

Downriver Utility Wastewater Authority

Downriver Sewage Disposal System Annual System Monitoring Report for 2021

May 24, 2022



Applied Science, Inc.



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1) INTRODUCTION

The Downriver Sewage Disposal System (DSDS) annual system monitoring report for 2021 provides a summary of the best available flow monitoring data for January through December 2021.

This report supersedes and consolidates the information previously issued in the quarterly system monitoring reports for 2021. It is intended to provide the best available estimate of flow rates for the entire DSDS, each meter district and community during the dry and wet weather conditions that occurred in 2021. For some meter districts and communities, the data have been revised from the previously issued reports. The flow monitoring data were reviewed and missing or erroneous data have been estimated using fill-in techniques to provide a complete data set.

Figure 1-1 is a map of the DSDS showing the flow meter and level sensor locations, incremental meter districts, the interceptor and tunnel system, and the location of rain gauges that may be used to evaluate the wet weather monitoring data.

2) SYSTEM SUMMARY

Major findings from the DSDS 2021 system monitoring are presented in the following subsections: subsection A lists noteworthy items, subsection B presents an overview of the DSDS performance, subsection C presents an overview of the controlled flow communities performance, and subsection D presents an overview of the non-controlled flow communities performance.

A) NOTEWORTHY ITEMS

1. Year 2020 Census data was used to update the populations listed in the Downriver System Monitoring Report. The 2021 Q4 report was the first occurrence of these newly estimated populations, and these 2020 Census populations will be used for future DSDS reports. The previously listed populations in the DSDS reports were from the 2010 Census.

Census “blocks” were used to estimate the populations within each meter district and community. A census “block” is the smallest geographic unit used by the United States Census Bureau for tabulation of collected data from 100-percent of all houses (rather than a sample of houses). Census blocks tributary to multiple meter districts or communities were allocated population based on service area.

Appendix G provides summary tables which compares the 2010 Census populations to 2020 Census populations for each meter district and community. The tables also compare the meter district percentage allocated to each community which is used in the sewage flow meter math.

Overall, the DSDS service area population increased by about 7,782 people (2.9%) from the 2010 to 2020 Census. As expected, some meter districts and communities had an increase in population and others had a decrease in population.

The sewage flow meter math for the communities of Riverview, River Rouge and Romulus were not affected by the 2020 Census update, as these communities are allocated 100% of the flow from the meter districts within their municipal boundaries.

The sewage flow meter math for the remaining communities of Allen Park, Belleville, Brownstown Township, Dearborn Heights, Ecorse, Lincoln Park, Southgate, Taylor, Van Buren Township, and Wyandotte were updated using the 2020 Census populations.

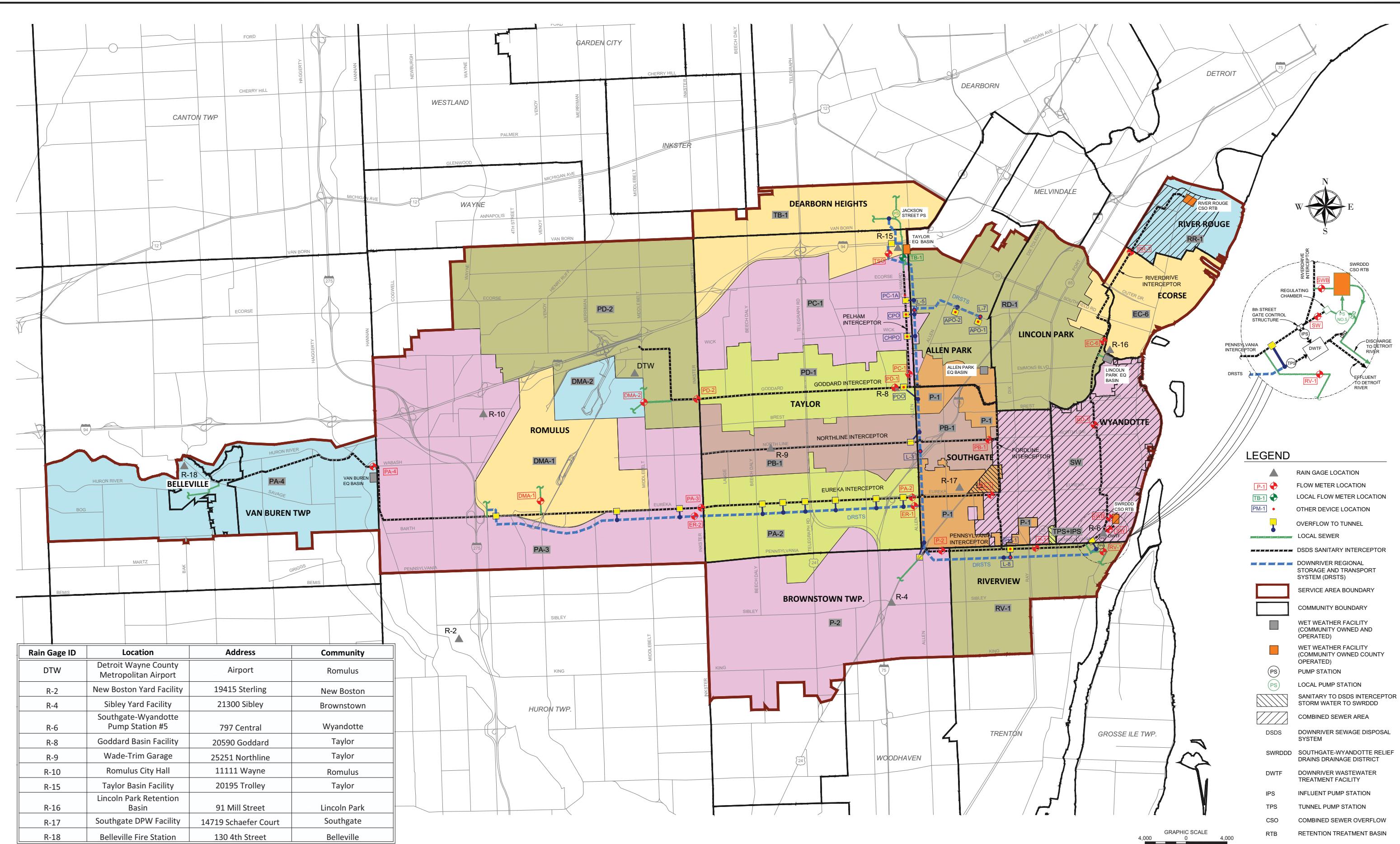
The 2020 Census update provides a contemporary estimate of population and flow allocation for the communities in the Downriver System Monitoring Report. The data presented in this report has been updated for the 2020 Census update. This update includes the historical community data from 2016 to present.

Year 2020 Census data is readily available on the SEMCOG website.

<https://maps.semcog.org/2020Census/>

2. On November 3, 2021, an ADS Triton+ flow meter was installed in the downstream pipe at the Meter PC-1 location while the Accusonic meter remained in the upstream pipe. The two flow metering devices ran in parallel for about fifteen days to confirm that the new ADS flow meter performed well at this location. On November 18, 2021, the Accusonic flow meter was salvaged, and the ADS flow meter moved to the upstream pipe where the Accusonic flow meter had been installed.
3. Accusonic Meter P-1 had failed components and the spare parts inventory had no spare parts available which could be used to repair the meter. Consequently, Meter PC-1 was removed on November 18, 2021, and the salvaged parts used to repair Meter P-1.
4. Flow control of the Riverdrive Interceptor at Alkali Street commenced on December 4, 2020 to facilitate repairs to the Riverdrive Interceptor. From January 5, 2021 through April 5, 2021, dry weather wastewater was bypass pumped from the Riverdrive Interceptor to the Southgate-Wyandotte collection system. The bypass volumes are deducted from downstream Meter SW for the months of January, February, March, and April 2021.
5. The Downriver Wastewater Treatment Facility (DWTF) recycle stream flow rate has been metered since April 2020. Recycled flow is reintroduced upstream of the Interceptor Pump Station (IPS). Therefore, the IPS magmeters re-meter the recycle flows. Past DSDS quarterly and annual reports presented DWTF flow rates with recycle flows included. The DSDS reports now present the DWTF flow rate with and without recycle flow rates to provide the best estimate of the DSDS flow rate and to allow a consistent comparison to previous years.

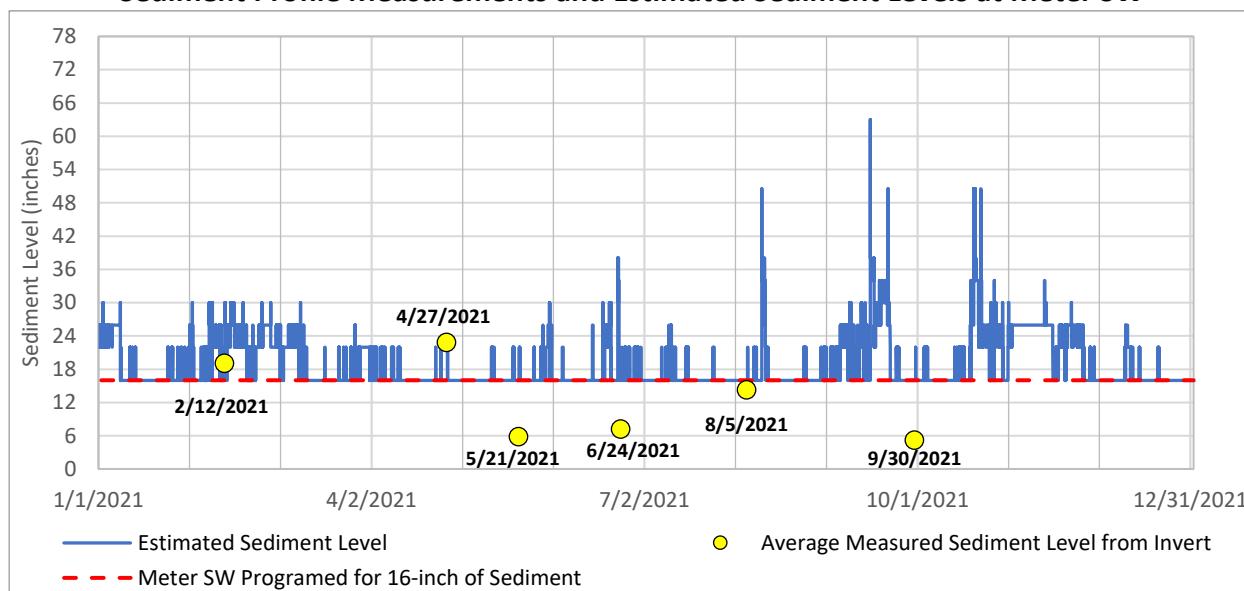
The total incoming flow rate to the DWTF based on the interceptor system flow meters (P-1 + RD-1 + RV-1 + SW + SWB + Tunnel Connections) is slightly higher than the DWTF meters (IPS + TPS - Recycle). The difference in flow rate is within the accuracy of the flow meters. Dye dilution testing of the DWTF meters, on a similar basis as the interceptor system meters, may increase the accuracy of the total system flow rates for the DSDS.



6. Sediment profiles were measured at Meter SW six times in 2021. The average sediment depth of the six profiles was 12 inches relative to the pipe invert at the metering location. Figure 2-1 shows the estimated sediment depths at Meter SW and the average measured sediment depths for the profiles for 2021. Detailed sediment profile measurements and the sediment estimation methodology are provided in Appendix E.

Figure 2-1 shows the dynamic nature of sediment accretion/reduction at this location. The historical average sediment depth at Meter SW is about 16-inches. Meter SW is programmed to account for 16-inches of sediment which markedly improves the accuracy of the real-time flow meter data (in contrast to the previous meter programming which did not account for sediment).

Figure 2-1
Sediment Profile Measurements and Estimated Sediment Levels at Meter SW



7. Meter EC-6 was dye-dilution tested on November 11, 2021. This test provided an adjustment factor of 0.79. This adjustment factor is slightly higher than the adjustment factor provided by the previous dye-dilution test of Meter EC-6 on February 19, 2014 (0.70). There are no known period breaks between these two tests, and the current period adjustment factor for Meter EC-6 has been updated based on both tests and is 0.75. The results of dye tests currently in-effect for DSDS meters are presented in Appendix E. The data presented in this report reflects the results of these dye dilution tests.

B) DSDS OVERVIEW

1. The total precipitation at the Detroit Metropolitan Wayne County Airport (DTW) for year 2021 was 39.99 inches, which is 6.52 inches above normal.
2. Over the last five years, the total annual precipitation at DTW has been above normal. The total precipitation above normal at DTW from 2016 through 2020 were 1.22, 1.99, 10.34, 2.91 and 5.26 inches, respectively.
3. There were eleven (11) significant storms in 2021. Significant storm events are defined as those with at least 0.5 inches of rainfall occurring on a single day with an event total of at least 1.0 inch of rainfall. Significant storm events are separated by at least 2 consecutive days without precipitation over 0.1 inches. This storm event definition is based on the arithmetic mean of the rainfall recorded by all rain gauges used in the analysis for that storm. Table 2-1 lists the average rainfall depths over the DSDS service area for the significant storm events for 2021.

Table 2-1
Average Rainfall Depths for Significant Storms during 2021 in the DSDS Service Area

Significant Storm Event	Event Dates	Average Total Rainfall Depth Over the Service Area (inches)
1	3/25-28/2021	1.99
2	6/20-21/2021	1.16
3	6/25-26/2021	2.07
4	7/16-17/2021	2.20
5	7/24-25/2021	1.18
6	8/11-12/2021	2.53
7	9/21-23/2021	4.01
8	10/14-16/2021	1.00
9	10/24-25/2021	2.10
10	10/28-30/2021	1.13
11	12/10-11/2021	1.09

4. There were five (5) major storm events in 2021. Major storm events are a subgroup of significant storm events which result in the peak hourly influent flow rate to the DWTF reaching or exceeding 175 million gallons per day (MGD). Significant Storm Events 3, 4, 6, 7 and 9 were also designated as Major Storm Events A, B, C, D and E, respectively, for year 2021.
5. The average rainfall depths and peak 24-hour rainfall depths at DTW for the significant/major storms are listed in Table 2-2.

Table 2-2
Rainfall Depths at DTW for Significant Storms during 2021 in the DSDS Service Area

Major Storm Event	Significant Storm Event	Event Dates	Peak 24-hour Rainfall Depth (inches)	Total Rainfall Depth (inches)
-	1	3/25-28/2021	1.19	2.10
-	2	6/20-21/2021	1.12	1.12
A	3	6/25-26/2021	2.37	2.37
B	4	7/16-17/2021	2.30	2.37
-	5	7/24-25/2021	-	1.26
C	6	8/11-12/2021	3.14	3.14
D	7	9/21-23/2021	3.16	4.43
-	8	10/14-16/2021	0.58	0.88
E	9	10/24-25/2021	2.11	2.12
-	10	10/28-30/2021	1.07	1.07
-	11	12/10-11/2021	1.38	1.38

Notes: 1) Hourly precipitation data not available for DTW for Significant Storm Event 5.

6. Figure 2-2 shows the long-term flow rate versus precipitation trends for the DSDS by month from 2016 through 2021. The incoming flow rate to the DWTF is based on the interceptor system flow meters, and the precipitation is at DTW. The figure shows the expected seasonal variations in flow rates, and the trend between precipitation and flow rates.

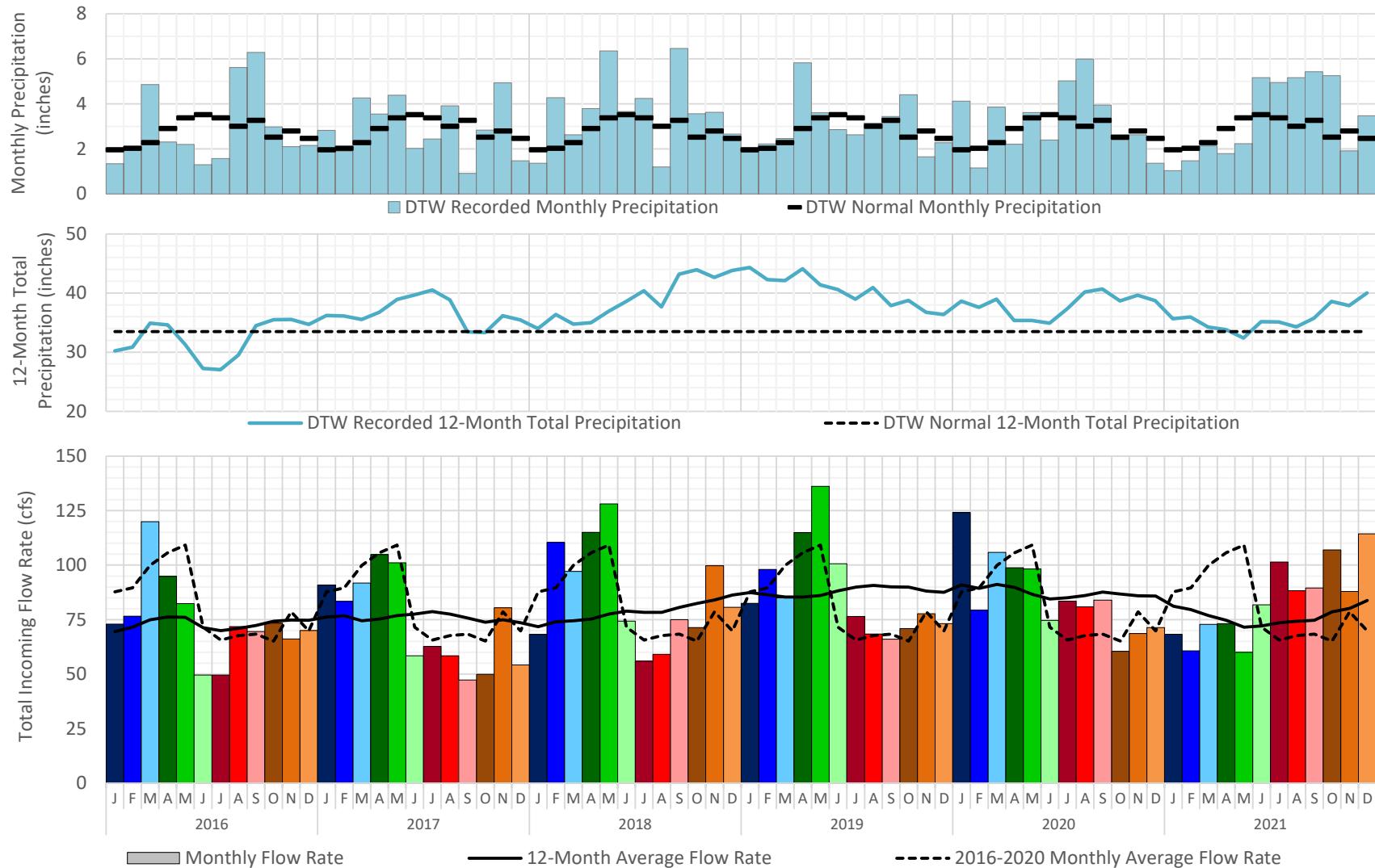
Precipitation from January through May 2021 was 3.89 inches below normal and from June through December 2021 was 10.41 inches above normal. Flow rates for 2021 reflects this variable precipitation. Winter and spring flow rates were unusually low and did not show the typical seasonal increase due to the diminished precipitation. The increase in flow rate was delayed until the summer months when precipitation increased above normal. Flow rates remained elevated through the fall months as precipitation remained above average. A similar effect can be seen on Figures 2-7, 3-1, and 3-2.

On the top graph, the blue vertical bars show the monthly precipitation, and the black markers show the monthly normal precipitation.

On the middle graph, the solid blue line shows the 12-month rolling total precipitation, and the grey dashed line shows the 12-month rolling total normal precipitation.

On the bottom graph, the vertical bars show the average monthly flow rate, the solid black line shows the 12-month rolling average flow rate, and the black dashed line shows the 2016-2020 average monthly flow rate. The 5-year average from 2016-2020 provides a long-term high-quality dataset for comparison to current conditions.

Figure 2-2
Monthly Influent Flow Rate to DWTF versus Precipitation at DTW for 2016 through 2021



7. Table 2-3 lists the average annual flow rate and total flow volume for years 2016 through 2021. The total incoming flow rate to the DWTF is based on the interceptor system flow meters. The DWTF flow rate is based on the IPS and TPS and includes recycle flow rate. The total influent volume to the DWTF for 2021 is above the average of the last five years.

Table 2-3
Average Annual Flow Rate and Total Volume for 2016 through 2021

Year	Total Precipitation at DTW (inches)	Average Flow Rate (cfs)			Total Flow Volume (MG)		
		Influent to DWTF	DWTF Including Recycle	DWTF Without Recycle	Influent to DWTF	DWTF Including Recycle	DWTF Including Recycle
2016	34.69	74.80	81.91	-	17,690	19,370	-
2017	35.46	73.67	80.41	-	17,380	18,970	-
2018	43.81	86.07	96.59	-	20,300	22,790	-
2019	36.38	87.44	92.35	-	20,630	21,790	-
2020	38.73	85.94	91.50	-	20,330	21,640	-
2021	39.99	83.83	85.73	81.03	19,780	20,220	19,120
2016-2020 Average	37.81	81.58	88.55	-	19,270	20,910	-

Notes:

1. DWTF recycle flows have been metered since April 2020. To provide a consistent comparison to previous years DWTF with recycle flow is presented.
2. DWTF Including Recycle = IPS + TPS
3. DWTF without Recycle = IPS + TPS - Recycle

8. Figures 2-3 through 2-6 plot the quarterly average influent flow rate (interceptor system flow meters) to the DWTF versus the quarterly total precipitation at DTW for years 2013 through 2021. These figures show the seasonal variation of the DSDS flow rate versus precipitation. The total quarterly precipitation for year 2021 was highly variable. Q1 precipitation was the second lowest of the past nine years, Q2 precipitation was the third lowest of the past nine years, and Q3 and Q4 precipitation was the highest of the past nine years. This figure shows the trend between precipitation and DSDS flow rates.

Figure 2-3
Average Influent Flow Rate to DWTF versus Precipitation at DTW
Quarter 1 January – March for 2013 through 2021

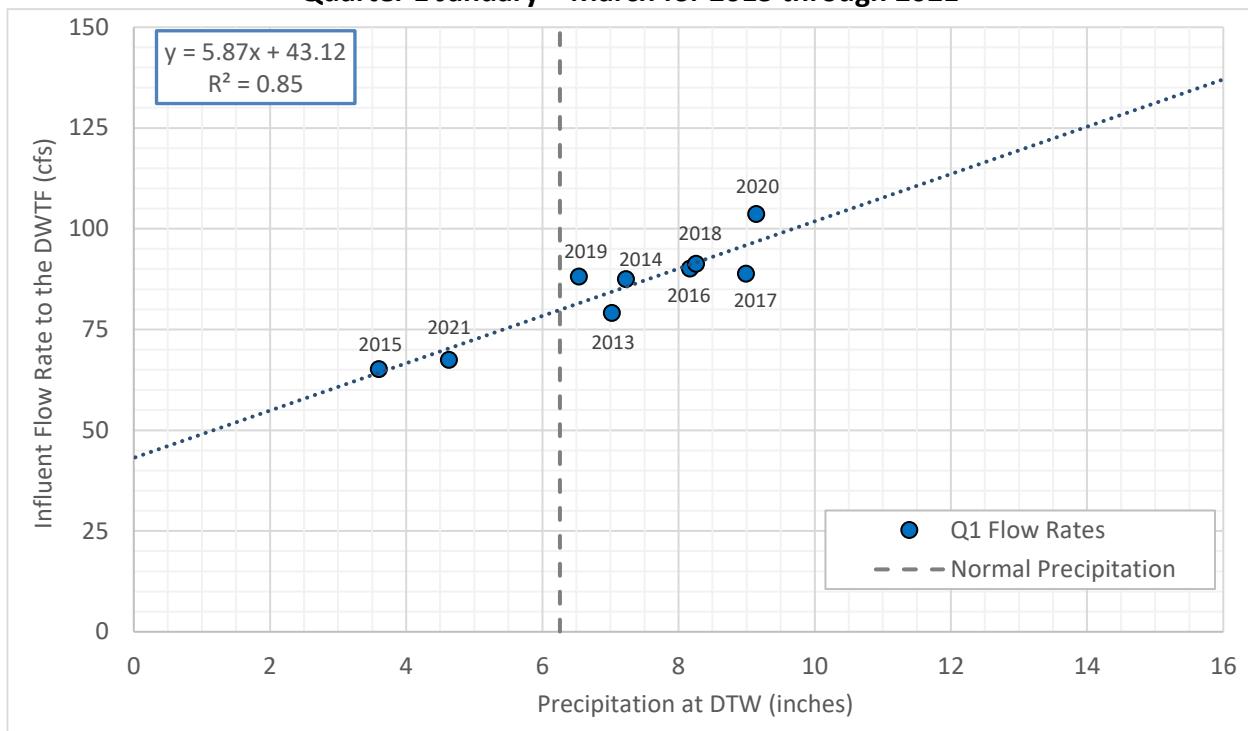


Figure 2-4
Average Influent Flow Rate to DWTF versus Precipitation at DTW
Quarter 2 April – June for 2013 through 2021

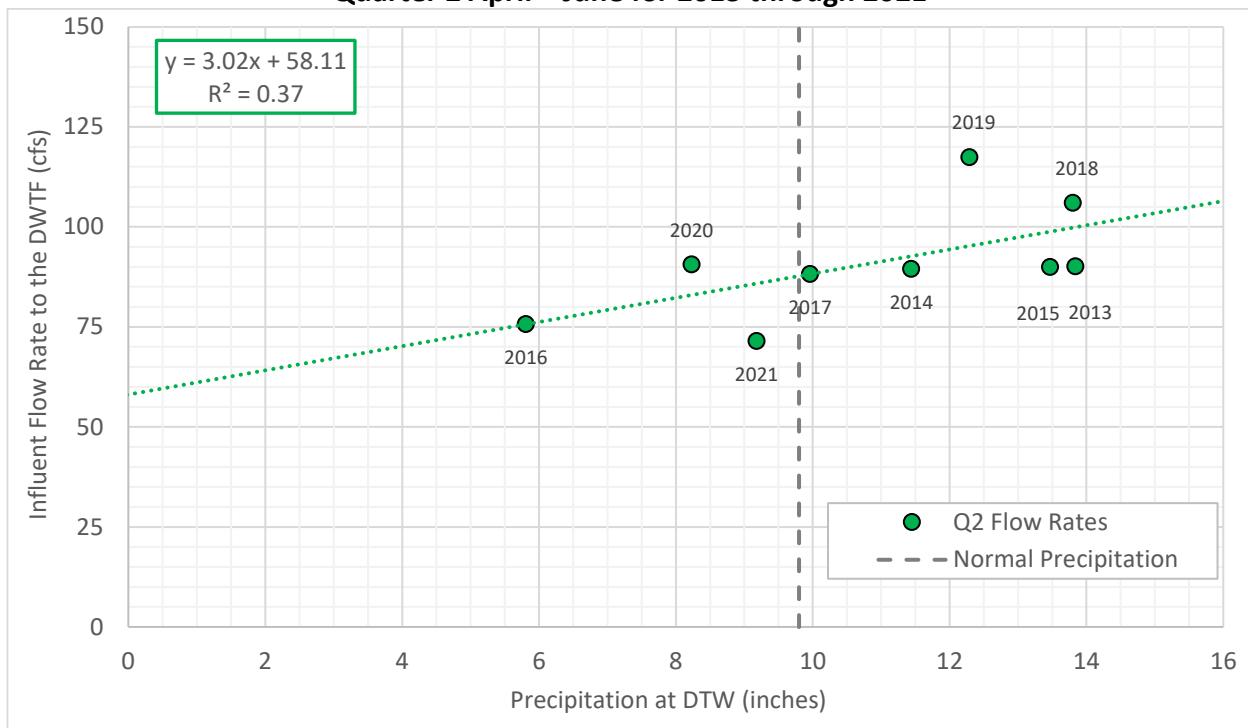


Figure 2-5
Average Influent Flow Rate to DWTF versus Precipitation at DTW
Quarter 3 July – September for 2013 through 2021

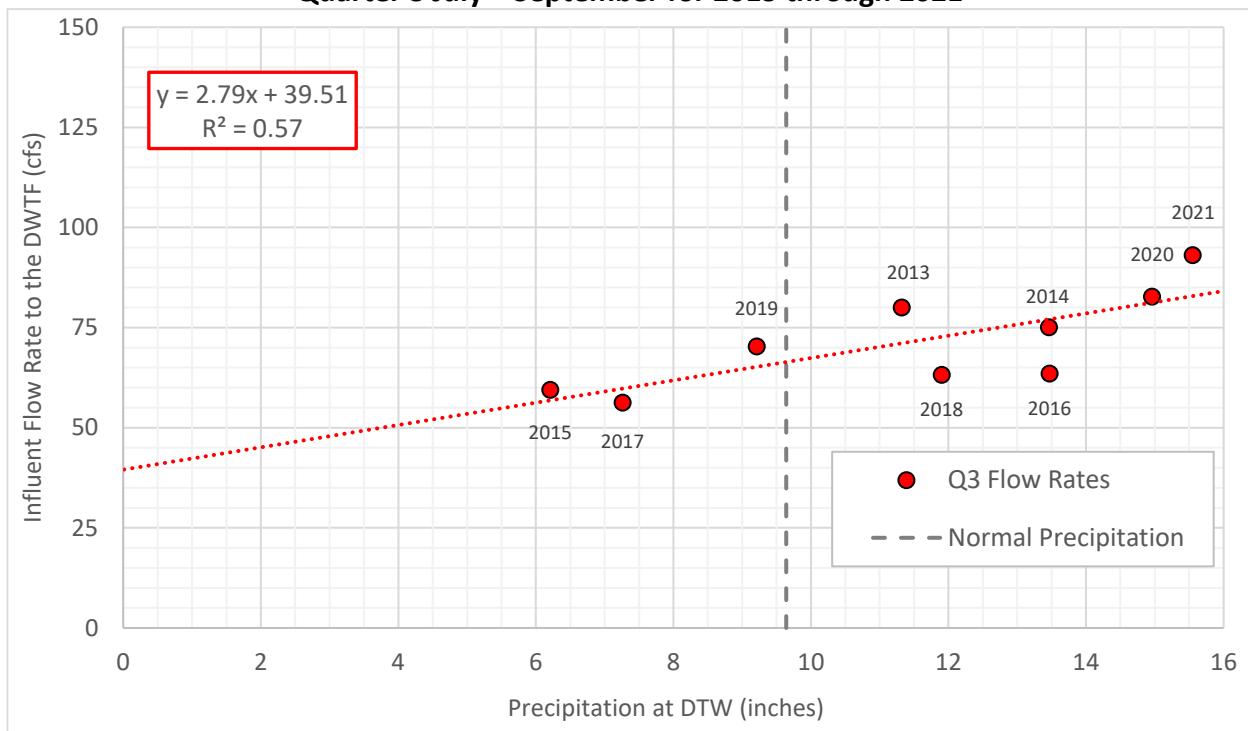
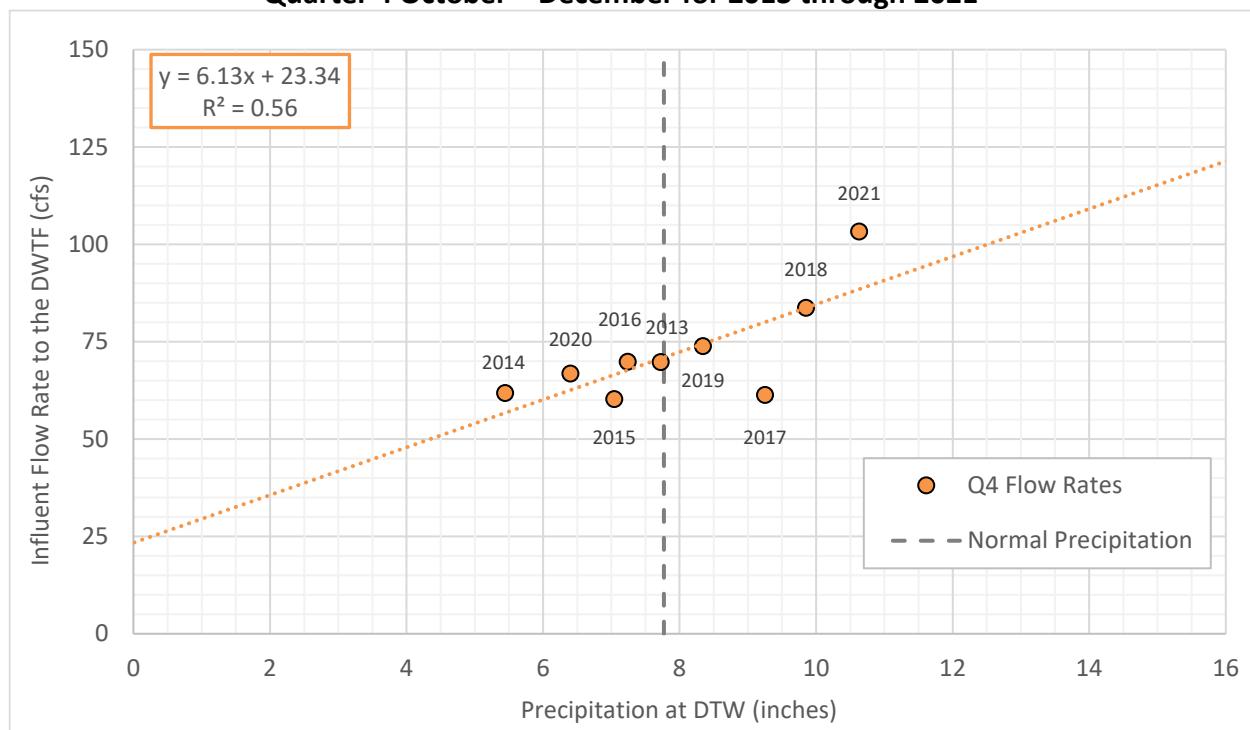


Figure 2-6
Average Influent Flow Rate to DWTF versus Precipitation at DTW
Quarter 4 October – December for 2013 through 2021



9. Figure 2-7 shows the long-term flow rate versus precipitation trends for the Controlled Flow Communities and Non-Controlled Flow Communities by month from 2016 through 2021. The flow rates are based on the interceptor system flow meters and the total precipitation is at DTW.

On the top graph, the blue vertical bars show the monthly precipitation, and the black markers show the monthly normal precipitation.

On the middle graph, the solid blue line shows the 12-month rolling total precipitation, and the grey dashed line shows the 12-month rolling total normal precipitation.

On the bottom graph, the vertical bars show the average monthly flow rate and the solid lines show the 12-month rolling average flow rate.

This figure shows the total flow contribution from the Controlled Flow Communities and Non-Controlled Flow Communities is generally about equal. From 2016 through 2020 the total flow contribution from the Controlled Flow Communities was about 52%, and from the Non-Controlled Flow Communities was about 48%. For 2021 the total flow contribution from the Controlled Flow Communities was about 53%, and from the Non-Controlled Flow Communities was about 47%. The Controlled Flow Communities tend to account for more flow in the summer and fall months than the Non-Controlled Flow Communities.

10. For each community, the average annual flow rates for years 2016 through 2021 are listed in Table 2-4 and shown in Figure 2-8.
11. The average annual flow rate for the City of Ecorse has been trending higher from 2016 to 2021. The City of Ecorse flow rates and water use records are actively being investigated as part of the DUWA Proposed Rate Methodology.

Figure 2-7
Monthly Influent Flow Rate to DWTF versus Precipitation at DTW for 2016 through 2021
by Controlled Flow and Non-Controlled Flow Communities

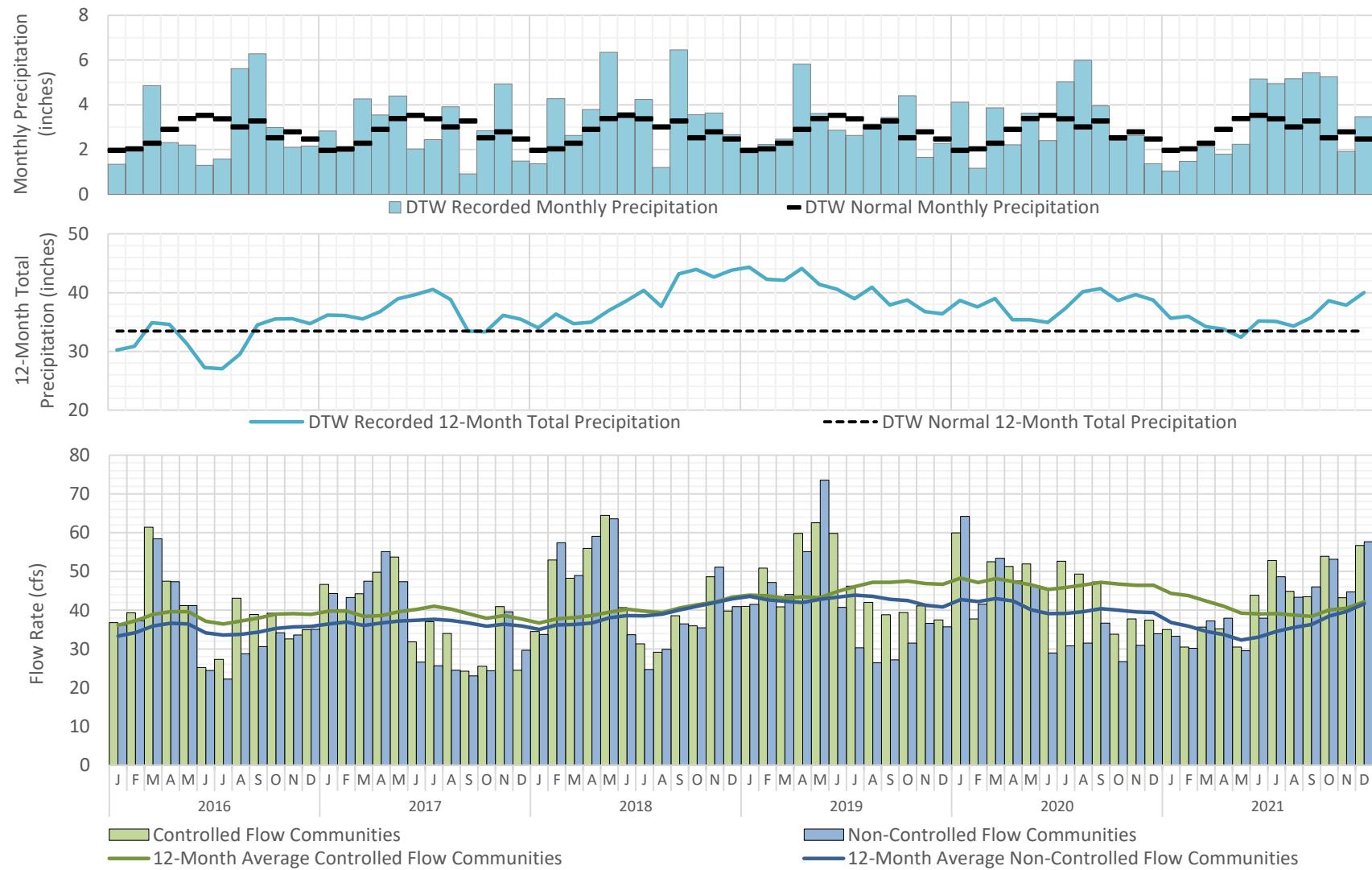
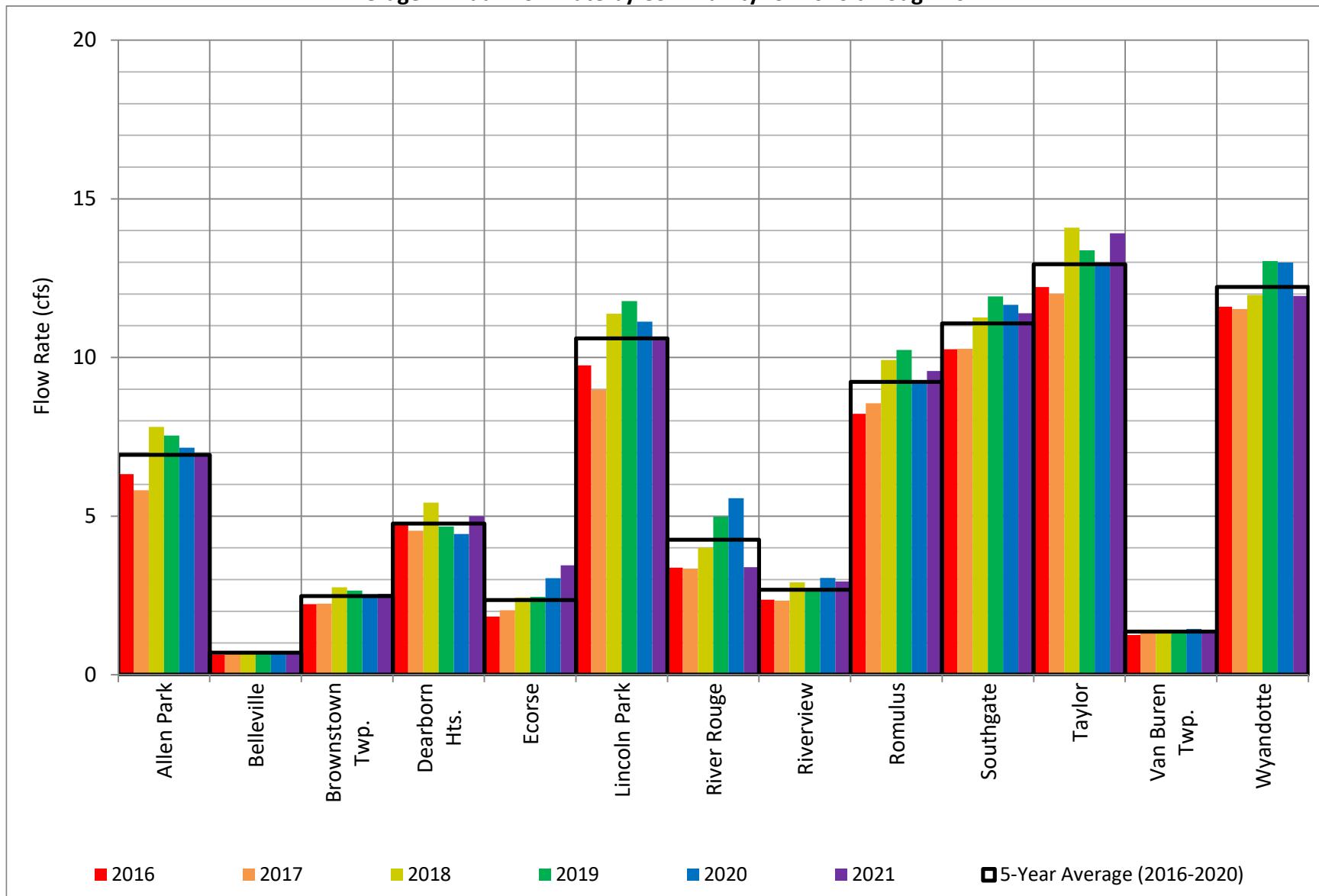


Table 2-4
Average Annual Flow Rate by Community for 2016 through 2021

Community	Average Flow Rate (cfs)						2016-2020 Average Flow Rate (cfs)
	2016	2017	2018	2019	2020	2021	
Allen Park	6.32	5.81	7.81	7.54	7.16	6.94	6.93
Belleville	0.64	0.68	0.71	0.70	0.73	0.70	0.69
Brownstown Twp.	2.22	2.24	2.76	2.65	2.53	2.55	2.48
Dearborn Hts.	4.74	4.54	5.42	4.67	4.43	5.00	4.76
Ecorse	1.83	2.03	2.43	2.46	3.04	3.45	2.36
Lincoln Park	9.75	8.99	11.38	11.77	11.13	10.65	10.60
River Rouge	3.38	3.35	4.00	4.98	5.56	3.39	4.25
Riverview	2.37	2.34	2.91	2.73	3.05	2.94	2.68
Romulus	8.22	8.56	9.92	10.24	9.23	9.57	9.23
Southgate	10.26	10.27	11.26	11.92	11.66	11.39	11.07
Taylor	12.22	12.01	14.09	13.38	12.99	13.92	12.94
Van Buren Twp.	1.25	1.33	1.40	1.37	1.44	1.38	1.36
Wyandotte	11.60	11.52	11.97	13.04	12.99	11.94	12.22
Total Incoming Flow Rate	74.80	73.67	86.07	87.44	85.94	83.83	81.58
DWTF Including Recycle (IPS + TPS)	81.91	80.41	96.59	92.35	91.50	85.73	88.55
Total Precipitation DTW (inches) =	34.69	35.46	43.81	36.38	38.73	39.99	37.81

Note: DWTF recycle flows have been metered since April 2020. To provide a consistent comparison to previous years recycle flow has not been deducted from IPS+TPS data for 2020 and 2021.

Figure 2-8
Average Annual Flow Rate by Community for 2016 through 2021



12. Interceptor inflow and infiltration has not been estimated and deducted from community flow rates.
13. Reverse flow at Meter SW occurs as hydraulically necessary for emergency operating conditions and/or storms greater than the design storm. Table 2-5 lists the estimated volume of reverse flow through Meter SW for the significant storm events in 2021. Reverse flow through Meter SW was estimated to have occurred for Significant Storm Events 4, 6, 7 and 9.
14. The DWTF primary and secondary treatment capacities are 150 and 125 MGD, respectively. The peak flow rate capacity of the DWTF is 225 MGD, with flow blending occurring at flow rates greater than 125 MGD. Under peak wet weather flow conditions, about 50 MGD receives both primary and secondary treatment, 100 MGD receives primary treatment only, and 75 MGD receives secondary treatment only. Table 2-5 lists the total volumes which bypassed primary and secondary treatment for each significant storm event. There was bypass for Significant Storm Events 3, 4, 5, 6, 7 and 9.

Table 2-5
DWTF Primary and Secondary Treatment Bypass and Reverse Flow through Meter SW for Significant Storm Events for 2021

Major Storm Event	Significant Storm Event	Event Dates	Bypass of Primary Treatment (MG)	Bypass of Secondary Treatment (MG)	Reverse Flow through Meter SW (MG)
-	1	3/25-28/2021	0	0	0
-	2	6/20-21/2021	0	0	0
A	3	6/25-26/2021	8.38	16.46	0
B	4	7/16-17/2021	56.67	89.04	0.05
-	5	7/24-25/2021	11.42	18.63	0
C	6	8/11-12/2021	52.96	65.83	6.21
D	7	9/21-23/2021	37.17	115.25	0.03
-	8	10/14-16/2021	0	0	0
E	9	10/24-25/2021	31.29	55.92	5.29
-	10	10/28-30/2021	0	0	0
-	11	12/10-11/2021	0	0	0
Total			197.89	361.13	11.58

C) CONTROLLED FLOW COMMUNITIES OVERVIEW

- The controlled flow communities are tributary to the Riverdrive Interceptor. Peak flow rates regulated to the MAFLs promotes good performance of the Riverdrive Interceptor without surcharging at the monitoring locations. The peak hourly flow rates and peak depths for the flow meters along the Riverdrive Interceptor for the significant storm events are listed in Table 2-6. The total wet weather MAFLs are also given and are used to check whether the incoming flow rates are being regulated properly. The total wet weather MAFLs at the flow meter locations are the sum of the MAFLs for the upstream communities.

Flow rates above the MAFL which occur after the peak of the storm event during dewatering operations of the Lincoln Park equalization basin or the Southgate-Wyandotte Relief Drains Drainage District (SWRDDD) combined sewer overflow (CSO) retention treatment facility (RTF), and were coordinated with Veolia to minimize bypass operations at the DWTF and discharges to the Detroit River from SWRDDD, are not considered an exceedance.

Table 2-6
Peak Hourly Flow Rates and Depth for Controlled Flow Communities
along the Riverdrive Interceptor for Significant Storms Events for 2021

Major Storm Event	Significant Storm Event	Peak Hourly Flow Rate (cfs)				Peak Depth (ft)			
		RR-1	EC-6	RD-1	SW+SWB	RR-1	EC-6	RD-1	SW
-	1	11.22	24.88	64.47	42.86	2.9	7.7	6.6	10.1
-	2	11.06	21.13	56.50	39.20	2.7	5.1	5.3	10.4
A	3	11.24	28.23	62.69	48.58	7.0	9.9	7.4	11.4
B	4	10.81	30.58	67.25	58.60	8.2	12.2	10.2	14.6
-	5	9.63	21.17	71.46	57.35	9.7	-	12.4	12.4
C	6	10.42	26.13	61.73	62.40	8.6	-	11.8	18.3
D	7	10.56	32.17	66.14	62.17	7.5	11.6	10.2	15.3
-	8	8.85	16.11	49.81	66.04	2.2	3.8	3.2	9.3
E	9	10.68	27.23	62.66	63.13	7.0	11.9	11.1	16.5
-	10	8.72	23.48	58.40	50.93	3.1	6.0	6.3	13.1
-	11	11.38	25.28	63.75	49.95	4.5	8.6	7.3	12.6
Total MAFL (cfs)		11.26	23.46	65.82	31.73				
Pipe Diameter (ft)						3.0	4.5	6.0	6.5
Manhole Depth (ft)						16.0	24.8	27.2	40.0

Legend:

XX.XX	Exceeds wet weather MAFL by 0 to 5%
XX.XX	Exceeds wet weather MAFL by > 5%
XX.XX	Exceeds wet weather MAFL coordinated with Veolia
XX.XX	Wastewater level exceeded sewer crown

Notes: 1) Meter EC-6 was out-of-service for Significant Storm Events 5 and 6.

2. The peak hourly flow rates at Meter RD-1 were below the total wet weather MAFL for eight significant storm events, exceeded the MAFL by less than 5% for two significant storm events, and exceeded the MAFL by about 9% for one significant storm event in 2021. These metrics indicate good performance of the Riverdrive Interceptor for the significant storm events in 2021.
3. SWRDDD was not granted authorization by Veolia to exceed the MAFL for Significant Storm Events 1 through 11 in 2021.
4. Incremental flow rates are estimated for storm events when the metered peak hourly flow rate exceeded the MAFL by 5% or more. Table 2-7 lists the estimated incremental peak hourly flow rates for the flow meters along the Riverdrive Interceptor for these storm events. Incremental flow rates are used to check whether the incoming flow rates are being regulated properly.

Table 2-7
Estimated Incremental Peak Hourly Flow Rates for Controlled Flow Communities
along the Riverdrive Interceptor for Significant Storms Events for 2021

Major Storm Event	Significant Storm Event	Incremental Peak Hourly Flow Rate (cfs)			
		RR-1	EC-6	RD-1	SW+SWB
-	1	11.22	14.88	48.73	42.86
-	2	11.06	10.47	42.01	39.20
A	3	11.24	19.88	40.29	48.58
B	4	10.81	23.02	46.07	58.60
-	5	9.63	14.43	60.36	57.35
C	6	10.42	17.88	47.20	62.40
D	7	10.56	24.57	58.53	62.17
-	8	8.85	8.23	38.10	66.04
E	9	10.68	18.80	51.17	63.13
-	10	8.72	18.35	39.25	50.93
-	11	11.38	15.59	47.58	49.95
Incremental MAFL (cfs)		11.26	12.20	42.36	31.73

Legend:

XX.XX	Exceeds wet weather MAFL by 0 to 5%
XX.XX	Exceeds wet weather MAFL by > 5%
XX.XX	Exceeds wet weather MAFL coordinated with Veolia

5. The Meter RR-1 district includes all of River Rouge. Wastewater from River Rouge is pumped from the River Rouge CSO RTB to the Riverdrive Interceptor. No flow meter exists on the pump station discharge pipe. The pumps are operated to maintain a maximum level in the Riverdrive Interceptor immediately downstream of the River Rouge CSO basin. This sometimes results in an exceedance of the MAFL. The flow rates estimated for the Meter RR-1 district exceeded the MAFL for one of the eleven significant storm events in 2021.
6. The Meter EC-6 district includes all of Ecorse and a portion of Lincoln Park. The district has three connection points from Ecorse which flow by gravity and have orifice plates installed to regulate the flow rates. The district has two connection points from Lincoln Park. The larger connection flows by gravity and has a vortex valve installed to regulate the flow rate into the Riverdrive Interceptor, and the smaller connection serves the Libra Hospital of Southeastern Michigan on Outer Drive. The incremental flow rates estimated for the Meter EC-6 district exceeded the MAFL for nine of the eleven significant storm events in 2021.
7. The Meter RD-1 district includes most of Allen Park and most of Lincoln Park. Flow from a portion of Allen Park flows through Lincoln Park to the Riverdrive Interceptor. The district has three connection points from Lincoln Park which flow by gravity and have either an orifice plate or vortex valve installed to regulate the flow rates. The Lincoln Park equalization basin dewatering pipe is controlled via a ball valve to regulate the flow rate into the Riverdrive Interceptor. Flow rates above the MAFL which occur after the peak of the storm event during dewatering operations of the Lincoln Park equalization basin, and were coordinated with Veolia to minimize bypass operations at the DWTF, are not considered an exceedance. The incremental flow rates estimated for the Meter RD-1 district exceeded the MAFL for seven of the eleven significant storm events in 2021.
8. The Meter SW district serves the SWRDDD. The SWRDDD is a combined sewer area that includes part of Southgate and all of Wyandotte. Flow rates above the MAFL which occur after the peak of the storm event during dewatering operations of the SWRDDD CSO RTF, can be coordinated with Veolia to minimize bypass operations at the DWTF and discharges to the Detroit River from SWRDDD, and are not considered an exceedance. The incremental flow rates estimated for the Meter SW district exceeded the MAFL for all eleven significant storm events in 2021. As previously noted, SWRDDD was not granted authorization to exceed the MAFL for these significant storm events.

D) NON-CONTROLLED FLOW COMMUNITIES OVERVIEW

- The non-controlled flow communities are tributary to both the Pennsylvania Interceptor system and the Downriver Regional Storage and Transport System (DRSTS) and have allowable peak 96-hour volumes that were established for the 4.42-inch design storm. There were five (5) major storm events in 2021. The estimated peak 96-hour total volumes for the 2021 major storm events are listed in Table 2-8. Allen Park (part) was estimated to have exceeded their peak 96-hour total volume for Major Storm Events D and E in 2021. Dearborn Heights was estimated to have exceeded their peak 96-hour total volume for Major Storm Event B in 2021. Southgate (part) was estimated to have exceeded their peak 96-hour total volume for Major Storm Events C, D and E in 2021.

Table 2-8
Peak 96-Hour Total Volumes for Non-Controlled Flow Communities
for Major Storms Events for 2021

Community	Total Volume (MG)					
	4.42 inch Design Storm	Major Storm Event A 6/25-26/2021 2.07 inches	Major Storm Event B 7/16-17/2021 2.20 inches	Major Storm Event C 8/11-12/2021 2.53 inches	Major Storm Event D 9/21-23/2021 4.01 inches	Major Storm Event E 10/24-25/2021 2.10 inches
Allen Park (part)	29.23	11.71	24.67	26.07	45.89	30.37
Belleville	4.86	3.52	3.30	2.54	2.37	3.09
Brownstown Twp.	20.90	8.91	8.40	8.73	11.86	11.38
Dearborn Heights	43.76	34.76	44.14	31.83	40.91	35.79
Riverview	28.30	13.12	15.37	11.98	23.08	18.24
Romulus	88.43	44.40	40.13	37.14	42.94	38.96
Southgate (part)	31.24	19.28	25.67	45.31	61.09	39.45
Taylor	164.45	61.49	78.60	90.35	116.66	88.01
Van Buren Twp.	7.04	6.91	6.48	4.98	4.64	6.07
Total	418.21	204.09	246.77	258.92	349.43	271.36

Legend:

XX.XX Exceeds design storm volume by 0 to 20%

XX.XX Exceeds design storm volume by > 20%

2. Monitoring devices indicated no issues with the DRSTS performance during all storm events for 2021.

3. Table 2-9 lists the monitored relief structures which discharged to the DRSTS for each significant storm event in 2021. At least one of the relief structures discharged into the DRSTS during each of the significant storm events in 2021.

Table 2-9
Downriver Regional Storage and Transport System Usage
for Significant Storm Events for 2021

Major Storm Event	Significant Storm Event	Event Dates	Meter									
			TPS	TSO	CHPO	CPO	PDO	ER-2	ER-1	APO-2	APO-1	PM-1
-	1	3/25-28/2021	✓	✓	✓	✗	✗	✗	✗	✓	✓	✗
-	2	6/20-21/2021	✓	✓	✓	✗	✗	✗	✗	✓	✓	✗
A	3	6/25-26/2021	✓	✓	✓	✓	✗	✓	✓	✓	✓	✗
B	4	7/16-17/2021	✓	✓	✓	✓	✗	✓	✓	✓	✓	✓
-	5	7/24-25/2021	✓	✓	✓	✓	✗	✗	✗	✓	✓	✗
C	6	8/11-12/2021	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
D	7	9/21-23/2021	✓	✓	✓	✓	✗	✓	✓	✓	✓	✓
-	8	10/14-16/2021	✓	✗	✗	✗	✗	✗	✗	✗	✗	✗
E	9	10/24-25/2021	✓	✓	✓	✓	✗	✓	✓	✓	✓	✓
-	10	10/28-30/2021	✓	✗	✓	✓	✗	✓	✓	✓	✓	✗
-	11	12/10-11/2021	✓	✓	✓	✓	✗	✓	✓	✓	✓	✗
Number of Overflow Events			11/11	9/11	10/11	8/11	1/11	7/11	7/11	10/11	10/11	4/11

Legend:

✓	Discharge to DRSTS
✗	No discharge to DRSTS

4. Figures 2-9 and 2-10 plot the total 96-hour volume for the non-controlled flow communities versus precipitation for the major storm events from 2013 through 2021. Figure 2-6 shows the growing season events (those that occurred between May 1st and September 30th), and Figure 2-7 shows the non-growing season events (those that occurred between October 1st and April 30th). The 4.42-inch design storm volume is shown for comparison.

Figure 2-9
Total 96-Hour Volume for the Non-Controlled Flow Communities for Major Storm Events
Growing Season from 2013 through 2021

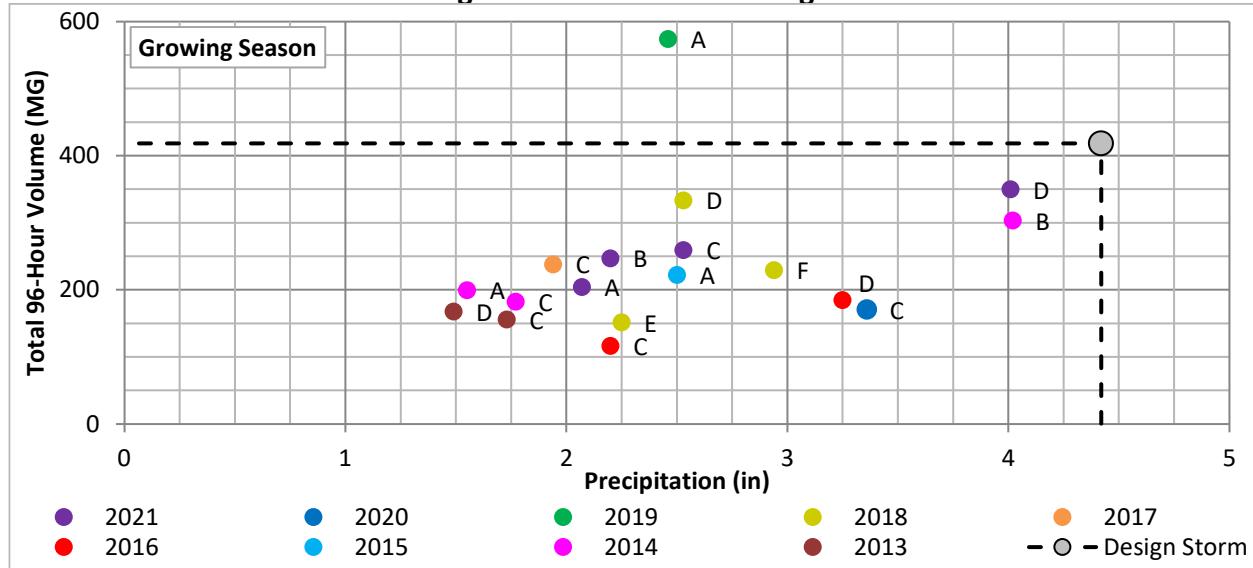
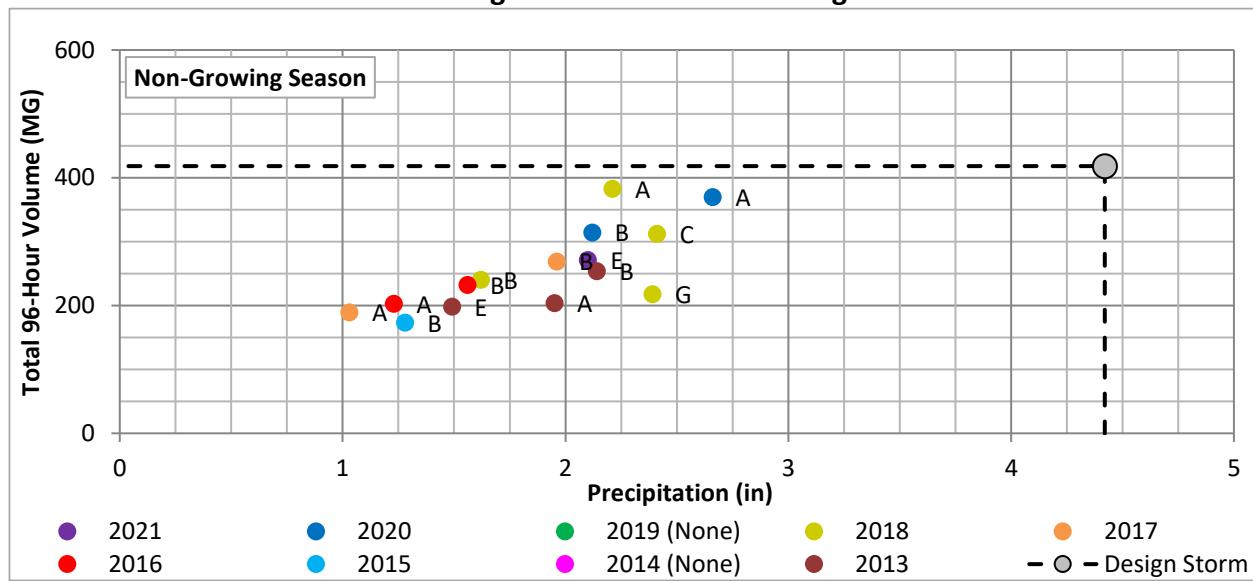


Figure 2-10
Total 96-Hour Volume for the Non-Controlled Flow Communities for Major Storm Events
Non-Growing Season from 2013 through 2021



5. The non-controlled flow communities have dry weather MAFLs. No community was estimated to have exceeded its dry weather MAFL on a total community basis for any month. The portion of Meter District PA-2 in Taylor was estimated to have exceeded its dry weather MAFL for July, October, November and December 2021. Meter District IPS+TPS in Southgate was estimated to have exceeded its dry weather MAFL for every month 2021. No portion of any other meter district was estimated to have exceeded its dry weather MAFL for any month in 2021.

3) SUMMARY BY COMMUNITY

Table 3-1 presents the estimated average monthly flow rate for each community in the DSDS for each month in 2021. The average monthly flow rate includes all days – both dry and wet weather. Table 3-1 also shows the percentages for each community of the incoming flow rate to the DWTF. The estimated average monthly flow rates are plotted on Figure 3-1, and the percentages are plotted on Figure 3-2.

The incoming flow rate to the DWTF is based on the interceptor system flow meters. It is given on Table 3-1 along with the average monthly influent pumping rate at the DWTF. The DWTF influent pumping rate includes recycle flow rates where the incoming flow rate measured by the interceptor system meters does not include DWTF recycle flow rates. Therefore, it is expected that the incoming flow rate measured by the sum of the interceptor system meters will be slightly less than the DWTF influent flow rate.

DWTF recycle flows have been metered since April 2021. To provide a consistent comparison to previous years, the table presents the IPS and TPS data with and without the recycle flow deducted.

The average monthly flow rates are subtotalled for controlled flow communities and for non-controlled flow communities. Tables 3-2 and 3-3 provide the breakdown of average monthly flow rates for controlled flow communities and non-controlled flow communities, respectively.

Table 3-1
Average Monthly Flow Rates by Community for 2021

Community	Flow Rate (cfs)												Average Annual
	January	February	March	April	May	June	July	August	September	October	November	December	
Allen Park	4.69	4.13	5.23	5.03	4.21	7.19	9.56	7.73	8.60	9.96	6.98	9.88	6.96
Belleville	0.60	0.55	0.65	0.71	0.62	0.78	0.87	0.68	0.64	0.78	0.73	0.82	0.70
Brownstown Twp.	2.33	2.21	2.45	2.47	2.34	2.43	2.48	2.40	2.50	3.08	2.79	3.13	2.55
Dearborn Hts.	3.55	3.16	4.38	3.97	2.95	4.57	6.91	5.29	5.29	7.21	5.42	7.19	5.01
Ecorse	3.62	3.34	3.66	3.15	3.11	3.22	3.70	3.87	4.00	4.09	2.49	3.12	3.45
Lincoln Park	8.26	7.31	8.89	8.46	7.37	11.37	13.56	11.24	11.15	13.66	11.07	15.35	10.67
River Rouge	2.21	1.93	2.68	2.74	2.44	3.80	4.56	3.59	3.45	4.32	3.94	5.01	3.40
Riverview	2.61	2.44	2.77	2.74	2.36	2.82	3.22	2.68	3.16	3.97	2.87	3.64	2.95
Romulus	8.24	7.36	9.41	10.98	7.59	9.16	10.93	8.78	8.56	9.69	10.88	13.24	9.58
Southgate	9.48	8.27	9.54	9.81	8.09	10.87	13.66	12.96	12.87	14.79	11.54	14.71	11.41
Taylor	10.99	9.91	11.95	11.32	9.00	11.96	15.45	14.93	16.03	18.56	15.53	21.24	13.94
Van Buren Twp.	1.17	1.07	1.28	1.40	1.22	1.53	1.71	1.33	1.25	1.54	1.44	1.61	1.38
Wyandotte	10.53	8.95	9.98	10.33	8.67	12.12	14.81	12.72	11.96	15.36	12.27	15.43	11.96
Subtotal Controlled Flow Communities	35.01	30.47	35.63	35.19	30.45	43.87	52.82	44.88	43.47	53.90	43.23	56.71	42.24
Subtotal Non-Controlled Flow Communities	33.28	30.17	37.23	37.92	29.51	37.94	48.61	43.33	45.99	53.12	44.72	57.65	41.72
Total Incoming Flow Rate	68.29	60.64	72.86	73.11	59.96	81.81	101.43	88.21	89.46	107.02	87.95	114.36	83.96
DWTF Including Recycle (IPS + TPS)	69.62	61.57	74.38	74.73	61.06	85.19	106.25	89.26	91.34	110.42	88.33	115.70	85.86
DWTF without Recycle (IPS + TPS - Recycle)	65.46	57.65	69.77	71.03	57.84	80.68	101.50	84.01	85.44	104.80	83.28	109.98	81.15
Recycle	4.15	3.93	4.61	3.70	3.21	4.51	4.75	5.25	5.90	5.61	5.05	5.72	4.71
Total Precipitation DTW (inches)	1.03	1.47	2.13	1.79	2.23	5.16	4.95	5.17	5.43	5.25	1.91	3.47	39.99
Normal Precipitation at DTW (inches)	1.96	2.02	2.28	2.90	3.38	3.52	3.37	3.00	3.27	2.52	2.79	2.46	33.47
Departure from Normal (inches)	-0.93	-0.55	-0.15	-1.11	-1.15	+1.64	+1.58	+2.17	+2.16	+2.73	-0.88	+1.01	+6.52

Percentage of Total Incoming Flow Rate by Community for 2021

Community	January	February	March	April	May	June	July	August	September	October	November	December	Average Annual
Allen Park	6.9%	6.8%	7.2%	6.9%	7.0%	8.8%	9.4%	8.8%	9.6%	9.3%	7.9%	8.6%	8.1%
Belleville	0.9%	0.9%	0.9%	1.0%	1.0%	1.0%	0.9%	0.8%	0.7%	0.7%	0.8%	0.7%	0.9%
Brownstown Twp.	3.4%	3.6%	3.4%	3.4%	3.9%	3.0%	2.4%	2.7%	2.8%	2.9%	3.2%	2.7%	3.1%
Dearborn Hts.	5.2%	5.2%	6.0%	5.4%	4.9%	5.6%	6.8%	6.0%	5.9%	6.7%	6.2%	6.3%	5.9%
Ecorse	5.3%	5.5%	5.0%	4.3%	5.2%	3.9%	3.6%	4.4%	4.5%	3.8%	2.8%	2.7%	4.3%
Lincoln Park	12.1%	12.1%	12.2%	11.6%	12.3%	13.9%	13.4%	12.7%	12.5%	12.8%	12.6%	13.4%	12.6%
River Rouge	3.2%	3.2%	3.7%	3.7%	4.1%	4.6%	4.5%	4.1%	3.9%	4.0%	4.5%	4.4%	4.0%
Riverview	3.8%	4.0%	3.8%	3.8%	3.9%	3.4%	3.2%	3.0%	3.5%	3.7%	3.3%	3.2%	3.6%
Romulus	12.1%	12.1%	12.9%	15.0%	12.7%	11.2%	10.8%	9.9%	9.6%	9.1%	12.4%	11.6%	11.6%
Southgate	13.9%	13.6%	13.1%	13.4%	13.5%	13.3%	13.5%	14.7%	14.4%	13.8%	13.1%	12.9%	13.6%
Taylor	16.1%	16.3%	16.4%	15.5%	15.0%	14.6%	15.2%	16.9%	17.9%	17.3%	17.7%	18.6%	16.5%
Van Buren Twp.	1.7%	1.8%	1.8%	1.9%	2.0%	1.9%	1.7%	1.5%	1.4%	1.4%	1.6%	1.4%	1.7%
Wyandotte	15.4%	14.8%	13.7%	14.1%	14.5%	14.8%	14.6%	14.4%	13.4%	14.4%	14.0%	13.5%	14.3%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Note:

1) DWTF recycle flows have been metered since April 2020. To provide a consistent comparison to previous months recycle flow has not been deducted from IPS+TPS.

Figure 3-1
Total Incoming Flow for 2021

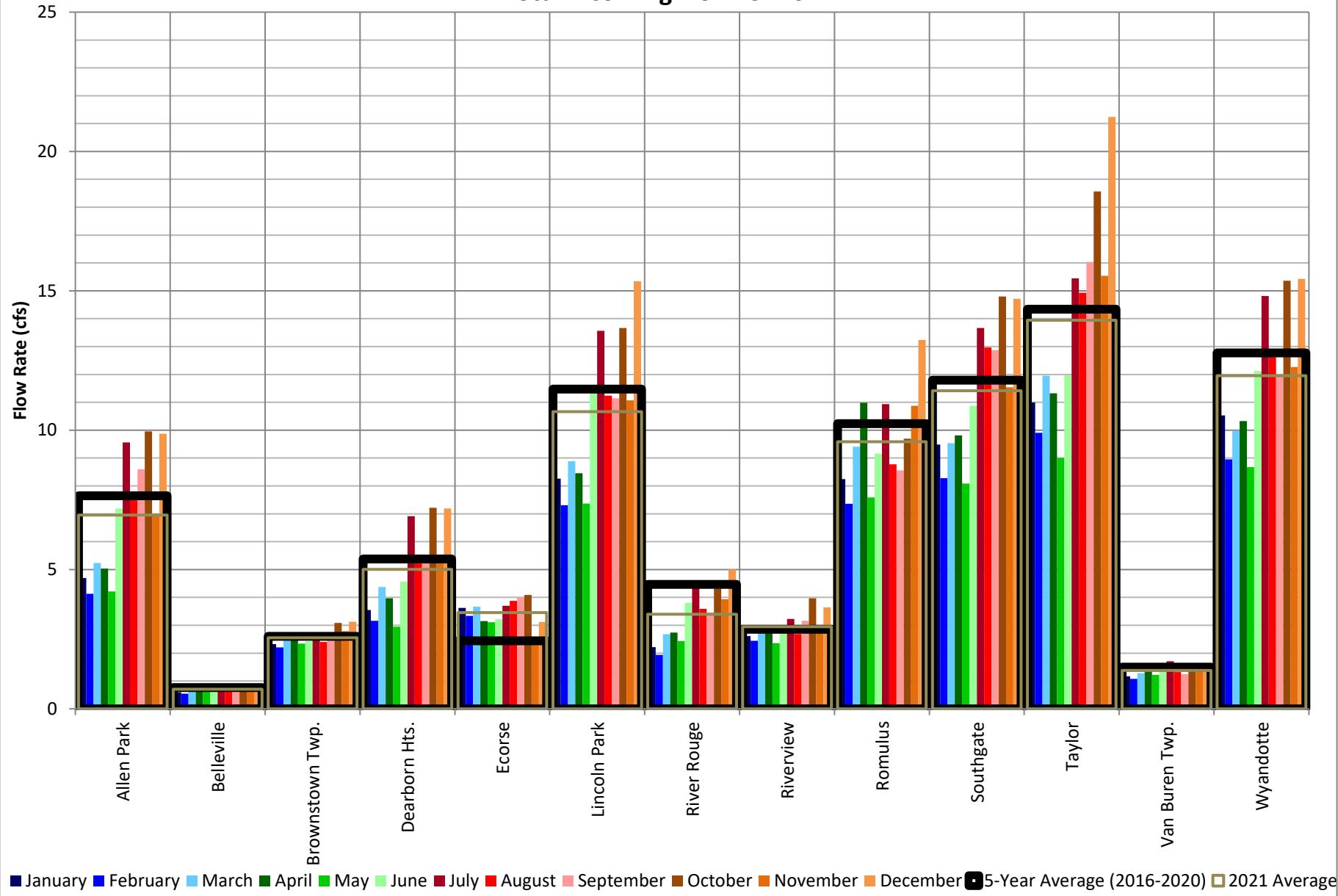
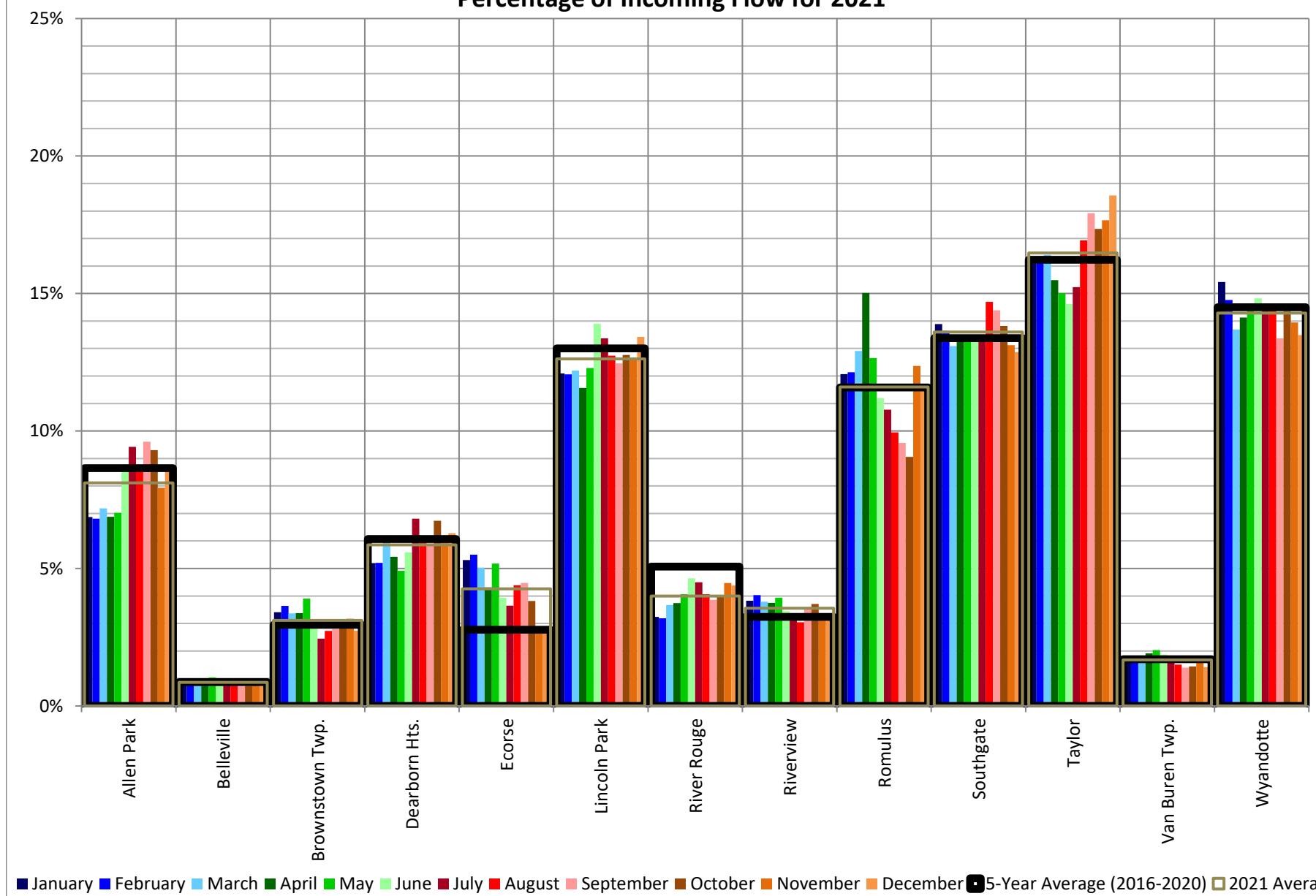


Figure 3-2
Percentage of Incoming Flow for 2021



■ January ■ February ■ March ■ April ■ May ■ June ■ July ■ August ■ September ■ October ■ November ■ December ■ 5-Year Average (2016-2020) ■ 2021 Average

Table 3-2
Average Monthly Flow Rates for Controlled Flow Communities for 2021

Community	Flow Rate (cfs)												
	January	February	March	April	May	June	July	August	September	October	November	December	Average Annual
Allen Park (part)	4.08	3.57	4.45	4.33	3.67	6.10	7.32	5.84	5.75	7.27	6.12	8.57	5.60
Ecorse	3.62	3.34	3.66	3.15	3.11	3.22	3.70	3.87	4.00	4.09	2.49	3.12	3.45
Lincoln Park	8.26	7.31	8.89	8.46	7.37	11.37	13.56	11.24	11.15	13.66	11.07	15.35	10.66
River Rouge	2.21	1.93	2.68	2.74	2.44	3.80	4.56	3.59	3.45	4.32	3.94	5.01	3.40
Southgate - Wyandotte RDDD	16.84	14.32	15.95	16.51	13.87	19.38	23.68	20.34	19.12	24.56	19.62	24.66	19.10
Total	35.01	30.47	35.63	35.19	30.45	43.87	52.82	44.88	43.47	53.90	43.23	56.71	42.21
Total Precipitation DTW (inches)	1.03	1.47	2.13	1.79	2.23	5.16	4.95	5.17	5.43	5.25	1.91	3.47	39.99

Table 3-3
Average Monthly Flow Rates for Non-Controlled Flow Communities for 2021

Community	Flow Rate (cfs)												
	January	February	March	April	May	June	July	August	September	October	November	December	Average Annual
Allen Park (part)	0.62	0.56	0.78	0.70	0.54	1.09	2.24	1.89	2.85	2.68	0.86	1.30	1.35
Belleville	0.60	0.55	0.65	0.71	0.62	0.78	0.87	0.68	0.64	0.78	0.73	0.82	0.70
Brownstown Twp.	2.33	2.21	2.45	2.47	2.34	2.43	2.48	2.40	2.50	3.08	2.79	3.13	2.55
Dearborn Hts.	3.55	3.16	4.38	3.97	2.95	4.57	6.91	5.29	5.29	7.21	5.42	7.19	5.00
Riverview	2.61	2.44	2.77	2.74	2.36	2.82	3.22	2.68	3.16	3.97	2.87	3.64	2.94
Romulus	8.24	7.36	9.41	10.98	7.59	9.16	10.93	8.78	8.56	9.69	10.88	13.24	9.58
Southgate (part)	3.18	2.91	3.56	3.63	2.89	3.61	4.79	5.34	5.71	5.60	4.20	5.48	4.25
Taylor	10.99	9.91	11.95	11.32	9.00	11.96	15.45	14.93	16.03	18.56	15.53	21.24	13.93
Van Buren Twp.	1.17	1.07	1.28	1.40	1.22	1.53	1.71	1.33	1.25	1.54	1.44	1.61	1.38
Total	33.28	30.17	37.23	37.92	29.51	37.94	48.61	43.33	45.99	53.12	44.72	57.65	41.69
Total Precipitation DTW (inches)	1.03	1.47	2.13	1.79	2.23	5.16	4.95	5.17	5.43	5.25	1.91	3.47	39.99

4) DRY WEATHER SUMMARY

Table 4-1 lists the incremental monthly flow rates for each community summarized by meter district component. Incremental average daily flow rates are given along with an estimate of the average daily dry weather flow rates. The Year 2020 residential population is given on Table 4-1 and it is used to estimate per-capita dry weather flow rates. Appendix A contains a set of tables that further support the monthly flow rates presented on Tables 3-1, 3-2, 3-3 and 4-1. In addition, Table 4-1 lists MAFLs from the Downriver Utility Wastewater Authority Service Agreement (March 21, 2017).

A single set of dry days was used to estimate the dry weather flow rates for all of the meters, with the number of dry days in each month listed in Table 5-1. Daily average flow rate traces for Meters P-2, PA-1, PB-1, PC-1, RD-1, and RV-1 were used for screening out dry and wet weather days. These meters were chosen because they are near the downstream end of the interceptor system, include some dewatering flow rates, and provide a well-defined sort of dry/wet days. Details of the dry and wet weather day selection process are provided in the *Wayne County Downriver Sewage Disposal System - System Monitoring Plan* dated May 7, 2018.

Table 4-1
Monthly Incremental Flow Rates Summarized by Community

Community	Sewage Flow Meter Math	Meter District	Year 2020 Incremental Population	January 2021			February 2021			March 2021			April 2021			May 2021			June 2021			Dry Weather MAFLs for Controlled Flow Communities ¹ (cfs)	Dry Weather MAFLs for Non-Controlled Flow Communities ¹ (cfs)	
				Total		Dry Weather		Total		Dry Weather		Total		Dry Weather		Total		Dry Weather		Total				
				Average Daily Flow Rate (cfs)	Average Daily Flow Rate (cfs)	Average Per Capita Flow Rate (gpcd)	Average Daily Flow Rate (cfs)	Average Per Capita Flow Rate (gpcd)	Average Daily Flow Rate (cfs)	Average Per Capita Flow Rate (gpcd)	Average Daily Flow Rate (cfs)	Average Per Capita Flow Rate (gpcd)	Average Daily Flow Rate (cfs)	Average Per Capita Flow Rate (gpcd)	Average Daily Flow Rate (cfs)	Average Per Capita Flow Rate (gpcd)	Average Daily Flow Rate (cfs)	Average Per Capita Flow Rate (gpcd)	Average Daily Flow Rate (cfs)	Average Per Capita Flow Rate (gpcd)				
Allen Park	2.7%([PC-1]+[CPO]+[CHPO]-[TB-1]) + 17.4%([P-1]+[PM-1]-[P-2]-[PA-2]-[PB-1]-[PD-1]-[PC-1]) + 38.1%([RD-1]-[EC-6]) + ([APO-1] + [APO-2])	PC-1	716	0.13	0.12	104	0.11	0.09	84	0.14	0.11	95	0.14	0.13	114	0.11	0.10	88	0.14	0.09	80	-	0.43	
		P-1	2,338	0.49	0.46	128	0.44	0.39	109	0.55	0.45	125	0.56	0.53	147	0.43	0.41	114	0.56	0.39	108	-	1.58	
		RD-1	22,170	4.08	3.31	96	3.57	2.30	67	4.45	2.44	71	4.33	3.44	100	3.67	3.02	88	6.10	3.04	89	17.20	-	
		APO-1 + APO-2	0	0.00	0.00	-	0.00	0.00	-	0.09	0.00	-	0.00	0.00	-	0.00	0.00	-	0.39	0.00	-	-	-	
		Total	25,224	4.69	3.89	100	4.13	2.78	71	5.23	2.99	77	5.03	4.10	105	4.21	3.53	90	7.19	3.52	90	-	2.01	
Belleville	33.8%[PA-4]	PA-4	4,008	0.60	0.59	95	0.55	0.53	86	0.65	0.62	99	0.71	0.69	111	0.62	0.61	98	0.78	0.60	97	-	1.32	
Brownstown Twp.	99.9%[P-2] + 0.2%([PA-2]+[ER-1]-[PA-3]-[ER-2])	P-2	11,002	2.32	2.25	132	2.20	2.10	124	2.45	2.25	132	2.46	2.37	139	2.34	2.31	136	2.42	2.15	126	-	3.91	
		PA-2	29	0.00	0.00	104	0.00	0.00	91	0.01	0.00	102	0.00	0.00	105	0.00	0.00	70	0.01	0.00	98	-	0.06	
		Total	11,031	2.33	2.26	132	2.21	2.11	123	2.45	2.26	132	2.47	2.37	139	2.34	2.32	136	2.43	2.16	126	-	3.97	
Dearborn Hts.	77.7%([TB-1]+[TSO])	TB-1	19,472	3.55	3.20	106	3.16	2.50	83	4.38	3.05	101	3.97	3.58	119	2.95	2.67	89	4.57	2.31	77	-	8.22	
Ecorse	69.1%([EC-6]-[RR-1])	EC-6	9,305	3.62	3.46	240	3.34	3.16	220	3.66	3.62	252	3.15	3.16	219	3.11	2.99	208	3.22	2.88	200	9.20	-	
Lincoln Park	30.9%([EC-6]-[RR-1]) + 61.9%([RD-1]-[EC-6])	EC-6	4,169	1.62	1.55	240	1.49	1.42	220	1.64	1.62	252	1.41	1.41	219	1.39	1.34	208	1.44	1.29	200	3.00	-	
		RD-1	36,076	6.63	5.38	96	5.82	3.74	67	7.24	3.96	71	7.04	5.60	100	5.97	4.91	88	9.93	4.95	89	25.16	-	
		Total	40,245	8.26	6.93	111	7.31	5.16	83	8.89	5.58	90	8.46	7.01	113	7.37	6.25	100	11.37	6.24	100	28.16	-	
River Rouge	[RR-1]	RR-1	7,224	2.21	2.01	180	1.93	1.62	145	2.68	1.94	174	2.74	2.40	215	2.44	2.10	188	3.80	2.17	195	11.26	-	
Riverview	[RV-1]	RV-1	12,490	2.61	2.43	125	2.44	2.04	105	2.77	2.19	113	2.74	2.46	127	2.36	2.18	113	2.82	2.19	113	-	3.61	
Romulus	[DMA-1] + ([PA-3]+[ER-2]-[PA-4]-[DMA-1] + [DMA-2] + ([PD-2] - [DMA-2])	DMA-1	0	0.43	0.40	-	0.39	0.36	-	0.40	0.38	-	0.45	0.45	-	0.50	0.49	-	0.63	0.53	-	-	6.39	
		PA-3	14,420	4.40	4.24	190	3.90	3.72	167	4.63	4.15	186	4.53	4.38	196	3.77	3.71	166	4.20	3.66	164	-		
		DMA-2	0	0.92	0.95	-	0.66	0.60	-	1.43	1.25	-	2.94	2.87	-	0.97	0.72	-	1.51	0.19	-	-	9.02	
		PD-2	8,069	2.50	2.44	195	2.40	2.19	175	2.94	2.44	195	3.06	2.95	237	2.35	2.26	181	2.82	2.20	176	-		
		Total	22,489	8.24	8.03	231	7.36	6.86	197	9.41	8.22	236	10.98	10.65	306	7.59	7.18	206	9.16	6.59	189	-	15.41	
Southgate	82.6%([P-1]+[PM-1]-[P-2]-[PA-2]-[PB-1]-[PD-1]-[PC-1]) + 38.9%[PB-1] + 37.5%([SW]+[SWB]) + 5.4%([P-1]+[PM-1]-[P-2]-[PA-2]-[PB-1]-[PD-1]-[PC-1])	P-1	11,079	2.32	2.20	128	2.10	1.86	109	2.61	2.15	125	2.66	2.52	147	2.06	1.95	114	2.66	1.85	108	-	3.65	
		PB-1	3,214	0.70	0.66	133	0.68	0.60	120	0.78	0.66	133	0.79	0.74	150	0.70	0.67	135	0.78	0.63	127	-	1.42	
		SW	15,003	6.31	5.17	223	5.36	3.82	165	5.97	4.19	181	6.18	4.79	206	5.19	4.13	178	7.26	4.28	184	11.88	-	
		TPS+IPS	718	0.15	0.14	128	0.14	0.12	109	0.17	0.14	125	0.17	0.16	147	0.13	0.13	114	0.17	0.12	108	-	0.06	
		Total	30,014	9.48	8.18	176	8.27	6.40	138	9.54	7.14	154	9.81	8.22	177	8.09	6.87	148	10.87	6.89	148	-	5.13	
Taylor	0.1%[P-2] + 99.8%([PA-2]+[ER-1]-[PA-3]-[ER-2]) + 61.1%[PB-1] + 22.3%([TB-1]+[TSO]) + 97.3%([PC-1]+[CPO]+[CHPO]-[TB-1]) + ([PD-1]-[PD-2])	P-2	10	0.00	0.00	132	0.00	0.00	124															

Table 4-1
Monthly Incremental Flow Rates Summarized by Community

Community	Sewage Flow Meter Math	Meter District	Year 2020 Incremental Population	July 2021			August 2021			September 2021			October 2021			November 2021			December 2021			Dry Weather MAFLs for Controlled Flow Communities ¹ (cfs)	Dry Weather MAFLs for Non-Controlled Flow Communities ¹ (cfs)	
				Total		Dry Weather		Total		Dry Weather		Total		Dry Weather		Total		Dry Weather		Total				
				Average Daily Flow Rate (cfs)	Average Daily Flow Rate (cfs)	Average Per Capita Flow Rate (gpcd)	Average Daily Flow Rate (cfs)	Average Per Capita Flow Rate (gpcd)	Average Daily Flow Rate (cfs)	Average Per Capita Flow Rate (gpcd)	Average Daily Flow Rate (cfs)	Average Per Capita Flow Rate (gpcd)	Average Daily Flow Rate (cfs)	Average Per Capita Flow Rate (gpcd)	Average Daily Flow Rate (cfs)	Average Per Capita Flow Rate (gpcd)	Average Daily Flow Rate (cfs)	Average Per Capita Flow Rate (gpcd)	Average Daily Flow Rate (cfs)	Average Per Capita Flow Rate (gpcd)				
Allen Park	2.7%([PC-1]+[CPO]+[CHPO]-[TB-1]) + 17.4%([P-1]+[PM-1]-[P-2]-[PA-2]-[PB-1]-[PD-1]-[PC-1]) + 38.1%([RD-1]-[EC-6]) + ([APO-1] + [APO-2])	PC-1	716	0.17	0.10	94	0.19	0.11	96	0.19	0.10	93	0.20	0.13	120	0.19	0.17	149	0.28	0.22	196	-	0.43	
		P-1	2,338	0.75	0.51	141	0.88	0.45	123	0.94	0.41	114	0.89	0.55	152	0.67	0.60	165	0.86	0.71	197	-	1.58	
		RD-1	22,170	7.32	3.74	109	5.84	3.22	94	5.75	3.25	95	7.27	3.71	108	6.12	4.32	126	8.57	4.82	140	17.20	-	
		APO-1 + APO-2	0	1.32	0.00	-	0.82	0.00	-	1.73	0.00	-	1.59	0.00	-	0.00	0.00	-	0.17	0.00	-	-	-	
		Total	25,224	9.56	4.36	112	7.73	3.78	97	8.60	3.77	97	9.96	4.40	113	6.98	5.09	130	9.88	5.75	147	-	2.01	
Belleville	33.8%[PA-4]	PA-4	4,008	0.87	0.77	123	0.68	0.64	103	0.64	0.56	90	0.78	0.65	105	0.73	0.69	111	0.82	0.76	123	-	1.32	
Brownstown Twp.	99.9%[P-2] + 0.2%([PA-2]+[ER-1]-[PA-3]-[ER-2])	P-2	11,002	2.48	2.19	129	2.40	2.10	123	2.49	2.06	121	3.07	2.56	150	2.78	2.65	156	3.12	2.81	165	-	3.91	
		PA-2	29	0.01	0.01	126	0.01	0.00	95	0.01	0.00	110	0.01	0.01	138	0.01	0.01	131	0.01	0.01	166	-	0.06	
		Total	11,031	2.48	2.20	129	2.40	2.10	123	2.50	2.06	121	3.08	2.56	150	2.79	2.65	156	3.13	2.82	165	-	3.97	
Dearborn Hts.	77.7%([TB-1]+[TSO])	TB-1	19,472	6.91	3.12	104	5.29	3.18	105	5.29	2.51	83	7.21	5.07	168	5.42	4.14	137	7.19	4.94	164	-	8.22	
Ecorse	69.1%([EC-6]-[RR-1])	EC-6	9,305	3.70	3.55	246	3.87	3.56	247	4.00	3.10	215	4.09	3.34	232	2.49	2.33	162	3.12	2.19	152	9.20	-	
Lincoln Park	30.9%([EC-6]-[RR-1]) + 61.9%([RD-1]-[EC-6])	EC-6	4,169	1.66	1.59	246	1.74	1.59	247	1.79	1.39	215	1.83	1.50	232	1.11	1.04	162	1.40	0.98	152	3.00	-	
		RD-1	36,076	11.90	6.09	109	9.50	5.24	94	9.35	5.30	95	11.83	6.04	108	9.96	7.04	126	13.95	7.84	140	25.16	-	
		Total	40,245	13.56	7.68	123	11.24	6.84	110	11.15	6.68	107	13.66	7.54	121	11.07	8.08	130	15.35	8.82	142	28.16	-	
River Rouge	[RR-1]	RR-1	7,224	4.56	2.90	259	3.59	2.96	265	3.45	2.35	210	4.32	2.40	215	3.94	3.46	310	5.01	3.88	347	11.26	-	
Riverview	[RV-1]	RV-1	12,490	3.22	2.28	118	2.68	2.11	109	3.16	2.13	110	3.97	2.36	122	2.87	2.40	124	3.64	2.74	142	-	3.61	
Romulus	[DMA-1] + ([PA-3]+[ER-2]-[PA-4]-[DMA-1] + [DMA-2] + ([PD-2] - [DMA-2])	DMA-1	0	0.61	0.57	-	0.57	0.57	-	0.57	0.57	-	0.57	0.57	-	0.57	0.57	-	0.57	0.57	-	-	6.39	
		PA-3	14,420	5.00	4.31	193	4.73	4.16	187	4.57	3.49	156	5.19	4.27	191	5.23	5.14	231	6.33	5.86	263	-		
		DMA-2	0	1.56	2.30	-	0.25	0.22	-	0.20	0.19	-	0.18	0.16	-	1.48	1.77	-	1.66	2.16	-	-	9.02	
		PD-2	8,069	3.76	2.89	231	3.22	2.73	219	3.22	2.46	197	3.75	2.89	232	3.60	3.39	272	4.68	4.07	326	-		
		Total	22,489	10.93	10.06	289	8.78	7.68	221	8.56	6.71	193	9.69	7.89	227	10.88	10.88	313	13.24	12.66	364	-	15.41	
Southgate	82.6%([P-1]+[PM-1]-[P-2]-[PA-2]-[PB-1]-[PD-1]-[PC-1]) + 38.9%[PB-1] + 37.5%([SW]+[SWB]) + 5.4%([P-1]+[PM-1]-[P-2]-[PA-2]-[PB-1]-[PD-1]-[PC-1])	P-1	11,079	3.55	2.41	141	4.19	2.11	123	4.45	1.96	114	4.21	2.61	152	3.17	2.83	165	4.09	3.37	197	-	3.65	
		PB-1	3,214	1.01	0.80	161	0.88	0.68	136	0.98	0.66	134	1.11	0.78	158	0.82	0.74	148	1.12	0.88	176	-	1.42	
		SW	15,003	8.87	5.95	256	7.62	5.23	225	7.16	5.19	224	9.20	5.55	239	7.35	5.46	235	9.24	5.03	217	11.88	-	
		TPS+IPS	718	0.23	0.16	141	0.27	0.14	123	0.29	0.13	114	0.27	0.17	152	0.21	0.18	165	0.26	0.22	197	-	0.06	
		Total	30,014	13.66	9.32	201	12.96	8.16	176	12.87	7.94	171	14.79	9.12	196	11.54	9.21	198	14.71	9.50	204	-	5.13	
Taylor	0.1%[P-2] + 99.8%([PA-2]+[ER-1]-[PA-3]-[ER-2]) + 61.1%[PB-1] + 22.3%([TB-1]+[TSO]) + 97.3%([PC-1]+[CPO]+[CHPO]-[TB-1]) + ([PD-1]-[PD-2])	P-2	10	0.00	0.00</td																			

5) PRECIPITATION DATA

Table 5-1 lists the monthly precipitation at the Detroit Metropolitan Wayne County Airport (DTW), the departure from normal, and the number of wet/dry days included for each month. Monthly precipitation data for the DSRS rain gauges is summarized on Table 5-2. Daily precipitation data for the DSRS rain gauges for each month in 2021 is summarized on Tables 5-3 through 5-14. Data for the rain gauge at DTW is included in these tables. The total precipitation for 2021 at DTW was 39.99 inches, which is 6.52 inches above normal.

Significant storm events are defined as those with at least 0.5 inches of rainfall occurring on a single day with an event total of at least 1.0 inch of rainfall. Significant storm events are separated by at least 2 consecutive days without precipitation over 0.1 inches. This storm event definition is based on the arithmetic mean of the rainfall recorded by all rain gauges used in the analysis for that storm. Major storm events are a subgroup of significant storm events which result in the peak hourly influent flow rate to the DWTF reaching or exceeding 175 MGD (271 cfs).

There were eleven (11) significant storm events in 2021. The events were designated as Significant Storm Events 1 through 11 for year 2021. There were five (5) major storm events in 2021. Significant Storm Events 3, 4, 6, 7 and 9 were also designated as Major Storm Events A, B, C, D and E for 2021. The precipitation data for the significant/major storm events are further summarized in Table 5-15 and Appendix B. None of these events equaled or exceeded the 25-year, 24-hour design storm rainfall total of 4.42 inches on which the DRSTS was based.

A quality assurance (QA) and quality control (QC) review of the DUWA rain gauge data was performed and involved a review of the maintenance logs and a comparison of the recorded precipitation to other nearby rain gauges. The maintenance logs identified rain gauge issues which were detected during site visits. In almost all cases these issues were resolved during the site visit. In general, when a rain gauge had an issue, it recorded zero precipitation. All rain gauge data with documented maintenance log issues were flagged.

Table 5-1
Dry/Wet Weather Count by Month and Monthly Precipitation at DTW for 2021

Month	Number of Dry Weather Days	Number of Wet Weather Days	Monthly Total Precipitation (in)	
			DTW¹	Departure From Normal²
January	22	9	1.03	-0.93
February	20	8	1.47	-0.55
March	19	12	2.13	-0.15
April	18	12	1.79	-1.11
May	22	9	2.23	-1.15
June	10	20	5.16	+1.64
July	5	26	4.95	+1.58
August	13	18	5.17	+2.17
September	15	15	5.43	+2.16
October	11	20	5.25	+2.73
November	13	17	1.91	-0.88
December	4	27	3.47	+1.01
Total	172	193	39.99	+6.52

Note:

- 1) Detroit Metropolitan Wayne County Airport (DTW)
- 2) Normal is a period mean computed by the National Climatic Data Center (NCDC) for a National Weather Service (NWS) observing station from a period comprising three consecutive 10-year decadal periods (for example, 1981-2010)

Table 5-2
Monthly Precipitation for 2021

Date	Monthly Precipitation (inches)											DTW Monthly Temperature (°F)		
	R-18	R-02	R-10	DTW	R-09	R-04	R-08	R-15	R-17	R-06	R-16	Max.	Min.	Avg.
January	1.02	0.00*	1.04	1.03	0.87	1.29	0.70	0.83	0.51	1.05	1.00	34	25	29
February	0.89	0.91	0.65	1.47	0.48	0.91	0.43	0.74	0.86	1.00	1.36	60	33	47
March	1.89	2.10	2.34*	2.13	1.87	2.81	1.88	2.19	2.03	2.12	2.07	55	31	43
April	2.01	2.12	2.23	1.79	1.10	2.54	1.94	1.82	2.19	2.29	2.08	61	40	51
May	1.74*	2.39	2.30	2.23	1.99*	2.34	2.39	1.39*	1.94	2.11	1.94	70	48	59
June	8.55	6.53	5.57*	5.16	5.33*	6.37	5.84	5.87	4.93	3.11*	5.42	82	64	73
July	4.33	3.73	5.00	4.95	5.38	5.44	6.00	6.25	5.90	6.05	6.00	83	65	74
August	3.77	3.80	4.99	5.17	7.05	4.92	6.06	5.47	5.51	4.55	5.17	85	67	76
September	4.57	5.23	4.82	5.43	4.93	5.66	5.53	5.27	5.13	5.02	5.75	77	57	67
October	5.42	5.56	5.28	5.25	3.83*	6.97	5.04	5.43	6.05	5.85	5.60	67	52	59
Novembert	1.61	1.76	1.94	1.91	0.25*	2.26	1.65	1.90	1.81	1.46	1.99	47	32	39
December	2.94	3.11	3.53	3.47	0.98*	3.76	3.21	3.42	3.16	3.27	3.26	44	30	37
Total	38.74*	37.24*	39.69*	39.99	34.06*	45.27	40.67	40.58*	40.02	37.88*	41.64	64	45	55

X.XX*

Missing or suspect data.

Table 5-3
Daily Precipitation for January 2021

Date	Daily Precipitation (inches)											DTW Daily Temperature (°F)		
	R-18	R-02	R-10	DTW	R-09	R-04	R-08	R-15	R-17	R-06	R-16	Max.	Min.	Avg.
1/1/2021	0.30	0*	0.35	0.30	0.32	0.51	0.18	0.33	0.04	0.49	0.43	33	22	28
1/2/2021	0.02	0*	0.03	0.03	0.01	0.03	0.09	0.03	0.05	0.04	0.04	35	32	34
1/3/2021	0.24	0*	0.21	0.16	0.14	0.16	0.15	0.15	0.15	0.13	0.13	35	32	34
1/4/2021	0	0*	0	0	0	0	0	0	0	0	0	34	31	33
1/5/2021	0	0*	0	0	0	0.01	0.01	0	0.01	0	0	34	30	32
1/6/2021	0	0*	0	0	0	0	0	0	0	0	0	39	33	36
1/7/2021	0	0*	0	0	0	0	0	0	0	0	0	36	30	33
1/8/2021	0	0*	0	0	0	0	0	0	0	0	0	34	27	31
1/9/2021	0	0*	0	0	0	0	0	0	0	0	0	43	21	32
1/10/2021	0	0*	0	0	0	0	0	0	0	0	0	37	21	29
1/11/2021	0	0*	0	0	0	0	0	0	0	0	0	31	25	28
1/12/2021	0	0*	0	0	0	0	0	0	0	0	0	32	26	29
1/13/2021	0	0*	0	0	0	0	0	0	0	0	0	45	29	37
1/14/2021	0.02	0*	0.01	0	0.01	0.01	0	0	0.01	0	0	43	34	39
1/15/2021	0.27	0*	0.20	0.17	0.16	0.17	0.14	0.14	0.16	0.16	0.16	41	27	34
1/16/2021	0	0*	0	0	0	0	0	0	0	0	0	32	27	30
1/17/2021	0.01	0*	0.03	0.01	0.01	0.01	0.04	0.01	0.03	0	0.02	37	32	35
1/18/2021	0	0*	0.01	0.01	0.01	0.01	0.01	0	0.02	0.01	0	35	30	33
1/19/2021	0	0*	0	0.03	0.01	0.02	0	0	0.01	0.01	0.01	34	27	31
1/20/2021	0	0*	0.01	0.02	0.02	0.03	0	0.01	0	0.02	0.02	28	17	23
1/21/2021	0	0*	0	0	0	0	0	0	0	0	0	43	27	35
1/22/2021	0	0*	0	0	0	0	0	0	0	0	0	36	18	27
1/23/2021	0	0*	0	0	0	0	0	0	0	0	0	30	14	22
1/24/2021	0	0*	0.01	0.02	0.01	0	0	0.01	0	0.01	0.02	28	20	24
1/25/2021	0	0*	0	0	0	0	0.01	0	0.01	0	0	31	20	26
1/26/2021	0.13	0*	0.17	0.20	0.14	0.23	0.06	0.14	0.01	0.14	0.14	33	26	30
1/27/2021	0	0*	0	0	0	0	0	0	0	0	0	29	16	23
1/28/2021	0	0*	0	0	0	0	0	0	0	0	0	23	17	20
1/29/2021	0	0*	0	0	0	0	0.01	0	0.01	0	0	28	11	20
1/30/2021	0	0*	0	0	0	0	0	0	0	0	0	29	12	21
1/31/2021	0.03	0*	0.01	0.08	0.03	0.10	0	0.01	0	0.04	0.03	31	26	29
Total	1.02	0.00*	1.04	1.03	0.87	1.29	0.70	0.83	0.51	1.05	1.00	34	25	29

X.XX* Missing or suspect data.

Table 5-4
Daily Precipitation for February 2021

Date	Daily Precipitation (inches)												DTW Daily Temperature (°F)		
	R-18	R-02	R-10	DTW	R-09	R-04	R-08	R-15	R-17	R-06	R-16	Max.	Min.	Avg.	
2/1/2021	0	0*	0	0.01	0	0	0	0	0	0	0	32	25	29	
2/2/2021	0	0*	0	0	0	0	0.02	0	0	0	0	34	21	28	
2/3/2021	0	0*	0	0	0	0	0	0	0.01	0	0	39	17	28	
2/4/2021	0.31	0.19	0.01	0.34	0.26	0.30	0	0	0	0.42	0.38	34	18	26	
2/5/2021	0	0	0	0	0	0	0.01	0	0.03	0.01	0	35	15	25	
2/6/2021	0	0	0	0	0	0	0	0	0	0	0	19	11	15	
2/7/2021	0	0.01	0	0.03	0.01	0	0	0	0	0	0	16	7	12	
2/8/2021	0.02	0.01	0.12	0.05	0	0.02	0	0.09	0.14	0.01	0.03	17	5	11	
2/9/2021	0	0.01	0	0	0	0	0.12	0.30*	0.11	0	0	24	10	17	
2/10/2021	0.01	0.03	0.02	0.02	0.02	0.03	0	0.01	0	0.12	0.04	19	4	12	
2/11/2021	0	0	0	0	0	0	0	0	0.03	0	0	25	10	18	
2/12/2021	0	0	0	0.01	0	0	0	0	0.01	0	0	26	16	21	
2/13/2021	0.02	0.02	0.02	0.05	0.02	0.03	0	0.02	0.05	0.02	0.03	22	17	20	
2/14/2021	0	0	0	0	0	0	0.03	0	0	0	0	26	8	17	
2/15/2021	0.11	0.24	0.09	0.38	0.04	0.12	0	0.07	0.11	0.11	0.15	17	12	15	
2/16/2021	0.12	0.15	0.07	0.25	0.02	0.11	0	0.02	0.08	0.04	0.42	19	4	12	
2/17/2021	0	0	0	0	0	0	0.02	0	0	0	0	22	-5	9	
2/18/2021	0.02	0.02	0.03	0.05	0.02	0.05	0.02	0.02	0.05	0.04	0.04	25	15	20	
2/19/2021	0	0	0	0	0	0	0.04	0	0	0	0	26	15	21	
2/20/2021	0	0	0	0.02	0	0	0.01	0	0	0	0.02	30	10	20	
2/21/2021	0.02	0	0	0.01	0	0	0	0	0	0	0	33	1	17	
2/22/2021	0.10	0.05	0.12	0.09	0.02	0.06	0.02	0.07	0.09	0.09	0.11	37	29	33	
2/23/2021	0	0	0	0	0	0	0	0	0	0	0	47	33	40	
2/24/2021	0	0	0	0	0	0	0	0	0	0	0	53	31	42	
2/25/2021	0	0	0	0	0	0	0	0	0	0	0	42	23	33	
2/26/2021	0	0	0	0	0	0	0	0	0	0	0	41	19	30	
2/27/2021	0.12	0.12	0.14	0.11	0.04	0.10	0.10	0.10	0.09	0.08	0.09	51	32	42	
2/28/2021	0.04	0.06	0.03	0.05	0.03	0.09	0.04	0.04	0.06	0.06	0.05	60	33	47	
Total	0.89	0.91	0.65	1.47	0.48	0.91	0.43	0.74	0.86	1.00	1.36	31	16	23	

X.XX*

Missing or suspect data.

Table 5-5
Daily Precipitation for March 2021

Date	Daily Precipitation (inches)												DTW Daily Temperature (°F)		
	R-18	R-02	R-10	DTW	R-09	R-04	R-08	R-15	R-17	R-06	R-16	Max.	Min.	Avg.	
3/1/2021	0	0	0	0	0	0	0	0	0	0	0	41	21	31	
3/2/2021	0	0	0	0	0	0	0.04	0.12	0	0	0	38	16	27	
3/3/2021	0	0	0	0	0	0	0	0	0	0	0	57	30	44	
3/4/2021	0	0	0	0	0	0.01	0	0	0	0	0	36	24	30	
3/5/2021	0	0	0	0	0	0	0	0	0	0	0	42	20	31	
3/6/2021	0	0	0	0	0	0	0	0	0	0	0	41	23	32	
3/7/2021	0	0	0	0	0	0	0	0	0	0	0	41	20	31	
3/8/2021	0	0	0	0	0	0	0	0	0	0	0	65	27	46	
3/9/2021	0	0	0	0	0	0	0	0	0	0	0	57	37	47	
3/10/2021	0	0	0	0	0	0	0	0	0	0	0	70	34	52	
3/11/2021	0	0	0	0	0	0	0	0	0	0	0	70	43	57	
3/12/2021	0	0	0	0	0	0	0	0	0	0	0	58	34	46	
3/13/2021	0	0	0	0	0	0	0	0	0	0	0	53	24	39	
3/14/2021	0	0	0	0	0	0	0	0	0	0	0	50	27	39	
3/15/2021	0	0	0	0	0	0.59	0	0	0	0	0	37	24	31	
3/16/2021	0	0	0	0	0	0	0	0	0	0	0	55	32	44	
3/17/2021	0	0	0*	0	0	0	0	0	0	0	0	57	31	44	
3/18/2021	0.03	0.07	0*	0.03	0.04	0.09	0.05	0.02	0.07	0.09	0.04	43	32	38	
3/19/2021	0	0	0*	0	0	0	0	0	0	0	0	47	27	37	
3/20/2021	0	0	0*	0	0	0	0	0	0	0	0	54	22	38	
3/21/2021	0	0	0*	0	0	0	0	0	0	0	0	63	27	45	
3/22/2021	0	0	0*	0	0	0	0	0	0	0	0	71	34	53	
3/23/2021	0	0	0*	0	0	0	0	0	0	0	0	67	46	57	
3/24/2021	0	0	0	0	0	0	0	0	0	0	0.01	72	52	62	
3/25/2021	0.27	0.35	0.33	0.29	0.30	0.46	0.31	0.33	0.45	0.40	0.37	66	44	55	
3/26/2021	0.64	0.82	0.98	0.90	0.71	0.89	0.72	0.81	0.82	0.93	0.90	58	38	48	
3/27/2021	0.61	0.45	0.59	0.50	0.38	0.23	0.34	0.42	0.23	0.17	0.24	58	38	48	
3/28/2021	0.32	0.38	0.42	0.41	0.41	0.49	0.40	0.46	0.44	0.50	0.48	51	36	44	
3/29/2021	0	0	0	0	0	0	0	0	0	0	0	51	29	40	
3/30/2021	0.01	0.01	0	0	0.01	0.01	0.01	0.01	0	0	0.01	70	41	56	
3/31/2021	0.01	0.02	0.02	0	0.02	0.04	0.01	0.02	0.02	0.03	0.02	56	34	45	
Total	1.89	2.10	2.34*	2.13	1.87	2.81	1.88	2.19	2.03	2.12	2.07	55	31	43	

X.XX* Missing or suspect data.

Table 5-6
Daily Precipitation for April 2021

Date	Daily Precipitation (inches)											DTW Daily Temperature (°F)		
	R-18	R-02	R-10	DTW	R-09	R-04	R-08	R-15	R-17	R-06	R-16	Max.	Min.	Avg.
4/1/2021	0	0	0	0	0	0	0	0	0	0	0	37	25	31
4/2/2021	0	0	0	0	0	0	0	0	0	0	0	47	21	34
4/3/2021	0	0	0	0	0	0	0	0	0	0	0	64	29	47
4/4/2021	0	0	0	0	0	0	0	0	0	0	0	68	38	53
4/5/2021	0.20	0.03	0.18	0.15	0.07	0.15	0.13	0.13	0.12	0.11	0.10	59	45	52
4/6/2021	0	0	0	0	0	0	0	0	0	0	0	78	43	61
4/7/2021	0	0	0	0	0	0	0	0	0	0	0	81	53	67
4/8/2021	0.40	0.45	0.52	0.27	0.27	0.59	0.42	0.52	0.57	0.50	0.41	77	53	65
4/9/2021	0.05	0.01	0.02	0.01	0.02	0.02	0.02	0.02	0.03	0.06	0.04	73	53	63
4/10/2021	0.73	0.62	0.54	0.50	0.22	0.49	0.35	0.33	0.35	0.41	0.36	73	50	62
4/11/2021	0.10	0.22	0.26	0.16	0.02	0.16	0.18	0.18	0.18	0.18	0.18	59	50	55
4/12/2021	0	0	0	0	0	0	0.01	0.02	0.01	0	0.04	63	48	56
4/13/2021	0	0	0	0	0	0	0	0	0	0	0	65	42	54
4/14/2021	0	0	0	0	0	0	0	0	0	0	0	58	38	48
4/15/2021	0.03	0.02	0.01	0.07	0.07	0.10	0.10	0.03	0.11	0.09	0.05	49	35	42
4/16/2021	0	0	0	0	0	0	0	0	0	0	0	55	39	47
4/17/2021	0	0	0	0	0	0	0	0	0	0	0	59	38	49
4/18/2021	0	0	0	0	0	0	0	0	0	0	0	62	42	52
4/19/2021	0	0.03	0.01	0.01	0.03	0.04	0.02	0.02	0.02	0.03	0.03	65	41	53
4/20/2021	0.20	0.41	0.37	0.34	0.16	0.49	0.14	0.26	0.41	0.45	0.43	41	32	37
4/21/2021	0.01	0	0.02	0.01	0.02	0.01	0.24	0.01	0.02	0.06	0.05	44	29	37
4/22/2021	0	0	0	0	0	0	0	0	0	0	0	50	27	39
4/23/2021	0	0	0	0	0	0	0	0	0	0	0	63	32	48
4/24/2021	0.03	0.03	0.03	0.03	0.04	0.05	0.03	0.05	0.04	0.04	0.05	58	40	49
4/25/2021	0	0	0	0	0	0	0	0	0	0	0	55	36	46
4/26/2021	0	0	0	0	0	0	0	0	0	0	0	56	35	46
4/27/2021	0	0	0	0	0	0	0	0	0	0	0	83	45	64
4/28/2021	0.02	0.01	0.01	0.02	0.02	0.06	0.02	0.02	0.03	0.03	0.02	80	55	68
4/29/2021	0.23	0.28	0.25	0.22	0.16	0.37	0.27	0.22	0.28	0.32	0.30	55	47	51
4/30/2021	0.01	0.01	0.01	0	0	0.01	0.01	0.01	0.02	0.01	0.02	57	41	49
Total	2.01	2.12	2.23	1.79	1.10	2.54	1.94	1.82	2.19	2.29	2.08	61	40	51

Legend

* Missing or suspect data

Table 5-7
Daily Precipitation for May 2021

Date	Daily Precipitation (inches)												DTW Daily Temperature (°F)		
	R-18	R-02	R-10	DTW	R-09	R-04	R-08	R-15	R-17	R-06	R-16	Max.	Min.	Avg.	
5/1/2021	0	0	0	0	0	0	0	0	0	0	0	67	32	50	
5/2/2021	0	0	0	0	0	0	0	0	0	0	0	83	62	73	
5/3/2021	0.32	0.26	0.29	0.22	0.23	0.24	0.17	0.21	0.20	0.22	0.20	68	56	62	
5/4/2021	0.08	0.05	0.09	0.06	0.08	0.06	0.07	0.08	0.03	0.07	0.03	64	53	59	
5/5/2021	0	0	0	0	0	0	0	0	0	0	0	56	42	49	
5/6/2021	0.13	0.14	0.08	0.09	0	0.12	0.05	0.07	0.08	0.10	0.06	56	40	48	
5/7/2021	0.24	0.08	0.23	0.33	0.69	0.21	0.75	0.39	0.17	0.26	0.36	57	39	48	
5/8/2021	0	0	0	0	0.01	0	0	0	0	0.01	0.02	58	39	49	
5/9/2021	0.26	0.29	0.24	0.24	0.25	0.30	0.20	0.22	0.25	0.26	0.23	48	39	44	
5/10/2021	0	0.01	0	0	0	0	0	0	0	0	0	57	36	47	
5/11/2021	0	0	0	0	0	0	0	0	0	0	0	56	36	46	
5/12/2021	0	0	0	0	0	0	0	0	0	0	0	65	39	52	
5/13/2021	0	0	0	0	0	0	0	0	0	0	0	69	40	55	
5/14/2021	0	0	0	0	0	0	0	0	0	0	0	71	42	57	
5/15/2021	0	0	0	0	0	0	0	0	0	0	0	73	46	60	
5/16/2021	0.09	0.12	0.06	0.05	0.05	0.04	0.04	0.04	0.03	0.02	0.04	70	52	61	
5/17/2021	0	0	0	0	0	0	0	0	0	0	0	74	50	62	
5/18/2021	0	0	0	0	0	0	0	0	0	0	0	77	50	64	
5/19/2021	0	0	0	0	0	0	0	0	0	0	0	82	55	69	
5/20/2021	0	0	0	0	0	0	0	0	0	0	0	86	61	74	
5/21/2021	0	0	0	0	0	0	0	0	0	0	0	88	63	76	
5/22/2021	0	0	0	0	0	0	0	0	0	0	0	86	65	76	
5/23/2021	0.38	0.42	0.33	0.30	0.38	0.40	0.29	0.16	0.25	0.27	0.13	87	57	72	
5/24/2021	0	0	0	0	0	0	0	0	0	0	0	78	56	67	
5/25/2021	0	0	0	0	0	0	0	0	0	0	0	88	65	77	
5/26/2021	0.24	0.28	0.23	0.25	0.30	0.20	0.21	0.22	0.21	0.22	0.21	76	56	66	
5/27/2021	0	0	0	0	0	0	0	0	0	0	0	67	48	58	
5/28/2021	0*	0.74	0.75	0.69	0*	0.77	0.61	0*	0.72	0.68	0.66	50	44	47	
5/29/2021	0*	0	0	0	0*	0	0	0*	0	0	0	63	41	52	
5/30/2021	0	0	0	0	0*	0	0	0*	0	0	0	70	41	56	
5/31/2021	0	0	0	0	0	0	0	0*	0	0	0	74	48	61	
Total	1.74*	2.39	2.30	2.23	1.99*	2.34	2.39	1.39*	1.94	2.11	1.94	70	48	59	

* Missing or suspect data

Table 5-8
Daily Precipitation for June 2021

Date	Daily Precipitation (inches)												DTW Daily Temperature (°F)		
	R-18	R-02	R-10	DTW	R-09	R-04	R-08	R-15	R-17	R-06	R-16	Max.	Min.	Avg.	
6/1/2021	0	0	0	0	0	0	0	0	0	0	0	75	55	65	
6/2/2021	0.49	0.52	0*	0.53	0.62	0.73	0.58	0.57	0.65	0.71	0.66	67	58	63	
6/3/2021	0	0	0*	0	0	0	0	0	0	0	0.01	79	61	70	
6/4/2021	0	0	0	0	0	0	0	0	0	0	0	87	63	75	
6/5/2021	0	0	0	0	0	0	0	0	0	0	0	87	66	77	
6/6/2021	0	0	0	0	0	0	0	0	0	0	0	89	65	77	
6/7/2021	0	0	0.08	0.01	0	0	0	0	0	0	0	84	70	77	
6/8/2021	1.22	1.11	0.54	0.37	1.10	0.02	0.77	1.31	0.02	0.01	0.03	86	70	78	
6/9/2021	0	0	0	0	0	0	0	0.01	0	0.21	0.21	85	68	77	
6/10/2021	0	0	0	0	0	0	0	0	0	0	0	87	69	78	
6/11/2021	0.25	0.13	0.05	0.03	0.02	0	0.02	0.03	0	0	0	88	68	78	
6/12/2021	0	0	0	0	0	0	0	0.01	0	0	0	84	66	75	
6/13/2021	0.47	0.75	0	0	0	0.31	0	0	0	0	0	84	68	76	
6/14/2021	0.01	0	0.01	0.03	0.16	0.29	0.10	0.07	0.04	0.03	0.12	80	61	71	
6/15/2021	0	0	0	0	0	0	0	0	0	0	0	77	58	68	
6/16/2021	0	0	0	0	0	0	0	0	0	0	0	77	51	64	
6/17/2021	0	0	0	0	0	0	0	0	0	0	0	85	54	70	
6/18/2021	0.49	0.50	0.52	0.51	0.55	0.52	0.53	0.48	0.50	0.47	0.50	82	63	73	
6/19/2021	0.07	0.11	0.06	0.04	0	0	0	0.11	0	0	0.02	77	66	72	
6/20/2021	1.08	0.80	0.88	0.70	0*	0.70	0.39	0.55	0.36	0.97	0.45	86	64	75	
6/21/2021	0.55	0.41	0.49	0.42	0*	0.55	0.55	0.51	0.44	0.45	0.51	80	53	67	
6/22/2021	0	0	0	0	0*	0	0	0	0	0	0	69	45	57	
6/23/2021	0	0	0	0	0*	0	0	0	0	0	0	74	51	63	
6/24/2021	0	0	0	0	0	0	0	0	0	0	0	82	63	73	
6/25/2021	1.86	1.20	1.85	1.98	1.83	1.90	1.47	1.51	1.52	0*	1.40	74	70	72	
6/26/2021	0.54	0.37	0.51	0.39	0.42	0.34	0.48	0.48	0.24	0*	0.44	84	73	79	
6/27/2021	0	0.01	0	0	0	0	0	0	0	0*	0	88	76	82	
6/28/2021	0.64	0.37	0.34	0.13	0.43	0.25	0.46	0.18	0.53	0.10*	0.44	90	73	82	
6/29/2021	0.86	0.08	0.22	0	0.04	0.60	0.45	0.03	0.46	0.03	0.58	90	72	81	
6/30/2021	0.02	0.17	0.02	0.02	0.16	0.16	0.04	0.02	0.17	0.13	0.05	81	72	77	
Total	8.55	6.53	5.57*	5.16	5.33*	6.37	5.84	5.87	4.93	3.11*	5.42	82	64	73	

Legend

* Missing or suspect data

Table 5-9
Daily Precipitation for July 2021

Date	Daily Precipitation (inches)												DTW Daily Temperature (°F)		
	R-18	R-02	R-10	DTW	R-09	R-04	R-08	R-15	R-17	R-06	R-16	Max.	Min.	Avg.	
7/1/2021	0	0.04	0	0	0	0	0.11	0	0.25	0.13	0.04	81	60	71	
7/2/2021	0	0	0	0	0	0	0	0	0	0	0	77	56	67	
7/3/2021	0	0.01	0	0	0	0	0	0	0	0	0	81	57	69	
7/4/2021	0	0	0	0	0	0	0	0	0	0	0	90	66	78	
7/5/2021	0	0	0	0	0	0	0	0	0	0	0	91	70	81	
7/6/2021	0	0.03	0.42	0.16	0.42	0.32	0.25	0.01	0.17	0.22	0	92	75	84	
7/7/2021	0.04	0.16	0.03	0.02	0.01	0.01	0	0.01	0.03	0	0.02	88	71	80	
7/8/2021	0.06	0.13	0.21	0.28	0.61	0.96	0.65	0.29	0.79	0.62	0.86	79	67	73	
7/9/2021	0	0	0	0	0	0	0	0	0	0	0.01	77	61	69	
7/10/2021	0	0	0	0	0	0	0	0	0	0	0	77	58	68	
7/11/2021	0.36	0.48	0.41	0.42	0.48	0.62	0.47	0.47	0.51	0.55	0.47	68	65	67	
7/12/2021	0.02	0.04	0	0.01	0.04	0.04	0.03	0.03	0.04	0.10	0.01	74	65	70	
7/13/2021	0.32	0.36	0.35	0.31	0.27	0.34	0.22	0.16	0.25	0.18	0.17	82	68	75	
7/14/2021	0.11	0.01	0.15	0	0.17	0	0.01	0	0.02	0	0	85	67	76	
7/15/2021	0	0.39	0	0.01	0.41	0.01	0.21	0	0.21	0.61	0.24	86	70	78	
7/16/2021	2.71	1.57	2.18	2.20	1.73	1.53	1.78	2.87	1.79	1.48	1.80	74	66	70	
7/17/2021	0.12	0.17	0.17	0.17	0.23	0.32	0.23	0.21	0.29	0.31	0.30	83	65	74	
7/18/2021	0	0	0	0	0	0	0	0	0	0	0	87	62	75	
7/19/2021	0	0	0	0	0	0	0	0	0	0	0	86	67	77	
7/20/2021	0.31	0.03	0.21	0.10	0.04	0.05	0.13	0.26	0	0.02	0.05	89	68	79	
7/21/2021	0	0	0	0	0	0	0	0	0	0	0	78	63	71	
7/22/2021	0	0	0	0	0	0	0	0	0	0	0	79	58	69	
7/23/2021	0.03	0.04	0.08	0.16	0.11	0.03	0.11	0.19	0.09	0.06	0.23	76	64	70	
7/24/2021	0.25	0.27	0.78	1.10	0.84	1.21	1.79	1.74	1.42	1.75	1.79	86	69	78	
7/25/2021	0	0	0.01	0	0.01	0	0.01	0	0	0	0.01	88	69	79	
7/26/2021	0	0	0	0	0	0	0	0	0	0	0	90	66	78	
7/27/2021	0	0	0	0	0	0	0	0	0	0	0	88	68	78	
7/28/2021	0	0	0	0	0	0	0	0	0	0	0	90	69	80	
7/29/2021	0	0	0	0.01	0.01	0	0	0.01	0.04	0.02	0	87	71	79	
7/30/2021	0	0	0	0	0	0	0	0	0	0	0	78	62	70	
7/31/2021	0	0	0	0	0	0	0	0	0	0	0	79	58	69	
Total	4.33	3.73	5.00	4.95	5.38	5.44	6.00	6.25	5.90	6.05	6.00	83	65	74	

Legend

* Missing or suspect data

Table 5-10
Daily Precipitation for August 2021

Date	Daily Precipitation (inches)												DTW Daily Temperature (°F)		
	R-18	R-02	R-10	DTW	R-09	R-04	R-08	R-15	R-17	R-06	R-16	Max.	Min.	Avg.	
8/1/2021	0.04	0.04	0.05	0.05	0.06	0.07	0.10	0.06	0.07	0.05	0.04	77	62	70	
8/2/2021	0	0	0	0	0	0	0	0	0	0	0	78	55	67	
8/3/2021	0	0	0	0	0	0	0	0	0	0	0	80	60	70	
8/4/2021	0	0	0	0	0	0	0	0	0	0	0	83	60	72	
8/5/2021	0	0	0	0	0	0	0	0	0	0	0	84	63	74	
8/6/2021	0.08	0	0.01	0	0	0	0	0	0	0	0	84	64	74	
8/7/2021	0	0.01	0	0	0	0	0	0	0	0	0	82	67	75	
8/8/2021	0	0.01	0	0	0	0	0	0	0	0	0	88	68	78	
8/9/2021	0.47	0.51	0.86	0.70	1.13	0.66	0.79	1.05	0.50	0.37	0.46	87	71	79	
8/10/2021	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.02	0.01	0.01	0.01	90	72	81	
8/11/2021	0.50	0.40	0.43	0.41	0.38	0.39	0.35	0.46	0.34	0.36	0.33	87	71	79	
8/12/2021	2.19	1.51	2.42	2.73	2.37	1.94	2.16	2.02	2.43	1.93	2.04	87	68	78	
8/13/2021	0	0	0	0	0	0.10	0	0	0	0.04	0	83	67	75	
8/14/2021	0	0	0	0	0	0	0	0	0	0	0	79	61	70	
8/15/2021	0	0	0	0	0	0	0	0	0	0	0	77	57	67	
8/16/2021	0	0.02	0.01	0.02	0.05	0.04	0.05	0.05	0.05	0.03	0.02	75	61	68	
8/17/2021	0	0	0	0	0	0	0	0	0	0	0	82	62	72	
8/18/2021	0	0	0	0	0	0	0	0	0	0	0	83	69	76	
8/19/2021	0	0.01	0	0	0	0	0.01	0.01	0	0	0	86	68	77	
8/20/2021	0	0	0	0	0	0	0	0	0	0	0	87	68	78	
8/21/2021	0	0	0	0	0	0	0	0	0	0	0	87	69	78	
8/22/2021	0.07	0	0	0	0	0	0	0	0	0	0	91	70	81	
8/23/2021	0	0	0	0	0	0	0	0	0	0	0	86	72	79	
8/24/2021	0.10	0.35	0.38	0.42	1.10	0.75	1.13	0.74	1.13	0.88	1.29	91	68	80	
8/25/2021	0.01	0.03	0.01	0	0.15	0.18	0.09	0.14	0.13	0.13	0.08	88	72	80	
8/26/2021	0	0	0	0	0	0	0	0	0	0	0	91	74	83	
8/27/2021	0	0.56	0.33	0.22	1.34	0.28	1.14	0.40	0.25	0.08	0.19	85	72	79	
8/28/2021	0	0.01	0	0	0	0	0	0	0	0	0	91	73	82	
8/29/2021	0.30	0.33	0.48	0.60	0.46	0.50	0.23	0.51	0.60	0.67	0.71	92	70	81	
8/30/2021	0	0	0	0	0	0	0	0.01	0	0	0	85	69	77	
8/31/2021	0	0	0	0	0	0	0	0	0	0	0	82	63	73	
Total	3.77	3.80	4.99	5.17	7.05	4.92	6.06	5.47	5.51	4.55	5.17	85	67	76	

Legend

* Missing or suspect data

Table 5-11
Daily Precipitation for September 2021

Date	Daily Precipitation (inches)												DTW Daily Temperature (°F)		
	R-18	R-02	R-10	DTW	R-09	R-04	R-08	R-15	R-17	R-06	R-16	Max.	Min.	Avg.	
9/1/2021	0	0	0	0	0	0	0	0	0	0	0	78	61	70	
9/2/2021	0	0	0	0	0	0	0	0	0	0	0	78	56	67	
9/3/2021	0	0	0	0	0	0	0	0	0	0	0	75	55	65	
9/4/2021	0	0.01	0.01	0.02	0.02	0.04	0.05	0.02	0.02	0.03	0.07	78	63	71	
9/5/2021	0.03	0	0.02	0	0.02	0.01	0	0	0.07	0.01	0	81	62	72	
9/6/2021	0.04	0.09	0.16	0.13	0.10	0.13	0.06	0.05	0.08	0.09	0.07	77	59	68	
9/7/2021	0.38	0.67	0.32	0.32	0.46	0.39	0.62	0.34	0.38	0.27	0.44	87	55	71	
9/8/2021	0.01	0.17	0.01	0.02	0.10	0.04	0.30	0.03	0.15	0.05	0.36	79	61	70	
9/9/2021	0	0	0.03	0	0	0	0	0	0	0	0	73	54	64	
9/10/2021	0	0	0	0	0	0	0	0	0	0	0	76	52	64	
9/11/2021	0	0	0	0	0	0	0	0	0	0	0	82	57	70	
9/12/2021	0	0	0	0	0	0	0	0	0	0	0	84	69	77	
9/13/2021	0	0	0	0	0	0	0	0	0	0	0	72	66	69	
9/14/2021	0.28	0.15	0.23	0.29	0.17	0.31	0.18	0.43	0.21	0.29	0.24	89	65	77	
9/15/2021	0	0	0	0	0	0	0	0	0	0	0	76	62	69	
9/16/2021	0	0	0	0	0	0	0	0	0	0	0	77	57	67	
9/17/2021	0	0	0	0	0	0	0	0	0	0	0	85	60	73	
9/18/2021	0	0	0	0	0	0	0	0	0	0	0	80	60	70	
9/19/2021	0	0	0	0	0	0	0	0	0	0	0	81	55	68	
9/20/2021	0	0	0	0.01	0.07	0.34	0.15	0.11	0.24	0.02	0.04	81	65	73	
9/21/2021	0.98	1.13	1.10	1.61	1.09	1.20	1.17	1.18	1.11	1.55	1.94	77	60	69	
9/22/2021	2.10	2.30	2.18	2.23	2.16	2.50	2.43	2.49	2.39	2.27	2.10	60	53	57	
9/23/2021	0.53	0.51	0.57	0.62	0.57	0.60	0.46	0.50	0.40	0.37	0.42	53	50	52	
9/24/2021	0	0	0	0	0	0	0	0	0	0	0	73	48	61	
9/25/2021	0.22	0.20	0.19	0.18	0.17	0.10	0.11	0.12	0.08	0.07	0.07	66	49	58	
9/26/2021	0	0	0	0	0	0	0	0	0	0	0	77	47	62	
9/27/2021	0	0	0	0	0	0	0	0	0	0	0	82	62	72	
9/28/2021	0	0	0	0	0	0	0	0	0	0	0	72	54	63	
9/29/2021	0	0	0	0	0	0	0	0	0	0	0	74	51	63	
9/30/2021	0	0	0	0	0	0	0	0	0	0	0	73	50	62	
Total	4.57	5.23	4.82	5.43	4.93	5.66	5.53	5.27	5.13	5.02	5.75	77	57	67	

Legend

* Missing or suspect data

Table 5-12
Daily Precipitation for October 2021

Date	Daily Precipitation (inches)											DTW Daily Temperature (°F)		
	R-18	R-02	R-10	DTW	R-09	R-04	R-08	R-15	R-17	R-06	R-16	Max.	Min.	Avg.
10/1/2021	0	0	0	0	0	0	0	0	0	0	0	74	50	62
10/2/2021	0.13	0.07	0.09	0.08	0.07	0.08	0.06	0.09	0.06	0.06	0.06	77	52	65
10/3/2021	0.24	0.36	0.22	0.26	0.52	1.12	0.68	0.36	0.86	0.89	0.93	77	66	72
10/4/2021	0.03	0.18	0.03	0	0.02	0.02	0.01	0.29	0	0	0.01	74	64	69
10/5/2021	0.05	0.01	0	0	0	0	0	0.02	0	0	0	70	63	67
10/6/2021	0	0	0	0	0	0	0	0	0	0	0	68	60	64
10/7/2021	0.10	0.05	0.05	0.05	0.07	0.07	0.07	0.05	0.06	0.05	0.05	74	64	69
10/8/2021	0.41	0.33	0.23	0.36	0.24	0.44	0.08	0.18	0.23	0.21	0.26	76	65	71
10/9/2021	0.01	0.01	0.01	0	0.01	0	0	0	0	0.01	0	77	59	68
10/10/2021	0.05	0.09	0.05	0.06	0.08	0.04	0*	0.09	0.07	0.03	0.18	78	65	72
10/11/2021	0	0	0	0	0	0	0*	0	0	0	0	80	65	73
10/12/2021	0	0	0	0	0	0	0	0	0	0.01	0	73	64	69
10/13/2021	0	0	0	0	0	0	0	0	0	0	0	74	61	68
10/14/2021	0.23	0.18	0.28	0.24	0*	0.30	0.14	0.14	0.26	0.26	0.25	81	62	72
10/15/2021	0.32	0.51	0.35	0.37	0*	0.73	0.49	0.39	0.66	0.77	0.53	63	56	60
10/16/2021	0.25	0.26	0.29	0.27	0	0.26	0.26	0.29	0.25	0.24	0.26	60	48	54
10/17/2021	0	0	0	0	0	0	0	0	0	0	0	64	45	55
10/18/2021	0	0	0	0	0	0	0	0	0	0	0	67	43	55
10/19/2021	0	0	0	0	0	0	0	0	0	0	0	74	43	59
10/20/2021	0	0	0.02	0.02	0.01	0.01	0.01	0.02	0.01	0	0.02	72	47	60
10/21/2021	0.26	0.19	0.34	0.30	0.30	0.17	0.19	0.24	0.15	0.17	0.20	67	48	58
10/22/2021	0	0	0	0	0	0	0	0	0	0	0	51	39	45
10/23/2021	0	0	0	0	0	0.01	0	0	0	0.01	0	56	40	48
10/24/2021	1.01	0.97	0.99	0.96	0.86	1.02	0.87	0.88	1.04	0.81	0.85	51	36	44
10/25/2021	1.22	1.08	1.24	1.16	1.19	1.13	1.15	1.33	1.21	1.13	0.99	50	45	48
10/26/2021	0	0	0	0.01	0.01	0.03	0.03	0.02	0.02	0	0	51	40	46
10/27/2021	0	0	0	0	0	0	0	0	0	0	0	53	43	48
10/28/2021	0.06	0.03	0.03	0.01	0.02	0.01	0.01	0.04	0.01	0.02	0.02	63	49	56
10/29/2021	1.00	1.21	1.03	1.06	0.43*	1.47	0.95	0.98	1.14	1.14	0.96	57	50	54
10/30/2021	0.03	0.03	0.03	0.04	0*	0.05	0.03	0.02	0.02	0.04	0.02	53	48	51
10/31/2021	0.02	0	0	0	0*	0.01	0.01	0	0	0	0.01	59	41	50
Total	5.42	5.56	5.28	5.25	3.83*	6.97	5.04	5.43	6.05	5.85	5.60	67	52	59

Legend

* Missing or suspect data

Table 5-13
Daily Precipitation for November 2021

Date	Daily Precipitation (inches)												DTW Daily Temperature (°F)		
	R-18	R-02	R-10	DTW	R-09	R-04	R-08	R-15	R-17	R-06	R-16	Max.	Min.	Avg.	
11/1/2021	0	0	0	0	0*	0	0	0	0	0	0	51	36	44	
11/2/2021	0	0	0	0	0	0	0	0	0	0	0	48	34	41	
11/3/2021	0	0	0	0	0	0	0	0	0	0	0	46	29	38	
11/4/2021	0	0	0	0	0	0	0	0	0	0	0	46	30	38	
11/5/2021	0	0	0	0	0	0	0	0	0	0	0	50	27	39	
11/6/2021	0	0	0	0	0	0	0.01	0	0	0	0	54	28	41	
11/7/2021	0	0	0	0	0	0	0	0	0	0	0	64	34	49	
11/8/2021	0	0	0	0	0	0	0	0	0	0	0	66	39	53	
11/9/2021	0	0	0.01	0.01	0	0	0	0.01	0	0	0	59	43	51	
11/10/2021	0	0	0	0	0	0	0	0	0	0.01	0	56	36	46	
11/11/2021	0.17	0.26	0.33	0.33	0.25	0.48	0.37	0.43	0.41	0*	0.43	67	45	56	
11/12/2021	0	0	0	0	0	0	0	0	0	0*	0	53	35	44	
11/13/2021	0.01	0	0.01	0.01	0	0.02	0	0	0	0*	0	42	34	38	
11/14/2021	0.23	0.22	0.28	0.19	0*	0.25	0.11	0.18	0.16	0*	0.21	38	33	36	
11/15/2021	0	0	0	0	0	0.01	0	0	0	0.04	0	40	32	36	
11/16/2021	0	0	0	0	0	0	0	0	0	0	0	44	26	35	
11/17/2021	0.11	0.13	0.11	0.12	0*	0.12	0.13	0.14	0.08	0.10	0.11	63	41	52	
11/18/2021	0	0.01	0	0	0	0.01	0.01	0.01	0	0	0	46	32	39	
11/19/2021	0	0	0	0.01	0	0	0	0	0	0	0	44	31	38	
11/20/2021	0	0	0	0	0	0	0	0	0	0	0	40	31	36	
11/21/2021	0.15	0.18	0.19	0.18	0*	0.18	0.13	0.17	0.12	0.14	0.13	44	30	37	
11/22/2021	0	0	0	0	0	0	0	0	0	0	0	38	26	32	
11/23/2021	0	0	0	0	0	0	0	0	0	0	0	38	22	30	
11/24/2021	0.01	0	0.02	0.02	0	0.01	0.02	0.02	0	0	0.01	50	29	40	
11/25/2021	0.40	0.41	0.47	0.49	0*	0.58	0.49	0.53	0.50	0.55	0.55	46	33	40	
11/26/2021	0	0	0	0	0	0	0	0	0	0	0	33	27	30	
11/27/2021	0.07	0.13	0	0.37	0*	0	0.03	0.27	0.11	0.16	0.13	32	23	28	
11/28/2021	0.32	0.26	0.10	0.02	0*	0.06	0.24	0.01	0.29	0.28	0.25	38	30	34	
11/29/2021	0.02	0.03	0.09	0.14	0*	0.15	0	0.10	0.03	0.10	0.03	38	22	30	
11/30/2021	0.12	0.13	0.33	0.02	0*	0.39	0.11	0.03	0.11	0.08	0.14	41	31	36	
Total	1.61	1.76	1.94	1.91	0.25*	2.26	1.65	1.90	1.81	1.46	1.99	47	32	39	

Legend

* Missing or suspect data

Table 5-14
Daily Precipitation for December 2021

Date	Daily Precipitation (inches)												DTW Daily Temperature (°F)		
	R-18	R-02	R-10	DTW	R-09	R-04	R-08	R-15	R-17	R-06	R-16	Max.	Min.	Avg.	
12/1/2021	0	0.01	0.01	0.01	0	0.02	0.01	0.02	0.01	0.01	0.01	43	28	36	
12/2/2021	0	0	0.01	0	0	0	0.01	0	0	0	0	56	36	46	
12/3/2021	0.02	0.02	0.03	0.04	0*	0.04	0.04	0.04	0.03	0.05	0.04	37	33	35	
12/4/2021	0	0	0.01	0	0	0	0	0	0	0	0	46	31	39	
12/5/2021	0.58	0.70	0.61	0.65	0*	0.69	0.70	0.62	0.67	0.66	0.71	44	33	39	
12/6/2021	0	0.03	0.01	0.01	0*	0.04	0.03	0.01	0.04	0.02	0.03	49	27	38	
12/7/2021	0	0	0	0	0	0	0	0	0	0	0	28	20	24	
12/8/2021	0	0	0	0	0	0	0	0	0	0	0	32	23	28	
12/9/2021	0	0	0	0	0	0	0	0	0	0	0	39	27	33	
12/10/2021	0.35	0.36	0.37	0.42	0*	0.38	0.30	0.36	0.36	0.41	0.32	53	34	44	
12/11/2021	0.72	0.65	0.94	0.96	0*	0.71	0.65	0.86	0.62	0.62	0.65	61	33	47	
12/12/2021	0	0	0	0	0	0	0	0	0	0	0	46	30	38	
12/13/2021	0	0	0	0	0	0	0	0	0	0	0	48	33	41	
12/14/2021	0	0	0	0	0	0	0	0	0	0	0	49	28	39	
12/15/2021	0.11	0.09	0.13	0.10	0*	0.11	0.09	0.10	0.10	0.10	0.12	59	42	51	
12/16/2021	0	0	0	0	0	0.01	0	0	0	0.01	0	60	38	49	
12/17/2021	0	0	0	0	0	0	0	0	0	0	0	43	30	37	
12/18/2021	0.29	0.32	0.35	0.32	0*	0.42	0.34	0.33	0.35	0.36	0.34	45	32	39	
12/19/2021	0	0	0	0.01	0	0.01	0	0	0	0	0	32	28	30	
12/20/2021	0	0.10	0.10	0	0	0.10	0	0.10	0.10	0.11	0	40	28	34	
12/21/2021	0	0	0	0	0.10	0	0.11	0	0	0	0.10	39	23	31	
12/22/2021	0	0	0	0	0	0	0	0	0	0	0	37	24	31	
12/23/2021	0	0	0	0	0	0	0	0	0	0	0	41	22	32	
12/24/2021	0.01	0	0.02	0.01	0.01	0	0	0.02	0.01	0	0.01	51	29	40	
12/25/2021	0.36	0.36	0.35	0.37	0.39	0.46	0.36	0.43	0.37	0.37	0.41	53	35	44	
12/26/2021	0	0	0	0	0	0	0	0	0	0	0	41	30	36	
12/27/2021	0.29	0.23	0.34	0.35	0.27	0.37	0.30	0.33	0.27	0.27	0.30	40	32	36	
12/28/2021	0.21	0.23	0	0.22	0.21	0	0.01	0.20	0.22	0.23	0.21	37	32	35	
12/29/2021	0	0.01	0.23	0	0	0.39	0.25	0	0.01	0.04	0	39	33	36	
12/30/2021	0	0	0	0	0	0	0	0	0	0	0	35	31	33	
12/31/2021	0	0	0.02	0	0	0.01	0.01	0	0	0.01	0.01	43	35	40	
Total	2.94	3.11	3.53	3.47	0.98*	3.76	3.21	3.42	3.16	3.27	3.26	44	30	37	

Legend

* Missing or suspect data

Table 5-15
Summary of Precipitation Data for Significant Storm Events

Period: 1/1/2021 through 12/31/2021

Significant Event No. ¹	Major Storm Event ²	DWTF Peak Hourly Flow Rate (cfs)	Start Date	Stop Date	Preceding Week Rainfall (inches)	Event Precipitation Depth (inches)				Coefficient of Variation ⁴
						Minimum	Average ³	Maximum	Std. Dev	
1	-	214	3/25/2021	3/28/2021	0.00	1.77	1.99	2.32	0.16	8%
2	-	165	6/20/2021	6/21/2021	0.61	0.80	1.16	1.63	0.24	21%
3	A	300	6/25/2021	6/26/2021	1.54	1.57	2.07	2.40	0.29	14%
4	B	367	7/16/2021	7/17/2021	1.01	1.74	2.20	3.08	0.43	20%
5	-	268	7/24/2021	7/25/2021	0.21	0.25	1.18	1.80	0.61	52%
6	C	340	8/11/2021	8/12/2021	0.73	1.90	2.53	3.14	0.33	13%
7	D	367	9/21/2021	9/23/2021	0.40	3.59	4.01	4.43	0.26	6%
8	-	189	10/14/2021	10/16/2021	0.39	0.80	1.00	1.29	0.18	18%
9	E	293	10/24/2021	10/25/2021	0.24	1.84	2.10	2.25	0.13	6%
10	-	202	10/28/2021	10/30/2021	2.11	0.97	1.13	1.50	0.16	14%
11	-	212	12/10/2021	12/11/2021	0.62	0.94	1.09	1.38	0.15	14%

Notes:

- 1) Significant storm events are defined as those with at least 0.5 inches of rainfall occurring on a single day with an event total of at least 1.0 inch of rainfall. Significant storm events are separated by at least 2 consecutive days without precipitation over 0.1 inches. This storm event definition is based on the arithmetic mean of the rainfall recorded by all rain gauges used in the analysis for that storm.
- 2) Major storm events are a subgroup of significant storm events which result in the peak hourly influent flow rate to the DWTF reaching or exceeding 175 MGD (271 cfs).
- 3) The average precipitation value is an arithmetic average of the collection of point gauges listed on Tables B-1 through B-4.
- 4) The coefficient of variation is the ratio of the standard deviation to the average. It provides a normalized assessment of the degree of spatial variability for a given event. This allows comparisons to be made between events regarding their uniformity over the service area independent of the magnitude of each event. A low coefficient of variation means the storm event was spatially uniform over the district, high coefficient of variation means the storm event was highly variable over the district.

6) PEAK FLOW RATES FOR CONTROLLED FLOW COMMUNITIES

Table 6-1 lists the peak hourly flow rates for the flow meters along the Riverdrive Interceptor for each significant/major storm event. The wet weather MAFLs from the Downriver Utility Wastewater Authority Service Agreement (March 21, 2017) are also given. These MAFLs are used to check whether or not the incoming flow rates are being regulated properly for the significant/major storm events. Exceedances of the MAFLs are highlighted (if any).

Incremental peak hourly flow rates are estimated if the total peak hourly flow rates for the flow meters exceed the MAFLs by 5% or more. Table 6-2 lists the incremental peak hourly flow rates for the flow meters along the Riverdrive Interceptor for these events. The incremental wet weather MAFLs from the Downriver Utility Wastewater Authority Service Agreement (March 21, 2017) are also given. Exceedances of the incremental MAFLs are highlighted (if any).

Appendix D includes hydrographs at select locations for the major storm events.

Table 6-1
Peak Hourly Flow Rates by Meter for Controlled Flow Communities

Meter =	RR-1	EC-6	RD-1	SW
Total Flow Formula =	[RR-1]	[EC-6]	[RD-1]	[SW]+[SWB]
Location =	River Rouge CSO Basin Outlet	Riverdrive Interceptor South of Southfield Road	Riverdrive Interceptor North of Northline Road	SWRDDD Connection
Communities Included in Total Flow =	River Rouge	River Rouge, Ecorse, & Lincoln Park (part)	River Rouge, Ecorse, Lincoln Park (part), & Allen Park (part)	Southgate (part) & Wyandotte
Total Wet Weather MAFL =	11.26 cfs	23.46 cfs	65.82 cfs	31.73 cfs
	Date/Time of Occurrence	Flow Rate / Volume	Date/Time of Occurrence	Flow Rate / Volume
			Date/Time of Occurrence	Flow Rate / Volume
Significant Storm Event 1 March 25-28, 2021 2.66 inches	Start of First Exceedence	--	--	3/26/21 2:20
	End of Last Exceedence	--	--	3/26/21 5:10
	Total Time of Exceedence	--	2:55	--
	Total Volume Above MAFL	--	--	0.07 MG
	Peak Hourly Flow Rate	3/26/21 4:50	11.22 cfs	3/26/21 2:55
Significant Storm Event 2 June 20-21, 2021 1.16 inches	Start of First Exceedence	--	--	--
	End of Last Exceedence	--	--	--
	Total Time of Exceedence	--	--	--
	Total Volume Above MAFL	--	--	--
	Peak Hourly Flow Rate	6/21/21 7:05	11.06 cfs	6/21/21 5:45
Significant Storm Event 3 Major Storm Event A June 25-26, 2021 2.07 inches	Start of First Exceedence	--	--	6/25/21 21:40
	End of Last Exceedence	--	--	6/26/21 10:25
	Total Time of Exceedence	--	12:50	--
	Total Volume Above MAFL	--	--	0.76 MG
	Peak Hourly Flow Rate	6/26/21 0:50	11.24 cfs	6/26/21 1:55
Significant Storm Event 4 Major Storm Event B July 16-17, 2021 2.20 inches	Start of First Exceedence	--	--	7/16/21 9:00
	End of Last Exceedence	--	--	7/16/21 21:25
	Total Time of Exceedence	--	12:30	--
	Total Volume Above MAFL	--	--	1.35 MG
	Peak Hourly Flow Rate	7/17/21 16:35	10.81 cfs	7/16/21 9:40

Notes:

1. The Wet Weather MAFLs for Controlled Flow Communities are from the Downriver Utility Wastewater Authority Service Agreement (March 21, 2017). The communities are responsible for regulating their flow rates to the Riverdrive Interceptor to the these flow limits. The MAFLs for each community are listed below:

- The MAFL for River Rouge at RR-1 is 11.26 cfs.
- The MAFL for Ecorse at EC-6 is 9.20 cfs.
- The MAFL for Lincoln Park is 28.16 cfs.
- The MAFL for Lincoln Park is divided between two meters 3.00 cfs at EC-6 and 25.16 cfs at RD-1. The Reg-U-Flo Vortex Valve on the Applewood connection restricts Lincoln Parks flow rate to about 3.00 cfs.
- The MAFL for Allen Park at RD-1 (via Lincoln Park) is 17.20 cfs.
- The MAFL for Southgate at SW is 7.67 cfs.
- The MAFL for Wyandotte at SW is 24.06 cfs.

Legend:

XX.XX	Exceeds wet weather MAFL by 0 to 5%
XX.XX	Exceeds wet weather MAFL by > 5%

Table 6-2
Peak Hourly Flow Rates by Meter for Controlled Flow Communities

Meter =	RR-1	EC-6	RD-1	SW
Total Flow Formula =	[RR-1]	[EC-6]	[RD-1]	[SW]+[SWB]
Location =	River Rouge CSO Basin Outlet	Riverdrive Interceptor South of Southfield Road	Riverdrive Interceptor North of Northline Road	SWRDDD Connection
Communities Included in Total Flow =	River Rouge	River Rouge, Ecorse, & Lincoln Park (part)	River Rouge, Ecorse, Lincoln Park (part), & Allen Park (part)	Southgate (part) & Wyandotte
Total Wet Weather MAFL =	11.26 cfs	23.46 cfs	65.82 cfs	31.73 cfs
	Date/Time of Occurrence	Flow Rate / Volume	Date/Time of Occurrence	Flow Rate / Volume
			Date/Time of Occurrence	Flow Rate / Volume
Significant Storm Event 5 July 16-17, 2021 2.20 inches	Start of First Exceedence	--	--	7/24/21 20:45
	End of Last Exceedence	--	--	7/25/21 0:25
	Total Time of Exceedence	--	--	3:45
	Total Volume Above MAFL	--	--	0.39 MG
	Peak Hourly Flow Rate	7/25/21 14:45	9.63 cfs	7/24/21 21:45
Significant Storm Event 6 Major Storm Event C August 11-12, 2021 2.53 inches	Start of First Exceedence	--	8/12/21 3:10	--
	End of Last Exceedence	--	8/12/21 12:45	--
	Total Time of Exceedence	--	9:40	--
	Total Volume Above MAFL	--	0.45 MG	--
	Peak Hourly Flow Rate	8/12/21 18:35	10.42 cfs	8/12/21 10:50
Significant Storm Event 7 Major Storm Event D September 21-23, 2021 4.01 inches	Start of First Exceedence	--	9/21/21 21:45	--
	End of Last Exceedence	--	9/23/21 13:50	--
	Total Time of Exceedence	--	40:10	0:35
	Total Volume Above MAFL	--	5.26 MG	--
	Peak Hourly Flow Rate	9/23/21 13:20	10.56 cfs	9/23/21 2:00
Significant Storm Event 8 October 14-16, 2021 1.00 inches	Start of First Exceedence	--	--	--
	End of Last Exceedence	--	--	--
	Total Time of Exceedence	--	--	--
	Total Volume Above MAFL	--	--	--
	Peak Hourly Flow Rate	10/15/21 15:50	8.85 cfs	10/16/21 7:30

- Notes:
1. The Wet Weather MAFLs for Controlled Flow Communities are from the Downriver Utility Wastewater Authority Service Agreement (March 21, 2017). The communities are responsible for regulating their flow rates to the Riverdrive Interceptor to the these flow limits. The MAFLs for each community are listed below:
 - i. The MAFL for River Rouge at RR-1 is 11.26 cfs.
 - ii. The MAFL for Ecorse at EC-6 is 9.20 cfs.
 - iii. The MAFL for Lincoln Park is 28.16 cfs.
 - iv. The MAFL for Lincoln Park is divided between two meters 3.00 cfs at EC-6 and 25.16 cfs at RD-1. The Reg-U-Flo Vortex Valve on the Applewood connection restricts Lincoln Parks flow rate to about 3.00 cfs.
 - v. The MAFL for Allen Park at RD-1 (via Lincoln Park) is 17.20 cfs.
 - vi. The MAFL for Southgate at SW is 7.67 cfs.
 - vii. The MAFL for Wyandotte at SW is 24.06 cfs.

Legend:

XX.XX	Exceeds wet weather MAFL by 0 to 5%
XX.XX	Exceeds wet weather MAFL by > 5%

Table 6-3
Peak Hourly Flow Rates by Meter for Controlled Flow Communities

Meter =	RR-1	EC-6	RD-1	SW
Total Flow Formula =	[RR-1]	[EC-6]	[RD-1]	[SW]+[SWB]
Location =	River Rouge CSO Basin Outlet	Riverdrive Interceptor South of Southfield Road	Riverdrive Interceptor North of Northline Road	SWRDDD Connection
Communities Included in Total Flow =	River Rouge	River Rouge, Ecorse, & Lincoln Park (part)	River Rouge, Ecorse, Lincoln Park (part), & Allen Park (part)	Southgate (part) & Wyandotte
Total Wet Weather MAFL =	11.26 cfs	23.46 cfs	65.82 cfs	31.73 cfs
	Date/Time of Occurrence	Flow Rate / Volume	Date/Time of Occurrence	Flow Rate / Volume
Significant Storm Event 9 Major Storm Event E October 24-25, 2021 2.10 inches	Start of First Exceedence	--	10/25/21 0:50	--
	End of Last Exceedence	--	10/25/21 21:15	--
	Total Time of Exceedence	--	18:30	--
	Total Volume Above MAFL	--	0.80 MG	--
	Peak Hourly Flow Rate	10/26/21 17:20	10.68 cfs	27.23 cfs
Significant Storm Event 10 October 28-30, 2021 1.13 inches	Start of First Exceedence	--	10/30/21 0:15	--
	End of Last Exceedence	--	10/30/21 0:15	--
	Total Time of Exceedence	--	0:05	--
	Total Volume Above MAFL	--	0.00 MG	--
	Peak Hourly Flow Rate	10/30/21 20:55	8.72 cfs	23.48 cfs
Significant Storm Event 11 December 10-11, 2021 1.09 inches	Start of First Exceedence	12/11/21 10:55	12/11/21 3:10	--
	End of Last Exceedence	12/11/21 23:45	12/11/21 8:15	--
	Total Time of Exceedence	2:05	4:35	--
	Total Volume Above MAFL	--	0.10 MG	--
	Peak Hourly Flow Rate	12/11/21 23:25	11.38 cfs	25.28 cfs
10/24/21 23:25				
62.66 cfs				
10/26/21 11:35				
63.13 cfs				
10/29/21 1:50				
11/1/21 2:15				
52:20				
6.06 MG				
10/29/21 3:10				
50.93 cfs				
12/10/21 21:20				
12/13/21 9:45				
24:20				
1.41 MG				
12/10/21 22:10				
49.95 cfs				

Notes:

1. The Wet Weather MAFLs for Controlled Flow Communities are from the Downriver Utility Wastewater Authority Service Agreement (March 21, 2017). The communities are responsible for regulating their flow rates to the Riverdrive Interceptor to the these flow limits. The MAFLs for each community are listed below:
 - i. The MAFL for River Rouge at RR-1 is 11.26 cfs.
 - ii. The MAFL for Ecorse at EC-6 is 9.20 cfs.
 - iii. The MAFL for Lincoln Park is 28.16 cfs.
 - iv. The MAFL for Lincoln Park is divided between two meters 3.00 cfs at EC-6 and 25.16 cfs at RD-1. The Reg-U-Flo Vortex Valve on the Applewood connection restricts Lincoln Parks flow rate to about 3.00 cfs.
 - v. The MAFL for Allen Park at RD-1 (via Lincoln Park) is 17.20 cfs.
 - vi. The MAFL for Southgate at SW is 7.67 cfs.
 - vii. The MAFL for Wyandotte at SW is 24.06 cfs.

Legend:

XX.XX

Exceeds wet weather MAFL by 0 to 5%

XX.XX

Exceeds wet weather MAFL by > 5%

Table 6-4
Incremental Peak Hourly Flow Rates by Meter District for Controlled Flow Communities

Meter District =	RR-1		EC-6		RD-1		SW	
Incremental Flow Formula =	[RR-1]		[EC-6] - [RR-1r]		[RD-1] - [EC-6r]		[SW]+[SWB]	
Location =	River Rouge CSO Basin Outlet		Riverdrive Interceptor South of Southfield Road		Riverdrive Interceptor North of Northline Road		SWRDDD Connection	
Communities Included in Total Flow =	River Rouge		Ecorse & Lincoln Park (part)		Lincoln Park (part) & Allen Park (part)		Southgate (part) & Wyandotte	
Incremental Wet Weather MAFL =	11.26 cfs		12.20 cfs		42.36 cfs		31.73 cfs	
	Date/Time of Occurrence	Flow Rate / Volume	Date/Time of Occurrence	Flow Rate / Volume	Date/Time of Occurrence	Flow Rate / Volume	Date/Time of Occurrence	Flow Rate / Volume
Significant Storm Event 1 March 25-28, 2021 2.66 inches	Start of First Exceedence	--	--	3/26/21 1:30	--	3/26/21 13:05	--	3/25/21 22:45
	End of Last Exceedence	--	--	3/26/21 5:15	--	3/29/21 0:35	--	3/29/21 23:55
	Total Time of Exceedence	--	--	3:50	--	25:15	--	79:45
	Total Volume Above MAFL	--	--	--	0.16 MG	--	1.92 MG	--
	Peak Hourly Flow Rate	3/26/21 4:50	11.22 cfs	3/26/21 2:55	14.88 cfs	3/28/21 11:20	48.73 cfs	3/27/21 9:45
Significant Storm Event 2 June 20-21, 2021 1.16 inches	Start of First Exceedence	--	--	--	--	--	--	6/20/21 20:25
	End of Last Exceedence	--	--	--	--	--	--	6/21/21 16:25
	Total Time of Exceedence	--	--	--	--	--	--	18:45
	Total Volume Above MAFL	--	--	--	--	--	--	1.66 MG
	Peak Hourly Flow Rate	6/21/21 7:05	11.06 cfs	6/21/21 5:45	10.47 cfs	6/21/21 9:55	42.01 cfs	6/21/21 4:35
Significant Storm Event 3 Major Storm Event A June 25-26, 2021 2.07 inches	Start of First Exceedence	--	--	6/25/21 21:30	--	--	--	6/25/21 10:20
	End of Last Exceedence	--	--	6/26/21 11:35	--	--	--	6/27/21 0:45
	Total Time of Exceedence	--	--	14:10	--	--	--	25:45
	Total Volume Above MAFL	--	--	--	1.31 MG	--	--	2.10 MG
	Peak Hourly Flow Rate	6/26/21 0:50	11.24 cfs	6/26/21 3:05	19.88 cfs	6/25/21 19:05	40.29 cfs	6/25/21 11:05
Significant Storm Event 4 Major Storm Event B July 16-17, 2021 2.20 inches	Start of First Exceedence	--	--	7/16/21 8:30	--	7/16/21 8:55	--	7/16/21 0:00
	End of Last Exceedence	--	--	7/16/21 22:35	--	7/16/21 9:40	--	7/18/21 2:20
	Total Time of Exceedence	--	--	14:10	--	0:50	--	34:35
	Total Volume Above MAFL	--	--	--	2.44 MG	--	0.05 MG	--
	Peak Hourly Flow Rate	7/17/21 16:35	10.81 cfs	7/16/21 9:35	23.02 cfs	7/16/21 9:20	46.07 cfs	7/17/21 21:50

Notes:

1. The Wet Weather MAFLs for Controlled Flow Communities are from the Downriver Utility Wastewater Authority Service Agreement (March 21, 2017). The communities are responsible for regulating their flow rates to the Riverdrive Interceptor to the these flow limits. The MAFLs for each community are listed below:

- The MAFL for River Rouge at RR-1 is 11.26 cfs.
- The MAFL for Ecorse at EC-6 is 9.20 cfs.
- The MAFL for Lincoln Park is 28.16 cfs.
- The MAFL for Lincoln Park is divided between two meters 3.00 cfs at EC-6 and 25.16 cfs at RD-1. The Reg-U-Flo Vortex Valve on the Applewood connection restricts Lincoln Parks flow rate to about 3.00 cfs.
- The MAFL for Allen Park at RD-1 (via Lincoln Park) is 17.20 cfs.
- The MAFL for Southgate at SW is 7.67 cfs.
- The MAFL for Wyandotte at SW is 24.06 cfs.

Legend:

XX.XX	Exceeds wet weather MAFL by 0 to 5%
XX.XX	Exceeds wet weather MAFL by > 5%

Table 6-5
Incremental Peak Hourly Flow Rates by Meter District for Controlled Flow Communities

Meter District =	RR-1		EC-6		RD-1		SW	
Incremental Flow Formula =	[RR-1]		[EC-6] - [RR-1r]		[RD-1] - [EC-6r]		[SW]+[SWB]	
Location =	River Rouge CSO Basin Outlet		Riverdrive Interceptor South of Southfield Road		Riverdrive Interceptor North of Northline Road		SWRDDD Connection	
Communities Included in Total Flow =	River Rouge		Ecorse & Lincoln Park (part)		Lincoln Park (part) & Allen Park (part)		Southgate (part) & Wyandotte	
Incremental Wet Weather MAFL =	11.26 cfs		12.20 cfs		42.36 cfs		31.73 cfs	
	Date/Time of Occurrence	Flow Rate / Volume	Date/Time of Occurrence	Flow Rate / Volume	Date/Time of Occurrence	Flow Rate / Volume	Date/Time of Occurrence	Flow Rate / Volume
Significant Storm Event 5 July 16-17, 2021 2.20 inches	Start of First Exceedence	--	--	7/24/21 21:15	--	7/24/21 20:25	--	7/24/21 20:20
	End of Last Exceedence	--	--	7/24/21 22:35	--	7/25/21 0:50	--	7/25/21 22:30
	Total Time of Exceedence	--	--	1:25	--	4:30	--	18:50
	Total Volume Above MAFL	--	--	--	0.04 MG	--	1.15 MG	--
	Peak Hourly Flow Rate	7/25/21 14:45	9.63 cfs	7/24/21 21:45	14.43 cfs	7/24/21 20:55	60.36 cfs	7/25/21 8:45
Significant Storm Event 6 Major Storm Event C August 11-12, 2021 2.53 inches	Start of First Exceedence	--	--	8/12/21 2:50	--	8/12/21 1:55	--	8/11/21 14:45
	End of Last Exceedence	--	--	8/12/21 14:10	--	8/12/21 3:20	--	8/13/21 6:10
	Total Time of Exceedence	--	--	11:25	--	1:30	--	29:25
	Total Volume Above MAFL	--	--	--	1.25 MG	--	0.12 MG	--
	Peak Hourly Flow Rate	8/12/21 18:35	10.42 cfs	8/12/21 7:30	17.88 cfs	8/12/21 2:20	47.20 cfs	8/12/21 19:35
Significant Storm Event 7 Major Storm Event D September 21-23, 2021 4.01 inches	Start of First Exceedence	--	--	9/21/21 21:35	--	9/21/21 19:15	--	9/21/21 7:35
	End of Last Exceedence	--	--	9/23/21 23:30	--	9/21/21 22:25	--	9/24/21 22:05
	Total Time of Exceedence	--	--	42:35	--	3:15	--	62:10
	Total Volume Above MAFL	--	--	--	7.85 MG	--	1.03 MG	--
	Peak Hourly Flow Rate	9/23/21 13:20	10.56 cfs	9/23/21 2:00	24.57 cfs	9/21/21 20:45	58.53 cfs	9/24/21 18:10
Significant Storm Event 8 October 14-16, 2021 1.00 inches	Start of First Exceedence	--	--	--	--	--	--	10/14/21 17:20
	End of Last Exceedence	--	--	--	--	--	--	10/16/21 14:50
	Total Time of Exceedence	--	--	--	--	--	--	44:40
	Total Volume Above MAFL	--	--	--	--	--	--	11.03 MG
	Peak Hourly Flow Rate	10/15/21 15:50	8.85 cfs	10/16/21 7:50	8.23 cfs	10/15/21 15:20	38.10 cfs	10/16/21 12:10

Notes:

1. The Wet Weather MAFLs for Controlled Flow Communities are from the Downriver Utility Wastewater Authority Service Agreement (March 21, 2017). The communities are responsible for regulating their flow rates to the Riverdrive Interceptor to the these flow limits. The MAFLs for each community are listed below:

- The MAFL for River Rouge at RR-1 is 11.26 cfs.
- The MAFL for Ecorse at EC-6 is 9.20 cfs.
- The MAFL for Lincoln Park is 28.16 cfs.
- The MAFL for Lincoln Park is divided between two meters 3.00 cfs at EC-6 and 25.16 cfs at RD-1. The Reg-U-Flo Vortex Valve on the Applewood connection restricts Lincoln Parks flow rate to about 3.00 cfs.
- The MAFL for Allen Park at RD-1 (via Lincoln Park) is 17.20 cfs.
- The MAFL for Southgate at SW is 7.67 cfs.
- The MAFL for Wyandotte at SW is 24.06 cfs.

Legend:

XX.XX	Exceeds wet weather MAFL by 0 to 5%
XX.XX	Exceeds wet weather MAFL by > 5%

Table 6-6
Incremental Peak Hourly Flow Rates by Meter District for Controlled Flow Communities

Meter District =	RR-1		EC-6		RD-1		SW	
Incremental Flow Formula =	[RR-1]		[EC-6] - [RR-1r]		[RD-1] - [EC-6r]		[SW]+[SWB]	
Location =	River Rouge CSO Basin Outlet		Riverdrive Interceptor South of Southfield Road		Riverdrive Interceptor North of Northline Road		SWRDDD Connection	
Communities Included in Total Flow =	River Rouge		Ecorse & Lincoln Park (part)		Lincoln Park (part) & Allen Park (part)		Southgate (part) & Wyandotte	
Incremental Wet Weather MAFL =	11.26 cfs		12.20 cfs		42.36 cfs		31.73 cfs	
	Date/Time of Occurrence	Flow Rate / Volume	Date/Time of Occurrence	Flow Rate / Volume	Date/Time of Occurrence	Flow Rate / Volume	Date/Time of Occurrence	Flow Rate / Volume
Significant Storm Event 9 Major Storm Event E October 24-25, 2021 2.10 inches	Start of First Exceedence	--	--	10/25/21 0:30	--	10/24/21 22:40	--	10/24/21 17:05
	End of Last Exceedence	--	--	10/26/21 7:40	--	10/25/21 0:10	--	10/26/21 14:50
	Total Time of Exceedence	--	--	23:30	--	1:35	--	28:25
	Total Volume Above MAFL	--	--	--	2.01 MG	--	0.23 MG	--
	Peak Hourly Flow Rate	10/26/21 17:20	10.68 cfs	10/25/21 14:15	18.80 cfs	10/24/21 23:25	51.17 cfs	10/26/21 11:35
Significant Storm Event 10 October 28-30, 2021 1.13 inches	Start of First Exceedence	--	--	10/29/21 20:15	--	--	--	10/29/21 1:50
	End of Last Exceedence	--	--	10/30/21 11:50	--	--	--	11/1/21 2:15
	Total Time of Exceedence	--	--	15:40	--	--	--	52:20
	Total Volume Above MAFL	--	--	--	1.39 MG	--	--	--
	Peak Hourly Flow Rate	10/30/21 20:55	8.72 cfs	10/30/21 1:35	18.35 cfs	10/29/21 6:50	39.25 cfs	10/29/21 3:10
Significant Storm Event 11 December 10-11, 2021 1.09 inches	Start of First Exceedence	12/11/21 10:55	--	12/11/21 3:00	--	12/11/21 2:40	--	12/10/21 21:20
	End of Last Exceedence	12/11/21 23:45	--	12/11/21 10:00	--	12/11/21 3:30	--	12/13/21 9:45
	Total Time of Exceedence	2:05	--	7:05	--	0:55	--	24:20
	Total Volume Above MAFL	--	0.00 MG	--	0.20 MG	--	0.09 MG	--
	Peak Hourly Flow Rate	12/11/21 23:25	11.38 cfs	12/11/21 3:30	15.59 cfs	12/11/21 3:05	47.58 cfs	12/10/21 22:10

Notes:

- The Wet Weather MAFLs for Controlled Flow Communities are from the Downriver Utility Wastewater Authority Service Agreement (March 21, 2017). The communities are responsible for regulating their flow rates to the Riverdrive Interceptor to the these flow limits. The MAFLs for each community are listed below:

- The MAFL for River Rouge at RR-1 is 11.26 cfs.
- The MAFL for Ecorse at EC-6 is 9.20 cfs.
- The MAFL for Lincoln Park is 28.16 cfs.
- The MAFL for Lincoln Park is divided between two meters 3.00 cfs at EC-6 and 25.16 cfs at RD-1. The Reg-U-Flo Vortex Valve on the Applewood connection restricts Lincoln Parks flow rate to about 3.00 cfs.
- The MAFL for Allen Park at RD-1 (via Lincoln Park) is 17.20 cfs.
- The MAFL for Southgate at SW is 7.67 cfs.
- The MAFL for Wyandotte at SW is 24.06 cfs.

Legend:

XX.XX Exceeds wet weather MAFL by 0 to 5%

XX.XX Exceeds wet weather MAFL by > 5%

7) WET WEATHER VOLUMES FOR NON-CONTROLLED FLOW COMMUNITIES

The peak 96-hour wet weather volumes for the non-controlled flow communities during the major storm events were estimated using the flow monitoring data set. These volumes were compared to those for the 4.42-inch storm event used in the design of the Downriver tunnel system as given on Table 7-1. Exceedances of the peak 96-hour volumes allocated to each community during the major storm events during this reporting period are highlighted (if any). Table 7-2 lists the peak 96-hour incremental volumes for each community by meter district component. Table 7-3 lists the peak 96-hour incremental volumes for each meter district by community component. Table 7-4 lists the peak hourly flow rates and 96-hour volumes at each meter, and Table 7-5 lists the peak hydraulic grade lines at each meter for the major storm event.

8) METER DATA SUMMARY

The flow monitoring data were reviewed and edited as summarized on Table 8-1. The flow monitoring data is summarized in more detail in Appendix C. This appendix includes: charts detailing data and meter maintenance issues that occurred during these months, and average daily flow rate plots for each meter. Data for each meter was carried through the analysis with the following exceptions:

- A rating curve is used to estimate flow rate for Meter RV-1 under extremely low flow rate conditions.
- Flow rates are recalculated to account for sediment deposits for Meter SW. Details of the flow rate recalculation are provided in the Wayne County Downriver Sewage Disposal System Annual System Monitoring Report for 2013.
- The incremental flow rates for Meter TPS + IPS and P-1 districts cannot be confidently and accurately calculated because they are too small relative to the total flow rate. Therefore, the incremental flow rates for the Meter TPS+IPS and P-1 districts were estimated using a ratio of each district's incremental population to the cumulative population of the upstream meters (Meters PC-1, PD-1, PB-1, PA-2 and P-2) multiplied by the sum of the cumulative district flow rates for Meters PC-1, PD-1, PB-1, PA-2 and P-2.
- Overflows to the DRSTS were calculated using the level sensor data and the previously developed ratings curves except for Meter TSO. The flow rates calculated with the area-velocity measurements were used for Meter TSO.

Table 7-1
Peak 96 Hour Total Volumes for Non-Controlled Flow Communities

Community	Total Volume (MG)						
	4.42 inch Design Storm	Significant Storm Event 3 Major Storm Event A June 25-26, 2021 2.07 inches	Significant Storm Event 4 Major Storm Event B July 16-17, 2021 2.20 inches	Significant Storm Event 6 Major Storm Event C August 11-12, 2021 2.53 inches	Significant Storm Event 7 Major Storm Event D September 21-23, 2021 4.01 inches	Significant Storm Event 9 Major Storm Event E October 24-25, 2021 2.10 inches	
Allen Park (part)	29.23	11.71	24.67	26.07	45.89	30.37	
Belleville	4.86	3.52	3.30	2.54	2.37	3.09	
Brownstown Twp.	20.90	8.91	8.40	8.73	11.86	11.38	
Dearborn Heights	43.76	34.76	44.14	31.83	40.91	35.79	
Riverview	28.30	13.12	15.37	11.98	23.08	18.24	
Romulus	88.43	44.40	40.13	37.14	42.94	38.96	
Southgate (part)	31.24	19.28	25.67	45.31	61.09	39.45	
Taylor	164.45	61.49	78.60	90.35	116.66	88.01	
Van Buren Twp.	7.04	6.91	6.48	4.98	4.64	6.07	
Total	418.21	204.09	246.77	258.92	349.43	271.36	

Legend:

XX.XX	Exceeds design storm volume by 0 to 20%
XX.XX	Exceeds design storm volume by > 20%

Table 7-2
Peak 96 Hour Total Volumes for Major Storm Events Summarized by Community

Community	Meter District	Peak 96 Hour Incremental Volume (MG)				
		Significant Storm Event 3 Major Storm Event A June 25-26, 2021 2.07 inches	Significant Storm Event 4 Major Storm Event B July 16-17, 2021 2.20 inches	Significant Storm Event 6 Major Storm Event C August 11-12, 2021 2.53 inches	Significant Storm Event 7 Major Storm Event D September 21-23, 2021 4.01 inches	Significant Storm Event 9 Major Storm Event E October 24-25, 2021 2.10 inches
Allen Park	PC-1	0.73	0.8	1.4	1.5	1.0
	P-1	3.20	4.2	8.2	10.9	6.8
	RD-1	33.84	40.1	31.2	37.0	37.0
	APO-1 + APO-2	7.78	19.7	16.4	33.5	22.5
	Total	45.55	64.7	57.3	82.9	67.3
Belleville	PA-4	3.52	3.3	2.5	2.4	3.1
Brownstown Twp.	P-2	8.88	8.4	8.7	11.8	11.3
	PA-2	0.03	0.0	0.0	0.0	0.0
	Total	8.91	8.4	8.7	11.9	11.4
Dearborn Hts.	TB-1	34.76	44.1	31.8	40.9	35.8
Ecorse	EC-6	13.20	11.5	13.7	22.4	15.5
Lincoln Park	EC-6	5.91	5.2	6.1	10.1	6.9
	RD-1	55.07	65.2	50.8	60.2	60.2
	Total	60.98	70.3	56.9	70.2	67.1
River Rouge	RR-1	19.69	20.8	15.4	22.2	20.0
Riverview	RV-1	13.12	15.4	12.0	23.1	18.2
Romulus	DMA-1	2.31	2.2	1.5	1.5	1.5
	PA-3	16.10	18.8	19.3	23.3	20.0
	DMA-2	12.69	0.8	1.2	0.7	0.6
	PD-2	13.30	18.4	15.1	17.5	16.8
	Total	44.40	40.1	37.1	42.9	39.0
Southgate	P-1	15.14	19.7	38.9	51.6	32.4
	PB-1	3.15	4.7	3.9	6.2	4.9
	SW	38.53	34.9	27.9	38.7	34.3
	TPS+IPS	0.98	1.3	2.5	3.3	2.1
	Total	57.80	60.6	73.2	99.8	73.8
Taylor	P-2	0.01	0.0	0.0	0.0	0.0
	PA-2	12.92	18.2	13.1	21.9	20.0
	PB-1	4.95	7.3	6.1	9.7	7.7
	TB-1	9.95	12.6	9.1	11.7	10.2
	PC-1	26.19	30.0	50.4	54.7	36.3
	PD-1	7.48	10.5	11.6	18.7	13.7
	Total	61.49	78.6	90.4	116.7	88.0
Van Buren Twp.	PA-4	6.91	6.5	5.0	4.6	6.1
Wyandotte	SW	64.34	58.3	46.5	64.6	57.4

Notes:

1) [TPS+IPS] = (TPS+TPS Inc. Pop. / P-1 Inc. Pop.) x [P-1]

Table 7-3
Peak 96 Hour Total Volumes for Major Storm Events Summarized by Meter District

Meter District	Incremental Meter District Formula	Community	Year 2020 Incremental Population	Meter District Percentage	Significant Storm Event 3 Major Storm Event A June 25-26, 2021 2.07 inches		Significant Storm Event 4 Major Storm Event B July 16-17, 2021 2.20 inches		Significant Storm Event 6 Major Storm Event C August 11-12, 2021 2.53 inches		Significant Storm Event 7 Major Storm Event D September 21-23, 2021 4.01 inches		Significant Storm Event 9 Major Storm Event E October 24-25, 2021 2.10 inches	
					Meter District Peak 96 Hour Volume (MG)	Peak 96 Hour Incremental Volume (MG)	Meter District Peak 96 Hour Volume (MG)	Peak 96 Hour Incremental Volume (MG)	Meter District Peak 96 Hour Volume (MG)	Peak 96 Hour Incremental Volume (MG)	Meter District Peak 96 Hour Volume (MG)	Peak 96 Hour Incremental Volume (MG)	Meter District Peak 96 Hour Volume (MG)	Peak 96 Hour Incremental Volume (MG)
APO-1 + APO-2	[APO-1]+[APO-2]	Allen Park	0	100.0%	7.8	7.8	19.7	19.7	16.4	16.4	33.5	33.5	22.5	22.5
DMA-1	[DMA-1]	Romulus	0	100.0%	2.3	2.3	2.2	2.2	1.5	1.5	1.5	1.5	1.5	1.5
DMA-2	[DMA-2]	Romulus	0	100.0%	12.7	12.7	0.8	0.8	1.2	1.2	0.7	0.7	0.6	0.6
EC-6	[EC-6]-[RR-1]	Ecorse	9,305	69.1%	19.1	13.2	16.7	11.5	19.8	13.7	32.5	22.4	22.4	15.5
		Lincoln Park	4,169	30.9%		5.9		5.2		6.1		10.1		6.9
		Total	13,474	100%		19.1		16.7		19.8		32.5		22.4
P-1	[P-1]+[PM-1]-[P-2] -[PA-2]-[PB-1]-[PD-1]-[PC-1]	Allen Park	2,338	17.4%	18.3	3.2	23.9	4.2	47.1	8.2	62.4	10.9	39.3	6.8
		Southgate	11,079	82.6%		15.1		19.7		38.9		51.6		32.4
		Total	13,417	100%		18.3		23.9		47.1		62.4		39.3
P-2	[P-2]	Brownstown Twp.	11,002	99.9%	8.9	8.9	8.4	8.4	8.7	8.7	11.8	11.8	11.3	11.3
		Taylor	10	0.1%		0.0		0.0		0.0		0.0		0.0
		Total	11,012	100%		8.9		8.4		8.7		11.8		11.3
PA-2	[PA-2]+[ER-1] -[PA-3]-[ER-2]	Brownstown Twp.	29	0.2%	12.9	0.0	18.2	0.0	13.1	0.0	21.9	0.0	20.1	0.0
		Taylor	14,125	99.8%		12.9		18.2		13.1		21.9		20.0
		Total	14,154	100%		12.9		18.2		13.1		21.9		20.1
PA-3	[PA-3]+[ER-2]	Romulus	14,420	100.0%	16.1	16.1	18.8	18.8	19.3	19.3	23.3	23.3	20.0	20.0
PA-4	[PA-4]	Belleville	4,008	33.8%	10.4	3.5	9.8	3.3	7.5	2.5	7.0	2.4	9.2	3.1
		Van Buren Twp.	7,865	66.2%		6.9		6.5		5.0		4.6		6.1
		Total	11,873	100%		10.4		9.8		7.5		7.0		9.2
PB-1	[PB-1]	Southgate	3,214	38.9%	8.1	3.2	11.9	4.7	10.0	3.9	15.9	6.2	12.6	4.9
		Taylor	5,040	61.1%		4.9		7.3		6.1		9.7		7.7
		Total	8,254	100%		8.1		11.9		10.0		15.9		12.6
PC-1	[PC-1]+[CPO] +[CHPO]-[TB-1]	Allen Park	716	2.7%	26.9	0.7	30.8	0.8	51.9	1.4	56.2	1.5	37.4	1.0
		Taylor	25,577	97.3%		26.2		30.0		50.4		54.7		36.3
		Total	26,293	100%		26.9		30.8		51.9		56.2		37.4
PD-1	[PD-1]-[PD-2]+[PDO]	Taylor	13,083	100.0%	7.5	7.5	10.5	10.5	11.6	11.6	18.7	18.7	13.7	13.7
PD-2	[PD-2] - [DMA-2]	Romulus	8,069	100.0%	13.3	13.3	18.4	18.4	15.1	15.1	17.5	17.5	16.8	16.8
RD-1	[RD-1]-[EC-6]	Allen Park	22,170	38.1%	88.9	33.8	105.2	40.1	81.9	31.2	97.2	37.0	97.1	37.0
		Lincoln Park	36,076	61.9%		55.1		65.2		50.8		60.2		60.2
		Total	58,246	100%		88.9		105.2		81.9		97.2		97.1
RR-1	[RR-1]	River Rouge	7,224	100.0%	19.7	19.7	20.8	20.8	15.4	15.4	22.2	22.2	20.0	20.0
RV-1	[RV-1]	Riverview	12,490	100.0%	13.1	13.1	15.4	15.4	12.0	12.0	23.1	23.1	18.2	18.2
SW	[SW]+[SWB]	Southgate	15,003	37.5%	102.9	38.5	93.2	34.9	74.4	27.9	103.3	38.7	91.7	34.3
		Wyandotte	25,058	62.5%		64.3		58.3		46.5		64.6		57.4
		Total	40,061	100%		102.9		93.2		74.4		103.3		91.7
TB-1	[TB-1]+[TSO]	Dearborn Hts.	19,472	77.7%	44.7	34.8	56.8	44.1	40.9	31.8	52.6	40.9	46.0	35.8
		Taylor	5,574	22.3%		10.0		12.6		9.1		11.7		10.2
		Total	25,046	100%		44.7		56.8		40.9		52.6		46.0
TPS+IPS	Population Ratio of Meter District P-1	Southgate	718	100.0%	1.0	1.0	1.3	1.3	2.5	2.5	3.3	3.3	2.1	2.1

Notes:

1) $[TPS+IPS] = (TPS+TPS \text{ Inc. Pop.} / P-1 \text{ Inc. Pop.}) \times [P-1]$

Table 7-4
Peak Flow Rates for Major Storm Events

System	Meter	Location	Significant Storm Event 3 Major Storm Event A June 25-26, 2021 2.07 inches				Significant Storm Event 4 Major Storm Event B July 16-17, 2021 2.20 inches				Significant Storm Event 6 Major Storm Event C August 11-12, 2021 2.53 inches				Significant Storm Event 7 Major Storm Event D September 21-23, 2021 4.01 inches				Significant Storm Event 9 Major Storm Event E October 24-25, 2021 2.10 inches			
			Peak Hour		Peak 96 Hour		Peak Hour		Peak 96 Hour		Peak Hour		Peak 96 Hour		Peak Hour		Peak 96 Hour		Peak Hour		Peak 96 Hour	
			Date/Time	Flow Rate (cfs)	Date/Time	Cumulative Volume (MG)	Date/Time	Flow Rate (cfs)	Date/Time	Cumulative Volume (MG)	Date/Time	Flow Rate (cfs)	Date/Time	Cumulative Volume (MG)	Date/Time	Flow Rate (cfs)	Date/Time	Cumulative Volume (MG)	Date/Time	Flow Rate (cfs)	Date/Time	Cumulative Volume (MG)
Tunnel (Non-Controlled)	TB-1	Taylor Basin	6/26/21 0:20	16.1	6/25/21 19:00	36.1	7/19/21 10:30	16.6	7/19/21 7:50	37.8	8/12/21 16:55	15.4	8/12/21 0:40	30.5	9/23/21 6:45	15.6	9/21/21 21:35	36.3	10/27/21 8:55	18.2	10/27/21 8:30	40.2
	PC-1	Pelham Interceptor North of Goddard Road	6/25/21 19:25	30.9	6/25/21 12:25	59.5	7/16/21 9:20	31.0	7/16/21 8:50	60.6	8/12/21 1:45	32.0	8/12/21 0:15	56.0	9/21/21 23:00	32.7	9/21/21 20:50	70.7	10/25/21 0:05	32.5	10/24/21 22:35	69.1
	DMA-2	Goddard near Harrison	6/25/21 21:55	6.3	6/25/21 10:40	12.7	7/15/21 6:10	1.1	7/15/21 0:00	0.8	8/12/21 3:10	3.5	8/11/21 6:10	1.2	9/23/21 0:55	0.6	9/21/21 21:05	0.7	10/25/21 14:25	0.5	10/27/21 23:55	0.6
	PD-2	Goddard Interceptor West of Inkster Road	6/26/21 3:05	17.0	6/25/21 19:55	26.0	7/16/21 15:30	19.0	7/16/21 9:30	19.2	8/12/21 4:35	19.9	8/12/21 1:30	16.3	9/23/21 2:30	13.0	9/21/21 22:05	18.2	10/25/21 15:10	13.5	10/24/21 23:35	17.4
	PD-1	Goddard Interceptor West of Allen Road	6/26/21 2:35	21.2	6/25/21 21:30	33.5	7/16/21 14:40	27.2	7/16/21 8:40	29.7	8/12/21 7:00	29.5	8/12/21 1:10	27.8	9/23/21 3:00	23.4	9/21/21 22:45	36.8	10/25/21 14:10	22.7	10/24/21 23:10	31.2
	PB-1	Northline Interceptor West of Fordline Road	6/25/21 22:40	8.9	6/25/21 11:15	8.1	7/16/21 10:20	13.2	7/16/21 4:45	11.9	8/12/21 3:15	14.4	8/11/21 22:40	10.0	9/23/21 1:20	14.3	9/21/21 20:25	15.9	10/25/21 14:15	11.4	10/24/21 21:55	12.6
	PA-4	Eureka Interceptor near Hannan Road	6/26/21 4:55	6.8	6/25/21 22:55	10.4	7/16/21 16:55	6.4	7/16/21 9:50	9.8	8/12/21 8:40	4.7	8/12/21 2:20	7.5	9/23/21 1:40	3.6	9/22/21 6:00	7.0	10/25/21 16:05	5.2	10/25/21 6:50	9.2
	DMA-1	Detroit Metropolitan Airport	6/26/21 10:05	1.5	6/25/21 21:25	2.3	7/16/21 15:55	1.9	7/16/21 5:10	2.2	8/11/21 19:15	0.8	8/13/21 7:10	1.5	9/21/21 19:15	0.8	9/24/21 7:10	1.5	10/25/21 19:15	0.8	10/27/21 7:15	1.5
	PA-3	Eureka Interceptor at Inkster Road	6/26/21 3:25	13.0	6/25/21 22:35	27.1	7/16/21 14:50	16.0	7/16/21 9:25	29.0	8/12/21 8:05	15.6	8/12/21 2:30	27.6	9/23/21 2:30	15.5	9/21/21 23:10	30.7	10/25/21 14:55	15.8	10/24/21 23:55	29.5
	PA-2	Eureka Interceptor at Allen Road	6/25/21 23:35	20.2	6/25/21 22:10	38.1	7/16/21 15:50	29.9	7/16/21 8:55	45.4	8/12/21 8:30	29.1	8/12/21 2:20	40.0	9/23/21 1:15	26.2	9/21/21 23:10	51.2	10/25/21 15:40	28.8	10/24/21 23:25	47.7
	PA-1	Eureka Interceptor West of Fordline Road	6/25/21 23:05	24.2	6/25/21 18:40	41.6	7/16/21 14:55	36.5	7/16/21 4:55	51.2	8/12/21 8:30	33.8	8/12/21 2:20	43.6	9/23/21 1:35	39.2	9/21/21 22:45	63.2	10/25/21 14:05	37.8	10/24/21 22:15	56.8
	P-2	Pennsylvania Interceptor East of Dix-Toledo Road	6/25/21 23:45	8.4	6/25/21 20:00	8.9	7/16/21 14:45	6.6	7/15/21 15:55	8.4	8/12/21 4:05	8.8	8/11/21 7:15	8.7	9/23/21 2:10	8.5	9/21/21 20:35	11.8	10/25/21 17:15	8.3	10/24/21 22:30	11.3
	P-1	Pennsylvania Interceptor East of Fort Street	6/26/21 0:10	97.1	6/25/21 19:40	166.4	7/16/21 14:10	111.0	7/16/21 9:45	176.8	8/12/21 7:55	112.5	8/12/21 1:35	159.7	9/23/21 1:20	114.1	9/21/21 22:00	217.6	10/25/21 16:30	111.4	10/24/21 23:25	198.0
	RV-1	Pennsylvania Interceptor West of Jefferson Avenue	6/25/21 23:00	28.1	6/25/21 18:25	13.1	7/16/21 13:55	21.0	7/15/21 19:05	15.4	8/12/21 3:05	28.0	8/11/21 14:45	12.0	9/23/21 1:15	26.2	9/21/21 19:55	23.1	10/24/21 23:55	20.9	10/24/21 14:40	18.2
Riverdrive (Controlled)	RR-1	River Rouge CSO Basin Outlet Jefferson North of Victoria	6/26/21 0:50	11.2	6/25/21 11:45	19.7	7/17/21 16:35	10.8	7/16/21 8:00	20.8	8/12/21 18:35	10.4	8/11/21 16:10	15.4	9/23/21 13:20	10.6	9/21/21 19:50	22.2	10/26/21 17:20	10.7	10/24/21 18:10	20.0
	EC-6	Riverdrive Interceptor South of Southfield Road	6/26/21 1:55	28.2	6/25/21 19:05	38.8	7/16/21 9:40	30.6	7/16/21 7:55	37.4	8/12/21 10:50	26.1	8/11/21 16:20	35.2	9/23/21 2:00	32.2	9/21/21 21:25	54.7	10/25/21 14:15	27.2	10/24/21 23:25	42.5
	RD-1	Riverdrive Interceptor North of Northline Road	6/26/21 22:05	67.3	6/25/21 19:00	127.7	7/16/21 9:40	67.2	7/16/21 8:25	142.7	8/13/21 5:05	63.6	8/11/21 16:30	117.2	9/24/21 10:40	66.3	9/21/21 19:45	151.9	10/26/21 8:00	66.3	10/24/21 22:20	139.6
	SW + SWB	Southgate-Wyandotte Connection	6/27/21 8:05	49.4	6/27/21 17:50	102.9	7/17/21 21:50	58.6	7/15/21 14:50	93.2	8/12/21 19:35	62.4	8/11/21 11:45	74.4	9/24/21 18:10	62.2	9/21/21 20:50	103.3	10/26/21 18:05	71.0	10/25/21 23:00	91.7
Tunnel Connection Meters	TSO	At Pelham Basin	6/26/21 2:45	20.8	6/25/21 18:20	8.6	7/16/21 23:20	36.8	7/16/21 7:55	18.9	8/12/21 6:45	42.5	8/12/21 1:05	10.4	9/23/21 1:30	40.7	9/21/21 23:30	16.3	10/25/21 19:35	20.3	10/24/21 21:55	5.9
	APO-1	Belmont and Rosedale	6/25/21 22:15	32.4	6/25/21 19:55	3.8	7/16/21 9:45	50.4	7/16/21 9:15	11.3	8/12/21 6:55	54.4	8/12/21 2:25	9.0	9/23/21 0:10	55.0	9/21/21 23:45	17.9	10/25/21 12:55	49.7	10/25/21 0:10	13.1

Table 7-5
Peak Hydraulic Grade Lines for Major Storm Events

System	Meter	Location	Rim Elevation (ft)	Invert Elevation (ft)	Diameter (ft)	Significant Storm Event 3 Major Storm Event A June 25-26, 2021 2.07 inches			Significant Storm Event 4 Major Storm Event B July 16-17, 2021 2.20 inches			Significant Storm Event 6 Major Storm Event C August 11-12, 2021 2.53 inches			Significant Storm Event 7 Major Storm Event D September 21-23, 2021 4.01 inches			Major Storm Event E October 24-25, 2021 2.10 inches							
						Date/Time of Occurrence	Peak Depth (ft)	Peak HGL (ft)	Date/Time of Occurrence	Peak Depth (ft)	Peak HGL (ft)	Date/Time of Occurrence	Peak Depth (ft)	Peak HGL (ft)	Date/Time of Occurrence	Peak Depth (ft)	Peak HGL (ft)	Date/Time of Occurrence	Peak Depth (ft)	Peak HGL (ft)					
Tunnel (Non-Controlled)	PC-1	Pelham Interceptor North of Goddard Road	601.9	565.0	4.5	6/26/21 2:40	4.3	569.2	○	7/16/21 14:25	5.4	570.3	○	8/12/21 7:15	8.2	573.2	○	9/23/21 1:40	7.1	572.1	○	10/25/21 13:30	5.9	570.8	○
	PD-2	Goddard Interceptor West of Inkster Road	623.3	598.3	4.5	6/26/21 3:35	2.1	600.4	○	7/16/21 15:00	2.3	600.7	○	8/12/21 5:55	2.4	600.7	○	9/23/21 3:20	1.8	600.1	○	10/25/21 15:55	1.8	600.1	○
	PD-1	Goddard Interceptor West of Allen Road	602.2	575.5	4.0	6/26/21 2:45	2.2	577.7	○	7/16/21 15:15	2.6	578.1	○	8/12/21 7:10	2.7	578.2	○	9/23/21 3:10	2.3	577.9	○	10/25/21 14:05	2.3	577.8	○
	PB-1	Northline Interceptor West of Fordline Road	596.1	569.5	3.0	6/25/21 23:05	1.5	571.1	○	7/16/21 10:35	1.9	571.4	○	8/12/21 3:25	2.0	571.5	○	9/23/21 1:40	1.9	571.5	○	10/25/21 14:45	1.7	571.2	○
	PA-4	Eureka Interceptor near Hannan Road	656.9	635.1	3.5	6/26/21 5:15	1.5	636.6	○	7/16/21 17:15	1.4	636.6	○	8/12/21 9:10	1.2	636.4	○	9/23/21 1:55	1.1	636.3	○	10/25/21 19:45	1.3	636.4	○
	PA-3	Eureka Interceptor at Inkster Road	622.6	601.0	3.5	6/26/21 0:20	2.1	603.1	○	7/16/21 15:30	2.4	603.4	○	8/12/21 8:35	2.3	603.3	○	9/23/21 2:15	2.3	603.3	○	10/25/21 15:30	2.3	603.3	○
	PA-2	Eureka Interceptor at Allen Road	601.5	576.2	4.0	6/25/21 23:45	2.3	578.5	○	7/16/21 15:40	3.4	579.5	○	8/12/21 8:35	3.4	579.5	○	9/23/21 2:10	3.7	579.9	○	10/25/21 15:20	3.3	579.5	○
	PA-1	Eureka Interceptor West of Fordline Road	594.9	570.4	4.0	6/25/21 23:50	2.0	572.4	○	7/16/21 15:25	2.7	573.1	○	8/12/21 5:15	2.0	572.4	○	9/23/21 1:50	2.9	573.3	○	10/25/21 15:15	2.8	573.2	○
	P-2	Pennsylvania Interceptor East of Dix-Toledo Road	598.9	577.3	3.0	6/26/21 0:15	1.5	578.8	○	7/16/21 15:30	1.3	578.6	○	8/12/21 4:20	1.5	578.9	○	9/23/21 2:25	1.5	578.8	○	10/25/21 15:25	1.4	578.8	○
	P-1	Pennsylvania Interceptor East of Fort Street	591.4	545.4	6.5	6/26/21 22:00	5.9	551.3	○	7/19/21 12:45	7.9	553.3	○	8/12/21 6:55	10.0	555.4	○	9/22/21 14:50	8.6	554.1	○	-	-	-	○
Riverdrive (Controlled)	RV-1	Pennsylvania Interceptor West of Jefferson Avenue	578.3	544.1	3.5	6/26/21 7:05	5.2	549.2	○	7/16/21 14:50	9.3	553.4	○	8/12/21 6:15	14.6	558.6	○	9/22/21 14:45	11.0	555.1	○	10/25/21 13:25	13.4	557.5	○
	RR-1	Riverdrive Interceptor South of Visger Road	582.2	566.2	3.0	6/26/21 2:15	7.0	573.2	○	7/16/21 12:20	8.2	574.4	○	8/12/21 6:50	8.6	574.8	○	9/23/21 1:20	7.5	573.7	○	10/25/21 15:40	7.0	573.2	○
	EC-6	Riverdrive Interceptor South of Southfield Road	579.3	554.5	4.5	6/26/21 2:15	9.9	564.4	○	7/16/21 12:20	12.2	566.8	○	-	-	-	-	9/23/21 2:40	11.6	566.1	○	10/25/21 15:15	11.9	566.4	○
	RD-1	Riverdrive Interceptor North of Northline Road	577.8	550.7	6.0	6/26/21 2:40	7.4	558.0	○	7/16/21 14:15	10.2	560.9	○	8/12/21 5:40	11.8	562.5	○	9/23/21 0:45	10.2	560.8	○	10/25/21 14:20	11.1	561.7	○
Tunnel Connection Meters	TSO	Connection to Tunnel at Pelham Basin	609.2	585.3	4.0	6/26/21 3:20	2.1	587.4	○	7/16/21 23:30	2.6	588.0	○	-	-	-	-	9/23/21 1:15	2.7	588.0	○	10/25/21 20:25	1.9	587.3	○
	APO-1	Allen Park Overflow at Belmont Road and Rosedale Road	594.6	565.5	3.0	6/25/21 22:25	9.9	575.4	○	7/16/2021 9:55 - 7/16/2021 10:25	≥10.1	≥575.6	○	8/12/2021 6:55 - 8/12/2021 7:05	≥10.2	≥575.7	○	9/23/2021 0:10 - 9/23/2021 1:25	≥10.3	≥575.8	○	10/25/2021 13:10 - 10/25/2021 13:45	≥10.3	≥575.8	○
	APO-2	Allen Park Overflow at Belmont Road and Quandt Road	597.2	571.0	3.0	6/25/21 22:40	4.8	575.8	○	7/16/2021 9:45 - 7/16/2021 10:45	≥4.5	≥575.5	○	8/12/2021 2:30 - 8/12/2021 7:55	≥4.8	≥575.8	○	9/23/2021 0:15 - 9/23/2021 1:45	≥4.7	≥575.7	○	10/25/2021 13:20 - 10/25/2021 13:30	≥4.7	≥575.7	○
	CHPO	Pelham Interceptor South of R.R.	603.0	566.5	4.5	6/25/21 22:45	4.1	570.6	○	7/16/21 14:30	4.6	571.0	○	8/12/21 7:10	7.9	574.3	○	9/23/21 1:50	6.6	573.0	○	10/25/21 13:40	5.0	571.4	○
	CPO	Pelham Interceptor North of Haskell Road	601.5	568.0	4.5	6/25/21 22:40	4.5	572.5	○	7/16/21 10:05	4.7	572.7	○	8/12/21 7:20	8.2	576.2	○	9/23/21 1:50	6.7	574.7	○	10/25/21 13:45	4.5	572.5	○
	PDO	Goddard Interceptor at Allen Road	602.0	570.0	4.0	6/25/21 22:35	0.8	570.8	○	7/16/21 15:20	0.9	570.9	○	8/12/21 7:15	4.2	574.2	○	9/23/21 1:50	2.4	572.3	○	10/25/21 14:25	0.8	570.7	○
	ER-2	Eureka Relief Sewer Extention on Eureka Road at Inkster Road	623.7	591.5	4.5	6/26/21 6:55	0.9	592.4	○	7/16/21 21:35	1.0	592.5	○	8/12/21 13:50	0.8	592.3	○	9/23/21 7:10	0.8	592.3	○	10/25/21 18:40	0.9	592.4	○
	ER-1	Eureka Relief Sewer at Allen Road	602.8	560.5	4.5	6/26/21 12:20	0.7	561.1	○	7/16/21 22:00	0.8	561.2	○	8/11/21 8:30	0.1	560.6	○	9/23/21 1:50	2.1	562.6	○	10/25/21 13:30	3.6	564.1	○
	PM-1	Pennsylvania Interceptor at Fordline Road	593.1	548.9	6.5	6/26/21 0:10	3.9	552.8	○	7/16/21 14:55	8.8	557.7	○	8/12/21 6:20	19.2	568.1	○	9/23/21 1:50	12.7	561.7	○	10/25/21 13:35	12.4	561.3	○
Tunnel Level Sensors	L-3	Allen and I-75 (North)	6																						

Table 8-1
Meter Data Review and Fixes for 2021

Meter	Start	Stop	Description of the Problem	Dry Period	Wet Period	Fix
DMA-1	2/4/2021	2/15/2021	Data unavailable due to inability to swap the battery due to access issues	X		The battery was replaced Diurnal pattern
	7/20/2021	12/31/2021	Data unavailable due to the monitor being removed for Ayyeka Wavelet configuration	X	X	Diurnal Pattern
EC-6	7/16/2021	8/20/2021	Battery died	X	X	Correlation to RR-1 and City of Ecorse Meters 1, 3 and 4
	8/26/2021	9/20/2021	Fuse tripped	X	X	
ER-1	8/11/2021	8/15/2021	Metering cabinet lost power	X	X	Correlation to ER-2
	10/29/2021	11/11/2021	Data unavailable due to power failure. Field crew found the meter unplugged from AC Power.	X	X	Correlation to Meter ER-2
ER-2	8/16/2021	9/1/2021	No data	X		Flow rate set to zero
	10/27/2021	11/2/2021	No velocity data		X	Flow rate estiamted with rating curve to depth
L-3	3/11/2021	3/26/2021	No data or depth data is zero Data downloaded locally once per month	X	X	No fix
L-5	1/1/2021	1/19/2021	No data or depth data is zero Data downloaded locally once per month	X	X	No fix
	3/1/2021	3/11/2021		X	X	
	11/18/2021	12/1/2021		X	X	
L-7	1/13/2021	2/8/2021	No data or depth data is zero Data downloaded locally once per month	X	X	No fix
	2/11/2021	3/8/2021		X	X	
	3/11/2021	3/31/2021		X	X	
	4/1/2021	4/13/2021		X	X	
	6/13/2021	6/25/2021		X	X	
	6/26/2021	6/30/2021		X	X	
	10/4/2021	10/5/2021			X	
	10/8/2021	10/14/2021		X	X	
	10/25/2021	11/5/2021		X	X	
	11/24/2021	12/1/2021		X	X	
L-8	3/11/2021	3/31/2021	No data or depth data is zero Data downloaded locally once per month	X	X	No fix
	4/1/2021	4/4/2021		X	X	
	5/1/2021	6/30/2021		X	X	
	7/1/2021	9/3/2021		X	X	
	9/22/2021	9/24/2021			X	
	9/26/2021	9/30/2021		X		
	10/25/2021	10/27/2021			X	
	11/24/2021	11/29/2021		X		
P-1	2/17/2021	12/31/2021	Pressure depth sensor failed Meter programming corrupted Power supply failed	X	X	New pressure sensor installed. Meter reprogrammed with new parameters. New power supply installed. Correlation to sum of upstream Meters [P-2] + [PA-1] + [PB-1] + [PC-1] + [PD-1]
PA-1	7/18/2021	8/20/2021	Bad depth data	X	X	Correlation to PA-2
PA-3	1/19/2021	1/28/2021	Data unavailable due to a battery failure	X		The battery was replaced Correlation to Meter PA-2
PA-4	4/12/2021	4/14/2021	Data unavailable due to a battery failure.	X	X	The battery was replaced.
PB-1	7/16/2021	8/12/2021	Fuse tripped	X	X	Correlation to PA-2
TSO	1/20/2021	1/28/2021	Data unavailable due to a battery failure	X		The battery was replaced Flow rate set to zero
	8/9/2021	8/20/2021	No data	X	X	Correlation to CHPO
RV-1	12/4/2021	12/17/2021	Meter programming corrupted	X	X	Meter reprogrammed Correlation to Meter P-2

Appendix A

Additional Monthly Summary Tables

Table A-1
Incremental Flow Rates Summarized by Meter District with Community Components

Meter District	Community	Year 2020 Incremental Population	Meter District Percentage	January 2021			February 2021			March 2021			April 2021			May 2021			June 2021				
				Total		Dry Weather		Total		Dry Weather		Total		Dry Weather		Total		Dry Weather		Total		Dry Weather	
				Average Daily Flow Rate (cfs)	Average Daily Flow Rate (cfs)	Average Per Capita Flow Rate (gpcd)	Average Daily Flow Rate (cfs)	Average Daily Flow Rate (cfs)	Average Per Capita Flow Rate (gpcd)	Average Daily Flow Rate (cfs)	Average Daily Flow Rate (cfs)	Average Per Capita Flow Rate (gpcd)	Average Daily Flow Rate (cfs)	Average Daily Flow Rate (cfs)	Average Per Capita Flow Rate (gpcd)	Average Daily Flow Rate (cfs)	Average Daily Flow Rate (cfs)	Average Per Capita Flow Rate (gpcd)	Average Daily Flow Rate (cfs)	Average Daily Flow Rate (cfs)	Average Per Capita Flow Rate (gpcd)	Average Daily Flow Rate (cfs)	Average Daily Flow Rate (cfs)
TB-1	Dearborn Heights	19,472	77.7%	3.55	3.20	106	3.16	2.50	83	4.38	3.05	101	3.97	3.58	119	2.95	2.67	89	4.57	2.31	77		
	Taylor	5,574	22.3%	1.02	0.92		0.90	0.72		1.25	0.87		1.14	1.03		0.84	0.76		1.31	0.66			
	Total	25,046	100.0%	4.56	4.12		4.06	3.22		5.63	3.92		5.10	4.61		3.79	3.44		5.88	2.97			
PC-1	Allen Park	716	2.7%	0.13	0.12	104	0.11	0.09	84	0.14	0.11	95	0.14	0.13	114	0.11	0.10	88	0.14	0.09	80		
	Taylor	25,577	97.3%	4.53	4.13		4.04	3.32		4.99	3.76		4.96	4.50		3.84	3.49		4.91	3.16			
	Total	26,293	100.0%	4.65	4.24		4.15	3.41		5.13	3.86		5.10	4.63		3.95	3.59		5.05	3.25			
DMA-2	Romulus	0	100.0%	0.92	0.95	--	0.66	0.60	--	1.43	1.25	--	2.94	2.87	--	0.97	0.72	--	1.51	0.19	--		
PD-2	Romulus	8,069	100.0%	2.50	2.44	195	2.40	2.19	175	2.94	2.44	195	3.06	2.95	237	2.35	2.26	181	2.82	2.20	176		
PD-1	Taylor	13,083	100.0%	2.01	1.90	94	1.67	1.53	76	1.89	1.67	82	1.57	1.51	75	1.62	1.62	80	1.85	1.62	80		
PB-1	Taylor	5,040	61.1%	1.10	1.04	133	1.06	0.94	120	1.23	1.03	133	1.24	1.17	150	1.10	1.05	135	1.23	0.99	127		
	Southgate	3,214	38.9%	0.70	0.66	133	0.68	0.60	120	0.78	0.66	133	0.79	0.74	150	0.70	0.67	135	0.78	0.63	127		
	Total	8,254	100.0%	1.81	1.70	133	1.74	1.54	120	2.01	1.69	133	2.04	1.91	150	1.81	1.73	135	2.01	1.63	127		
PA-4	Belleville	4,008	33.8%	0.60	0.59	95	0.55	0.53	86	0.65	0.62	99	0.71	0.69	111	0.62	0.61	98	0.78	0.60	97		
	Van Buren Twp	7,865	66.2%	1.17	1.16		1.07	1.04		1.28	1.21		1.40	1.36		1.22	1.20		1.53	1.18			
	Total	11,873	100.0%	1.77	1.75		1.62	1.57		1.94	1.83		2.11	2.05		1.84	1.81		2.30	1.79			
DMA-1	Romulus (Airport)	0	100.0%	0.43	0.40	--	0.39	0.36	--	0.40	0.38	--	0.45	0.45	--	0.50	0.49	--	0.63	0.53	--		
PA-3	Romulus	14,420	100.0%	4.40	4.24	190	3.90	3.72	167	4.63	4.15	186	4.53	4.38	196	3.77	3.71	166	4.20	3.66	164		
PA-2	Taylor	14,125	99.8%	2.34	2.26	104	2.23	1.99	91	2.59	2.22	102	2.41	2.30	105	1.59	1.54	70	2.66	2.13	98		
	Brownstown Twp	29	0.2%	0.00	0.00		0.00	0.00		0.01	0.00		0.00	0.00		0.00	0.00		0.01	0.00			
	Total	14,154	100.0%	2.34	2.27		2.23	1.99		2.60	2.23		2.42	2.31		1.60	1.54		2.67	2.14			
P-2	Brownstown Twp	11,002	99.9%	2.32	2.25	132	2.20	2.10	124	2.45	2.25	132	2.46	2.37	139	2.34	2.31	136	2.42	2.15	126		
	Taylor	10	0.1%	0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00			
	Total	11,012	100.0%	2.32	2.26		2.20	2.10		2.45	2.26		2.46	2.37		2.34	2.32		2.43	2.15			
P-1	Allen Park	2,338	17.4%	0.49	0.46	128	0.44	0.39	109	0.55	0.45	125	0.56	0.53	147	0.43	0.41	114	0.56	0.39	108		
	Southgate	11,079	82.6%	2.32	2.20		2.10	1.86		2.61	2.15		2.66	2.52		2.06	1.95		2.66	1.85			
	Total	13,417	100.0%	2.81	2.67		2.54	2.26		3.16	2.61		3.23	3.05		2.49	2.36		3.22	2.25			
RV-1	Riverview	12,490	100.0%	2.61	2.43	125	2.44	2.04	105	2.77	2.19	113	2.74	2.46	127	2.36	2.18	113	2.82	2.19	113		
RR-1	River Rouge	7,224	100.0%	2.21	2.01	180	1.93	1.62	145	2.68	1.94	174	2.74	2.40	215	2.44	2.10	188	3.80	2.17	195		
EC-6	Ecorse	9,305	69.1%	3.62	3.46	240	3.34	3.16	220	3.66	3.62	2											

Table A-1 continued
Incremental Flow Rates Summarized by Meter District with Community Components

Meter District	Community	Year 2020 Incremental Population	Meter District Percentage	July 2021			August 2021			September 2021			October 2021			November 2021			December 2021				
				Total		Dry Weather		Total		Dry Weather		Total		Dry Weather		Total		Dry Weather		Total		Dry Weather	
				Average Daily Flow Rate (cfs)	Average Daily Flow Rate (cfs)	Average Per Capita Flow Rate (gpcd)	Average Daily Flow Rate (cfs)	Average Daily Flow Rate (cfs)	Average Per Capita Flow Rate (gpcd)	Average Daily Flow Rate (cfs)	Average Daily Flow Rate (cfs)	Average Per Capita Flow Rate (gpcd)	Average Daily Flow Rate (cfs)	Average Daily Flow Rate (cfs)	Average Per Capita Flow Rate (gpcd)	Average Daily Flow Rate (cfs)	Average Daily Flow Rate (cfs)	Average Per Capita Flow Rate (gpcd)	Average Daily Flow Rate (cfs)	Average Daily Flow Rate (cfs)	Average Per Capita Flow Rate (gpcd)	Average Daily Flow Rate (cfs)	Average Daily Flow Rate (cfs)
TB-1	Dearborn Heights	19,472	77.7%	6.91	3.12	104	5.29	3.18	105	5.29	2.51	83	7.21	5.07	168	5.42	4.14	137	7.19	4.94	164		
	Taylor	5,574	22.3%	1.98	0.89		1.51	0.91		1.51	0.72		2.06	1.45		1.55	1.18		2.06	1.41			
	Total	25,046	100.0%	8.89	4.01		6.80	4.09		6.80	3.23		9.28	6.52		6.97	5.32		9.25	6.36			
PC-1	Allen Park	716	2.7%	0.17	0.10	94	0.19	0.11	96	0.19	0.10	93	0.20	0.13	120	0.19	0.17	149	0.28	0.22	196		
	Taylor	25,577	97.3%	6.06	3.72		6.73	3.82		6.66	3.68		7.20	4.74		6.93	5.90		9.83	7.76			
	Total	26,293	100.0%	6.23	3.83		6.92	3.92		6.84	3.78		7.40	4.88		7.12	6.07		10.11	7.98			
DMA-2	Romulus	0	100.0%	1.56	2.30	--	0.25	0.22	--	0.20	0.19	--	0.18	0.16	--	1.48	1.77	--	1.66	2.16	--		
PD-2	Romulus	8,069	100.0%	3.76	2.89	231	3.22	2.73	219	3.22	2.46	197	3.75	2.89	232	3.60	3.39	272	4.68	4.07	326		
PD-1	Taylor	13,083	100.0%	2.31	1.59	78	2.50	1.72	85	2.85	1.85	91	3.21	2.37	117	2.39	2.09	103	3.06	2.23	110		
PB-1	Taylor	5,040	61.1%	1.58	1.25	161	1.39	1.06	136	1.53	1.04	134	1.74	1.23	158	1.29	1.16	148	1.76	1.37	176		
	Southgate	3,214	38.9%	1.01	0.80	161	0.88	0.68	136	0.98	0.66	134	1.11	0.78	158	0.82	0.74	148	1.12	0.88	176		
	Total	8,254	100.0%	2.60	2.05	161	2.27	1.73	136	2.51	1.71	134	2.86	2.01	158	2.12	1.90	148	2.89	2.25	176		
PA-4	Belleville	4,008	33.8%	0.87	0.77	123	0.68	0.64	103	0.64	0.56	90	0.78	0.65	105	0.73	0.69	111	0.82	0.76	123		
	Van Buren Twp	7,865	66.2%	1.71	1.50		1.33	1.25		1.25	1.10		1.54	1.28		1.44	1.36		1.61	1.49			
	Total	11,873	100.0%	2.57	2.27		2.00	1.88		1.89	1.65		2.32	1.93		2.17	2.05		2.43	2.26			
DMA-1	Romulus (Airport)	0	100.0%	0.61	0.57	--	0.57	0.57	--	0.57	0.57	--	0.57	0.57	--	0.57	0.57	--	0.57	0.57	--		
PA-3	Romulus	14,420	100.0%	5.00	4.31	193	4.73	4.16	187	4.57	3.49	156	5.19	4.27	191	5.23	5.14	231	6.33	5.86	263		
PA-2	Taylor	14,125	99.8%	3.51	2.75	126	2.81	2.08	95	3.48	2.40	110	4.34	3.01	138	3.37	2.87	131	4.52	3.64	166		
	Brownstown Twp	29	0.2%	0.01	0.01		0.01	0.00		0.01	0.00		0.01	0.01		0.01	0.01		0.01	0.01			
	Total	14,154	100.0%	3.52	2.75		2.81	2.08		3.49	2.40		4.35	3.02		3.38	2.88		4.53	3.65			
P-2	Brownstown Twp	11,002	99.9%	2.48	2.19	129	2.40	2.10	123	2.49	2.06	121	3.07	2.56	150	2.78	2.65	156	3.12	2.81	165		
	Taylor	10	0.1%	0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00			
	Total	11,012	100.0%	2.48	2.19		2.40	2.10		2.50	2.06		3.08	2.56		2.78	2.65		3.12	2.82			
P-1	Allen Park	2,338	17.4%	0.75	0.51	141	0.88	0.45	123	0.94	0.41	114	0.89	0.55	152	0.67	0.60	165	0.86	0.71	197		
	Southgate	11,079	82.6%	3.55	2.41		4.19	2.11		4.45	1.96		4.21	2.61		3.17	2.83		4.09	3.37			
	Total	13,417	100.0%	4.30	2.92		5.07	2.56		5.39	2.37		5.10	3.16		3.84	3.43		4.95	4.08			
RV-1	Riverview	12,490	100.0%	3.22	2.28	118	2.68	2.11	109	3.16	2.13	110	3.97	2.36	122	2.87	2.40	124	3.64	2.74	142		
RR-1	River Rouge	7,224	100.0%	4.56	2.90	259	3.59	2.96	265	3.45	2.35	210	4.32	2.40	215	3.94	3.46	310	5.01	3.88	347		
EC-6	Ecorse	9,305	69.1%	3.70	3.55	246	3.87	3.56	247	4.00	3.10</td												

Table A-2
Incremental Flow Rates by Meter District

Meter District	Incremental Meter District Formula	Year 2020 Incremental Population	January 2021			February 2021			March 2021			April 2021			May 2021			June 2021				
			Total		Dry Weather		Total		Dry Weather		Total		Dry Weather		Total		Dry Weather		Total		Dry Weather	
			Average Daily Flow Rate (cfs)	Average Daily Flow Rate (cfs)	Average Per Capita Flow Rate (gpcd)	Average Daily Flow Rate (cfs)	Average Daily Flow Rate (cfs)	Average Per Capita Flow Rate (gpcd)	Average Daily Flow Rate (cfs)	Average Daily Flow Rate (cfs)	Average Per Capita Flow Rate (gpcd)	Average Daily Flow Rate (cfs)	Average Daily Flow Rate (cfs)	Average Per Capita Flow Rate (gpcd)	Average Daily Flow Rate (cfs)	Average Daily Flow Rate (cfs)	Average Per Capita Flow Rate (gpcd)	Average Daily Flow Rate (cfs)	Average Daily Flow Rate (cfs)	Average Per Capita Flow Rate (gpcd)		
TB-1	[TB-1]+[TSO]	25,046	4.56	4.12	106	4.06	3.22	83	5.63	3.92	101	5.10	4.61	119	3.79	3.44	89	5.88	2.97	77		
PC-1	[PC-1]+[CPO]+[CHPO]-[TB-1]	26,293	4.65	4.24	104	4.15	3.41	84	5.13	3.86	95	5.10	4.63	114	3.95	3.59	88	5.05	3.25	80		
DMA-2	[DMA-2]	0	0.92	0.95	-	0.66	0.60	-	1.43	1.25	-	2.94	2.87	-	0.97	0.72	-	1.51	0.19	-		
PD-2	[PD-2] - [DMA-2]	8,069	2.50	2.44	195	2.40	2.19	175	2.94	2.44	195	3.06	2.95	237	2.35	2.26	181	2.82	2.20	176		
PD-1	[PD-1]-[PD-2]+[PDO]	13,083	2.01	1.90	94	1.67	1.53	76	1.89	1.67	82	1.57	1.51	75	1.62	1.62	80	1.85	1.62	80		
PB-1	[PB-1]	8,254	1.81	1.70	133	1.74	1.54	120	2.01	1.69	133	2.04	1.91	150	1.81	1.73	135	2.01	1.63	127		
PA-4	[PA-4]	11,873	1.77	1.75	95	1.62	1.57	86	1.94	1.83	99	2.11	2.05	111	1.84	1.81	98	2.30	1.79	97		
DMA-1	[DMA-1]	0	0.43	0.40	-	0.39	0.36	-	0.40	0.38	-	0.45	0.45	-	0.50	0.49	-	0.63	0.53	-		
PA-3	[PA-3]+[ER-2]-[PA-4]-[DMA-1]	14,420	4.40	4.24	190	3.90	3.72	167	4.63	4.15	186	4.53	4.38	196	3.77	3.71	166	4.20	3.66	164		
PA-2	[PA-2]+[ER-1]-[PA-3]-[ER-2]	14,154	2.34	2.27	104	2.23	1.99	91	2.60	2.23	102	2.42	2.31	105	1.60	1.54	70	2.67	2.14	98		
P-2	[P-2]	11,012	2.32	2.26	132	2.20	2.10	124	2.45	2.26	132	2.46	2.37	139	2.34	2.32	136	2.43	2.15	126		
P-1	[P-1]+[PM-1]-[P-2]-[PA-2]-[PB-1]-[PD-1]-[PC-1]	13,417	2.81	2.67	128	2.54	2.26	109	3.16	2.61	125	3.23	3.05	147	2.49	2.36	114	3.22	2.25	108		
RV-1	[RV-1]	12,490	2.61	2.43	125	2.44	2.04	105	2.77	2.19	113	2.74	2.46	127	2.36	2.18	113	2.82	2.19	113		
RR-1	[RR-1]	7,224	2.21	2.01	180	1.93	1.62	145	2.68	1.94	174	2.74	2.40	215	2.44	2.10	188	3.80	2.17	195		
EC-6	[EC-6]-[RR-1]	13,474	5.25	5.01	240	4.83	4.58	220	5.31	5.24	252	4.57	4.57	219	4.50	4.33	208	4.66	4.17	200		
RD-1	[RD-1]-[EC-6]	58,246	10.71	8.68	96	9.39	6.03	67	11.70	6.40	71	11.37	9.04	100	9.65	7.93	88	16.03	8.00	89		
APO-1 + APO-2	[APO-1]+[APO-2]	0	0.00	0.00	-	0.00	0.00	-	0.09	0.00	-	0.00	0.00	-	0.00	0.00	-	0.39	0.00	-		
SW+SWB	[SW]+[SWB]	40,061	16.84	13.81	223	14.32	10.20	165	15.95	11.19	181	16.51	12.79	206	13.87	11.02	178	19.38	11.42	184		
TPS+IPS ¹	Population Ratio of Meter District P-1	718	0.15	0.14	128	0.14	0.12	109	0.17	0.14	125	0.17	0.16	147	0.13	0.13	114	0.17	0.12	108		

Notes:

1) ([TPS+IPS] Inc. Flow Rate) = (TPS-IPS Inc. Pop. / P-1 Inc. Pop.) x ([P-1] Inc. Flow Rate)

Table A-2 continued
Incremental Flow Rates by Meter District

Meter District	Incremental Meter District Formula	Year 2020 Incremental Population	July 2021			August 2021			September 2021			October 2021			November 2021			December 2021				
			Total		Dry Weather		Total		Dry Weather		Total		Dry Weather		Total		Dry Weather		Total		Dry Weather	
			Average Daily Flow Rate (cfs)	Average Daily Flow Rate (cfs)	Average Per Capita Flow Rate (gpcd)	Average Daily Flow Rate (cfs)	Average Daily Flow Rate (cfs)	Average Per Capita Flow Rate (gpcd)	Average Daily Flow Rate (cfs)	Average Daily Flow Rate (cfs)	Average Per Capita Flow Rate (gpcd)	Average Daily Flow Rate (cfs)	Average Daily Flow Rate (cfs)	Average Per Capita Flow Rate (gpcd)	Average Daily Flow Rate (cfs)	Average Daily Flow Rate (cfs)	Average Per Capita Flow Rate (gpcd)	Average Daily Flow Rate (cfs)	Average Daily Flow Rate (cfs)	Average Per Capita Flow Rate (gpcd)		
TB-1	[TB-1]+[TSO]	25,046	8.89	4.01	104	6.80	4.09	105	6.80	3.23	83	9.28	6.52	168	6.97	5.32	137	9.25	6.36	164		
PC-1	[PC-1]+[CPO] +[CHPO]-[TB-1]	26,293	6.23	3.83	94	6.92	3.92	96	6.84	3.78	93	7.40	4.88	120	7.12	6.07	149	10.11	7.98	196		
DMA-2	[DMA-2]	0	1.56	2.30	-	0.25	0.22	-	0.20	0.19	-	0.18	0.16	-	1.48	1.77	-	1.66	2.16	-		
PD-2	[PD-2] - [DMA-2]	8,069	3.76	2.89	231	3.22	2.73	219	3.22	2.46	197	3.75	2.89	232	3.60	3.39	272	4.68	4.07	326		
PD-1	[PD-1]-[PD-2]+[PDO]	13,083	2.31	1.59	78	2.50	1.72	85	2.85	1.85	91	3.21	2.37	117	2.39	2.09	103	3.06	2.23	110		
PB-1	[PB-1]	8,254	2.60	2.05	161	2.27	1.73	136	2.51	1.71	134	2.86	2.01	158	2.12	1.90	148	2.89	2.25	176		
PA-4	[PA-4]	11,873	2.57	2.27	123	2.00	1.88	103	1.89	1.65	90	2.32	1.93	105	2.17	2.05	111	2.43	2.26	123		
DMA-1	[DMA-1]	0	0.61	0.57	-	0.57	0.57	-	0.57	0.57	-	0.57	0.57	-	0.57	0.57	-	0.57	0.57	-		
PA-3	[PA-3]+[ER-2] -[PA-4]-[DMA-1]	14,420	5.00	4.31	193	4.73	4.16	187	4.57	3.49	156	5.19	4.27	191	5.23	5.14	231	6.33	5.86	263		
PA-2	[PA-2]+[ER-1] -[PA-3]-[ER-2]	14,154	3.52	2.75	126	2.81	2.08	95	3.49	2.40	110	4.35	3.02	138	3.38	2.88	131	4.53	3.65	166		
P-2	[P-2]	11,012	2.48	2.19	129	2.40	2.10	123	2.50	2.06	121	3.08	2.56	150	2.78	2.65	156	3.12	2.82	165		
P-1	[P-1]+[PM-1]-[P-2] -[PA-2]-[PB-1]-[PD-1]-[PC-1]	13,417	4.30	2.92	141	5.07	2.56	123	5.39	2.37	114	5.10	3.16	152	3.84	3.43	165	4.95	4.08	197		
RV-1	[RV-1]	12,490	3.22	2.28	118	2.68	2.11	109	3.16	2.13	110	3.97	2.36	122	2.87	2.40	124	3.64	2.74	142		
RR-1	[RR-1]	7,224	4.56	2.90	259	3.59	2.96	265	3.45	2.35	210	4.32	2.40	215	3.94	3.46	310	5.01	3.88	347		
EC-6	[EC-6]-[RR-1]	13,474	5.36	5.13	246	5.61	5.15	247	5.80	4.49	215	5.92	4.84	232	3.60	3.38	162	4.52	3.18	152		
RD-1	[RD-1]-[EC-6]	58,246	19.22	9.84	109	15.34	8.47	94	15.10	8.55	95	19.11	9.76	108	16.07	11.36	126	22.52	12.66	140		
APO-1 + APO-2	[APO-1]+[APO-2]	0	1.32	0.00	-	0.82	0.00	-	1.73	0.00	-	1.59	0.00	-	0.00	0.00	-	0.17	0.00	-		
SW+SWB	[SW]+[SWB]	40,061	23.68	15.89	256	20.34	13.97	225	19.12	13.85	224	24.56	14.83	239	19.62	14.57	235	24.66	13.44	217		
TPS+IPS ¹	Population Ratio of Meter District P-1	718	0.23	0.16	141	0.27	0.14	123	0.29	0.13	114	0.27	0.17	152	0.21	0.18	165	0.26	0.22	197		

Notes:

1) ([TPS+IPS] Inc. Flow Rate) = (TPS-IPS Inc. Pop. / P-1 Inc. Pop.) x ([P-1] Inc. Flow Rate)

Table A-3
Monthly Flow Rates by Meter for 2021

System	Meter	Location	Year 2020 Cumulative Population	Average Flow Rates (cfs)												
				January	February	March	April	May	June	July	August	September	October	November	December	Average Annual
Tunnel (Non-Controlled)	TB-1	Taylor Basin	25,046	4.56	4.06	5.63	5.10	3.79	5.54	7.84	6.28	5.96	8.97	6.97	9.21	6.17
	PC-1	Pelham Interceptor North of Goddard Road	51,339	9.22	8.21	10.70	10.20	7.74	10.43	13.46	11.86	11.68	15.64	14.09	19.10	11.88
	DTW Pond 3 West	Detroit Metro Airport	0	0.32	0.28	0.81	2.80	0.84	1.44	1.33	0.00	0.00	0.00	1.41	1.70	0.91
	DMA-2	Detroit Metro Airport	0	0.92	0.66	1.43	2.94	0.97	1.51	1.56	0.25	0.20	0.18	1.48	1.66	1.14
	PD-2	Goddard Interceptor West of Inkster Road	8,069	3.42	3.06	4.37	6.00	3.32	4.33	5.32	3.47	3.42	3.93	5.08	6.33	4.34
	PD-1	Goddard Interceptor West of Allen Road	21,152	5.42	4.73	6.27	7.57	4.94	6.18	7.63	5.97	6.27	7.14	7.47	9.39	6.59
	PB-1	Northline Interceptor West of Fordline Road	8,254	1.81	1.74	2.01	2.04	1.81	2.01	2.60	2.27	2.51	2.86	2.12	2.89	2.22
	PA-4	Eureka Interceptor near Hannan Road	11,873	1.77	1.62	1.94	2.11	1.84	2.30	2.57	2.00	1.89	2.32	2.17	2.43	2.08
	DMA-1	Detroit Metro Airport Connection to the Eureka Interceptor	0	0.43	0.39	0.40	0.45	0.50	0.63	0.61	0.57	0.57	0.57	0.57	0.57	0.52
	PA-3	Eureka Interceptor at Inkster Road	26,293	6.59	5.92	6.97	7.10	6.11	7.06	8.10	7.26	6.97	7.97	7.96	9.30	7.28
	PA-2	Eureka Interceptor at Allen Road	40,447	8.93	8.15	9.57	9.51	7.70	9.64	11.52	10.04	10.38	12.17	11.31	13.77	10.24
	PA-1	Eureka Interceptor West of Fordline Road	40,447	9.26	8.60	10.59	10.96	8.88	10.81	12.15	10.04	10.58	12.68	11.28	15.22	10.93
	P-2	Pennsylvania Interceptor East of Dix-Toledo Road	11,012	2.32	2.20	2.45	2.46	2.34	2.43	2.48	2.40	2.50	3.08	2.78	3.12	2.55
	P-1	Pennsylvania Interceptor East of Fort Street	145,621	30.52	27.59	34.16	35.01	27.02	33.91	41.83	36.12	37.11	45.33	41.61	53.22	37.00
	RV-1	Pennsylvania Interceptor West of Jefferson Avenue	12,490	2.61	2.44	2.77	2.74	2.36	2.82	3.22	2.68	3.16	3.97	2.87	3.64	2.94
Riverdrive (Controlled)	RR-1	River Rouge CSO Basin Outlet	7,224	2.21	1.93	2.68	2.74	2.44	3.80	4.56	3.59	3.45	4.32	3.94	5.01	3.40
	EC-6	Riverdrive Interceptor South of Southfield Road	20,698	7.46	6.77	7.98	7.30	6.93	8.46	9.92	9.20	9.25	10.24	7.54	9.53	8.39
	RD-1	Riverdrive Interceptor North of Northline Road	78,944	18.17	16.16	19.68	18.67	16.58	24.49	29.14	24.54	24.35	29.34	23.61	32.05	23.11
	SW	On Southgate-Wyandotte Connection	40,061	16.07	13.62	14.86	15.25	13.13	16.21	19.78	17.60	17.70	22.56	17.97	21.95	17.25
	SWB	Southgate-Wyandotte Basin	0	0.77	0.70	1.09	1.26	0.74	3.17	3.90	2.74	1.41	2.00	1.65	2.71	1.85
Tunnel Connection Meters	TSO	Connection to Tunnel at Pelham Basin	0	0.00	0.00	0.00	0.00	0.00	0.33	1.06	0.52	0.84	0.31	0.00	0.04	0.26
	APO-1	Allen Park Connection to Tunnel at Belmont and Rosedale Road	0	0.00	0.00	0.00	0.00	0.00	0.19	0.75	0.45	0.92	0.96	0.00	0.08	0.28
	APO-2	Allen Park Connection to Tunnel at Belmont and Quandt Road	0	0.00	0.00	0.09	0.00	0.00	0.20	0.58	0.37	0.80	0.63	0.00	0.08	0.23
	CHPO	Pelham Interceptor Connection to Tunnel North of Haskell Road	0	0.00	0.00	0.05	0.00	0.00	0.12	0.29	0.67	0.67	0.57	0.00	0.15	0.21
	CPO	Pelham Interceptor Connection to Tunnel South of R.R.	0	0.00	0.00	0.00	0.00	0.00	0.05	0.32	0.66	0.46	0.16	0.00	0.07	0.14
	PDO	Goddard Interceptor Connection to Tunnel at Allen Road	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
	ER-2	Eureka Relief Sewer Extention Connection to Tunnel at Inkster Road	0	0.00	0.00	0.00	0.00	0.00	0.07	0.09	0.04	0.06	0.11	0.00	0.04	0.03
	ER-1	Eureka Relief Sewer Connection to Tunnel at Allen Road	0	0.00	0.00	0.00	0.00	0.00	0.16	0.18	0.07	0.13	0.26	0.03	0.09	0.08
	PM-1	Pennsylvania Interceptor Connection to Tunnel at Fordline Road	0	0.00	0.00	0.00	0.00	0.00	0.00	0.16	1.49	1.61	0.66	0.00	0.00	0.33
DWTF	P-1+RD-1+RV-1+SW+SWB +Tunnel Connections	End of Interceptor System Meters	277,116	68.14	60.50	72.70	72.94	59.82	81.63	101.20	87.94	89.17	106.74	87.74	114.09	83.69
	(IPS + TPS)	DWTF Including Recycle	277,834	69.62	61.57	74.38	74.73	61.06	85.19	106.25	89.26	91.34	110.42	88.33	115.70	85.79
	(IPS + TPS - Recycle)	DWTF without Recycle	277,834	65.46	57.65	69.77	71.03	57.84	80.68	101.50	84.01	85.44	104.80	83.28	109.98	81.09
	Recycle	End of Interceptor System Meters	0	4.15	3.93	4.61	3.70	3.21	4.51	4.75	5.25	5.90	5.61	5.05	5.72	4.70

Table A-4
Average Flow Rates by Meter

System	Meter	Year 2020 Cumulative Population	January 2021			February 2021			March 2021			April 2021			May 2021			June 2021		
			Total	Dry Weather		Total	Dry Weather		Total	Dry Weather		Total	Dry Weather		Total	Dry Weather		Total	Dry Weather	
			Average Daily Flow Rate (cfs)	Average Daily Flow Rate (cfs)	Average Per Capita Flow Rate (gpcd)	Average Daily Flow Rate (cfs)	Average Daily Flow Rate (cfs)	Average Per Capita Flow Rate (gpcd)	Average Daily Flow Rate (cfs)	Average Daily Flow Rate (cfs)	Average Per Capita Flow Rate (gpcd)	Average Daily Flow Rate (cfs)	Average Daily Flow Rate (cfs)	Average Per Capita Flow Rate (gpcd)	Average Daily Flow Rate (cfs)	Average Daily Flow Rate (cfs)	Average Per Capita Flow Rate (gpcd)	Average Daily Flow Rate (cfs)	Average Daily Flow Rate (cfs)	Average Per Capita Flow Rate (gpcd)
Tunnel (Non-Controlled)	TB-1	25,046	4.56	4.12	106	4.06	3.22	83	5.63	3.92	101	5.10	4.61	119	3.79	3.44	89	5.54	2.97	77
	PC-1	51,339	9.22	8.36	105	8.21	6.63	83	10.70	7.78	98	10.20	9.24	116	7.74	7.02	88	10.43	6.22	78
	DTW Pond 3 West	0	0.32	0.35	-	0.28	0.26	-	0.81	0.56	-	2.80	2.72	-	0.84	0.58	-	1.44	0.00	-
	DMA-2	0	0.92	0.95	-	0.66	0.60	-	1.43	1.25	-	2.94	2.87	-	0.97	0.72	-	1.51	0.19	-
	PD-2	8,069	3.42	3.39	271	3.06	2.78	223	4.37	3.69	296	6.00	5.83	467	3.32	2.98	239	4.33	2.39	191
	PD-1	21,152	5.42	5.29	162	4.73	4.32	132	6.27	5.36	164	7.57	7.34	224	4.94	4.61	141	6.18	4.01	123
	PB-1	8,254	1.81	1.70	133	1.74	1.54	120	2.01	1.69	133	2.04	1.91	150	1.81	1.73	135	2.01	1.63	127
	PA-4	11,873	1.77	1.75	95	1.62	1.57	86	1.94	1.83	99	2.11	2.05	111	1.84	1.81	98	2.30	1.79	97
	DMA-1	0	0.43	0.40	-	0.39	0.36	-	0.40	0.38	-	0.45	0.45	-	0.50	0.49	-	0.63	0.53	-
	PA-3	26,293	6.59	6.39	157	5.92	5.65	139	6.97	6.36	156	7.10	6.87	169	6.11	6.01	148	7.06	5.98	147
	PA-2	40,447	8.93	8.65	138	8.15	7.64	122	9.57	8.59	137	9.51	9.18	147	7.70	7.55	121	9.64	8.12	130
	PA-1	40,447	9.26	8.80	141	8.60	7.79	124	10.59	9.28	148	10.96	10.44	167	8.88	8.51	136	10.81	9.04	145
	P-2	11,012	2.32	2.26	132	2.20	2.10	124	2.45	2.26	132	2.46	2.37	139	2.34	2.32	136	2.43	2.15	126
	P-1 ¹	145,621	30.52	28.93	128	27.59	24.48	109	34.16	28.28	125	35.01	33.09	147	27.02	25.58	114	33.91	24.38	108
	RV-1	12,490	2.61	2.43	125	2.44	2.04	105	2.77	2.19	113	2.74	2.46	127	2.36	2.18	113	2.82	2.19	113
Riverdrive (Controlled)	RR-1	7,224	2.21	2.01	180	1.93	1.62	145	2.68	1.94	174	2.74	2.40	215	2.44	2.10	188	3.80	2.17	195
	EC-6	20,698	7.46	7.03	219	6.77	6.20	194	7.98	7.18	224	7.30	6.97	218	6.93	6.43	201	8.46	6.34	198
	RD-1	78,944	18.17	15.71	129	16.16	12.24	100	19.68	13.58	111	18.67	16.01	131	16.58	14.36	118	24.49	14.34	117
	SW (with sludge depth)	40,061	16.07	13.81	223	13.62	10.19	164	14.86	11.19	181	15.25	12.79	206	13.13	10.82	174	16.21	11.42	184
	SWB	0	0.77	0.00	-	0.70	0.01	-	1.09	0.00	-	1.26	0.00	-	0.74	0.20	-	3.17	0.00	-
Tunnel Connection Meters	TSO	0	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.33	0.00	-
	APO-1	0	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.19	0.00	-
	APO-2	0	0.00	0.00	-	0.00	0.00	-	0.09	0.00	-	0.00	0.00	-	0.00	0.00	-	0.20	0.00	-
	CHPO	0	0.00	0.00	-	0.00	0.00	-	0.05	0.00	-	0.00	0.00	-	0.00	0.00	-	0.12	0.00	-
	CPO	0	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.05	0.00	-
	PDO	0	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-
	ER-2	0	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.07	0.00	-
	ER-1	0	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.16	0.00	-
	PM-1	0	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-
	Total	0	0.00	0.00	-	0.00	0.00	-	0.14	0.00	-	0.00	0.00	-	0.00	0.00	-	1.04	0.00	-
DWTF	P-1+RV-1+RD-1+SW+SWB +Tunnel Connections	277,116	68.14	60.88	142	60.50	48.95	114	72.70	55.24	129	72.94	64.36	150	59.82	53.13	124	81.63	52.34	122
	DWTF Including Recycle (IPS + TPS)	277,834	69.62	61.73	144	61.57	49.47	115	74.38	55.32	129	74.73	65.20	152	61.06	54.78	127	85.19	52.46	122
	DWTF without Recycle (IPS + TPS - Recycle)	277,834	65.46	57.70	134	57.65	45.73	106	69.77	51.55	120	71.03	62.11	144	57.84	51.53	120	80.68	49.69	116
	Recycle	0	4.15	4.04	-	3.93	3.74	-	4.61	3.78	-	3.70	3.09	-	3.21	3.25	-	4.51	2.78	-

Notes:

1) [P-1] = [P-2] + [PA-2] + [PB-1] + [

Table A-4 continued
Average Flow Rates by Meter

System	Meter	Year 2020 Cumulative Population	July 2021			August 2021			September 2021			October 2021			November 2021			December 2021		
			Total	Dry Weather		Total	Dry Weather		Total	Dry Weather		Total	Dry Weather		Total	Dry Weather		Total	Dry Weather	
			Average Daily Flow Rate (cfs)	Average Daily Flow Rate (cfs)	Average Per Capita Flow Rate (gpcd)	Average Daily Flow Rate (cfs)	Average Daily Flow Rate (cfs)	Average Per Capita Flow Rate (gpcd)	Average Daily Flow Rate (cfs)	Average Daily Flow Rate (cfs)	Average Per Capita Flow Rate (gpcd)	Average Daily Flow Rate (cfs)	Average Daily Flow Rate (cfs)	Average Per Capita Flow Rate (gpcd)	Average Daily Flow Rate (cfs)	Average Daily Flow Rate (cfs)	Average Per Capita Flow Rate (gpcd)	Average Daily Flow Rate (cfs)	Average Daily Flow Rate (cfs)	Average Per Capita Flow Rate (gpcd)
Tunnel (Non-Controlled)	TB-1	25,046	7.84	4.01	104	6.28	4.09	105	5.96	3.23	83	8.97	6.52	168	6.97	5.32	137	9.21	6.36	164
	PC-1	51,339	13.46	7.84	99	11.86	8.01	101	11.68	7.01	88	15.64	11.40	143	14.09	11.39	143	19.10	14.34	180
	DTW Pond 3 West	0	1.33	2.10	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	1.41	1.69	-	1.70	2.30	-
	DMA-2	0	1.56	2.30	-	0.25	0.22	-	0.20	0.19	-	0.18	0.16	-	1.48	1.77	-	1.66	2.16	-
	PD-2	8,069	5.32	5.18	415	3.47	2.95	237	3.42	2.65	213	3.93	3.05	244	5.08	5.16	414	6.33	6.23	499
	PD-1	21,152	7.63	6.77	207	5.97	4.67	143	6.27	4.50	138	7.14	5.42	166	7.47	7.25	222	9.39	8.46	259
	PB-1	8,254	2.60	2.05	161	2.27	1.73	136	2.51	1.71	134	2.86	2.01	158	2.12	1.90	148	2.89	2.25	176
	PA-4	11,873	2.57	2.27	123	2.00	1.88	103	1.89	1.65	90	2.32	1.93	105	2.17	2.05	111	2.43	2.26	123
	DMA-1	0	0.61	0.57	-	0.57	0.57	-	0.57	0.57	-	0.57	0.57	-	0.57	0.57	-	0.57	0.57	-
	PA-3	26,293	8.10	7.14	176	7.26	6.62	163	6.97	5.71	140	7.97	6.77	167	7.96	7.76	191	9.30	8.69	214
	PA-2	40,447	11.52	9.90	158	10.04	8.70	139	10.38	8.12	130	12.17	9.79	156	11.31	10.64	170	13.77	12.34	197
	PA-1	40,447	12.15	9.96	159	10.04	8.25	132	10.58	7.36	118	12.68	9.02	144	11.28	10.05	161	15.22	11.53	184
	P-2	11,012	2.48	2.19	129	2.40	2.10	123	2.50	2.06	121	3.08	2.56	150	2.78	2.65	156	3.12	2.82	165
	P-1 ¹	145,621	41.83	31.68	141	36.12	27.77	123	37.11	25.77	114	45.33	34.35	152	41.61	37.26	165	53.22	44.28	197
	RV-1	12,490	3.22	2.28	118	2.68	2.11	109	3.16	2.13	110	3.97	2.36	122	2.87	2.40	124	3.64	2.74	142
Riverdrive (Controlled)	RR-1	7,224	4.56	2.90	259	3.59	2.96	265	3.45	2.35	210	4.32	2.40	215	3.94	3.46	310	5.01	3.88	347
	EC-6	20,698	9.92	8.03	251	9.20	8.11	253	9.25	6.84	214	10.24	7.24	226	7.54	6.84	213	9.53	7.06	220
	RD-1	78,944	29.14	17.87	146	24.54	16.58	136	24.35	15.39	126	29.34	17.00	139	23.61	18.19	149	32.05	19.72	161
	SW (with sludge depth)	40,061	19.78	15.28	246	17.60	13.96	225	17.70	13.61	219	22.56	14.62	236	17.97	14.14	228	21.95	13.43	217
	SWB	0	3.90	0.61	-	2.74	0.01	-	1.41	0.25	-	2.00	0.20	-	1.65	0.43	-	2.71	0.00	-
Tunnel Connection Meters	TSO	0	1.06	0.00	-	0.52	0.00	-	0.84	0.00	-	0.31	0.00	-	0.00	0.00	-	0.04	0.00	-
	APO-1	0	0.75	0.00	-	0.45	0.00	-	0.92	0.00	-	0.96	0.00	-	0.00	0.00	-	0.08	0.00	-
	APO-2	0	0.58	0.00	-	0.37	0.00	-	0.80	0.00	-	0.63	0.00	-	0.00	0.00	-	0.08	0.00	-
	CHPO	0	0.29	0.00	-	0.67	0.00	-	0.67	0.00	-	0.57	0.00	-	0.00	0.00	-	0.15	0.00	-
	CPO	0	0.32	0.00	-	0.66	0.00	-	0.46	0.00	-	0.16	0.00	-	0.00	0.00	-	0.07	0.00	-
	PDO	0	0.00	0.00	-	0.01	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-
	ER-2	0	0.09	0.00	-	0.04	0.00	-	0.06	0.00	-	0.11	0.00	-	0.00	0.00	-	0.04	0.00	-
	ER-1	0	0.18	0.00	-	0.07	0.00	-	0.13	0.00	-	0.26	0.00	-	0.03	0.00	-	0.09	0.00	-
	PM-1	0	0.16	0.00	-	1.49	0.00	-	1.61	0.00	-	0.66	0.00	-	0.00	0.00	-	0.00	0.00	-
	Total	0	3.33	0.00	-	4.25	0.00	-	5.44	0.00	-	3.55	0.00	-	0.03	0.00	-	0.52	0.00	-
DWTF	P-1+RV-1+RD-1+SWB +Tunnel Connections	277,116	101.20	67.71	158	87.94	60.43	141	89.17	57.15	133	106.74	68.53	160	87.74	72.43	169	114.09	80.18	187
	DWTF Including Recycle (IPS + TPS)	277,834	106.25	71.86	167	89.26	60.16	140	91.34	57.57	134	110.42	71.00	165	88.33	72.94	170	115.70	80.71	188
	DWTF without Recycle (IPS + TPS - Recycle)	277,834	101.50	67.95	158	84.01	56.42	131	85.44	53.07	123	104.80	66.13	154	83.28	68.07	158	109.98	75.02	175
	Recycle	0	4.75	3.91	-	5.25	3.74	-	5.90	4.50	-	5.61	4.88	-	5.05	4.87	-	5.72	5.69	-

Notes:

Appendix B

Precipitation Data for Significant/Major Storm Events

Table B-1
Rainfall Event Summary Table for Significant Storm Event 1

Start Date: 3/25/2021

Stop Date: 3/28/2021

Gauge ID	Peak Rainfall (in)								
	1-Hour	2-Hour	3-Hour	6-Hour	12-Hour	24-Hour	2-Day	3-Day	Event Total
R18	0.37	0.48	0.56	0.85	0.92	0.93	1.35	1.84	1.84
R02	0.40	0.61	0.76	1.11	1.17	1.17	1.44	2.00	2.00
R10	0.44	0.65	0.88	1.22	1.31	1.31	1.70	2.32	2.32
DTW	0.36	0.53	0.78	1.11	1.19	1.19	1.52	2.10	2.10
R09	0.32	0.50	0.64	0.94	1.00	1.01	1.23	1.80	1.79
R04	0.39	0.59	0.83	1.25	1.35	1.35	1.42	2.07	2.07
R08	0.29	0.50	0.64	0.96	1.03	1.03	1.24	1.77	1.77
R15	0.34	0.56	0.72	1.05	1.12	1.14	1.38	2.02	2.02
R17	0.37	0.59	0.78	1.19	1.27	1.27	1.35	1.94	1.94
R06	0.44	0.68	0.87	1.27	1.33	1.33	1.39	2.00	2.00
R16	0.39	0.67	0.83	1.20	1.26	1.27	1.39	1.99	1.99
Minimum (in):	0.29	0.48	0.56	0.85	0.92	0.93	1.23	1.77	1.77
Average (in):	0.37	0.58	0.75	1.10	1.18	1.18	1.40	1.99	1.99
Maximum (in):	0.44	0.68	0.88	1.27	1.35	1.35	1.70	2.32	2.32
X.XX*	Missing or suspect data (not used).								Standard Deviation (in): 0.16
									Coefficient of Variation: 8%

Gauge ID	Recurrence Interval (years)								
	1-Hour	2-Hour	3-Hour	6-Hour	12-Hour	24-Hour	2-Day	3-Day	Maximum
R18	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
R02	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
R10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
DTW	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
R09	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
R04	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
R08	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
R15	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
R17	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
R06	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
R16	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Minimum:	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Average:	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Maximum:	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1

- Missing or suspect data (not used).

Notes:

- 1) Return periods determined from point precipitation frequency (PF) estimates from NOAA Atlas 14, Volume 8, Version 2 published in 2013. NOAA Atlas 14 is the current reference document for return frequency as of 2013.
- 2) Return periods calculated by linear interpolation between the published whole number month or year frequencies.

Table B-2
Rainfall Event Summary Table for Significant Storm Event 2

Start Date: 6/20/2021

Stop Date: 6/21/2021

Gauge ID	Peak Rainfall (in)								
	1-Hour	2-Hour	3-Hour	6-Hour	12-Hour	24-Hour	2-Day	3-Day	Event Total
R18	0.86	1.04	1.12	1.42	1.63	1.63	1.63	1.63	1.63
R02	0.56	0.79	0.92	1.04	1.21	1.21	1.21	1.21	1.21
R10	0.73	0.85	0.93	1.16	1.37	1.37	1.37	1.37	1.37
DTW	0.54	0.66	0.69	0.88	1.12	1.12	1.12	1.12	1.12
R09	0.00*	0.00*	0.00*	0.00*	0.00*	0.00*	0.00*	0.00*	0.00*
R04	0.58	0.69	0.83	1.02	1.25	1.25	1.25	1.25	1.25
R08	0.27	0.39	0.50	0.74	0.94	0.94	0.94	0.94	0.93
R15	0.43	0.54	0.58	0.85	1.05	1.05	1.05	1.05	1.05
R17	0.25	0.37	0.48	0.63	0.80	0.80	0.80	0.80	0.80
R06	0.55	0.92	1.00	1.21	1.42	1.42	1.42	1.42	1.31
R16	0.28	0.39	0.51	0.78	0.96	0.96	0.96	0.96	0.96
Minimum (in):	0.25	0.37	0.48	0.63	0.80	0.80	0.80	0.80	0.80
Average (in):	0.51	0.66	0.76	0.97	1.18	1.18	1.18	1.18	1.16
Maximum (in):	0.86	1.04	1.12	1.42	1.63	1.63	1.63	1.63	1.63
X.XX*	Missing or suspect data (not used).								Standard Deviation (in): 0.24
									Coefficient of Variation: 21%

Gauge ID	Recurrence Interval (years)								
	1-Hour	2-Hour	3-Hour	6-Hour	12-Hour	24-Hour	2-Day	3-Day	Maximum
R18	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
R02	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
R10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
DTW	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
R09	-	-	-	-	-	-	-	-	-
R04	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
R08	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
R15	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
R17	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
R06	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
R16	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Minimum:	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Average:	< 1	< 1	< 1	< 1	1	1	1	1	1
Maximum:	< 1	1	1	1	2	2	2	2	2

- Missing or suspect data (not used).

Notes:

- 1) Return periods determined from point precipitation frequency (PF) estimates from NOAA Atlas 14, Volume 8, Version 2 published in 2013. NOAA Atlas 14 is the current reference document for return frequency as of 2013.
- 2) Return periods calculated by linear interpolation between the published whole number month or year frequencies.

Table B-3
Rainfall Event Summary Table for Significant Storm Event 3

Start Date: 6/25/2021

Stop Date: 6/26/2021

Gauge ID	Peak Rainfall (in)								
	1-Hour	2-Hour	3-Hour	6-Hour	12-Hour	24-Hour	2-Day	3-Day	Event Total
R18	0.51	0.68	0.70	0.96	1.44	2.40	2.40	2.40	2.40
R02	0.57	0.57	0.58	0.94	1.17	1.57	1.57	1.58	1.57
R10	0.68	0.70	0.88	1.20	1.60	2.36	2.36	2.36	2.36
DTW	0.84	0.85	0.92	1.31	1.74	2.37	2.37	2.37	2.37
R09	0.75	0.79	0.80	1.21	1.70	2.25	2.25	2.25	2.25
R04	1.14	1.15	1.15	1.48	1.76	2.24	2.24	2.24	2.23
R08	0.67	0.72	0.74	1.20	1.43	1.95	1.95	1.95	1.95
R15	0.44	0.51	0.69	1.01	1.46	1.99	1.99	1.99	1.99
R17	0.74	0.80	0.80	1.07	1.34	1.76	1.76	1.76	1.76
R06	0.00*	0.00*	0.00*	0.00*	0.00*	0.00*	0.01*	0.10*	0.00*
R16	0.58	0.77	0.79	1.20	1.48	1.84	1.84	1.84	1.84
Minimum (in):	0.44	0.51	0.58	0.94	1.17	1.57	1.57	1.58	1.57
Average (in):	0.69	0.75	0.81	1.16	1.51	2.07	2.07	2.07	2.07
Maximum (in):	1.14	1.15	1.15	1.48	1.76	2.40	2.40	2.40	2.40
X.XX*	Missing or suspect data (not used).								Standard Deviation (in): 0.29
									Coefficient of Variation: 14%

Gauge ID	Recurrence Interval (years)								
	1-Hour	2-Hour	3-Hour	6-Hour	12-Hour	24-Hour	2-Day	3-Day	Maximum
R18	< 1	< 1	< 1	< 1	< 1	2	1	< 1	2
R02	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
R10	< 1	< 1	< 1	< 1	< 1	2	1	< 1	2
DTW	< 1	< 1	< 1	< 1	< 1	2	1	< 1	2
R09	< 1	< 1	< 1	< 1	< 1	2	< 1	< 1	2
R04	2	< 1	< 1	< 1	< 1	2	< 1	< 1	2
R08	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
R15	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
R17	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
R06	-	-	-	-	-	-	-	-	-
R16	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Minimum:	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Average:	< 1	< 1	< 1	< 1	< 1	1	< 1	< 1	1
Maximum:	2	< 1	< 1	< 1	< 1	2	1	< 1	2

- Missing or suspect data (not used).

Notes:

- 1) Return periods determined from point precipitation frequency (PF) estimates from NOAA Atlas 14, Volume 8, Version 2 published in 2013. NOAA Atlas 14 is the current reference document for return frequency as of 2013.
- 2) Return periods calculated by linear interpolation between the published whole number month or year frequencies.

Table B-4
Rainfall Event Summary Table for Significant Storm Event 4

Start Date: 7/16/2021

Stop Date: 7/17/2021

Gauge ID	Peak Rainfall (in)								
	1-Hour	2-Hour	3-Hour	6-Hour	12-Hour	24-Hour	2-Day	3-Day	Event Total
R18	0.88	1.32	1.58	2.32	2.61	2.80	2.83	2.83	2.83
R02	0.34	0.44	0.52	0.87	1.45	1.66	1.74	1.74	1.74
R10	0.54	0.86	0.94	1.81	2.09	2.30	2.35	2.35	2.35
DTW	0.50	0.75	1.14	1.65	2.14	2.30	2.37	2.37	2.37
R09	0.55	0.84	0.97	1.38	1.67	1.85	1.96	1.96	1.96
R04	0.46	0.60	0.70	1.13	1.41	1.70	1.85	1.85	1.85
R08	0.67	0.95	1.09	1.53	1.73	1.92	2.01	2.01	2.01
R15	0.75	1.14	1.62	2.48	2.83	3.03	3.08	3.08	3.08
R17	0.53	0.70	0.84	1.33	1.73	1.94	2.08	2.08	2.08
R06	0.49	0.65	0.74	1.20	1.42	1.66	1.79	1.79	1.78
R16	0.83	1.05	1.18	1.52	1.77	1.98	2.10	2.10	2.10
Minimum (in):	0.34	0.44	0.52	0.87	1.41	1.66	1.74	1.74	1.74
Average (in):	0.59	0.85	1.03	1.57	1.90	2.10	2.20	2.20	2.20
Maximum (in):	0.88	1.32	1.62	2.48	2.83	3.03	3.08	3.08	3.08
X.XX*	Missing or suspect data (not used).								Standard Deviation (in): 0.43
									Coefficient of Variation: 20%

Gauge ID	Recurrence Interval (years)								
	1-Hour	2-Hour	3-Hour	6-Hour	12-Hour	24-Hour	2-Day	3-Day	Maximum
R18	< 1	2	2	6	6	5	3	2	6
R02	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
R10	< 1	< 1	< 1	2	2	2	< 1	< 1	2
DTW	< 1	< 1	< 1	1	3	2	1	< 1	3
R09	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
R04	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
R08	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
R15	< 1	< 1	3	8	9	7	4	3	9
R17	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
R06	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
R16	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Minimum:	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Average:	< 1	< 1	1	2	2	2	1	1	2
Maximum:	< 1	2	3	8	9	7	4	3	9

- Missing or suspect data (not used).

Notes:

- 1) Return periods determined from point precipitation frequency (PF) estimates from NOAA Atlas 14, Volume 8, Version 2 published in 2013. NOAA Atlas 14 is the current reference document for return frequency as of 2013.
- 2) Return periods calculated by linear interpolation between the published whole number month or year frequencies.

Table B-5
Rainfall Event Summary Table for Significant Storm Event 5

Start Date: 7/24/2021

Stop Date: 7/25/2021

Gauge ID	Peak Rainfall (in)								
	1-Hour	2-Hour	3-Hour	6-Hour	12-Hour	24-Hour	2-Day	3-Day	Event Total
R18	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
R02	0.25	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26
R10	0.78	0.78	0.78	0.79	0.79	0.79	0.79	0.79	0.79
DTW	0.00*	0.00*	0.00*	0.00*	0.00*	0.00*	0.00*	0.00*	0.00*
R09	0.84	0.84	0.84	0.84	0.85	0.85	0.85	0.85	0.85
R04	1.16	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17
R08	1.70	1.79	1.79	1.79	1.80	1.80	1.80	1.80	1.79
R15	1.02	1.68	1.74	1.74	1.74	1.74	1.74	1.74	1.74
R17	1.40	1.41	1.41	1.42	1.42	1.42	1.42	1.42	1.42
R06	1.66	1.73	1.73	1.73	1.73	1.73	1.73	1.73	1.73
R16	1.64	1.79	1.79	1.80	1.80	1.80	1.80	1.80	1.80
Minimum (in):	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Average (in):	1.07	1.17	1.18	1.18	1.18	1.18	1.18	1.18	1.18
Maximum (in):	1.70	1.79	1.79	1.80	1.80	1.80	1.80	1.80	1.80
X.XX*	Missing or suspect data (not used).								Standard Deviation (in): 0.61
									Coefficient of Variation: 52%

Gauge ID	Recurrence Interval (years)								
	1-Hour	2-Hour	3-Hour	6-Hour	12-Hour	24-Hour	2-Day	3-Day	Maximum
R18	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
R02	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
R10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
DTW	-	-	-	-	-	-	-	-	-
R09	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
R04	2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	2
R08	10	5	4	2	1	< 1	< 1	< 1	10
R15	1	4	3	2	< 1	< 1	< 1	< 1	4
R17	5	2	1	< 1	< 1	< 1	< 1	< 1	5
R06	9	5	3	2	< 1	< 1	< 1	< 1	9
R16	9	5	4	2	1	< 1	< 1	< 1	9
Minimum:	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Average:	4	2	2	1	< 1	< 1	< 1	< 1	4
Maximum:	10	5	4	2	1	< 1	< 1	< 1	10

- Missing or suspect data (not used).

Notes:

- 1) Return periods determined from point precipitation frequency (PF) estimates from NOAA Atlas 14, Volume 8, Version 2 published in 2013. NOAA Atlas 14 is the current reference document for return frequency as of 2013.
- 2) Return periods calculated by linear interpolation between the published whole number month or year frequencies.
- 3) Hourly precipitation data not available for DTW for Significant Storm Event 5.

Table B-6
Rainfall Event Summary Table for Significant Storm Event 6

Start Date: 8/11/2021

Stop Date: 8/12/2021

Gauge ID	Peak Rainfall (in)								
	1-Hour	2-Hour	3-Hour	6-Hour	12-Hour	24-Hour	2-Day	3-Day	Event Total
R18	1.07	1.45	1.65	2.00	2.25	2.68	2.68	2.68	2.67
R02	0.92	1.17	1.22	1.39	1.53	1.90	1.90	1.90	1.90
R10	1.39	1.76	1.87	2.28	2.54	2.80	2.80	2.80	2.79
DTW	1.38	1.63	1.99	2.41	2.92	3.14	3.14	3.14	3.14
R09	1.43	1.74	1.83	2.24	2.43	2.72	2.72	2.72	2.72
R04	1.18	1.51	1.58	1.78	2.01	2.32	2.39	2.42	2.32
R08	1.09	1.42	1.53	2.06	2.24	2.48	2.48	2.48	2.48
R15	0.97	1.46	1.49	1.94	2.19	2.44	2.44	2.44	2.44
R17	1.50	1.78	1.82	2.31	2.53	2.75	2.75	2.75	2.75
R06	1.01	1.39	1.53	1.80	2.00	2.27	2.29	2.31	2.27
R16	1.14	1.44	1.46	1.95	2.14	2.35	2.35	2.35	2.35
Minimum (in):	0.92	1.17	1.22	1.39	1.53	1.90	1.90	1.90	1.90
Average (in):	1.19	1.52	1.63	2.01	2.25	2.53	2.54	2.54	2.53
Maximum (in):	1.50	1.78	1.99	2.41	2.92	3.14	3.14	3.14	3.14
X.XX*	Missing or suspect data (not used).								Standard Deviation (in): 0.33
									Coefficient of Variation: 13%

Gauge ID	Recurrence Interval (years)								
	1-Hour	2-Hour	3-Hour	6-Hour	12-Hour	24-Hour	2-Day	3-Day	Maximum
R18	2	3	3	3	3	4	2	1	4
R02	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
R10	4	5	4	6	5	5	3	2	6
DTW	4	4	6	7	10	8	4	3	10
R09	5	5	4	5	4	4	2	1	5
R04	2	3	2	2	2	2	1	< 1	3
R08	2	2	2	4	3	3	1	< 1	4
R15	1	2	2	3	3	3	1	< 1	3
R17	6	5	4	6	5	4	2	1	6
R06	1	2	2	2	2	2	< 1	< 1	2
R16	2	2	2	3	3	2	1	< 1	3
Minimum:	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Average:	3	3	3	4	4	3	2	1	4
Maximum:	6	5	6	7	10	8	4	3	10

- Missing or suspect data (not used).

Notes:

- 1) Return periods determined from point precipitation frequency (PF) estimates from NOAA Atlas 14, Volume 8, Version 2 published in 2013. NOAA Atlas 14 is the current reference document for return frequency as of 2013.
- 2) Return periods calculated by linear interpolation between the published whole number month or year frequencies.

Table B-7
Rainfall Event Summary Table for Significant Storm Event 7

Start Date: 9/21/2021

Stop Date: 9/23/2021

Gauge ID	Peak Rainfall (in)								
	1-Hour	2-Hour	3-Hour	6-Hour	12-Hour	24-Hour	2-Day	3-Day	Event Total
R18	0.46	0.58	0.83	1.06	2.04	2.47	3.59	3.59	3.59
R02	0.46	0.65	0.82	1.16	2.11	2.81	3.92	3.92	3.92
R10	0.46	0.61	0.83	1.09	2.01	2.68	3.81	3.82	3.82
DTW	0.65	0.85	1.35	1.58	2.43	3.16	4.42	4.43	4.43
R09	0.61	0.75	0.91	1.10	1.91	2.53	3.79	3.80	3.80
R04	0.53	0.73	0.95	1.10	1.96	2.90	4.17	4.18	4.18
R08	0.52	0.65	0.84	1.15	2.12	2.96	4.02	4.03	4.03
R15	0.58	0.74	0.85	1.17	2.29	3.07	4.15	4.15	4.15
R17	0.56	0.73	0.87	1.05	1.64	2.70	3.78	3.80	3.79
R06	0.50	0.87	1.18	1.73	2.30	3.05	4.04	4.04	4.04
R16	0.64	0.93	1.37	1.89	2.44	3.40	4.36	4.36	4.36
Minimum (in):	0.46	0.58	0.82	1.05	1.64	2.47	3.59	3.59	3.59
Average (in):	0.54	0.74	0.98	1.28	2.11	2.88	4.00	4.01	4.01
Maximum (in):	0.65	0.93	1.37	1.89	2.44	3.40	4.42	4.43	4.43
X.XX*	Missing or suspect data (not used).								Standard Deviation (in): 0.26
									Coefficient of Variation: 6%

Gauge ID	Recurrence Interval (years)								
	1-Hour	2-Hour	3-Hour	6-Hour	12-Hour	24-Hour	2-Day	3-Day	Maximum
R18	< 1	< 1	< 1	< 1	2	3	8	6	8
R02	< 1	< 1	< 1	< 1	2	5	14	9	14
R10	< 1	< 1	< 1	< 1	2	4	11	8	11
DTW	< 1	< 1	1	1	4	8	23	17	23
R09	< 1	< 1	< 1	< 1	1	3	11	8	11
R04	< 1	< 1	< 1	< 1	2	6	19	13	19
R08	< 1	< 1	< 1	< 1	2	6	15	10	15
R15	< 1	< 1	< 1	< 1	3	7	17	11	17
R17	< 1	< 1	< 1	< 1	< 1	4	10	8	10
R06	< 1	< 1	< 1	2	4	7	16	10	16
R16	< 1	< 1	1	3	4	12	22	16	22
Minimum:	< 1	< 1	< 1	< 1	< 1	3	8	6	8
Average:	< 1	< 1	< 1	1	3	6	15	10	15
Maximum:	< 1	< 1	1	3	4	12	23	17	23

- Missing or suspect data (not used).

Notes:

- 1) Return periods determined from point precipitation frequency (PF) estimates from NOAA Atlas 14, Volume 8, Version 2 published in 2013. NOAA Atlas 14 is the current reference document for return frequency as of 2013.
- 2) Return periods calculated by linear interpolation between the published whole number month or year frequencies.

Table B-8
Rainfall Event Summary Table for Significant Storm Event 8

Start Date: 10/14/2021

Stop Date: 10/16/2021

Gauge ID	Peak Rainfall (in)								
	1-Hour	2-Hour	3-Hour	6-Hour	12-Hour	24-Hour	2-Day	3-Day	Event Total
R18	0.20	0.20	0.21	0.25	0.30	0.52	0.80	0.80	0.80
R02	0.14	0.21	0.24	0.30	0.42	0.67	0.95	0.95	0.95
R10	0.25	0.25	0.26	0.29	0.36	0.60	0.92	0.92	0.92
DTW	0.22	0.22	0.22	0.27	0.30	0.58	0.88	0.88	0.88
R09	0.00*	0.00*	0.00*	0.00*	0.00*	0.00*	0.00*	0.00*	0.00*
R04	0.35	0.40	0.41	0.49	0.64	0.99	1.29	1.29	1.29
R08	0.15	0.18	0.18	0.26	0.39	0.64	0.89	0.89	0.89
R15	0.11	0.14	0.19	0.29	0.33	0.58	0.82	0.82	0.82
R17	0.25	0.35	0.36	0.41	0.59	0.89	1.17	1.17	1.17
R06	0.44	0.49	0.49	0.55	0.69	0.99	1.27	1.27	1.26
R16	0.20	0.26	0.26	0.30	0.45	0.75	1.04	1.04	1.03
Minimum (in):	0.11	0.14	0.18	0.25	0.30	0.52	0.80	0.80	0.80
Average (in):	0.23	0.27	0.28	0.34	0.45	0.72	1.00	1.00	1.00
Maximum (in):	0.44	0.49	0.49	0.55	0.69	0.99	1.29	1.29	1.29
-	Standard Deviation (in):							0.18	
X.XX*	Coefficient of Variation:							18%	
Missing or suspect data (not used).									

Gauge ID	Recurrence Interval (years)								
	1-Hour	2-Hour	3-Hour	6-Hour	12-Hour	24-Hour	2-Day	3-Day	Maximum
R18	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
R02	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
R10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
DTW	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
R09	-	-	-	-	-	-	-	-	-
R04	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
R08	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
R15	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
R17	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
R06	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
R16	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Minimum:	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Average:	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Maximum:	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1

- Missing or suspect data (not used).

Notes:

- 1) Return periods determined from point precipitation frequency (PF) estimates from NOAA Atlas 14, Volume 8, Version 2 published in 2013. NOAA Atlas 14 is the current reference document for return frequency as of 2013.
- 2) Return periods calculated by linear interpolation between the published whole number month or year frequencies.

Table B-9
Rainfall Event Summary Table for Significant Storm Event 9

Start Date: 10/24/2021

Stop Date: 10/25/2021

Gauge ID	Peak Rainfall (in)								
	1-Hour	2-Hour	3-Hour	6-Hour	12-Hour	24-Hour	2-Day	3-Day	Event Total
R18	0.35	0.57	0.84	1.08	1.64	2.23	2.23	2.23	2.23
R02	0.32	0.53	0.79	1.01	1.43	2.04	2.05	2.05	2.05
R10	0.35	0.54	0.81	1.05	1.56	2.21	2.23	2.23	2.23
DTW	0.38	0.52	0.81	1.06	1.48	2.11	2.13	2.13	2.12
R09	0.31	0.48	0.72	0.94	1.40	2.05	2.06	2.06	2.05
R04	0.34	0.55	0.84	1.01	1.47	2.14	2.18	2.18	2.15
R08	0.33	0.48	0.74	0.97	1.36	2.01	2.05	2.05	2.02
R15	0.35	0.49	0.74	1.00	1.54	2.20	2.23	2.23	2.21
R17	0.36	0.57	0.88	1.09	1.49	2.24	2.27	2.27	2.25
R06	0.29	0.46	0.70	0.90	1.16	1.86	1.94	1.94	1.93
R16	0.32	0.46	0.72	0.91	1.27	1.83	1.84	1.84	1.84
Minimum (in):	0.29	0.46	0.70	0.90	1.16	1.83	1.84	1.84	1.84
Average (in):	0.34	0.51	0.78	1.00	1.44	2.08	2.11	2.11	2.10
Maximum (in):	0.38	0.57	0.88	1.09	1.64	2.24	2.27	2.27	2.25
-	Standard Deviation (in):								0.13
X.XX*	Coefficient of Variation:								6%
Missing or suspect data (not used).									

Gauge ID	Recurrence Interval (years)								
	1-Hour	2-Hour	3-Hour	6-Hour	12-Hour	24-Hour	2-Day	3-Day	Maximum
R18	< 1	< 1	< 1	< 1	< 1	2	< 1	< 1	2
R02	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
R10	< 1	< 1	< 1	< 1	< 1	2	< 1	< 1	2
DTW	< 1	< 1	< 1	< 1	< 1	1	< 1	< 1	1
R09	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
R04	< 1	< 1	< 1	< 1	< 1	1	< 1	< 1	1
R08	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
R15	< 1	< 1	< 1	< 1	< 1	1	< 1	< 1	1
R17	< 1	< 1	< 1	< 1	< 1	2	< 1	< 1	2
R06	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
R16	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Minimum:	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Average:	< 1	< 1	< 1	< 1	< 1	1	< 1	< 1	1
Maximum:	< 1	< 1	< 1	< 1	< 1	2	< 1	< 1	2

- Missing or suspect data (not used).

Notes:

- 1) Return periods determined from point precipitation frequency (PF) estimates from NOAA Atlas 14, Volume 8, Version 2 published in 2013. NOAA Atlas 14 is the current reference document for return frequency as of 2013.
- 2) Return periods calculated by linear interpolation between the published whole number month or year frequencies.

Table B-10
Rainfall Event Summary Table for Significant Storm Event 10

Start Date: 10/28/2021

Stop Date: 10/30/2021

Gauge ID	Peak Rainfall (in)								
	1-Hour	2-Hour	3-Hour	6-Hour	12-Hour	24-Hour	2-Day	3-Day	Event Total
R18	0.12	0.18	0.22	0.39	0.56	1.05	1.09	1.11	1.06
R02	0.26	0.36	0.40	0.50	0.67	1.23	1.27	1.27	1.24
R10	0.11	0.19	0.23	0.39	0.55	1.04	1.09	1.09	1.06
DTW	0.10	0.17	0.21	0.37	0.56	1.07	1.11	1.11	1.07
R09	0.08*	0.11*	0.12*	0.21*	0.33*	0.45*	0.45*	0.45*	0.45*
R04	0.24	0.38	0.46	0.62	0.88	1.48	1.53	1.54	1.50
R08	0.08	0.15	0.19	0.33	0.52	0.96	0.99	1.00	0.97
R15	0.10	0.17	0.21	0.35	0.54	1.01	1.04	1.04	1.02
R17	0.16	0.26	0.30	0.42	0.61	1.14	1.17	1.17	1.16
R06	0.24	0.32	0.36	0.45	0.64	1.16	1.20	1.20	1.20
R16	0.09	0.15	0.19	0.33	0.54	0.98	1.00	1.01	0.98
Minimum (in):	0.08	0.15	0.19	0.33	0.52	0.96	0.99	1.00	0.97
Average (in):	0.15	0.23	0.28	0.42	0.61	1.11	1.15	1.15	1.13
Maximum (in):	0.26	0.38	0.46	0.62	0.88	1.48	1.53	1.54	1.50
-	Standard Deviation (in):								0.16
X.XX*	Coefficient of Variation:								14%
Missing or suspect data (not used).									

Gauge ID	Recurrence Interval (years)								
	1-Hour	2-Hour	3-Hour	6-Hour	12-Hour	24-Hour	2-Day	3-Day	Maximum
R18	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
R02	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
R10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
DTW	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
R09	-	-	-	-	-	-	-	-	-
R04	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
R08	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
R15	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
R17	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
R06	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
R16	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Minimum:	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Average:	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Maximum:	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1

- Missing or suspect data (not used).

Notes:

- 1) Return periods determined from point precipitation frequency (PF) estimates from NOAA Atlas 14, Volume 8, Version 2 published in 2013. NOAA Atlas 14 is the current reference document for return frequency as of 2013.
- 2) Return periods calculated by linear interpolation between the published whole number month or year frequencies.

Table B-11
Rainfall Event Summary Table for Significant Storm Event 11

Start Date: 12/10/2021

Stop Date: 12/11/2021

Gauge ID	Peak Rainfall (in)								
	1-Hour	2-Hour	3-Hour	6-Hour	12-Hour	24-Hour	2-Day	3-Day	Event Total
R18	0.59	0.71	0.72	0.93	1.07	1.07	1.07	1.07	1.07
R02	0.52	0.65	0.65	0.87	1.01	1.01	1.01	1.01	1.01
R10	0.75	0.91	0.92	1.12	1.29	1.31	1.31	1.31	1.29
DTW	0.75	0.87	0.96	1.19	1.38	1.38	1.38	1.38	1.38
R09	0.00*	0.00*	0.00*	0.00*	0.00*	0.00*	0.00*	0.00*	0.00*
R04	0.56	0.70	0.71	0.94	1.09	1.09	1.09	1.09	1.09
R08	0.50	0.64	0.65	0.82	0.95	0.95	0.95	0.95	0.94
R15	0.67	0.85	0.86	1.08	1.22	1.22	1.22	1.22	1.22
R17	0.46	0.60	0.61	0.83	0.97	0.98	0.98	0.98	0.97
R06	0.48	0.60	0.61	0.89	1.02	1.03	1.03	1.03	1.01
R16	0.49	0.63	0.65	0.84	0.97	0.97	0.97	0.97	0.96
Minimum (in):	0.46	0.60	0.61	0.82	0.95	0.95	0.95	0.95	0.94
Average (in):	0.58	0.72	0.73	0.95	1.10	1.10	1.10	1.10	1.09
Maximum (in):	0.75	0.91	0.96	1.19	1.38	1.38	1.38	1.38	1.38
X.XX*	Missing or suspect data (not used).								Standard Deviation (in): 0.15
									Coefficient of Variation: 14%

Gauge ID	Recurrence Interval (years)								
	1-Hour	2-Hour	3-Hour	6-Hour	12-Hour	24-Hour	2-Day	3-Day	Maximum
R18	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
R02	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
R10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
DTW	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
R09	-	-	-	-	-	-	-	-	-
R04	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
R08	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
R15	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
R17	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
R06	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
R16	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Minimum:	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Average:	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Maximum:	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1

- Missing or suspect data (not used).

Notes:

- 1) Return periods determined from point precipitation frequency (PF) estimates from NOAA Atlas 14, Volume 8, Version 2 published in 2013. NOAA Atlas 14 is the current reference document for return frequency as of 2013.
- 2) Return periods calculated by linear interpolation between the published whole number month or year frequencies.

Appendix C

Meter Data Summaries

Figure C-1
Data Flags for 2021

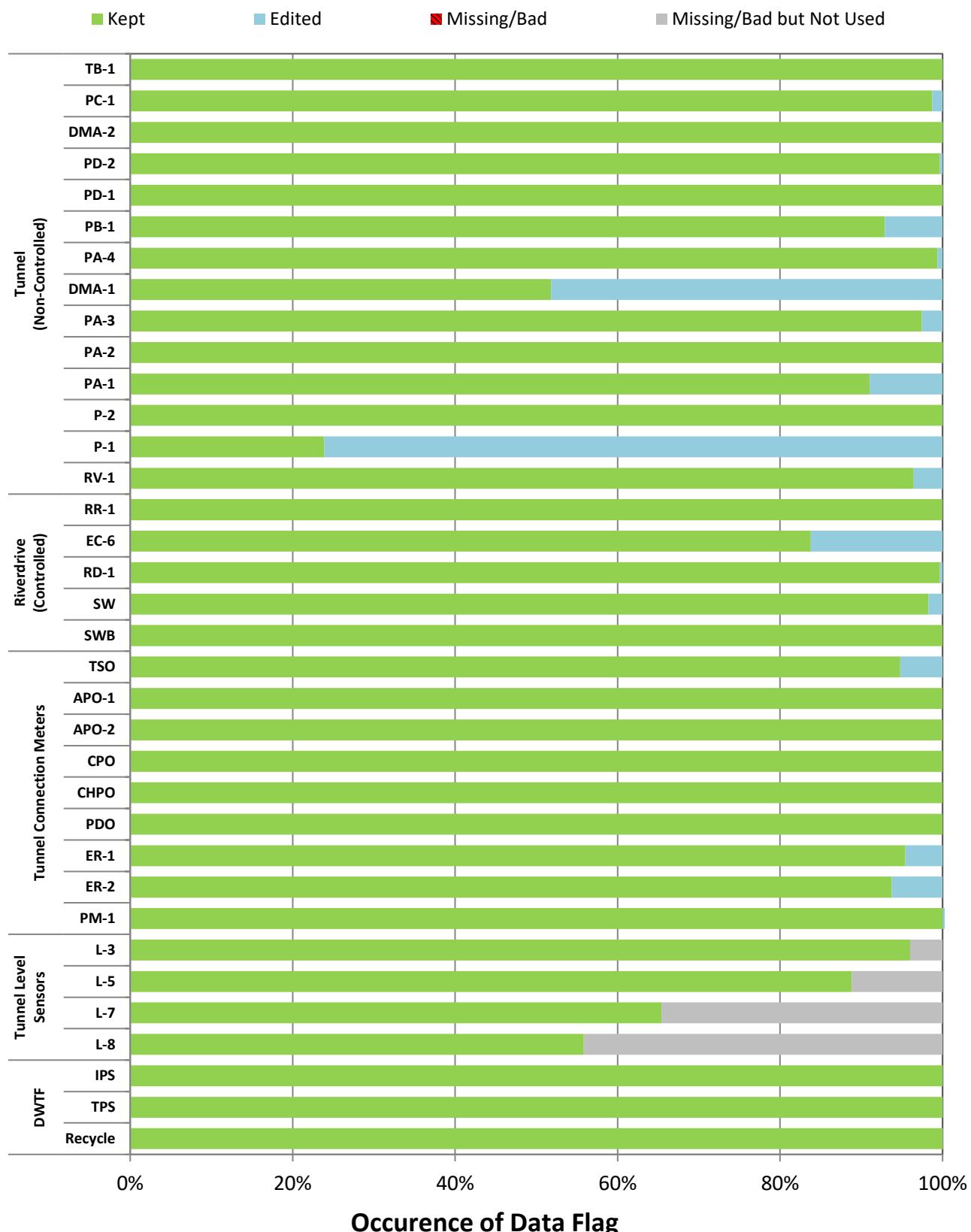


Figure C-2
Meter Report

Meter: TB-1
Type: Magmeter

Location: Taylor Basin
System Meter Type: Interceptor Flow Meter

Period: 1/1/2021 through 12/31/2021

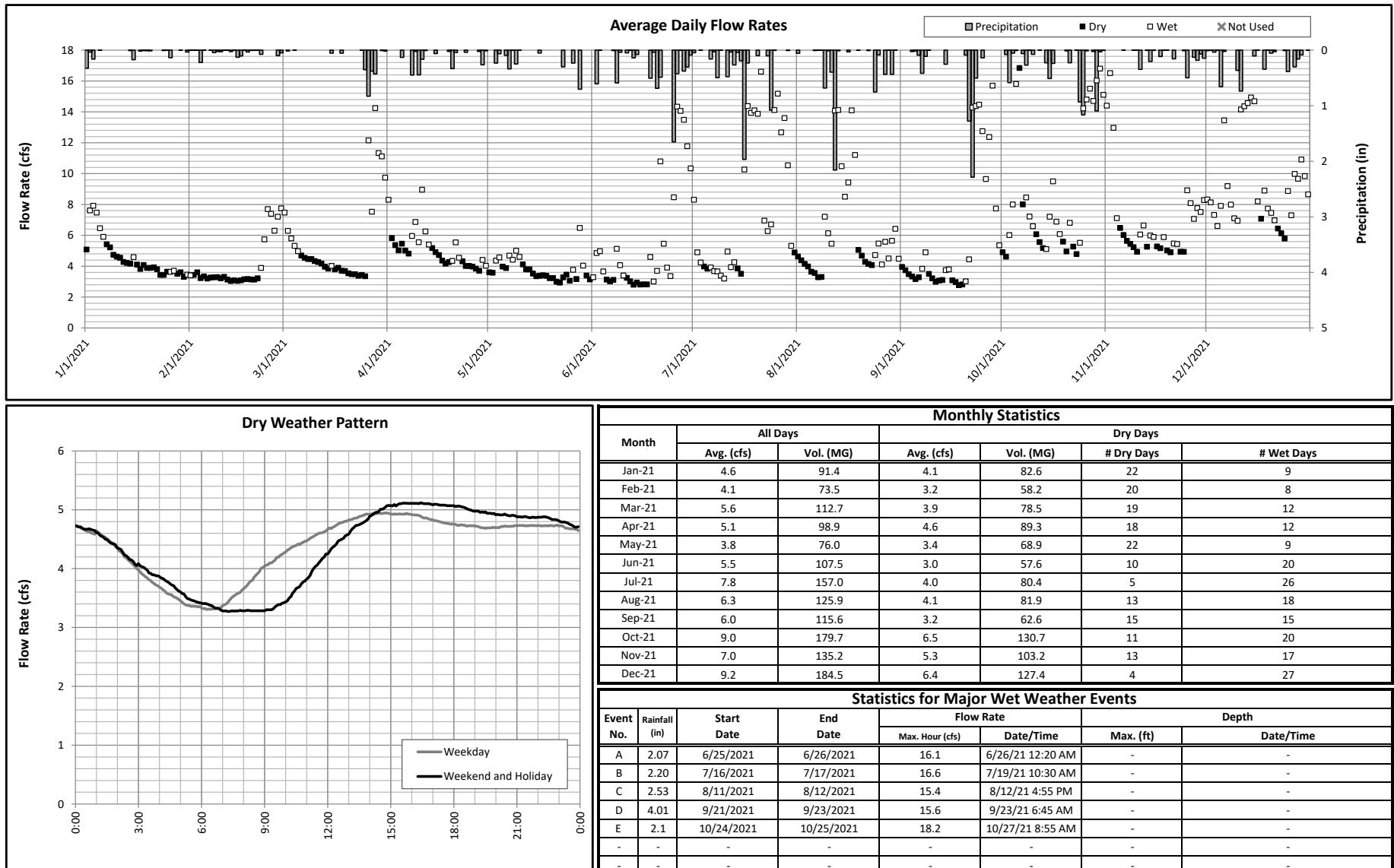


Figure C-3
Meter Report

Meter: PC-1
Type: Accusonic 7510

Location: Pelham Interceptor North of Goddard Road
System Meter Type: Interceptor Flow Meter

Period: 1/1/2021 through 12/31/2021

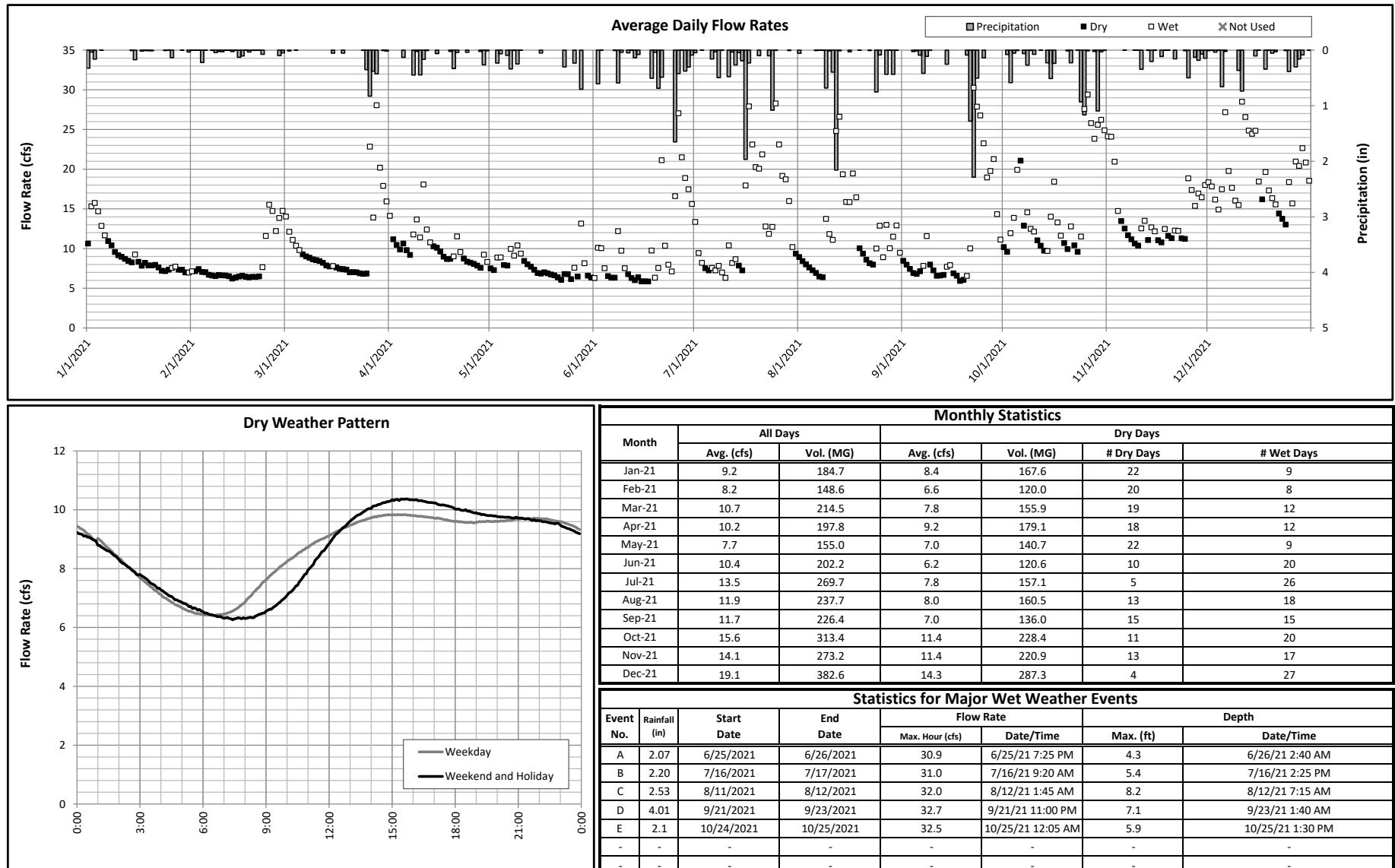


Figure C-4
Meter Report

Meter: Pond 3W to DSDS
Type: Magmeter

Location: Detroit Metro Airport
System Meter Type: WCAA

Period: 1/1/2021 through 12/31/2021

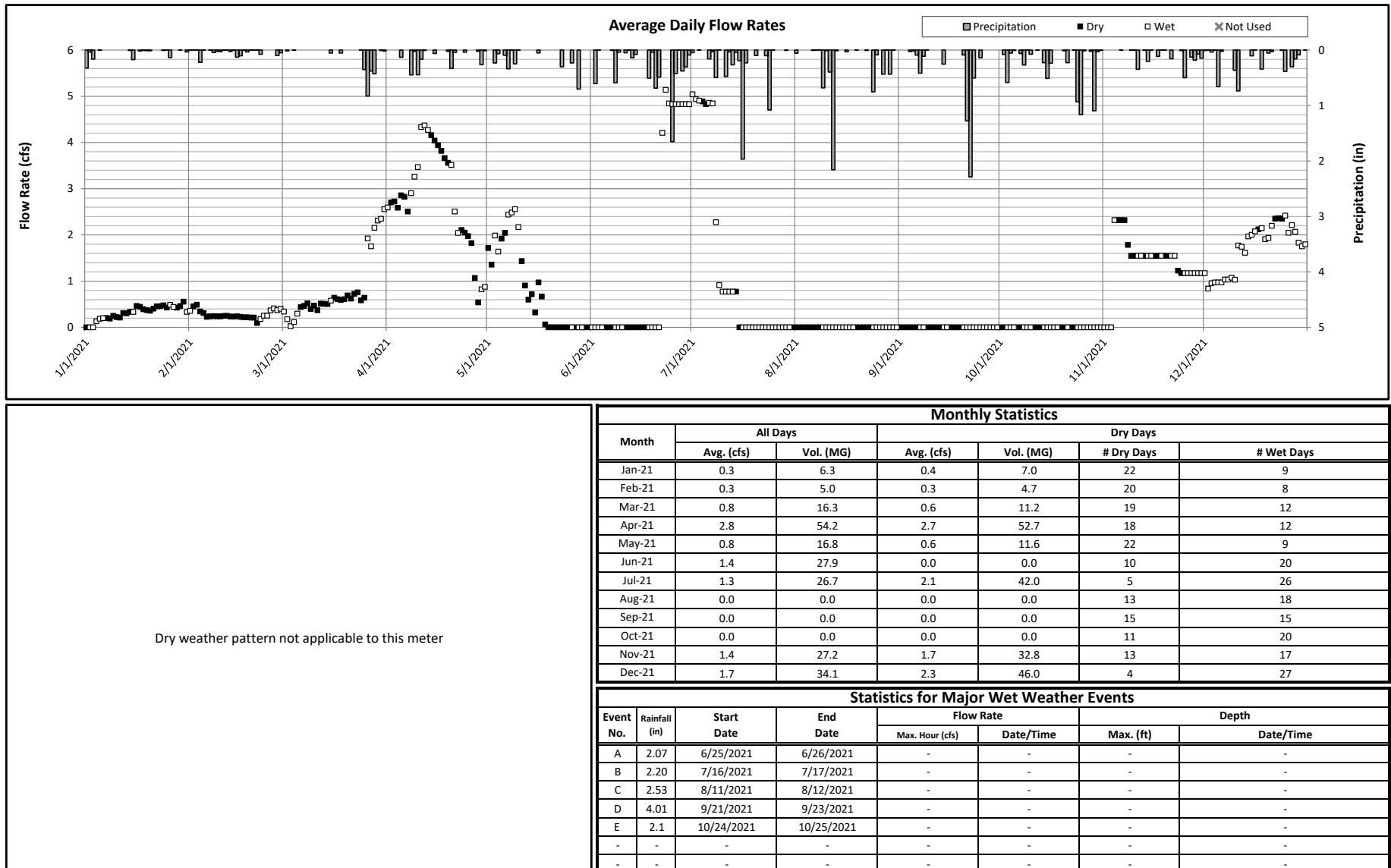


Figure C-5
Meter Report

Meter: DMA-2
Type: ADS Triton

Location: Detroit Metro Airport
System Meter Type: Interceptor Flow Meter

Period: 1/1/2021 through 12/31/2021

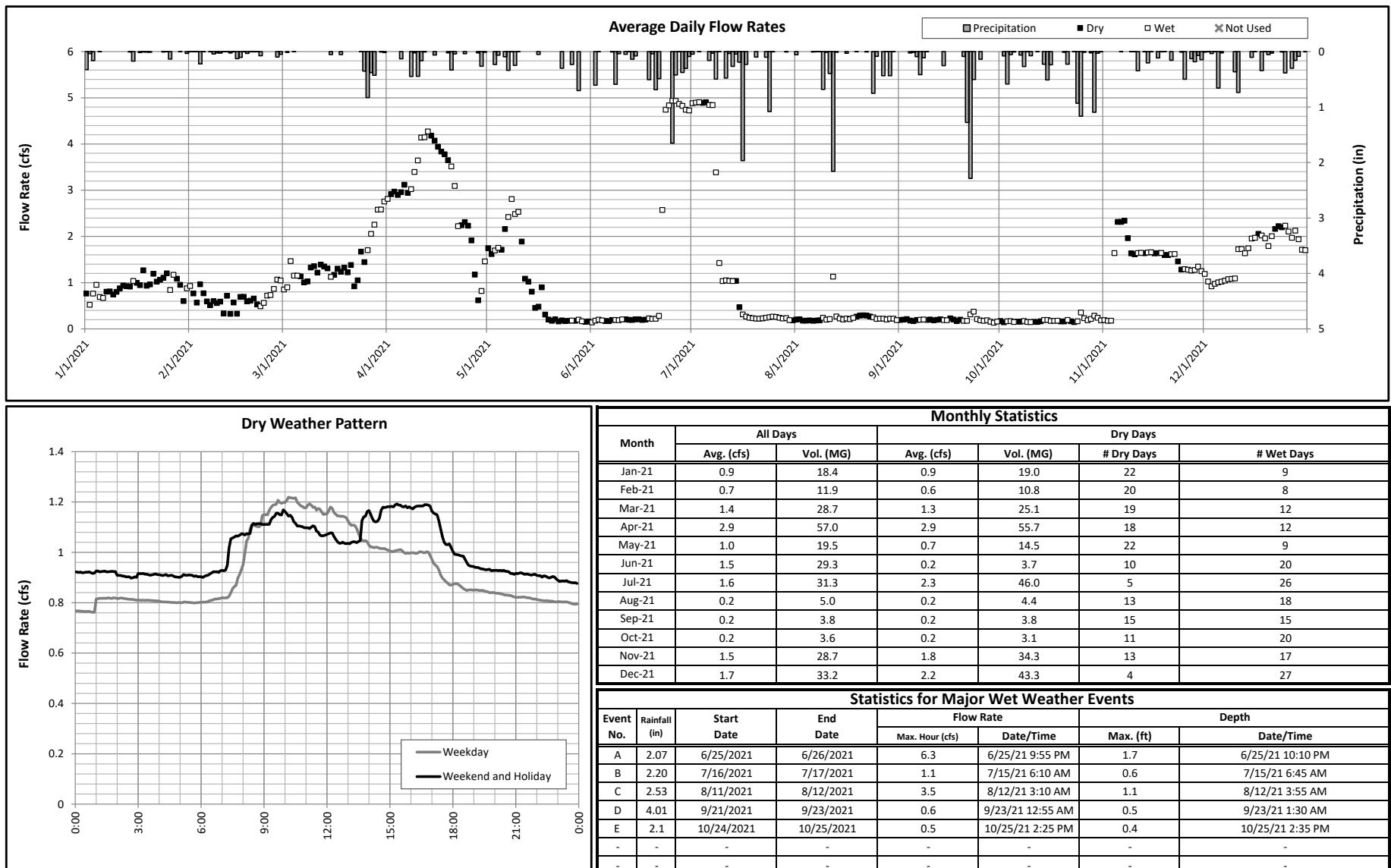


Figure C-6
Meter Report

Meter: PD-2
Type: ADS Triton+

Location: Goddard Interceptor West of Inkster Road
System Meter Type: Interceptor Flow Meter

Period: 1/1/2021 through 12/31/2021

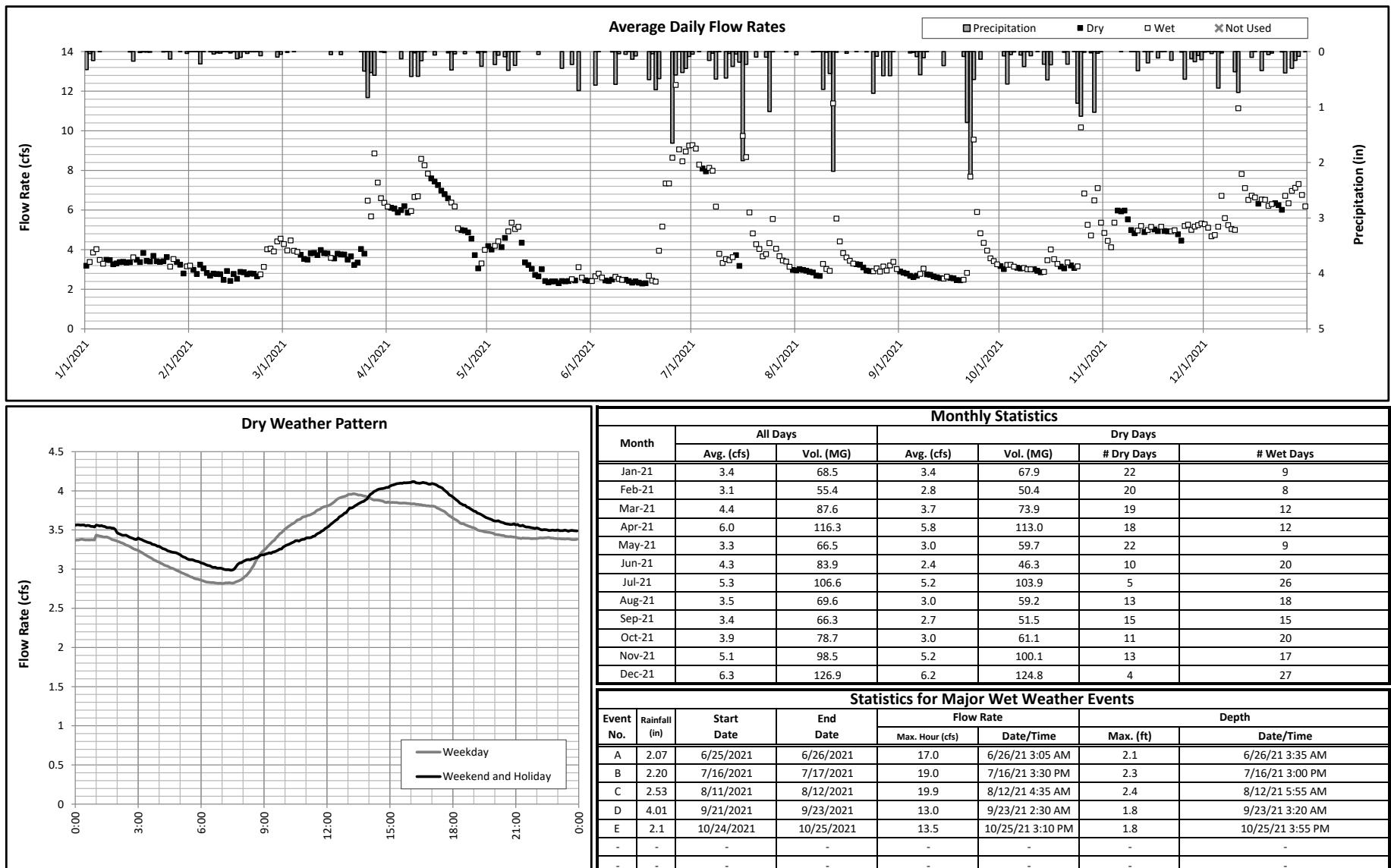


Figure C-7
Meter Report

Meter: PD-1
Type: ADS Triton+

Location: Goddard Interceptor West of Allen Road
System Meter Type: Interceptor Flow Meter

Period: 1/1/2021 through 12/31/2021

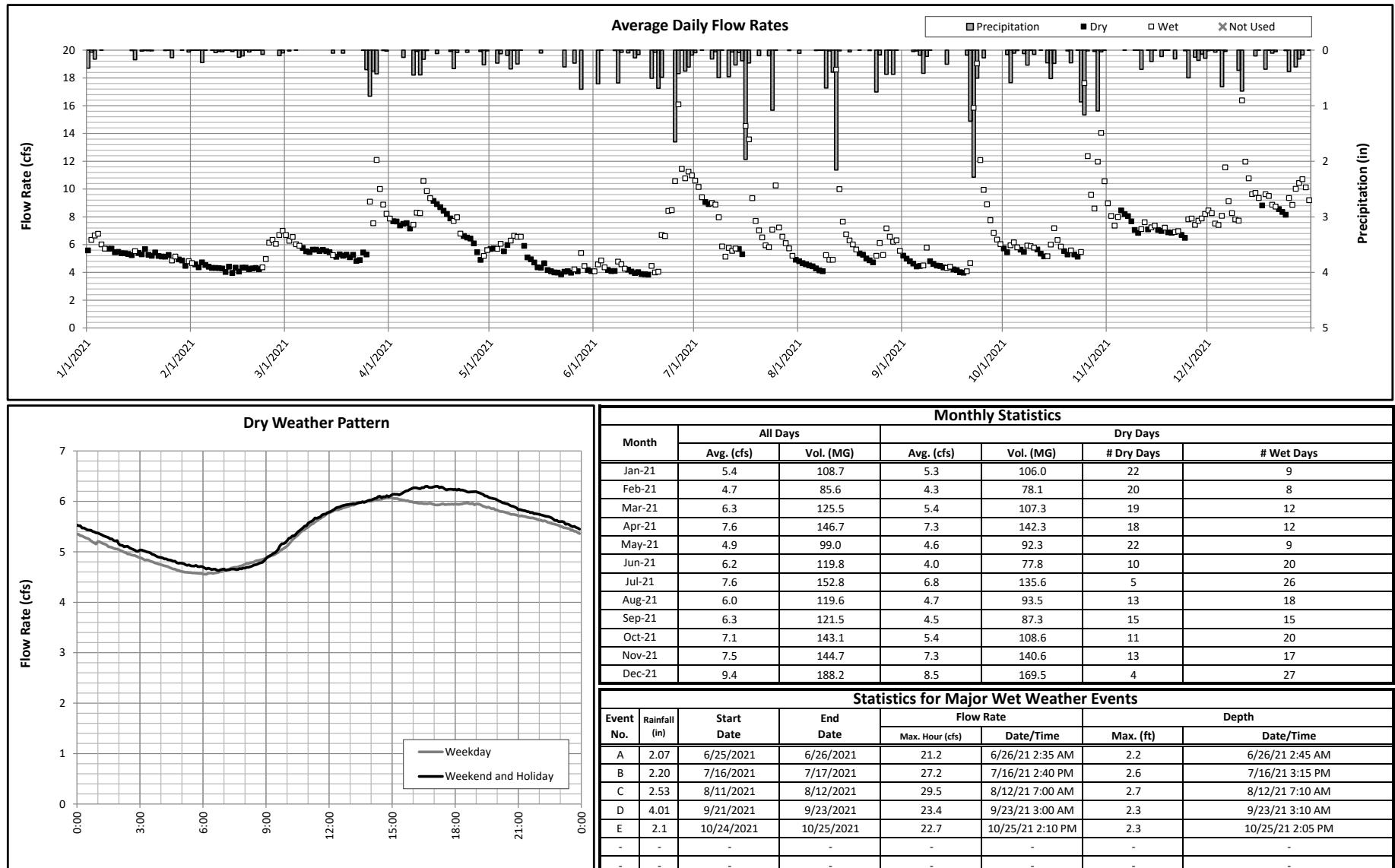


Figure C-8
Meter Report

Meter: PB-1
Type: ADS Triton

Location: Northline Interceptor West of Fordline Road
System Meter Type: Interceptor Flow Meter

Period: 1/1/2021 through 12/31/2021

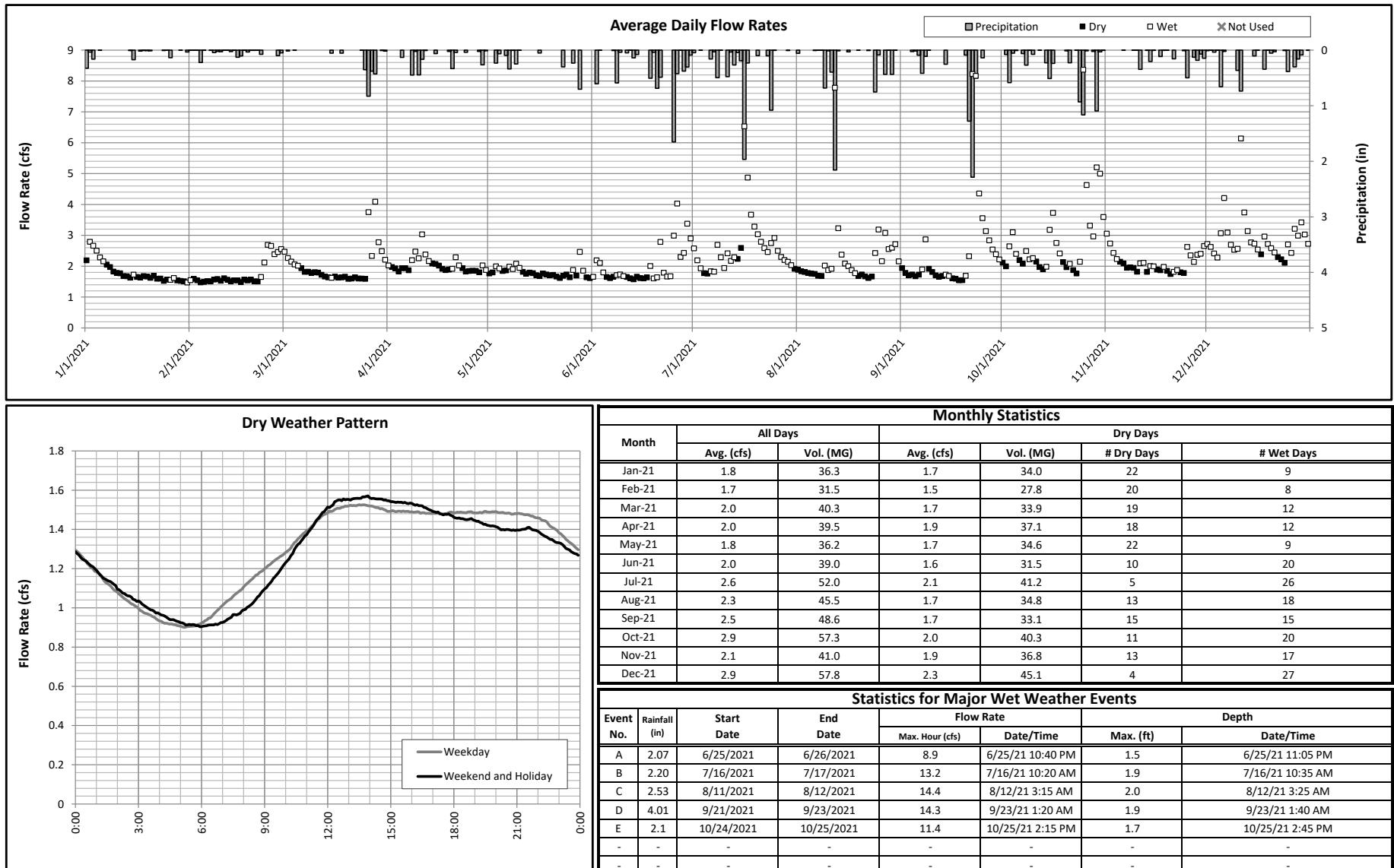


Figure C-9
Meter Report

Meter: PA-4
Type: ADS Triton+

Location: Eureka Interceptor near Hannan Road
System Meter Type: Interceptor Flow Meter

Period: 1/1/2021 through 12/31/2021

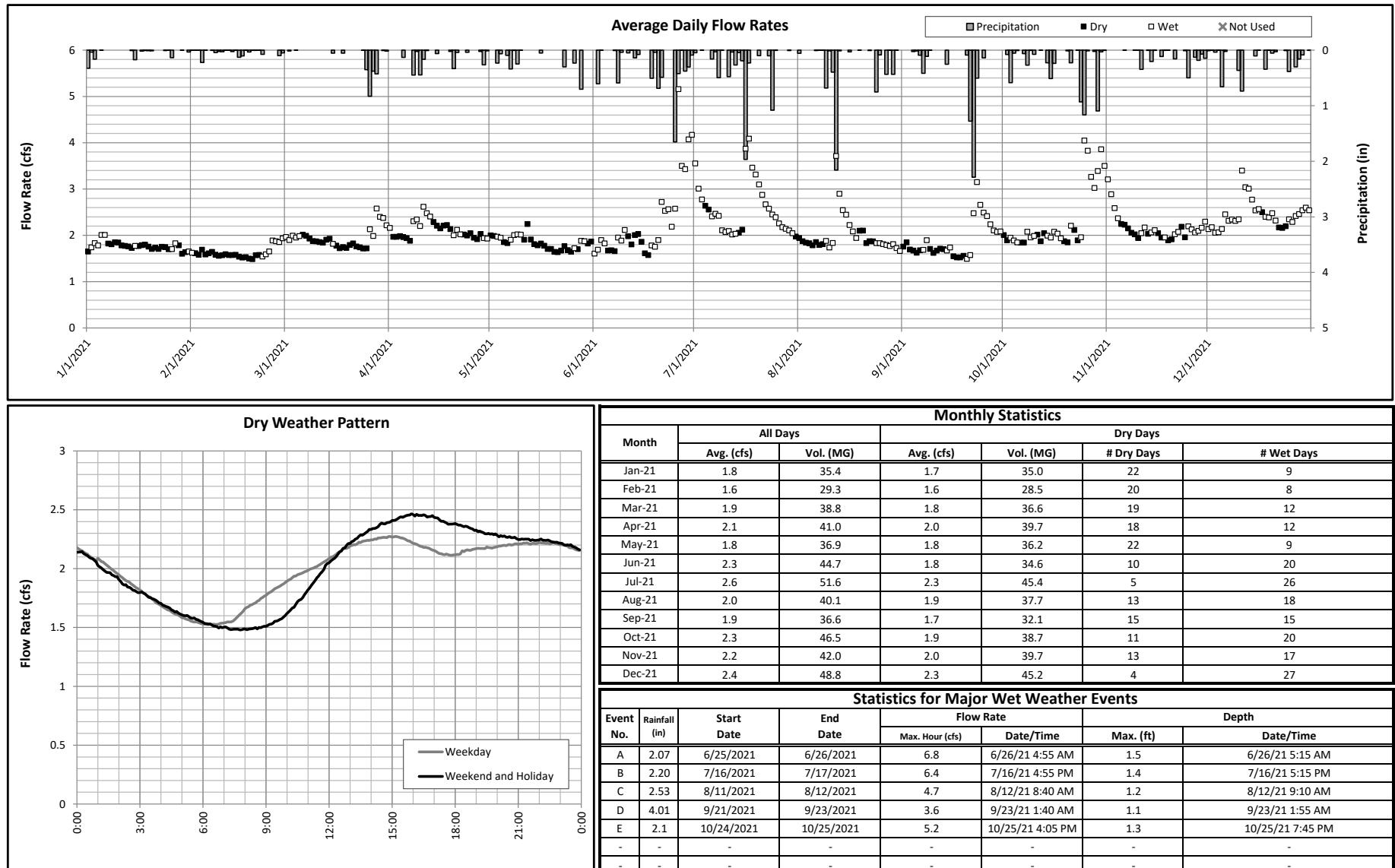


Figure C-10
Meter Report

Meter: DMA-1
Type: ADS Triton+

Location: Detroit Metro Airport outlet at Eureka
System Meter Type: Interceptor Flow Meter

Period: 1/1/2021 through 12/31/2021

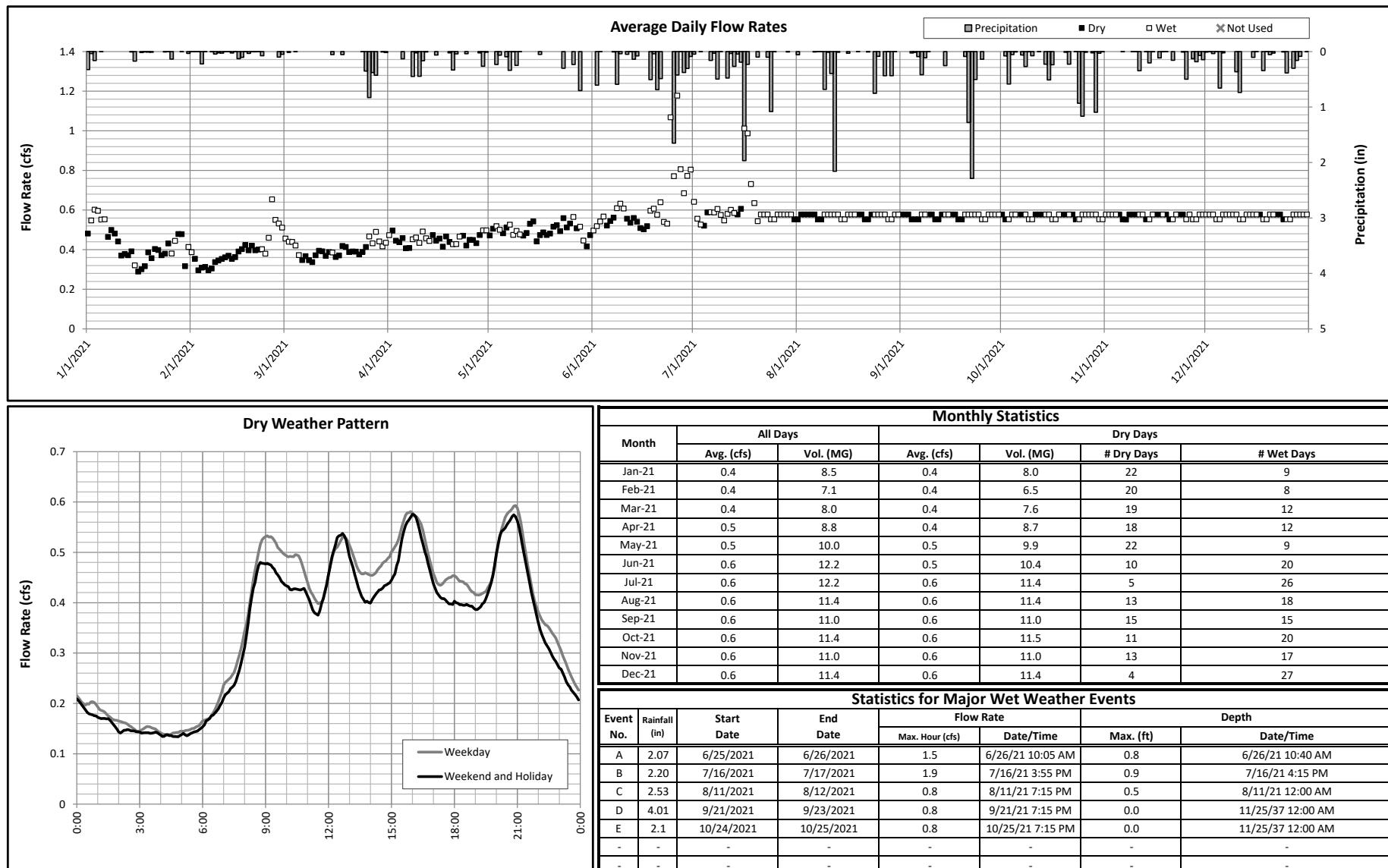


Figure C-11
Meter Report

Meter: PA-3
Type: ADS Triton+

Location: Eureka Interceptor at Inkster Road
System Meter Type: Interceptor Flow Meter

Period: 1/1/2021 through 12/31/2021

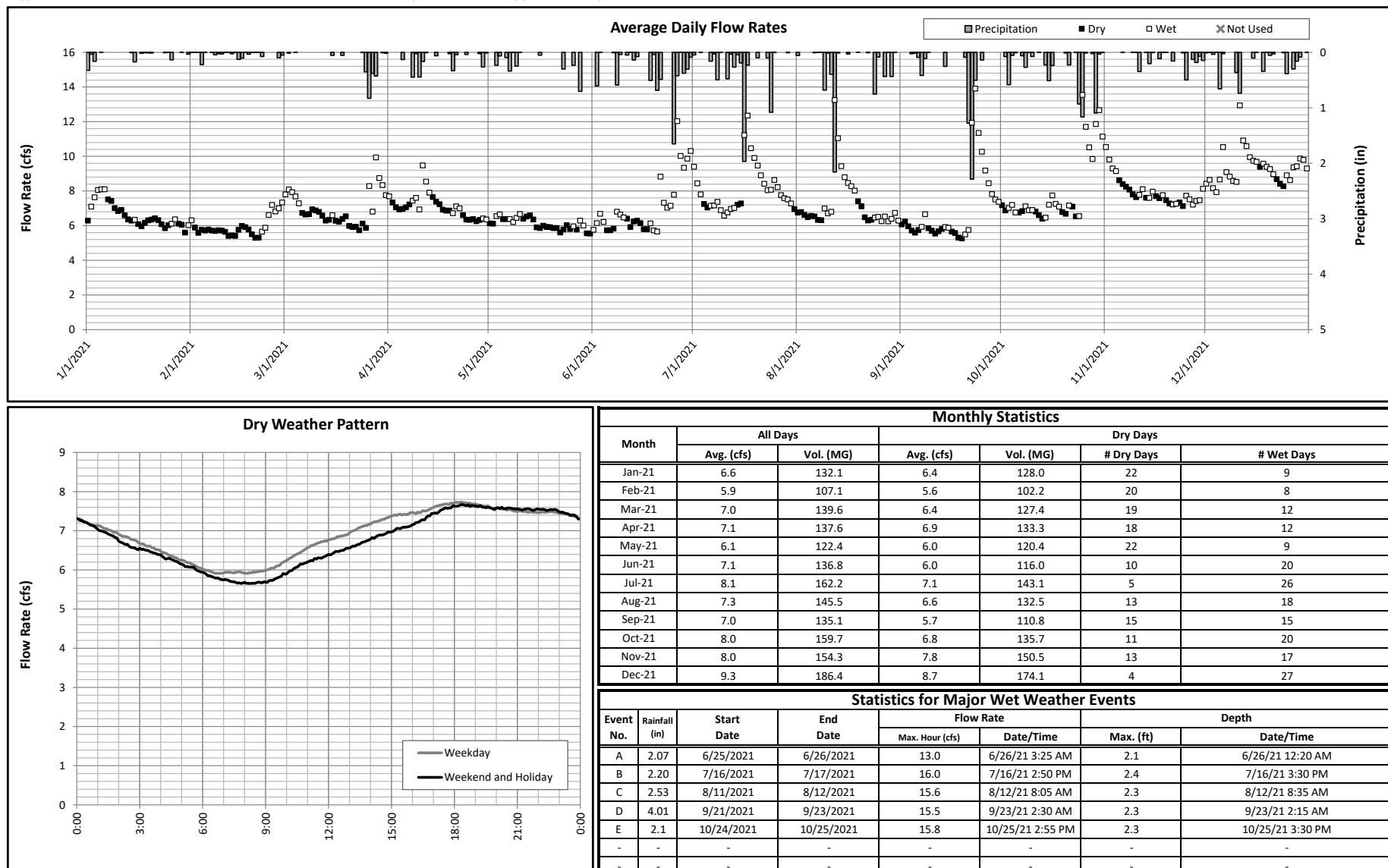


Figure C-12
Meter Report

Meter: PA-2
Type: ADS Triton+

Location: Eureka Interceptor at Allen Road
System Meter Type: Interceptor Flow Meter

Period: 1/1/2021 through 12/31/2021

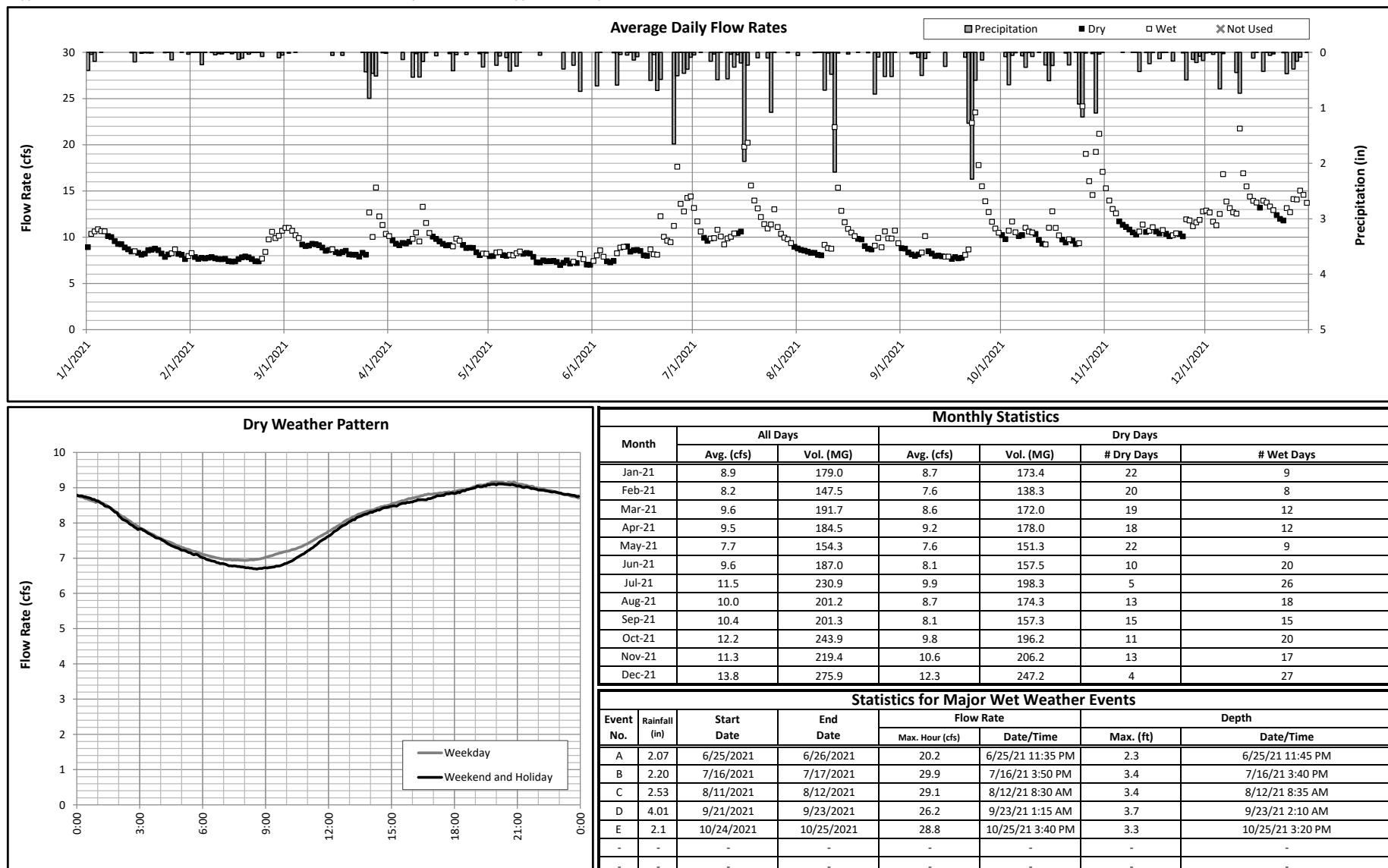


Figure C-13
Meter Report

Meter: PA-1
Type: ADS Triton+

Location: Eureka Interceptor West of Fordline Road
System Meter Type: Interceptor Flow Meter

Period: 1/1/2021 through 12/31/2021

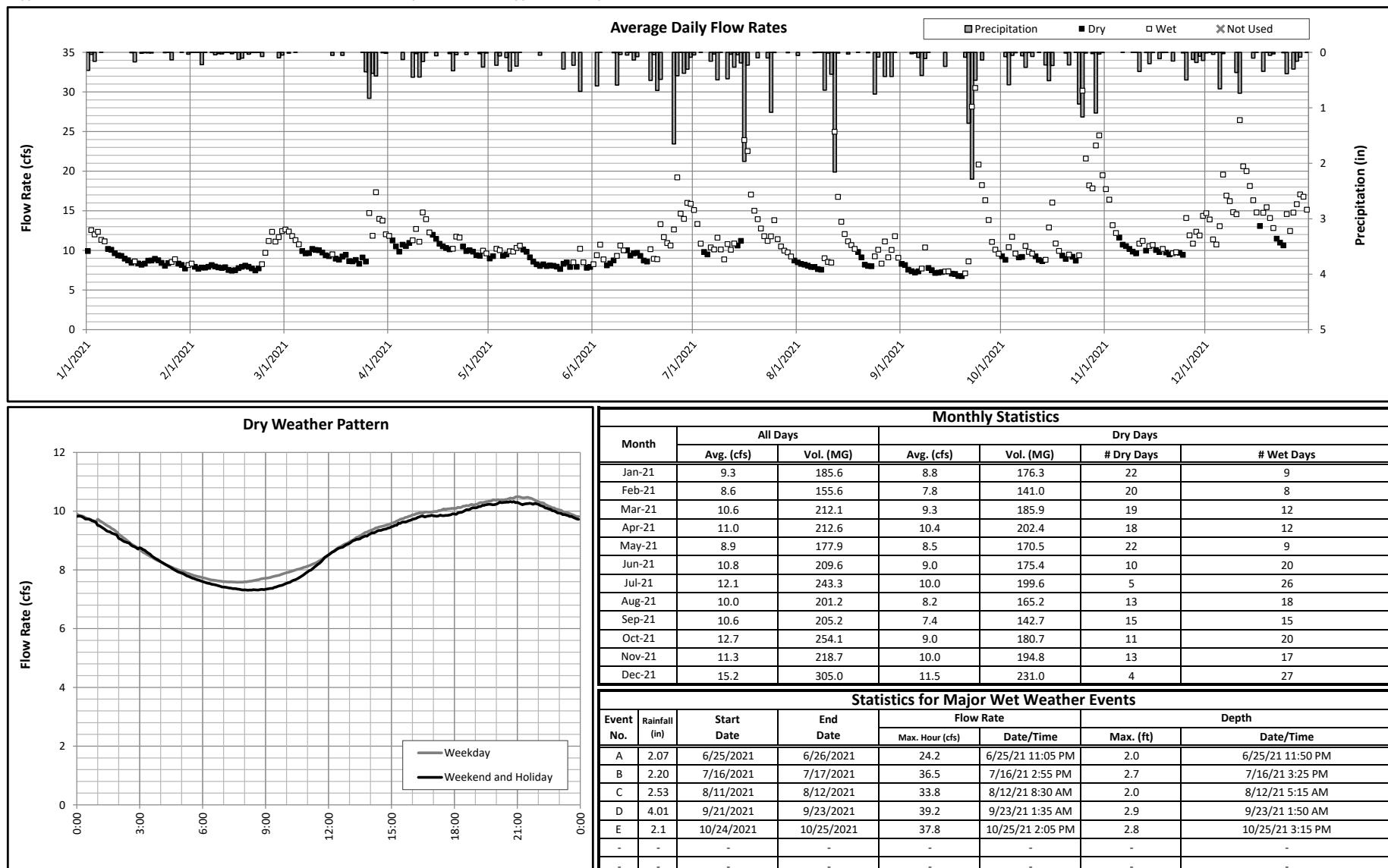


Figure C-14
Meter Report

Meter: P-2
Type: ADS Triton+

Location: Pennsylvania Interceptor East of Dix-Toledo Road
System Meter Type: Interceptor Flow Meter

Period: 1/1/2021 through 12/31/2021

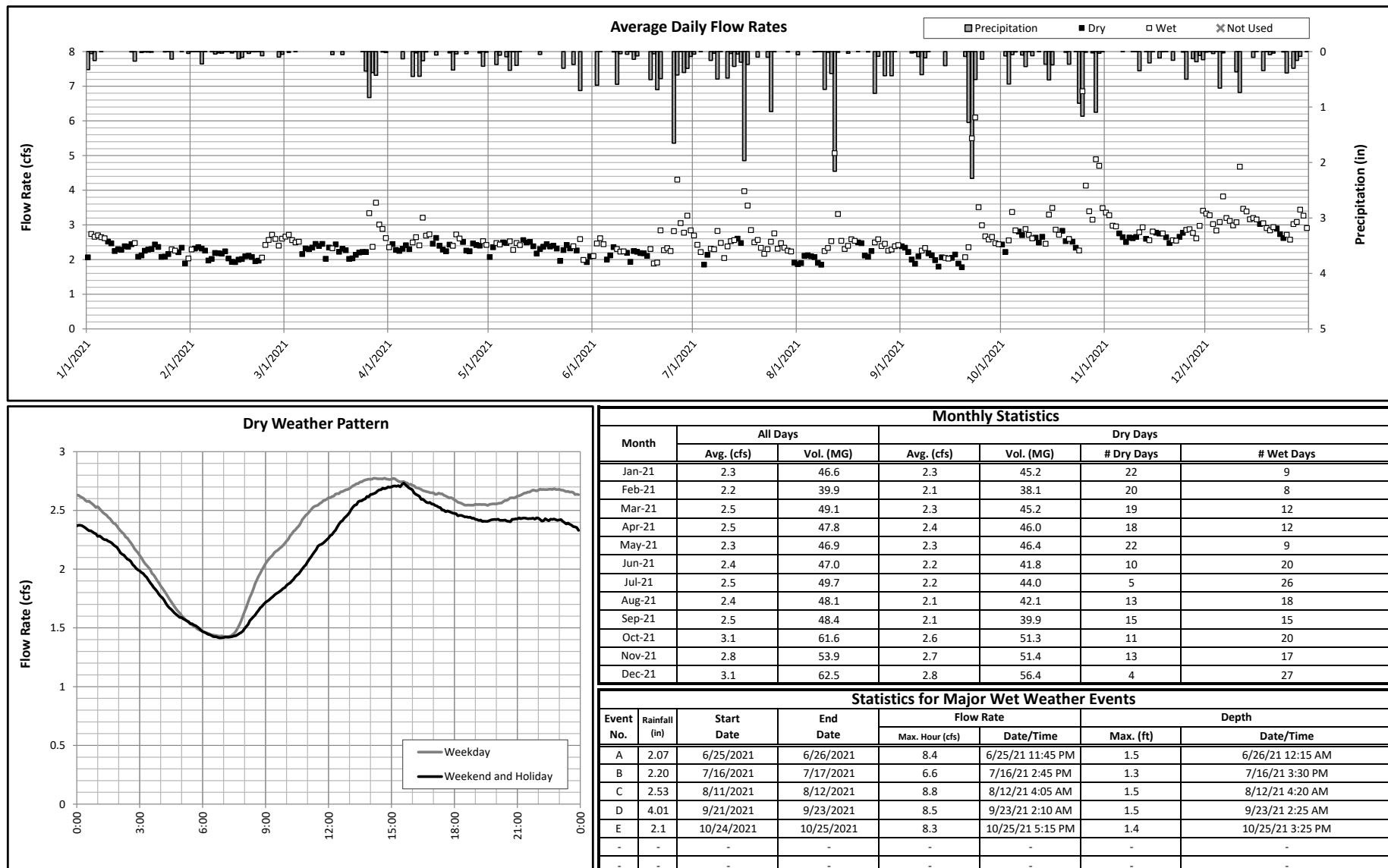


Figure C-15
Meter Report

Meter: P-1
Type: Accusonic 7510

Location: Pennsylvania Interceptor East of Fort Street
System Meter Type: Interceptor Flow Meter

Period: 1/1/2021 through 12/31/2021

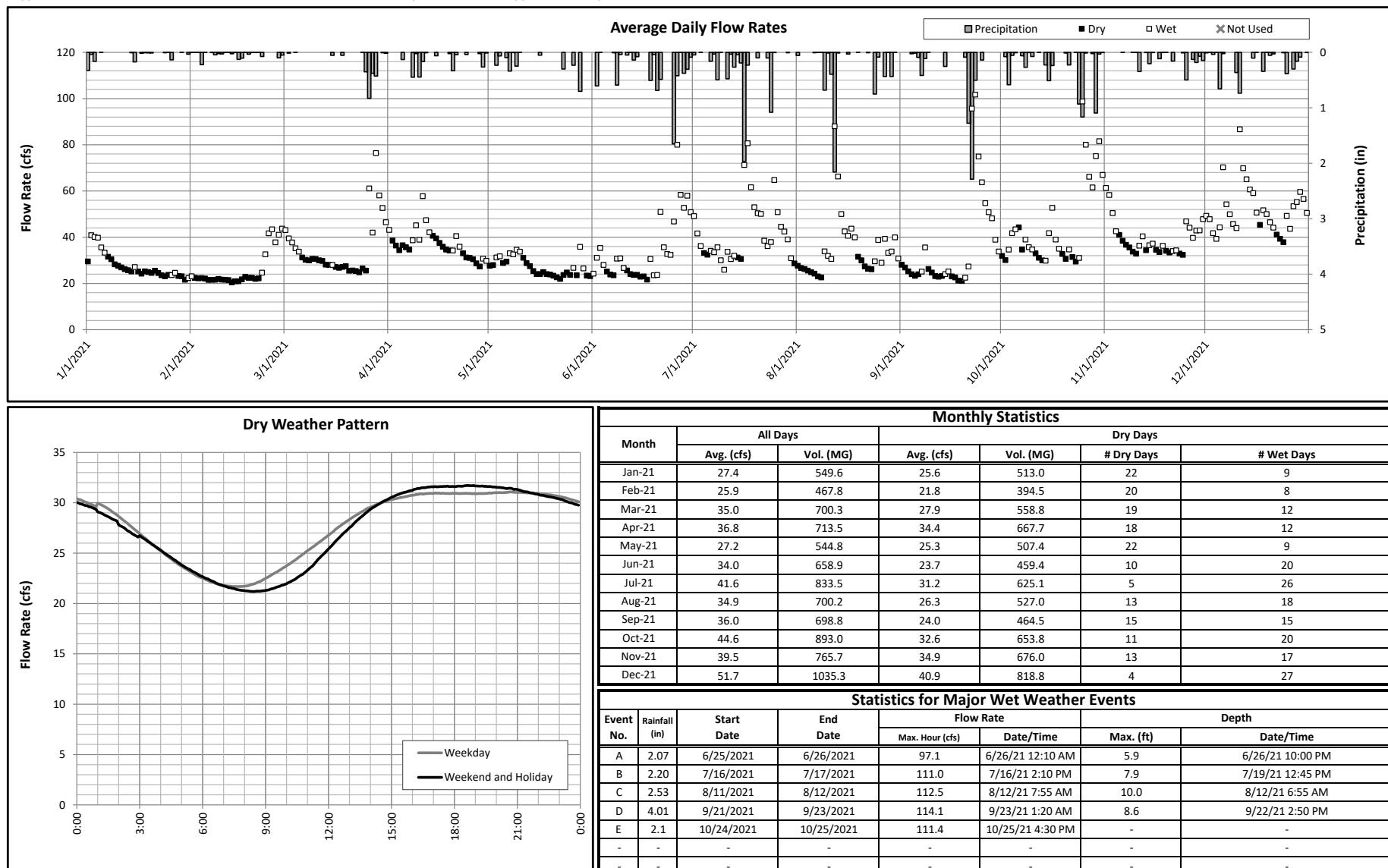


Figure C-16
Meter Report

Meter: RV-1
Type: Accusonic 7510

Location: Pennsylvania Interceptor West of Jefferson Avenue
System Meter Type: Interceptor Flow Meter

Period: 1/1/2021 through 12/31/2021

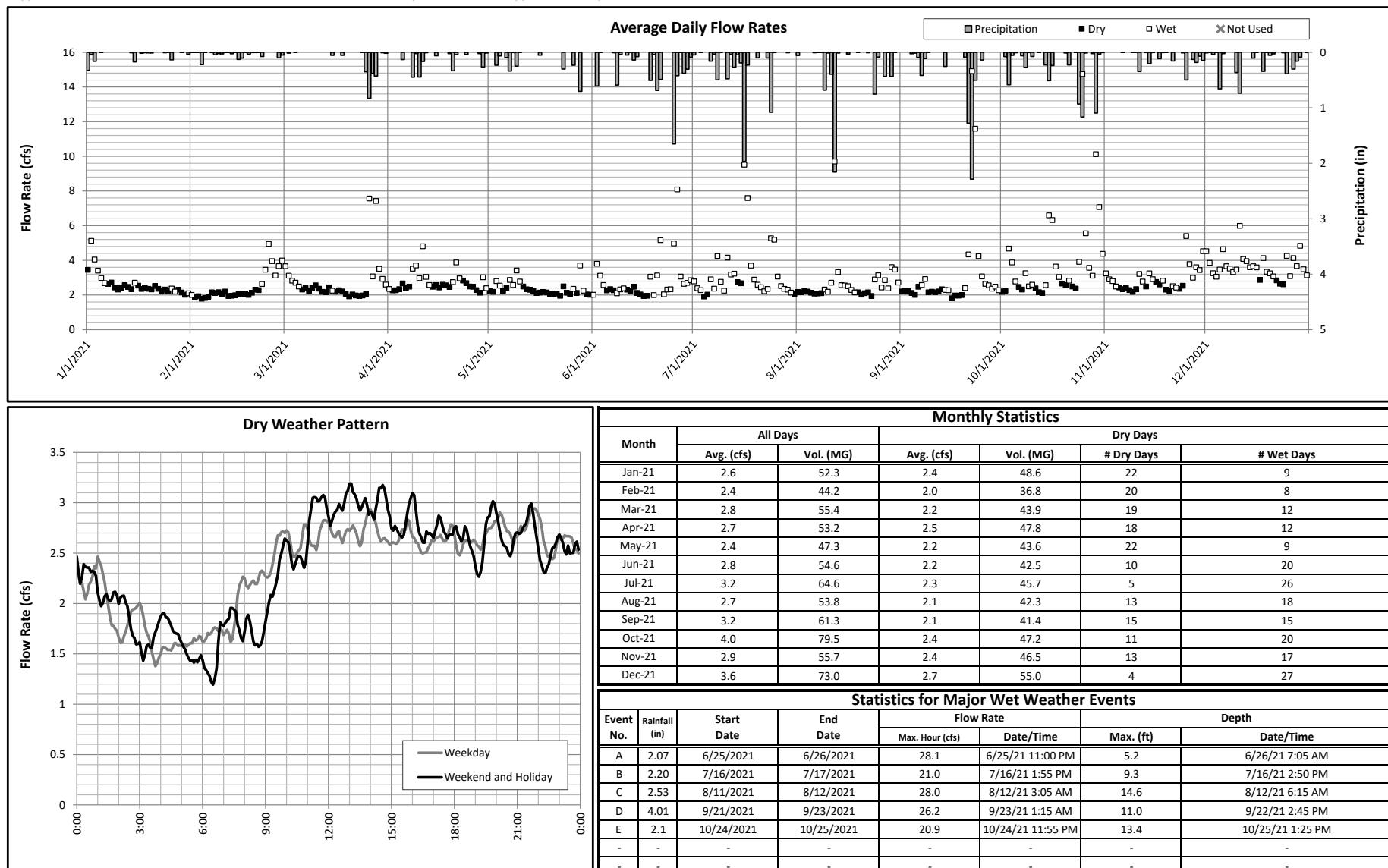


Figure C-17
Meter Report

Meter: RR-1
Type: ADS Triton

Location: 17th Street near Visger Road
System Meter Type: Interceptor Flow Meter

Period: 1/1/2021 through 12/31/2021

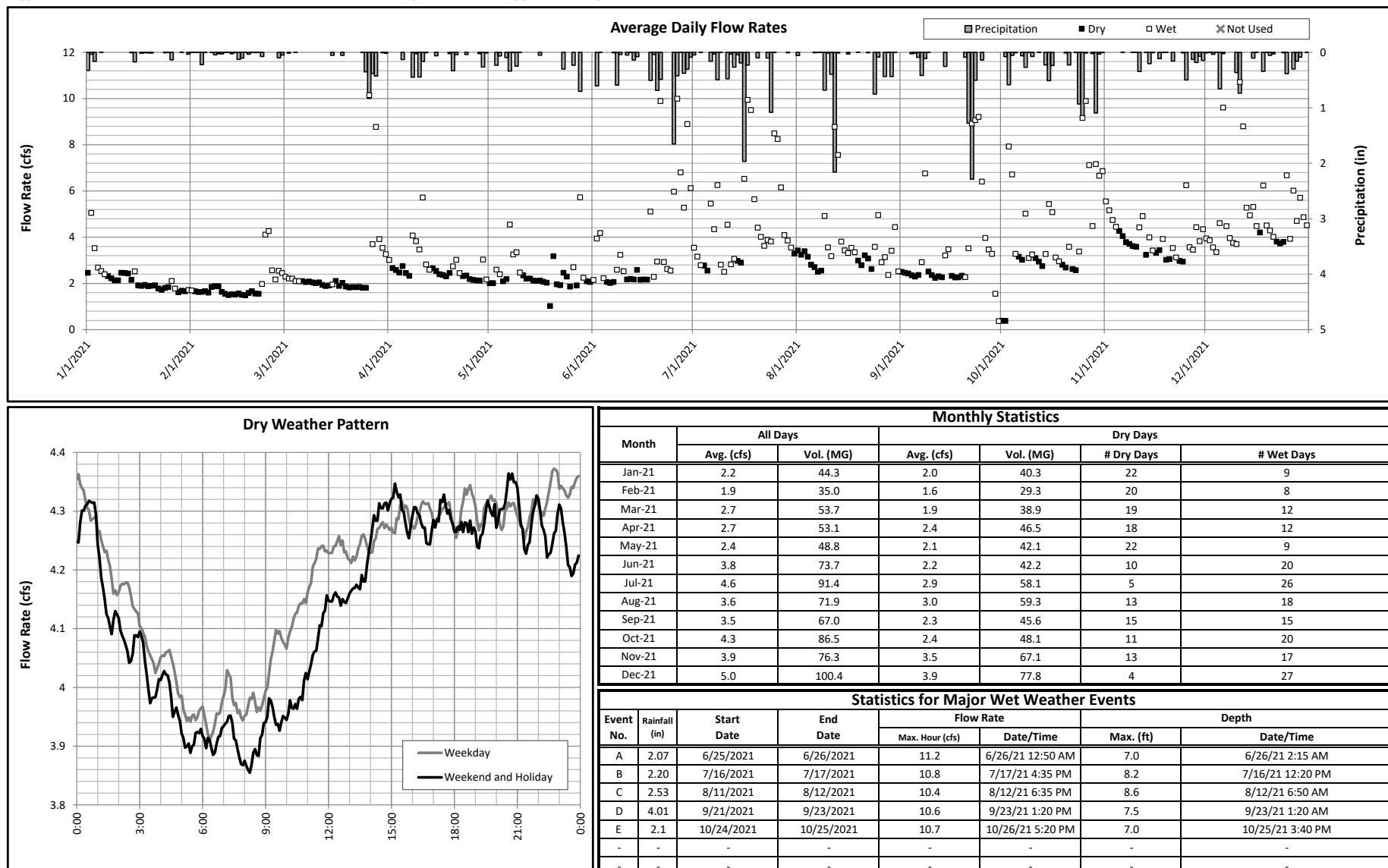


Figure C-18
Meter Report

Meter: EC-6
Type: ADS Triton

Location: Riverdrive Interceptor South of Southfield Road
System Meter Type: Interceptor Flow Meter

Period: 1/1/2021 through 12/31/2021

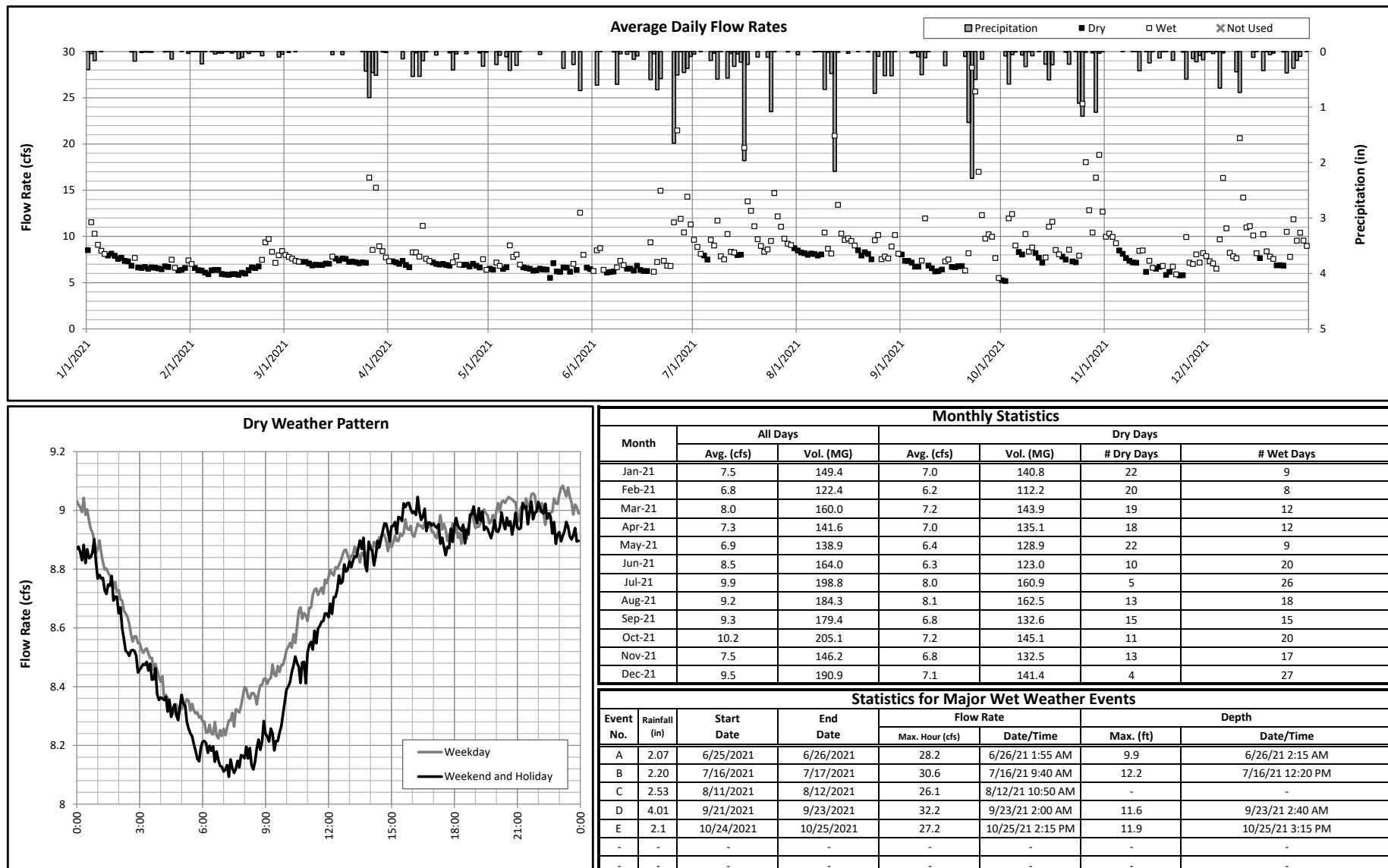


Figure C-19
Meter Report

Meter: RD-1
Type: Accusonic 7510

Location: Riverdrive Interceptor North of Northline Road
System Meter Type: Interceptor Flow Meter

Period: 1/1/2021 through 12/31/2021

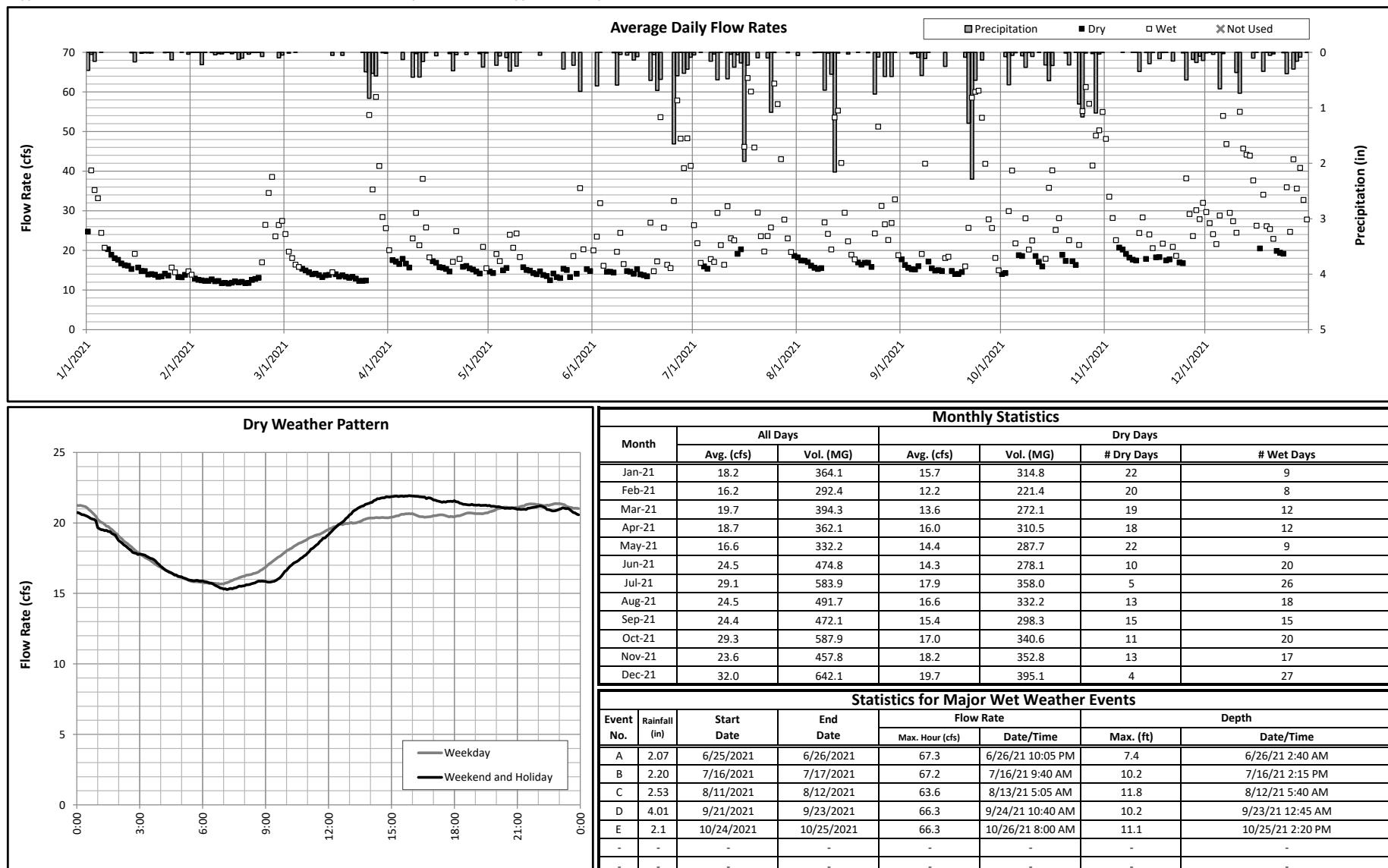


Figure C-20
Meter Report

Meter: [SW] + [SWB]

Type: Accusonic 7510 (SW) & Telog 3314 (SWB)

Location: Southgate / Wyandotte

System Meter Type: Total for SWDDD

Period: 1/1/2021 through 12/31/2021

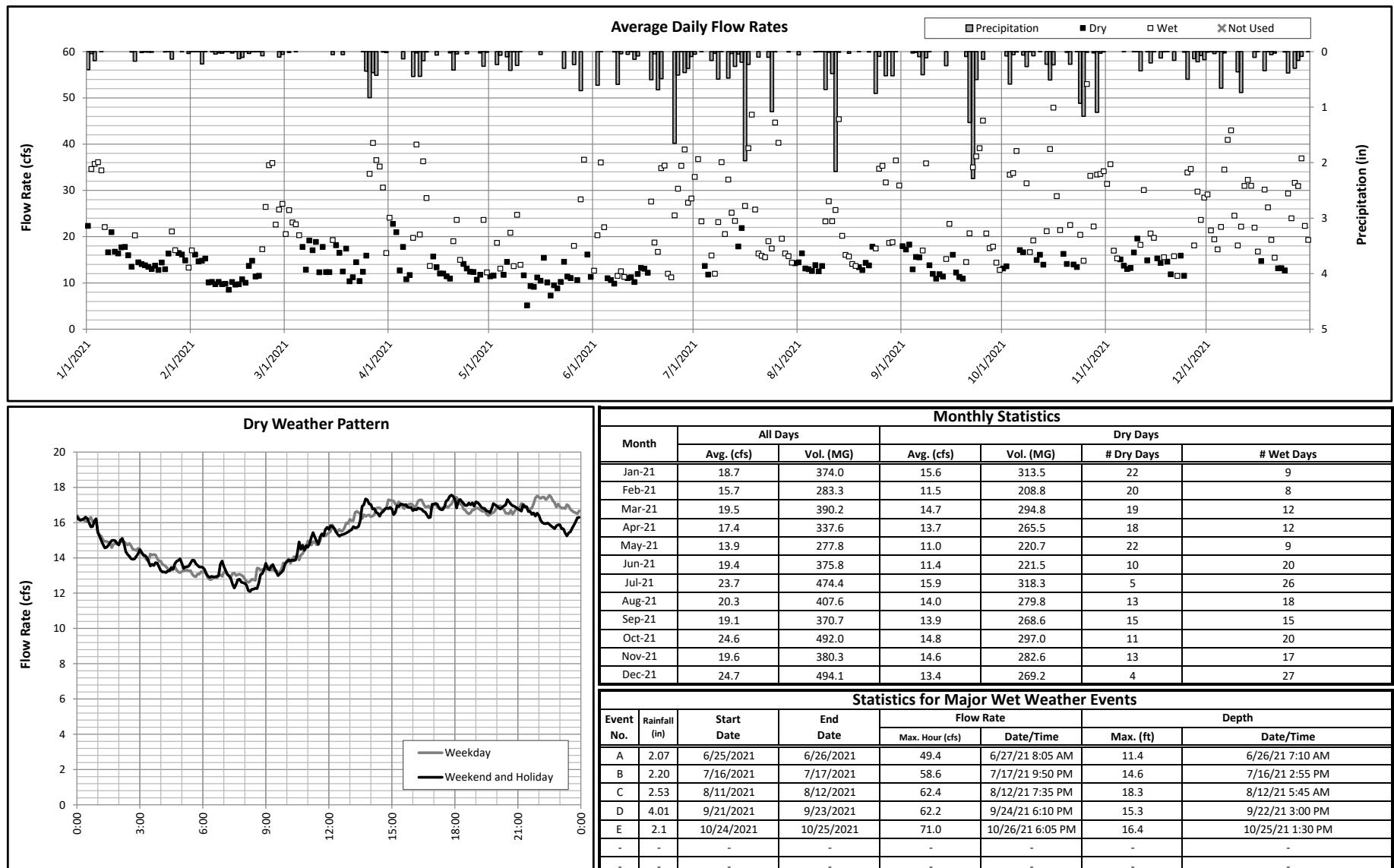


Figure C-21
Meter Report

Meter: [IPS] + [TPS]
Type: Magmeters

Location: Main Influent Pump Station and Tunnel Pump Station
System Meter Type: DWTF

Period: 1/1/2021 through 12/31/2021

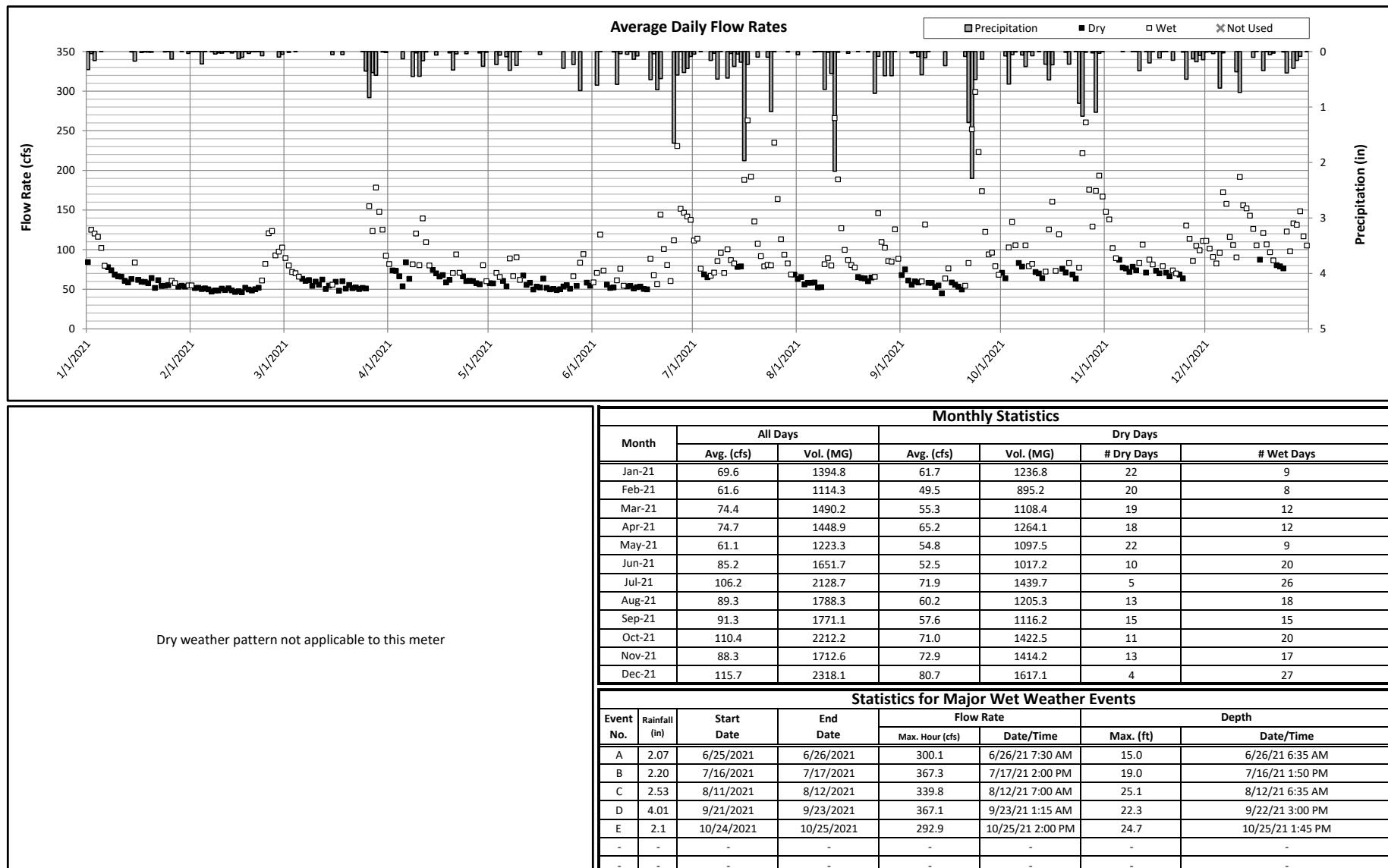
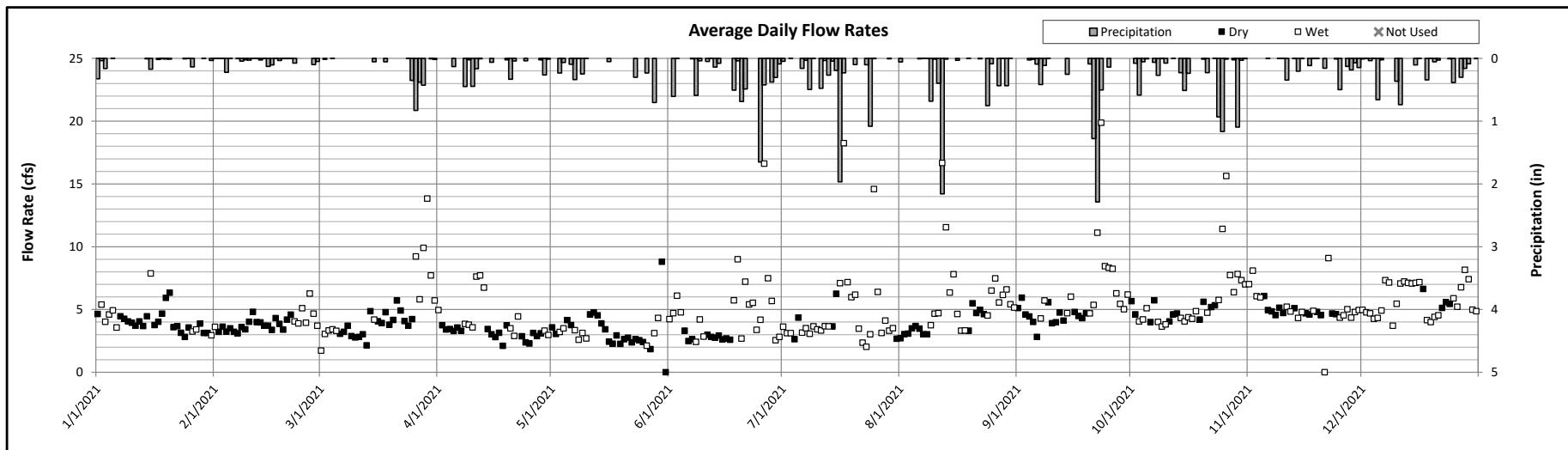


Figure C-22
Meter Report

Meter: DWTF Recycle
Type: HydroRanger 200

Location: Main Influent Pump Station
System Meter Type: Parshall Flume

Period: 1/1/2021 through 12/31/2021



Dry weather pattern not applicable to this meter

Month	All Days		Dry Days			
	Avg. (cfs)	Vol. (MG)	Avg. (cfs)	Vol. (MG)	# Dry Days	# Wet Days
Jan-21	4.2	83.2	4.0	80.9	22	9
Feb-21	3.9	71.1	3.7	67.6	20	8
Mar-21	4.6	92.4	3.8	75.7	19	12
Apr-21	3.7	71.7	3.1	59.9	18	12
May-21	3.2	64.4	3.3	65.2	22	9
Jun-21	4.5	87.4	2.8	53.8	10	20
Jul-21	4.8	95.2	3.9	78.3	5	26
Aug-21	5.2	105.2	3.7	74.9	13	18
Sep-21	5.9	114.5	4.5	87.2	15	15
Oct-21	5.6	112.5	4.9	97.7	11	20
Nov-21	5.1	97.9	4.9	94.4	13	17
Dec-21	5.7	114.6	5.7	114.1	4	27

Event No.	Rainfall (in)	Start Date	End Date	Flow Rate		Depth	
				Max. Hour (cfs)	Date/Time	Max. (ft)	Date/Time
A	2.07	6/25/2021	6/26/2021	-	-	-	-
B	2.20	7/16/2021	7/17/2021	-	-	-	-
C	2.53	8/11/2021	8/12/2021	-	-	-	-
D	4.01	9/21/2021	9/23/2021	-	-	-	-
E	2.1	10/24/2021	10/25/2021	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-

Figure C-23
Meter Report

Meter: TSO

Type: ADS Triton+

Location: At Pelham Basin

System Meter Type: Tunnel System Flow Meter

Period: 1/1/2021 through 12/31/2021

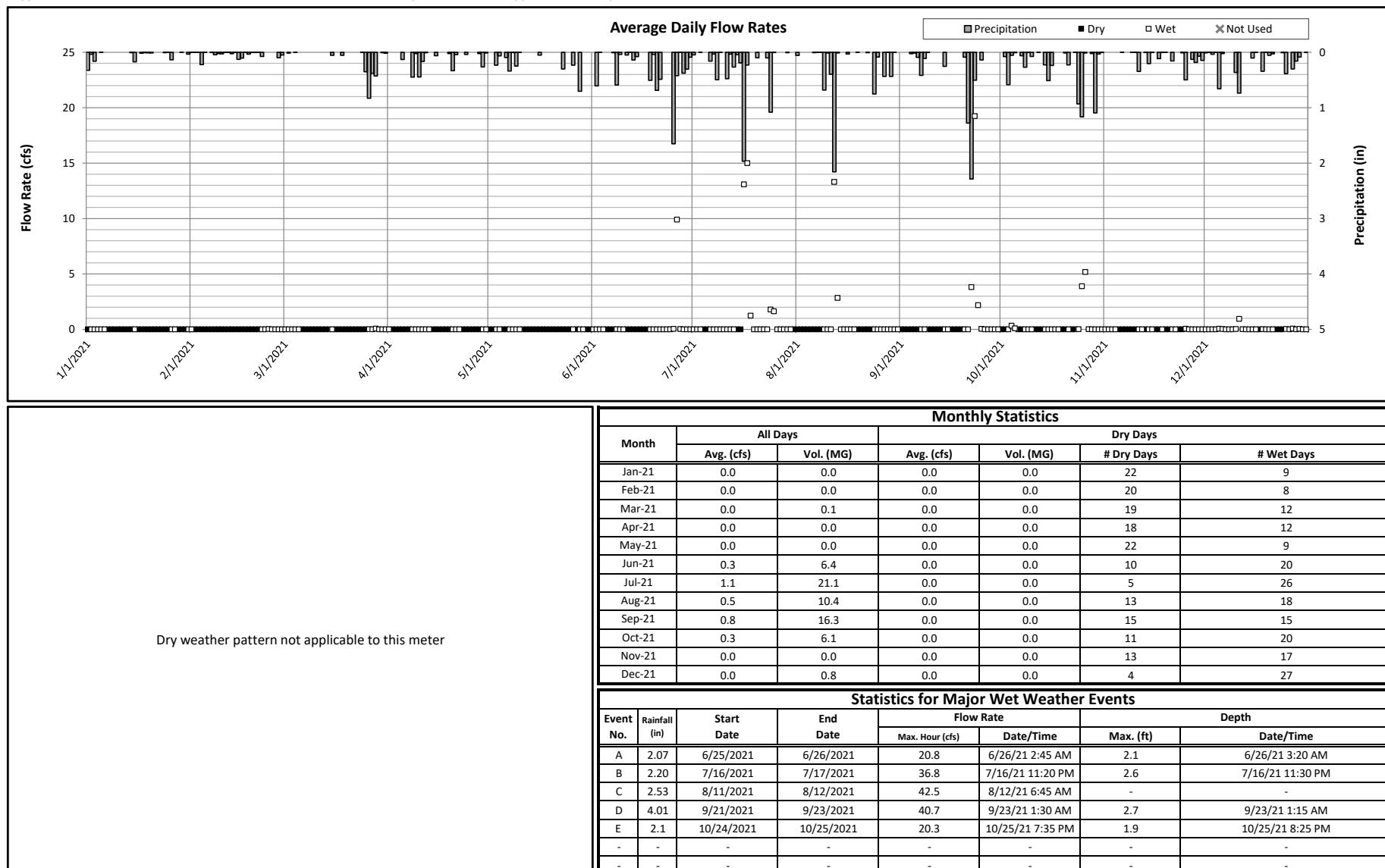


Figure C-24
Meter Report

Meter: APO-1
Type: Telog 3307

Location: Belmont and Rosedale
System Meter Type: Tunnel Diversion Chamber Level Sensor

Period: 1/1/2021 through 12/31/2021

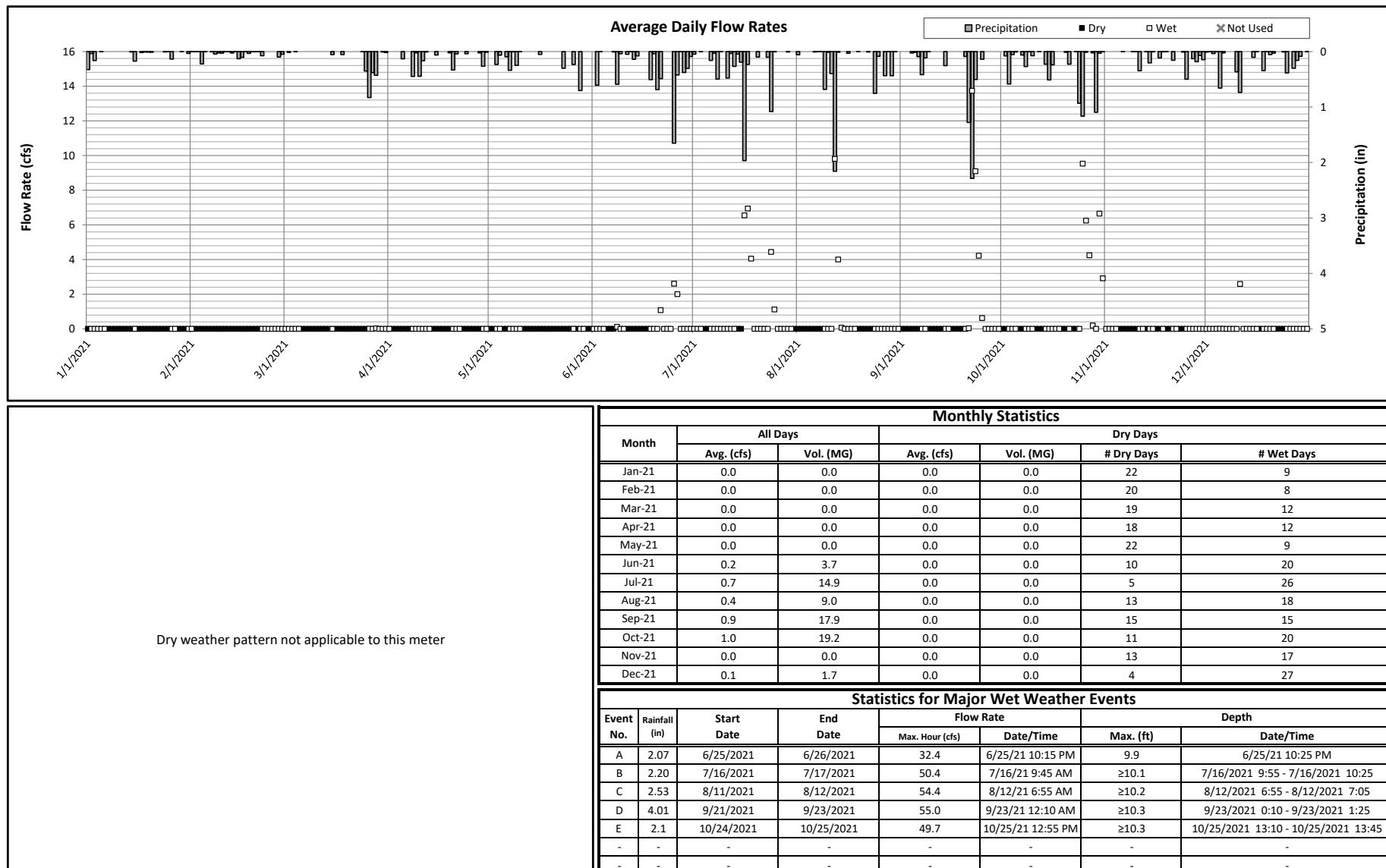


Figure C-25
Meter Report

Meter: APO-2
Type: Telog 3307

Location: Belmont and Quandt
System Meter Type: Tunnel Diversion Chamber Level Sensor

Period: 1/1/2021 through 12/31/2021

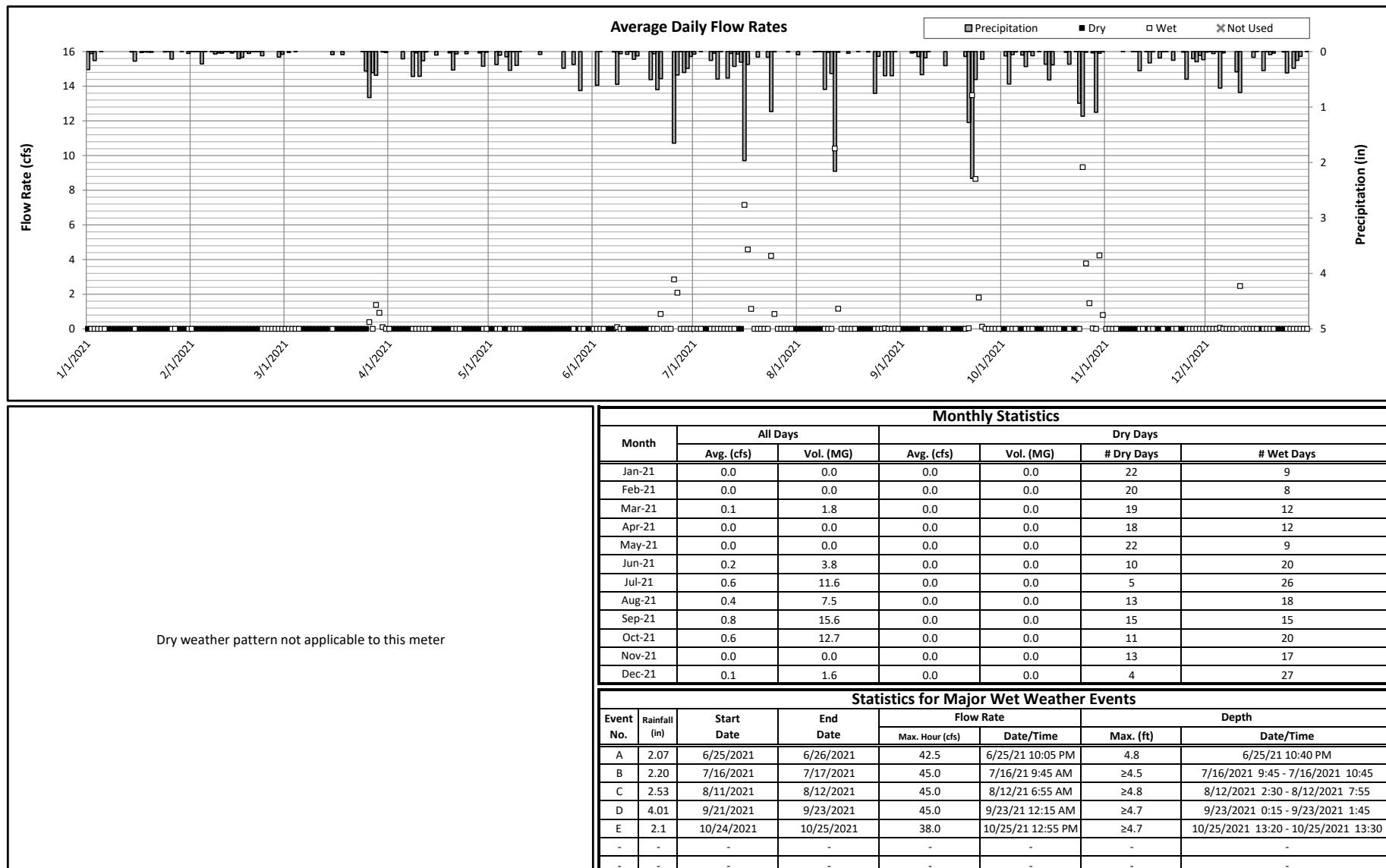


Figure C-26
Meter Report

Meter: CHPO
Type: Telog 3307

Location: Pelham Road North of Haskell
System Meter Type: Tunnel Diversion Chamber Level Sensor

Period: 1/1/2021 through 12/31/2021

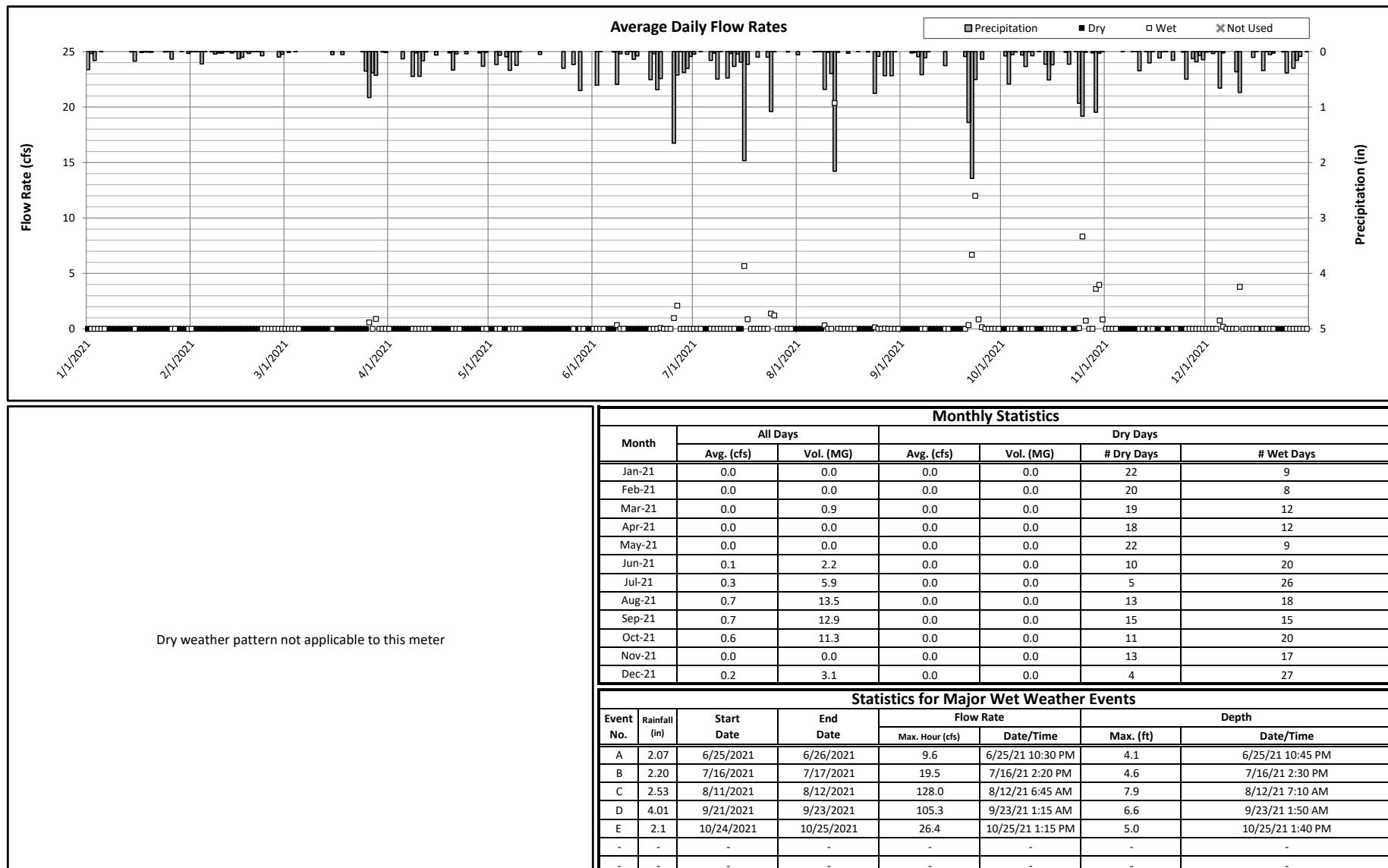


Figure C-27
Meter Report

Meter: CPO
Type: Telog 3307

Location: Pelham Road South of R.R.
System Meter Type: Tunnel Diversion Chamber Level Sensor

Period: 1/1/2021 through 12/31/2021

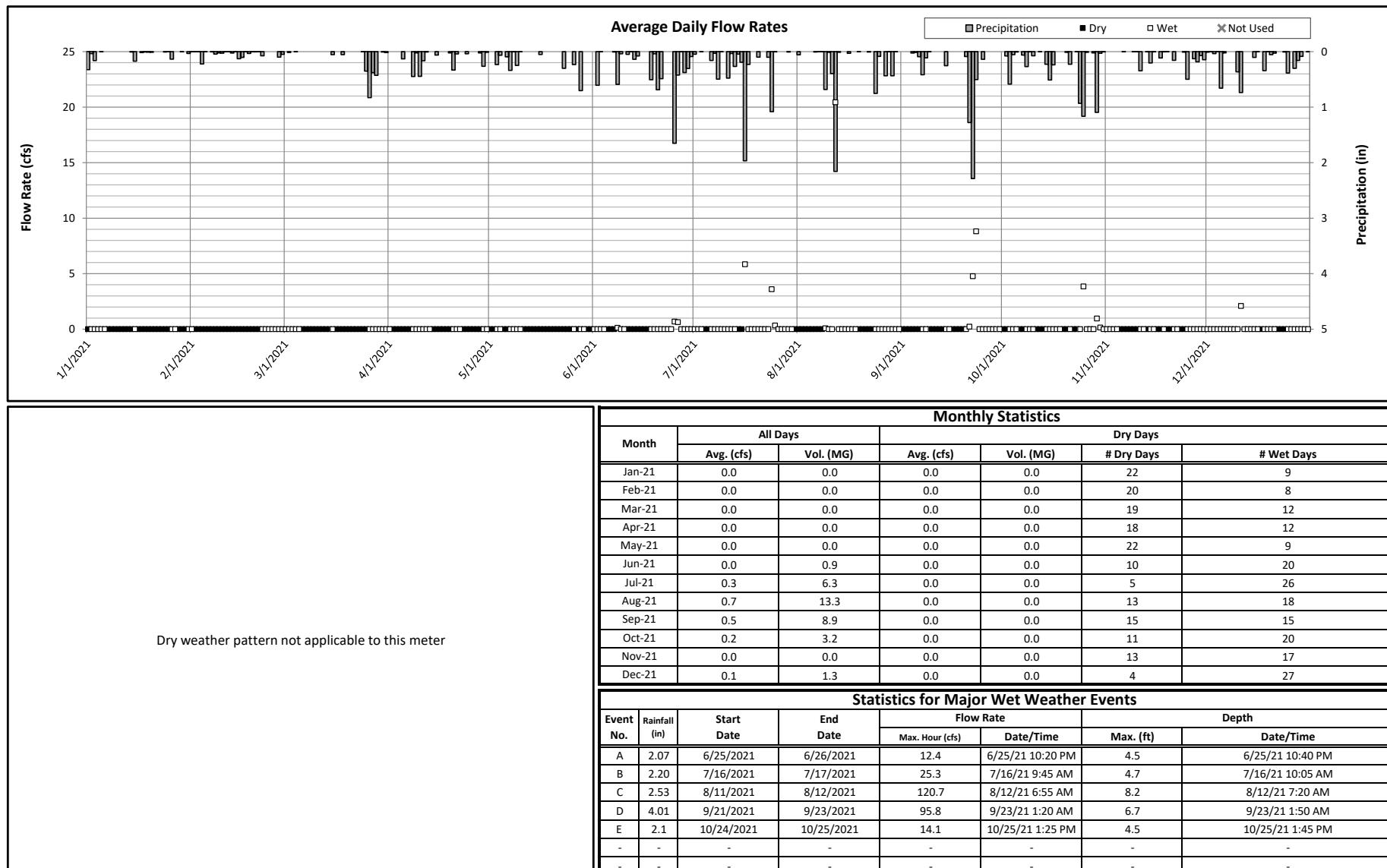


Figure C-28
Meter Report

Meter: PDO
Type: Telog 3307

Location: Allen Road and Goddard
System Meter Type: Tunnel Diversion Chamber Level Sensor

Period: 1/1/2021 through 12/31/2021

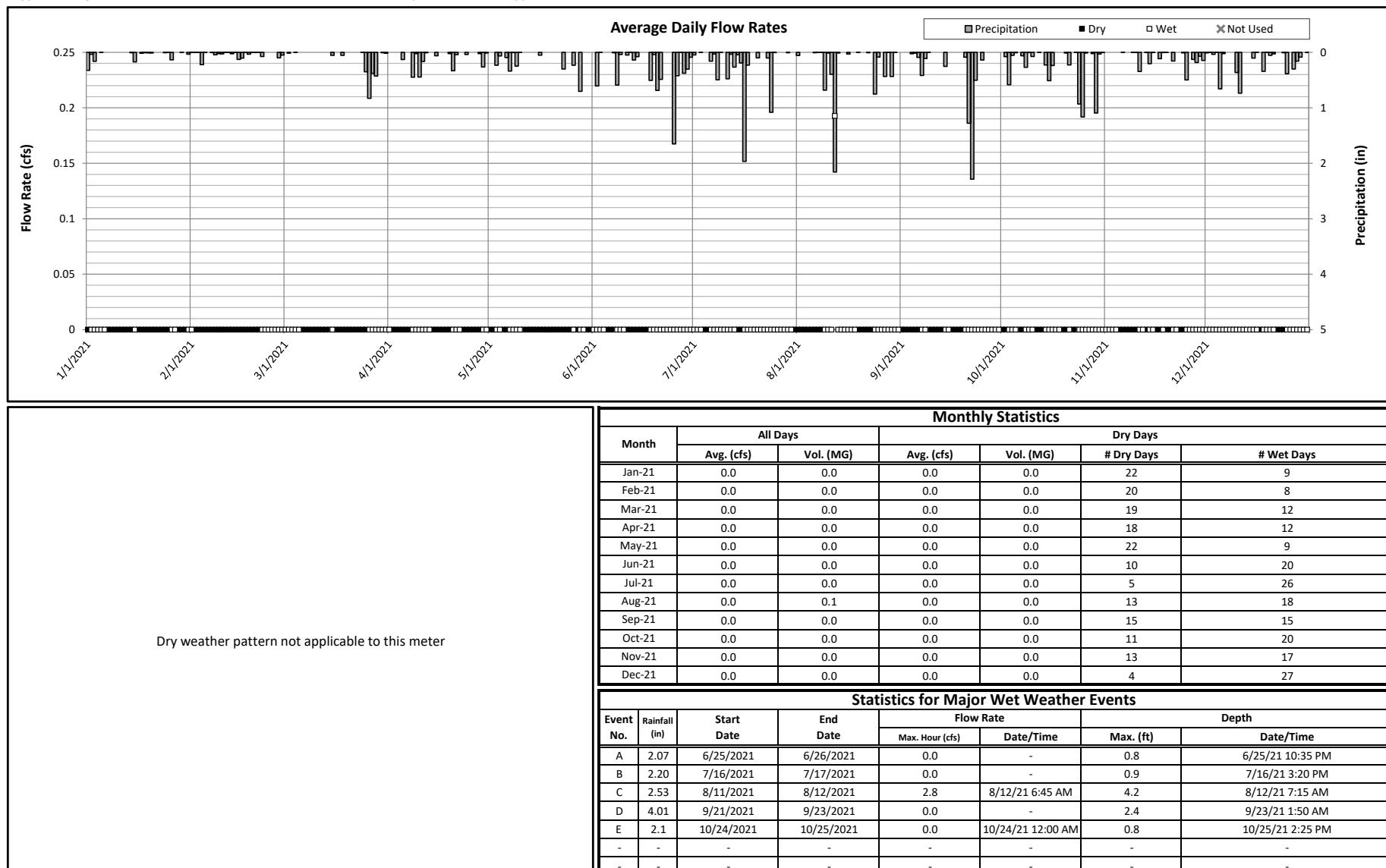


Figure C-29
Meter Report

Meter: ER-2
Type: ADS Triton+

Location: Eureka Road and Inkster
System Meter Type: Tunnel System Flow Meter

Period: 1/1/2021 through 12/31/2021

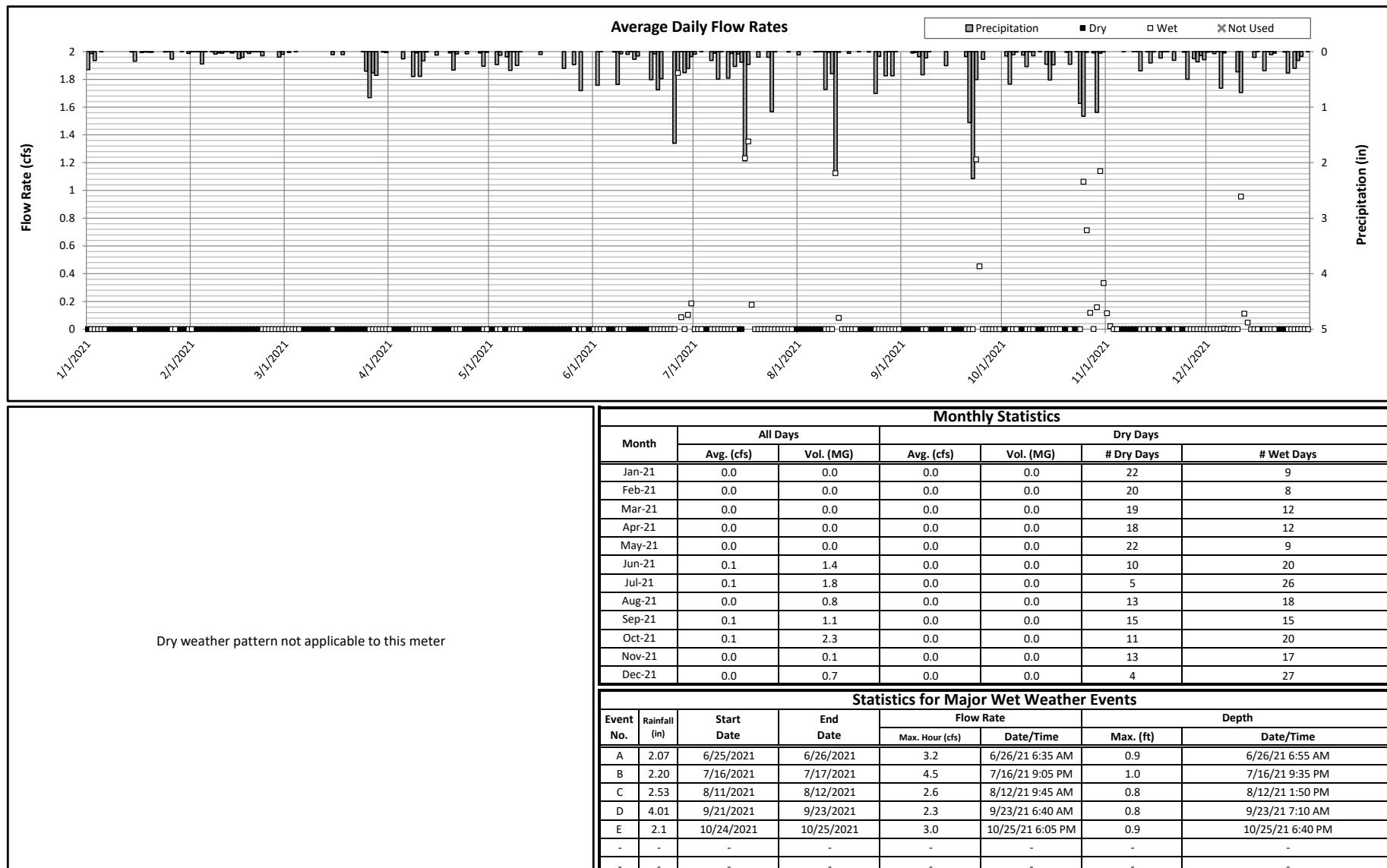


Figure C-30
Meter Report

Meter: ER-1
Type: ADS Triton+

Location: Allen Road and Eureka Road
System Meter Type: Tunnel System Flow Meter

Period: 1/1/2021 through 12/31/2021

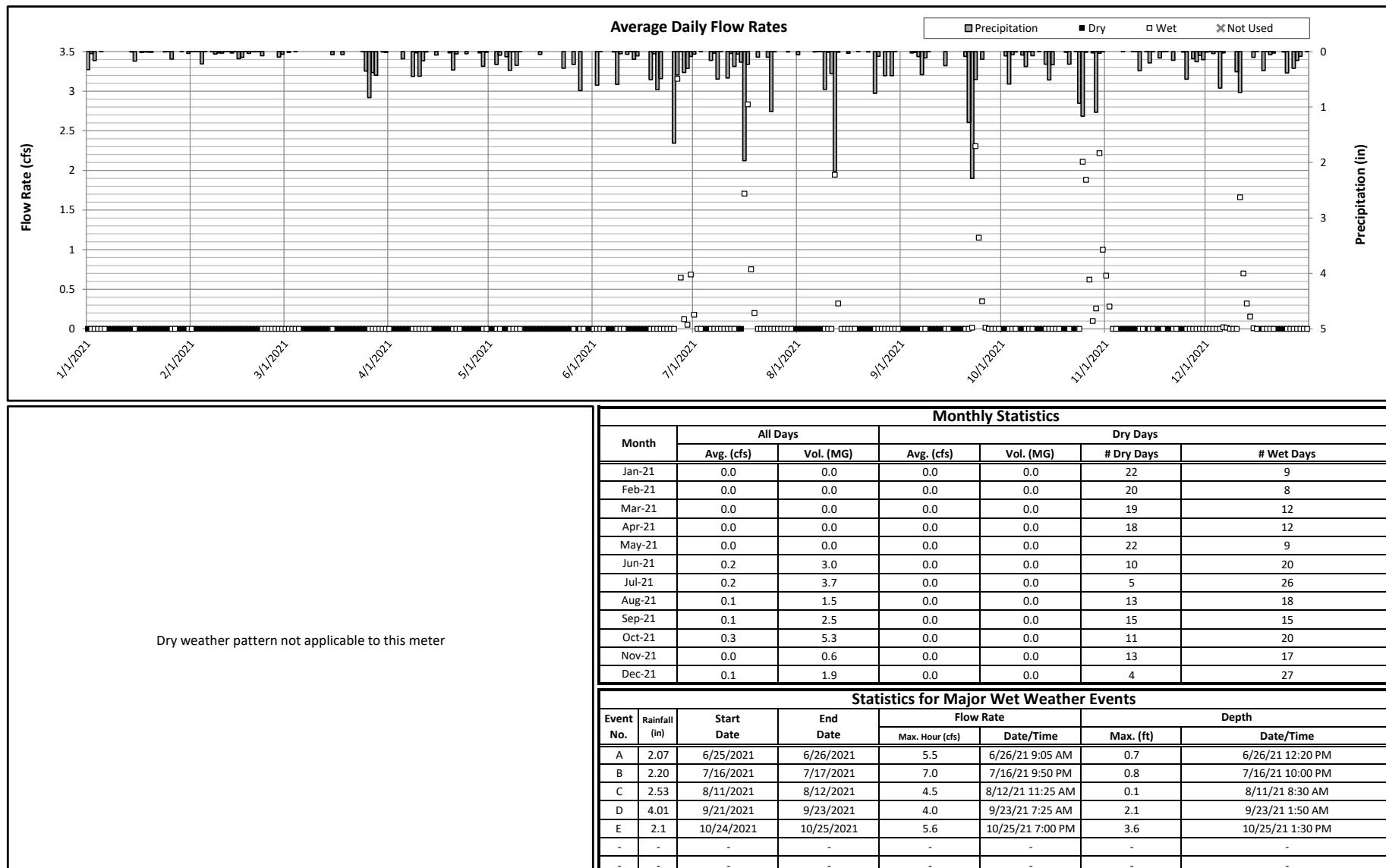
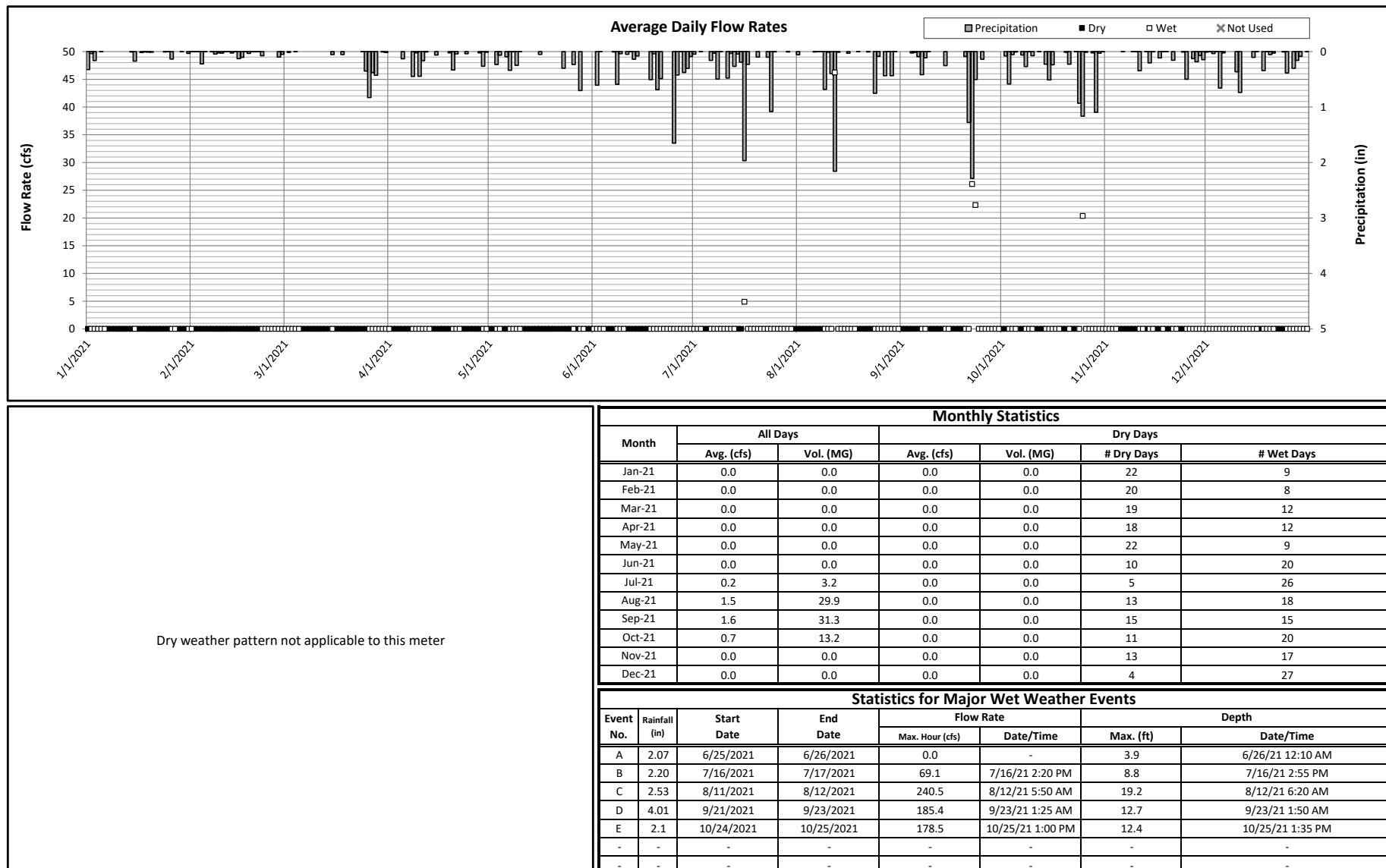


Figure C-31
Meter Report

Meter: PM-1
Type: Telog 3307

Location: Pennsylvania Ave. at Fordline
System Meter Type: Tunnel Diversion Chamber Level Sensor

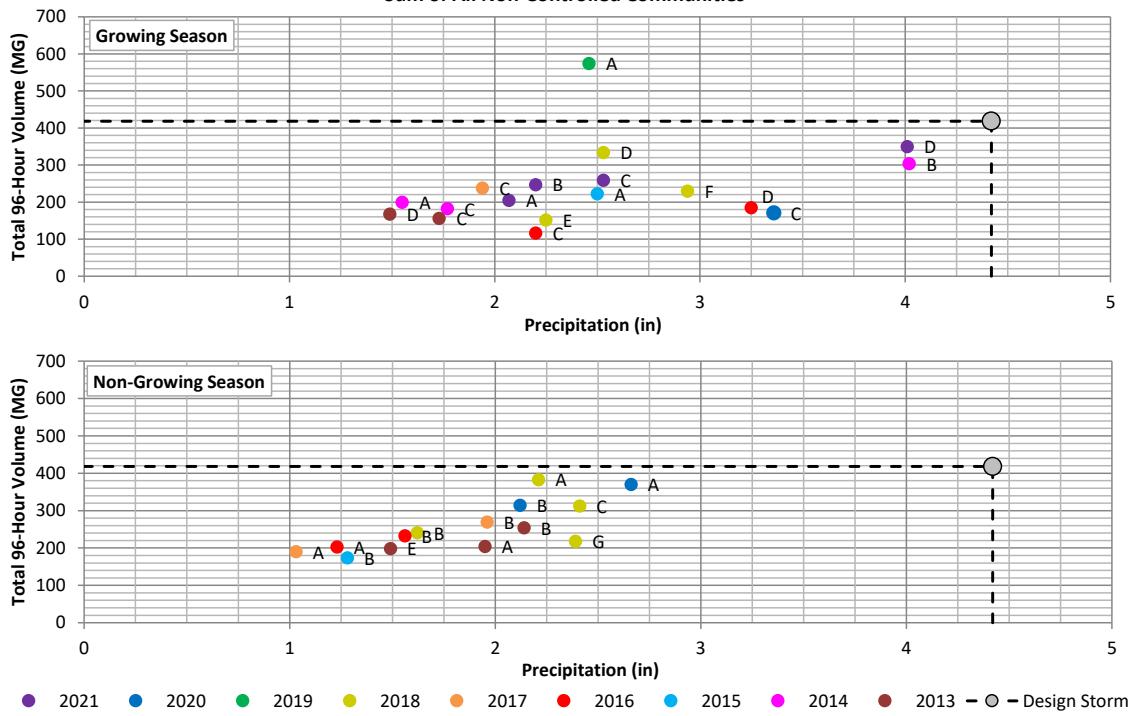
Period: 1/1/2021 through 12/31/2021



Appendix D

Major Storm Event Wet Weather Summary Figures

Figure D-1
Total 96-Hour Volume versus Precipitation for Major Storm Events for 2013 through 2021
Sum of All Non-Controlled Communities

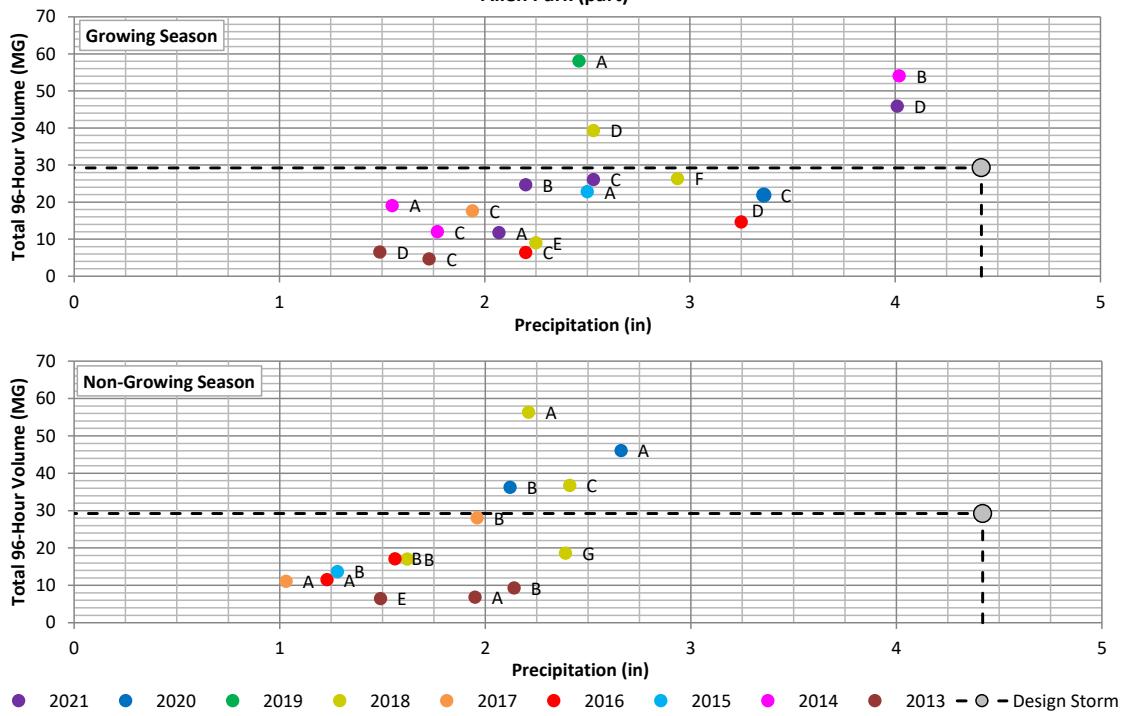


Major Storm Event	Sum of All Non-Controlled Communities	
	DTW Precipitation (in)	96-hour Volume (MG)
2013	A	1.95
	B	2.14
	C	1.73
	D	1.49
	E	1.49
2014	A	1.55
	B	4.02
	C	1.77
2015	A	2.50
	B	1.28
2016	A	1.23
	B	1.56
	C	2.20
	D	3.25
2017	A	1.03
	B	1.96
	C	1.94
2018	A	2.21
	B	1.62
	C	2.41
	D	2.53
	E	2.25
	F	2.94
2019	G	2.39
	A	2.46
2020	B	2.66
	C	2.12
	A	3.36
2021	B	2.07
	C	2.20
	A	2.53
	D	4.01
	E	2.10
Design Storm		4.42
		418.21

Notes:

1. A Major storm event has a peak 24 hour rainfall depth of at least 0.5 inches, an event total of at least 1.0 inch, and the peak hourly flow rate at DWTF reaches or exceeds 175 MGD.
2. The 4.42 inch storm event used in the design of the Downriver Regional Storage and Transport System.

Figure D-2
Total 96-Hour Volume versus Precipitation for Major Storm Events for 2013 through 2021
Allen Park (part)

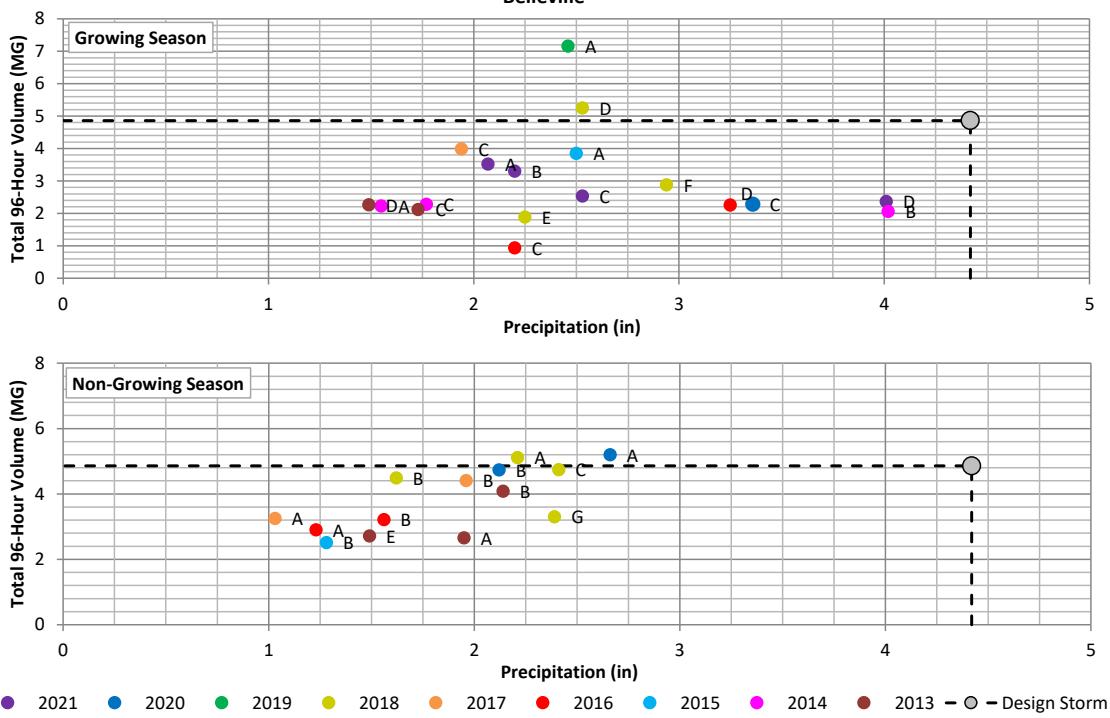


Major Storm Event	Allen Park (part)	
	DTW Precipitation (in)	96-hour Volume (MG)
2013	A	1.95
	B	2.14
	C	1.73
	D	1.49
	E	1.49
2014	A	1.55
	B	4.02
	C	1.77
2015	A	2.50
	B	1.28
2016	A	1.23
	B	1.56
	C	2.20
	D	3.25
2017	A	1.03
	B	1.96
	C	1.94
2018	A	2.21
	B	1.62
	C	2.41
	D	2.53
	E	2.25
	F	2.94
2019	G	2.39
	A	2.46
2020	B	2.66
	C	2.12
	A	3.36
2021	B	2.07
	C	2.20
	D	2.53
	E	4.01
	A	2.10
Design Storm		4.42
		29.23

Notes:

1. A Major storm event has a peak 24 hour rainfall depth of at least 0.5 inches, an event total of at least 1.0 inch, and the peak hourly flow rate at DTWF reaches or exceeds 175 MGD.
2. The 4.42 inch storm event used in the design of the Downriver Regional Storage and Transport System.

Figure D-3
Total 96-Hour Volume versus Precipitation for Major Storm Events for 2013 through 2021
Belleville



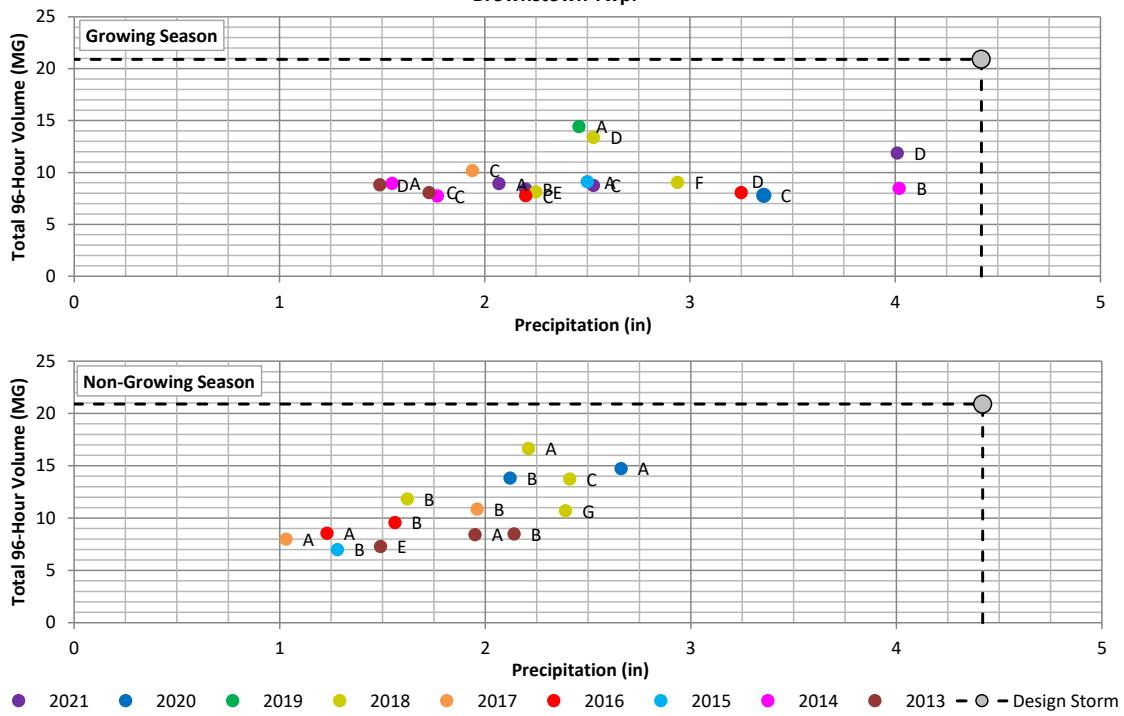
● 2021 ● 2020 ● 2019 ● 2018 ● 2017 ● 2016 ● 2015 ● 2014 ● 2013 — ○ — Design Storm

Major Storm Event	Belleville	
	DTW Precipitation (in)	96-hour Volume (MG)
2013	A	1.95
	B	2.14
	C	1.73
	D	1.49
	E	1.49
2014	A	1.55
	B	4.02
	C	1.77
2015	A	2.50
	B	1.28
2016	A	1.23
	B	1.56
	C	2.20
	D	3.25
2017	A	1.03
	B	1.96
	C	1.94
2018	A	2.21
	B	1.62
	C	2.41
	D	2.53
	E	2.25
	F	2.94
2019	G	2.39
	A	2.46
2020	A	2.66
	B	2.12
	C	3.36
2021	A	2.07
	B	2.20
	C	2.53
	D	4.01
	E	2.10
Design Storm	4.42	4.86

Notes:

1. A Major storm event has a peak 24 hour rainfall depth of at least 0.5 inches, an event total of at least 1.0 inch, and the peak hourly flow rate at DTWF reaches or exceeds 175 MGD.
2. The 4.42 inch storm event used in the design of the Downriver Regional Storage and Transport System.

Figure D-4
Total 96-Hour Volume versus Precipitation for Major Storm Events for 2013 through 2021
Brownstown Twp.

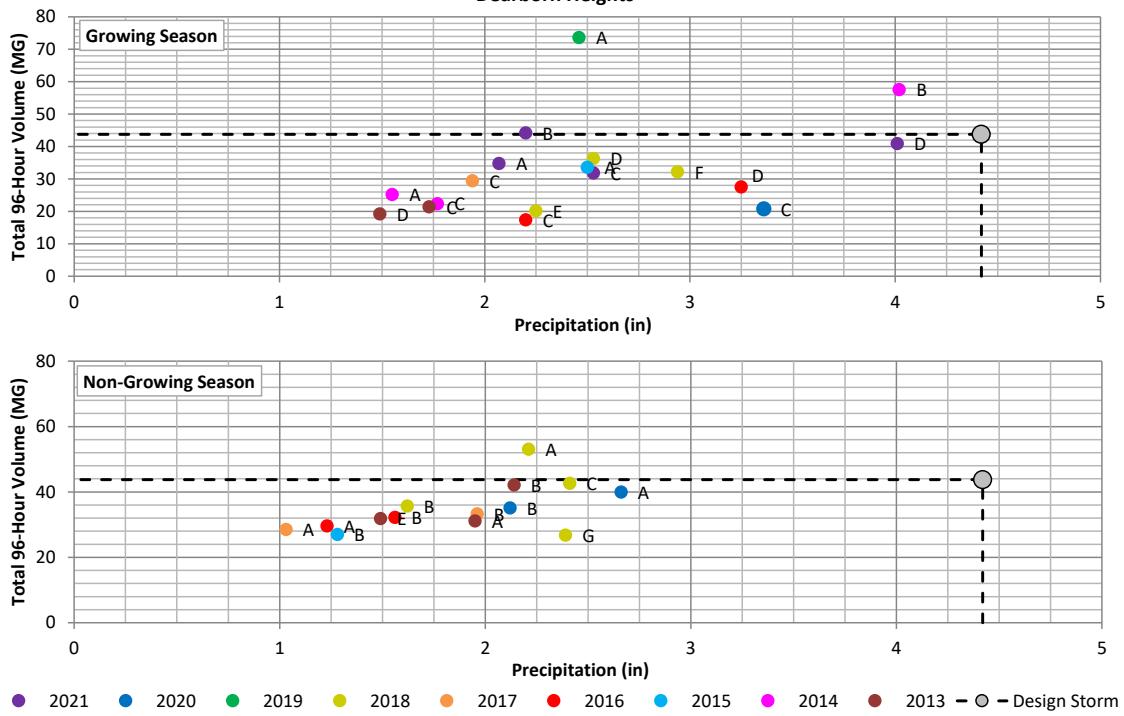


Major Storm Event	Brownstown Twp.	
	DTW Precipitation (in)	96-hour Volume (MG)
2013	A	1.95
	B	2.14
	C	1.73
	D	1.49
	E	1.49
2014	A	1.55
	B	4.02
	C	1.77
2015	A	2.50
	B	1.28
2016	A	1.23
	B	1.56
	C	2.20
	D	3.25
2017	A	1.03
	B	1.96
	C	1.94
2018	A	2.21
	B	1.62
	C	2.41
	D	2.53
	E	2.25
	F	2.94
2019	G	2.39
	A	2.46
2020	B	2.66
	C	2.12
	A	3.36
2021	A	2.07
	B	2.20
	C	2.53
	D	4.01
	E	2.10
Design Storm		4.42
		20.90

Notes:

1. A Major storm event has a peak 24 hour rainfall depth of at least 0.5 inches, an event total of at least 1.0 inch, and the peak hourly flow rate at DTWF reaches or exceeds 175 MGD.
2. The 4.42 inch storm event used in the design of the Downriver Regional Storage and Transport System.

Figure D-5
Total 96-Hour Volume versus Precipitation for Major Storm Events for 2013 through 2021
Dearborn Heights

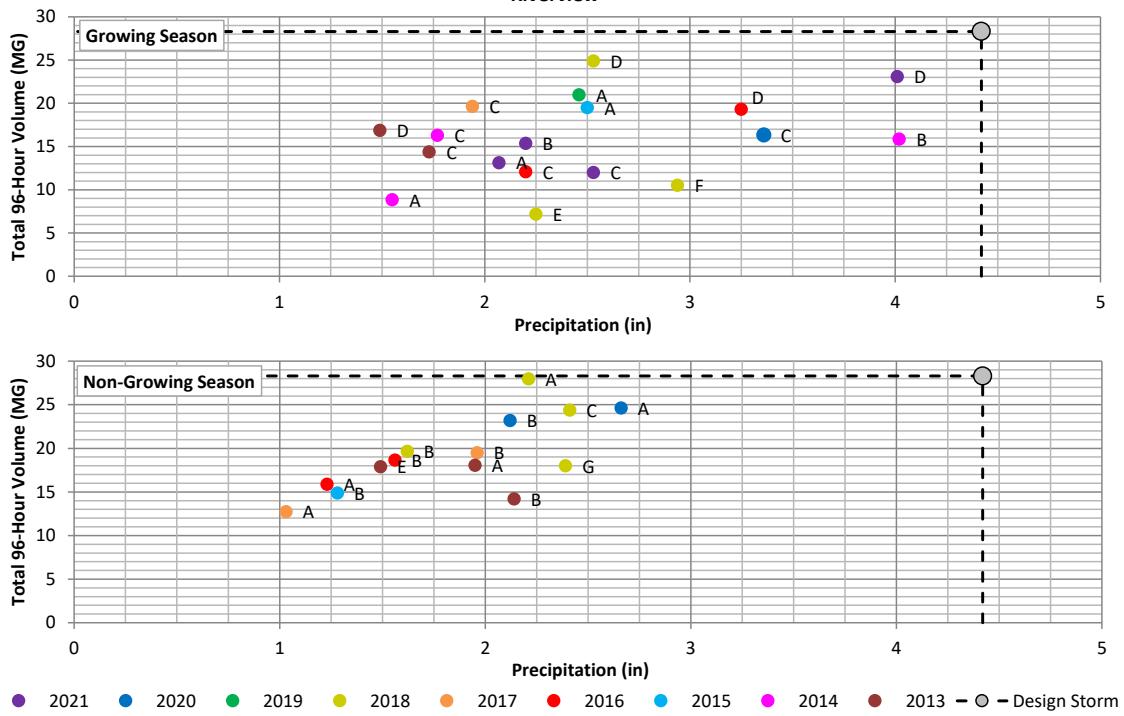


Major Storm Event	Dearborn Heights	
	DTW Precipitation (in)	96-hour Volume (MG)
2013	A	1.95
	B	2.14
	C	1.73
	D	1.49
	E	1.49
2014	A	1.55
	B	4.02
	C	1.77
2015	A	2.50
	B	1.28
2016	A	1.23
	B	1.56
	C	2.20
	D	3.25
2017	A	1.03
	B	1.96
	C	1.94
2018	A	2.21
	B	1.62
	C	2.41
	D	2.53
	E	2.25
	F	2.94
2019	G	2.39
	A	2.46
2020	B	2.66
	C	2.12
	A	3.36
2021	B	2.07
	C	2.20
	D	2.53
	E	4.01
	A	2.10
Design Storm		4.42
		43.76

Notes:

1. A Major storm event has a peak 24 hour rainfall depth of at least 0.5 inches, an event total of at least 1.0 inch, and the peak hourly flow rate at DTWF reaches or exceeds 175 MGD.
2. The 4.42 inch storm event used in the design of the Downriver Regional Storage and Transport System.

Figure D-6
Total 96-Hour Volume versus Precipitation for Major Storm Events for 2013 through 2021
Riverview

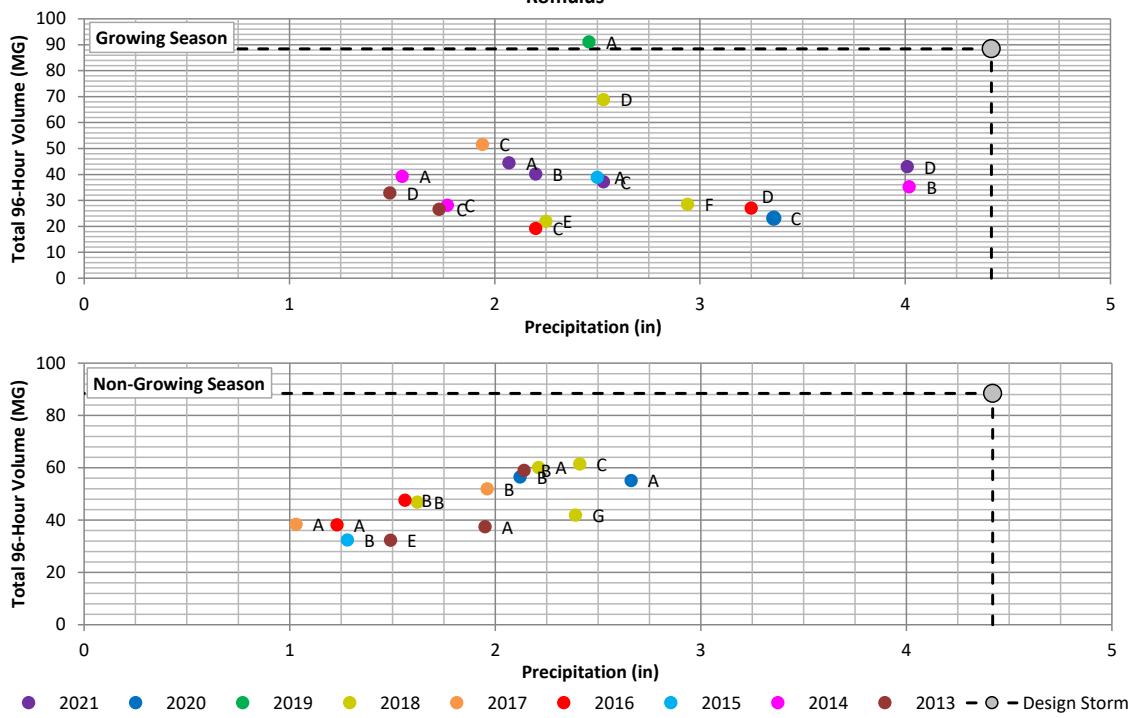


Major Storm Event	Riverview	
	DTW Precipitation (in)	96-hour Volume (MG)
2013	A	1.95
	B	2.14
	C	1.73
	D	1.49
	E	1.49
2014	A	1.55
	B	4.02
	C	1.77
2015	A	2.50
	B	1.28
2016	A	1.23
	B	1.56
	C	2.20
	D	3.25
2017	A	1.03
	B	1.96
	C	1.94
2018	A	2.21
	B	1.62
	C	2.41
	D	2.53
	E	2.25
	F	2.94
2019	G	2.39
	A	2.46
2020	A	2.66
	B	2.12
	C	3.36
2021	A	2.07
	B	2.20
	C	2.53
	D	4.01
	E	2.10
Design Storm	4.42	28.30

Notes:

1. A Major storm event has a peak 24 hour rainfall depth of at least 0.5 inches, an event total of at least 1.0 inch, and the peak hourly flow rate at DWTF reaches or exceeds 175 MGD.
2. The 4.42 inch storm event used in the design of the Downriver Regional Storage and Transport System.

Figure D-7
Total 96-Hour Volume versus Precipitation for Major Storm Events for 2013 through 2021

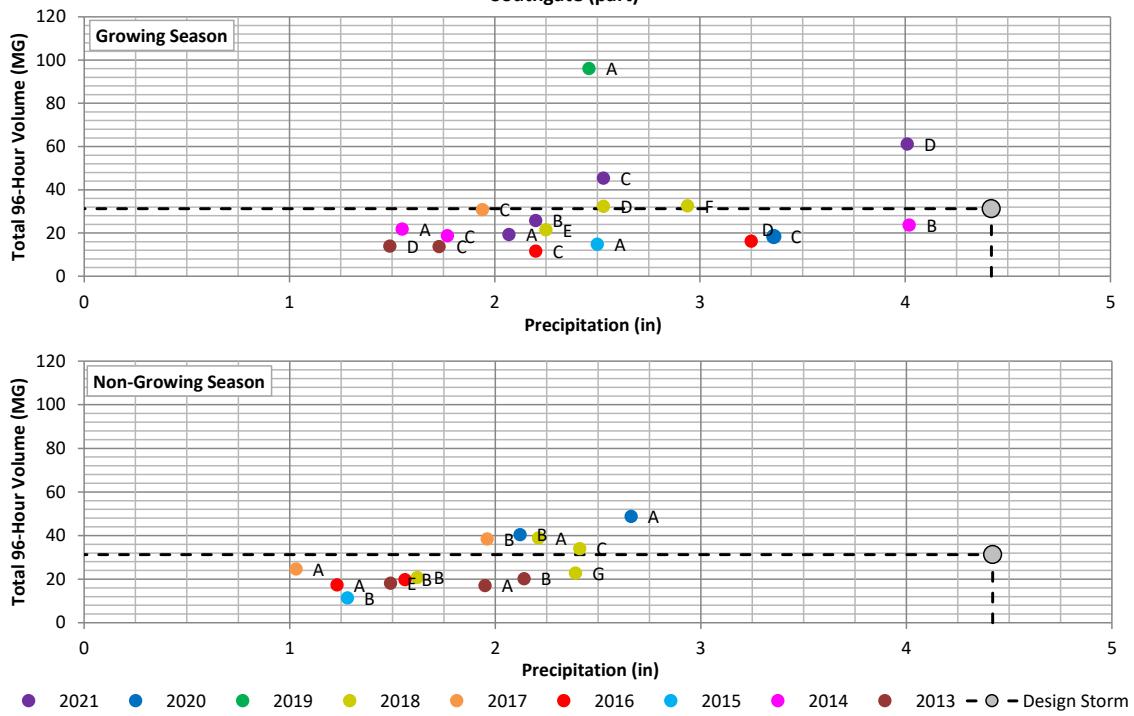


Major Storm Event	Romulus		
	DTW Precipitation (in)	96-hour Volume (MG)	
2013	A	1.95	37.45
	B	2.14	59.02
	C	1.73	26.57
	D	1.49	32.88
	E	1.49	32.32
2014	A	1.55	39.20
	B	4.02	35.18
	C	1.77	28.09
2015	A	2.50	38.82
	B	1.28	32.41
2016	A	1.23	38.16
	B	1.56	47.64
	C	2.20	19.10
	D	3.25	27.02
2017	A	1.03	38.42
	B	1.96	51.94
	C	1.94	51.53
2018	A	2.21	60.07
	B	1.62	46.91
	C	2.41	61.49
	D	2.53	68.83
	E	2.25	21.89
	F	2.94	28.48
2019	G	2.39	41.89
	A	2.46	91.05
2020	A	2.66	55.09
	B	2.12	56.53
	C	3.36	23.10
2021	A	2.07	44.40
	B	2.20	40.13
	C	2.53	37.14
	D	4.01	42.94
	E	2.10	38.96
Design Storm		4.42	88.43

Notes:

1. A Major storm event has a peak 24 hour rainfall depth of at least 0.5 inches, an event total of at least 1.0 inch, and the peak hourly flow rate at DTWTF reaches or exceeds 175 MGD.
2. The 4.42 inch storm event used in the design of the Downriver Regional Storage and Transport System.

Figure D-8
Total 96-Hour Volume versus Precipitation for Major Storm Events for 2013 through 2021
Southgate (part)

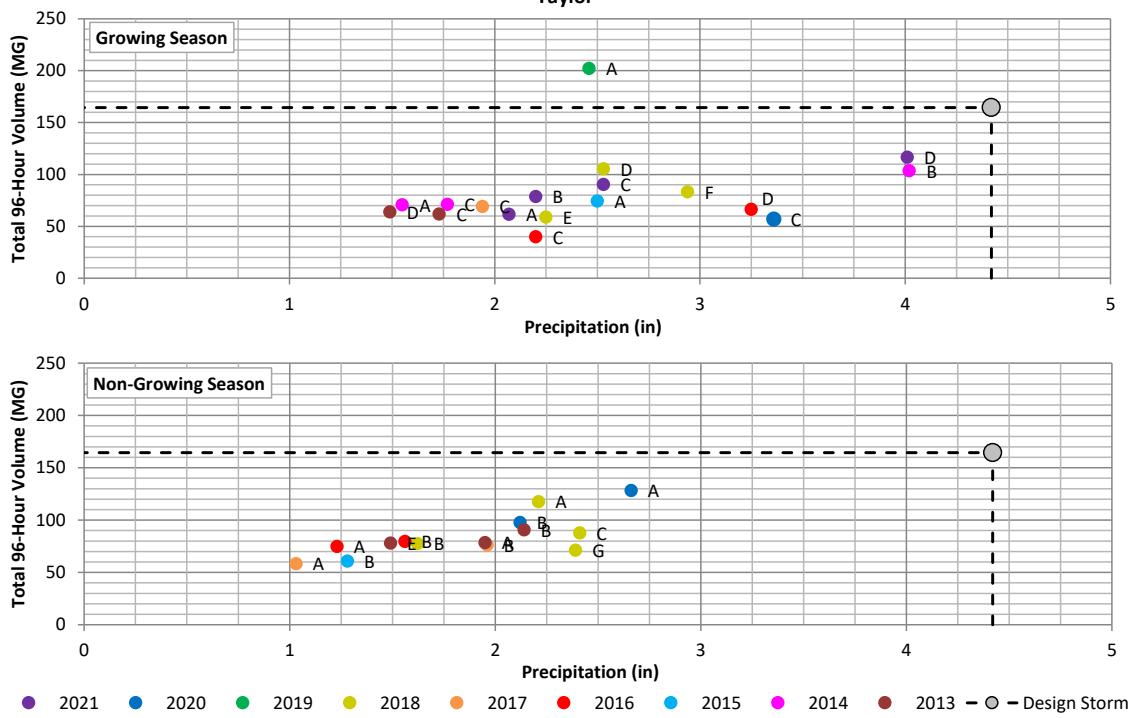


Major Storm Event	Southgate (part)	
	DTW Precipitation (in)	96-hour Volume (MG)
2013	A	1.95
	B	2.14
	C	1.73
	D	1.49
	E	1.49
2014	A	1.55
	B	4.02
	C	1.77
2015	A	2.50
	B	1.28
2016	A	1.23
	B	1.56
	C	2.20
	D	3.25
2017	A	1.03
	B	1.96
	C	1.94
2018	A	2.21
	B	1.62
	C	2.41
	D	2.53
	E	2.25
	F	2.94
2019	G	2.39
	A	2.46
2020		38.86
	A	2.66
	B	2.12
2021	C	3.36
	A	2.07
	B	2.20
	C	2.53
	D	4.01
Design Storm		4.42
		31.24

Notes:

1. A Major storm event has a peak 24 hour rainfall depth of at least 0.5 inches, an event total of at least 1.0 inch, and the peak hourly flow rate at DTWF reaches or exceeds 175 MGD.
2. The 4.42 inch storm event used in the design of the Downriver Regional Storage and Transport System.

Figure D-9
Total 96-Hour Volume versus Precipitation for Major Storm Events for 2013 through 2021
Taylor

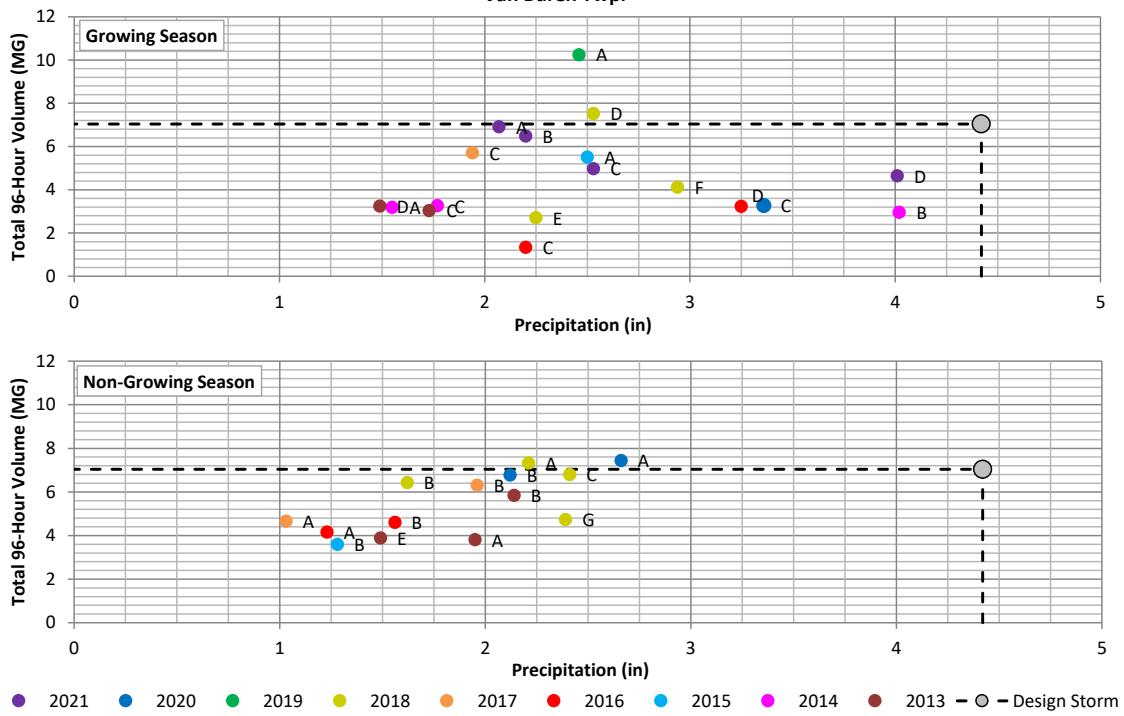


Major Storm Event	Taylor	
	DTW Precipitation (in)	96-hour Volume (MG)
2013	A	1.95
	B	2.14
	C	1.73
	D	1.49
	E	1.49
2014	A	1.55
	B	4.02
	C	1.77
2015	A	2.50
	B	1.28
2016	A	1.23
	B	1.56
	C	2.20
	D	3.25
2017	A	1.03
	B	1.96
	C	1.94
2018	A	2.21
	B	1.62
	C	2.41
	D	2.53
	E	2.25
	F	2.94
2019	G	2.39
	A	2.46
2020	B	2.66
	C	2.12
	A	3.36
2021	B	2.07
	C	2.20
	A	2.53
	D	4.01
	E	2.10
Design Storm		4.42
		164.45

Notes:

1. A Major storm event has a peak 24 hour rainfall depth of at least 0.5 inches, an event total of at least 1.0 inch, and the peak hourly flow rate at DTWF reaches or exceeds 175 MGD.
2. The 4.42 inch storm event used in the design of the Downriver Regional Storage and Transport System.

Figure D-10
Total 96-Hour Volume versus Precipitation for Major Storm Events for 2013 through 2021
Van Buren Twp.



● 2021 ● 2020 ● 2019 ● 2018 ● 2017 ● 2016 ● 2014 ● 2013 — ○ — Design Storm

Major Storm Event	Van Buren Twp.	
	DTW Precipitation (in)	96-hour Volume (MG)
2013	A	1.95
	B	2.14
	C	1.73
	D	1.49
	E	1.49
2014	A	1.55
	B	4.02
	C	1.77
2015	A	2.50
	B	1.28
2016	A	1.23
	B	1.56
	C	2.20
	D	3.25
2017	A	1.03
	B	1.96
	C	1.94
2018	A	2.21
	B	1.62
	C	2.41
	D	2.53
	E	2.25
	F	2.94
2019	G	2.39
	A	2.46
2020	A	2.66
	B	2.12
	C	3.36
2021	A	2.07
	B	2.20
	C	2.53
	D	4.01
	E	2.10
Design Storm	4.42	7.04

Notes:

1. A Major storm event has a peak 24 hour rainfall depth of at least 0.5 inches, an event total of at least 1.0 inch, and the peak hourly flow rate at DTWF reaches or exceeds 175 MGD.
2. The 4.42 inch storm event used in the design of the Downriver Regional Storage and Transport System.

Figure D-11
Downriver Wastewater Treatment Facility
Major Storm Event A - June 25-26, 2021

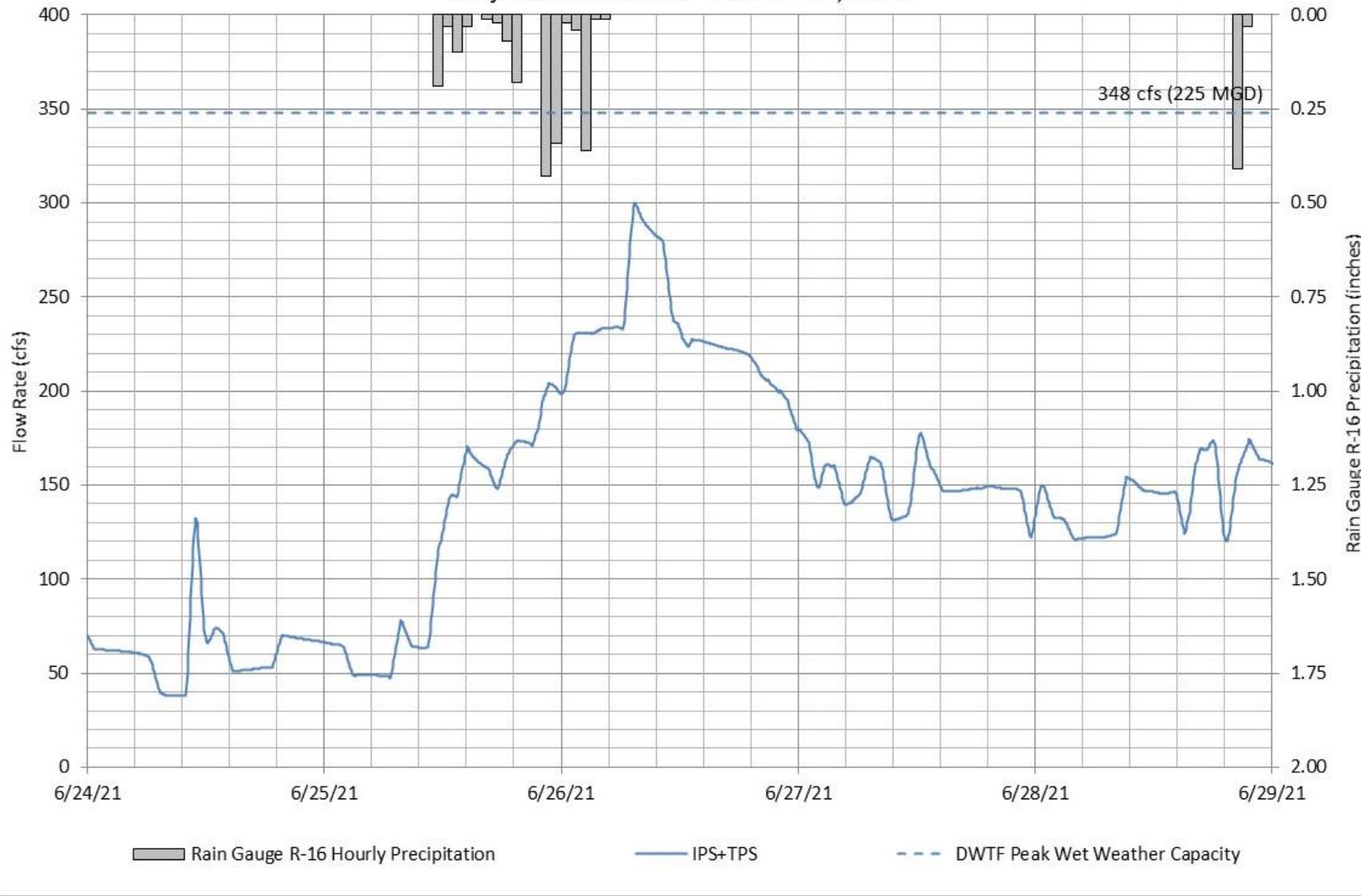


Figure D-12
Riverdrive Interceptor
Major Storm Event A - June 25-26, 2021

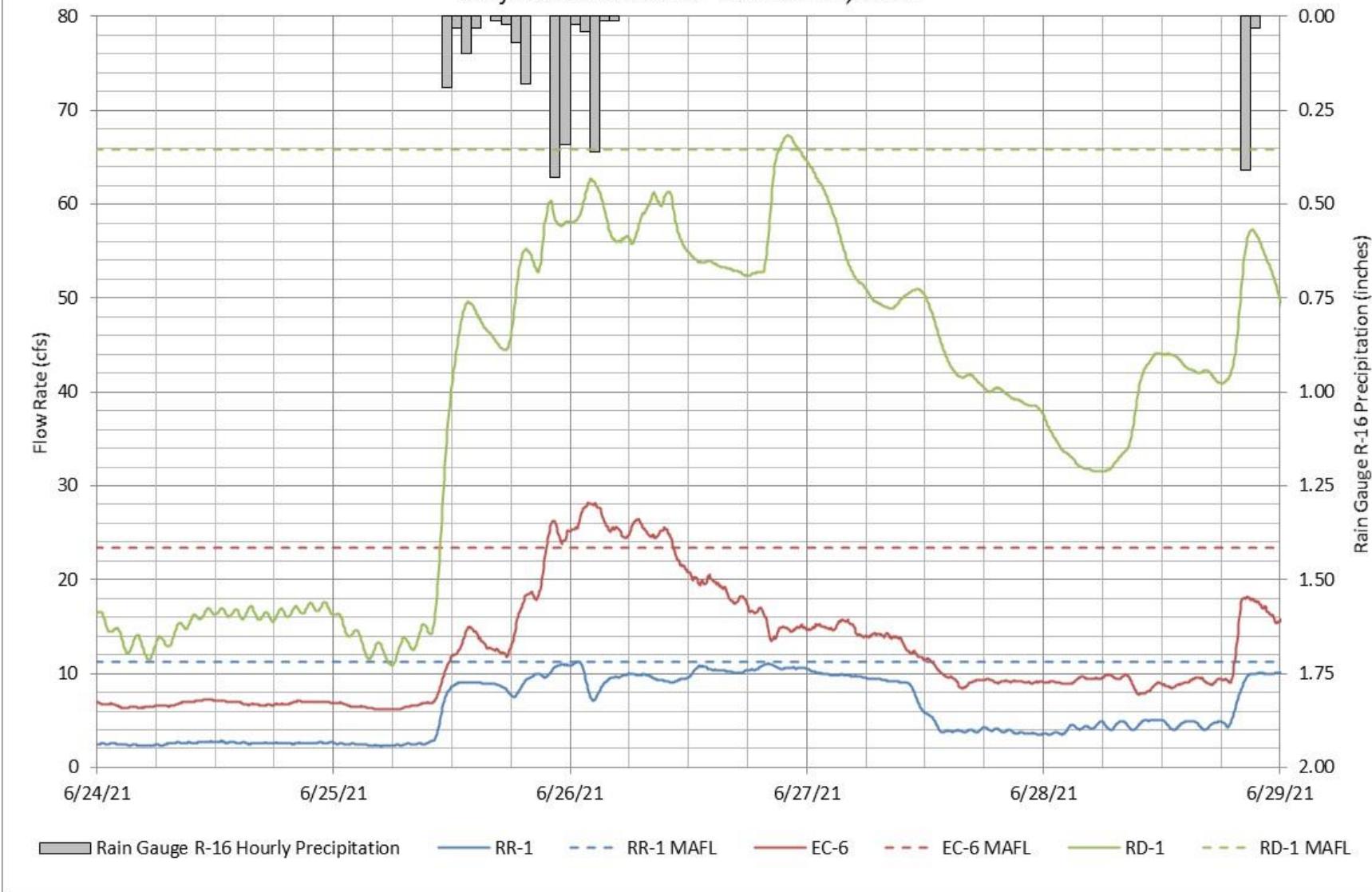


Figure D-13
Riverdrive Interceptor
Major Storm Event A - June 25-26, 2021

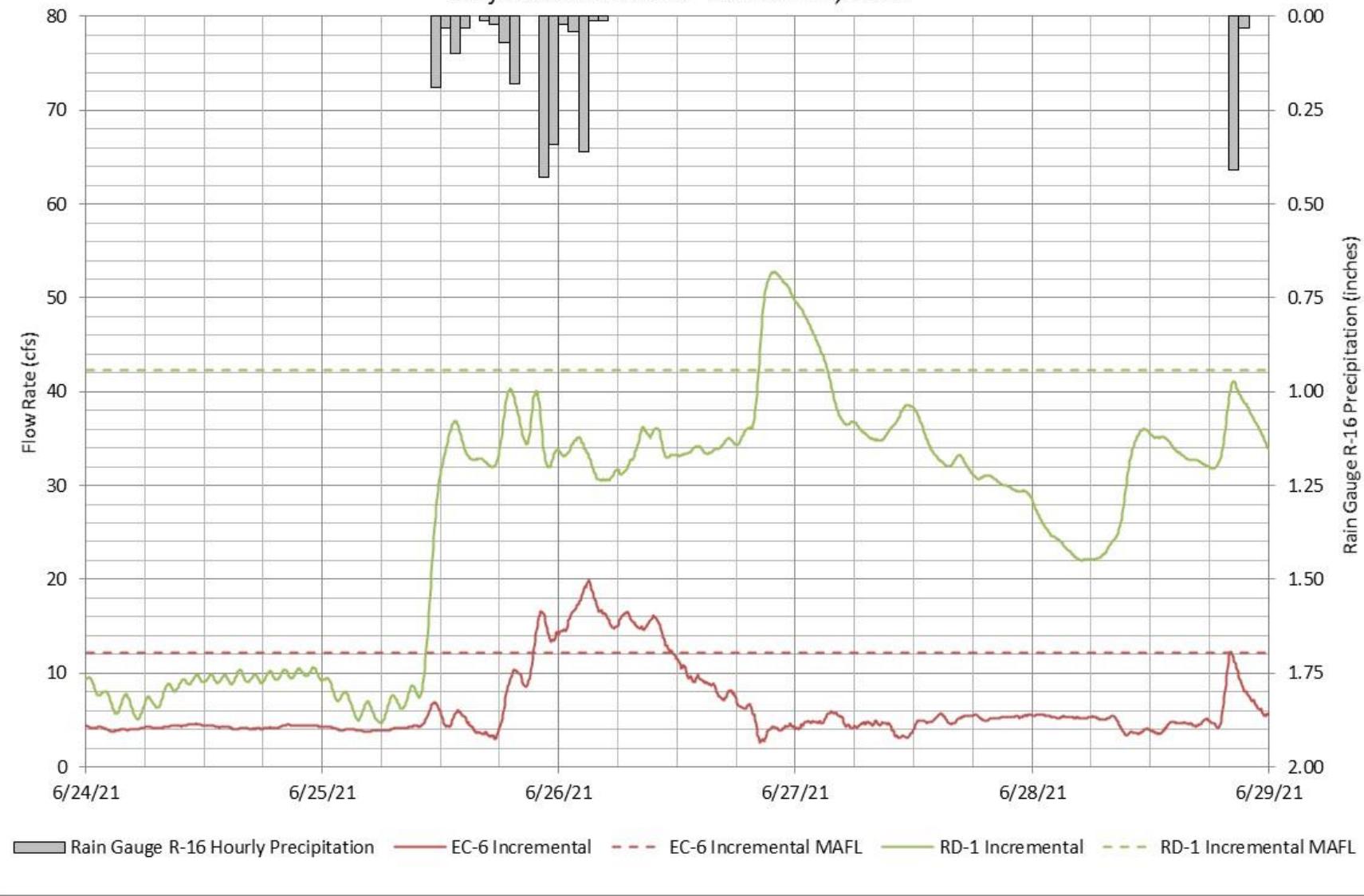


Figure D-14
SWRDDD Connection

Major Storm Event A - June 25-26, 2021

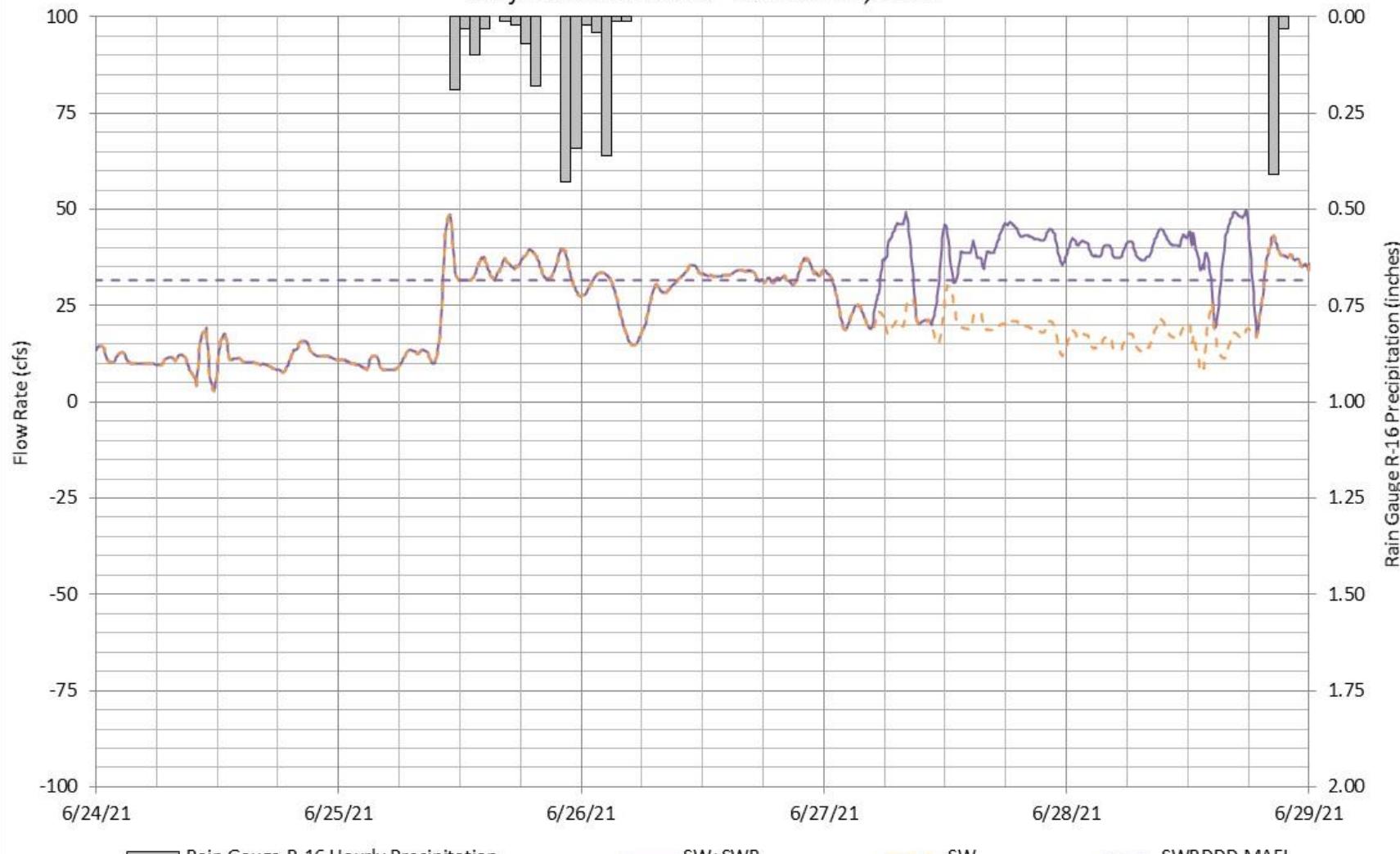


Figure D-15
Downriver Wastewater Treatment Facility
Major Storm Event B - July 16-17, 2021

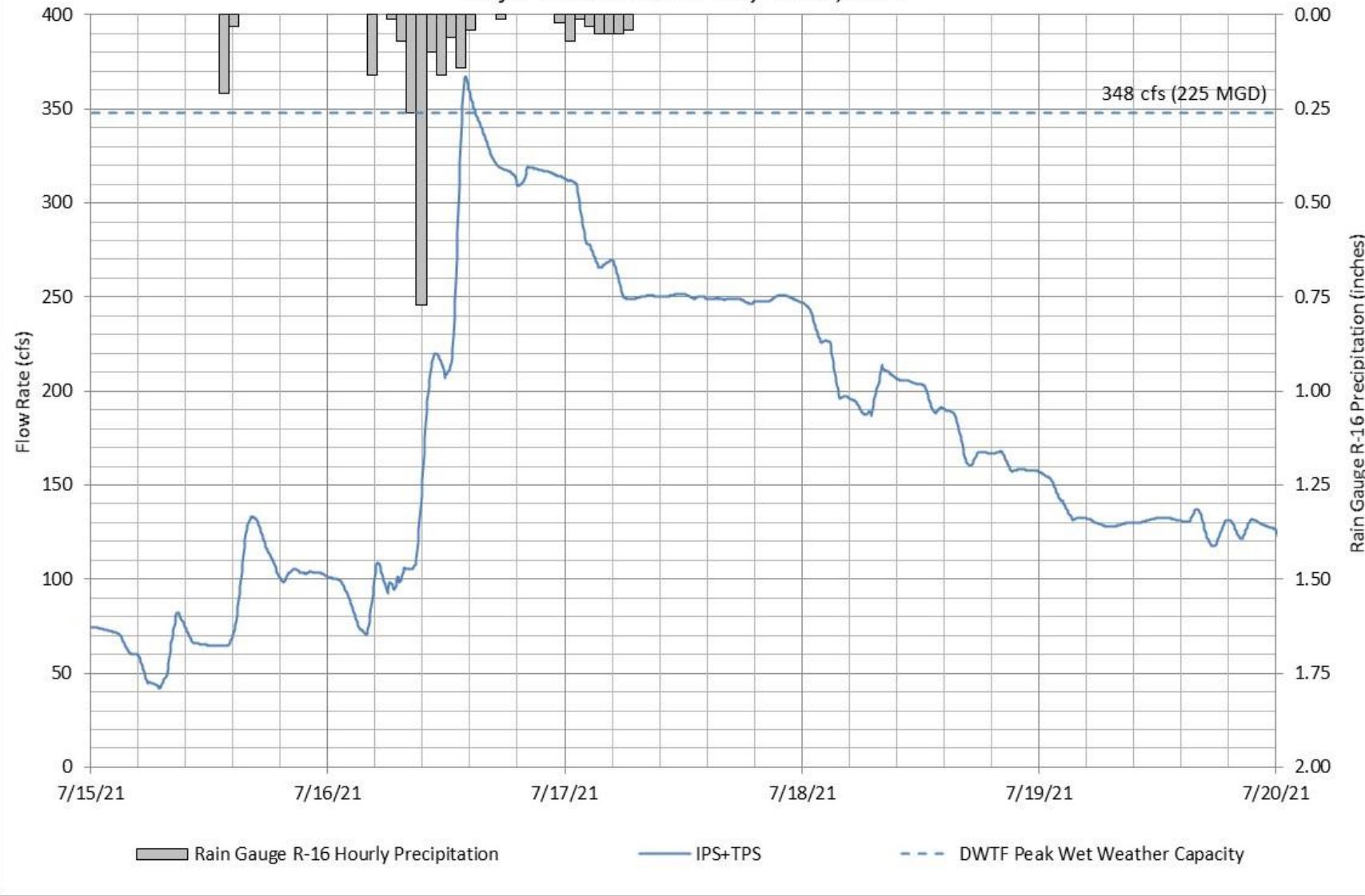


Figure D-16
Riverdrive Interceptor
Major Storm Event B - July 16-17, 2021

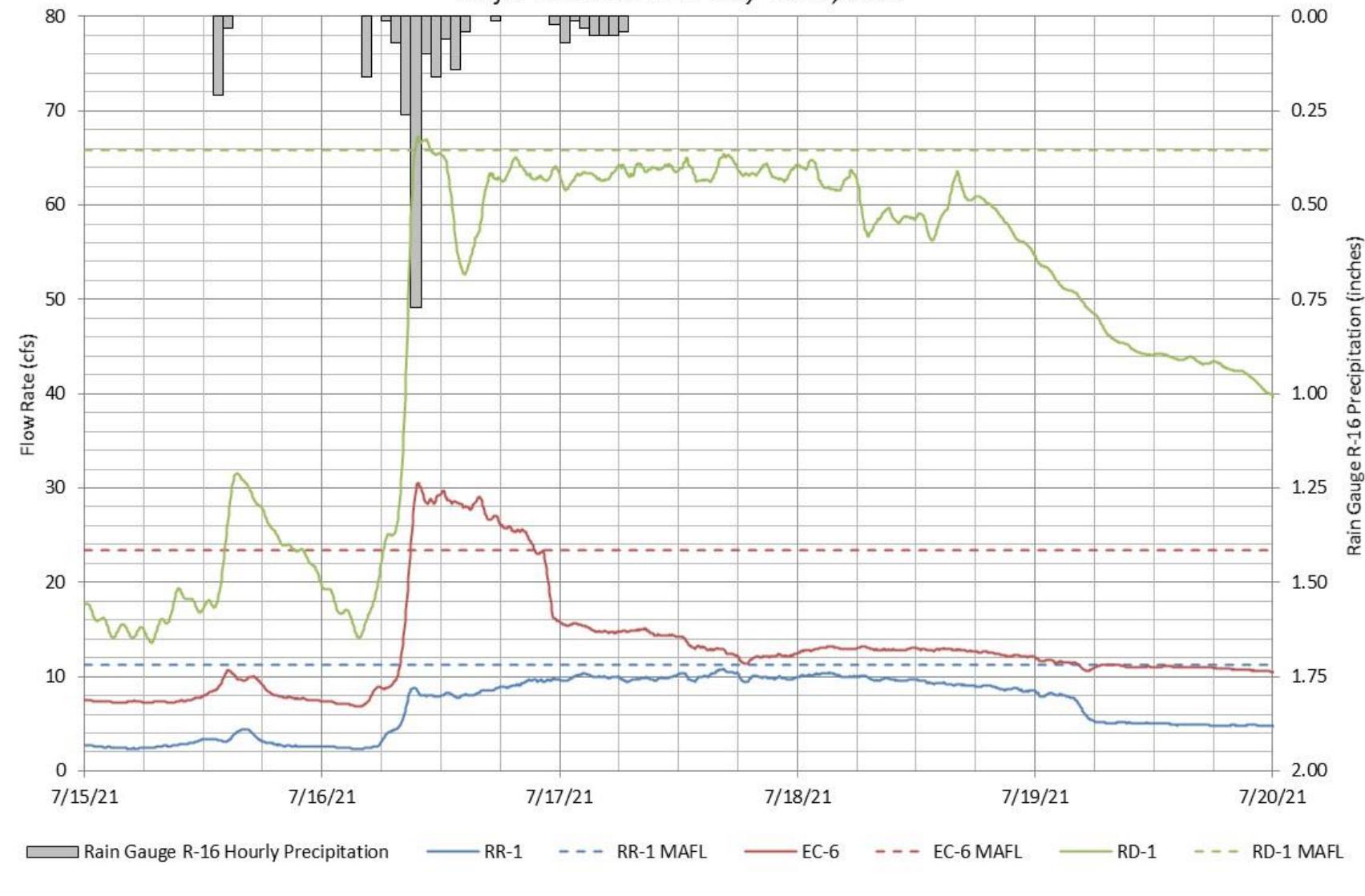


Figure D-17
Riverdrive Interceptor
Major Storm Event B - July 16-17, 2021

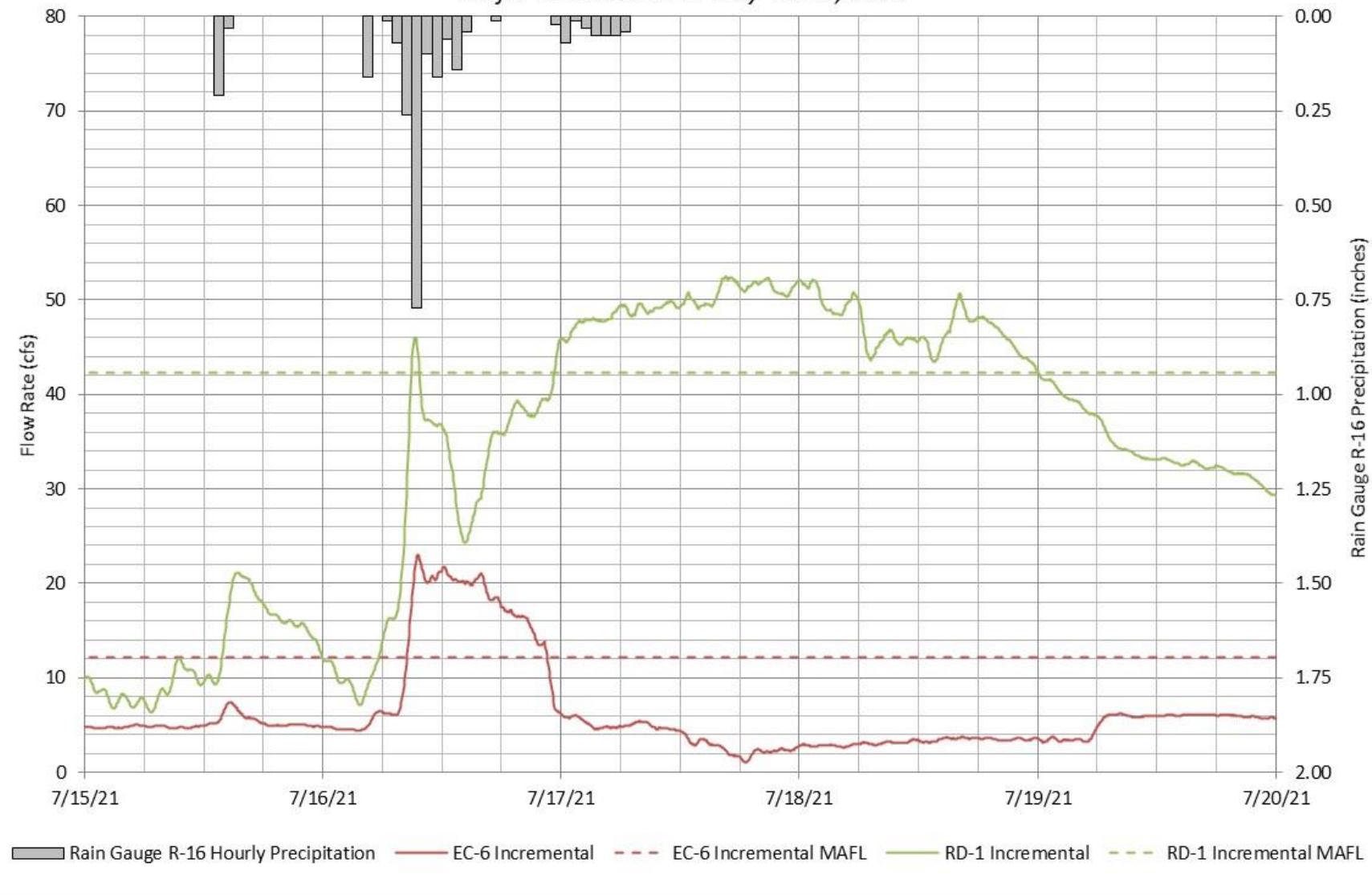


Figure D-18
SWRDDD Connection
Major Storm Event B - July 16-17, 2021

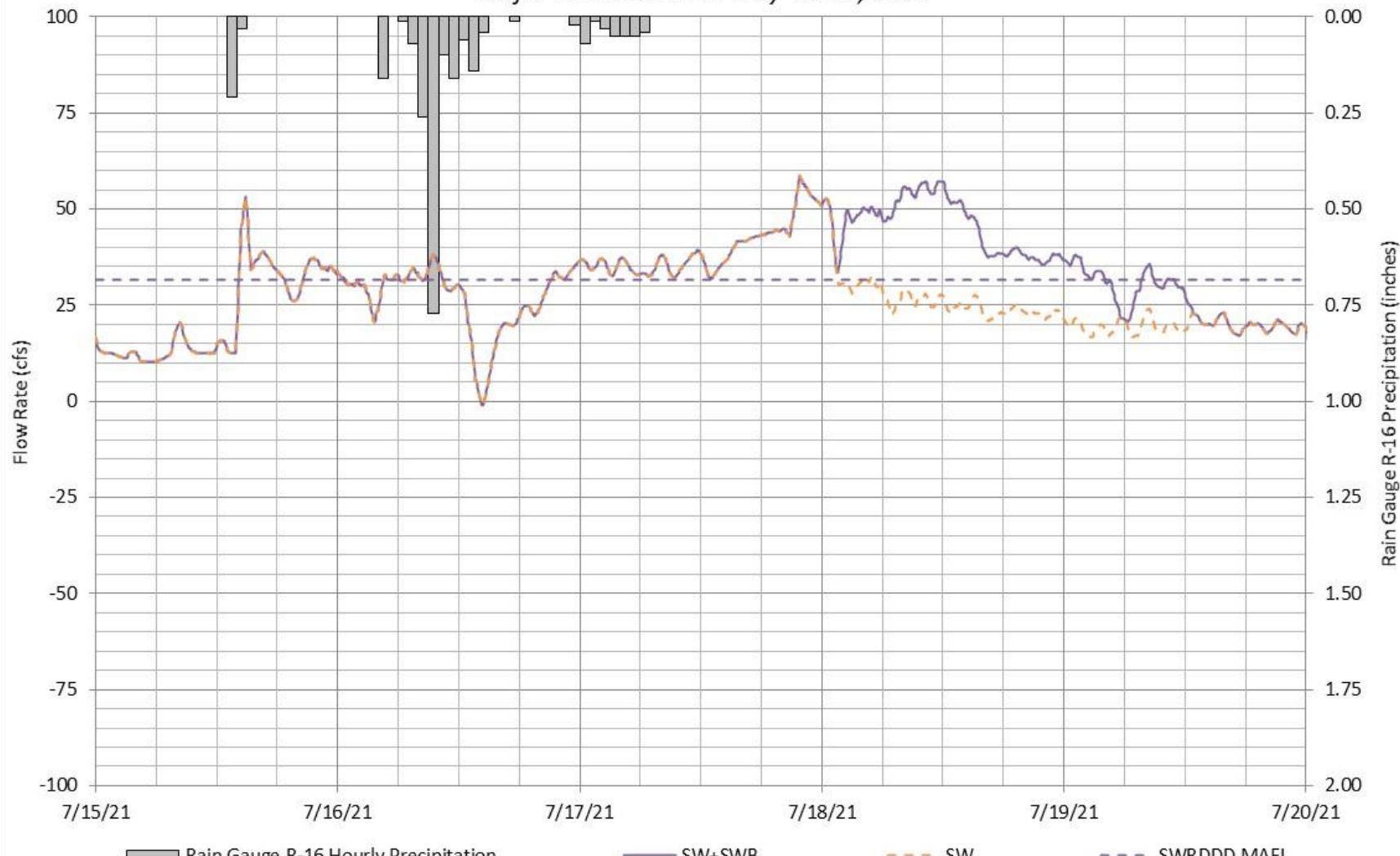


Figure D-19
Downriver Wastewater Treatment Facility
Major Storm Event C - August 11-12, 2021

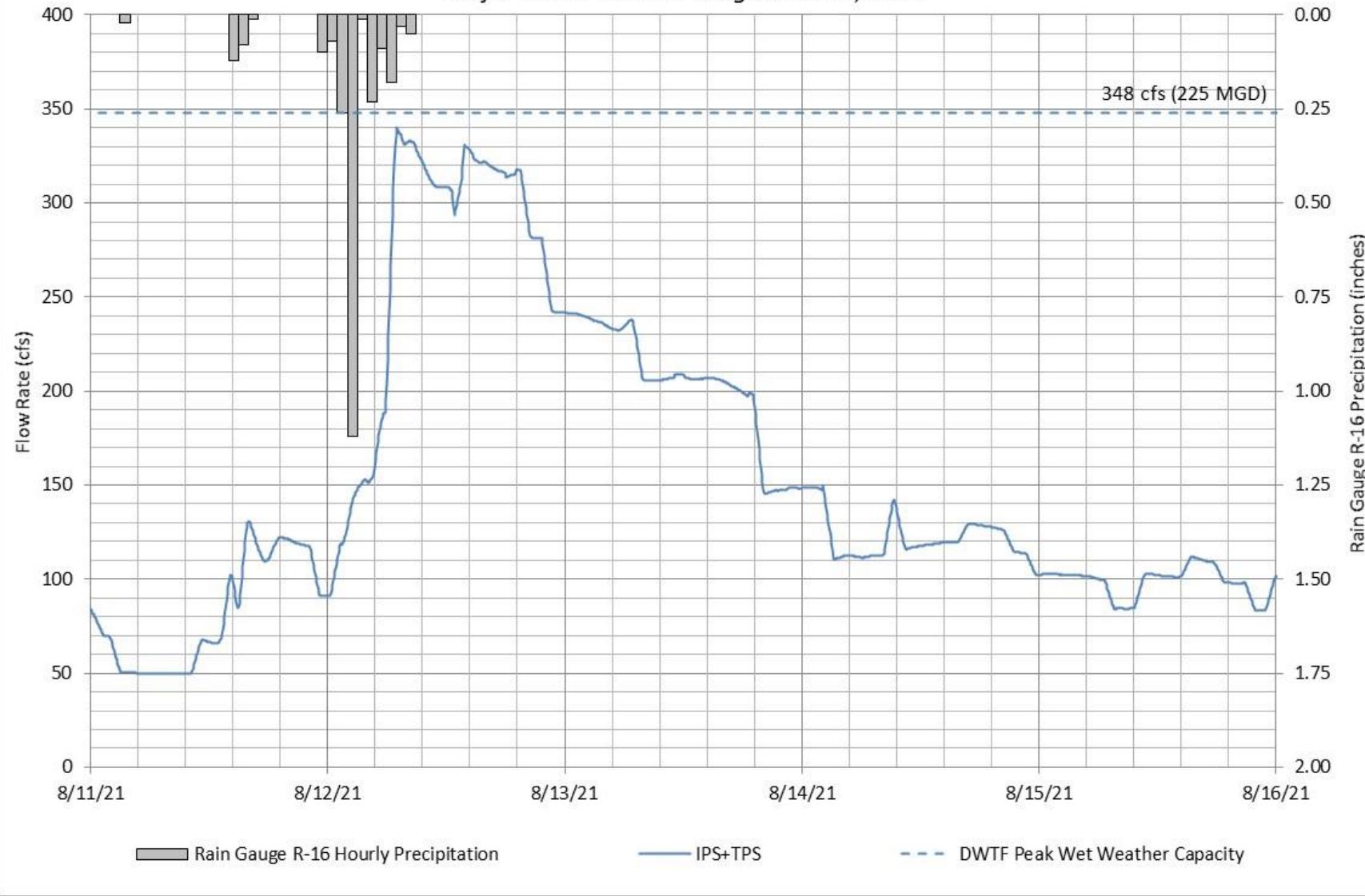


Figure D-20
Riverdrive Interceptor
Major Storm Event C - August 11-12, 2021

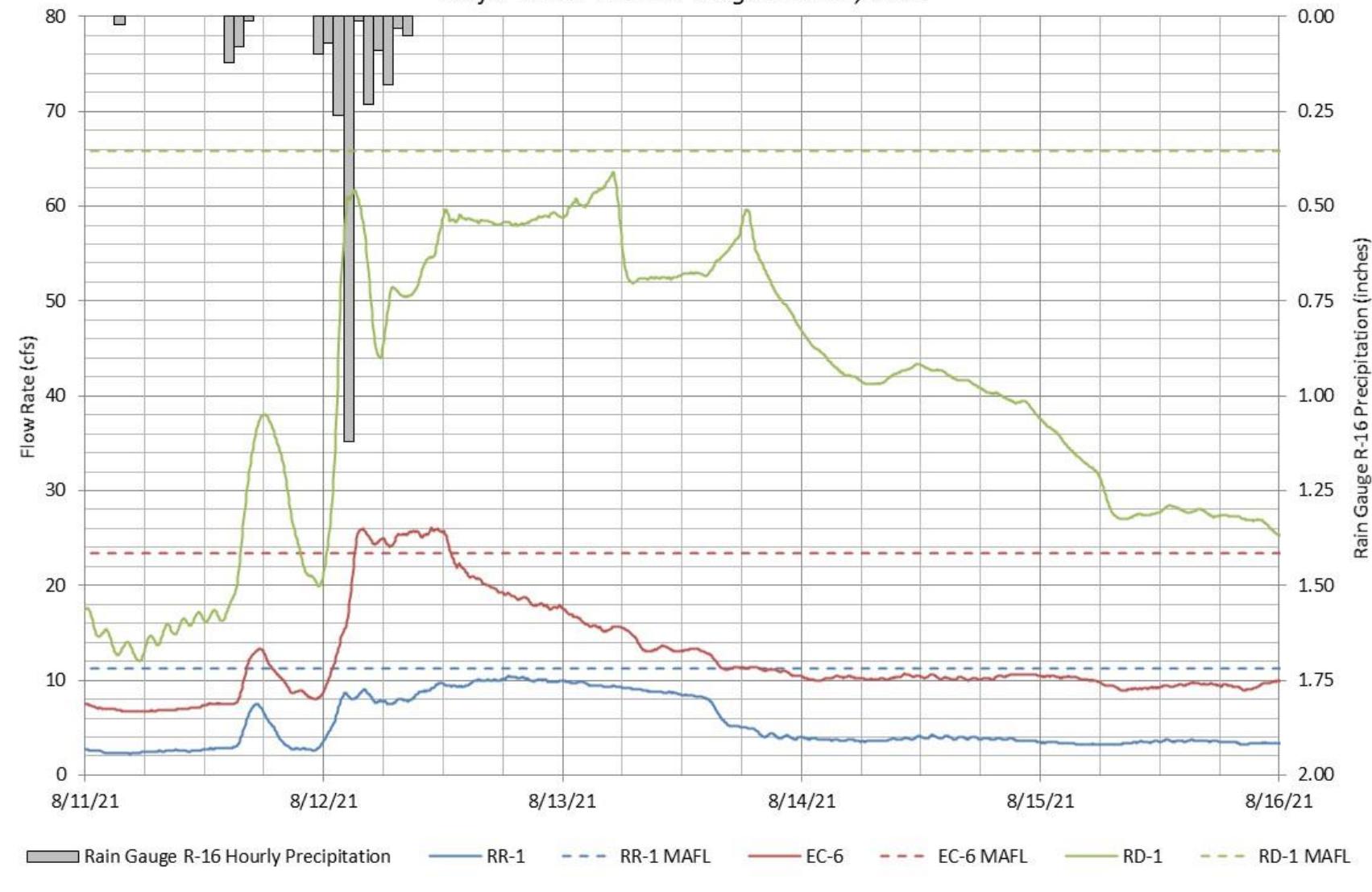


Figure D-21
Riverdrive Interceptor
Major Storm Event C - August 11-12, 2021

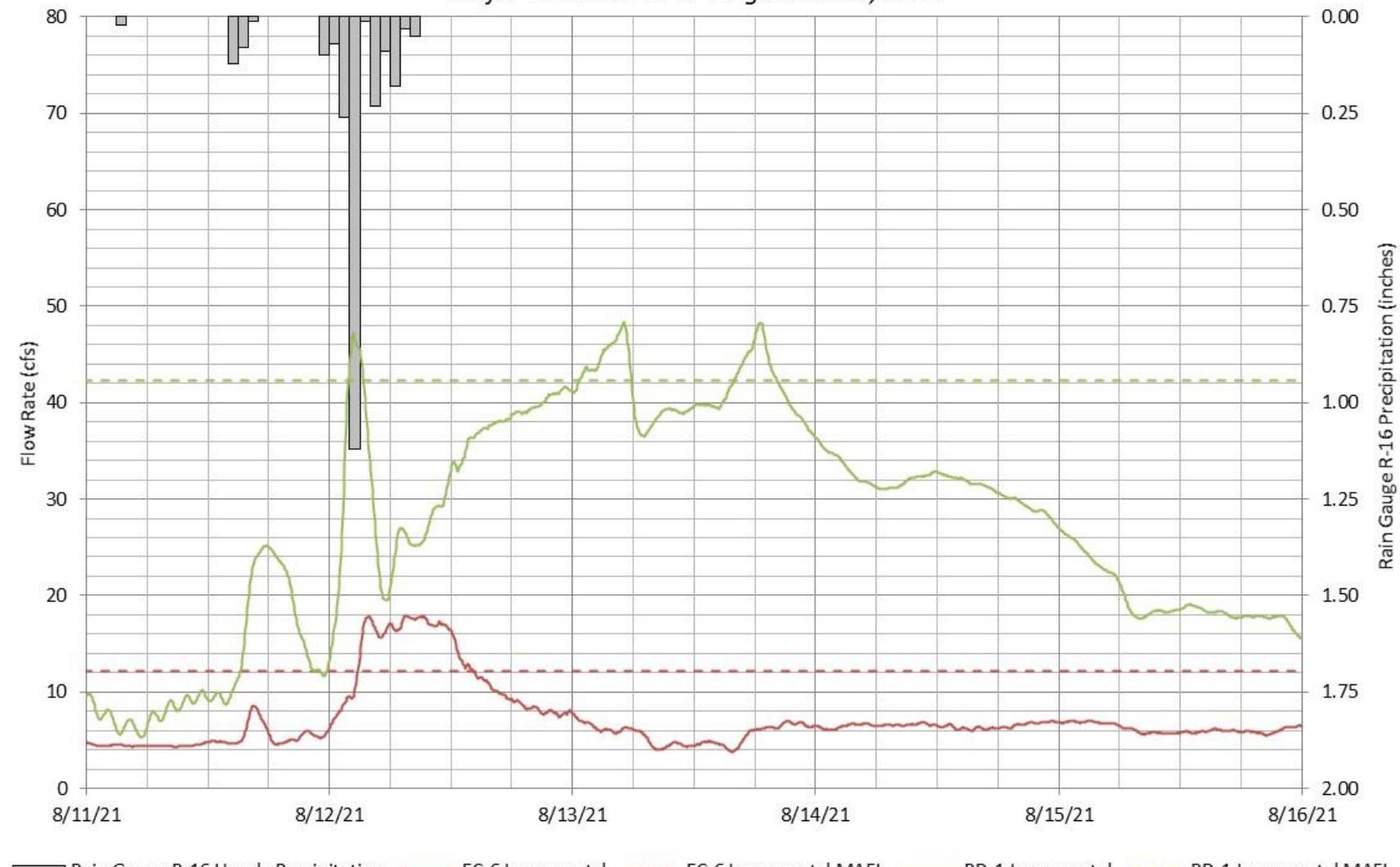


Figure D-22
SWRDDD Connection
Major Storm Event C - August 11-12, 2021

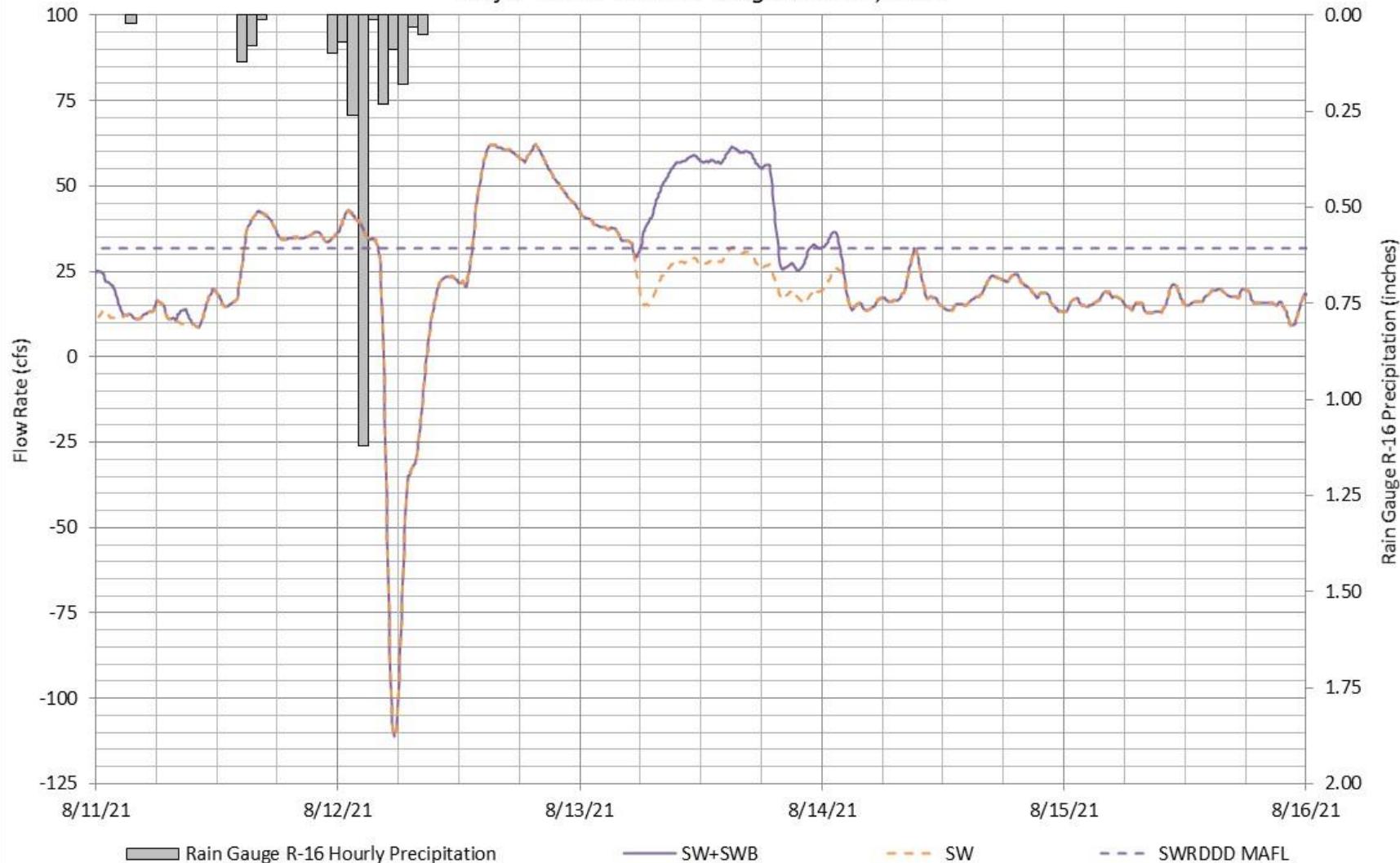


Figure D-23
Downriver Wastewater Treatment Facility
Major Storm Event D - September 21-23, 2021

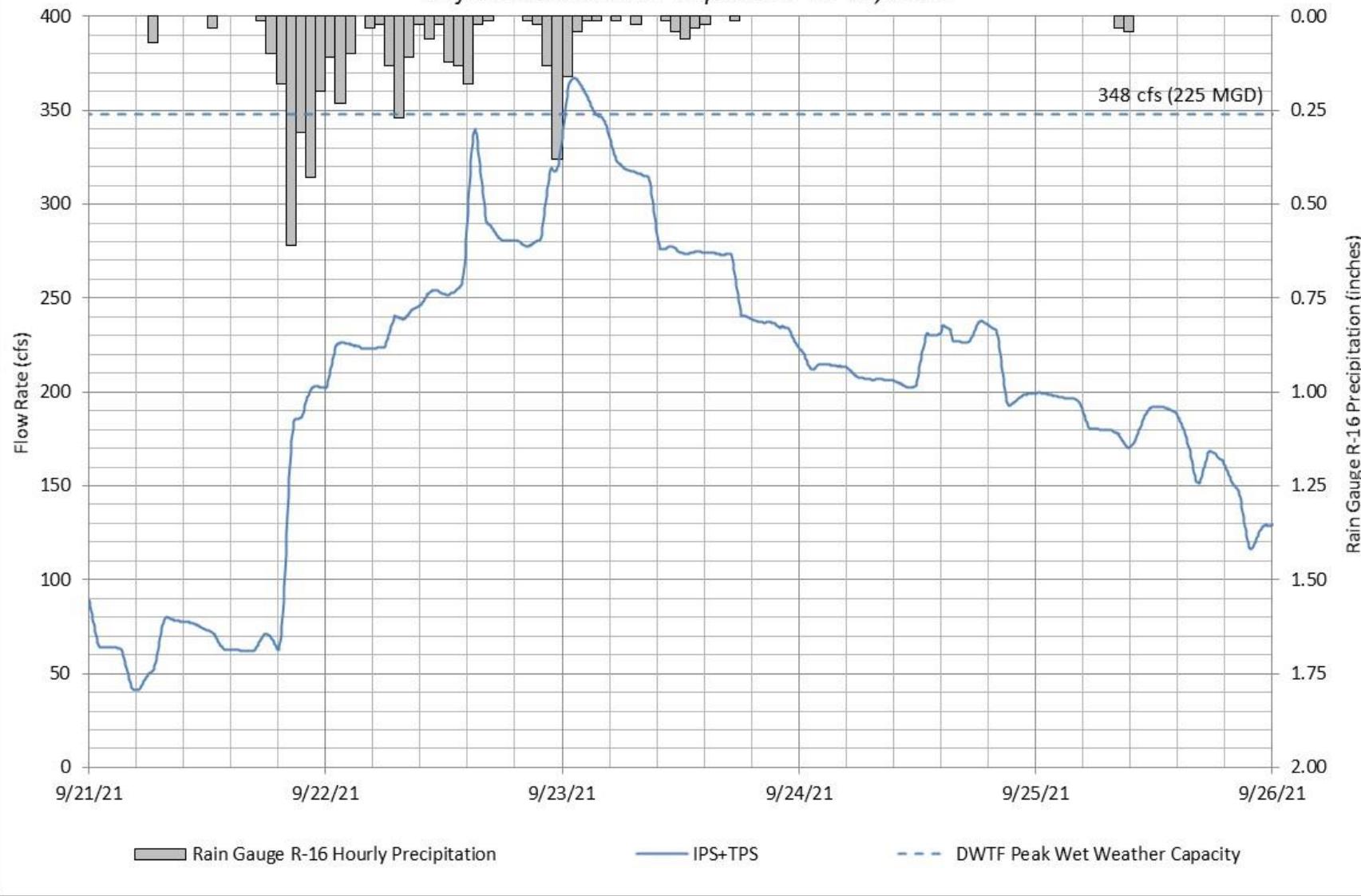


Figure D-24
Riverdrive Interceptor

Major Storm Event D - September 21-23, 2021

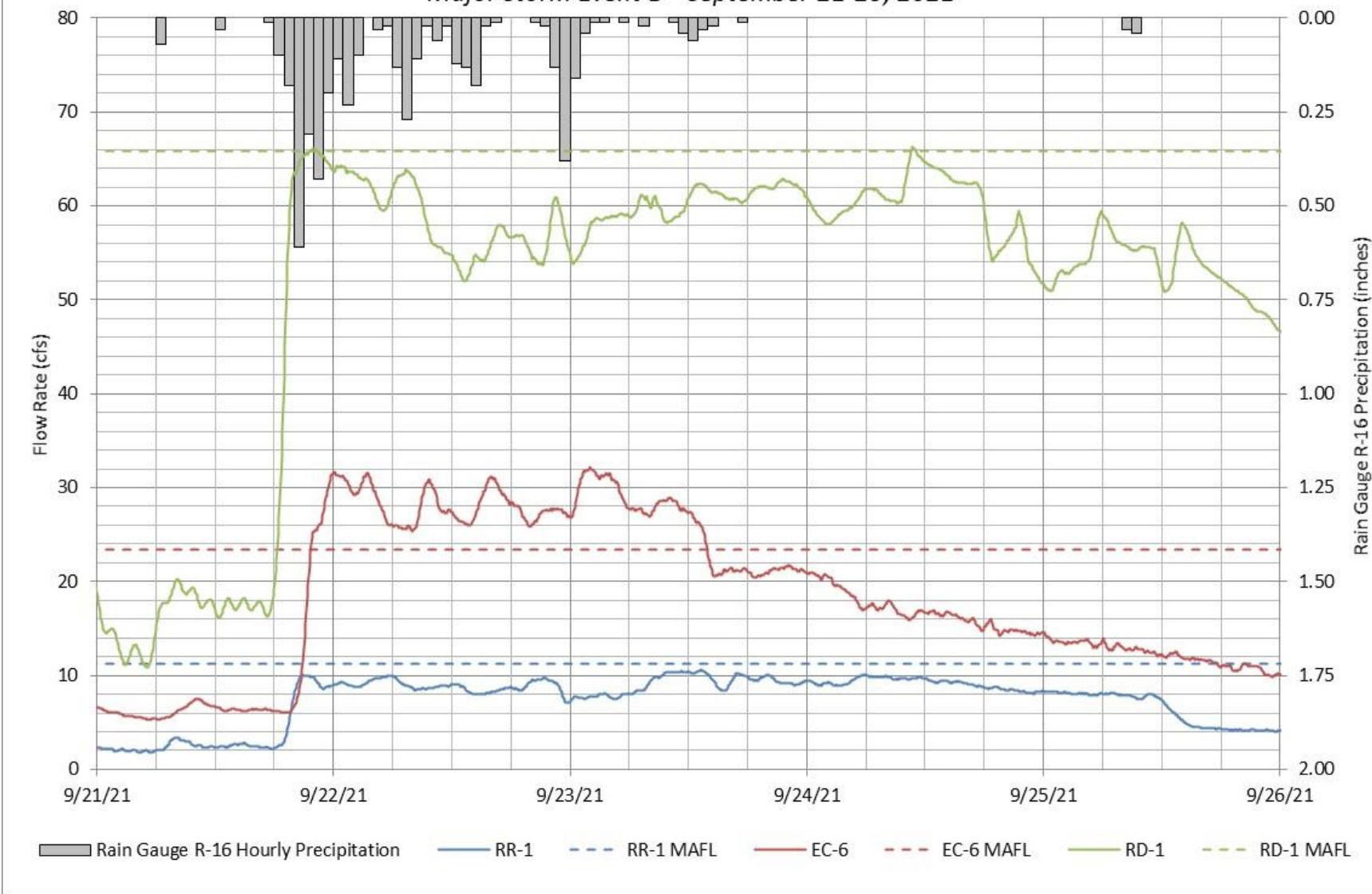


Figure D-25
Riverdrive Interceptor

Major Storm Event D - September 21-23, 2021

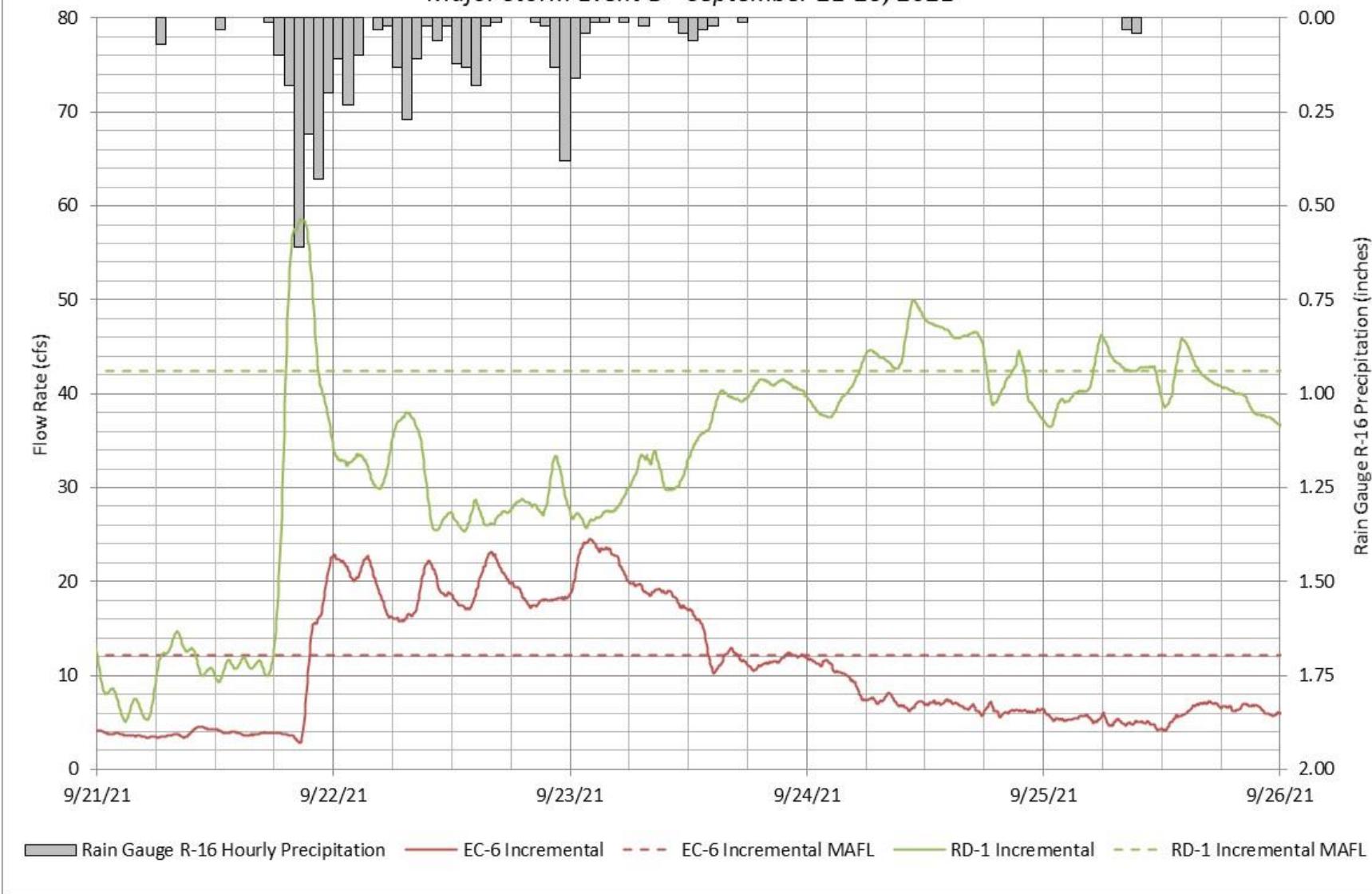


Figure D-26
SWRDDD Connection

Major Storm Event D - September 21-23, 2021

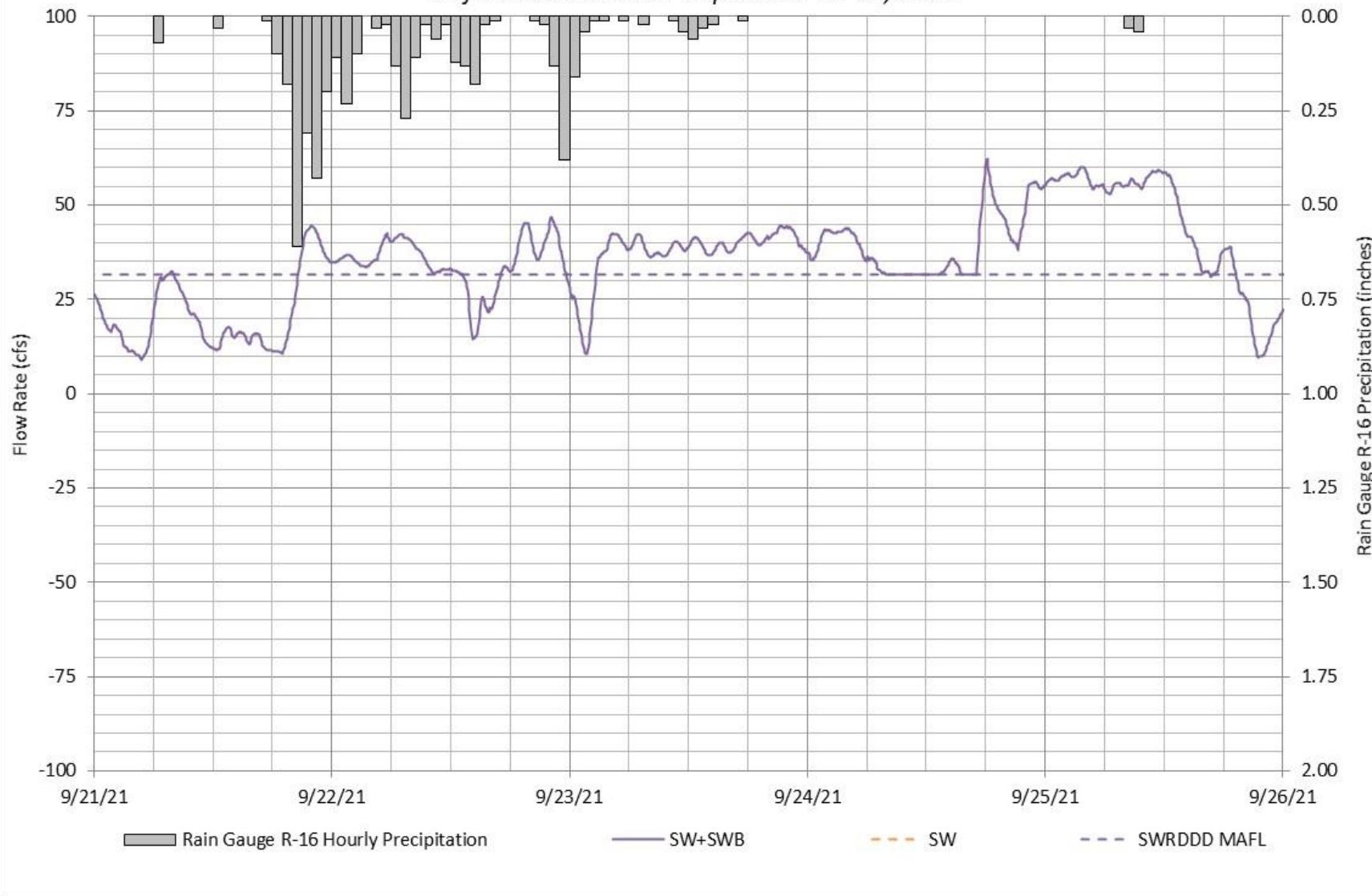


Figure D-27
Downriver Wastewater Treatment Facility
Major Storm Event E - October 24-25, 2021

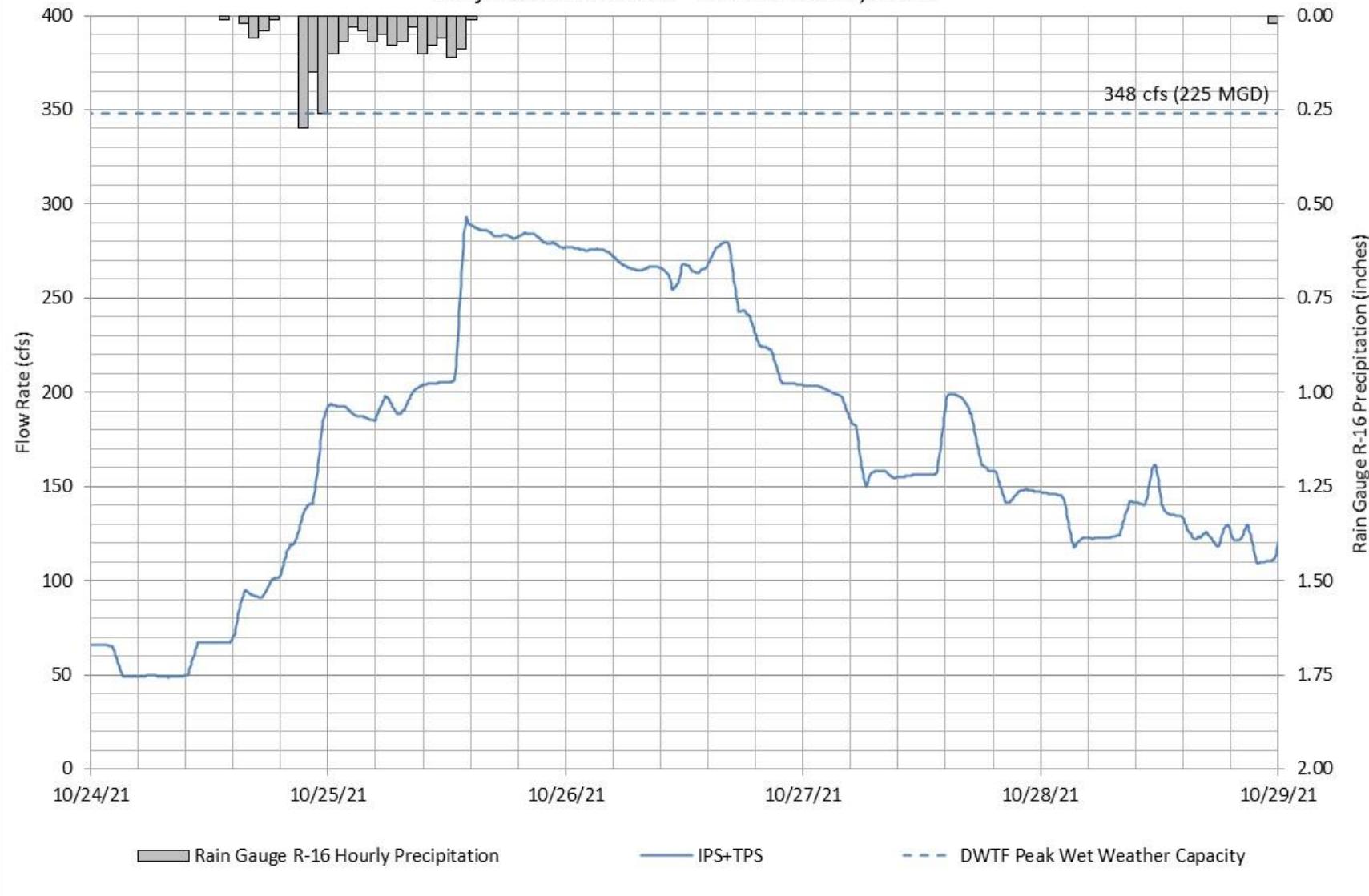


Figure D-28
Riverdrive Interceptor
Major Storm Event E - October 24-25, 2021

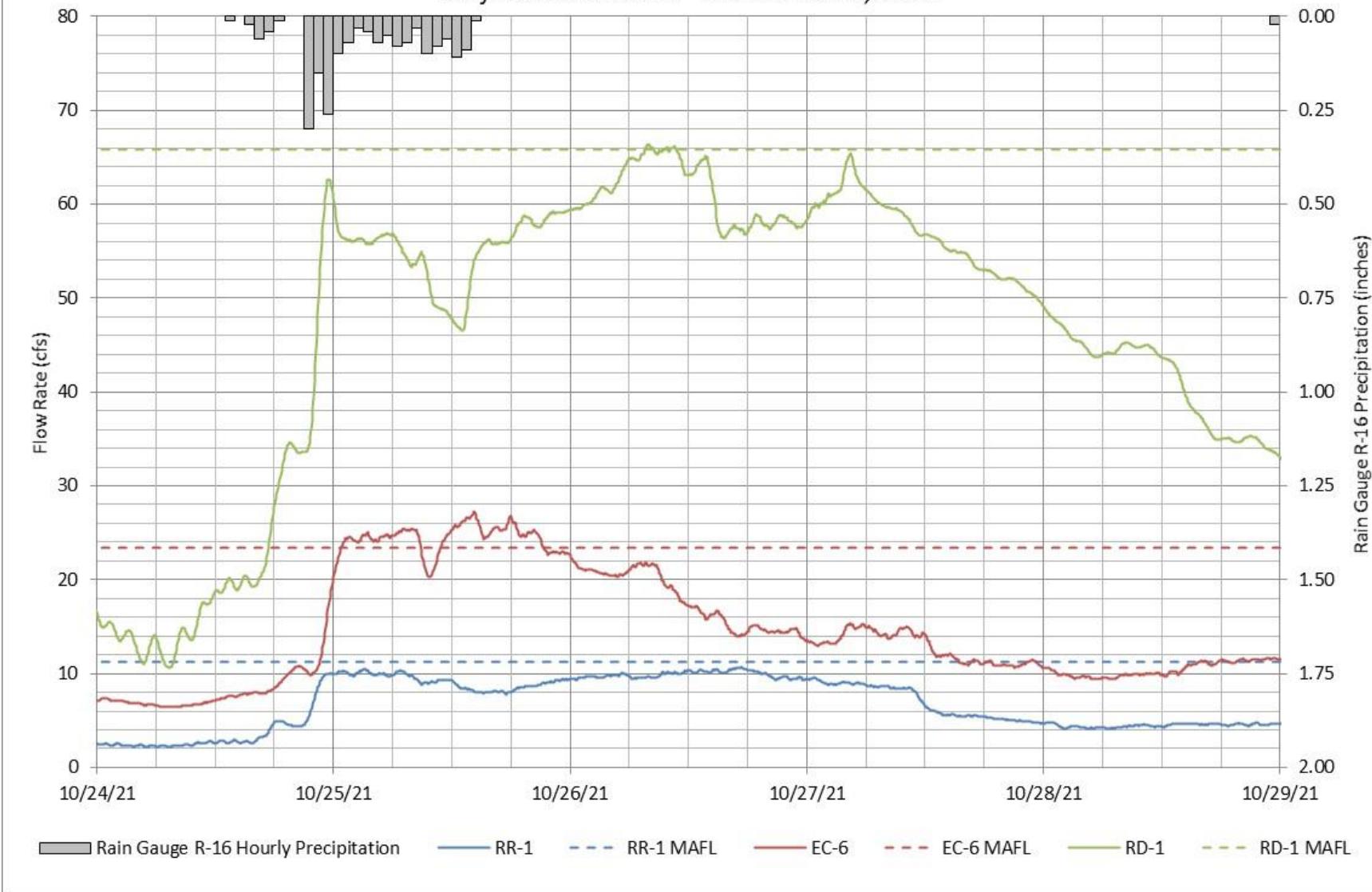


Figure D-29
Riverdrive Interceptor
Major Storm Event E - October 24-25, 2021

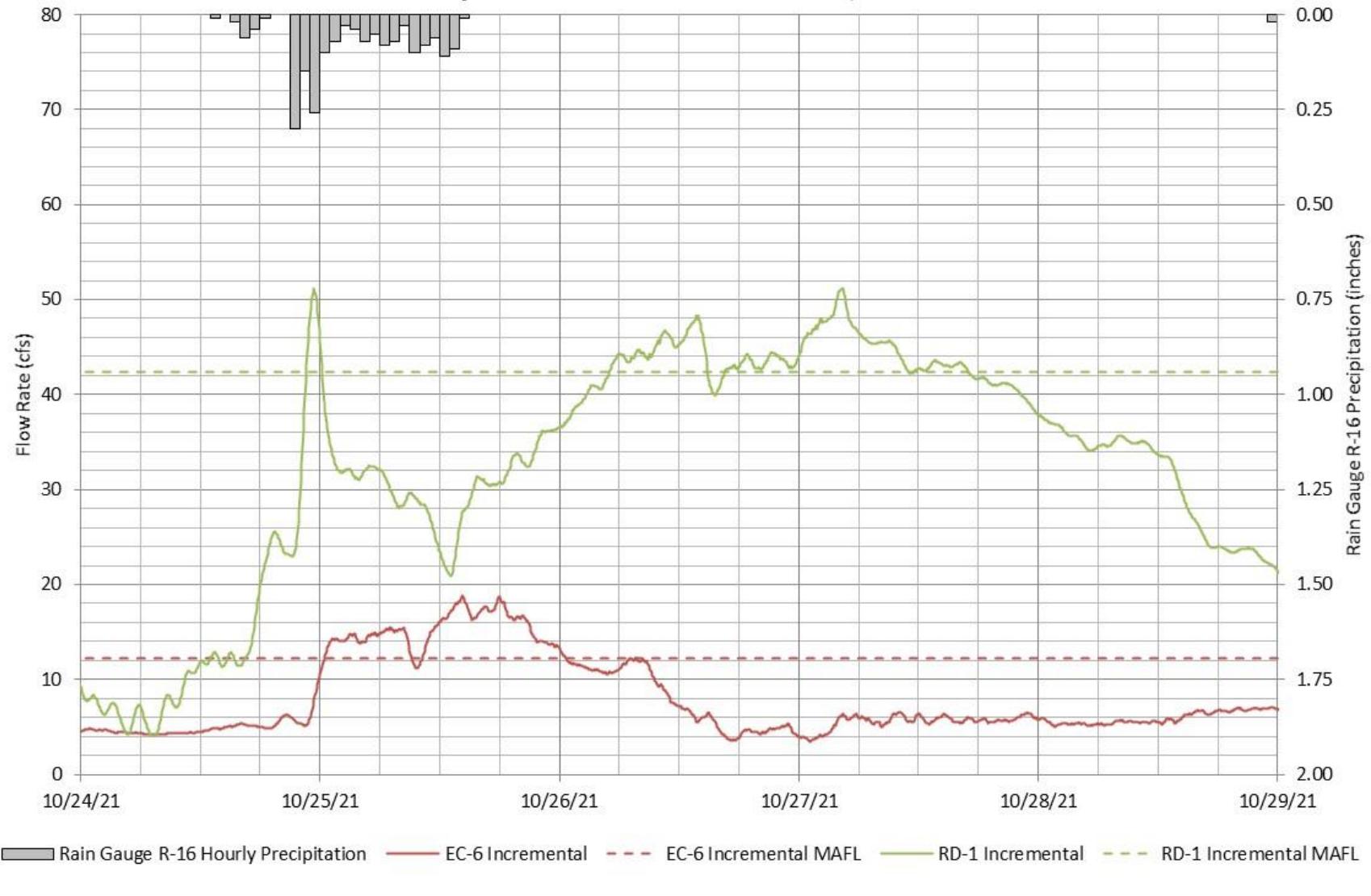
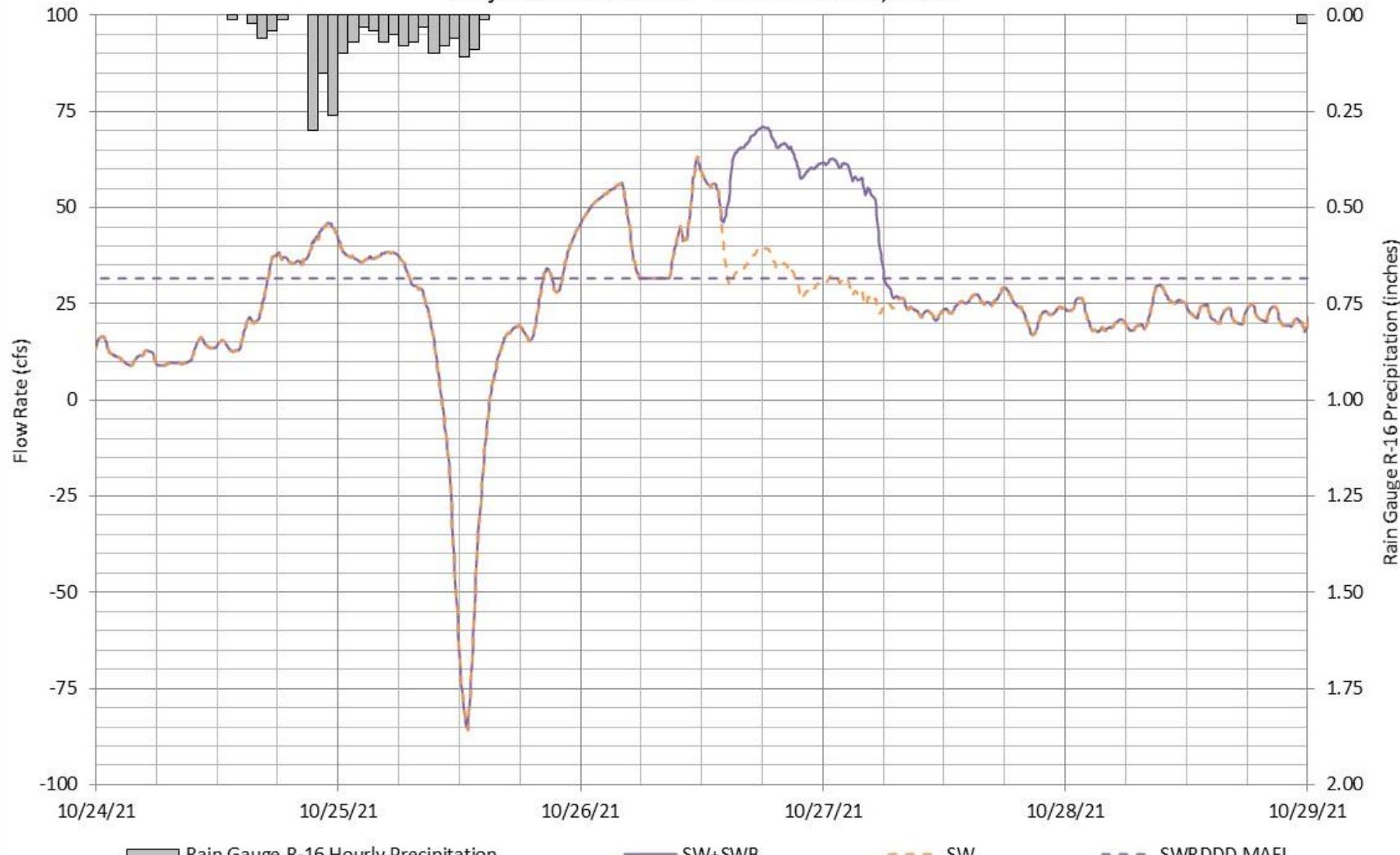


Figure D-30
SWRDDD Connection
Major Storm Event E - October 24-25, 2021



Appendix E

Sediment at Meter SW

Methodology for Estimating Sediment Depth at Meter SW using Flow Meter Velocity Paths

Meter SW has four levels of crossed path velocity sensors, for a total of eight velocity sensors. As the sediment depth at Meter SW increases, the lower velocity paths become buried in sediment or blinded by sediment suspended in the flow, and the sensors record zero velocity. The estimated sediment depth at Meter SW is based on which velocity sensors are recording zero velocity. Table E-1 lists the estimated sediment depths at Meter SW based on the sensors recording zero velocity.

When all eight velocity sensors are working, the estimated sediment depth is 1.33 ft. This depth is the average sludge depth from previous sludge profiles measurements in 2015 and is estimated to be a minimum sludge depth at this location. When one of the lowest velocity path sensors (sensors 1 or 2) records zero velocity, it is estimated that the sludge depth is at the velocity path 1 height of 1.83 feet. When both velocity path sensors (sensors 1 and 2) record zero velocity, it is estimated that the sludge depth is halfway between velocity path 1 and velocity path 2 at 2.17 feet. The same logic applies to velocity paths 2, 3, and 4 to estimate higher sediment depths.

Sediment depths are estimated for each 5-minute meter recording interval. Typically, the increased flow rates and velocities during a storm event will reduce the sludge depth at Meter SW, uncovering the buried velocity paths, which results in a lower estimated sludge depth and higher flow rate.

On September 18, 2019, Meter SW was reprogrammed to account for 16-inches of sediment. There is a long-term record of sediment profiles at this location which support an assumed stable depth of sediment of 16-inches. This programming change greatly improved the real-time flow rate readings for Meter SW. This is important because Meter SW is used to control a gate which throttles the SWRDDD flow rate to its contract capacity of 20.5 MGD.

At the end of each calendar month, the flow rate for Meter SW is recalculated using the estimated sediment depths. The recalculated flow rate is the best estimate of Meter SW flow rates.

Table E-1
Estimated Sediment Depths at Meter SW Based on Velocity Sensor Data

Velocity Path	Velocity Path Height (ft)	Velocity Sensor	Sensors Recording Zero Velocity								
			1	2	1 or 2	1 & 2	1 & 2	1 & 2	1 & 2	1 & 2	1 & 2
1	1.83	1	-								
		2									
2	2.50	3	-	-	-	3 or 4	3 & 4	3 & 4	3 & 4	3 & 4	3 & 4
		4									
3	3.17	5	-	-	-	-	-	5 or 6	5 & 6	5 & 6	5 & 6
		6									
4	5.25	7	-	-	-	-	-	-	-	7 or 8	7 & 8
		8									
Estimated Sediment Depth (ft)			1.33	1.83	2.17	2.50	2.84	3.17	3.67	5.25	5.88

Sediment Profile Measurements

Sediment profiles at the Meter SW location have been taken since 2013. These profiles measure the sediment depth every 6 inches across the pipe cross section. Table E-2 lists the sediment profile measurements. The equivalent sediment level from invert is also listed for each measurement. This value represents the depth of sediment from the pipe invert if the sediment was perfectly flat (horizontal). Figure E-1 shows the pipe cross section at Meter SW with the sediment profiles from 2013 to date.

The variability in the sediment profile measurements highlight the dynamic nature of sediment accretion/reduction at this location. The historical average sediment depth at Meter SW is about 16-inches.

Since Veolia took over operations of the Downriver Wastewater Treatment Facility (DWTF), the Interceptor Pump Station (IPS) wet well has been pumped down more frequently. The frequent wet well drawdowns are assumed to have helped mobilize and clear the sediment from this location.

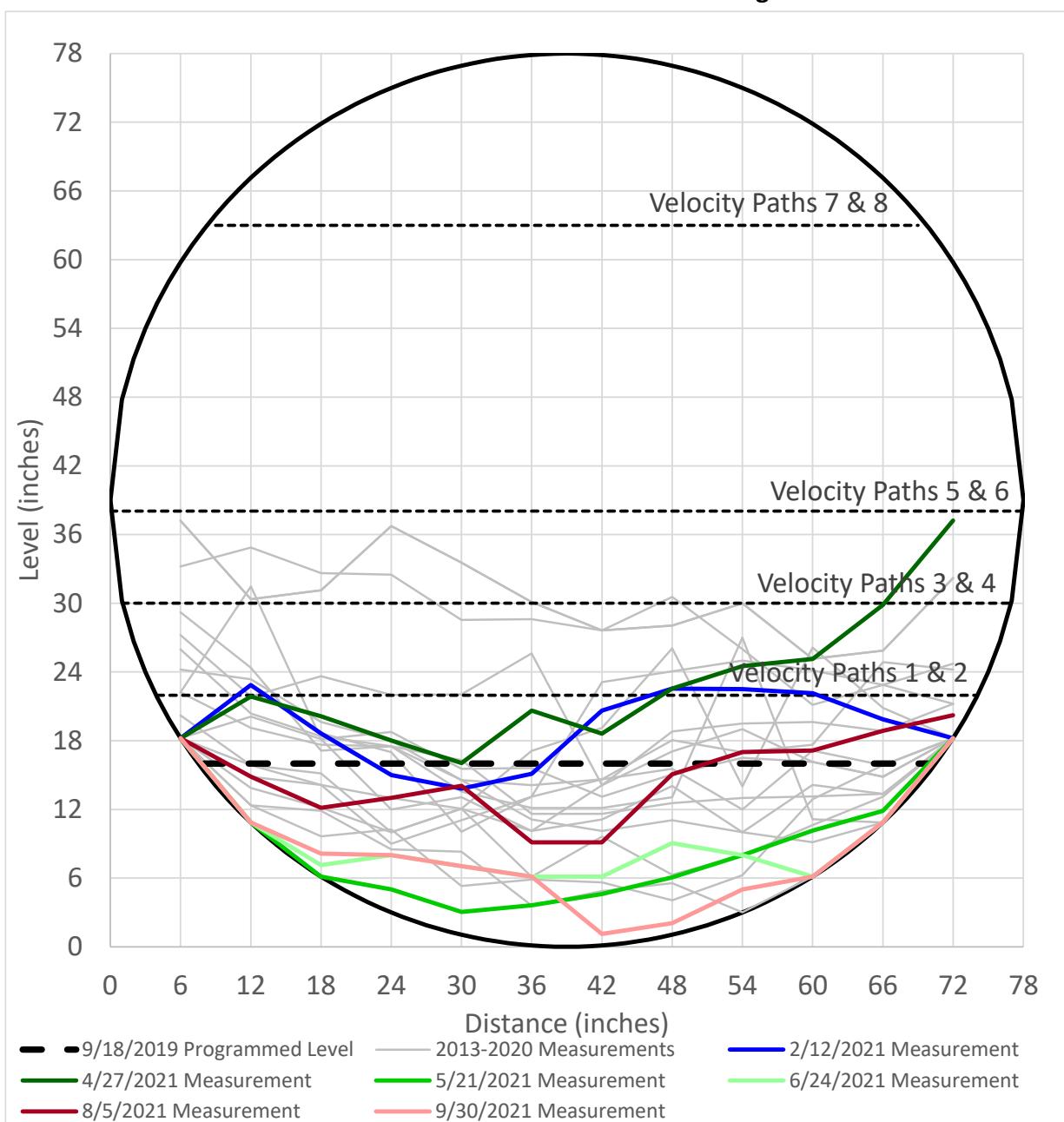
Table E-2
Meter SW Sediment Profile Measurements

Date	Equivalent Sediment Level from Invert		Distance from Pipe Wall (inches)											
			6	12	18	24	30	36	42	48	54	60	66	72
	(inches)	(feet)	Sediment Level from Invert (inches)											
12/19/2013	21.3	1.8	27.2	21.9	23.6	22.0	22.1	25.6	14.1	18.8	19.5	19.6	18.9	21.2
5/9/2014	30.6	2.5	37.2	30.4	31.1	36.8	33.6	30.1	27.6	28.1	30.0	25.1	25.9	32.2
7/25/2014	30.6	2.5	37.2	30.4	31.1	36.8	33.6	30.1	27.6	28.1	30.0	25.1	25.9	32.2
9/24/2014	17.8	1.5	22.2	31.5	18.1	18.8	15.6	15.6	13.1	15.1	16.5	16.1	14.9	18.2
2/27/2015	28.6	2.4	33.2	34.9	32.6	32.5	28.6	28.6	27.6	30.6	26.0	21.1	22.9	24.7
5/27/2015	15.8	1.3	22.2	19.1	17.6	17.5	13.6	12.1	12.1	13.1	27.0	11.1	10.9	18.2
8/26/2015	17.0	1.4	24.2	23.4	19.6	18.0	14.6	14.1	14.6	15.6	12.0	17.1	15.9	18.2
11/20/2015	15.6	1.3	26.0	20.4	18.4	17.5	16.3	11.6	11.6	12.6	13.0	13.1	13.4	18.2
11/18/2016	10.7	0.9	18.2	14.9	14.1	13.0	12.1	6.1	9.6	6.3	8.0	10.6	13.1	18.2
12/21/2016	14.7	1.2	29.2	24.4	17.1	17.5	14.6	11.1	10.1	11.1	10.0	9.1	10.9	18.2
5/24/2017	14.0	1.2	18.2	13.9	12.1	10.0	12.1	10.1	14.1	17.1	19.0	16.1	14.9	18.2
8/23/2017	17.5	1.5	18.2	15.9	15.1	10.0	12.1	17.1	19.1	26.1	14.0	26.1	20.9	18.2
2/13/2018	13.7	1.1	18.2	20.1	18.1	12.0	13.1	10.1	11.1	14.1	10.0	14.1	13.4	18.2
2/28/2020	6.6	0.6	18.2	12.4	11.9	8.5	8.3	3.6	4.9	5.6	3.0	6.1	10.9	18.2
6/12/2020	17.9	1.5	18.2	22.9	18.6	17.0	10.1	13.1	14.6	18.1	17.0	17.6	24.9	24.2
9/21/2020	8.3	0.7	18.2	12.4	9.6	10.3	5.3	5.9	5.6	4.1	6.3	12.9	15.9	18.2
12/21/2020	18.5	1.5	20.2	15.9	14.1	9.0	11.1	13.1	23.1	24.1	25.0	24.1	22.9	21.2
2/12/2021	19.1	1.6	30.2	23.4	18.1	15.8	16.1	20.6	21.6	20.6	19.0	15.1	10.9	18.2
4/27/2021	22.8	1.9	18.2	21.9	20.1	18.0	16.1	20.6	18.6	22.6	24.5	25.1	29.9	37.2
5/21/2021	5.8	0.5	18.2	10.9	6.1	5.0	3.1	3.6	4.6	6.1	8.0	10.1	11.9	18.2
6/24/2021	7.2	0.6	18.2	10.9	7.1	8.0	7.1	6.1	6.1	9.1	8.0	6.1	10.9	18.2
8/5/2021	14.3	1.2	18.2	14.9	12.1	13.0	14.1	9.1	9.1	15.1	17.0	17.1	18.9	20.2
9/30/2021	5.2	0.4	18.2	10.9	8.1	8.0	7.1	6.1	1.1	2.1	5.0	6.1	10.9	18.2
Assumed	16.0	1.3	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0

Legend

	Equivalent sediment level less than meter programmed level of 16 inches
	Equivalent sediment level greater than meter programmed level of 16 inches

Figure E-1
Sediment Profiles at Meter SW from 2013 through 2021



Appendix F

Dye-Dilution Test Adjustment Factors

Table F-1
Downriver Sewage Disposal System
Dye Dilution Test Summary

Meter	Date	Adjustment Factor	Period Adjustment Factor
DMA-1	8/30/2018	0.85	0.85
DMA-2	9/24/2014	0.86	0.98
	8/1/2018	1.09	
EC-6	2/18/2014	0.70	0.75
	11/18/2021	0.79	
P-1	9/16/2013	0.99	0.98
	8/7/2018	0.96	
P-2	9/18/2017	1.01	1.01
PA-1	11/6/2013	0.93	0.93
PA-2	9/18/2017	0.94	0.98
	1/24/2020	1.02	
PA-3	1/29/2020	0.96	0.96
PA-4	4/4/2018	0.90	0.90
PB-1	1/23/2020	1.14	1.14
PC-1	9/25/2014	0.93	0.93
	8/9/2018	0.93	
PD-1	8/18/2015	0.76	0.76
	7/31/2018	0.76	
PD-2	1/30/2020	0.99	0.99
RD-1	4/6/2018	1.02	1.02
RR-1	2/19/2014	0.97	1.06
	1/28/2020	1.16	
RV-1	12/11/2019	1.00	1.00
SW	11/12/2013	1.00 (with sediment accounted for)	1.00
	1/27/2020	1.00 (with sediment accounted for)	
TB-1	11/10/2014	1.05	1.01
	1/28/2020	0.97	

Appendix G

Year 2020 Census Update

Table 1
Meter District Allocation Update from Census 2010 to Census 2020 Residential Population

Meter District	Community	Year 2010		Year 2020		Net Change		
		Incremental Population	Meter District Percentage	Incremental Population	Meter District Percentage	Incremental Population	Meter District Percentage	
TB-1	Dearborn Heights	19,152	78.2%	19,472	77.7%	+320	+1.7%	-0.5%
	Taylor	5,339	21.8%	5,574	22.3%	+235	+4.4%	+0.5%
	Total	24,491	100.0%	25,046	100.0%	+555	+2.3%	-
PC-1	Allen Park	1,019	3.8%	716	2.7%	-303	-29.8%	-1.1%
	Taylor	25,700	96.2%	25,577	97.3%	-123	-0.5%	+1.1%
	Total	26,719	100.0%	26,293	100.0%	-426	-1.6%	-
DMA-2	Romulus	0	100.0%	0	100.0%	0	0.0%	-
PD-2	Romulus	9,532	100.0%	8,069	100.0%	-1,463	-15.4%	-
PD-1	Taylor	12,100	100.0%	13,083	100.0%	+983	+8.1%	-
PB-1	Taylor	6,462	59.2%	5,040	61.1%	-1,422	-22.0%	+1.9%
	Southgate	4,459	40.8%	3,214	38.9%	-1,245	-27.9%	-1.9%
	Total	10,921	100.0%	8,254	100.0%	-2,667	-24.4%	-
PA-4	Belleville	3,993	41.1%	4,008	33.8%	+15	+0.4%	-7.4%
	Van Buren Twp	5,719	58.9%	7,865	66.2%	+2,146	+37.5%	+7.4%
	Total	9,712	100.0%	11,873	100.0%	+2,161	+22.2%	-
DMA-1	Romulus	0	100.0%	0	100.0%	0	0.0%	-
PA-3	Romulus	11,371	100.0%	14,420	100.0%	+3,049	+26.8%	-
PA-2	Taylor	13,270	98.2%	14,125	99.8%	+855	+6.4%	+1.6%
	Brownstown Twp	248	1.8%	29	0.2%	-219	-88.3%	-1.6%
	Total	13,517	100.0%	14,154	100.0%	+637	+4.7%	-
P-2	Brownstown Twp	10,397	97.5%	11,002	99.9%	+605	+5.8%	+2.4%
	Taylor	262	2.5%	10	0.1%	-252	-96.2%	-2.4%
	Total	10,659	100.0%	11,012	100.0%	+353	+3.3%	-
P-1	Allen Park	3,332	23.9%	2,338	17.4%	-994	-29.8%	-6.4%
	Southgate	10,637	76.1%	11,079	82.6%	+442	+4.2%	+6.4%
	Total	13,969	100.0%	13,417	100.0%	-552	-4.0%	-
RV-1	Riverview	12,486	100.0%	12,490	100.0%	+4	+0.0%	-
RR-1	River Rouge	7,903	100.0%	7,224	100.0%	-679	-8.6%	-
EC-6	Ecorse	9,515	71.5%	9,305	69.1%	-210	-2.2%	-2.4%
	Lincoln Park	3,795	28.5%	4,169	30.9%	+374	+9.9%	+2.4%
	Total	13,310	100.0%	13,474	100.0%	+164	+1.2%	-
RD-1	Allen Park	18,179	34.6%	22,170	38.1%	+3,991	+22.0%	+3.5%
	Lincoln Park	34,347	65.4%	36,076	61.9%	+1,729	+5.0%	-3.5%
	Total	52,526	100.0%	58,246	100.0%	+5,720	+10.9%	-
SW + SWB	Southgate	14,752	36.3%	15,003	37.5%	+251	+1.7%	+1.1%
	Wyandotte	25,883	63.7%	25,058	62.5%	-825	-3.2%	-1.1%
	Total	40,635	100.0%	40,061	100.0%	-574	-1.4%	-
APO-1 + APO-2	Allen Park	0	100.0%	0	100.0%	0	0.0%	-
TPS + IPS	Southgate	199	100.0%	718	100.0%	+519	+260.8%	-

Subtotal Controlled Flow Communities	114,374	42.4%	119,005	42.8%	+4,631	+4.0%	+0.5%
Subtotal Non-Controlled Flow Communities	155,677	57.6%	158,829	57.2%	+3,152	+2.0%	-0.5%
Total Incoming Flow	270,052	100.0%	277,834	100.0%	+7,782	+2.9%	-
DWTF Including Recycle (IPS + TPS)	270,052	100.0%	277,834	100.0%	+7,782	+2.9%	-
DWTF without Recycle (IPS + TPS - Recycle)	270,052	100.0%	277,834	100.0%	+7,782	+2.9%	-
Recycle	0	-	0	0.0%	0	0.0%	-

Notes:

- Prior to the 2021 Q4 DSDS System Monitoring Report Meter District PB-1 flow rates were estimated to be 60% Taylor and 40% Southgate.
- Meter District TPS + IPS is estimated using a population ratio to the upstream Meter District P-1.

Table 2
Community Summary of Meter District Allocation Update from Census 2010 to Census 2020 Residential Population

Community	Meter District	Sewage Flow Meter Math	Incremental Population			Meter District Percentage		
			Year 2010	Year 2020	Net Change	Year 2010	Year 2020	Net Change
Allen Park	PC-1	[PC-1]+[CPO]+[CHPO]-[TB-1]	1,019	716	-303	-29.8%	3.8%	2.7%
	P-1	[P-1]+[PM-1]-[P-2]-[PA-2]-[PB-1]-[PD-1]-[PC-1]	3,332	2,338	-994	-29.8%	23.9%	17.4%
	RD-1	[RD-1]-[EC-6]	18,179	22,170	+3,991	+22.0%	34.6%	38.1%
	APO-1 + APO-2	[APO-1] + [APO-2]	0	0	0	0.0%	100.0%	100.0%
	Total	-	22,531	25,224	2,693	+12.0%	-	-
Belleville	PA-4	[PA-4]	3,993	4,008	+15	+0.4%	41.1%	33.8%
Brownstown Twp	P-2	[P-2]	10,397	11,002	+605	+5.8%	97.5%	99.9%
	PA-2	[PA-2]+[ER-1]-[PA-3]-[ER-2]	248	29	-219	-88.3%	1.8%	0.2%
	Total	-	10,645	11,031	386	+3.6%	-	-
Dearborn Heights	TB-1	[TB-1]+[TSO]	19,152	19,472	+320	+1.7%	78.2%	77.7%
Ecorse	EC-6	[EC-6]-[RR-1]	9,515	9,305	-210	-2.2%	71.5%	69.1%
Lincoln Park	EC-6	[EC-6]-[RR-1]	3,795	4,169	+374	+9.9%	28.5%	30.9%
	RD-1	[RD-1]-[EC-6]	34,347	36,076	+1,729	+5.0%	65.4%	61.9%
	Total	-	38,142	40,245	+2,103	+5.5%	-	-
River Rouge	RR-1	[RR-1]	7,903	7,224	-679	-8.6%	100.0%	100.0%
Riverview	RV-1	[RV-1]	12,486	12,490	+4	+0.0%	100.0%	100.0%
Romulus	DMA-1	[DMA-1]	0	0	0	0.0%	100.0%	100.0%
	PA-3	[PA-3]+[ER-2]-[PA-4]-[DMA-1]	11,371	14,420	+3,049	+26.8%	100.0%	100.0%
	DMA-2	[DMA-2]	0	0	0	0.0%	100.0%	100.0%
	PD-2	[PD-2] - [DMA-2]	9,532	8,069	-1,463	-15.4%	100.0%	100.0%
	Total	-	20,904	22,489	1,585	+7.6%	-	-
Southgate	P-1	[P-1]+[PM-1]-[P-2]-[PA-2]-[PB-1]-[PD-1]-[PC-1]	10,637	11,079	+442	+4.2%	76.1%	82.6%
	PB-1	[PB-1]	4,459	3,214	-1,245	-27.9%	40.8%	38.9%
	SW + SWB	[SW]+[SWB]	14,752	15,003	+251	+1.7%	36.3%	37.5%
	TPS + IPS	[P-1]+[PM-1]-[P-2]-[PA-2]-[PB-1]-[PD-1]-[PC-1]	199	718	+519	+260.8%	1.4%	5.4%
	Total	-	30,047	30,014	-33	-0.1%	-	-
Taylor	P-2	[P-2]	262	10	-252	-96.2%	2.5%	0.1%
	PA-2	[PA-2]+[ER-1]-[PA-3]-[ER-2]	13,270	14,125	+855	+6.4%	98.2%	99.8%
	PB-1	[PB-1]	6,462	5,040	-1,422	-22.0%	59.2%	61.1%
	TB-1	[TB-1]+[TSO]	5,339	5,574	+235	+4.4%	21.8%	22.3%
	PC-1	[PC-1]+[CPO]+[CHPO]-[TB-1]	25,700	25,577	-123	-0.5%	96.2%	97.3%
	PD-1	[PD-1]-[PD-2]	12,100	13,083	+983	+8.1%	100.0%	100.0%
	Total	-	63,131	63,409	+278	+0.4%	-	-
Van Buren Twp	PA-4	[PA-4]	5,719	7,865	+2,146	+37.5%	58.9%	66.2%
Wyandotte	SW + SWB	[SW]+[SWB]	25,883	25,058	-825	-3.2%	63.7%	62.5%
DSDS Total			270,052	277,834	+7,782	+2.9%	-	-

Notes:

1) Prior to the 2021 Q4 DSDS System Monitoring Report Meter District PB-1 flow rates were estimated to be 60% Taylor and 40% Southgate.

2) Meter District TPS + IPS is estimated using a population ratio to the upstream Meter District P-1.