

**From:** Byers, Harris <Harris.Byers@stantec.com>  
**Sent:** Friday, July 28, 2023 5:05 PM  
**To:** Beggs, Tauren R - DNR; Adam Tegen  
**Subject:** PFAS Concentrations in Soil at River Point District (BBRTS Case No. 07-36-583000)  
**Attachments:** Table 1 - Detected PFAS Compounds in Soil.pdf; Figure 13 - PFAS in GW (002).pdf

**CAUTION: This email originated from outside the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.**

Tauren and Adam:

To follow up to our separate discussions this week, attached is a table summarizing the concentrations of fluorinated compounds in soil at the River Point District in Manitowoc. Please review and let's discuss next week if you have time. As noted below, we are considering not having the laboratory analyze the remaining soil samples – especially given the exorbitant cost for this analysis.

For context, attached is Figure 13 adapted from the River Point Drive RAP/MMP summarizing the concentrations of fluorinated compounds in groundwater and noting the recent soil boring IDs corresponding to data on Table 1. (please consider both a working DRAFT at this time)

As illustrated on the attached (and in the RAP/MMP and other previous reports), the greatest fluorinated impacts were identified in groundwater from monitoring wells MW-5 and MW-6. Therefore, we sampled black granular fill from the surface and directly below the surface horizons (staying well above the capillary fringe) at these two groundwater monitoring locations and at one additional soil boring near the wells. The purpose of sampling surficial/shallow fill was to determine if a surface release (e.g., AFFF or other) could be a potential "source" of identified groundwater impacts.

Monitoring Well Location	Soil Boring ID (2023)
MW-5	SB-282
MW-6	SB-284
NA	SB-283

As noted on the attached, the concentrations of detected fluorinated compounds are several orders of magnitude less than ch. NR 720 RCLs suggesting the compounds do not pose a direct contact risk. And therefore, although apparently present in soil, would not require further evaluation under NR700.

However, a soil to groundwater RCL has not been established; therefore, it is not possible to directly determine if the detected compounds pose a risk to groundwater or if they are indicative of a significant spill. The scientific literature was recently summarized by Brusseau et al. (2020; <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7654437/>) who noted that the range of PFAS compounds in soil from a variety of background locations (n=5,700 samples from 1,400 locations) ranged from 0-237 ug/kg. Conversely, the range of PFAS compounds at "Contaminated" sites (PFAS-MFR sites; AFFF-testing locations, crash site) were two to three orders of magnitude greater than background. Specifically, the concentrations in AFFF source zones were 50,000 ug/kg (PFOA) and 373,000 ug/kg (PFOS).

Given the extremely small concentrations of compounds detected in soil at SB-282, SB-283, and SB-284 compared to Brusseau et al. (2020), it does not appear likely that the groundwater impacts identified at

the River Point District are associated with a surface release of AFFF (or other fluorinated compound) at MW-5/MW-6.

Given the exorbitant cost of PFAS analysis in soil, we are planning to have the laboratory toss the rest of the soil samples (n~15 from nearby soil borings completed at the same time as SB-282 for other purposes) submitted for analysis and instead focus the City's remaining grant dollars towards evaluating other data gaps/environmental impacts at the Property.

Sincerely,

**Harris Byers, Ph.D.**

Sr. Brownfields Project Manager  
Contaminant Hydrogeologist / Urban Geochemist

Direct: 414 581-6476  
Harris.Byers@stantec.com

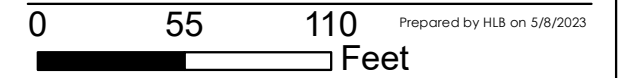
Stantec  
12080 Corporate Parkway Suite 200  
Mequon WI 53092-2649



The content of this email is the confidential property of Stantec and should not be copied, modified, retransmitted, or used for any purpose except with Stantec's written authorization. If you are not the intended recipient, please delete all copies and notify us immediately.

Figure No. **13**  
 Title  
**PFAS Concentrations in Groundwater**

Client/Project  
 River Point Drive Rights of Ways  
 River Point District  
 City of Manitowoc

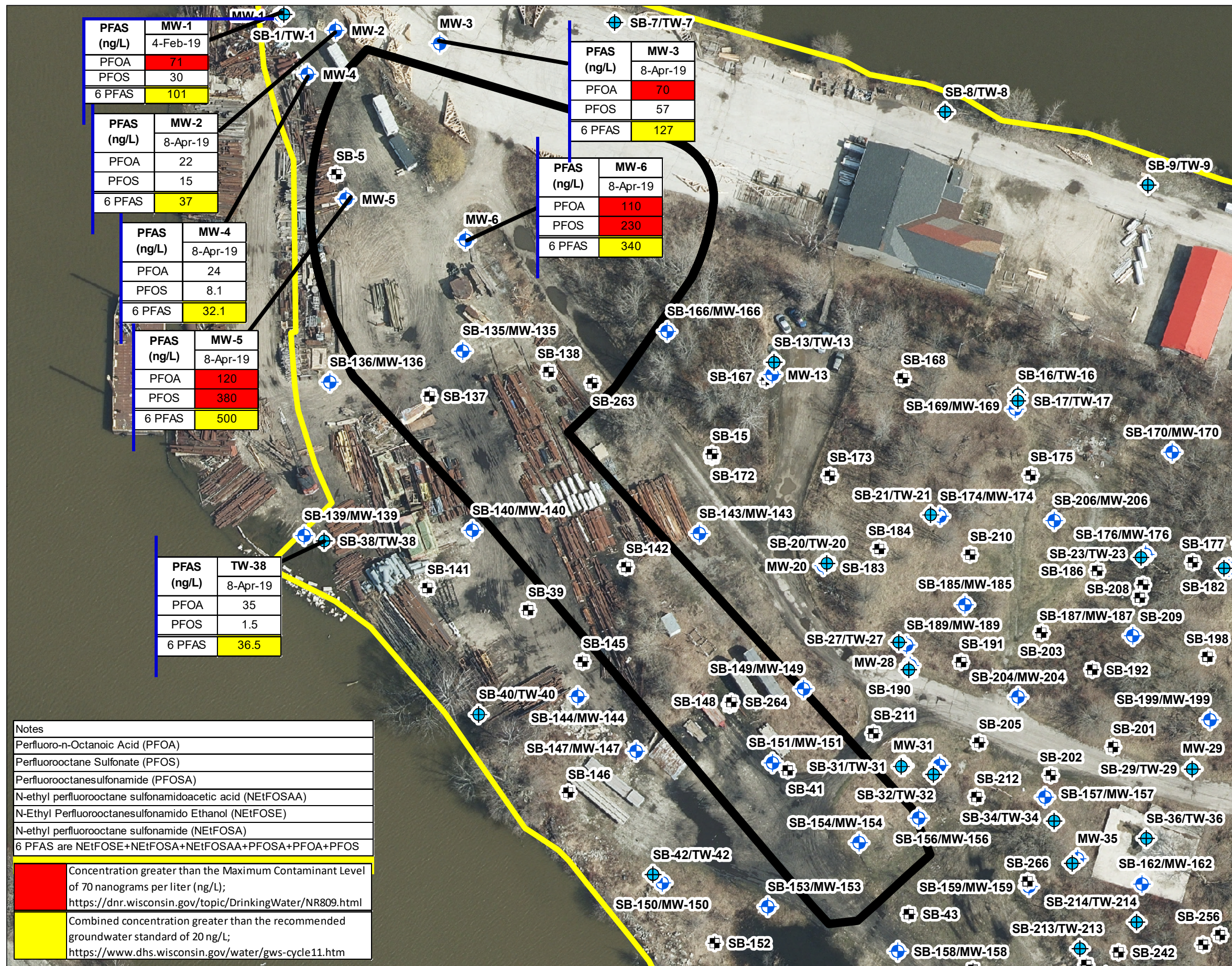


### Legend

- River Point District
- River Point Drive Rights of Way

### Sample Locations

- Soil Boring / Monitoring Well
- Soil Boring
- Soil Boring / Temp Well



Notes	
Perfluoro-n-Octanoic Acid (PFOA)	
Perfluorooctane Sulfonate (PFOS)	
Perfluorooctanesulfonamide (PFOSA)	
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	
N-Ethyl Perfluorooctanesulfonamido Ethanol (NEtFOSE)	
N-ethyl perfluorooctane sulfonamide (NEtFOSA)	
6 PFAS are NEtFOSE+NEtFOSA+NEtFOSAA+PFOSA+PFOA+PFOS	
	Concentration greater than the Maximum Contaminant Level of 70 nanograms per liter (ng/L); <a href="https://dnr.wisconsin.gov/topic/DrinkingWater/NR809.html">https://dnr.wisconsin.gov/topic/DrinkingWater/NR809.html</a>
	Combined concentration greater than the recommended groundwater standard of 20 ng/L; <a href="https://www.dhs.wisconsin.gov/water/gws-cycle11.htm">https://www.dhs.wisconsin.gov/water/gws-cycle11.htm</a>

Notes  
 1. Coordinate System: NAD 1983 HARN WISCRS Manitowoc County Feet  
 2. Orthophotograph: Manitowoc County, 2020



Table 1  
 Fluorinated Compounds in Soil  
 River Point District  
 Manitowoc, Wisconsin

PFAS Constituent	Units	Non-Industrial Direct Contact RCL	Industrial Direct Contact RCL	Sample Location, Depth, Sample Date					
				SB-282 (0.25-1)	SB-282 (1-2)	SB-283 (0.25-2)	SB-283 (2-3)	SB-284 (0.25-0.75)	Equip. Blank <sup>1</sup>
				06/29/2023	06/29/2023	06/29/2023	06/29/2023	06/29/2023	06/30/2023
11CI-PF3OUdS	UG/KG	NE	NE	< 0.036	< 0.038	< 0.030	< 0.039	< 0.031	< 0.29
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	UG/KG	NE	NE	< 0.045	< 0.048	< 0.038	< 0.049	< 0.039F1	< 0.37
4:2 FTS	UG/KG	NE	NE	< 0.059	< 0.062	< 0.049	< 0.064	< 0.052	< 0.22
6:2 FTS	UG/KG	NE	NE	< 0.031	< 0.033	< 0.026	< 0.034	< 0.027	< 2.3
8:2 FTS	UG/KG	NE	NE	< 0.041	< 0.043	< 0.034	< 0.044	< 0.035	< 0.42
9CI-PF3ONS	UG/KG	NE	NE	< 0.041	< 0.043	< 0.034	< 0.044	< 0.035	< 0.22
HFPO-DA (GenX)	UG/KG	NE	NE	< 0.047	< 0.050	< 0.040	< 0.051	< 0.041	< 1.4
NEtFOSA	UG/KG	NE	NE	< 0.054	< 0.058	< 0.045	< 0.059	< 0.048	< 0.80
NEtFOSAA	UG/KG	NE	NE	< 0.056	< 0.059	< 0.046	< 0.060	< 0.049	< 1.2
NEtFOSE	UG/KG	NE	NE	< 0.032	< 0.034	< 0.027	0.039J	< 0.028	< 0.78
NMeFOSA	UG/KG	NE	NE	< 0.057	< 0.060	< 0.047	< 0.061	< 0.050	< 0.39
NMeFOSAA	UG/KG	NE	NE	< 0.027	< 0.028	< 0.022	< 0.029	< 0.023	< 1.1
NMeFOSE	UG/KG	NE	NE	< 0.054	< 0.058	< 0.045	< 0.059	< 0.048	< 1.3
Perfluorobutanesulfonic acid (PFBS)	UG/KG	1.26E+06	1.64E+07	0.33	0.058J	< 0.037	0.051J	< 0.038	< 0.18
Perfluorobutanoic acid (PFBA)	UG/KG	NE	NE	0.28	0.20J	< 0.045	0.25	< 0.047	< 2.2
Perfluorodecanesulfonic acid (PFDS)	UG/KG	NE	NE	< 0.060	< 0.064	< 0.050	< 0.065	< 0.053	< 0.29
Perfluorodecanoic acid (PFDA)	UG/KG	NE	NE	0.17J	< 0.059	< 0.046	0.17J	< 0.049	< 0.28
Perfluorododecanesulfonic acid (PFDoS)	UG/KG	NE	NE	< 0.054	< 0.058	< 0.045	< 0.059	< 0.048	< 0.89
Perfluorododecanoic acid (PFDoA)	UG/KG	NE	NE	0.097J	< 0.037	< 0.029	0.11J	< 0.030F1	< 0.50
Perfluoroheptanesulfonic acid (PFHpS)	UG/KG	NE	NE	0.11J	0.11J	< 0.047	0.12J	< 0.050	< 0.17
Perfluoroheptanoic acid (PFHpA)	UG/KG	NE	NE	0.066J	0.059J	< 0.037	< 0.048	< 0.038	< 0.23
Perfluorohexanesulfonic acid (PFHxS)	UG/KG	NE	NE	4.7	1.1	0.37	1.5	< 0.029	< 0.52
Perfluorohexanoic acid (PFHxA)	UG/KG	NE	NE	0.13J	0.23J	0.035J	0.085J	< 0.031	< 0.53
Perfluoronanesulfonic acid (PFNS)	UG/KG	NE	NE	0.039J	< 0.036	< 0.028	0.063J	< 0.029	< 0.34
Perfluorononanoic acid (PFNA)	UG/KG	NE	NE	0.091J	0.16J	< 0.021	0.071J	0.022J	< 0.25
Perfluorooctanesulfonamide (FOSA)	UG/KG	NE	NE	< 0.038	< 0.040	< 0.032	< 0.041	< 0.033	< 0.90
Perfluorooctanesulfonic acid (PFOS)	UG/KG	1,260	16,400	11	8.7	0.69	20	0.21	< 0.49
Perfluorooctanoic acid (PFOA)	UG/KG	1,260	16,400	0.31	0.56	0.063J	0.43	0.065J	< 0.78
Perfluoropentanesulfonic acid (PFPeS)	UG/KG	NE	NE	0.39	0.077J	< 0.036	0.069J	< 0.037	< 0.27
Perfluoropentanoic acid (PFPeA)	UG/KG	NE	NE	< 0.047	0.081J	< 0.040	< 0.051	< 0.041	< 0.45
Perfluorotetradecanoic acid (PFTeA)	UG/KG	NE	NE	< 0.043	< 0.045	< 0.036	0.054J	< 0.037	< 0.67
Perfluorotridecanoic acid (PFTrDA)	UG/KG	NE	NE	0.030J	< 0.026	< 0.020	0.065J	< 0.021	< 1.2
Perfluoroundecanoic acid (PFUnA)	UG/KG	NE	NE	0.078J	< 0.051	< 0.041	0.094J	< 0.042	< 1.0

Notes:

<sup>1</sup> Concentration was reported in nanograms per liter

ug/kg; micrograms per kilogram

RCL = residual contaminant level per WDNR RCL Spreadsheet available at <https://dnr.wisconsin.gov/topic/Brownfields/soil.html> (accessed July 28, 2023).