	ND	ND	ND	**3.96J**	ND	ND	ND	ND	ND	ND	**5.69**
1006717-BU	8/22/2019	Unknown	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1006718	8/21/2019	Unknown	ND	ND	**2.37J**	ND	ND	**2.29J**	**8.07J**	**4.93J**	ND	**2.20J**	ND	ND	ND	ND	**19.86**
1006920	8/20/2019	Unknown	ND	ND	**4.99J**	ND	ND	**4.18J**	**8.38J**	**4.00J**	ND	**5.57J**	**5.31J**	ND	ND	ND	**32.43**
1006944	8/20/2019	Unknown	ND	ND	**5.46J**	ND	ND	**4.25J**	**7.90J**	**4.11J**	ND	**5.97J**	**3.73**	ND	ND	ND	**31.42**
1007105	8/20/2019	68	ND	ND	**3.29J**	ND	ND	ND	**3.17J**	**2.94J**	ND	ND	ND	ND	ND	ND	**9.4**
1006727	5/14/2019	43'	ND	ND	**2.01J**	ND	ND	**2.81J**	**10.3**	**5.95J**	ND	**3.33J**	**2.69J**	ND	ND	ND	**27.09**
1006800-DR	5/14/2019	129'	ND	ND	**1.61J**	ND	ND	**3.90J**	**9.84**	**4.49J**	**2.50J**	**7.87J**	**15.1**	ND	ND	ND	**45.31**
1006811	5/15/2019	50'	ND	ND	**10.6**	ND	ND	ND	ND	**1.76J**	ND	**3.28J**	**3.31J**	ND	ND	ND	**18.95**
1006825	5/13/2019	Unknown	ND	ND	ND	ND	ND	**2.05J**	**8.26J**	**1.72J**	ND	**3.92J**	**10.7**	ND	ND	ND	**26.65**
1006881	5/15/2019	41'	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1006891	5/14/2019	54'	ND	ND	ND	ND	ND	ND	**2.53J**	ND	ND	ND	ND	ND	ND	ND	**2.53**
1006878	11/20/2019	NA	ND	ND	**9.94**	ND	ND	**5.64J**	**22**	**6.15J**	ND	**13.8**	**4.33B**	ND	ND	ND	**61.86**
1006900-CI	11/20/2019	128	ND	ND	**10.6**	ND	ND	**6.68J**	**25**	**5.18J**	ND	**15.2**	**7.82B**	ND	ND	ND	**70.48**
1006916-CI	11/20/2019	NA	ND	ND	**3.9J**	ND	ND	**1.91J**	**4.62J**	**2.88J**	ND	**8.05J**	**3.74B**	ND	ND	ND	**25.1**
1006932	11/20/2019	59	ND	ND	**4.43J**	ND	ND	**2.21J**	**5.43J**	**3.32J**	ND	**7.25J**	**3.49B**	ND	ND	ND	**26.13**
1006950	11/20/2019	105	ND	ND	**4.66J**	ND	ND	**2.54J**	**9.54**	**3.51J**	ND	**5.85J**	**2.77B**	ND	ND	ND	**28.87**
1006986	12/2/2019	NA	ND	ND	**1.49J**	ND	ND	ND	ND	**5.44J**	ND	ND	ND	ND	ND	ND	**6.93**
1006860	8/21/2019	Unknown	ND	ND	**4.74J**	ND	ND	**2.40J**	**7.52J**	**4.59J**	ND	**5.74J**	**1.94J**	ND	ND	ND	**26.93**
1006865	8/20/2019	Unknown	ND	ND	**6.65J**	ND	ND	**4.86J**	**12.1**	**5.05J**	ND	**10.4**	**6.95J**	ND	ND	ND	**46.01**
1006871	8/20/2019	63	ND	ND	**7.66J**	ND	ND	**5.28J**	**22**	**7.64J**	ND	**10.3**	**14.1**	ND	ND	ND	**66.98**
1006885	8/20/2019	63	ND	ND	**11.6**	ND	ND	**4.17J**	**15.3**	**5.75J**	ND	**10.7**	**13.6**	ND	ND	ND	**61.12**
1006901	8/20/2019	66	ND	ND	**14.7**	ND	ND	**8.15J**	**31.7**	**7.23J**	**2.26J**	**20.8**	**14.1**	ND	ND	ND	**98.94**
1006923	8/20/2019	63	ND	ND	**6.26J**	ND	ND	**3.50J**	**10.8**	**4.38J**	ND	**10.6**	**4.25J**	ND	ND	ND	**44.04**
1006985	8/20/2019	Unknown	ND	ND	**4.51J**	ND	ND	**2.38J**	**6.61J**	**7.51J**	ND	**3.46J**	ND	ND	ND	ND	**24.47**
1006941	5/15/2019	58'	ND	ND	**2.72J**	ND	ND	**3.23J**	**12.4**	**5.97J**	ND	**4.63J**	ND	ND	ND	ND	**28.95**
1006965	5/14/2019	77'	ND	ND	**2.77J**	ND	ND	ND	**4.96J**	**6.09J**	ND	ND	ND	ND	ND	ND	**13.82**

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Client ID	Sample Date	ANALYTE	NEtFOSAA	NMeFOSAA	PFBS	PFDA	PFDoA	PFHpA	PFHxA	PFHxS	PFNA	PFOA	PFOS	PFTA	PFTrDA	PFUnA	TOTAL PFAS
		CAS #	2991-50-6	2355-31-9	375-73-5	335-76-2	307-55-1	375-85-9	307-24-4	355-46-4	375-95-1	335-67-1	1763-23-1	376-06-7	72629-94-8	2058-94-8	
		Carbon Chain Length	C8	C8	C4	C10	C12	C7	C6	C6	C9	C8	C8	C14	C13	C11	
		EGLE DW Criteria	NA	NA	420	NA	NA	NA	400,000	51	6	8	16	NA	NA	NA	NA
		Well Depth															
1006886-FO	11/21/2019	45	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	**1.68J**	ND	ND	ND	**1.68**
1006897	11/21/2019	NA	ND	ND	ND	ND	ND	ND	**2.44J**	**2.76J**	ND	ND	ND	ND	ND	ND	**5.2**
1006900-FO	11/21/2019	81	ND	ND	**2.36J**	ND	ND	ND	**3.93J**	**3.45J**	ND	ND	ND	ND	ND	ND	**9.74**
1006914-FO	12/2/2019	118	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1006925-FO	11/21/2019	63	ND	ND	**2.68J**	ND	ND	ND	ND	**2.23J**	ND	ND	ND	ND	ND	ND	**4.91**
1006905	5/14/2019	Unknown	ND	ND	**3.33J**	ND	ND	ND	**4.41J**	**3.35J**	ND	**1.56J**	ND	ND	ND	ND	**12.65**

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Client ID	Sample Date	ANALYTE	NEtFOSAA	NMeFOSAA	PFBS	PFDA	PFDoA	PFHpA	PFHxA	PFHxS	PFNA	PFOA	PFOS	PFTA	PFTrDA	PFUnA	TOTAL PFAS
		CAS #	2991-50-6	2355-31-9	375-73-5	335-76-2	307-55-1	375-85-9	307-24-4	355-46-4	375-95-1	335-67-1	1763-23-1	376-06-7	72629-94-8	2058-94-8	
		Carbon Chain Length	C8	C8	C4	C10	C12	C7	C6	C6	C9	C8	C8	C14	C13	C11	
		EGLE DW Criteria	NA	NA	420	NA	NA	NA	400,000	51	6	8	16	NA	NA	NA	NA
		Well Depth															
1003425	11/20/2019	79	ND	ND	**3.58J**	ND	ND	**2.7J**	**7.62J**	**15.9**	ND	**4.96J**	**7.8B**	ND	ND	ND	**42.56**
1003426	11/20/2019	NA	ND	ND	**5.36J**	ND	ND	ND	**2.63J**	**10.4**	ND	**2.52J**	**4.4B**	ND	ND	ND	**25.31**
1003434-GO	11/20/2019	121	ND	ND	**3.58J**	ND	ND	ND	**3.25J**	**11**	ND	**2.37J**	**4.35B**	ND	ND	ND	**24.55**
1003439	11/20/2019	NA	ND	ND	**6.41J**	ND	ND	ND	**3.51J**	**6.07J**	ND	ND	ND	ND	ND	ND	**15.99**
1003455	11/20/2019	85	ND	ND	**11**	ND	ND	**2.18J**	**8.01J**	**8.55**	ND	**4.69J**	**2.46J**	ND	ND	ND	**36.89**
1003468	11/20/2019	77	ND	ND	**2.11J**	ND	ND	ND	ND	**2.21J**	ND	ND	**2.68B**	ND	ND	ND	**7**
1003475	11/20/2019	112	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1003480	11/20/2019	NA	ND	ND	**13.3**	ND	ND	**1.92J**	**6.95J**	**7.04J**	ND	**5.97J**	**8.09J**	ND	ND	ND	**43.27**
1003491	11/20/2019	NA	ND	ND	**8.84**	ND	ND	ND	**3.24J**	**1.93J**	ND	**4.32J**	ND	ND	ND	ND	**18.33**
1003506-GO	11/20/2019	67	ND	ND	**6.76J**	ND	ND	**1.69J**	**6.16J**	**5.62J**	ND	**5.08J**	**2.57B**	ND	ND	ND	**27.88**
1003517-GO	11/21/2019	108	ND	ND	**12.2J**	ND	ND	ND	**2.96J**	**5.4J**	ND	**2.81J**	**3.89J**	ND	ND	ND	**27.26**
1003539-GO	11/21/2019	NA	ND	ND	**3.7J**	ND	ND	**2.42J**	**16.3**	**1.61J**	ND	**7.82J**	**1.86J**	ND	ND	ND	**33.71**
1003558	11/20/2019	57	ND	ND	**10.2**	ND	ND	**4.2J**	**6.47J**	**5.47J**	ND	**8.81**	**8.29B**	ND	ND	ND	**43.44**
1003584	11/20/2019	NA	ND	ND	**1.57J**	ND	ND	**3.29J**	**6.42J**	**7.89J**	ND	**6.94J**	ND	ND	ND	ND	**26.11**
1003593	11/20/2019	108	ND	ND	**6.48J**	ND	ND	**1.89J**	**12**	**3.17J**	ND	**4.46J**	**2.71B**	ND	ND	ND	**30.71**
1003648	11/20/2019	41	ND	ND	ND	ND	ND	ND	ND	**7.37J**	ND	ND	ND	ND	ND	ND	**7.37**
1003651	11/21/2019	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1003669	11/20/2019	72	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	**2.24J**	ND	ND	ND	**2.24**
1003700	11/20/2019	NA	ND	ND	**1.71J**	ND	ND	ND	**2.55J**	**4.15J**	ND	ND	ND	ND	ND	ND	**8.41**
1003715	11/20/2019	78	ND	ND	**2.59J**	ND	ND	**2.39J**	**8.88**	**10.1**	ND	**3.3J**	ND	ND	ND	ND	**27.26**
1003565-GO	8/21/2019	70	ND	ND	**8.54**	ND	ND	**1.78J**	**7.48J**	**5.72J**	ND	**5.83J**	**6.22J**	ND	ND	ND	**35.57**
1003462	3/25/19	Unknown	ND	ND	**4.48J**	ND	ND	ND	**2.89J**	**24.8**	ND	ND	**5.26J**	ND	ND	ND	**37.43**
1006991	8/20/2019	124	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1003411	8/19/2019	130	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1003434	8/21/2019	30	ND	ND	**5.41J**	ND	ND	ND	**4.11J**	**1.90J**	ND	ND	ND	ND	ND	ND	**11.42**
1003417	5/13/2019	61'	ND	ND	**10.9**	ND	ND	**5.92J**	**14.0**	**6.52J**	ND	**5.78J**	**1.67J**	ND	ND	ND	**44.79**
1003433	5/13/2019	Unknown	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1003454	3/27/19	62	ND	ND	**11.6**	ND	ND	ND	**5.84J**	**3.91J**	ND	**1.75J**	ND	ND	ND	ND	**23.1**
1003801	11/21/2019	120	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1003615	11/21/2019	133	ND	ND	**1.52J**	ND	ND	ND	**4.58J**	ND	ND	**2.1J**	**2.03J**	ND	ND	ND	**10.23**
1003620	11/21/2019	NA	ND	ND	**3.24J**	ND	ND	**3.03J**	**11.9**	**1.43J**	ND	**3.74J**	ND	ND	ND	ND	**23.34**
1003594	11/19/2019	NA	ND	ND	**1.74J**	ND	ND	**2.64J**	**8.17J**	**3.06J**	ND	**3.28J**	ND	ND	ND	ND	**18.89**
1003610	12/4/2019	138	ND	ND	ND	ND	ND	ND	**2.87J**	ND	ND	ND	**1.98B**	ND	ND	ND	**4.85**
1006847	11/19/2019	NA	ND	ND	ND	ND	ND	ND	**3.93J**	ND	ND	ND	ND	ND	ND	ND	**3.93**
1006870	11/19/2019	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1006890	12/4/2019	100	ND	ND	ND	ND	ND	ND	**1.98J**	ND	ND	ND	**3.16B**	ND	ND	ND	**5.14**
1006899	11/19/2019	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1006916-SA	12/2/2019	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1003601-SA	8/21/2019	100	ND	ND	ND	ND	ND	ND	**4.18J**	ND	ND	ND	ND	ND	ND	ND	**4.18**
1006927	8/20/2019	120	ND	ND	ND	ND	ND	ND	ND	**2.07J**	ND	ND	ND	ND	ND	ND	**2.07**
1006928	8/20/2019	Unknown	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1006931	8/20/2019	Unknown	ND	ND	**1.44J**	ND	ND	ND	**6.93J**	**7.07J**	ND	ND	ND	ND	ND	ND	**15.44**

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Client ID	Sample Date	ANALYTE	NEtFOSAA	NMeFOSAA	PFBS	PFDA	PFDoA	PFHpA	PFHxA	PFHxS	PFNA	PFOA	PFOS	PFTA	PFTrDA	PFUnA	TOTAL PFAS
		CAS #	2991-50-6	2355-31-9	375-73-5	335-76-2	307-55-1	375-85-9	307-24-4	355-46-4	375-95-1	335-67-1	1763-23-1	376-06-7	72629-94-8	2058-94-8	
		Carbon Chain Length	C8	C8	C4	C10	C12	C7	C6	C6	C9	C8	C8	C14	C13	C11	
		EGLE DW Criteria	NA	NA	420	NA	NA	NA	400,000	51	6	8	16	NA	NA	NA	NA
		Well Depth															
1006690-TA	8/19/2019	54	ND	ND	**1.45J**	ND	ND	ND	ND	**4.36J**	ND	ND	**1.60J**	ND	ND	ND	**7.41**
1006717-TA	8/21/2019	57	ND	ND	**2.26J**	ND	ND	**8.97**	**22.1**	**12.6**	**10.4**	**15.2**	**51.9**	ND	ND	ND	**123.43**
1006741-DR	5/15/2019	99'	ND	ND	**2.99J**	ND	ND	**13.4**	**31.9**	**12.6**	**4.43J**	**15.1**	**20.1**	ND	ND	ND	**100.52**
1006742	5/14/2019	39'	ND	ND	**1.61J**	ND	ND	**10.5**	**31.9**	**5.82J**	**4.07J**	**13.0**	**23.2**	ND	ND	ND	**90.1**
1006487	5/14/2019	30'	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1006506	5/15/2019	67'	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1006542	5/14/2019	52'	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1006583	5/13/2019	30'	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1006650	5/13/2019	75'	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1006647	5/15/2019	Unknown	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1006665	5/14/2019	71'	ND	ND	**2.31J**	ND	ND	ND	ND	**14.5**	ND	**3.60J**	**3.36J**	ND	ND	ND	**23.77**
1006672	5/14/2019	154'	ND	ND	ND	ND	ND	ND	ND	**4.19J**	ND	**1.56J**	**3.41J**	ND	ND	ND	**9.16**
1006681	5/14/2019	Unknown	ND	ND	**1.80J**	ND	ND	**2.34J**	**5.05J**	**11.2J**	**9.10**	**4.40J**	**14.1**	ND	ND	ND	**47.99**
1006760	5/13/2019	Unknown	ND	ND	**1.46J**	ND	ND	**11.6**	**35.3**	**4.76J**	**4.15J**	**15.6**	**18.9**	ND	ND	ND	**91.77**
1006710	5/14/2019	48'	ND	ND	**1.75J**	ND	ND	**3.69J**	**8.96**	**4.44J**	**2.65J**	**8.99**	**14.2**	ND	ND	ND	**44.68**
1006767	5/15/2019	88'	ND	ND	**2.33J**	ND	ND	**9.68**	**24.5**	**12.2**	**4.02J**	**13.7**	**19.3**	ND	ND	ND	**85.73**
1006770	5/14/2019	135'	ND	ND	**1.31J**	ND	ND	**12.0**	**34.9**	**4.44J**	**3.75J**	**13.9**	**18.6**	ND	ND	ND	**88.9**
1006787	5/15/2019	30'	ND	ND	**1.87J**	ND	ND	**8.30J**	**20.3**	**13.7**	ND	**6.78J**	**5.39J**	ND	ND	ND	**56.28**
1006790	5/14/2019	Unknown	ND	ND	**2.29J**	ND	ND	**19.7**	**38.7**	**11.7**	**4.56J**	**23.2**	**19.7**	ND	ND	ND	**119.85**
1006436	3/27/19	37	ND	ND	**1.37J**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	**1.37**
1006445	3/27/19	Unknown	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1006454	3/25/19	48	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	**4.11J**	ND	ND	ND	**4.11**
1006472	3/25/19	Unknown	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1006490	3/26/19	64	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1006526	3/27/19	100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1006529	3/27/19	80	ND	ND	ND	ND	ND	ND	**9.29**	**29.7**	ND	ND	ND	ND	ND	ND	**38.99**
1006545	3/26/19	30	ND	ND	**42.1**	ND	ND	**3.22J**	**13.3**	**9.08J**	ND	**6.84J**	**8.71J**	ND	ND	ND	**83.25**
1006560	3/25/19	Unknown	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1006565	3/26/19	Unknown	ND	ND	**5.97J**	ND	ND	**3.12J**	**10.9**	**2.21J**	ND	**11.5**	ND	ND	ND	ND	**33.7**
1006616	3/27/19	58	ND	ND	ND	ND	ND	ND	**2.23J**	ND	ND	ND	ND	ND	ND	ND	**2.23**
1006701	3/26/19	68	ND	ND	**2.33J**	ND	ND	**10.1**	**27.2**	**9.75**	**5.99J**	**16.1**	**38.7**	ND	ND	ND	**110.17**
1006786	3/25/19	112	ND	ND	**2.65J**	ND	ND	**18.1**	**37**	**18**	**2.13J**	**10.7**	**11.5**	ND	ND	ND	**100.08**
1003260	8/19/2019	Unknown	ND	ND	**1.24J**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	**1.24**
1003530	8/22/2019	87	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1003611	5/13/2019	115'	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1003464	3/25/19	45	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1003601	3/26/19	75	ND	ND	ND	ND	ND	ND	**2.24J**	ND	ND	ND	**3.10J**	ND	ND	ND	**5.34**

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Client ID	Sample Date	ANALYTE	NEtFOSAA	NMeFOSAA	PFBS	PFDA	PFDoA	PFHpA	PFHxA	PFHxS	PFNA	PFOA	PFOS	PFTA	PFTrDA	PFUnA	TOTAL PFAS
		CAS #	2991-50-6	2355-31-9	375-73-5	335-76-2	307-55-1	375-85-9	307-24-4	355-46-4	375-95-1	335-67-1	1763-23-1	376-06-7	72629-94-8	2058-94-8	
		Carbon Chain Length	C8	C8	C4	C10	C12	C7	C6	C6	C9	C8	C8	C14	C13	C11	
		EGLE DW Criteria	NA	NA	420	NA	NA	NA	400,000	51	6	8	16	NA	NA	NA	NA
		Well Depth															
1006714	11/19/2019	70	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1006758	11/21/2019	71	ND	ND	ND	ND	ND	ND	**5.74J**	**2.3J**	ND	**2.31J**	ND	ND	ND	ND	**10.35**
1006682	8/22/2019	124	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1006690-TR	8/19/2019	Unknown	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1006700	8/21/2019	112	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1006715	8/21/2019	114	ND	ND	ND	ND	ND	ND	**1.69J**	ND	ND	ND	ND	ND	ND	ND	**1.69**
1006728	8/21/2019	131	ND	ND	ND	ND	ND	ND	**1.69J**	ND	ND	ND	ND	ND	ND	ND	**1.69**
1006691	5/14/2019	125'	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1006733	5/14/2019	76'	ND	ND	ND	ND	ND	ND	**2.83J**	**1.67J**	ND	ND	ND	ND	ND	ND	**4.5**
1006741-CT	5/13/2019	116'	ND	ND	ND	ND	ND	ND	**5.18J**	**1.91J**	ND	ND	ND	ND	ND	ND	**7.09**
1006751	5/14/2019	75'	ND	ND	**1.51J**	ND	ND	ND	**3.76J**	**2.79J**	ND	ND	ND	ND	ND	ND	**8.06**
1006757	5/14/2019	81'	ND	ND	**1.75J**	ND	ND	ND	**4.44J**	**3.49J**	ND	**1.60J**	ND	ND	ND	ND	**11.28**
1006801	5/14/2019	128'	ND	ND	**4.87J**	ND	ND	**1.81J**	**6.09J**	**4.84J**	ND	**3.26J**	ND	ND	ND	ND	**20.87**
1006800-CT	3/25/19	80	ND	ND	**9.16**	ND	ND	**5.60J**	**17.9**	**17.9**	ND	**14.8**	**1.60J**	ND	ND	ND	**66.96**
1003413	8/19/2019	112	ND	ND	ND	ND	ND	**1.75J**	**4.16J**	**3.07J**	ND	**3.11J**	ND	ND	ND	ND	**12.09**
1003414	8/19/2019	Unknown	ND	ND	ND	ND	ND	ND	ND	**3.87J**	**1.58J**	**2.22J**	**3.73J**	ND	ND	ND	**11.4**
1003508	8/20/2019	Unknown	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1003540-TR	8/20/2019	118	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1003548	8/20/2019	58	ND	ND	**2.19J**	ND	ND	ND	**3.24J**	ND	ND	**1.89J**	ND	ND	ND	ND	**7.32**
1003556	8/20/2019	69	ND	ND	**3.55J**	ND	ND	**1.63J**	**5.34J**	ND	ND	**3.06J**	ND	ND	ND	ND	**13.58**
1003564	8/19/2019	74	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1003476	5/14/2019	Unknwn	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1003579	5/14/2019	106'	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1003597	5/14/2019	75'	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1003431	3/27/19	Unknown	ND	ND	ND	ND	ND	ND	**2.96J**	ND	ND	ND	ND	ND	ND	ND	**2.96**
1003493	3/26/19	66	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1003511	3/25/19	59	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1003529	3/25/19	118	ND	ND	**11.6**	ND	ND	**4.62J**	**13.5**	**14.1**	ND	**6.26J**	ND	ND	ND	ND	**50.08**
1003545	3/25/19	70	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1003557	3/27/19	75	ND	ND	**3.81J**	ND	ND	**1.65J**	**4.54J**	ND	ND	**3.42J**	ND	ND	ND	ND	**13.42**
1003565	3/25/19	70	ND	ND	**4.01J**	ND	ND	**2.00J**	**6.32J**	**1.95J**	ND	**4.36J**	ND	ND	ND	ND	**18.64**
1003571	3/25/19	78	ND	ND	**1.76J**	ND	ND	ND	**3.57J**	**2.50J**	ND	ND	ND	ND	ND	ND	**7.83**
1003587	3/27/19	82	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1003591	3/26/19	Unknown	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

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Client ID	Sample Date	ANALYTE	NEtFOSAA	NMeFOSAA	PFBS	PFDA	PFDoA	PFHpA	PFHxA	PFHxS	PFNA	PFOA	PFOS	PFTA	PFTrDA	PFUnA	TOTAL PFAS
		CAS #	2991-50-6	2355-31-9	375-73-5	335-76-2	307-55-1	375-85-9	307-24-4	355-46-4	375-95-1	335-67-1	1763-23-1	376-06-7	72629-94-8	2058-94-8	
		Carbon Chain Length	C8	C8	C4	C10	C12	C7	C6	C6	C9	C8	C8	C14	C13	C11	
		EGLE DW Criteria	NA	NA	420	NA	NA	NA	400,000	51	6	8	16	NA	NA	NA	NA
		Well Depth															
1003516	8/21/2019	62	ND	ND	**3.53J**	ND	ND	ND	**3.54J**	**3.10J**	ND	**2.13J**	ND	ND	ND	ND	**12.3**
1003517	8/20/2019	64	ND	ND	ND	ND	ND	ND	**2.85J**	ND	ND	ND	ND	ND	ND	ND	**2.85**
1003521	5/14/2019	101'	ND	ND	ND	ND	ND	ND	**3.48J**	ND	ND	ND	ND	ND	ND	ND	**3.48**
1003524	3/25/19	66	ND	ND	**7.33J**	ND	ND	**13**	**45.8**	**30.8**	ND	**44.1**	**8.77J**	ND	ND	ND	**149.8**
1006930	11/19/2019	137	ND	ND	**6.76J**	ND	ND	**3.92J**	**10.6**	**5.06J**	ND	**7.92J**	ND	ND	ND	ND	**34.26**
1006951	11/19/2019	NA	ND	ND	**3.08J**	ND	ND	**4.11J**	**11.5J**	**3.68J**	ND	**9.53**	ND	ND	ND	ND	**31.9**
1006967	11/21/2019	215	ND	ND	**5.83J**	ND	ND	**8.41**	**27.4**	**8.04J**	ND	**21.2**	**9.96**	ND	ND	ND	**80.84**
1006895	8/20/2019	128	ND	ND	**10.1**	ND	ND	**6.37J**	**18.5**	**7.93J**	ND	**11.9**	ND	ND	ND	ND	**54.8**
1006914	8/20/2019	47	ND	ND	**3.72J**	ND	ND	**2.11J**	**5.70J**	**2.39J**	ND	**4.49J**	ND	ND	ND	ND	**18.41**
1006915	8/20/2019	70	ND	ND	**3.86J**	ND	ND	**3.72J**	**19.9**	**3.88J**	ND	**5.29J**	ND	ND	ND	ND	**36.65**
1006933	8/19/2019	70	ND	ND	**5.20J**	ND	ND	**5.11J**	**16.9**	**4.28J**	ND	**10.1**	ND	ND	ND	ND	**41.59**
1003506-TU	11/21/2019	NA	ND	ND	**3.11J**	ND	ND	**2.09J**	**6.38J**	**1.86J**	ND	**4.53J**	ND	ND	ND	ND	**17.97**
1003515	11/21/2019	NA	ND	ND	**3.07J**	ND	ND	**3.36J**	**9.74**	**2.21J**	ND	**5.06J**	ND	ND	ND	ND	**23.44**
1003549	11/21/2019	123	ND	ND	ND	ND	ND	ND	**2.15J**	ND	ND	ND	ND	ND	ND	ND	**2.15**
1003579-GO	12/4/2019	104	ND	ND	ND	ND	ND	ND	**3.13J**	ND	ND	ND	ND	ND	ND	ND	**3.13**
1003580	11/20/2019	123	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	**2.29B**	ND	ND	ND	**2.29**
1003589	11/19/2019	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1003590	11/19/2019	115	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	**1.96J**	ND	ND	ND	**1.96**
1003420	8/20/2019	Unknown	ND	ND	**3.86J**	ND	ND	**2.49J**	**7.85J**	**3.65J**	ND	**6.74J**	**2.55J**	ND	ND	ND	**27.14**
1003452	8/20/2019	Unknown	ND	ND	**9.13**	ND	ND	**5.79J**	**18.2**	**10.4**	ND	**10.8**	ND	ND	ND	ND	**54.32**
1003539	8/20/2019	Unknown	ND	ND	ND	ND	ND	ND	**4.64J**	**1.88J**	ND	ND	ND	ND	ND	ND	**6.52**
1003540-TU	8/21/2019	Unknown	ND	ND	**5.62J**	ND	ND	**4.09J**	**11.6**	**7.75J**	ND	**10.1**	**4.41J**	ND	ND	ND	**43.57**
1003550	8/20/2019	73	ND	ND	**3.77J**	ND	ND	**2.98J**	**6.81J**	**5.13J**	ND	**5.69**	ND	ND	ND	ND	**24.38**
1003559	8/20/2019	65	ND	ND	**1.87J**	ND	ND	**1.81J**	**7.32J**	**1.55J**	ND	ND	ND	ND	ND	ND	**12.55**
1003560	8/20/2019	63	ND	ND	**3.44J**	ND	ND	**4.00J**	**9.24**	**5.34J**	ND	**6.83J**	ND	ND	ND	ND	**28.85**
1003570	8/21/2019	63	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1003395	5/13/2019	Unknown	ND	ND	**7.46J**	ND	ND	**4.51J**	**9.04**	**4.00J**	ND	**4.90J**	**3.12J**	ND	ND	ND	**33.03**
1003417-DR	5/15/2019	80'	ND	ND	**4.20J**	ND	ND	**2.14J**	**5.33J**	**2.75J**	ND	**5.99J**	**2.09J**	ND	ND	ND	**21**
1003435	5/15/2019	122'	ND	ND	**3.84J**	ND	ND	**3.94J**	**16.9**	**5.52J**	ND	**5.43J**	ND	ND	ND	ND	**35.63**
1003453	5/15/2019	120'	ND	ND	**16.5**	ND	ND	**12.4**	**23.5**	**13.7**	**1.79J**	**33.7**	**2.67J**	ND	ND	ND	**104.26**
1003481	5/14/2019	112'	ND	ND	**3.44J**	ND	ND	**2.12J**	**7.70J**	**4.94J**	ND	**3.14J**	ND	ND	ND	ND	**21.34**
1003501	5/13/2019	Unknown	ND	ND	**10.6**	ND	ND	**6.63J**	**22.3**	**6.00J**	ND	**12.4**	ND	ND	ND	ND	**57.93**
1003591-DR	5/15/2019	88'	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1003569	3/27/19	70	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

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		CAS #	2991-50-6	2355-31-9	375-73-5	335-76-2	307-55-1	375-85-9	307-24-4	355-46-4	375-95-1	335-67-1	1763-23-1	376-06-7	72629-94-8	2058-94-8	
		Carbon Chain Length	C8	C8	C4	C10	C12	C7	C6	C6	C9	C8	C8	C14	C13	C11	
		EGLE DW Criteria	NA	NA	420	NA	NA	NA	400,000	51	6	8	16	NA	NA	NA	NA
		Well Depth															
1003460	3/26/19	Unknown	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1006579-WO	11/21/2019	90	ND	ND	**1.47J**	ND	ND	ND	**3.01J**	ND	ND	**2.91J**	ND	ND	ND	ND	**7.39**
1006595	12/2/2019	105	ND	ND	**3.24J**	ND	ND	**3.92J**	**27J**	**1.51J**	ND	**5.45J**	ND	ND	ND	ND	**41.12**
1006669-WO	11/18/2019	161	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1006715-WO	11/20/2019	136	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1006723	12/4/2019	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	**2.84B**	ND	ND	ND	**2.84**
1006739-R	11/19/2019	121	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1006791	11/18/2019	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	**15.1B**	ND	ND	ND	**15.1**
1006807	11/21/2019	116	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1006849	11/21/2019	122	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1006909	11/18/2019	130	ND	ND	ND	ND	ND	ND	ND	**3.82J**	ND	ND	ND	ND	ND	ND	**3.82**
1006920-WO	11/18/2019	63	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1006958	12/4/2019	102	ND	ND	**2.94J**	ND	ND	ND	**6.65J**	**3.31J**	ND	ND	**6.99B**	ND	ND	ND	**19.89**
1006983	11/18/2019	58	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1006405	5/13/2019	Unknown	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1006400	3/26/19	Unknown	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1006416	3/26/19	97	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

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Client ID	Sample Date	ANALYTE	NEtFOSAA	NMeFOSAA	PFBS	PFDA	PFDoA	PFHpA	PFHxA	PFHxS	PFNA	PFOA	PFOS	PFTA	PFTrDA	PFUnA	TOTAL PFAS
		CAS #	2991-50-6	2355-31-9	375-73-5	335-76-2	307-55-1	375-85-9	307-24-4	355-46-4	375-95-1	335-67-1	1763-23-1	376-06-7	72629-94-8	2058-94-8	
		EGLE DW Criteria	NA	NA	420	NA	NA	NA	400,000	51	6	8	16	NA	NA	NA	NA
		Well Depth															
1007147-R	9/10/2020	NA	ND	ND	**3.81J**	ND	ND	**3.93J**	ND	**4.59J**	ND	**5.54J**	ND	ND	ND	ND	**17.87**
1007158	7/1/2020	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1007160-AQ-S	7/6/2020	NA	ND	ND	**2.67J**	ND	ND	ND	**2.35J**	ND	ND	ND	ND	ND	ND	ND	**5.02**
1007165-R	9/10/2020	75	ND	ND	**5.38J**	ND	ND	**3.33J**	ND	**5.80J**	ND	**5.38J**	ND	ND	ND	ND	**19.89**
1007176	6/29/2020	87	ND	ND	**8.96J**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	**8.96**
1007178-R	9/10/2020	108	ND	ND	ND	ND	ND	ND	**4.67J**	ND	ND	ND	ND	ND	ND	ND	**4.67**
1006414	6/29/2020	100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1006430	6/30/2020	93	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1006431	6/30/2020	62	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1006449	6/30/2020	140	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1006450	6/30/2020	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1006465	8/13/2020	142	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1006466	6/30/2020	133	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1006482	6/30/2020	114	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1006545-BR	6/30/2020	NA	ND	ND	ND	ND	ND	ND	**2.58J**	**3.85J**	ND	**4.81J**	ND	ND	ND	ND	**11.24**
1003395-BR	6/30/2020	106	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1003411-BR	6/30/2020	119	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1006577	6/30/2020	90	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1007230	6/30/2020	88	ND	ND	ND	ND	ND	ND	**2.74J**	**9.82J**	ND	ND	**4.05J**	ND	ND	ND	**16.61**
1003719	6/30/2020	70	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1003756-FO	6/30/2020	120	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1006749	7/1/2020	96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1006783	6/30/2020	118	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1006809	6/29/2020	119	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1006816	7/1/2020	118	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1006825-FO	7/1/2020	124	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1006830	8/13/2020	30	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1006845	6/30/2020	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1006858	7/1/2020	70	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1006885-FO	7/1/2020	83	ND	ND	**14.6**	ND	ND	**2.91J**	**8.91J**	**17.5**	ND	ND	**3.83J**	ND	ND	ND	**47.75**
1003824	7/1/2020	112	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1003770	7/1/2020	95	ND	ND	**6.08J**	ND	ND	**3.21J**	**12.1**	**5.56J**	ND	**8.48J**	ND	ND	ND	ND	**35.43**
1006600-MA	7/1/2020	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1003914	7/7/2020	88	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1003928	6/30/2020	80	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1003929	7/7/2020	90	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1003941	7/7/2020	71	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1003944	7/7/2020	125	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1006855	7/7/2020	114	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

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Client ID	Sample Date	ANALYTE	NEtFOSAA	NMeFOSAA	PFBS	PFDA	PFDoA	PFHpA	PFHxA	PFHxS	PFNA	PFOA	PFOS	PFTA	PFTrDA	PFUnA	TOTAL PFAS
		CAS #	2991-50-6	2355-31-9	375-73-5	335-76-2	307-55-1	375-85-9	307-24-4	355-46-4	375-95-1	335-67-1	1763-23-1	376-06-7	72629-94-8	2058-94-8	
		EGLE DW Criteria	NA	NA	420	NA	NA	NA	400,000	51	6	8	16	NA	NA	NA	NA
		Well Depth															
1006864	6/29/2020	85	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	**6.81J**	ND	ND	ND	**6.81**
1006865-MA	7/7/2020	55	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1006866	7/7/2020	95	ND	ND	ND	ND	ND	ND	**3.46J**	ND	ND	**3.08J**	ND	ND	ND	ND	**6.54**
1006870-MA	7/7/2020	118	ND	ND	ND	ND	ND	ND	**2.78J**	ND	ND	ND	ND	ND	ND	ND	**2.78**
1006875-MA	7/7/2020	58	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	**6.65J**	ND	ND	ND	**6.65**
1006886	7/6/2020	83	ND	**5.04J**	**2.87J**	ND	ND	ND	**4.66J**	**3.70J**	ND	**5.23J**	**6.82J**	ND	ND	ND	**28.32**
1006912	7/6/2020	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1006921-MA	7/6/2020	63	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1006928-MA	7/6/2020	77	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1006945	7/6/2020	62	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1006948	7/6/2020	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1006959	7/6/2020	118	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1006971	7/6/2020	70	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1006860-MA	6/30/2020	117	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1006862	6/30/2020	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1003720-OA	7/7/2020	NA	ND	ND	**2.55J**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	**2.55**
1003740	7/8/2020	122	ND	ND	**5.60J**	ND	ND	ND	ND	**6.45J**	ND	ND	ND	ND	ND	ND	**12.05**
1003780	7/8/2020	64	ND	ND	**11.8**	ND	ND	ND	**6.53J**	**4.80J**	ND	**5.38J**	ND	ND	ND	ND	**28.51**
1003812	7/8/2020	80	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1003828	7/8/2020	120	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1003845	7/8/2020	111	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1003851	7/8/2020	190	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1003852	6/29/2020	120	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1003855	7/8/2020	125	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1003861	7/8/2020	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1003720-OB	7/7/2020	103	ND	ND	**2.62J**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	**2.62**
1003756	7/8/2020	75	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1003639-RI	6/30/2020	126	ND	ND	ND	ND	ND	ND	**2.31J**	**4.19J**	ND	ND	ND	ND	ND	ND	**6.5**
1003591-SA	7/7/2020	120	ND	ND	ND	ND	ND	**3.07J**	**10.7**	ND	ND	**2.42J**	ND	ND	ND	ND	**16.19**
1006902	8/13/2020		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1003003	7/6/2020	128	ND	ND	**14.3**	ND	ND	**2.74J**	**8.65J**	ND	ND	**5.54J**	ND	ND	ND	ND	**31.23**
1003021	7/6/2020	NA	ND	ND	**4.52J**	ND	ND	ND	**3.24J**	ND	ND	**2.52J**	ND	ND	ND	ND	**10.28**
1003024	7/6/2020	NA	ND	ND	**4.83J**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	**4.83**
1003056	7/6/2020	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1003092	7/6/2020	NA	ND	ND	**3.71J**	ND	ND	ND	ND	**5.70J**	ND	ND	ND	ND	ND	ND	**9.41**
1003148	7/6/2020	101	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1003150	7/6/2020	NA	ND	ND	**3.99J**	ND	ND	ND	**6.62J**	**6.01J**	ND	**2.56J**	ND	ND	ND	ND	**19.18**
1003176	7/6/2020	120	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1003180	7/7/2020	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1003191	7/8/2020	75	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Cascade Township Residential Sampling
PFAS Analytical Results
Phase 5

Client ID	Sample Date	ANALYTE	NEtFOSAA	NMeFOSAA	PFBS	PFDA	PFDoA	PFHpA	PFHxA	PFHxS	PFNA	PFOA	PFOS	PFTA	PFTrDA	PFUnA	TOTAL PFAS
		CAS #	2991-50-6	2355-31-9	375-73-5	335-76-2	307-55-1	375-85-9	307-24-4	355-46-4	375-95-1	335-67-1	1763-23-1	376-06-7	72629-94-8	2058-94-8	
		EGLE DW Criteria	NA	NA	420	NA	NA	NA	400,000	51	6	8	16	NA	NA	NA	NA
		Well Depth															
1003192	7/7/2020	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1003408	7/7/2020	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1003444	7/7/2020	120	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1003572	7/7/2020	126	ND	ND	ND	ND	ND	ND	**4.13J**	ND	ND	**3.89J**	ND	ND	ND	ND	**8.02**
1003580-TR	7/7/2020	102	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1003588	7/7/2020	116	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1003596	7/1/2020	103	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1003450	6/30/2020	131	ND	ND	**3.18J**	ND	ND	**3.74J**	**13.6J**	**4.32J**	ND	**5.00J**	ND	ND	ND	ND	**29.84**
1006430-WO	7/1/2020	130	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1006445-WO	7/1/2020	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1006460	7/1/2020	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1006472-WO	7/1/2020	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1006486	7/1/2020	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1006500	7/1/2020	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1006513	6/30/2020	NA	ND	ND	ND	ND	ND	ND	ND	**4.23J**	ND	ND	ND	ND	ND	ND	**4.23**
1006539	6/30/2020	NA	ND	ND	**2.69J**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	**2.89**
1006560-WO	6/30/2020	NA	ND	ND	ND	ND	ND	ND	**3.25J**	**3.60J**	ND	ND	ND	ND	ND	ND	**6.85**
1006576-WO	6/30/2020	75	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1006700-WO	6/30/2020	45	ND	ND	**2.54J**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	**2.54**
1006718-WO	6/29/2020	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1006734	6/29/2020	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	**4.90J**	ND	ND	ND	**4.9**
1006777	6/29/2020	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1006790-WO	6/29/2020	NA	ND	ND	**14.6**	ND	ND	**3.21J**	**7.89J**	**10.8**	ND	**15.3**	**15.6**	ND	ND	ND	**67.4**
1006808	6/29/2020	56	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1006826	6/29/2020	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1006840	6/29/2020	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	**6.99J**	ND	ND	ND	**6.99**
1006965-WO	6/30/2020	110	ND	ND	**2.87J**	ND	ND	ND	ND	**11.5**	ND	ND	ND	ND	ND	ND	**14.37**
1003400	7/1/2020	NA	ND	ND	**6.67J**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	**6.67**
1003409	7/1/2020	71	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1003410-WI	7/1/2020	62	ND	ND	**3.06J**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	**3.06**
1003440	7/1/2020	45	ND	ND	**5.11J**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	**5.11**

Notes:

All values in nanograms per Liter (ng/L)

Criteria from the Michigan Department of Environment, Great Lakes, and Energy (EGLE), Part 201, 6/25/2018

analyte was not detected above Laboratory Detection Limit

PFOA+PFOS or total PFAS > 0 < 10 ng/L

PFOA+PFOS > 10 < 70 ng/L or total PFAS > 10 < 100 ng/L

PFOA+PFOS > 70 ng/L or total PFAS > 100 ng/L

Data was rejected, see DVR for explanation

Exceeds EGLE 2020 Criteria

U =The analyte was not detected above the associated limit of detection

UJ = The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample

R = The sample result is rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

ND = Not detected

EGLE = Michigan Department of Environment, Great Lakes, and Energy

MDHHS = Michigan Department of Health and Human Services

Perfluorotetradecanoic acid (PFTA)

Perfluorotridecanoic acid (PFTrDA)

Perfluorododecanoic acid (PFDoA)

Perfluoroundecanoic acid (PFUnA)

Perfluorodecanoic acid (PFDA)

Perfluorononanoic acid (PFNA)

Perfluorooctanoic Acid (PFOA)

Perfluoroheptanoic acid (PFHpA)

Perfluorohexanoic acid (PFHxA)

Perfluorooctane sulfonate (PFOS)

Perfluorohexanesulfonic acid (PFHxS)

Perfluorobutanesulfonic acid (PFBS)

2-(N-Ethylperfluorooctanesulfonamido) acetic acid (N-EtFOSAA)

2-(N-Methylperfluorooctanesulfonamido) acetic acid (N-MeFOSAA)

Appendix 2

December 01, 2020

Vista Work Order No. 2002508

Ms. Hillary Caron
City of Grand Rapids Water System
17350 Lake Michigan Drive
West Olive, MI 49460

Dear Ms. Caron,

Enclosed are the results for the sample set received at Vista Analytical Laboratory on November 13, 2020 under your Project Name 'Monthly PFAS Testing'.

Vista Analytical Laboratory is committed to serving you effectively. If you require additional information, please contact me at 916-673-1520 or by email at mmaier@vista-analytical.com.

Thank you for choosing Vista as part of your analytical support team.

Sincerely,

Oliver Cawdill For

Martha Maier
Laboratory Director

Vista Analytical Laboratory certifies that the report herein meets all the requirements set forth by NELAP for those applicable test methods. Results relate only to the samples as received by the laboratory. This report should not be reproduced except in full without the written approval of Vista.

Vista Work Order No. 2002508
Case Narrative

Sample Condition on Receipt:

Two aqueous samples and one drinking water sample were received and stored securely in accordance with Vista standard operating procedures and EPA methodology. The samples were received in good condition and within the method temperature requirements.

Analytical Notes:

PFAS Isotope Dilution Method

The aqueous samples were extracted and analyzed for a selected list of PFAS using Vista's PFAS Isotope Dilution Method. The results for PFHxS, PFOA, PFOS, MeFOSAA and EtFOSAA include both linear and branched isomers. Results for all other analytes include the linear isomers only.

Holding Times

The samples were extracted and analyzed within the hold times.

Quality Control

The Initial Calibration and Continuing Calibration Verifications met the acceptance criteria.

A Method Blank and Ongoing Precision and Recovery (OPR) sample were extracted and analyzed with the preparation batch. No analytes were detected in the Method Blank above the Reporting Limit. The OPR recoveries were within the method acceptance criteria.

The internal standard recovery outside the acceptance criteria is listed in the table below.

EPA Method 537.1

The drinking water sample was extracted and analyzed for eighteen PFAS using EPA Method 537.1.

Holding Times

The sample was extracted and analyzed within the method hold times.

Quality Control

The Initial Calibration and Continuing Calibration Verifications met the method acceptance criteria.

Two Laboratory Fortified Blanks (LFB/LFBD) and a Laboratory Reagent Blank (LRB) were extracted and analyzed with the preparation batch. No analytes were detected in the LRB above the method required limits. The LFB/LFBD recoveries were within the method acceptance criteria.

The surrogate recoveries for all QC and field samples were within the acceptance criteria.

QC Anomalies

LabNumber	SampleName	Analysis	Analyte	Flag	%Rec
B0K0137-BLK1	B0K0137-BLK1	PFAS Isotope Dilution Method	13C2-PFDA	H	59.5

H = Recovery was outside laboratory acceptance criteria.

TABLE OF CONTENTS

Sample Inventory Report

Vista Sample ID	Client Sample ID	Sampled	Received	Components/Containers
2002508-01	FRB	12-Nov-20 08:58	13-Nov-20 10:04	HDPE Bottle, 250 mL
				HDPE Bottle, 250 mL
2002508-02	E. TAP	12-Nov-20 08:59	13-Nov-20 10:04	Polypropylene, 250mL
				Polypropylene, 250mL
2002508-03	RAW	12-Nov-20 09:01	13-Nov-20 10:04	HDPE Bottle, 250 mL
				HDPE Bottle, 250 mL

Vista Project: 2002508

Client Project: Monthly PFAS Testing

ANALYTICAL RESULTS

Sample ID: Method Blank

PFAS Isotope Dilution Method

Client Data

Name: City of Grand Rapids Water System
Project: Monthly PFAS Testing
Matrix: Aqueous

Laboratory Data

Lab Sample: B0K0137-BLK1
Column: BEH C18

Analyte	CAS Number	Conc. (ng/L)	RL	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
PFBA	375-22-4	ND	2.00		B0K0137	18-Nov-20	0.250 L	20-Nov-20 20:24	1
PFPeA	2706-90-3	ND	2.00		B0K0137	18-Nov-20	0.250 L	20-Nov-20 20:24	1
PFBS	375-73-5	ND	2.00		B0K0137	18-Nov-20	0.250 L	20-Nov-20 20:24	1
4:2 FTS	757124-72-4	ND	2.00		B0K0137	18-Nov-20	0.250 L	20-Nov-20 20:24	1
PFHxA	307-24-4	ND	2.00		B0K0137	18-Nov-20	0.250 L	20-Nov-20 20:24	1
PFPeS	2706-91-4	ND	2.00		B0K0137	18-Nov-20	0.250 L	20-Nov-20 20:24	1
PFHpA	375-85-9	ND	2.00		B0K0137	18-Nov-20	0.250 L	20-Nov-20 20:24	1
PFHxS	355-46-4	ND	2.00		B0K0137	18-Nov-20	0.250 L	20-Nov-20 20:24	1
6:2 FTS	27619-97-2	ND	2.00		B0K0137	18-Nov-20	0.250 L	20-Nov-20 20:24	1
PFOA	335-67-1	ND	2.00		B0K0137	18-Nov-20	0.250 L	20-Nov-20 20:24	1
PFHpS	375-92-8	ND	2.00		B0K0137	18-Nov-20	0.250 L	20-Nov-20 20:24	1
PFNA	375-95-1	ND	2.00		B0K0137	18-Nov-20	0.250 L	20-Nov-20 20:24	1
PFOSA	754-91-6	ND	2.00		B0K0137	18-Nov-20	0.250 L	20-Nov-20 20:24	1
PFOS	1763-23-1	ND	2.00		B0K0137	18-Nov-20	0.250 L	20-Nov-20 20:24	1
PFDA	335-76-2	ND	2.00		B0K0137	18-Nov-20	0.250 L	20-Nov-20 20:24	1
8:2 FTS	39108-34-4	ND	2.00		B0K0137	18-Nov-20	0.250 L	20-Nov-20 20:24	1
PFNS	68259-12-1	ND	2.00		B0K0137	18-Nov-20	0.250 L	20-Nov-20 20:24	1
MeFOSAA	2355-31-9	ND	2.00		B0K0137	18-Nov-20	0.250 L	20-Nov-20 20:24	1
EtFOSAA	2991-50-6	ND	2.00		B0K0137	18-Nov-20	0.250 L	20-Nov-20 20:24	1
PFUnA	2058-94-8	ND	2.00		B0K0137	18-Nov-20	0.250 L	20-Nov-20 20:24	1
PFDS	335-77-3	ND	2.00		B0K0137	18-Nov-20	0.250 L	20-Nov-20 20:24	1
PFDoA	307-55-1	ND	2.00		B0K0137	18-Nov-20	0.250 L	20-Nov-20 20:24	1
PFTrDA	72629-94-8	ND	2.00		B0K0137	18-Nov-20	0.250 L	20-Nov-20 20:24	1
PFTeDA	376-06-7	ND	2.00		B0K0137	18-Nov-20	0.250 L	20-Nov-20 20:24	1

Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C3-PFBA	IS	113	60 - 130		B0K0137	18-Nov-20	0.250 L	20-Nov-20 20:24	1
13C3-PFPeA	IS	73.8	60 - 150		B0K0137	18-Nov-20	0.250 L	20-Nov-20 20:24	1
13C3-PFBS	IS	81.9	60 - 150		B0K0137	18-Nov-20	0.250 L	20-Nov-20 20:24	1
13C2-4:2 FTS	IS	87.2	20 - 150		B0K0137	18-Nov-20	0.250 L	20-Nov-20 20:24	1
13C2-PFHxA	IS	71.5	70 - 130		B0K0137	18-Nov-20	0.250 L	20-Nov-20 20:24	1
13C4-PFHpA	IS	70.0	60 - 150		B0K0137	18-Nov-20	0.250 L	20-Nov-20 20:24	1
13C3-PFHxS	IS	74.0	60 - 130		B0K0137	18-Nov-20	0.250 L	20-Nov-20 20:24	1
13C2-6:2 FTS	IS	82.8	40 - 150		B0K0137	18-Nov-20	0.250 L	20-Nov-20 20:24	1
13C5-PFNA	IS	72.3	50 - 130		B0K0137	18-Nov-20	0.250 L	20-Nov-20 20:24	1
13C8-PFOSA	IS	49.0	20 - 150		B0K0137	18-Nov-20	0.250 L	20-Nov-20 20:24	1
13C2-PFOA	IS	71.9	60 - 130		B0K0137	18-Nov-20	0.250 L	20-Nov-20 20:24	1
13C8-PFOS	IS	75.9	60 - 130		B0K0137	18-Nov-20	0.250 L	20-Nov-20 20:24	1
13C2-PFDA	IS	59.5	60 - 130	H	B0K0137	18-Nov-20	0.250 L	20-Nov-20 20:24	1

Sample ID: Method Blank **PFAS Isotope Dilution Method**

Client Data

Name: City of Grand Rapids Water System Matrix: Aqueous

Project: Monthly PFAS Testing

Laboratory Data

Lab Sample: B0K0137-BLK1 Column: BEH C18

Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C2-8:2 FTS	IS	69.9	40 - 150		B0K0137	18-Nov-20	0.250 L	20-Nov-20 20:24	1
d3-MeFOSAA	IS	68.1	50 - 150		B0K0137	18-Nov-20	0.250 L	20-Nov-20 20:24	1
13C2-PFUnA	IS	72.9	60 - 130		B0K0137	18-Nov-20	0.250 L	20-Nov-20 20:24	1
d5-EtFOSAA	IS	61.9	50 - 150		B0K0137	18-Nov-20	0.250 L	20-Nov-20 20:24	1
13C2-PFDoA	IS	56.3	30 - 130		B0K0137	18-Nov-20	0.250 L	20-Nov-20 20:24	1
13C2-PFTeDA	IS	57.4	20 - 150		B0K0137	18-Nov-20	0.250 L	20-Nov-20 20:24	1

RL - Reporting limit

Results reported to RL.

When reported, PFHxS, PFOA, PFOS, MeFOSAA and EtFOSAA include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: OPR **PFAS Isotope Dilution Method**

Client Data

Name: City of Grand Rapids Water System
Project: Monthly PFAS Testing
Matrix: Aqueous

Laboratory Data

Lab Sample: B0K0137-BS1
Column: BEH C18

Analyte	CAS Number	Amt Found (ng/L)	Spike Amt	% Rec	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
PFBA	375-22-4	40.0	40.0	100	70 - 130		B0K0137	18-Nov-20	0.250 L	20-Nov-20 20:34	1
PFPeA	2706-90-3	40.2	40.0	100	70 - 130		B0K0137	18-Nov-20	0.250 L	20-Nov-20 20:34	1
PFBS	375-73-5	42.2	40.0	106	70 - 130		B0K0137	18-Nov-20	0.250 L	20-Nov-20 20:34	1
4:2 FTS	757124-72-4	41.1	40.0	103	60 - 130		B0K0137	18-Nov-20	0.250 L	20-Nov-20 20:34	1
PFHxA	307-24-4	40.9	40.0	102	70 - 130		B0K0137	18-Nov-20	0.250 L	20-Nov-20 20:34	1
PFPeS	2706-91-4	38.8	40.0	96.9	70 - 130		B0K0137	18-Nov-20	0.250 L	20-Nov-20 20:34	1
PFHpA	375-85-9	44.4	40.0	111	70 - 130		B0K0137	18-Nov-20	0.250 L	20-Nov-20 20:34	1
PFHxS	355-46-4	37.1	40.0	92.6	70 - 130		B0K0137	18-Nov-20	0.250 L	20-Nov-20 20:34	1
6:2 FTS	27619-97-2	43.3	40.0	108	60 - 130		B0K0137	18-Nov-20	0.250 L	20-Nov-20 20:34	1
PFOA	335-67-1	38.6	40.0	96.5	70 - 130		B0K0137	18-Nov-20	0.250 L	20-Nov-20 20:34	1
PFHpS	375-92-8	40.7	40.0	102	60 - 130		B0K0137	18-Nov-20	0.250 L	20-Nov-20 20:34	1
PFNA	375-95-1	42.8	40.0	107	70 - 130		B0K0137	18-Nov-20	0.250 L	20-Nov-20 20:34	1
PFOSA	754-91-6	44.5	40.0	111	70 - 130		B0K0137	18-Nov-20	0.250 L	20-Nov-20 20:34	1
PFOS	1763-23-1	41.9	40.0	105	70 - 130		B0K0137	18-Nov-20	0.250 L	20-Nov-20 20:34	1
PFDA	335-76-2	39.3	40.0	98.3	70 - 130		B0K0137	18-Nov-20	0.250 L	20-Nov-20 20:34	1
8:2 FTS	39108-34-4	37.6	40.0	94.1	60 - 130		B0K0137	18-Nov-20	0.250 L	20-Nov-20 20:34	1
PFNS	68259-12-1	40.6	40.0	101	70 - 130		B0K0137	18-Nov-20	0.250 L	20-Nov-20 20:34	1
MeFOSAA	2355-31-9	42.5	40.0	106	70 - 130		B0K0137	18-Nov-20	0.250 L	20-Nov-20 20:34	1
EtFOSAA	2991-50-6	37.6	40.0	93.9	70 - 130		B0K0137	18-Nov-20	0.250 L	20-Nov-20 20:34	1
PFUnA	2058-94-8	41.9	40.0	105	70 - 130		B0K0137	18-Nov-20	0.250 L	20-Nov-20 20:34	1
PFDS	335-77-3	36.0	40.0	90.0	60 - 130		B0K0137	18-Nov-20	0.250 L	20-Nov-20 20:34	1
PFDoA	307-55-1	38.0	40.0	94.9	70 - 130		B0K0137	18-Nov-20	0.250 L	20-Nov-20 20:34	1
PFTrDA	72629-94-8	39.3	40.0	98.3	60 - 130		B0K0137	18-Nov-20	0.250 L	20-Nov-20 20:34	1
PFTeDA	376-06-7	39.5	40.0	98.7	70 - 130		B0K0137	18-Nov-20	0.250 L	20-Nov-20 20:34	1

Labeled Standards	Type	% Rec	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C3-PFBA	IS	117	60 - 130		B0K0137	18-Nov-20	0.250 L	20-Nov-20 20:34	1
13C3-PFPeA	IS	76.3	60 - 150		B0K0137	18-Nov-20	0.250 L	20-Nov-20 20:34	1
13C3-PFBS	IS	83.0	60 - 150		B0K0137	18-Nov-20	0.250 L	20-Nov-20 20:34	1
13C2-4:2 FTS	IS	79.8	20 - 150		B0K0137	18-Nov-20	0.250 L	20-Nov-20 20:34	1
13C2-PFHxA	IS	73.8	70 - 130		B0K0137	18-Nov-20	0.250 L	20-Nov-20 20:34	1
13C4-PFHpA	IS	73.8	60 - 150		B0K0137	18-Nov-20	0.250 L	20-Nov-20 20:34	1
13C3-PFHxS	IS	75.0	60 - 130		B0K0137	18-Nov-20	0.250 L	20-Nov-20 20:34	1
13C2-6:2 FTS	IS	81.0	40 - 150		B0K0137	18-Nov-20	0.250 L	20-Nov-20 20:34	1
13C5-PFNA	IS	78.4	50 - 130		B0K0137	18-Nov-20	0.250 L	20-Nov-20 20:34	1
13C8-PFOSA	IS	48.7	20 - 150		B0K0137	18-Nov-20	0.250 L	20-Nov-20 20:34	1

Sample ID: OPR — **PFAS Isotope Dilution Method**

Client Data

Name: City of Grand Rapids Water System
Project: Monthly PFAS Testing
Matrix: Aqueous

Laboratory Data

Lab Sample: B0K0137-BS1
Column: BEH C18

Labeled Standards	Type	% Rec	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C2-PFOA	IS	79.7	60 - 130		B0K0137	18-Nov-20	0.250 L	20-Nov-20 20:34	1
13C8-PFOS	IS	79.3	60 - 130		B0K0137	18-Nov-20	0.250 L	20-Nov-20 20:34	1
13C2-PFDA	IS	75.1	60 - 130		B0K0137	18-Nov-20	0.250 L	20-Nov-20 20:34	1
13C2-8:2 FTS	IS	76.6	40 - 150		B0K0137	18-Nov-20	0.250 L	20-Nov-20 20:34	1
d3-MeFOSAA	IS	70.7	50 - 150		B0K0137	18-Nov-20	0.250 L	20-Nov-20 20:34	1
13C2-PFUnA	IS	68.6	60 - 130		B0K0137	18-Nov-20	0.250 L	20-Nov-20 20:34	1
d5-EtFOSAA	IS	61.2	50 - 150		B0K0137	18-Nov-20	0.250 L	20-Nov-20 20:34	1
13C2-PFDoA	IS	61.2	30 - 130		B0K0137	18-Nov-20	0.250 L	20-Nov-20 20:34	1
13C2-PFTeDA	IS	62.9	20 - 150		B0K0137	18-Nov-20	0.250 L	20-Nov-20 20:34	1

Sample ID: FRB

PFAS Isotope Dilution Method

Client Data

Name: City of Grand Rapids Water System
Project: Monthly PFAS Testing
Location: FRB
Matrix: Aqueous
Date Collected: 12-Nov-20 08:58

Laboratory Data

Lab Sample: 2002508-01
Date Received: 13-Nov-20 10:04
Column: BEH C18

Analyte	CAS Number	Conc. (ng/L)	RL	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
PFBA	375-22-4	ND	2.12		B0K0137	18-Nov-20	0.236 L	20-Nov-20 20:45	1
PFPeA	2706-90-3	ND	2.12		B0K0137	18-Nov-20	0.236 L	20-Nov-20 20:45	1
PFBS	375-73-5	ND	2.12		B0K0137	18-Nov-20	0.236 L	20-Nov-20 20:45	1
4:2 FTS	757124-72-4	ND	2.12		B0K0137	18-Nov-20	0.236 L	20-Nov-20 20:45	1
PFHxA	307-24-4	ND	2.12		B0K0137	18-Nov-20	0.236 L	20-Nov-20 20:45	1
PFPeS	2706-91-4	ND	2.12		B0K0137	18-Nov-20	0.236 L	20-Nov-20 20:45	1
PFHpA	375-85-9	ND	2.12		B0K0137	18-Nov-20	0.236 L	20-Nov-20 20:45	1
PFHxS	355-46-4	ND	2.12		B0K0137	18-Nov-20	0.236 L	20-Nov-20 20:45	1
6:2 FTS	27619-97-2	ND	2.12		B0K0137	18-Nov-20	0.236 L	20-Nov-20 20:45	1
PFOA	335-67-1	ND	2.12		B0K0137	18-Nov-20	0.236 L	20-Nov-20 20:45	1
PFHpS	375-92-8	ND	2.12		B0K0137	18-Nov-20	0.236 L	20-Nov-20 20:45	1
PFNA	375-95-1	ND	2.12		B0K0137	18-Nov-20	0.236 L	20-Nov-20 20:45	1
PFOSA	754-91-6	ND	2.12		B0K0137	18-Nov-20	0.236 L	20-Nov-20 20:45	1
PFOS	1763-23-1	ND	2.12		B0K0137	18-Nov-20	0.236 L	20-Nov-20 20:45	1
PFDA	335-76-2	ND	2.12		B0K0137	18-Nov-20	0.236 L	20-Nov-20 20:45	1
8:2 FTS	39108-34-4	ND	2.12		B0K0137	18-Nov-20	0.236 L	20-Nov-20 20:45	1
PFNS	68259-12-1	ND	2.12		B0K0137	18-Nov-20	0.236 L	20-Nov-20 20:45	1
MeFOSAA	2355-31-9	ND	2.12		B0K0137	18-Nov-20	0.236 L	20-Nov-20 20:45	1
EtFOSAA	2991-50-6	ND	2.12		B0K0137	18-Nov-20	0.236 L	20-Nov-20 20:45	1
PFUnA	2058-94-8	ND	2.12		B0K0137	18-Nov-20	0.236 L	20-Nov-20 20:45	1
PFDS	335-77-3	ND	2.12		B0K0137	18-Nov-20	0.236 L	20-Nov-20 20:45	1
PFDoA	307-55-1	ND	2.12		B0K0137	18-Nov-20	0.236 L	20-Nov-20 20:45	1
PFTrDA	72629-94-8	ND	2.12		B0K0137	18-Nov-20	0.236 L	20-Nov-20 20:45	1
PFTeDA	376-06-7	ND	2.12		B0K0137	18-Nov-20	0.236 L	20-Nov-20 20:45	1

Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C3-PFBA	IS	122	60 - 130		B0K0137	18-Nov-20	0.236 L	20-Nov-20 20:45	1
13C3-PFPeA	IS	77.3	60 - 150		B0K0137	18-Nov-20	0.236 L	20-Nov-20 20:45	1
13C3-PFBS	IS	84.3	60 - 150		B0K0137	18-Nov-20	0.236 L	20-Nov-20 20:45	1
13C2-4:2 FTS	IS	85.9	20 - 150		B0K0137	18-Nov-20	0.236 L	20-Nov-20 20:45	1
13C2-PFHxA	IS	74.9	70 - 130		B0K0137	18-Nov-20	0.236 L	20-Nov-20 20:45	1
13C4-PFHpA	IS	81.1	60 - 150		B0K0137	18-Nov-20	0.236 L	20-Nov-20 20:45	1
13C3-PFHxS	IS	76.8	60 - 130		B0K0137	18-Nov-20	0.236 L	20-Nov-20 20:45	1
13C2-6:2 FTS	IS	75.8	40 - 150		B0K0137	18-Nov-20	0.236 L	20-Nov-20 20:45	1
13C5-PFNA	IS	75.5	50 - 130		B0K0137	18-Nov-20	0.236 L	20-Nov-20 20:45	1
13C8-PFOSA	IS	47.9	20 - 150		B0K0137	18-Nov-20	0.236 L	20-Nov-20 20:45	1
13C2-PFOA	IS	67.4	60 - 130		B0K0137	18-Nov-20	0.236 L	20-Nov-20 20:45	1
13C8-PFOS	IS	80.7	60 - 130		B0K0137	18-Nov-20	0.236 L	20-Nov-20 20:45	1
13C2-PFDA	IS	68.0	60 - 130		B0K0137	18-Nov-20	0.236 L	20-Nov-20 20:45	1

Sample ID: FRB **PFAS Isotope Dilution Method**

Client Data

Name: City of Grand Rapids Water System
Project: Monthly PFAS Testing
Location: FRB
Matrix: Aqueous
Date Collected: 12-Nov-20 08:58

Laboratory Data

Lab Sample: 2002508-01
Date Received: 13-Nov-20 10:04
Column: BEH C18

Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C2-8:2 FTS	IS	78.3	40 - 150		B0K0137	18-Nov-20	0.236 L	20-Nov-20 20:45	1
d3-MeFOSAA	IS	74.4	50 - 150		B0K0137	18-Nov-20	0.236 L	20-Nov-20 20:45	1
13C2-PFUnA	IS	78.1	60 - 130		B0K0137	18-Nov-20	0.236 L	20-Nov-20 20:45	1
d5-EtFOSAA	IS	57.7	50 - 150		B0K0137	18-Nov-20	0.236 L	20-Nov-20 20:45	1
13C2-PFDoA	IS	67.1	30 - 130		B0K0137	18-Nov-20	0.236 L	20-Nov-20 20:45	1
13C2-PFTeDA	IS	57.7	20 - 150		B0K0137	18-Nov-20	0.236 L	20-Nov-20 20:45	1

RL - Reporting limit

Results reported to RL.

When reported, PFHxS, PFOA, PFOS, MeFOSAA and EtFOSAA include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: RAW

PFAS Isotope Dilution Method

Client Data

Name: City of Grand Rapids Water System
Project: Monthly PFAS Testing
Location: RAW
Matrix: Aqueous
Date Collected: 12-Nov-20 09:01

Laboratory Data

Lab Sample: 2002508-03
Date Received: 13-Nov-20 10:04
Column: BEH C18

Analyte	CAS Number	Conc. (ng/L)	RL	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
PFBA	375-22-4	ND	2.07		B0K0137	18-Nov-20	0.241 L	20-Nov-20 20:55	1
PFPeA	2706-90-3	ND	2.07		B0K0137	18-Nov-20	0.241 L	20-Nov-20 20:55	1
PFBS	375-73-5	ND	2.07		B0K0137	18-Nov-20	0.241 L	20-Nov-20 20:55	1
4:2 FTS	757124-72-4	ND	2.07		B0K0137	18-Nov-20	0.241 L	20-Nov-20 20:55	1
PFHxA	307-24-4	ND	2.07		B0K0137	18-Nov-20	0.241 L	20-Nov-20 20:55	1
PFPeS	2706-91-4	ND	2.07		B0K0137	18-Nov-20	0.241 L	20-Nov-20 20:55	1
PFHpA	375-85-9	ND	2.07		B0K0137	18-Nov-20	0.241 L	20-Nov-20 20:55	1
PFHxS	355-46-4	ND	2.07		B0K0137	18-Nov-20	0.241 L	20-Nov-20 20:55	1
6:2 FTS	27619-97-2	ND	2.07		B0K0137	18-Nov-20	0.241 L	20-Nov-20 20:55	1
PFOA	335-67-1	ND	2.07		B0K0137	18-Nov-20	0.241 L	20-Nov-20 20:55	1
PFHpS	375-92-8	ND	2.07		B0K0137	18-Nov-20	0.241 L	20-Nov-20 20:55	1
PFNA	375-95-1	ND	2.07		B0K0137	18-Nov-20	0.241 L	20-Nov-20 20:55	1
PFOSA	754-91-6	ND	2.07		B0K0137	18-Nov-20	0.241 L	20-Nov-20 20:55	1
PFOS	1763-23-1	ND	2.07		B0K0137	18-Nov-20	0.241 L	20-Nov-20 20:55	1
PFDA	335-76-2	ND	2.07		B0K0137	18-Nov-20	0.241 L	20-Nov-20 20:55	1
8:2 FTS	39108-34-4	ND	2.07		B0K0137	18-Nov-20	0.241 L	20-Nov-20 20:55	1
PFNS	68259-12-1	ND	2.07		B0K0137	18-Nov-20	0.241 L	20-Nov-20 20:55	1
MeFOSAA	2355-31-9	ND	2.07		B0K0137	18-Nov-20	0.241 L	20-Nov-20 20:55	1
EtFOSAA	2991-50-6	ND	2.07		B0K0137	18-Nov-20	0.241 L	20-Nov-20 20:55	1
PFUnA	2058-94-8	ND	2.07		B0K0137	18-Nov-20	0.241 L	20-Nov-20 20:55	1
PFDS	335-77-3	ND	2.07		B0K0137	18-Nov-20	0.241 L	20-Nov-20 20:55	1
PFDoA	307-55-1	ND	2.07		B0K0137	18-Nov-20	0.241 L	20-Nov-20 20:55	1
PFTrDA	72629-94-8	ND	2.07		B0K0137	18-Nov-20	0.241 L	20-Nov-20 20:55	1
PFTeDA	376-06-7	ND	2.07		B0K0137	18-Nov-20	0.241 L	20-Nov-20 20:55	1

Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C3-PFBA	IS	120	60 - 130		B0K0137	18-Nov-20	0.241 L	20-Nov-20 20:55	1
13C3-PFPeA	IS	77.8	60 - 150		B0K0137	18-Nov-20	0.241 L	20-Nov-20 20:55	1
13C3-PFBS	IS	79.1	60 - 150		B0K0137	18-Nov-20	0.241 L	20-Nov-20 20:55	1
13C2-4:2 FTS	IS	90.5	20 - 150		B0K0137	18-Nov-20	0.241 L	20-Nov-20 20:55	1
13C2-PFHxA	IS	72.5	70 - 130		B0K0137	18-Nov-20	0.241 L	20-Nov-20 20:55	1
13C4-PFHpA	IS	79.0	60 - 150		B0K0137	18-Nov-20	0.241 L	20-Nov-20 20:55	1
13C3-PFHxS	IS	63.8	60 - 130		B0K0137	18-Nov-20	0.241 L	20-Nov-20 20:55	1
13C2-6:2 FTS	IS	70.1	40 - 150		B0K0137	18-Nov-20	0.241 L	20-Nov-20 20:55	1
13C5-PFNA	IS	72.5	50 - 130		B0K0137	18-Nov-20	0.241 L	20-Nov-20 20:55	1
13C8-PFOSA	IS	58.0	20 - 150		B0K0137	18-Nov-20	0.241 L	20-Nov-20 20:55	1
13C2-PFOA	IS	74.8	60 - 130		B0K0137	18-Nov-20	0.241 L	20-Nov-20 20:55	1
13C8-PFOS	IS	73.0	60 - 130		B0K0137	18-Nov-20	0.241 L	20-Nov-20 20:55	1
13C2-PFDA	IS	70.1	60 - 130		B0K0137	18-Nov-20	0.241 L	20-Nov-20 20:55	1

Sample ID: RAW — **PFAS Isotope Dilution Method**

Client Data

Name:	City of Grand Rapids Water System	Matrix:	Aqueous
Project:	Monthly PFAS Testing	Date Collected:	12-Nov-20 09:01
Location:	RAW		

Laboratory Data

Lab Sample:	2002508-03	Column:	BEH C18
Date Received:	13-Nov-20 10:04		

Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C2-8:2 FTS	IS	66.8	40 - 150		B0K0137	18-Nov-20	0.241 L	20-Nov-20 20:55	1
d3-MeFOSAA	IS	61.2	50 - 150		B0K0137	18-Nov-20	0.241 L	20-Nov-20 20:55	1
13C2-PFUnA	IS	71.8	60 - 130		B0K0137	18-Nov-20	0.241 L	20-Nov-20 20:55	1
d5-EtFOSAA	IS	65.0	50 - 150		B0K0137	18-Nov-20	0.241 L	20-Nov-20 20:55	1
13C2-PFDoA	IS	60.1	30 - 130		B0K0137	18-Nov-20	0.241 L	20-Nov-20 20:55	1
13C2-PFTeDA	IS	46.8	20 - 150		B0K0137	18-Nov-20	0.241 L	20-Nov-20 20:55	1

RL - Reporting limit

Results reported to RL.

When reported, PFHxS, PFOA, PFOS, MeFOSAA and EtFOSAA include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: LRB

EPA Method 537.1

Client Data

Name: City of Grand Rapids Water System
Project: Monthly PFAS Testing
Matrix: Aqueous

Laboratory Data

Lab Sample: B0K0132-BLK1
Column: BEH C18

Analyte	CAS Number	Conc. (ng/L)	RL	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
PFBS	375-73-5	ND	2.00		B0K0132	18-Nov-20	0.250 L	19-Nov-20 23:24	1
PFHxA	307-24-4	ND	2.00		B0K0132	18-Nov-20	0.250 L	19-Nov-20 23:24	1
HFPO-DA	13252-13-6	ND	2.00		B0K0132	18-Nov-20	0.250 L	19-Nov-20 23:24	1
PFHpA	375-85-9	ND	2.00		B0K0132	18-Nov-20	0.250 L	19-Nov-20 23:24	1
ADONA	919005-14-4	ND	2.00		B0K0132	18-Nov-20	0.250 L	19-Nov-20 23:24	1
PFHxS	355-46-4	ND	2.00		B0K0132	18-Nov-20	0.250 L	19-Nov-20 23:24	1
PFOA	335-67-1	ND	2.00		B0K0132	18-Nov-20	0.250 L	19-Nov-20 23:24	1
PFNA	375-95-1	ND	2.00		B0K0132	18-Nov-20	0.250 L	19-Nov-20 23:24	1
PFOS	1763-23-1	ND	2.00		B0K0132	18-Nov-20	0.250 L	19-Nov-20 23:24	1
9Cl-PF3ONS	756426-58-1	ND	2.00		B0K0132	18-Nov-20	0.250 L	19-Nov-20 23:24	1
PFDA	335-76-2	ND	2.00		B0K0132	18-Nov-20	0.250 L	19-Nov-20 23:24	1
MeFOSAA	2355-31-9	ND	2.00		B0K0132	18-Nov-20	0.250 L	19-Nov-20 23:24	1
EtFOSAA	2991-50-6	ND	2.00		B0K0132	18-Nov-20	0.250 L	19-Nov-20 23:24	1
PFUnA	2058-94-8	ND	2.00		B0K0132	18-Nov-20	0.250 L	19-Nov-20 23:24	1
PFDoA	307-55-1	ND	2.00		B0K0132	18-Nov-20	0.250 L	19-Nov-20 23:24	1
PFTrDA	72629-94-8	ND	2.00		B0K0132	18-Nov-20	0.250 L	19-Nov-20 23:24	1
11Cl-PF3OUdS	763051-92-9	ND	2.00		B0K0132	18-Nov-20	0.250 L	19-Nov-20 23:24	1
PFTeDA	376-06-7	ND	2.00		B0K0132	18-Nov-20	0.250 L	19-Nov-20 23:24	1

Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C2-PFHxA	SURR	107	70 - 130		B0K0132	18-Nov-20	0.250 L	19-Nov-20 23:24	1
13C2-PFDA	SURR	95.7	70 - 130		B0K0132	18-Nov-20	0.250 L	19-Nov-20 23:24	1
d5-EtFOSAA	SURR	94.7	70 - 130		B0K0132	18-Nov-20	0.250 L	19-Nov-20 23:24	1
13C3-HFPO-DA	SURR	112	70 - 130		B0K0132	18-Nov-20	0.250 L	19-Nov-20 23:24	1

RL - Reporting limit

Results reported to RL.

When reported, PFHxS, PFOA, PFOS, MeFOSAA and EtFOSAA include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: LFBD **EPA Method 537.1**

Name:	City of Grand Rapids Water System	Lab Sample:	B0K0132-BS1/B0K0132-BSD1
Project:	Monthly PFAS Testing	QC Batch:	B0K0132
Matrix:	Aqueous	Samp Size:	0.250/0.250 L
		Date Extracted:	18-Nov-20
		Column:	BEH C18

Analyte	CAS Number	LFB (ng/L)	LFB Spike	LFB % Rec	LFB Quals	LFBD (ng/L)	LFBD Spike	LFBD % Rec	RPD	LFBD Quals	%Rec Limits	RPD Limits	LFB Analyzed	LFB Dil	LFBD Analyzed	LFBD Dil
PFBS	375-73-5	13.1	14.2	92.5		13.0	14.2	91.9	0.675		70-130	30	19-Nov-20 23:35	1	19-Nov-20 23:46	1
PFHxA	307-24-4	16.4	16.0	103		16.6	16.0	104	1.39		70-130	30	19-Nov-20 23:35	1	19-Nov-20 23:46	1
HFPO-DA	13252-13-6	17.4	16.0	109		17.6	16.0	110	1.39		70-130	30	19-Nov-20 23:35	1	19-Nov-20 23:46	1
PFHpA	375-85-9	15.5	16.0	96.7		15.2	16.0	95.1	1.68		70-130	30	19-Nov-20 23:35	1	19-Nov-20 23:46	1
ADONA	919005-14-4	14.6	15.1	96.4		14.3	15.1	94.8	1.67		70-130	30	19-Nov-20 23:35	1	19-Nov-20 23:46	1
PFHxS	355-46-4	13.5	14.6	92.4		13.2	14.6	90.4	2.20		70-130	30	19-Nov-20 23:35	1	19-Nov-20 23:46	1
PFOA	335-67-1	15.3	16.0	95.8		15.1	16.0	94.3	1.67		70-130	30	19-Nov-20 23:35	1	19-Nov-20 23:46	1
PFNA	375-95-1	14.7	16.0	92.0		14.8	16.0	92.3	0.330		70-130	30	19-Nov-20 23:35	1	19-Nov-20 23:46	1
PFOS	1763-23-1	13.2	14.8	89.5		12.7	14.8	86.0	3.93		70-130	30	19-Nov-20 23:35	1	19-Nov-20 23:46	1
9Cl-PF3ONS	756426-58-1	11.6	14.9	78.0		11.7	14.9	78.8	1.14		70-130	30	19-Nov-20 23:35	1	19-Nov-20 23:46	1
PFDA	335-76-2	13.8	16.0	86.3		14.1	16.0	88.2	2.11		70-130	30	19-Nov-20 23:35	1	19-Nov-20 23:46	1
MeFOSAA	2355-31-9	14.3	16.0	89.6		14.3	16.0	89.2	0.512		70-130	30	19-Nov-20 23:35	1	19-Nov-20 23:46	1
EtFOSAA	2991-50-6	14.1	16.0	88.3		14.1	16.0	88.4	0.129		70-130	30	19-Nov-20 23:35	1	19-Nov-20 23:46	1
PFUnA	2058-94-8	15.4	16.0	96.2		15.3	16.0	95.9	0.322		70-130	30	19-Nov-20 23:35	1	19-Nov-20 23:46	1
PFDoA	307-55-1	16.9	16.0	106		17.1	16.0	107	0.862		70-130	30	19-Nov-20 23:35	1	19-Nov-20 23:46	1
PFTrDA	72629-94-8	16.1	16.0	100		16.1	16.0	101	0.366		70-130	30	19-Nov-20 23:35	1	19-Nov-20 23:46	1
11Cl-PF3OUdS	763051-92-9	14.2	15.0	94.2		14.4	15.0	95.8	1.71		70-130	30	19-Nov-20 23:35	1	19-Nov-20 23:46	1
PFTeDA	376-06-7	17.0	16.0	106		16.8	16.0	105	1.15		70-130	30	19-Nov-20 23:35	1	19-Nov-20 23:46	1

Labeled Standards	Type	LFB % Rec	LFB Quals	LFBD % Rec	LFBD Quals	Limits	LFB Analyzed	LFB Dil	LFBD Analyzed	LFBD Dil
13C2-PFHxA	SURR	114		111		70 - 130	19-Nov-20 23:35	1	19-Nov-20 23:46	1
13C2-PFDA	SURR	106		97.8		70 - 130	19-Nov-20 23:35	1	19-Nov-20 23:46	1
d5-EtFOSAA	SURR	98.2		94.7		70 - 130	19-Nov-20 23:35	1	19-Nov-20 23:46	1
13C3-HFPO-DA	SURR	120		116		70 - 130	19-Nov-20 23:35	1	19-Nov-20 23:46	1

Sample ID: E. TAP

EPA Method 537.1

Client Data

Name: City of Grand Rapids Water System
Project: Monthly PFAS Testing
Location: E. TAP
Matrix: Drinking Water
Date Collected: 12-Nov-20 08:59

Laboratory Data

Lab Sample: 2002508-02
Date Received: 13-Nov-20 10:04
Column: BEH C18

Analyte	CAS Number	Conc. (ng/L)	RL	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
PFBS	375-73-5	ND	1.98		B0K0132	18-Nov-20	0.252 L	20-Nov-20 00:08	1
PFHxA	307-24-4	ND	1.98		B0K0132	18-Nov-20	0.252 L	20-Nov-20 00:08	1
HFPO-DA	13252-13-6	ND	1.98		B0K0132	18-Nov-20	0.252 L	20-Nov-20 00:08	1
PFHpA	375-85-9	ND	1.98		B0K0132	18-Nov-20	0.252 L	20-Nov-20 00:08	1
ADONA	919005-14-4	ND	1.98		B0K0132	18-Nov-20	0.252 L	20-Nov-20 00:08	1
PFHxS	355-46-4	ND	1.98		B0K0132	18-Nov-20	0.252 L	20-Nov-20 00:08	1
PFOA	335-67-1	ND	1.98		B0K0132	18-Nov-20	0.252 L	20-Nov-20 00:08	1
PFNA	375-95-1	ND	1.98		B0K0132	18-Nov-20	0.252 L	20-Nov-20 00:08	1
PFOS	1763-23-1	ND	1.98		B0K0132	18-Nov-20	0.252 L	20-Nov-20 00:08	1
9Cl-PF3ONS	756426-58-1	ND	1.98		B0K0132	18-Nov-20	0.252 L	20-Nov-20 00:08	1
PFDA	335-76-2	ND	1.98		B0K0132	18-Nov-20	0.252 L	20-Nov-20 00:08	1
MeFOSAA	2355-31-9	ND	1.98		B0K0132	18-Nov-20	0.252 L	20-Nov-20 00:08	1
EtFOSAA	2991-50-6	ND	1.98		B0K0132	18-Nov-20	0.252 L	20-Nov-20 00:08	1
PFUnA	2058-94-8	ND	1.98		B0K0132	18-Nov-20	0.252 L	20-Nov-20 00:08	1
PFDoA	307-55-1	ND	1.98		B0K0132	18-Nov-20	0.252 L	20-Nov-20 00:08	1
PFTrDA	72629-94-8	ND	1.98		B0K0132	18-Nov-20	0.252 L	20-Nov-20 00:08	1
11Cl-PF3OUdS	763051-92-9	ND	1.98		B0K0132	18-Nov-20	0.252 L	20-Nov-20 00:08	1
PFTeDA	376-06-7	ND	1.98		B0K0132	18-Nov-20	0.252 L	20-Nov-20 00:08	1

Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C2-PFHxA	SURR	108	70 - 130		B0K0132	18-Nov-20	0.252 L	20-Nov-20 00:08	1
13C2-PFDA	SURR	93.6	70 - 130		B0K0132	18-Nov-20	0.252 L	20-Nov-20 00:08	1
d5-EtFOSAA	SURR	88.5	70 - 130		B0K0132	18-Nov-20	0.252 L	20-Nov-20 00:08	1
13C3-HFPO-DA	SURR	114	70 - 130		B0K0132	18-Nov-20	0.252 L	20-Nov-20 00:08	1

RL - Reporting limit

Results reported to RL.

When reported, PFHxS, PFOA, PFOS, MeFOSAA and EtFOSAA include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

DATA QUALIFIERS & ABBREVIATIONS

B	This compound was also detected in the method blank
Conc.	Concentration
CRS	Cleanup Recovery Standard
D	Dilution
DL	Detection Limit
E	The associated compound concentration exceeded the calibration range of the instrument
H	Recovery and/or RPD was outside laboratory acceptance limits
I	Chemical Interference
IS	Internal Standard
J	The amount detected is below the Reporting Limit/LOQ
K	EMPC (specific projects only)
LOD	Limit of Detection
LOQ	Limit of Quantitation
M	Estimated Maximum Possible Concentration (CA Region 2 projects only)
MDL	Method Detection Limit
NA	Not applicable
ND	Not Detected
OPR	Ongoing Precision and Recovery sample
P	The reported concentration may include contribution from chlorinated diphenyl ether(s).
Q	The ion transition ratio is outside of the acceptance criteria.
RL	Reporting Limit
TEQ	Toxic Equivalency
U	Not Detected (specific projects only)

Unless otherwise noted, solid sample results are reported in dry weight. Tissue samples are reported in wet weight.

Vista Analytical Laboratory Certifications

Accrediting Authority	Certificate Number
Alaska Department of Environmental Conservation	17-013
Arkansas Department of Environmental Quality	19-013-0
California Department of Health – ELAP	2892
DoD ELAP - A2LA Accredited - ISO/IEC 17025:2005	3091.01
Florida Department of Health	E87777-23
Hawaii Department of Health	N/A
Louisiana Department of Environmental Quality	01977
Maine Department of Health	2018017
Massachusetts Department of Environmental Protection	N/A
Michigan Department of Environmental Quality	9932
Minnesota Department of Health	1521520
New Hampshire Environmental Accreditation Program	207718-B
New Jersey Department of Environmental Protection	190001
New York Department of Health	11411
Oregon Laboratory Accreditation Program	4042-010
Pennsylvania Department of Environmental Protection	016
Texas Commission on Environmental Quality	T104704189-19-10
Vermont Department of Health	VT-4042
Virginia Department of General Services	10272
Washington Department of Ecology	C584-19
Wisconsin Department of Natural Resources	998036160

Current certificates and lists of licensed parameters are located in the Quality Assurance office and are available upon request.

NELAP Accredited Test Methods

MATRIX: Air	
Description of Test	**Method**
Determination of Polychlorinated p-Dioxins & Polychlorinated Dibenzofurans	EPA 23
Determination of Polychlorinated p-Dioxins & Polychlorinated Dibenzofurans	EPA TO-9A

MATRIX: Biological Tissue	
Description of Test	**Method**
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613B
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Pesticides in Water, Soil, Sediment, Biosolids, and Tissue by HRGC/HRMS	EPA 1699
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A

MATRIX: Drinking Water	
Description of Test	**Method**
2,3,7,8-Tetrachlorodibenzo- p-dioxin (2,3,7,8-TCDD) GC/HRMS	EPA 1613/1613B
1,4-Dioxane (1,4-Diethyleneoxide) analysis by GC/HRMS	EPA 522
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	ISO 25101 2009

MATRIX: Non-Potable Water	
Description of Test	**Method**
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613B
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Pesticides in Water, Soil, Sediment, Biosolids, and Tissue by HRGC/HRMS	EPA 1699
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Dioxin by GC/HRMS	EPA 613
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A

MATRIX: Solids	
Description of Test	**Method**
Tetra-Octa Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613B
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Pesticides in Water, Soil, Sediment, Biosolids, and Tissue by HRGC/HRMS	EPA 1699
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A

Vista Analytical Laboratory

CHAIN OF CUSTODY

For Laboratory Use Only
Work Order #: 2002508 Temp: 0.9 °C
Storage ID: R13 WR.2 Storage Secured: Yes ☐ No ☐

Project ID: Monthly PFAS Testing PO#: MA 2330000132 Sampler: Hillary Caron (name)

TAT (check one): Standard: [X] 21 days; Rush (surcharge may apply): [ ] 14 days [ ] 7 days Specify:

Hillary Caron Hillary Caron 11/12/2020 9:15A Bethni Benedict 11/13/20 1004
Relinquished by (printed name and signature) Date Time Received by (printed name and signature) Date Time

Relinquished by (printed name and signature) Date Time Received by (printed name and signature) Date Time

SHIP TO: Vista Analytical Laboratory
1104 Windfield Way
El Dorado Hills, CA 95762
(916) 673-1520 * Fax (916) 673-0106

ATTN:

Method of Shipment:

Tracking No.:

Add Analysis(es) Requested

Sample ID	Date	Time	Location/ Sample Description	Container(s) Quantity	Type	Matrix	PFAS by Isotope Dilution: PFOA/ PFOS	UCMR3 PFAS List:6	537.1 List: 14 or 18 (Circle One)	EPA Draft List of 24	OTHER: Please attach analyte list	EPA Method 537 (DW only): PFOA/ PFOS	UCMR3 PFAS List:6	537.1 List of 14	537.1 List of 18	Comments
FRB	11/12/20	8:58A	FRB	2	P	AQ				X						
E. TAP	↓	8:59A	E. TAP	2	P	DW									X	
RAW	↓	9:01A	RAW	2	P	AQ				X						

Special Instructions/Comment
Thank you!

SEND DOCUMENTATION AND RESULTS TO:

Name: Hillary Caron
Company: City of Grand Rapids Lake Michigan Filtration Plant
Address: 17350 Lake Michigan Drive
City: West Olive State: MI Zip: 49460
Phone: 616-456-3700
Email: hkarbowski@grcity.us

Container Types: P = HDPE, PJ = HDPE Jar
PY = Polypropylene, O= Other

Bottle Preservation Type:
TZ= Trizma:

Matrix Types: AQ = Aqueous, DW = Drinking Water, EF = Effluent, PP = Pulp/Paper, SD = Sediment, SL = Sludge, SO = Soil, WW = Wastewater, B = Blood/Serum, O = Other

Vista Analytical Laboratory

Sample Log-In Checklist

Page # 1 of 1

Vista Work Order #: 2002508 TAT Std

Samples Arrival:	**Date/Time** 11/13/20 1004		**Initials:** VBLB		**Location:** WR-2 **Shelf/Rack:** NA		
Delivered By:	FedEx	UPS	On Trac	GLS	DHL	Hand Delivered	Other
Preservation:	Ice		Blue Ice		Techni Ice	Dry Ice	None
Temp °C: 0.9 (uncorrected)			**Probe used:** Y / N		**Thermometer ID:** IR 4		
Temp °C: 0.9 (corrected)							

	YES	NO	NA
Shipping Container(s) Intact?	✓		
Shipping Custody Seals Intact?			✓
Airbill — Trk # 3988 4385 8503	✓		
Shipping Documentation Present?	✓		
Shipping Container: Vista / Client / Retain / Return / Dispose			
Chain of Custody / Sample Documentation Present?	✓		
Chain of Custody / Sample Documentation Complete?	✓		
Holding Time Acceptable?	✓		

Logged In:	**Date/Time** 11/14/20 1324	**Initials:** VBLB	**Location:** R13 WR-2 **Shelf/Rack:** A2 E3	
COC Anomaly/Sample Acceptance Form completed?			✓	✓

Comments:

CoC/Label Reconciliation Report WO# 2002508

LabNumber	CoC Sample ID	SampleAlias	Sample Date/Time	Container	BaseMatrix	Sample Comments
2002508-01	A FRB	FRB	12-Nov-20 08:58	HDPE Bottle, 250 mL	Aqueous	
2002508-01	B FRB	FRB	12-Nov-20 08:58	HDPE Bottle, 250 mL	Aqueous	
2002508-02	A E. TAP	E. TAP	12-Nov-20 08:59	Polypropylene, 250mL	Aqueous	
2002508-02	B E. TAP	E. TAP	12-Nov-20 08:59	Polypropylene, 250mL	Aqueous	
2002508-03	A RAW	RAW	12-Nov-20 09:01	HDPE Bottle, 250 mL	Aqueous	
2002508-03	B RAW	RAW	12-Nov-20 09:01	HDPE Bottle, 250 mL	Aqueous	

Checkmarks indicate that information on the COC reconciled with the sample label.
Any discrepancies are noted in the following columns.

	Yes	No	NA
Sample Container Intact?	✓		
Sample Custody Seals Intact?		✓	
Adequate Sample Volume?	✓		
Container Type Appropriate for Analysis(es)	✓		
Preservation Documented: Na2S2O3 (Trizma) None Other KJR 11/16/20 (A)	✓	✗ KJR 11/16/20	✓
If Chlorinated or Drinking Water Samples, Acceptable Preservation?			✓

Comments: (A) Contains Trizma (KJR 11/16/20)

Verifed by/Date: HS 11/14/20

Appendix 3

STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
GRAND RAPIDS DISTRICT OFFICE

RICK SNYDER
GOVERNOR

C. HEIDI GRETHER
DIRECTOR

December 11, 2017

Mr. Dave Harran, Interim Water System Manager
City of Grand Rapids
1900 Oak Industrial Drive, NE
Grand Rapids, Michigan 49505

WSSN: **2790**

Dear Mr. Harran:

SUBJECT: City of Grand Rapids (City) – 2017 Water System Sanitary Survey

This letter will confirm my visits with several of the City's Water System staff between April and November of 2017, and summarize the review and discussion of the water supply facilities serving the City of Grand Rapids (supply). The purpose of the sanitary survey was to evaluate the water system with respect to the requirements of the Michigan Safe Drinking Water Act – Act 399 (PA 1976 as amended). The sanitary survey form was updated to gather information on the water supply system. Electronic copies of the sanitary survey document in .pdf format have been emailed to you. You are encouraged to share this document with all pertinent water system and administrative personnel at the City.

As this is a rather large document, please note the following outline:

Page 1 – Sanitary Survey Review Summary
Page 4 to 62 – Water Treatment Plant Data Gathering Form
Page 63 to 72 – Compliance with Rules and Regulations
Page 71 to 105 – Distribution System Data Gathering Form

The report's findings summary on Page 2 lists the individual items that should or must be addressed and references the pages in the report where those items are discussed. In an effort to help you prioritize, each item has been assigned a rating of 1-4, with 1 being the most critical.

Our department would first like to acknowledge some of the progress the City has made in improving the water system since our 2014 sanitary survey. These improvements include:

- Sodium hypochlorite feed system at the Lake Michigan Filtration Plant (LMFP)
- Ongoing concrete rehabilitation projects in the LMFP
- Improvements to the Wilson, Franklin, and Bristol Pump Stations
- Rehabilitation of the South Clearwell at the LMFP
- Construction of a new 0.5 million gallon elevated tank (North Walker Tank)
- Ongoing watermain replacement projects
- LMFP High Service Pumps and VFD upgrades

The water system has undergone some significant changes from a staffing perspective since 2014 as well. By condensing staff at the LMFP, the Coldbrook pumping station no longer serves as a base of operations for distribution maintenance crews. In fact, maintenance has been assigned to shared staff at the Water Resource Recovery Facility. The new staffing structure was further put to the test in July of 2017, when multiple levels of failure of power generation equipment resulted in historically low water levels in the distribution system reservoirs.

Operators were able to avoid a public health impact by implementing emergency response to the best of their abilities. Some of the recommendations are a result of observations and conversations pertaining to the change in staffing as well as this emergency event.

The following table summarizes the findings from our survey of the water system:

Survey Element	Findings
Source	**Deficiency Identified**
Treatment	Recommendations Made
Distribution System	Recommendations Made
Finished Water Storage	Recommendations Made
Pumps	Recommendations Made
Monitoring & Reporting	Recommendations Made
Management & Operations	**Deficiency Identified**
Operator Compliance	Recommendations Made
Security	Recommendations Made
Financial	Recommendations Made
Other	No deficiencies/recommendations

The following deficiencies must be addressed to comply with Act 399:

D1. Events in early July of 2017 resulted in multiple levels of failure of emergency power generation equipment, as well as onsite high voltage electrical equipment. One limitation caused by these failures was the inability to pump water to the distribution system, resulting in dangerously low reservoir levels of historic magnitude. The water supply must take adequate steps to ensure all power equipment is fully functional through a robust preventative maintenance and testing protocol. In addition, the water supply must study the capabilities of the existing emergency interconnections, and the potential for adding additional emergency interconnects if necessary.

D2. Through observations at distribution sites and lessons learned from multiple events in the water system, the maintenance of the distribution system is a topic of concern. At multiple locations, vegetation overtakes perimeter fencing, air vents and access hatches deteriorate, pipe coatings continue to deteriorate, and some unsafe conditions exist on walkways due to deterioration. In addition, review of maintenance records finds a lack of preventative and routine maintenance of pumps and pumping facilities. The water supply must provide adequate staffing, training, and managerial oversight to properly implement preventative maintenance in the distribution facilities.

D3. Chlorine piping has been modified, to provide additional flexibility between chlorine pumps and potential feed locations. While this effort is recommended to be done, an Act 399 permit was not obtained. A permit application must be submitted by December 1, 2017.

The following recommendations are significant or have the potential to significantly impact the water supply:

R1. According to Rule 710b (5) of Act 399, sampling of water quality parameters is required for large water supplies that install corrosion control treatment. The City continues to surpass the minimum requirements in frequency of sampling, both at the point of entry as well as in the distribution taps. However, due to poor sampling practices and inadvertent lack of follow-up, there were a number of 'excursions' from the designated parameters in 2014 and 2015 for pH in the distribution/tap samples. The Department of Environmental Quality (DEQ) has only recently begun tracking distribution WQP's for compliance, and as such these excursions are not being identified as a deficiency. The City reports the excursions were likely due to sampling procedural errors, and a standard procedure has now been established for quickly addressing these excursions to ensure proper water quality and effective corrosion treatment.

R2. The City has both a history of compliance with the Lead and Copper Rule, as well as an abundance of lead in the system (full lead service lines). As such, there is a great deal of importance placed on the corrosion treatment at the water plant, due to the potential impact to public health. Our office has identified a need to re-visit the designated ranges for pH, orthophosphate, and total phosphate at both the point of entry and tap locations (i.e., optimal water quality parameters, or OWQPs). We are contacting the supply under separate cover to begin this discussion. As discussions progress, the City should bear in mind the impacts of all water treatment process (i.e., coagulation, disinfection) on water quality parameters and corrosion control.

R3. The capacity of the transmission and high service pumping have been reduced relative to the water plant's rated treatment capacity. Since the system demands are around 85 percent of that capacity and likely growing, the City must implement a solution to increase the ability to move water from the water plant to the distribution system.

R4. The City has begun to incorporate residential accounts into its cross connection prevention program, primarily in the form of requiring testing of backflow preventers. This effort is commended, and should be complimented with a more robust inspections program. The City may wish to conduct systematic inspections in residential areas, or at a minimum conduct formal interior inspections at opportune times such as complaint investigations or meter changeouts. Inspection forms and records must be maintained for these activities, and reported annually.

We would appreciate a response to this letter outlining how the City plans to address each of these items by **January 12, 2017**. Lower priority recommendations should also be reviewed. In future visits, we will be tracking progress of the items listed in the report.

If you have any questions, please contact me at 616-356-0207; sarkipatoe@michigan.gov; or Department of Environmental Quality, Drinking Water and Municipal Assistance Division, Grand Rapids District Office, 350 Ottawa Avenue NW, Unit 10, Grand Rapids, Michigan 49503-2341.

Sincerely,

Ernie Sarkipato, P.E.
Surface Water Treatment Specialist
Engineering Unit

ES:kw

Enclosure

cc/enc: Mr. Mike Grenier, Water Treatment Plant Superintendent
Mr. Chad Reenders, Water Treatment Plant Supervisor

WATER
SYSTEM

CITY OF GRAND RAPIDS

January 12th, 2018

Mr. Ernie Sarkipato, P.E.
Department of Environmental Quality
Drinking Water and Municipal Assistance Division
350 Ottawa Avenue NW Unit 10
Grand Rapids, Michigan 49503

Dear Mr. Sarkipato:

The City of Grand Rapids has reviewed the recommendations and deficiencies highlighted in the Michigan Department of Environmental Services (MDEQ) letter dated December 11, 2017. As requested, I am providing a written response to address those areas.

Deficiencies:

D1. Lake Michigan Filtration Plant (LMFP) Power Outage

A review of the event took place immediately after the incident. From this, an action plan was developed along with schedules of completion. Quarterly reviews of our progress occur to ensure the action items progress satisfactorily. A list of major electrical repairs, improvements, or corrections are bullet pointed below.

- The main switch gear (B) that was damaged has been repaired. An evaluation of the other major gear was done and was found to be satisfactory.
- The large generators powering the plant's pump system are fully operational. Dark tests have been performed to ensure readiness.
- The small generator powering the filtration plant controls is operational.
- A new UPS system is in the procurement process while a temporary back up is in place.
- A lightning protection survey has been completed with recommended repairs. This repair work has been awarded, with work scheduled to begin in spring.
- Contracts for PMs and emergency services are in place for the large and small generators, as well as switch gear. We will soon have similar contracts for the generator's electronics. Regular testing and PM work is being completed by staff, which is substantially completed.

In addition, an electrical consultant was hired to provide an assessment of the facility's electrical equipment. The analysis was completed in late December. In summary, the report provided insight into PM schedules and typical life cycles of equipment with cost estimates. We are currently organizing and implementing the recommended PM schedules. Also, in concurrence with the report, funding for equipment replacement has been scheduled in the city's 5-year fiscal plan.

In regards to our emergency interconnects, the GR Water System is currently partnering with Ottawa County and the City of Wyoming to study the impact of an additional interconnecting water main between the City of Grand Rapids and the City of Wyoming. The study is expected to be completed in the spring of 2018. In addition, the City is already looking forward to our Comprehensive Master Plan update in 2019 and 2020. In this update, one of the key items will be to study the capabilities of all interconnects that the City of Grand Rapids has with the surrounding communities.

D2. Maintenance of Distribution System

The Environmental Services Department (ESD), in cooperation with the Water System, have established an inspection and maintenance schedule for all distribution sites. This includes vegetation management with regular site inspections.

The deteriorating air vents and access hatches have been bid for replacement. We are currently evaluating the bids received which includes new hatches and vents at all the large underground storage facilities. Over the last 3 years, several of the water pump stations piping have been repainted. Franklin Pump Station is being painted this winter (2017-2018). Deteriorating walkways will be evaluated for repairs this fiscal year.

Water system pumps, PRVs, and appurtenances are to be routinely inspected every two weeks. Predictive, preventative and corrective maintenance of pumps, PRVs and other support equipment will be scheduled and tracked.

Environmental Services, who perform the maintenance of water system vertical assets, are working to provide the Water System improved reporting tools. These reports will aid in the Water System's ability to ensure inspections and maintenance requirements are performed.

D3. LMFP Chlorine Plumbing

Chlorine piping permit was submitted to the DEQ on December 13th, 2017. Please advise if additional information is needed.

Recommendations:

R1. WQP's

Past sampling practices have been corrected and our 2016 MORs have been revised to reflect this change. Standard Operating Procedures (SOPs) have been updated to provide proper sampling instructions. We will continue to be watchful and avoid excursions.

R2. Corrosion Control Treatment

The City of Grand Rapids understands the need for optimized corrosion control treatment and has agreed to conduct a study of the effectiveness of the program. More to be shared in the coming months.

R3. Transmission Main Capacity

The City will continue to monitor the capacity within our major transmission mains. We are currently working on a study about whether the Allendale Booster Station is still a possible option for boosting capacity in the north transmission main. The City also has been reviewing long term maintenance activities such as cleaning the south main to increase capacity as well as constructing a booster station along the south transmission main. We will continue to monitor demands and will study additional options for an increase in capacity in future comprehensive master plan updates.

WATER SYSTEM

CITY OF GRAND RAPIDS

R4. Residential Cross Connection Program

Cross connection literature will be provided to residential customers (via bill insert) each year to make them aware of cross connections. The City will also provide cross connection training to those employees that routinely go into a home to change out a meter so they can have a conversation with the customer about the dangers of cross connections. The more comprehensive or formal internal cross connection inspection for residential customers can be looked upon as a long term goal.

If you have any questions, I can be reached at 616-456-4522 or dharran@grcity.us.

Sincerely,

Dave Harran
Acting Water System Manager
City of Grand Rapids
1900 Oak Industrial Drive NE
Grand Rapids, MI 49505

Appendix 4

CITY OF GRAND RAPIDS

January 26, 2021

Subject: Letter of Support from the Utility Advisory Board for the Consolidation and Contamination Risk Reduction (C2R2) Grant Application for Cascade Township

To whom it may concern:

On behalf of the Utility Advisory Board, I write to you to express support of the City of Grand Rapids' application on behalf of Cascade Township for the Consolidation and Contamination Risk Reduction (C2R2) Grant. The grant would provide Cascade Township with a maximum grant award of $5 million for a drinking water system project that would extend a public watermain in neighborhoods where residential wells are affected by PFAS and other similar contaminants. The proposed project will also provide service extensions/connections to homes along the extension project and residential well homes with existing watermains in front of their home.

Cascade Township is a partner community of the Utility Advisory Board and a retail water and sewer customer of the City of Grand Rapids. The Utility Advisory Board is a regional partnership with communities outside of the Grand Rapids city limits that are served by the Grand Rapids Water and Sewer System. The Utility Advisory Board was established in 1999, and members on the board represent nine retail and wholesale customers. The regional partnership includes:

- Ada Township
- Cascade Township
- City of East Grand Rapids
- City of Kentwood
- Tallmadge Township
- City of Walker
- Wright Township
- Caledonia Township
- City of Grand Rapids

The Utility Advisory Board reviews Water/Sewer System rates, policies, and fees and makes recommendations to the Grand Rapids City Commission. On January 21, 2020, the Utility Advisory Board voted unanimously to support Cascade Township's C2R2 grant application.

The grant application submitted on behalf of Cascade Township would provide safe drinking water to Cascade Township residents. Furthermore, the Grand Rapids Water System has a long history of providing safe and high-quality drinking water that protects public health and supports the local economy. It also continues to meet and exceed all regulatory requirements. Thank you for your consideration on this matter.

Sincerely yours,

Eric DeLong
Deputy City Manager
City of Grand Rapids

CASCADE CHARTER TOWNSHIP

2865 Thornhills SE Grand Rapids, Michigan 49546-7140

January 28, 2021

Subject: Letter of Support from Cascade Charter Township for the Consolidation and Contamination Risk Reduction (C2R2) Grant Application

To Whom It May Concern:

On behalf of the Cascade Township Board of Trustees I would like to express Cascade Charter Township's support of the C2R2 grant application from the City of Grand Rapids to connect the Burger Goodwood Neighbohood to the City of Grand Rapids public water system.

Cascade Township is a partner community of the City of Grand Rapids Utility Advisory Board and a retail water and sewer customer of the City of Grand Rapids. The Utility Advisory Board is a regional partnership with communities outside of the Grand Rapids city limits that are served by the Grand Rapids Water and Sewer System.

The Burger Goodwood Neighborhood is an EGLE designated area of interest for PFAS contamination. Through their comprehensive testing program they identified 40 wells considered contaminated with PFAS chemicals based on the part 201 criteria established by the state of Michigan in August 2020. Additionally, 60% of the 364 wells tested had some detection of PFAS. Based on the testing, EGLE has determined that a long-term solution, protective of public health, for the large area is required.

In addition to the Burger Goodwood Neighborhood, EGLE has also identified the Gerald R Ford International Airport as a PFAS site. Foam containing PFAS has been historically used as fire fighting tool at the airport, including training.

We appreciate the work EGLE is doing on the investigation for both these sites. While investigations are ongoing, This grant will allow the Township and City of Grand Rapids to ensure that safe reliable drinking water can be made available to those Cascade residents whose drinking water has been negatively impacted by PFAS as quickly as possible.

I'm happy to answer any questions you may have, and thank you for your consideration on this matter.

Regards,

Benjamin Swayze

Benjamin Swayze
Township Manager

86TH DISTRICT
STATE CAPITOL
P.O. BOX 30014
LANSING, MI 48909-7514
PHONE: (517) 373-0846
FAX: (517) 373-8714
E-MAIL: thomasalbert@house.mi.gov

MICHIGAN HOUSE OF REPRESENTATIVES

THOMAS A. ALBERT

STATE REPRESENTATIVE

January 28, 2021

Michigan Department of Environment, Great Lakes and Energy
Finance Division – Water Infrastructure Financing Section
525 West Allegan Street
P.O. Box 30457
Lansing, MI 48909-7957

To Whom It May Concern,

We are pleased to write to you in support of the City of Grand Rapids' request for a Consolidation and Contamination Risk Reduction (C2R2) Grant. Funding from the Michigan Department of Environment, Great Lakes and Energy (EGLE) will be used to address PFAS contamination in Cascade Township's residential drinking water.

In 2018, groundwater contamination related to PFAS was identified in Cascade Township during independent drinking water well tests. Since then, the City of Grand Rapids and Cascade Township have worked with EGLE, MDHHS, and the Kent County Health Department to diligently address this issue and protect public health. Most homes in Cascade Township neighborhoods being supplied with well water have been identified as a substantial challenge. Thus far, 40 houses in the area have tested for PFAS/PFOA above the 16/8 parts per trillion threshold set in August 2020.

To remedy this situation, the City of Grand Rapids plans to connect 473 Cascade Township houses to the Grand Rapids municipal water system. The City estimates that this will cost approximately $13 million and plans to dedicate any awarded C2R2 grant dollars toward this cost. We believe that the City of Grand Rapids has proven its ability to use public funds responsibly and we believe that this project will be executed effectively.

We are hopeful that the Department of Environment, Great Lakes and Energy will find the City of Grand Rapids to be an excellent applicant for this grant. We appreciate your time and consideration. Please do not hesitate to reach out if you have any questions.

Sincerely,

Thomas Albert
State Representative
86th District

Winnie Brinks
State Senator
29th District

Appendix 5

Burger - Goodwood Neighborhood - Phase 1

Water Main Extension Schematic Estimate

January 29, 2021

General Comments

Water Main Unit cost includes water main, fittings, average hydrant spacing and narrow trench restoration

Water Service includes tap, curb stop and copper to get to the ROW.

Water Connection includes water service to house and internal plumbing (Unit cost adjusted based on house distance from ROW)

Assumes majority of the water main would placed outside the roadway to minimize disturbance, restoration and costs.

Location	Limits	Limits	Item	Unit	Quantity	Unit Cost	Ext Amt
Burger	Goodwood	1500' W Bayou	Water Main, 12-inch	Ft	2350	$ 165.00	$ 387,750.00
			Water Main, 12-inch Bayou Crossing	Ft	400	$ 300.00	$ 120,000.00
			Water Service, Res, 1-inch	Ea	39	$ 1,500.00	$ 58,500.00
			Water Connection	Ea	39	$ 5,100.00	$ 198,900.00
Tanglewood	TRD	Burger	Water Main, 12-inch	Ft	2750	$ 165.00	$ 453,750.00
			Water Service, Res, 1-inch	Ea	41	$ 1,500.00	$ 61,500.00
			Water Connection	Ea	41	$ 6,000.00	$ 246,000.00
Tricklewood	Brookhills	Tricklewood Ct	Water Main, 8-inch	Ft	1025	$ 145.00	$ 148,625.00
			Water Main, 8-inch Trout Creek Crossing	Ft	250	$ 300.00	$ 75,000.00
			Water Service, Res, 1-inch	Ea	11	$ 1,500.00	$ 16,500.00
			Water Connection	Ea	11	$ 5,100.00	$ 56,100.00
Brookhills	Tricklewood	End	Water Main, 8-inch	Ft	350	$ 145.00	$ 50,750.00
			Water Service, Res, 1-inch	Ea	6	$ 1,500.00	$ 9,000.00
			Water Connection	Ea	6	$ 5,000.00	$ 30,000.00
Tricklewood Ct	Tricklewood	End	Water Main, 8-inch	Ft	875	$ 145.00	$ 126,875.00
			Water Service, Res, 1-inch	Ea	13	$ 1,500.00	$ 19,500.00
			Water Connection	Ea	13	$ 6,500.00	$ 84,500.00
Tuscany	Burger	East end	Water Main, 8-inch	Ft	1800	$ 145.00	$ 261,000.00
			Water Service, Res, 1-inch	Ea	30	$ 1,500.00	$ 45,000.00
			Water Connection	Ea	30	$ 6,000.00	$ 180,000.00
Cimarron	Tuscany	Burger	Water Main, 8-inch	Ft	1100	$ 145.00	$ 159,500.00
			Water Service, Res, 1-inch	Ea	15	$ 1,500.00	$ 22,500.00
			Water Connection	Ea	15	$ 5,100.00	$ 76,500.00
Tripoli	Tuscany	Burger	Water Main, 8-inch	Ft	825	$ 145.00	$ 119,625.00
			Water Service, Res, 1-inch	Ea	9	$ 1,500.00	$ 13,500.00
			Water Connection	Ea	9	$ 5,000.00	$ 45,000.00
Tripoli Ct	Tripoli	End	Water Main, 8-inch	Ft	300	$ 145.00	$ 43,500.00
			Water Service, Res, 1-inch	Ea	4	$ 1,500.00	$ 6,000.00
			Water Connection	Ea	4	$ 5,100.00	$ 20,400.00
Goodwood Service Connections			Water Connection	Ea	46	$ 6,500.00	$ 299,000.00
Woodbrook Service Connections			Water Connection	Ea	42	$ 5,000.00	$ 210,000.00
Well Abandonment					256	$ 750.00	$ 192,000.00
Residential Pressure Reducing Valves (Estimated Quantity)					120	$ 500.00	$ 60,000.00
							$ 3,896,775.00
			Contractor mobilization, overhead and project Costs (15%)				$ 584,500.00
			Construction and Estimating Contingency (20%)				$ 779,350.00
						Preliminary Construction Estimate	**$ 5,260,625.00**
			Survey, Engineering Des & CA (15%)				$ 789,100.00
						Estimated Project Cost	**$ 6,049,725.00**

Burger - Goodwood Neighborhood - Future Phases

Water Main Extension Schematic Estimate

January 29, 2021

General Comments

Water Main Unit cost includes water main, fittings, average hydrant spacing and narrow trench restoration

Water Service includes tap, curb stop and copper to get to the ROW.

Water Connection includes water service to house and internal plumbing (Unit cost adjusted based on house distance from ROW)

Assumes majority of the water main would placed outside the roadway to minimize disturbance, restoration and costs.

Location	Limits	Limits	Item	Unit	Quantity	Unit Cost	Ext Amt
Burger	1500' W Bayou	Mahesh	Water Main, 12-inch	Ft	2800	$ 165.00	$ 462,000.00
			Water Main, 12-inch Creek Crossing	Ft	300	$ 300.00	$ 90,000.00
			System PRV	Ea	1	$ 125,000.00	$ 125,000.00
			Water Service, Res, 1-inch	Ea	28	$ 1,500.00	$ 42,000.00
			Water Connection	Ea	28	$ 6,900.00	$ 193,200.00
Westridge	Burger	End	Water Main, 8-inch	Ft	600	$ 145.00	$ 87,000.00
			Water Service, Res, 1-inch	Ea	4	$ 1,500.00	$ 6,000.00
			Water Connection	Ea	4	$ 6,000.00	$ 24,000.00
Brookhills	TRD	Tricklewood	Water Main, 8-inch	Ft	1450	$ 145.00	$ 210,250.00
			Water Service, Res, 1-inch	Ea	21	$ 1,500.00	$ 31,500.00
			Water Connection	Ea	21	$ 5,100.00	$ 107,100.00
Brookpoint	Brookhills	Tanglewood	Water Main, 8-inch	Ft	875	$ 145.00	$ 126,875.00
			Water Service, Res, 1-inch	Ea	8	$ 1,500.00	$ 12,000.00
			Water Connection	Ea	8	$ 5,000.00	$ 40,000.00
Winterberry	Tanglewood	End	Water Main, 8-inch	Ft	500	$ 145.00	$ 72,500.00
			Water Service, Res, 1-inch	Ea	7	$ 1,500.00	$ 10,500.00
			Water Connection	Ea	7	$ 5,150.00	$ 36,050.00
Woodbrook	Ridgemont	North End	Water Main, 8-inch	Ft	875	$ 145.00	$ 126,875.00
			Water Service, Res, 1-inch	Ea	15	$ 1,500.00	$ 22,500.00
			Water Connection	Ea	15	$ 5,000.00	$ 75,000.00
Tricklewood	Woodbrook	Tricklewood Ct	Water Main, 8-inch	Ft	1350	$ 145.00	$ 195,750.00
			Water Service, Res, 1-inch	Ea	16	$ 1,500.00	$ 24,000.00
			Water Connection	Ea	16	$ 5,000.00	$ 80,000.00
Ridgemont Court	Woodbrook	End	Water Main, 8-inch	Ft	250	$ 145.00	$ 36,250.00
			Water Service, Res, 1-inch	Ea	4	$ 1,500.00	$ 6,000.00
			Water Connection	Ea	4	$ 5,000.00	$ 20,000.00
Sandy Lane	Woodbrook	End	Water Main, 8-inch	Ft	875	$ 145.00	$ 126,875.00
			Water Service, Res, 1-inch	Ea	16	$ 1,500.00	$ 24,000.00
			Water Connection	Ea	16	$ 5,000.00	$ 80,000.00
Oakmont/Forest Valley	Ridgemont	Oak Tree	Water Main, 8-inch	Ft	4550	$ 145.00	$ 659,750.00
White Oak/Oak Creek			Water Service, Res, 1-inch	Ea	54	$ 1,500.00	$ 81,000.00
Forest Valley Ct			Water Connection	Ea	54	$ 6,000.00	$ 324,000.00
Oak Tree	Woodbrook	Maplecrest	Water Main, 8-inch	Ft	1600	$ 145.00	$ 232,000.00
			Water Service, Res, 1-inch	Ea	16	$ 1,500.00	$ 24,000.00
			Water Connection	Ea	16	$ 5,000.00	$ 80,000.00
Maplecrest/Maplecrest Ct	End	Existing WM	Water Main, 8-inch	Ft	1450	$ 145.00	$ 210,250.00
			Water Service, Res, 1-inch	Ea	22	$ 1,500.00	$ 33,000.00
			Water Connection	Ea	22	$ 6,000.00	$ 132,000.00
Aqua Fria	Goodwood	End	Water Main, 8-inch	Ft	575	$ 145.00	$ 83,375.00
			Water Service, Res, 1-inch	Ea	6	$ 1,500.00	$ 9,000.00
			Water Connection	Ea	6	$ 8,500.00	$ 51,000.00
Well Abandonment					217	$ 750.00	$ 162,750.00
Residential Pressure Reducing Valves					100	$ 500.00	$ 50,000.00
							$ 4,625,325.00
			Contractor mobilization, overhead and project Costs (15%)				$ 693,800.00
			Construction and Estimating Contingency (20%)				$ 925,075.00
						Preliminary Construction Estimate	**$ 6,244,200.00**
			Survey, Engineering Des & CA (15%)				$ 936,600.00
						Estimated Project Cost	**$ 7,180,800.00**