

To:

Grant Trigger, RACER

Copies:

Tony Maffeo, Arcadis

Chris Peters, Arcadis

Arcadis of Michigan, LLC

28550 Cabot Drive

Suite 500

Novi

Michigan 48377

Tel 248 994 2240

Fax 248 994 2241

From:

Micki Maki

Date:

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Arcadis Project No.:

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Subject:

July-August PFAS Investigation Sample Results
RACER Buick City Site Flint, Michigan

This memo summarizes the results of additional per- and poly-fluoroalkyl substances (PFAS) Sampling conducted in July and August 2019 at the RACER Buick City Site (Site) located in Flint, Michigan. These samples were collected in accordance with the PFAS Status Update and Work Plan dated July 15, 2019 (Work Plan) as part of continued investigation activities to assess areas of potential impacts at the Site (Figure 1).

Samples from the following events are discussed in this memo:

- July 16, 2019 - Storm sewer investigation samples were collected from manholes Outfall 003 (MH 3-1), Outfall 005 (MH 5-1), and Outfall 013 (MH 13-2, MH 13-6, MH 13-11, and MH 13-14). Sanitary sewer investigation samples were collected from manhole MH-H, MH H-1, MH H-2, MH H-3, and MH H-4.
- July 26, 2019 – Dry weather storm sewer investigation samples were collected from Outfall 003 (MH 3-1), Outfall 010 (MH 10-1, MH 10-1A, and MH 10-2), Outfall 011 (MH 11-6, MH 11-6-A-2, MH 11-6-A-3, MH 11-6-A-6-1, and MH 11-6-A-6), and Outfall 13 (MH 13-2, MH 13-6, MH 13-11, MH 13-11-11, MH 13-14, MH 13-17).
- August 1, 2019 – Dry weather storm sewer investigation samples were collected from Outfall 005 (MH 5-1, MH 5-2-lateral, MH 5-3-lateral, MH 5-4-lateral) and Outfall 006 (Outfall 006 DP, MH 6-2-N-lateral, and MH 6-2-S lateral).

- August 13-15, 2019 – Monitoring well investigation samples were collected from the Outfall 002 Drainage Area (36-FP2, 36-100R, MW-36-40, and RFI-36-04), Outfall 003 (OW-3S, OW-5, RFI-81-09, RFI-83/84-02, and RFI-83/84-29), Outfall 004 (RFI-81-12R and RFI-86-16R) Outfall 005 (RFI-86-15), and Outfall 006 (94-100)

Please note that while all samples were analyzed for 24 PFAS compounds only the PFOA and PFOS results (which have established EGLE Part 201 criteria) are discussed herein.

PFAS INVESTIGATION SAMPLE SUMMARY

Outfall Drainage Area 001

During previous investigation activities PFOS has been detected in dry and wet weather samples collected from Outfall 001 at concentrations exceeding GSI criterion (**Figure 2**). In August 2019 attempts were made to collect samples from proposed locations along the Outfall 001 storm sewer (Outfall, MH 1-1-9, MH 1-3, and MH 1-7) as well as five on-Site monitoring wells to assess whether there are any PFAS impacts related to the Site contributing to Outfall 001. However, due to low flow conditions in the storm sewer and access issues several of the proposed storm sewer sampling locations could not be sampled. In addition, two of the monitoring wells (RFI-38-04 and RFI-38-06) have been damaged and could not be sampled. The table below presents the results of the locations able to be sampled.

Analyte	Monitoring Wells		
	36-FP2 (ng/L) 8/13/19	36-100R (ng/L) 8/13/19	RFI-36-04 (ng/L) 8/13/19
PFOA	10.3	6.19	4.7
PFOS	34.4	5.01	ND

Only the sample collected from monitoring well 36-FP2 detected PFOS at a concentration that exceeds the GSI criterion.

Outfall Drainage Area 002

During previous investigation activities PFOS has been detected in dry and wet weather samples collected from Outfall 002 at concentrations exceeding GSI criterion (**Figure 2**). During the August 2019 investigation a sample was collected from one on-Site monitoring well located in the Outfall 002 drainage area downgradient of former Factory 36 to further refine the understanding of potential PFAS source areas in this portion of the Site. The table below presents the results:

Analyte	Monitoring Well
	MW-36-40 (ng/L) 8/13/19
PFOA	41.8
PFOS	86.4

At MW-36-40 PFOS was detected at a concentration exceeding GSI criteria.

Outfall Drainage Area 003

During previous investigation activities PFOS has been detected in dry and wet weather samples collected from Outfall 003 at concentrations exceeding GSI criterion (**Figure 3**). As part of ongoing Site investigation activities, samples were collected from manhole MH 3-1 on July 16 and July 26, 2019, while the flow study was ongoing in order to aid in quantifying the mass of PFAS at Outfall 003. The table below presents the PFOA and PFOS analytical results:

Analyte	MH 3-1	MH 3-1
	Result (ng/L) 7/16/19	Dry Weather Result (ng/L) 7/26/19
PFOA	86	13
PFOS	1200	190

This data will be used in conjunction with available flow data to estimate the mass flux of PFAS at Outfall 003.

In addition, investigation samples were collected from five monitoring wells located in the Outfall 003 drainage area in the vicinity of areas where PFAS may have been present historically. The table below presents the results:

Analyte	Monitoring Wells				
	OW-3S (ng/L) 8/13/19	OW-5 (ng/L) 8/13/19	RFI-81-09 (ng/L) 8/13/19	RFI-83/84-02 (ng/L) 8/13/19	RFI-83/84-29 (ng/L) 8/13/19
PFOA	97.6	ND	33.9	ND	5.1
PFOS	17.8	38.8	2730 b	15.2	17.6

b- Analyte found in associated method blank

Monitoring wells OW-3S and OW-5 are located in the vicinity of former stormwater detention ponds and detected PFOS at concentrations that exceed GSI criteria. Monitoring wells RFI-81-09, RFI-83/84-02 and RFI-82/84-29 are located in a portion of the Site where PFAS may have been used historically. RFI-81-09 is located downgradient of the area and has detected PFOS at 2,730 ng/L. However, the preliminary data report has flagged the result as PFOS was found in the associated method blank. Additional follow-up will be completed on this result.

Outfall Drainage Areas 004/005

During previous investigation activities PFOS has been detected in dry and wet weather samples collected from Outfall 005 at concentrations exceeding GSI criterion (**Figure 4**). As part of Site investigation activities, a sample was collected from manhole MH 5-1 on July 16, 2019, while the flow study was ongoing in order to quantify the mass of PFAS at Outfall 005. The table below presents the results:

Analyte	MH 5-1
	Result (ng/L) 7/16/19
PFOA	ND
PFOS	40

This result is consistent with previous samples collected from Outfall 005.

On August 1, 2019 investigation samples were collected from four locations (MH 5-1, MH 5-2-lateral, MH 5-3-lateral, MH 5-4-lateral) along the Outfall 005 storm sewer to continue to identify potential areas of PFOS infiltration to the storm sewer. The table below presents the results:

Analyte	Outfall 005			
	MH 5-1 (ng/L) 8/1/19	MH 5-2 Lateral (ng/L) 8/1/19	MH 5-3 Lateral (ng/L) 8/1/19	MH 5-4 Lateral (ng/L) 8/1/19
PFOA	12	ND	ND	ND
PFOS	43	ND	ND	ND

PFOS was not detected in the laterals discharging to the Outfall 005 storm sewer from the property to the South.

In addition, investigation samples were collected from three monitoring wells located in the Outfall 004 and 005 drainage areas to further refine the understanding of PFAS in this portion of the Site. The table below presents the results:

Analyte	Monitoring Wells		
	RFI-81-12R (ng/L) 8/13/19	RFI-86-15 (ng/L) 8/13/19	RFI-86-16R (ng/L) 8/13/19
PFOA	2.87 J	7.70	ND
PFOS	27.8	4.36	ND

J – Indicates an estimated value.

These results show that PFOS impacts in groundwater decrease east of the railroad tracks.

Outfall Drainage Area 006

During previous investigation activities PFOS has been detected in a dry weather sample collected from Outfall 006 at a concentration exceeding GSI criterion (**Figure 5**). On August 1, 2019 investigation samples were collected from three locations (Outfall 006 discharge point, MH 6-2-N-lateral, and MH 6-2-S lateral) along the Outfall 006 storm sewer. The table below presents the results:

Analyte	Outfall 006		
	Outfall 006 (ng/L) 8/1/19	MH 6-2-N (ng/L) 8/1/19	MH 6-2-S Lateral (ng/L) 8/1/19
PFOA	14	17	ND
PFOS	200	240	26

In addition, an investigation sample was collected from one monitoring well located in the Outfall 006 drainage area to further refine the understanding of PFAS in this portion of the Site. The table below presents the results:

Analyte	94-100
	Result (ng/L) 8/13/19
PFOA	ND
PFOS	ND

Analytical results from 94-100, which is located adjacent to the MH 6-2-S lateral, indicates that groundwater in the vicinity of this lateral is not PFAS impacted.

Outfall Drainage Area 010

During previous investigation activities PFOS has been detected in dry and wet weather samples collected from Outfall 010 at concentrations exceeding GSI criterion (**Figure 6**). On July 26, 2019 investigation samples were collected from three locations (MH 10-1, MH 10-1A, and MH 10-2) along the Outfall 010 storm sewer. During the event the lateral located at MH 10-2 was dry and manhole 10-4 was inaccessible. The table below presents the analytical results:

Analyte	Outfall 010		
	MH 10-1 (ng/L) 7/26/19	MH 10-1-A (ng/L) 7/26/19	MH 10-2 (ng/L) 7/26/19
PFOA	150	33	320
PFOS	1100	610	9600

Outfall Drainage Area 011

During previous investigation activities PFOS has been detected in a dry weather sample collected from Outfall 011 at a concentration exceeding the GSI criteria (**Figure 7**). On July 26, 2019 investigation samples were collected from five locations (MH 11-6, MH 11-6-A-2, MH 11-6-A-3, MH 11-6-A-6-1, and MH 11-6-A-6) along the Outfall 011 storm sewer. The table below presents the results:

Analyte	Outfall 011				
	MH 11-6 (ng/L)	MH 11-6-A-2 (ng/L)	MH 11-6-A-3 (ng/L)	MH 11-6-A-6 (ng/L)	MH 11-6-A-6-1 (ng/L)
PFOA	14	10	12	12	73
PFOS	200	140	150	120	3400

PFAS impacts in the Outfall 011 storm sewer appear to be infiltrating from the laterals at manholes MH 11-6-A-6 and MH 11-6-A-8 (**Figure 7**).

Outfall Drainage Area 013

During previous investigation activities PFOS has been detected in dry and wet weather samples collected from Outfall 013 at concentrations exceeding the GSI criterion (**Figure 8**). On July 16, 2019 samples were collected from four manholes along the Outfall 013 storm sewer to aid in determining potential portions of the sewer contribution PFAS impact. The table below presents the results of the investigation samples collected at Outfall 013:

Analyte	Outfall 013			
	MH 13- 2 (ng/L)	MH 13- 6 (ng/L)	MH 13- 11 (ng/L)	MH 13- 14 (ng/L)
PFOA	ND	ND	ND	ND
PFOS	28	39	18	38

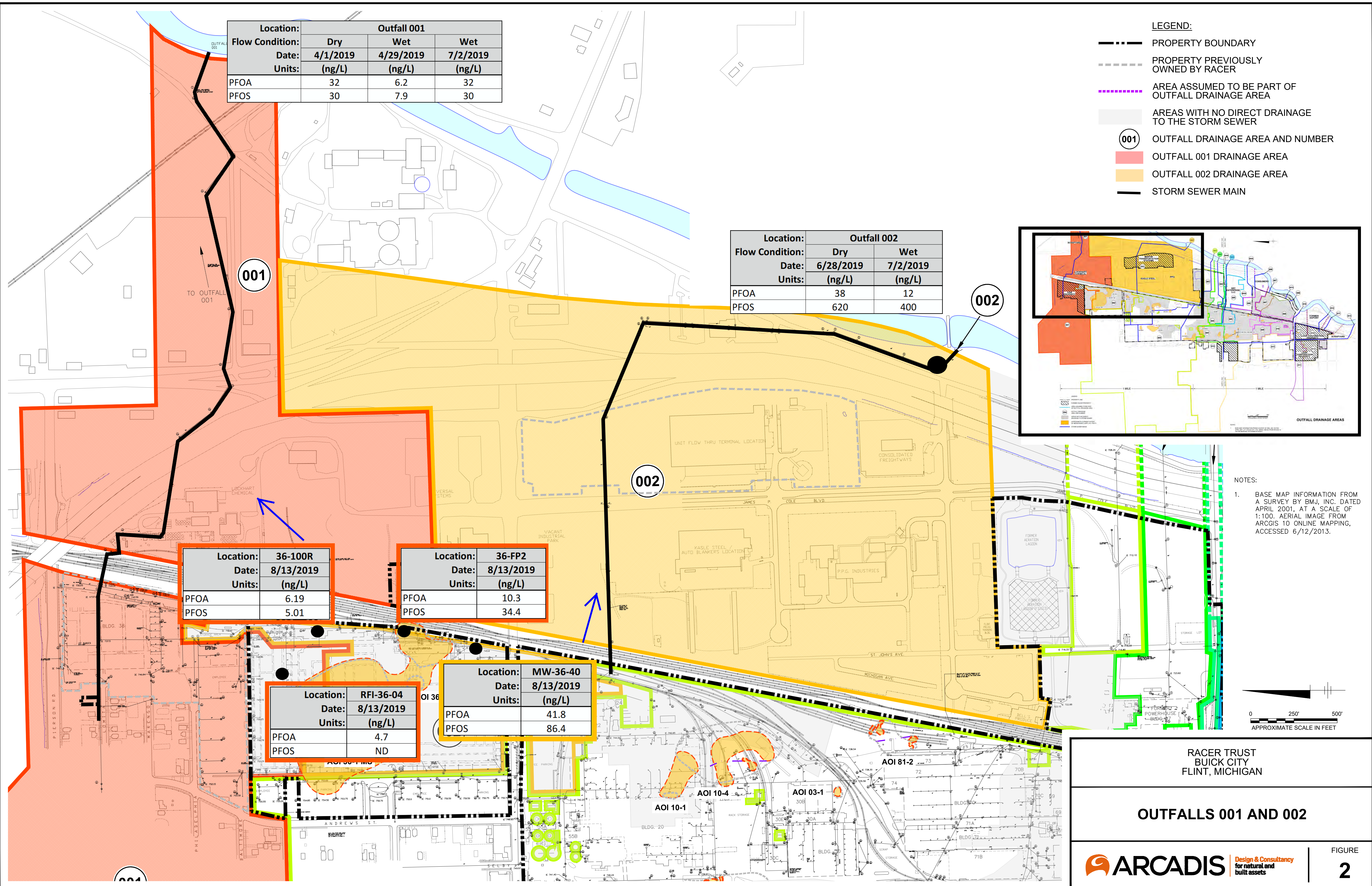
In addition, on July 26, 2019 dry weather investigation samples were collected from six locations (MH 13-2, MH 13-6, MH 13-11, MH 13-11-11, MH 13-14, MH 13-17) along the Outfall 013 storm sewer. The table below presents the results:

Analyte	Outfall 013					
	MH 13-2 (ng/L)	MH 13-6 (ng/L)	MH 13-11 (ng/L)	MH 13-11-11 (ng/l)	MH 13-14 (ng/L)	MH 13-17 (ng/L)
PFOA	ND	ND	ND	61	ND	ND
PFOS	40	56	24	390	48	39

Sanitary Sewer

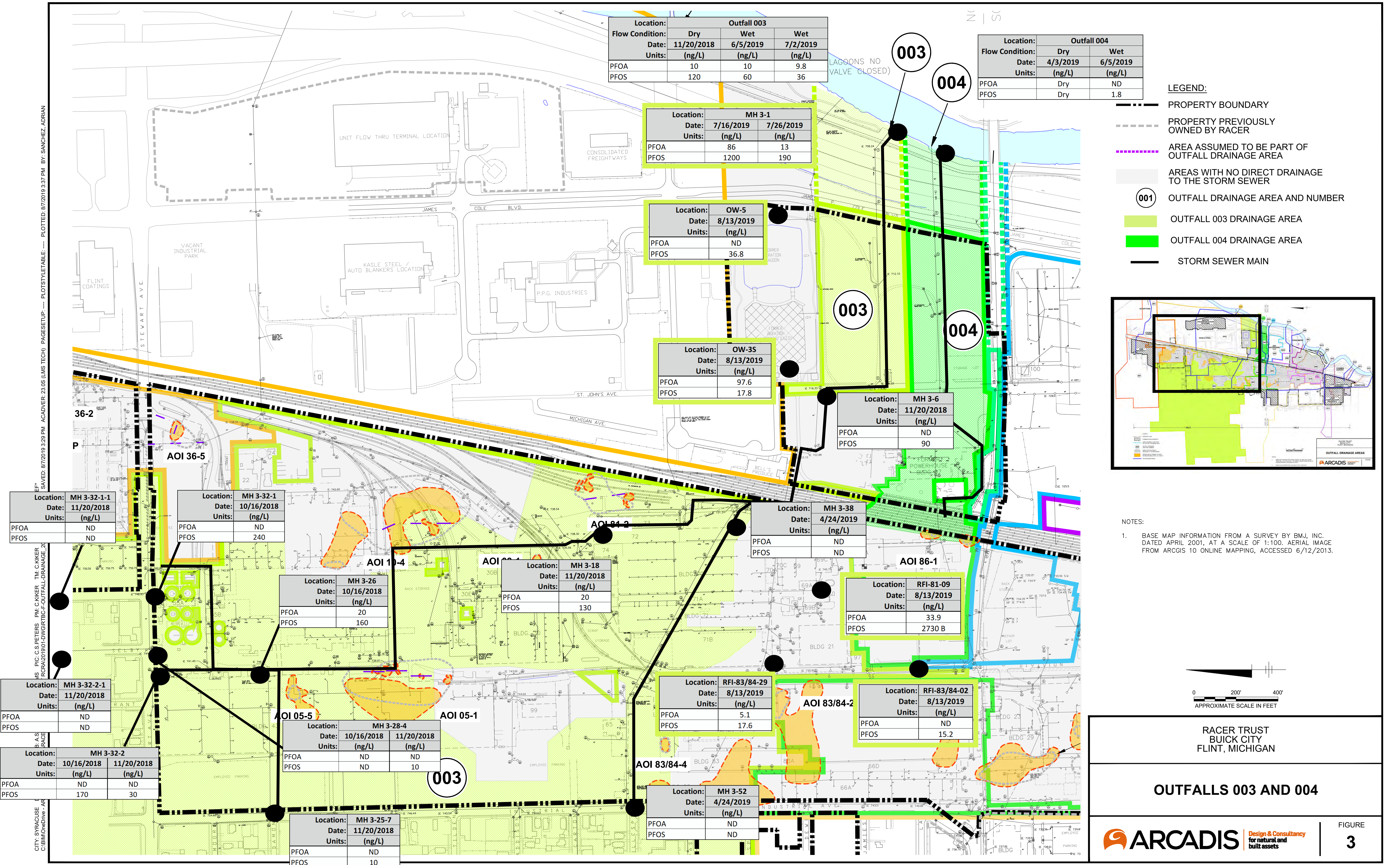
During previous investigation activities PFOS has been detected in the Hamilton Avenue sanitary sewer downgradient of the Site at concentrations exceeding the GSI criterion (**Figure 9**). On July 18, 2019 sanitary sewer investigation samples were collected from manholes MH-H, MH H-1, MH H-2, MH H-3, and MH H-4. The table below presents the results of the investigation samples collected at sanitary sewer:

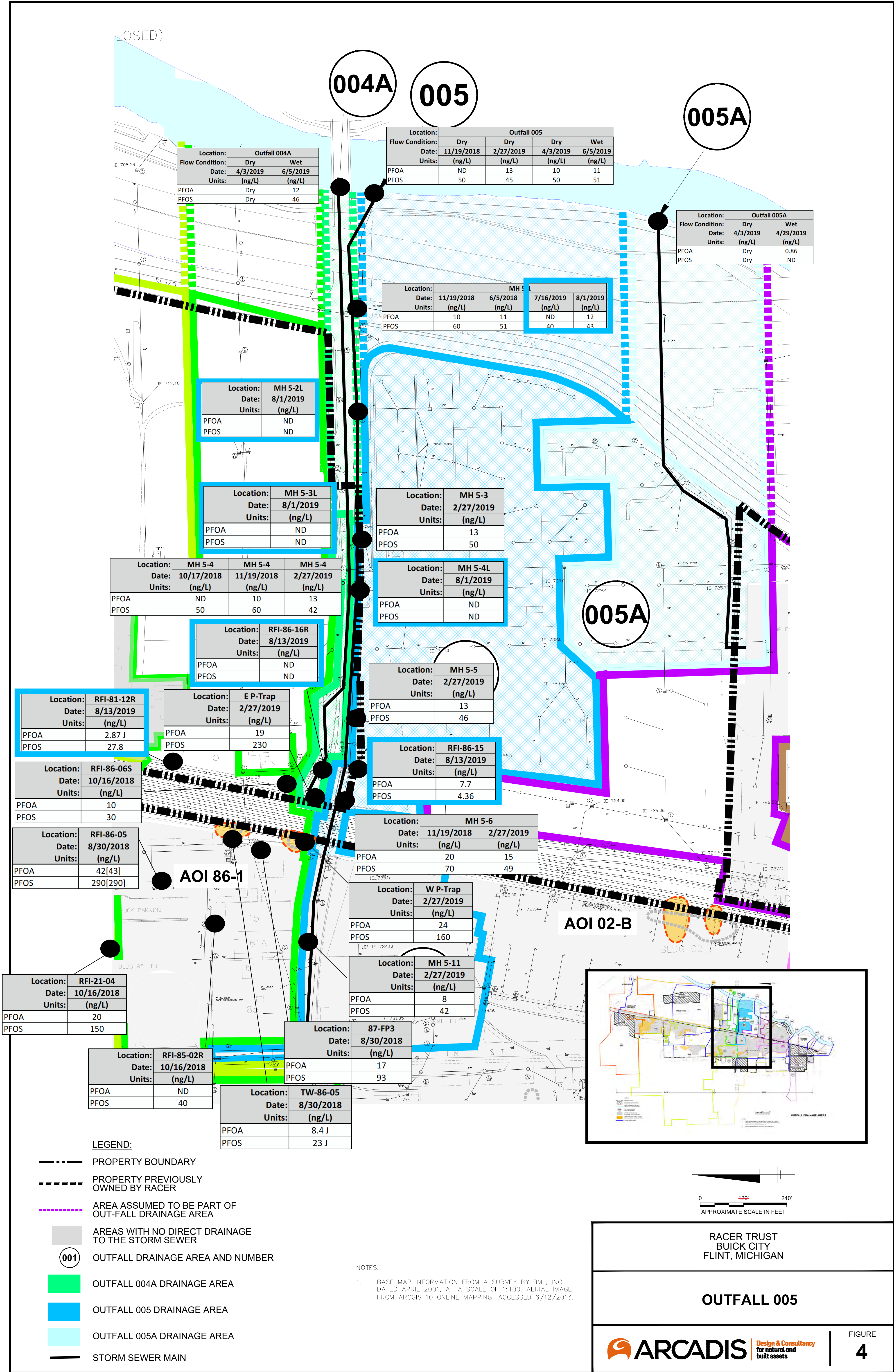
Analyte	Sanitary Sewer Samples				
	MH H (ng/L)	MH H-1 (ng/L)	MH H-2 (ng/L)	MH H-3 (ng/L)	MH H-4 (ng/L)
PFOA	410	2200	27	65	ND
PFOS	6600	34000	520	1800	19

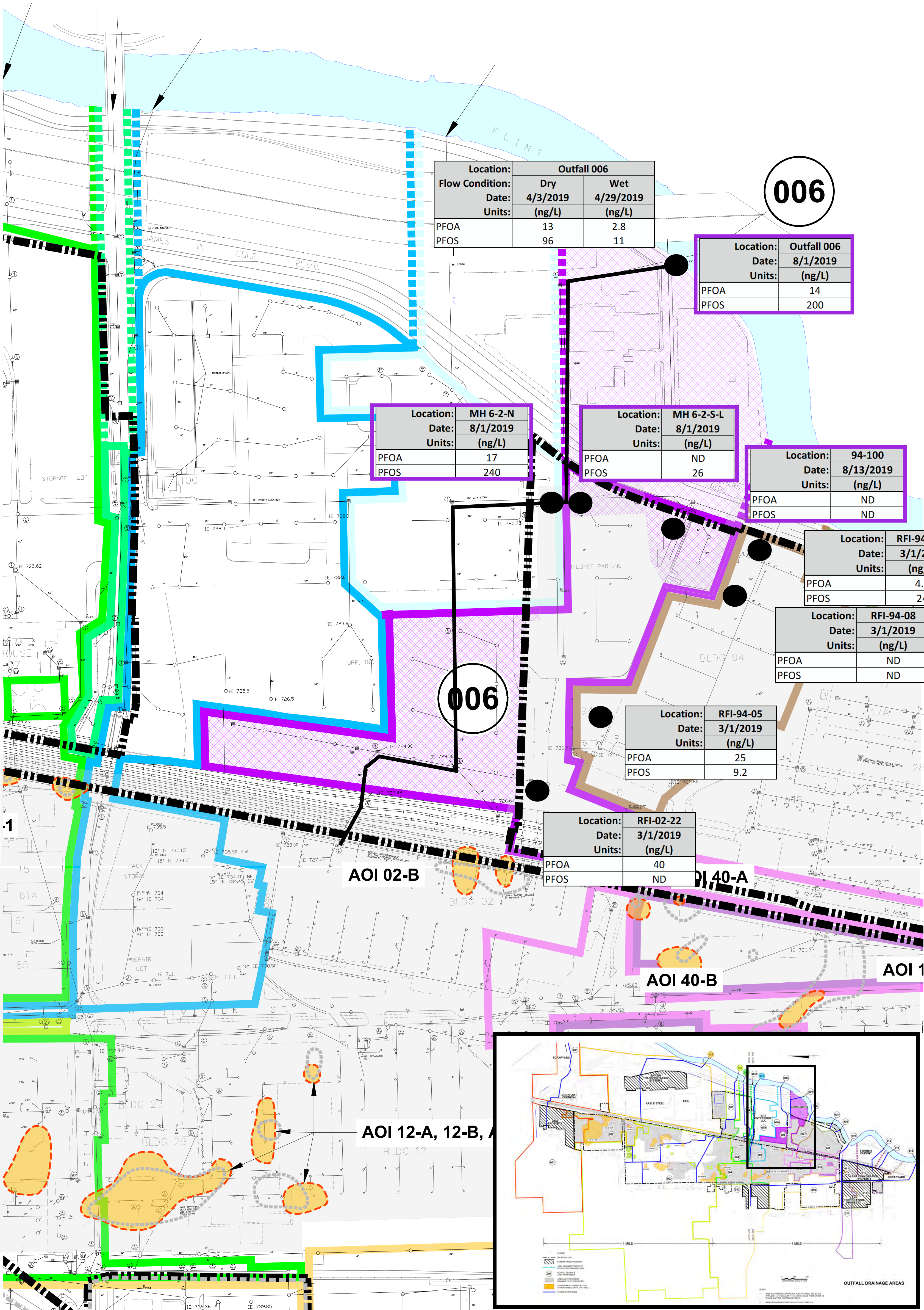


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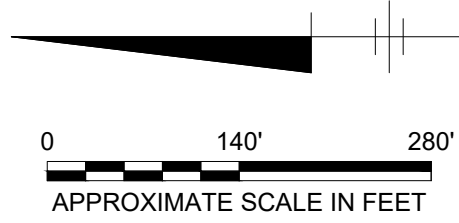


LEGEND:

- PROPERTY BOUNDARY
- PROPERTY PREVIOUSLY OWNED BY RACER
- AREA ASSUMED TO BE PART OF OUTFALL DRAINAGE AREA
- AREAS WITH NO DIRECT DRAINAGE TO THE STORM SEWER
- OUTFALL DRAINAGE AREA AND NUMBER
- OUTFALL 006 DRAINAGE AREA
- STORM SEWER MAIN

NOTES:

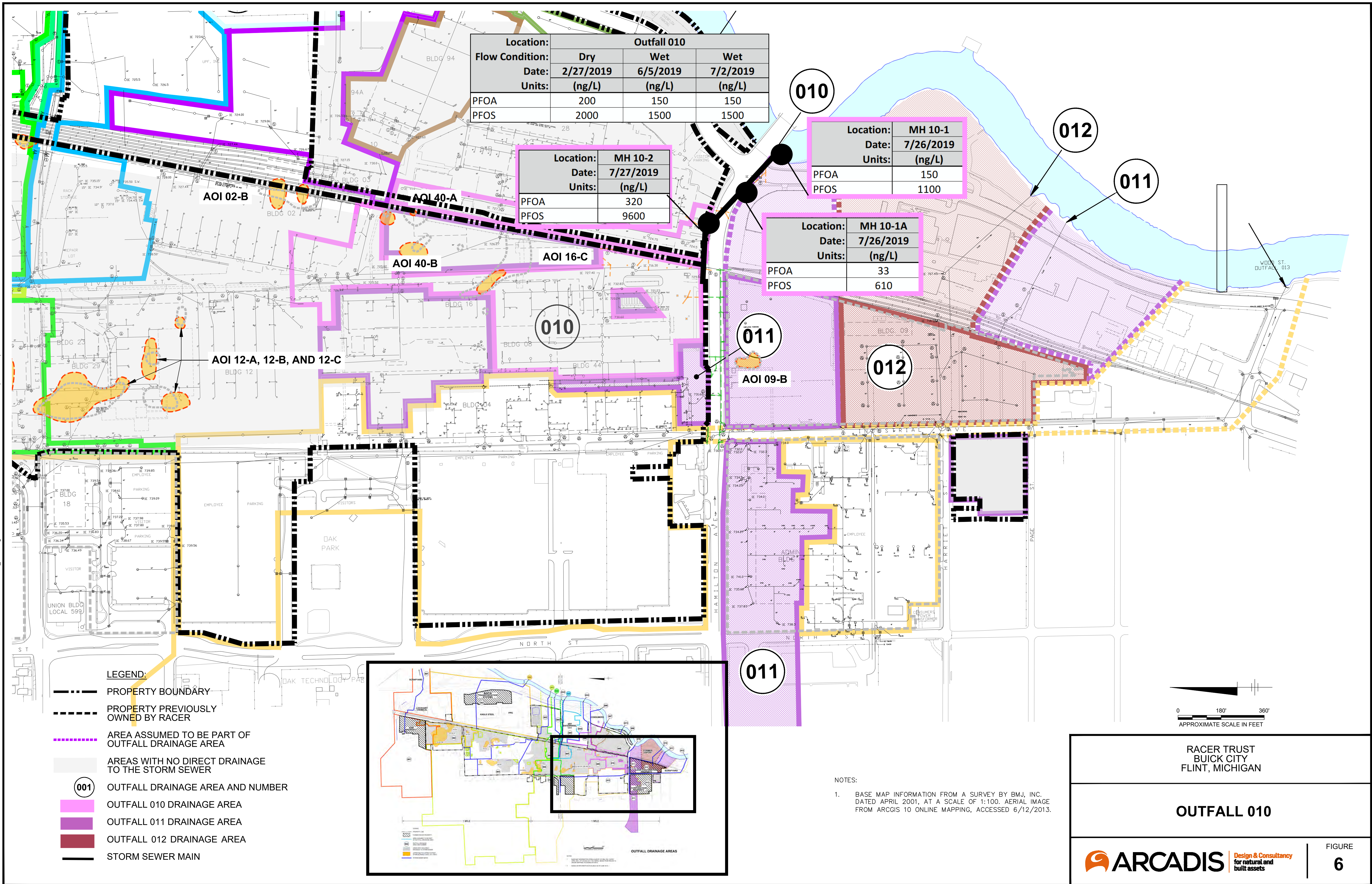
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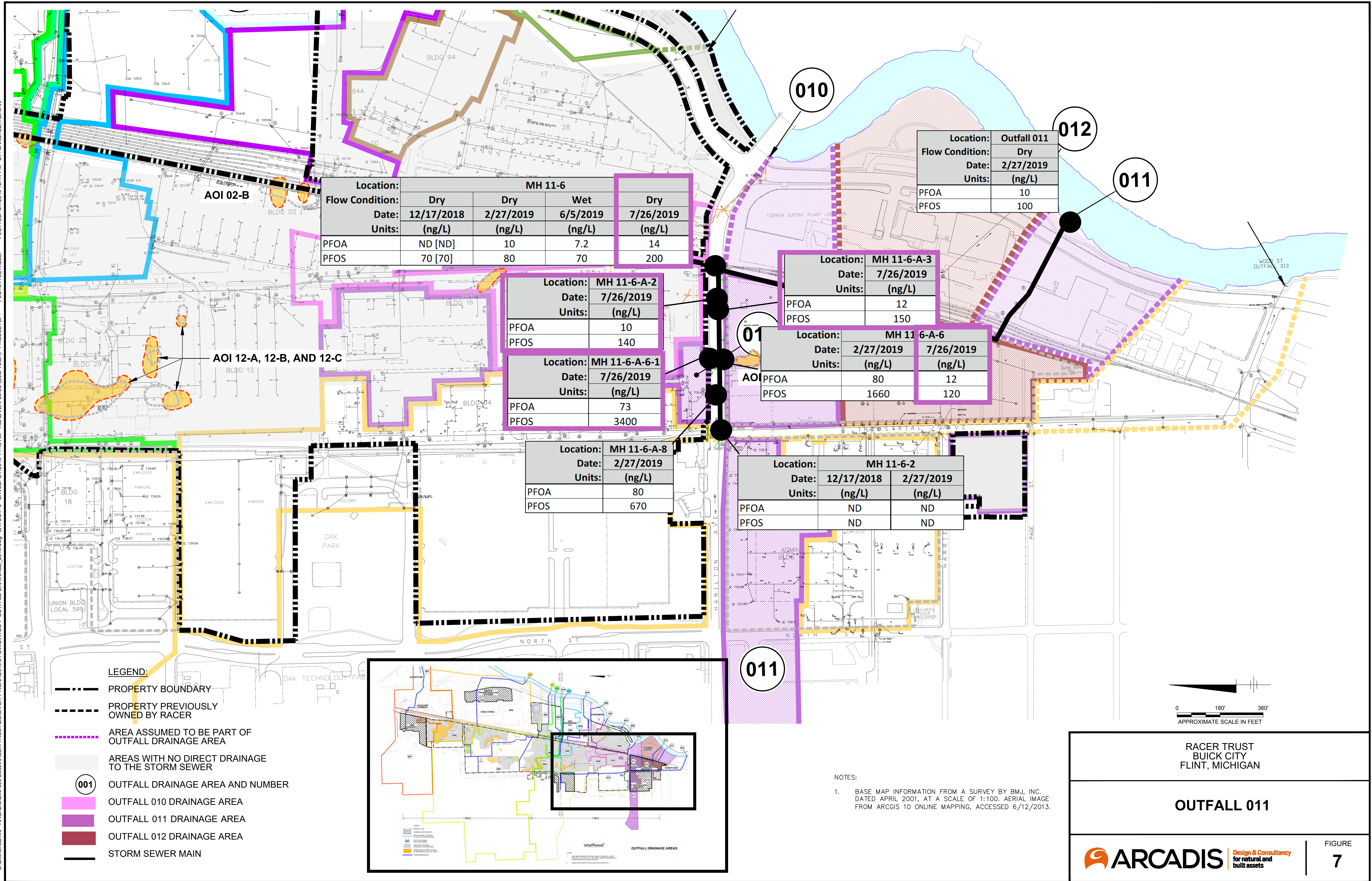
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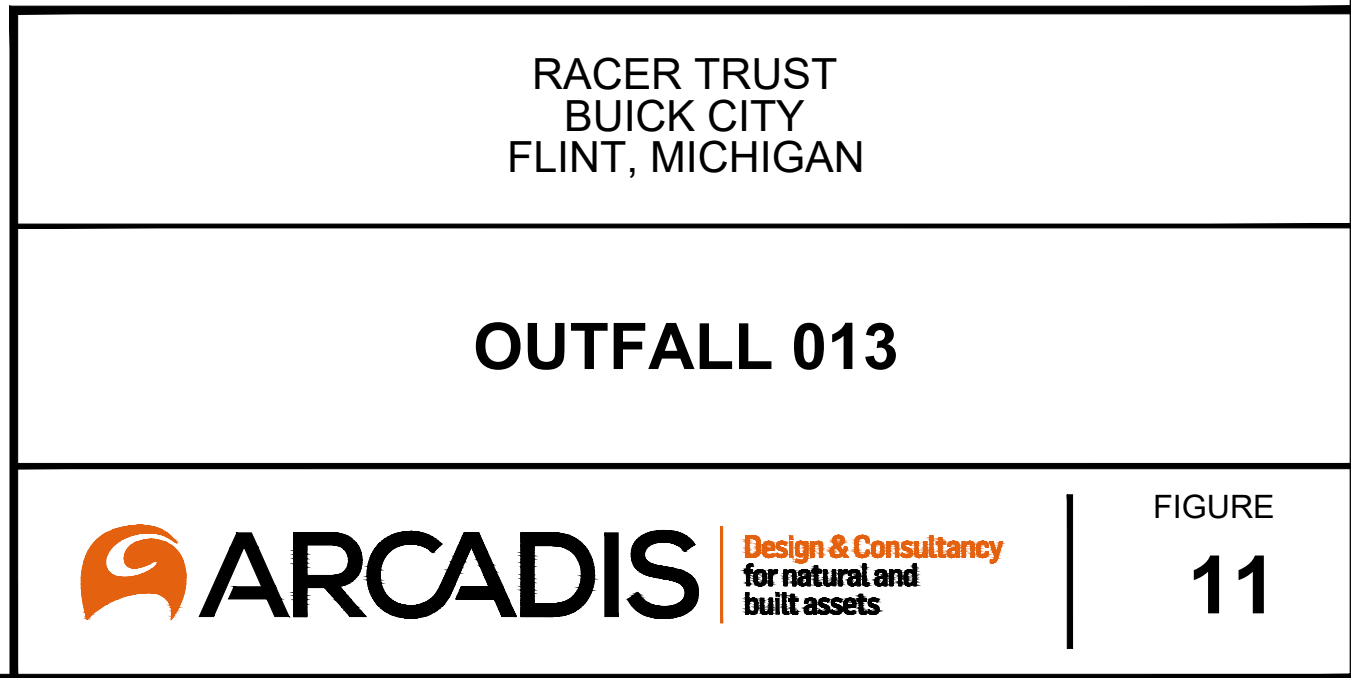
OUTFALL 006

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