

Downriver Utility Wastewater Authority

Downriver Sewage Disposal System Annual System Monitoring Report for 2019

March 27, 2020



Applied Science, Inc.



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1) INTRODUCTION

The Downriver Sewage Disposal System (DSDS) annual system monitoring report for 2019 provides a summary of the flow monitoring data for January through December 2019. This report supersedes and consolidates the information previously issued in the quarterly system monitoring reports for 2019. 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 2019. 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 2019 system monitoring are presented in the following subsections: subsection A lists the noteworthy items which occurred, 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. Influent flow rates to the Downriver Wastewater Treatment Facility (DWTF) are calculated daily based on flow meter totalizer readings. However, during wet weather events that include bypasses, Veolia estimates daily average flow rates for the Influent Pump Station (IPS) and Tunnel Pump Station (TPS) using supplemental data manually recorded by the operations staff, and these values were used in this report. More specifically, IPS Meter #5 currently is inoperable. IPS Pump #5 (the pump that discharges through IPS Meter #5) is in a lag position and currently only used during wet weather. When IPS Pump #5 is used, flow rates are manually recorded by operations staff in 5-minute intervals using rated pump capacity. For all other IPS magmeters, flow rates are calculated and recorded daily using flow meter totalizer readings. All six IPS magmeters were replaced in January 2020. All TPS pump discharge magmeters are operational. TPS Meter #2 records erroneous readings when there is no flow; therefore, TPS Pump #2 readings are disregarded during periods of no flow.

2. When the *Flow Meter and Rain Gauge Maintenance and Data Management Services for the DSDS* service agreement ended at the end of 2018, service of the ADS flow meters was suspended, communications were decommissioned, and no service costs were incurred by DUWA. When the service agreement was renewed it took time to recommission communications and service of the flow meters. As a result, data for most of the ADS flow meters is not available from mid-January through mid-March 2019. The exact dates for each meter are listed in Table 8-1. Missing data were estimated with correlations to other flow meters with complete datasets. All meters were restored to normal operations before the first significant storm event of 2019. There are no adverse effects of this sequence of events on the data summaries and findings in this report.
3. On June 25, 2019 the control module for Meter SW failed. The spare parts inventory had no control modules available which could be used to repair the meter. Consequently, the control module from Meter PA-3 was removed and used to repair Meter SW. At that time, Meter PA-3 was slated to be replaced with an ADS Triton+ flow meter.
4. An ADS Triton+ flow meter was installed at PA-3 on September 10, 2019.
5. 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 and recent measurements support an assumed stable depth of sediment of 16-inches. The updated meter settings provide a more accurate real-time estimate of flow rate. This allows the SWRDDD gate to regulate the maximum flow rate through Meter SW to a value closer to the Maximum Allowable Flow Limit (MAFL) than was possible with the previous meter settings. Meter SW flow rate continues to be recalculated at the end of each month to account for the variable sediment depth at this location.
6. An ADS Triton+ flow meter was installed in the downstream pipe at PD-2 on September 10, 2019. The Accusonic flow meter was left in place in the upstream pipe to provide a performance comparison to the ADS flow meter. The ADS Triton+ flow meter exhibited comparable performance to the Accusonic flow meter over a range of depths and flow rates and was considered an acceptable replacement for this site. The Accusonic flow meter was removed on November 14, 2019 and added to the spare parts inventory. The ADS Triton+ flow meter remains installed in the downstream pipe and is the permanent meter for this site.
7. The results of dye tests currently in-effect for DSDS meters are shown in Table 2-1 for reference. The data presented in this report reflects the results of these dye dilution tests. Flow meters PA-2, PA-3, PB-1, PD-2, RR-1, RV-1, and SW were recently dye tested and the results have been incorporated into this report.

8. The January 27, 2020 dye dilution test of Meter SW will be reanalyzed once an updated sediment profile at Meter SW is taken in the spring of 2020. The current adjustment factor of 1.16 for this test was developed using recalculated flow rate data for Meter SW which assumes a minimum sediment depth of 16-inches. In a 78-inch sewer, 16-inches of sediment is about 15% of the total cross-sectional area. The preliminary dye test result may indicate that the sediment depth at the time of the test was well below 16-inches. Veolia has been performing routine drawdowns of the IPS wet well which may have reduced sediment levels at Meter SW.

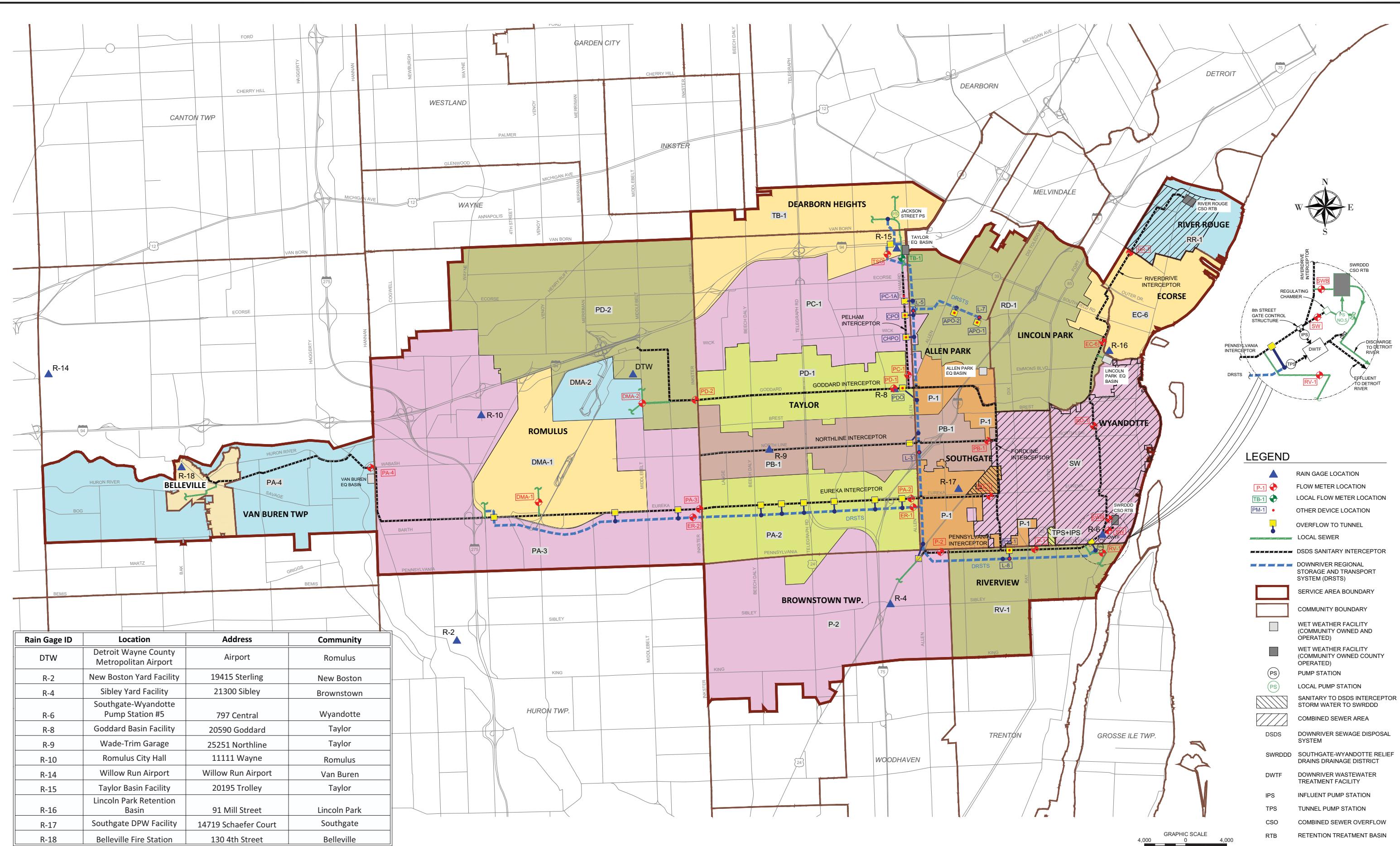


Table 2-1
Downriver Sewage Disposal System
Dye Dilution Test Summary

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	0.70
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	11/4/2013	0.86	0.94
	9/18/2017	0.94	
	1/24/2020	1.02	
PA-3 (Pre-9/10/2019)	11/5/2013	1.00	0.99
	8/8/2018	0.98	
PA-3 (Post-9/10/2019)	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 (Pre-11/13/2019)	11/26/2013	0.97	0.97
PD-2 (Post-11/13/2019)	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 sludge accounted for)	1.00
	1/27/2020	1.16 ¹	
TB-1	11/10/2014	1.05	1.01
	1/28/2020	0.97	

Notes:

1. The 1/27/2020 dye dilution test of Meter SW will be reanalyzed once an updated sediment profile at Meter SW is taken in the spring of 2020.

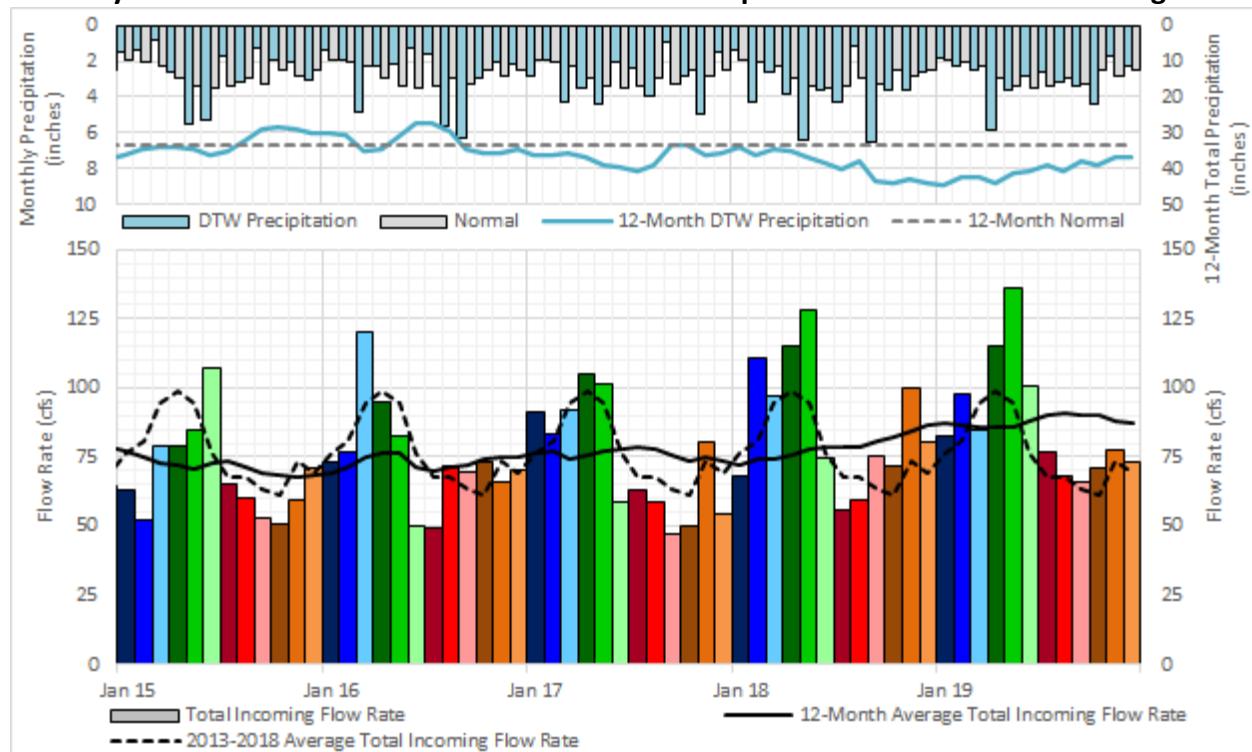
B) DSDS OVERVIEW

1. The total precipitation at the Detroit Metropolitan Wayne County Airport (DTW) for 2019 was 36.38 inches, which is 2.91 inches above normal.
2. Over the last four years the total precipitation at DTW was 16.46 inches above normal. The total annual precipitation at DTW has been above normal for each of the past four years. The total precipitation above normal at DTW from 2016 through 2019 were 1.22, 1.99, 10.34, and 2.91 inches, respectively.
3. There were eleven (11) significant storms in 2019. 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.
4. Of the significant storms, one (1) was also defined as a major 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 million gallons per day (MGD).
5. The rainfall for Major Storm Event A was significant, with a recurrence interval of up to 16-years. However, the rainfall for this event was not extraordinary when compared to historical events. What sets this event apart is the preceding dry weather flow rate. The dry weather flow rate to the DWTF for this event was about 109 MGD, as flow rates were still elevated from preceding rains. For comparison, the dry weather flow rate to the DWTF for the August 11, 2014 event was only 34 MGD, and the average daily dry weather flow rate to the DWTF for May 2018 was about 62 MGD. The combination of the high baseflow antecedent conditions and the rainfall from this event exceeded the total incoming flow rate for the 4.42-inch design storm event.
6. The average rainfall depths at DTW for the significant/major storms are listed in Table 2-2.
7. Figure 2-1 shows the long-term flow rate versus precipitation trends for the DSDS by month from 2015 through 2019. Total incoming flow rate to the DWTF is based on the interceptor system flow meters, and the total precipitation is at DTW. On the bottom graph, the vertical bars show the average monthly flow rate, the solid black line shows the 12-month average flow rate, and the black dashed line shows the 2013-2018 average monthly flow rate. On the top graph, the blue vertical bars show the total monthly precipitation, the solid blue line shows the 12-month total precipitation, and the grey dashed line shows the 12-month normal precipitation. This figure shows the expected seasonal variations in flow rates, and the trend between increased precipitation and increased flow rates in 2018 and 2019.

Table 2-2
Downriver Sewage Disposal System
Rainfall Depths at DTW for Major Storms during 2019 in the DSDS Service Area

2019 Major Storm Event	2019 Significant Storm Event	Event Dates	Peak 24-hour Rainfall Depth (inches)	Total Rainfall Depth (inches)
-	1	3/19-31/2019	1.34	1.34
-	2	4/18-21/2019	0.76	1.29
A	3	4/30/2019	3.28	3.28
-	4	5/18-19/2019	0.46	0.80
-	5	7/19/2019	1.61	1.61
-	6	8/18/2019	1.28	1.28
-	7	9/11-13/2019	1.10	1.50
-	8	10/2-3/2019	0.94	0.94
-	9	10/26-27/2019	1.38	1.38
-	10	10/29-31/2019	1.04	1.27
-	11	12/29-30/2019	1.53	1.57

Figure 2-1
Downriver Sewage Disposal System
Monthly Influent Flow Rate to DWTF versus Total Precipitation at DTW for 2015 through 2019



8. Table 2-3 lists the average flow rate and total flow volume for years 2013 through 2019. 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 2019 was about equal to the influent volume for 2018, and was about 12% higher than the average influent volume for years 2013 through 2018. The increased flow volume for 2018 and 2019 is likely a result of increased precipitation.

Table 2-3
Downriver Sewage Disposal System
Average Flow Rate and Total Volume for 2013 through 2019

Year	Total Precipitation at DTW (inches)	Average Flow Rate (cfs)		Total Flow Volume (MG)		Total Flow Volume (MCF)	
		Influent to DWTF	DWTF Including Recycle (IPS + TPS)	Influent to DWTF	DWTF Including Recycle (IPS + TPS)	Influent to DWTF	DWTF Including Recycle (IPS + TPS)
2013	39.90	79.74	84.22	18,811	19,868	2,514,643	2,655,980
2014	37.57	78.40	85.20	18,495	20,098	2,472,357	2,686,713
2015	30.32	68.68	79.43	16,201	18,738	2,165,777	2,504,916
2016	34.69	74.84	81.87	17,703	19,365	2,366,537	2,588,743
2017	35.46	73.63	80.28	17,370	18,939	2,321,975	2,531,783
2018	43.81	86.08	96.51	20,305	22,766	2,714,445	3,043,389
2019	36.47	87.45	92.29	20,628	21,771	2,757,626	2,910,423

9. Figures 2-2 through 2-5 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 2019. These figures show the seasonal variation of the DSDS flow rate versus precipitation. The quarterly periods of April through June tend to have the highest influent flow rates and total precipitation.
10. For 2019 quarters Q1, Q3, and Q4, the total quarterly precipitation at DTW was close to normal and the influent flow rate was about average. For 2019 quarter Q2, the total quarterly precipitation at DTW was about 2.49 inches above normal and the influent flow rate was well above normal. The month of April 2019 had several large storm events which resulted in wet antecedent conditions and high capture coefficients for these events.

Figure 2-2
Downriver Sewage Disposal System
Average Influent Flow Rate to DWTF versus Total Precipitation at DTW
Quarter 1 January – March for 2013 through 2019

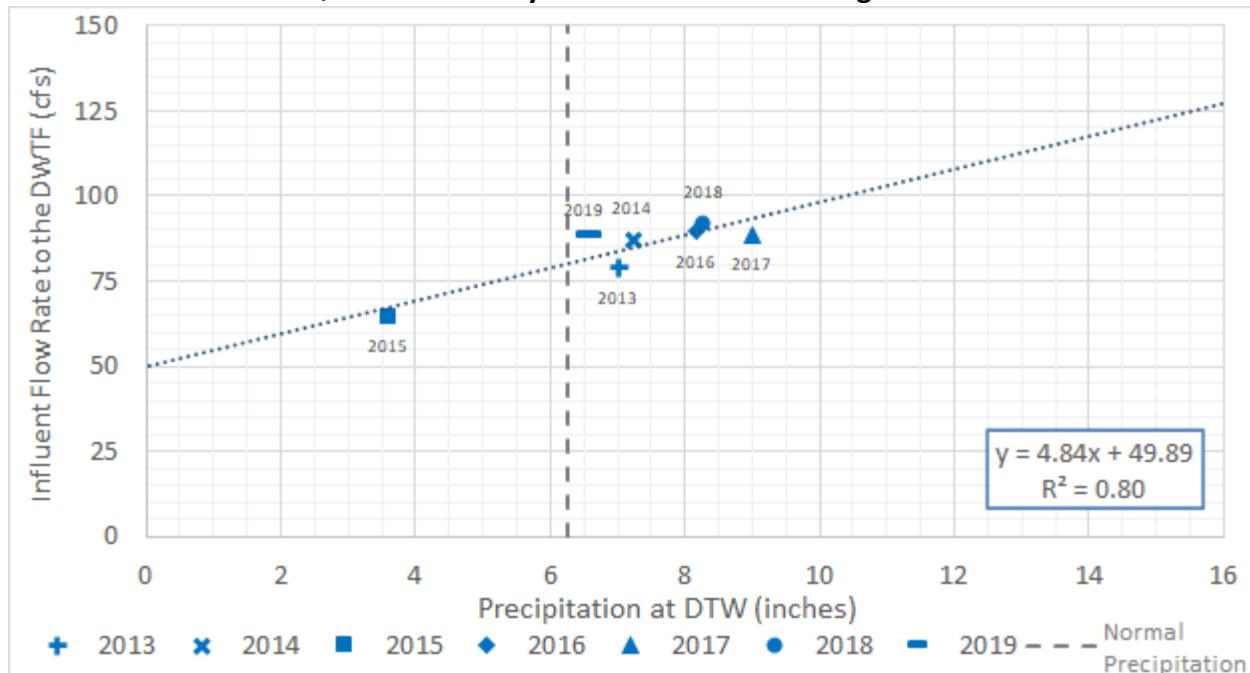


Figure 2-3
Downriver Sewage Disposal System
Average Influent Flow Rate to DWTF versus Total Precipitation at DTW
Quarter 2 April – June for 2013 through 2019

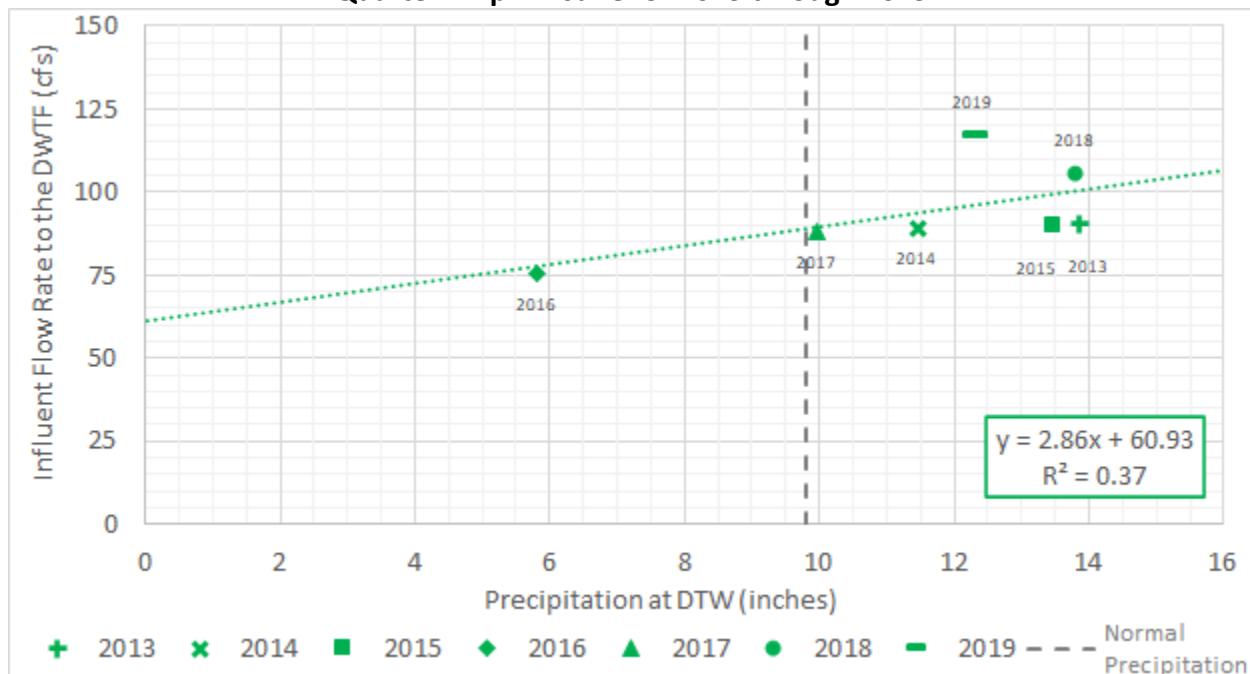


Figure 2-4
Downriver Sewage Disposal System
Average Influent Flow Rate to DWTF versus Total Precipitation at DTW
Quarter 3 July – September for 2013 through 2019

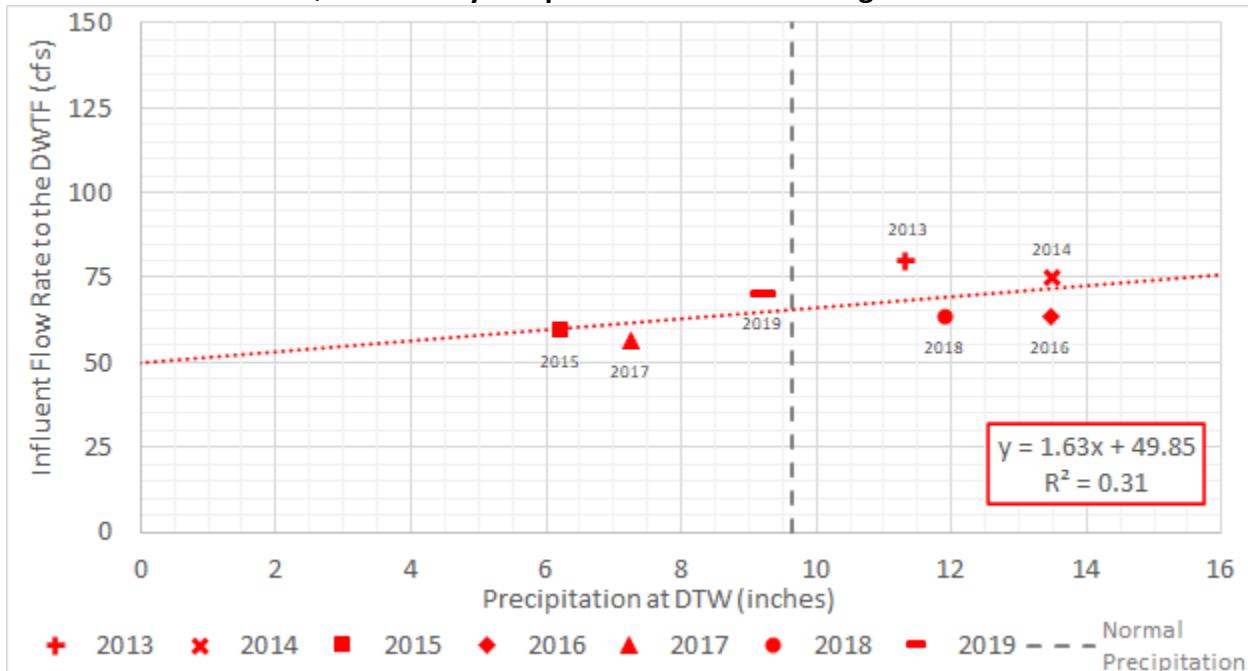
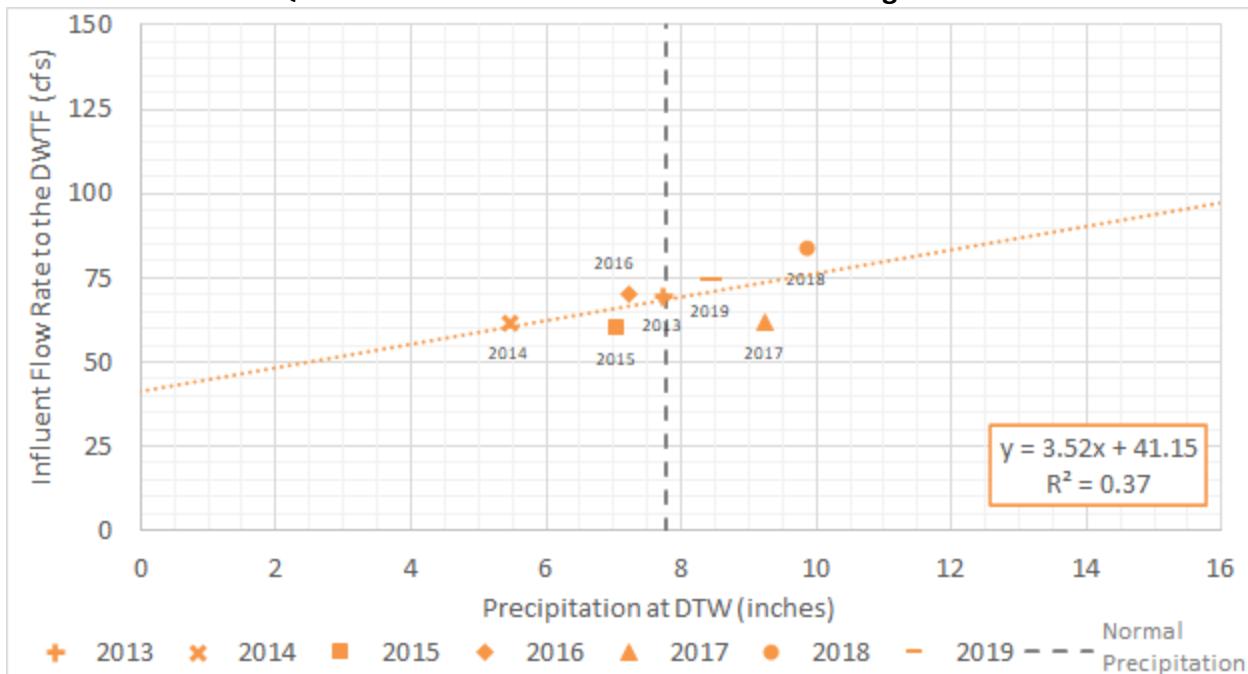
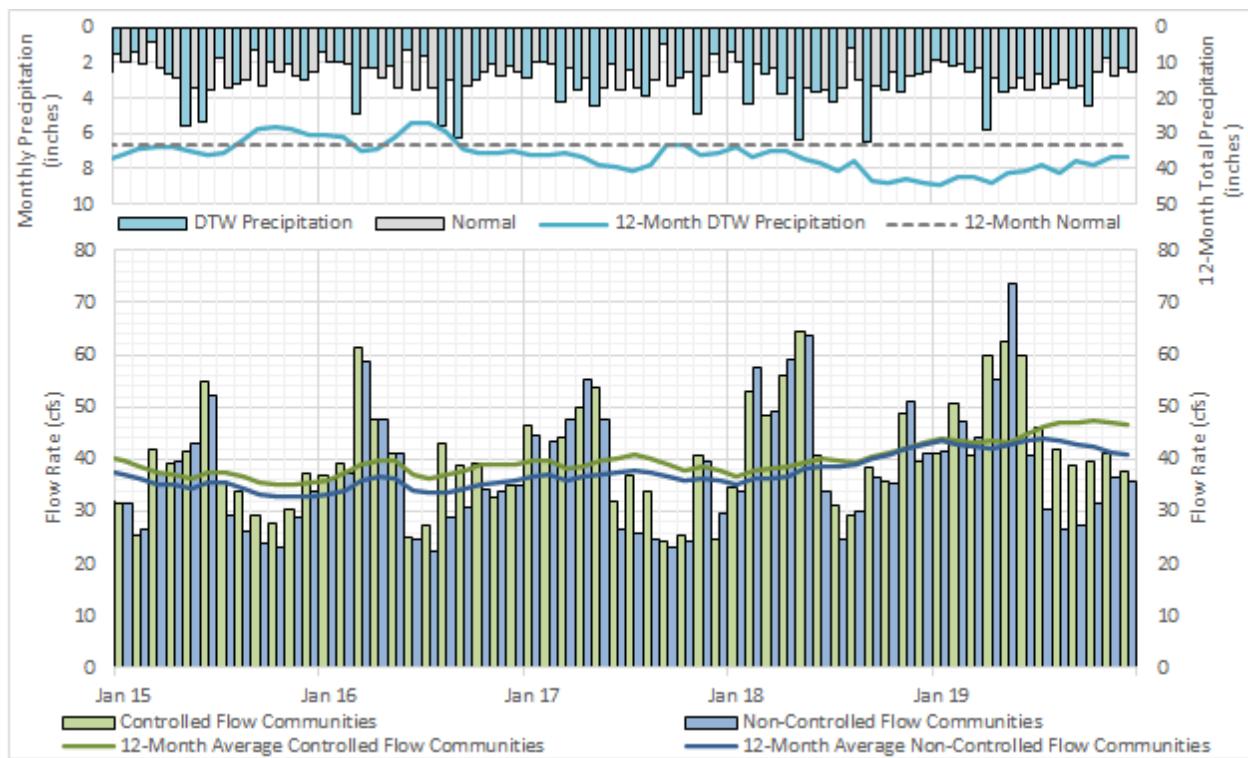


Figure 2-5
Downriver Sewage Disposal System
Average Influent Flow Rate to DWTF versus Total Precipitation at DTW
Quarter 4 October – December for 2013 through 2019



11. Figure 2-6 shows the long-term flow rate versus precipitation trends for the Controlled Flow Communities and Non-Controlled Flow Communities by month from 2015 through 2019. The flow rates are based on the interceptor system flow meters and the total precipitation is at DTW. On the bottom graph, the vertical bars show the average monthly flow rates and the solid lines show the 12-month average flow rates. On the top graph, the blue vertical bars show the total monthly precipitation, the gray vertical bars show the normal monthly precipitation, the solid blue line shows the 12-month total precipitation, and the grey dashed line shows the 12-month normal precipitation. This figure shows the expected seasonal variations in flow rates, and the trend between increased precipitation and increased flow rates in 2018 and 2019. In addition, this figure shows the total flow contribution from the Controlled Flow Communities and Non-Controlled Flow Communities is about equal. From 2013 through 2018 the Controlled Flow Communities contributed about 52% of the flow, and in 2019 this percentage increased to about 55%.

Figure 2-6
Downriver Sewage Disposal System
Quarterly Average Influent Flow Rate to DWTF and Quarterly Total Precipitation at DTW for
2013 through 2019

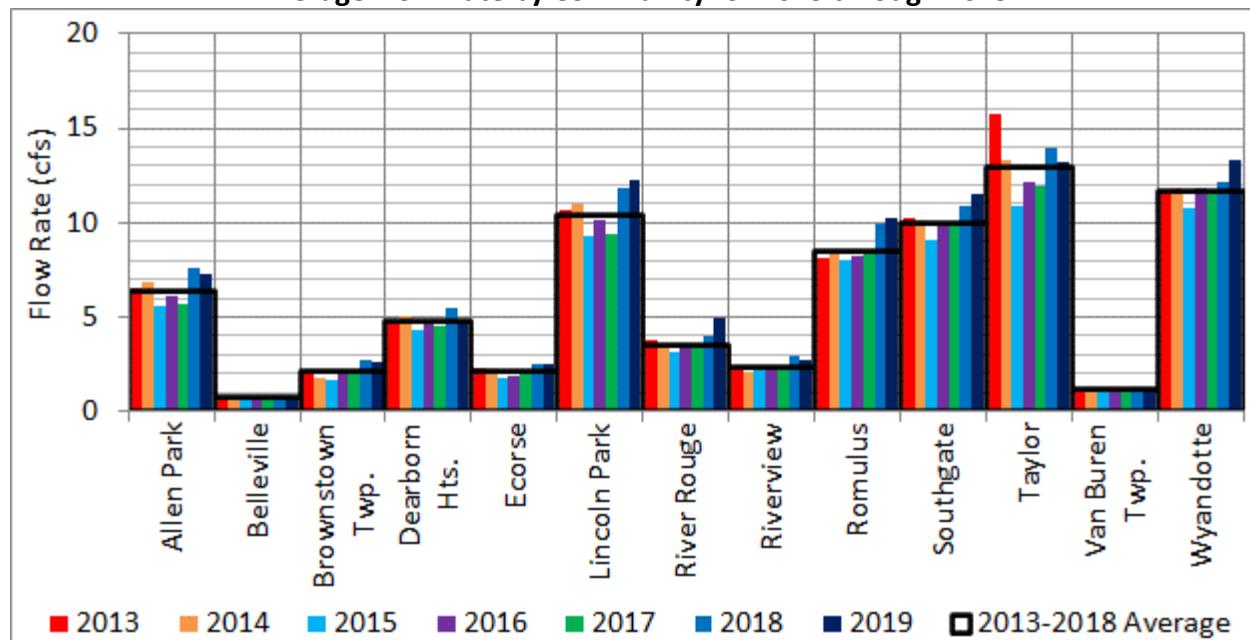


12. For each community, the average annual flow rate for years 2013 through 2019 are listed in Table 2-4 and shown in Figure 2-7.

Table 2-4
Downriver Sewage Disposal System
Average Flow Rate by Community for 2013 through 2019

Community	Average Flow Rate (cfs)							2013-2018 Average Flow Rate	
	2013	2014	2015	2016	2017	2018	2019	(cfs)	(MGD)
Allen Park	6.5	6.8	5.6	6.1	5.7	7.6	7.3	6.4	4.1
Belleville	0.7	0.8	0.8	0.8	0.8	0.9	0.8	0.8	0.5
Brownstown Twp.	2.0	1.8	1.6	2.2	2.2	2.7	2.6	2.1	1.4
Dearborn Hts.	4.6	5.0	4.3	4.8	4.6	5.4	4.7	4.8	3.1
Ecorse	2.3	2.3	1.7	1.9	2.1	2.5	2.5	2.1	1.4
Lincoln Park	10.7	11.0	9.3	10.2	9.3	11.9	12.3	10.4	6.7
River Rouge	3.8	3.5	3.2	3.4	3.3	4.0	5.0	3.5	2.3
Riverview	2.4	2.1	2.2	2.4	2.3	2.9	2.7	2.4	1.5
Romulus	8.1	8.6	8.0	8.2	8.5	9.9	10.2	8.5	5.5
Southgate	10.3	10.1	9.1	9.9	9.9	10.8	11.5	10.0	6.5
Taylor	15.7	13.3	10.8	12.1	11.9	14.0	13.3	13.0	8.4
Van Buren Twp.	1.0	1.2	1.2	1.1	1.2	1.2	1.2	1.2	0.7
Wyandotte	11.7	11.8	10.8	11.8	11.7	12.2	13.3	11.7	7.5
Total Incoming Flow Rate	79.7	78.4	68.7	74.8	73.6	86.1	87.4	76.9	49.7
DWTF Including Recycle (IPS + TPS)	84.2	85.2	79.4	81.9	80.3	96.5	92.3	84.6	54.7
Total Precipitation DTW (inches) =	39.90	37.57	30.32	34.69	35.46	43.81	36.47		36.96

Figure 2-7
Downriver Sewage Disposal System
Average Flow Rate by Community for 2013 through 2019



13. Estimated interceptor infiltration and inflow has not been deducted from community flow rates.
14. Reverse flow at Meter SW occurs as hydraulically necessary for emergency operating conditions and/or storms greater than the design storm. Significant Storm Event 3 / Major Storm Event A and Significant Storm Event 11 were the only events with reverse flow through Meter SW. Approximately 29.1 and 0.3 MG of reverse flow through Meter SW during Significant Storm Events 3 and 11, respectively.
15. 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. Significant Storm Event 2 and Significant Storm Event 3 / Major Storm Event A were the only events with bypass flow in 2019. For Significant Storm Event 2 approximately 0 and 11 MG bypassed primary and secondary treatment, respectively. For Significant Storm Event 3 / Major Storm Event A approximately 181 and 244 MG bypassed primary and secondary treatment, respectively.

C) CONTROLLED FLOW COMMUNITIES OVERVIEW

- The controlled flow communities are tributary to the Riverdrive Interceptor. The performance of the Riverdrive Interceptor relies on the peak flow rates being regulated to the MAFLs. 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 2-5. 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.

Table 2-5
Downriver Sewage Disposal System
Peak Hourly Flow Rates and Depth for Controlled Flow Communities
along the Riverdrive Interceptor for Significant Storms Events for 2019

2019 Major Storm Event	2019 Significant Storm Event	Peak Hourly Flow Rate (cfs)				Peak Depth (ft)			
		RR-1	EC-6	RD-1	SW+SWB ¹	RR-1	EC-6	RD-1	SW
-	1	11.45	18.84	57.18	63.30 ²	2.6	5.5	4.6	10.0
-	2	12.58	23.15	64.17	31.75	3.3	7.5	6.2	11.7
A	3	10.95	27.02	69.67	36.47	11.2	≥18.3	18.3	19.5
-	4	12.27	22.75	62.90	45.47	3.0	6.7	5.4	12.4
-	5	9.56	13.44	51.18	40.43	2.2	4.0	3.6	11.3
-	6	11.97	25.31	65.60	52.44	4.5	8.4	7.1	10.7
-	7	11.19	19.82	58.61	34.15	2.4	5.5	4.5	10.2
-	8	10.95	20.47	64.31	52.26	2.3	5.5	5.0	10.2
-	9	11.34	17.35	59.67	45.17	2.4	5.6	5.3	10.2
-	10	11.49	21.25	63.95	35.64	2.6	6.6	5.9	10.0
-	11	11.21	20.24	60.69	33.36	-	8.5	8.7	14.7
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	Wastewater level exceeded sewer crown

- Notes: 1) Meter SW+SWB flow rates above the MAFL are not considered an exceedance when dewatering operations were requested at a higher flow rate and permission was granted by DWTF.
 2) Excused exceedance due to Meter SW recording erroneous flow rates which caused SWRDDD staff to switch the gate operation from automatic to manual mode. In addition, reliable real-time flow rates for Meter SW were not available to operational staff.

2. Incremental flow rates are estimated for storm events when the metered peak hourly flow rate exceeded the MAFL by 5% or more. Table 2-6 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 2-6
Downriver Sewage Disposal System
Estimated Incremental Peak Hourly Flow Rates for Controlled Flow Communities
along the Riverdrive Interceptor for Significant Storms Events for 2019

2019 Major Storm Event	2019 Significant Storm Event	Incremental Peak Hourly Flow Rate (cfs)			
		RR-1	EC-6	RD-1	SW+SWB ¹
-	1	<i>Total Metered Flow Rates did not Exceed MAFL by more than 5%</i>			
	2	12.58	13.99	48.54	31.75
A	3	10.95	21.75	47.83	36.47
	4	12.27	13.72	44.06	45.47
-	5	<i>Total Metered Flow Rates did not Exceed MAFL by more than 5%</i>			
-	6	11.97	19.87	48.22	52.44
-	7	<i>Total Metered Flow Rates did not Exceed MAFL by more than 5%</i>			
-	8	<i>Total Metered Flow Rates did not Exceed MAFL by more than 5%</i>			
-	9	<i>Total Metered Flow Rates did not Exceed MAFL by more than 5%</i>			
-	10	<i>Total Metered Flow Rates did not Exceed MAFL by more than 5%</i>			
-	11	<i>Total Metered Flow Rates did not Exceed MAFL by more than 5%</i>			
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%

Notes:

- 1) Meter SW+SWB flow rates above the MAFL are not considered an exceedance when dewatering operations were requested at a higher flow rate and permission was granted by DWTF.
- 2) Excused exceedance due to Meter SW recording erroneous flow rates which caused SWRDDD staff to switch the gate operation from automatic to manual mode. In addition, reliable real-time flow rates for Meter SW were not available to operational staff.
3. The Meter RR-1 district includes all of River Rouge. The flow rates estimated for the Meter RR-1 district exceeded the MAFL for Significant Storm Events 2, 4 and 6. 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.
4. The Meter EC-6 district includes all of the City of Ecorse and a portion of Lincoln Park. The incremental flow rates estimated for the Meter EC-6 district exceeded the MAFL for Significant Storm Events 2, 3, 4 and 6.

5. The Meter RD-1 district includes most of Allen Park and most of Lincoln Park. The incremental flow rates estimated for the Meter RD-1 district exceeded the MAFL for Significant Storm Events 2, 3, 4 and 6.
6. The Meter SW district serves the Southgate-Wyandotte Relief Drains Drainage District (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 retention treatment facility, which were coordinated with DWTF operations to minimize bypass operations at DWTF and discharges to Detroit River from SWRDDD, are not considered an exceedance. The incremental flow rates estimated for the Meter SW district exceeded the MAFL for Significant Storm Events 2 through 11.
7. The peak hourly flow rate at Meter SW exceeded the MAFL for Significant Storm Event 1. The flow rate at Meter SW is typically throttled to a maximum of about 31.73 cfs by a gate at an upstream regulating chamber. This gate uses the raw flow rate data from Meter SW to control the throttling. During this event Meter SW recorded erroneous flow rates which caused SWRDDD staff to switch the gate operation from automatic to manual mode. Therefore, this event is being treated as an excused exceedance. The DWTF was able to process the excess flow through Meter SW and there was no bypass of primary or secondary treatment for this event. Meter SW continued to have short intermittent periods of erroneous flow rates from about February through June 2019. During this period, the meter was serviced numerous times to try to identify the issue and repair the meter. In June 2019 the control module at Meter SW failed and was replaced with the control module from PA-3 on June 25, 2019. The meter has been performing well since this repair.

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 was only one major storm event in 2019. The estimated peak 96-hour total volumes for the 2019 major storm event is listed in Table 2-7.

Table 2-7
Downriver Sewage Disposal System
Peak 96-Hour Total Volumes for Non-Controlled Flow Communities
for Major Storms Events for 2019

Community	Total Volume (MG)	
	4.42 inch Design Storm	2019 Major Storm Events
		A 4/30/2019 to 5/1/2019 2.46 inches
Allen Park (part)	29.23	58.07
Belleville	4.86	7.15
Brownstown Twp.	20.90	14.41
Dearborn Heights	43.76	73.63
Riverview	28.30	20.97
Romulus	88.43	91.05
Southgate (part)	31.24	96.00
Taylor	164.45	202.23
Van Buren Twp.	7.04	10.24
Total	418.21	573.77

Legend:

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

Note: 1) Wastewater levels at meters APO-1, APO-2, CHPO, CPO, PDO, and PM-1 exceeded the level sensors top of range. Consequently, the peak hourly flow rates for these meters could not be estimated from level and the peak 96-hour volumes were estimated. The total DRSTS peak 96 hour volume was estimated as the difference in the DWTF and upstream metered volume ($DRSTS = ([IPS] + [TPS]) - ([P-1] + [RV-1] + [RV-1] + [SW] + [SWB])$). The total DRSTS 96-hour volume was allocated to the individual meters based on a ratio to the 4.42-inch design storm. These estimated flow rates are allocated to Allen Park (part), Southgate (part), and Taylor.

- Monitoring devices indicated no issues with the DRSTS performance during all of the storm events for 2019.
- Major Storm Event A exceeded the peak 96-hour total volume of 418.21 MG estimated for the 4.42-inch design storm. As mentioned above in Section B Note 5, this was a result of a combination of the high baseflow antecedent conditions and the rainfall from this event.

4. The City of Romulus is estimated to have slightly exceeded their peak 96-hour total volumes during Major Storm Event A. The City of Allen Park (part), City of Belleville, City of Dearborn Heights, City of Southgate (part), City of Taylor, and Van Buren Township are estimated to have significantly exceeded their peak 96-hour total volumes during Major Storm Event A. None of the other Downriver communities are estimated to have exceeded its peak 96-hour total volumes during 2019.
5. Surcharging was recorded at flow meters P-1, PA-1, PA-2, PA-4, PB-1, PC-1, PD-1, PD-2 and RV-1 for Major Storm Event A.
6. A summary of DRSTS usage during significant storm events for 2019 are listed in Table 2-8. At least one of the relief structures discharged into the DRSTS during each of the significant storm events in 2019.

Table 2-8
Downriver Sewage Disposal System
Downriver Regional Storage and Transport System Usage
for Significant Storm Events for 2019

2019 Storm Events	Meter									
	TPS	TSO	CHPO	CPO	PDO	ER-2	ER-1	APO-2	APO-1	PM-1
Event 1 (3/29-31/2019)	✓	✗	✓	✗	✗	✗	✓	✓	✓	✗
Event 2 (4/18-21/2019)	✓	✓	✓	✓	✗	✓	✓	✓	✓	✗
Event 3 / Major Event A (4/30/2019 – 5/1/2019)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Event 4 (5/18-19/2019)	✓	✓	✓	✗	✗	✓	✓	✗	✗	✗
Event 5 (7/19/2019)	✓	✓	✓	✗	✗	✓	✓	✗	✗	✗
Event 6 (8/18/2019)	✓	✓	✓	✓	✗	✗	✗	✓	✓	✗
Event 7 (9/11-13/2019)	✓	✓	✓	✗	✗	✗	✗	✗	✗	✗
Event 8 (10/2-3/2019)	✓	✓	✓	✗	✗	✗	✗	✗	✗	✗
Event 9 (10/26-27/2019)	✓	✓	✓	✓	✗	✗	✗	✓	✓	✗
Event 10 (10/39-31/2019)	✓	✓	✓	✗	✗	✗	✗	✓	✓	✗
Event 11 (12/29-30/2019)	✓	✓	✓	✓	✗	✗	✗	✓	✗	✗
Number of Overflow Events	11/11	10/11	11/11	5/11	1/11	4/11	5/11	7/11	6/11	1/11

Legend:

<input checked="" type="checkbox"/>	Discharge to DRSTS
<input type="checkbox"/> ✗	No discharge to DRSTS

7. Figures 2-8 and 2-9 plot the total 96-hour volume for the non-controlled flow communities versus precipitation for the major storm events from 2013 through 2019. Figure 2-8 shows the growing season events which occurred between May 1st and September 30th, and Figure 2-9 shows the non-growing season events which occurred between October 1st and April 30th. The 4.42-inch design storm volume is shown for comparison. The largest major storm event by total 96-hour volume occurred in the 2019 growing season.

Figure 2-8
Downriver Sewage Disposal System
Total 96-Hour Volume for the Non-Controlled Flow Communities for Major Storms Events
Growing Season from 2013 through 2019

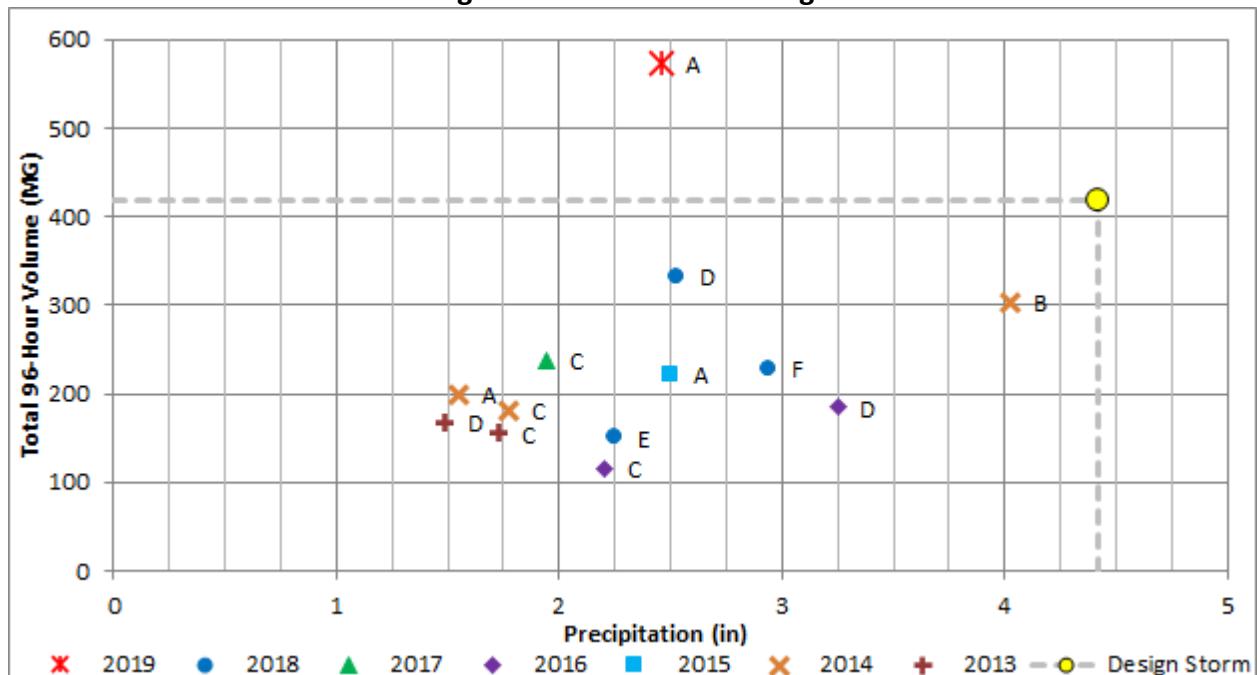
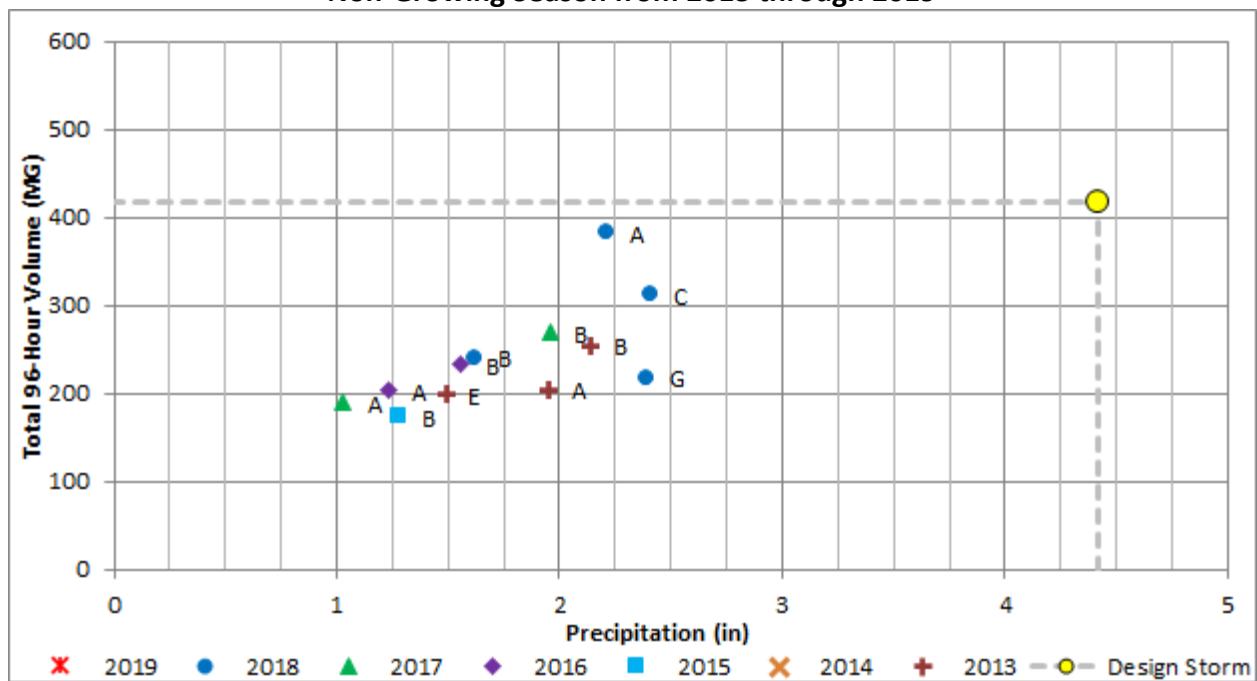


Figure 2-9
Downriver Sewage Disposal System
Total 96-Hour Volume for the Non-Controlled Flow Communities for Major Storms Events
Non-Growing Season from 2013 through 2019



8. The non-controlled flow communities have dry weather MAFLs. Wyandotte was estimated to have exceeded its dry weather MAFL on a total community basis for June 2019. No other 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 in February, March, April and May 2019. The portion of Meter District SW in Southgate was estimated to have exceeded its dry weather MAFL in June 2019. No portion of any meter district was estimated to have exceeded its dry weather MAFL for any month this year.

3) SUMMARY BY COMMUNITY

Table 3-1 presents the estimated average monthly flow rate for each community in the DSDS for each month in 2019. 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.

The average monthly flow rates are subtotalized 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
Downriver Sewage Disposal System
Average Monthly Flow Rates by Community for 2019

Community	Flow Rate (cfs)												
	January	February	March	April	May	June	July	August	September	October	November	December	Average Annual
Allen Park	6.90	8.20	6.96	10.71	12.58	7.07	5.87	5.45	5.14	6.21	6.55	6.01	7.30
Belleville	0.88	0.95	0.87	1.04	1.40	0.94	0.67	0.59	0.61	0.61	0.74	0.89	0.85
Brownstown Twp.	2.67	3.00	2.85	3.02	3.33	2.68	2.33	2.13	2.24	2.32	2.50	2.53	2.63
Dearborn Hts.	5.35	5.97	5.06	7.03	9.00	3.86	3.08	2.61	2.85	3.56	4.16	3.87	4.69
Ecorse	2.08	2.57	2.11	2.11	3.19	3.26	3.14	3.35	2.48	2.18	2.04	2.00	2.54
Lincoln Park	11.70	14.04	11.53	17.60	17.37	12.57	10.80	10.18	9.35	10.83	11.28	10.25	12.27
River Rouge	3.79	4.56	3.75	6.02	8.14	6.22	6.73	4.90	4.27	4.00	3.75	3.65	4.98
Riverview	2.73	3.15	2.79	3.48	3.70	2.70	1.85	2.09	2.48	2.73	2.46	2.57	2.72
Romulus	9.58	10.83	10.79	14.59	17.06	11.89	9.13	6.74	6.36	7.00	10.00	8.88	10.23
Southgate	10.20	12.63	10.58	14.20	18.04	15.23	10.24	9.31	9.14	9.10	10.05	9.30	11.49
Taylor	14.18	16.37	15.16	17.75	24.18	12.63	8.70	8.22	8.58	10.63	11.43	11.49	13.26
Van Buren Twp.	1.26	1.35	1.25	1.48	2.01	1.35	0.96	0.85	0.87	0.87	1.06	1.28	1.21
Wyandotte	11.26	14.50	11.35	16.07	16.15	20.27	13.04	12.03	11.65	10.90	11.79	10.58	13.27
Subtotal Controlled Flow Communities	41.00	50.82	40.87	59.83	62.58	59.83	46.20	42.00	38.82	39.39	41.11	37.50	46.59
Subtotal Non-Controlled Flow Communities	41.58	47.29	44.17	55.27	73.58	40.85	30.35	26.44	27.21	31.55	36.68	35.78	40.85
Total Incoming Flow Rate	82.58	98.11	85.03	115.11	136.15	100.68	76.55	68.44	66.02	70.94	77.80	73.28	87.45
DWTF Including Recycle (IPS + TPS)	79.50	88.82	92.33	122.88	145.92	110.41	86.89	73.68	74.80	76.96	78.59	76.95	92.29
Total Precipitation DTW (inches)	1.86	2.22	2.46	5.82	3.61	2.86	2.63	3.14	3.44	4.41	1.65	2.28	36.38
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)	-0.10	+0.20	+0.18	+2.92	+0.23	-0.66	-0.74	+0.14	+0.17	+1.89	-1.14	-0.18	+2.91

Percentage of Total Incoming Flow Rate by Community for 2019

Community	January	February	March	April	May	June	July	August	September	October	November	December	Average Annual
Allen Park	8.4%	8.4%	8.2%	9.3%	9.2%	7.0%	7.7%	8.0%	7.8%	8.8%	8.4%	8.2%	8.3%
Belleville	1.1%	1.0%	1.0%	0.9%	1.0%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	1.2%	1.0%
Brownstown Twp.	3.2%	3.1%	3.3%	2.6%	2.4%	2.7%	3.0%	3.1%	3.4%	3.3%	3.2%	3.5%	3.1%
Dearborn Hts.	6.5%	6.1%	5.9%	6.1%	6.6%	3.8%	4.0%	3.8%	4.3%	5.0%	5.4%	5.3%	5.2%
Ecorse	2.5%	2.6%	2.5%	1.8%	2.3%	3.2%	4.1%	4.9%	3.8%	3.1%	2.6%	2.7%	3.0%
Lincoln Park	14.2%	14.3%	13.6%	15.3%	12.8%	12.5%	14.1%	14.9%	14.2%	15.3%	14.5%	14.0%	14.1%
River Rouge	4.6%	4.6%	4.4%	5.2%	6.0%	6.2%	8.8%	7.2%	6.5%	5.6%	4.8%	5.0%	5.8%
Riverview	3.3%	3.2%	3.3%	3.0%	2.7%	2.7%	2.4%	3.1%	3.8%	3.9%	3.2%	3.5%	3.2%
Romulus	11.6%	11.0%	12.7%	12.7%	12.5%	11.8%	11.9%	9.8%	9.6%	9.9%	12.9%	12.1%	11.6%
Southgate	12.4%	12.9%	12.4%	12.3%	13.3%	15.1%	13.4%	13.6%	13.8%	12.8%	12.9%	12.7%	13.1%
Taylor	17.2%	16.7%	17.8%	15.4%	17.8%	12.5%	11.4%	12.0%	13.0%	15.0%	14.7%	15.7%	14.9%
Van Buren Twp.	1.5%	1.4%	1.5%	1.3%	1.5%	1.3%	1.3%	1.2%	1.3%	1.2%	1.4%	1.7%	1.4%
Wyandotte	13.6%	14.8%	13.4%	14.0%	11.9%	20.1%	17.0%	17.6%	17.6%	15.4%	15.2%	14.4%	15.4%
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%

Figure 3-1
Downriver Sewage Disposal System
Total Incoming Flow for 2019

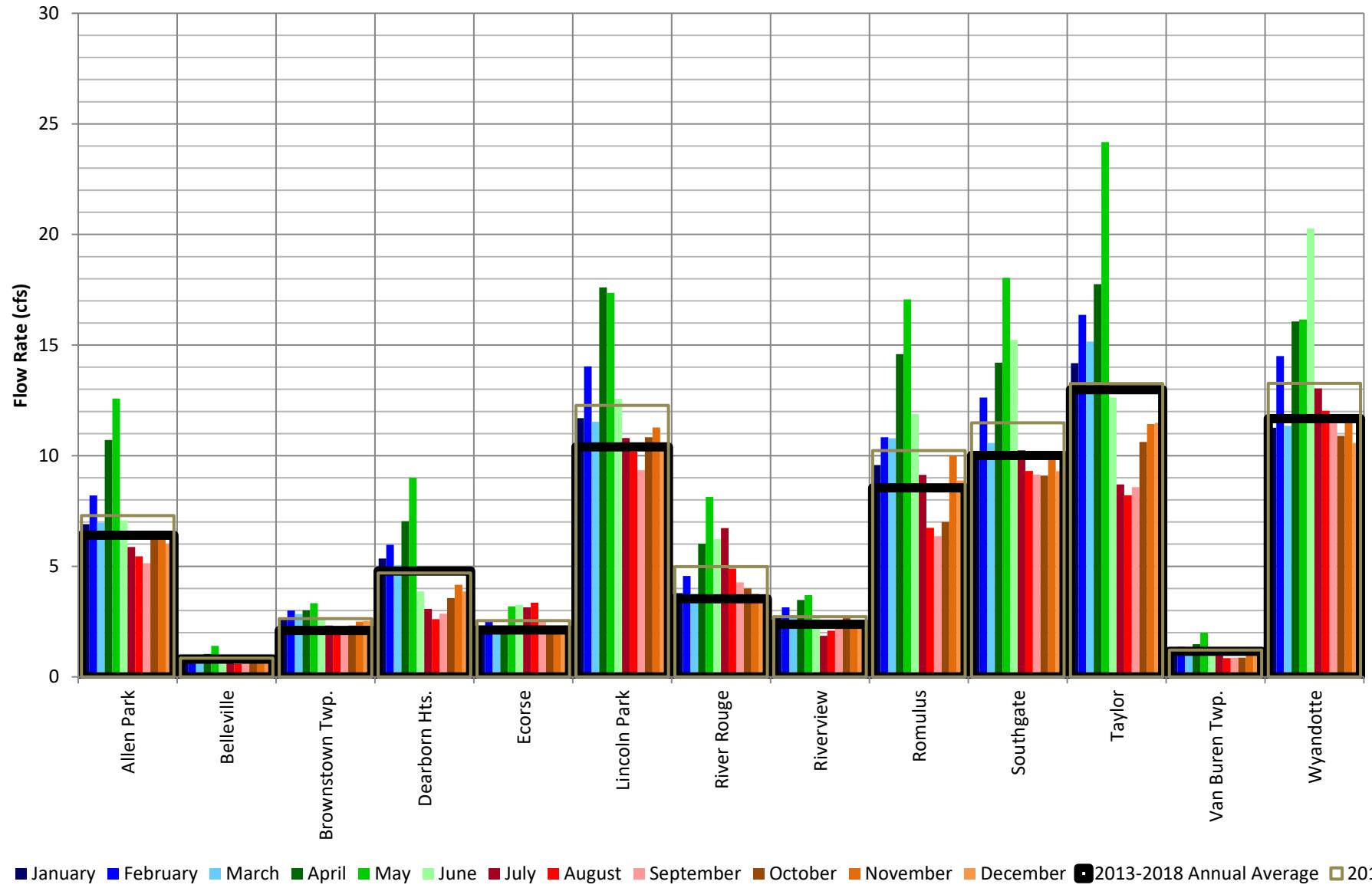


Figure 3-2
Downriver Sewage Disposal System
Percentage of Incoming Flow for 2019

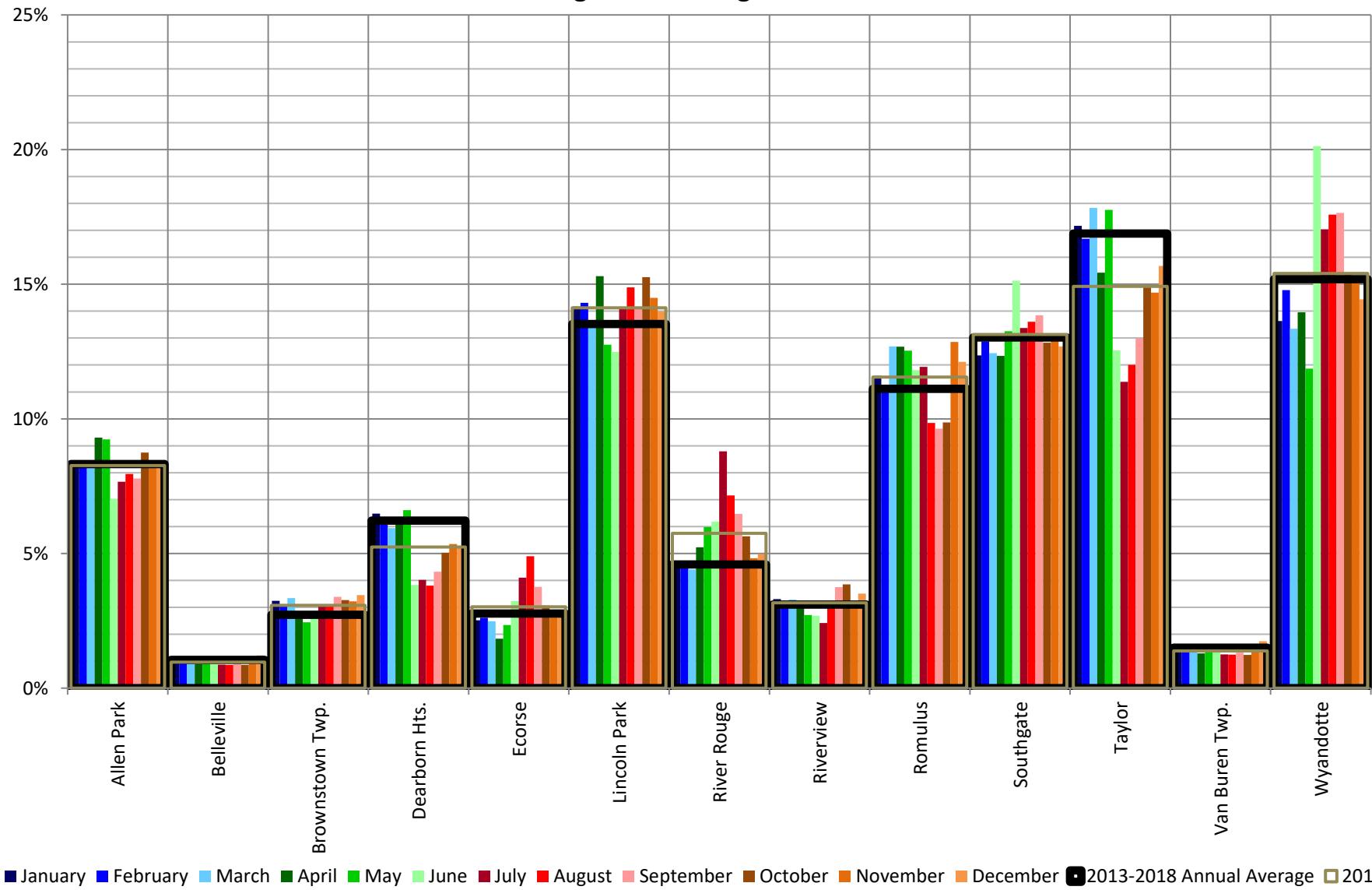


Table 3-2
Downriver Sewage Disposal System
Average Monthly Flow Rates for Controlled Flow Communities for 2019

Community	Flow Rate (cfs)												
	January	February	March	April	May	June	July	August	September	October	November	December	Average Annual
Allen Park (part)	5.75	6.89	5.66	8.87	8.52	5.97	5.05	4.68	4.42	5.27	5.54	5.00	6.19
Ecorse	2.08	2.57	2.11	2.11	3.19	3.26	3.14	3.35	2.48	2.18	2.04	2.00	2.70
Lincoln Park	11.70	14.04	11.53	17.60	17.37	12.57	10.80	10.18	9.35	10.83	11.28	10.25	12.78
River Rouge	3.79	4.56	3.75	6.02	8.14	6.22	6.73	4.90	4.27	4.00	3.75	3.65	5.38
Southgate - Wyandotte RDDD	17.68	22.77	17.82	25.22	25.36	31.82	20.47	18.89	18.29	17.11	18.50	16.61	21.99
Total	41.00	50.82	40.87	59.83	62.58	59.83	46.20	42.00	38.82	39.39	41.11	37.50	49.05
Total Precipitation DTW (inches)	1.86	2.22	2.46	5.82	3.61	2.86	2.63	3.14	3.44	4.41	1.65	2.28	36.38

Table 3-3
Downriver Sewage Disposal System
Average Monthly Flow Rates for Non-Controlled Flow Communities for 2019

Community	Flow Rate (cfs)												
	January	February	March	April	May	June	July	August	September	October	November	December	Average Annual
Allen Park (part)	1.15	1.31	1.30	1.84	4.06	1.11	0.81	0.76	0.71	0.94	1.01	1.01	1.46
Belleville	0.88	0.95	0.87	1.04	1.40	0.94	0.67	0.59	0.61	0.61	0.74	0.89	0.88
Brownstown Twp.	2.67	3.00	2.85	3.02	3.33	2.68	2.33	2.13	2.24	2.32	2.50	2.53	2.69
Dearborn Hts.	5.35	5.97	5.06	7.03	9.00	3.86	3.08	2.61	2.85	3.56	4.16	3.87	4.97
Riverview	2.73	3.15	2.79	3.48	3.70	2.70	1.85	2.09	2.48	2.73	2.46	2.57	2.77
Romulus	9.58	10.83	10.79	14.59	17.06	11.89	9.13	6.74	6.36	7.00	10.00	8.88	10.77
Southgate (part)	3.78	4.36	4.11	5.04	8.84	3.68	2.81	2.46	2.50	2.89	3.33	3.27	4.18
Taylor	14.18	16.37	15.16	17.75	24.18	12.63	8.70	8.22	8.58	10.63	11.43	11.49	13.96
Van Buren Twp.	1.26	1.35	1.25	1.48	2.01	1.35	0.96	0.85	0.87	0.87	1.06	1.28	1.26
Total	41.58	47.29	44.17	55.27	73.58	40.85	30.35	26.44	27.21	31.55	36.68	35.78	42.94
Total Precipitation DTW (inches)	1.86	2.22	2.46	5.82	3.61	2.86	2.63	3.14	3.44	4.41	1.65	2.28	36.38

4) DRY WEATHER SUMMARY

Tables 4-1 and 4-2 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 2010 residential population is given on Tables 4-1 and 4-2 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, Tables 4-1 and 4-2 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
Downriver Sewage Disposal System
Monthly Incremental Flow Rates Summarized by Community

Community	Sewage Flow Meter Math	Meter District	Year 2010 Incremental Population	January 2019			February 2019			March 2019			April 2019			May 2019			June 2019			Dry Weather MAFLs for Controlled Flow Communities ¹ (cfs)	Dry Weather MAFLs for Non-Controlled Flow Communities ¹ (cfs)
				Total	Dry Weather	Total	Average Daily Flow Rate (cfs)	Average Daily Flow Rate (cfs)	Average Per Capita Flow Rate (gpcd)	Total	Dry Weather	Total	Average Daily Flow Rate (cfs)	Average Daily Flow Rate (cfs)	Average Per Capita Flow Rate (gpcd)	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 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)		
Allen Park	3.8%([PC-1]+[CPO]+[CHPO]-[TB-1]) + 23.9%([P-1]+[PM-1]-[P-2]-[PA-2]-[PB-1]-[PD-1]-[PC-1]) + 34.6%([RD-1]-[EC-6]) + ([APO-1] + [APO-2])	PC-1	1,019	0.25	0.20	125	0.29	0.22	140	0.25	0.20	127	0.32	0.22	137	0.42	0.24	155	0.22	0.18	114	-	0.43
		P-1	3,332	0.90	0.77	150	1.03	0.86	166	0.96	0.84	163	1.21	0.91	176	2.35	1.02	198	0.89	0.78	151	-	1.58
		RD-1	18,179	5.75	3.85	137	6.89	4.72	168	5.66	4.18	149	8.87	4.83	172	8.52	5.94	211	5.97	4.52	161	17.20	-
		APO-1 + APO-2	0	0.00	0.00	-	0.00	0.00	-	0.09	0.00	-	0.31	0.00	-	1.29	0.00	-	0.00	0.00	-	-	-
		Total	22,531	6.90	4.82	138	8.20	5.79	166	6.96	5.22	150	10.71	5.95	171	12.58	7.20	207	7.07	5.47	157	-	2.01
Belleville	41.1%[PA-4]	PA-4	3,993	0.88	0.82	133	0.95	0.85	138	0.87	0.82	132	1.04	0.88	143	1.40	1.13	182	0.94	0.86	139	-	1.32
Brownstown Twp.	97.5%[P-2] + 1.8%([PA-2]+[ER-1]-[PA-3]-[ER-2])	P-2	10,397	2.62	2.47	153	2.93	2.59	161	2.78	2.55	158	2.95	2.51	156	3.24	2.72	169	2.63	2.40	149	-	3.91
		PA-2	248	0.05	0.04	104	0.06	0.05	142	0.06	0.05	143	0.07	0.05	141	0.09	0.06	158	0.05	0.04	117	-	0.06
		Total	10,645	2.67	2.51	152	3.00	2.65	161	2.85	2.60	158	3.02	2.57	156	3.33	2.78	169	2.68	2.45	149	-	3.97
Dearborn Hts.	78.2%([TB-1]+[TSO])	TB-1	19,152	5.35	4.06	137	5.97	4.50	152	5.06	4.07	137	7.03	4.51	152	9.00	4.99	169	3.86	3.11	105	-	8.22
Ecorse	71.5%([EC-6]-[RR-1])	EC-6	9,515	2.08	1.84	125	2.57	2.33	158	2.11	2.03	138	2.11	1.91	130	3.19	2.87	195	3.26	3.38	230	9.20	-
Lincoln Park	28.5%([EC-6]-[RR-1]) + 65.4%([RD-1]-[EC-6])	EC-6	3,795	0.83	0.73	125	1.02	0.93	158	0.84	0.81	138	0.84	0.76	130	1.27	1.15	195	1.30	1.35	230	3.00	-
		RD-1	34,347	10.87	7.28	137	13.01	8.91	168	10.69	7.90	149	16.76	9.12	172	16.09	11.22	211	11.27	8.53	161	25.16	-
		Total	38,142	11.70	8.01	136	14.04	9.84	167	11.53	8.71	148	17.60	9.88	167	17.37	12.36	209	12.57	9.88	167	28.16	-
River Rouge	[RR-1]	RR-1	7,903	3.79	3.03	248	4.56	3.08	252	3.75	3.07	251	6.02	4.17	341	8.14	6.84	559	6.22	5.71	467	11.26	-
Riverview	[RV-1]	RV-1	12,486	2.73	2.30	119	3.15	2.35	121	2.79	2.06	107	3.48	2.13	110	3.70	2.44	126	2.70	2.10	109	-	3.61
Romulus	[DMA-1] + ([PA-3]+[ER-2]-[PA-4]-[DMA-1] + [DMA-2] + ([PD-2]-[DMA-2]))	DMA-1	0	0.66	0.67	-	0.67	0.67	-	0.67	0.67	-	0.67	0.67	-	0.67	0.66	-	0.72	0.77	-	-	6.39
		PA-3	11,371	4.57	4.18	238	5.22	4.59	261	5.03	4.62	262	5.60	4.58	260	7.04	5.39	306	4.55	4.06	231	-	9.02
		DMA-2	0	1.54	1.48	-	1.17	1.17	-	1.74	1.69	-	3.70	3.49	-	3.46	3.51	-	2.90	2.70	-	-	-
		PD-2	9,532	2.81	2.43	165	3.77	2.80	190	3.34	2.83	192	4.62	3.31	224	5.90	4.26	289	3.72	3.34	226	-	15.41
		Total	20,904	9.58	8.77	271	10.83	9.23	285	10.79	9.81	303	14.59	12.06	373	17.06	13.82	427	11.89	10.87	336	-	-
Southgate	76.1%([P-1]+[PM-1]-[P-2]-[PA-2]-[PB-1]-[PD-1]-[PC-1]) + 40%[PB-1] + 36.3%([SW]+[SWB]) + 1.4%([P-1]+[PM-1]-[P-2]-[PA-2]-[PB-1]-[PD-1]-[PC-1])	P-1	10,637	2.89	2.46	150	3.28	2.73	166	3.07	2.67	163	3.85	2.89	176	7.51	3.26	198	2.83	2.48	151	-	3.65
		PB-1	4,459	0.84	0.73	106	1.02	0.85	123	0.97	0.84	122	1.12	0.82	118	1.18	0.85	123	0.80	0.68	99	-	1.42
		SW	14,752	6.42	4.73	207	8.27	5.09	223	6.47	4.81	211	9.16	6.00	263	9.21	7.22	316	11.55	10.22	448	11.52	-
		TPS+IPS	199	0.05	0.05	150	0.06	0.05	166	0.06	0.05	163	0.07	0.05	176	0.14	0.06	198	0.05	0.05	151	-	0.06
		Total	30,047	10.20	7.97	171	12.63	8.72	188	10.58	8.38	180	14.20	9.77	210	18.04	11.39	245	15.23	13.43	289	-	5.13
Taylor	2.5%[P-2] + 98.2%([PA-2]+[ER-1]-[PA-3]-[ER-2]) + 60%[PB-1] + 21.8%([TB-1]+[TSO]) + 96.2%([PC-1]+[CPO]+[CHPO]-[TB-1]) + ([PD-1]-[PD-2])	P-2	262	0.07	0.06	153	0.07	0.07	161	0.07	0.06	158	0.07	0.06	156	0.08	0.07	169	0.07	0.06	149	-	0.08
		PA-2	13,270	2.68	2.13	104	3.36	2.92	142	3.39	2.93	143	3.74	2.90	141	4.60	3.24	158	2.80	2.39	117	-	2.40
		PB-1	6,462	1.26	1.10	110	1.53	1.27	128	1.46	1.26	126	1.68	1.22	122	1.77	1.27	128	1.19	1.03	103	-	2.15
		TB-1	5,339	1.49	1.13	137	1.67	1.26	152	1.41	1.13	137	1.96	1.26	152	2.51	1.39	169	1.08	0.87	105	-	2.29
		PC-1	25,700	6.21	4.98	125	7.22	5.58	140	6.29	5.06	127	8.07	5.46	137	10.47	6.17	155	5.50	4.55	114	-	11.03
		PD-1	12,100	2.47	2.19	117	2.52	2.49	133	2.55	2.49	133	2.23	1.88	101	4.74	1.97	105	1.99	1.79	95	-	4.01
		Total	63,131	14.18	11.59	119	16.37	13.59	139	15.16	12.94	132	17.75	12.79	131	24.18	14.11	144	12.63	10.68	109	-	21.96
Van Buren Twp.	58.9%[PA-4]	PA-4	5,719	1.26	1.18	133	1.35	1.22	138	1.25	1.17	132	1.48	1.27	143	2.01	1.61	182	1.35	1.23	139	-	2.37
Wyandotte	63.7%([SW]+[SWB])	SW	25,883	11.26	8.29	207	14.50	8.93	223	11.35	8.44	211	16.07	10.53	263	16.15	12.66	316	20.27	17.94	448	20.21	-
Subtotal Controlled Flow Communities			114,374	41.00	29.75	168	50.82	33.98	192	40.87	31.24	177	59.83	37.33	211	62.58	47.89	271	59.83	51.66	292	97.55	-
Subtotal Non-Controlled Flow Communities			155,677	41.58	35.44	147	47.29	39.10	162	44.08	38.07	158	54.96	41.10	171	72.28	46.33	192	40.85	35.46	147	-	64.00
Total Incoming Flow			270,052	82.58	65.19	156	98.11	73.08	175	85.03	69.31	166	115.11	78.43	188	136.15	94.21	225	100.68	87.13	209	-	-
DWTF Including Recycle (IPS + TPS)			270,052	79.50	73.43	176	88.82	87.80	210	92.33	80.19	192	122.88	87.62	210	145.92	107.69	258	110.41	101.78	244	-	-

Note:

1) Dry weather MAFLs from the Downriver Utility Wastewater Authority Service Agreement (March 21, 2017).

2) The MAFL for each community component of Meter District SW is population weighted. Southgate and Wyandotte have MAFLs of 7.67 and 24.06 cfs, respectively. Therefore, the combined MAFL is 31.73 cfs. The population weighted MAFL for Southgate and Wyandotte are allocated to be 11.52 and 20.21 cfs, respectively.

3) The meter district flow rates are split into community components based on relative 2010 residential population.

Legend:

XX.XX	Exceeds the dry weather MAFL by 0 to 20%
XX.XX	Exceeds the dry weather MAFL by greater than 20%

Table 4-2
Downriver Sewage Disposal System
Monthly Incremental Flow Rates Summarized by Community

Community	Sewage Flow Meter Math	Meter District	Year 2010 Incremental Population	July 2019			August 2019			September 2019			October 2019			November 2019			December 2019			Dry Weather MAFLs for Controlled Flow Communities ¹ (cfs)	Dry Weather MAFLs for Non-Controlled Flow Communities ¹ (cfs)	
				Total	Dry Weather	Total	Average Daily Flow Rate (cfs)	Average Daily Flow Rate (cfs)	Average Per Capita Flow Rate (gpcd)	Total	Dry Weather	Total	Average Daily Flow Rate (cfs)	Average Daily Flow Rate (cfs)	Average Per Capita Flow Rate (gpcd)	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 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)			
Allen Park	3.8%([PC-1]+[CPO]+[CHPO]-[TB-1]) + 23.9%([P-1]+[PM-1]-[P-2]-[PA-2]-[PB-1]-[PD-1]-[PC-1]) + 34.6%([RD-1]-[EC-6]) + ([APO-1] + [APO-2])	PC-1	1,019	0.15	0.14	89	0.14	0.12	77	0.14	0.12	75	0.18	0.13	85	0.21	0.18	112	0.20	0.16	101	-	0.43	
		P-1	3,332	0.66	0.63	121	0.57	0.53	103	0.58	0.53	102	0.67	0.56	109	0.80	0.72	140	0.77	0.67	131	-	1.58	
		RD-1	18,179	5.05	4.01	143	4.68	3.73	133	4.42	3.40	121	5.27	3.48	124	5.54	3.96	141	5.00	3.49	124	17.20	-	
		APO-1 + APO-2	0	0.00	0.00	-	0.06	0.00	-	0.00	0.00	-	0.08	0.00	-	0.00	0.00	-	0.03	0.00	-	-	-	
		Total	22,531	5.87	4.78	137	5.45	4.38	126	5.14	4.05	116	6.21	4.18	120	6.55	4.86	139	6.01	4.32	124	-	2.01	
Belleville	41.1%[PA-4]	PA-4	3,993	0.67	0.65	105	0.59	0.58	93	0.61	0.60	97	0.61	0.56	91	0.74	0.69	111	0.89	0.92	149	-	1.32	
Brownstown Twp.	97.5%[P-2] + 1.8%([PA-2]+[ER-1]-[PA-3]-[ER-2])	P-2	10,397	2.29	2.14	133	2.10	2.01	125	2.21	2.05	128	2.29	2.10	130	2.47	2.34	145	2.50	2.28	142	-	3.91	
		PA-2	248	0.03	0.03	78	0.03	0.03	69	0.03	0.03	66	0.03	0.02	64	0.03	0.03	79	0.04	0.03	77	-	0.06	
		Total	10,645	2.33	2.17	132	2.13	2.04	124	2.24	2.08	126	2.32	2.12	129	2.50	2.37	144	2.53	2.31	140	-	3.97	
Dearborn Hts.	78.2%([TB-1]+[TSO])	TB-1	19,152	3.08	2.46	83	2.61	2.27	77	2.85	2.40	81	3.56	2.60	88	4.16	3.39	114	3.87	3.09	104	-	8.22	
Ecorse	71.5%([EC-6]-[RR-1])	EC-6	9,515	3.14	3.31	225	3.35	3.31	225	2.48	2.35	160	2.18	1.95	132	2.04	2.00	136	2.00	1.84	125	9.20	-	
Lincoln Park	28.5%([EC-6]-[RR-1]) + 65.4%([RD-1]-[EC-6])	EC-6	3,795	1.25	1.32	225	1.34	1.32	225	0.99	0.94	160	0.87	0.78	132	0.81	0.80	136	0.80	0.73	125	3.00	-	
		RD-1	34,347	9.55	7.58	143	8.85	7.05	133	8.36	6.43	121	9.96	6.58	124	10.47	7.49	141	9.45	6.59	124	25.16	-	
		Total	38,142	10.80	8.90	151	10.18	8.37	142	9.35	7.37	125	10.83	7.35	125	11.28	8.28	140	10.25	7.32	124	28.16	-	
River Rouge	[RR-1]	RR-1	7,903	6.73	5.79	473	4.90	4.22	345	4.27	3.63	297	4.00	3.23	264	3.75	3.28	268	3.65	2.99	245	11.26	-	
Riverview	[RV-1]	RV-1	12,486	1.85	1.71	89	2.09	1.89	98	2.48	1.90	98	2.73	1.89	98	2.46	2.05	106	2.57	1.89	98	-	3.61	
Romulus	[DMA-1] + ([PA-3]+[ER-2]-[PA-4]-[DMA-1] + [DMA-2] + ([PD-2]-[DMA-2]))	DMA-1	0	0.89	0.86	-	0.86	0.85	-	0.74	0.73	-	0.70	0.71	-	0.68	0.67	-	0.64	0.63	-	-	6.39	
		PA-3	11,371	3.53	3.29	187	3.16	3.10	176	3.55	3.33	189	4.02	3.69	209	4.79	4.46	253	4.63	4.29	244	-	9.02	
		DMA-2	0	1.71	1.93	-	0.50	0.51	-	0.23	0.21	-	0.22	0.20	-	1.56	1.97	-	0.87	0.91	-	-	-	
		PD-2	9,532	3.01	3.19	217	2.21	2.20	149	1.83	1.70	115	2.07	1.82	123	2.97	2.80	190	2.73	2.48	168	-	15.41	
		Total	20,904	9.13	9.28	287	6.74	6.66	206	6.36	5.97	185	7.00	6.41	198	10.00	9.89	306	8.88	8.31	257	-	-	
Southgate	76.1%([P-1]+[PM-1]-[P-2]-[PA-2]-[PB-1]-[PD-1]-[PC-1]) + 40%[PB-1] + 36.3%([SW]+[SWB]) + 1.4%([P-1]+[PM-1]-[P-2]-[PA-2]-[PB-1]-[PD-1]-[PC-1])	P-1	10,637	2.12	2.00	121	1.81	1.70	103	1.84	1.68	102	2.14	1.79	109	2.54	2.30	140	2.47	2.15	131	-	3.65	
		PB-1	4,459	0.65	0.60	87	0.61	0.58	85	0.63	0.58	83	0.71	0.60	87	0.74	0.67	96	0.76	0.64	93	-	1.42	
		SW	14,752	7.43	6.25	274	6.86	5.47	240	6.64	4.76	209	6.21	4.22	185	6.72	5.05	221	6.03	4.69	205	11.52	-	
		TPS+IPS	199	0.04	0.04	121	0.03	0.03	103	0.03	0.03	102	0.04	0.03	109	0.05	0.04	140	0.05	0.04	131	-	0.06	
		Total	30,047	10.24	8.88	191	9.31	7.79	167	9.14	7.04	152	9.10	6.65	143	10.05	8.06	173	9.30	7.52	162	-	5.13	
Taylor	2.5%[P-2] + 98.2%([PA-2]+[ER-1]-[PA-3]-[ER-2]) + 60%[PB-1] + 21.8%([TB-1]+[TSO]) + 96.2%([PC-1]+[CPO]+[CHPO]-[TB-1]) + ([PD-1]-[PD-2])	P-2	262	0.06	0.05	133	0.05	0.05	125	0.06	0.05	128	0.06	0.05	130	0.06	0.06	145	0.06	0.06	142	-	0.08	
		PA-2	13,270	1.78	1.61	78	1.48	1.42	69	1.49	1.35	66	1.56	1.31	64	1.86	1.62	79	1.94	1.59	77	-	2.40	
		PB-1	6,462	0.97	0.90	90	0.92	0.88	88	0.94	0.86	86	1.06	0.90	90	1.11	1.00	100	1.13	0.96	96	-	2.15	
		TB-1	5,339	0.86	0.69	83	0.73	0.63	77	0.80	0.67	81	0.99	0.72	88	1.16	0.94	114	1.08	0.86	104	-	2.29	
		PC-1	25,700	3.75	3.52	89	3.49	3.05	77	3.52	2.98	75	4.62	3.37	85	5.28	4.46	112	5.14	4.02	101	-	11.03	
		PD-1	12,100	1.28	1.24	66	1.55	1.52	81	1.78	1.82	97	2.33	2.12	113	1.95	1.71	91	2.13	1.86	99	-	4.01	
Van Buren Twp.	58.9%[PA-4]	PA-4	5,719	0.96	0.93	105	0.85	0.82	93	0.87	0.86	97	0.87	0.81	91	1.06	0.99	111	1.28	1.32	149	-	2.37	
		SW	25,883	13.04	10.96	274	12.03	9.60	240	11.65	8.35	209	10.90	7.41	185	11.79	8.85	221	10.58	8.22	205	20.21	-	
Subtotal Controlled Flow Communities			114,374	46.20	39.21	222	42.00	34.69	196	38.82	29.87	169	39.39	27.64	156	41.11	31.43	178	37.50	28.55	161	97.55	-	
Subtotal Non-Controlled Flow Communities			155,677	30.34	28.62	119	26.38	24.76	103	27.21	24.46	102	31.47	25.99	108	36.68	33.08	137	35.75	30.85	128	-	64.00	
Total Incoming Flow			270,052	76.55	67.83	162	68.44	59.45	142	66.02	54.33	130	70.94	53.63	128	77.80	64.50	154	73.28	59.40	142	-	-	
DWTF Including Recycle (IPS + TPS)			270,052	86.89	75.45	181	73.68	61.27	147	74.80	65.03	156	76.96	56.82	136	78.59	65.51	157	76.95	60.96	146	-	-	

Note:

1) Dry weather MAFLs from the Downriver Utility Wastewater Authority Service Agreement (March 21, 2017).

2) The MAFL for each community component of Meter District SW is population weighted. Southgate and Wyandotte have MAFLs of 7.67 and 24.06 cfs, respectively. Therefore, the combined MAFL is 31.73 cfs. The population weighted MAFL for Southgate and Wyandotte are allocated to be 11.52 and 20.21 cfs, respectively.

3) The meter district flow rates are split into community components based on relative 2010 residential population.

Legend:

XX.XX	Exceeds the dry weather MAFL by 0 to 20%
XX.XX	Exceeds the dry weather MAFL by greater than 20%

5) PRECIPITATION DATA

Table 5-1 lists the monthly precipitation at Metro Airport (DTW), the departure from normal, and the number of wet/dry days included for each month. Monthly precipitation data for the DSDS rain gauges for 2019 is summarized on Table 5-2. Daily precipitation data for the DSDS rain gauges for each month in 2019 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 2019 at DTW was 36.38 inches, which is 2.91 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 significant storm events in 2019. The events were designated as Significant Storm Events 1 through 11 for year 2019. There was one major storm events in 2019. The event was designated as Major Storm Event A for year 2019. 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
Downriver Sewage Disposal System
Dry/Wet Weather Count by Month and Monthly Precipitation at DTW for 2019

Month	Number of Dry Weather Days	Number of Wet Weather Days	Monthly Total Precipitation (in)	
			DTW ¹	Departure From Normal ²
January	22	9	1.86	-0.10
February	9	19	2.22	+0.20
March	18	13	2.46	+0.18
April	11	19	5.82	+2.92
May	8	23	3.61	+0.23
June	10	20	2.86	-0.66
July	13	17	2.63	-0.74
August	18	13	3.14	+0.14
September	15	15	3.44	+0.17
October	15	16	4.41	+1.89
November	13	17	1.65	-1.14
December	23	8	2.28	-0.18
Total	175	190	36.38	+2.91

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
Downriver Sewage Disposal System
Monthly Precipitation for 2019

Date	Monthly Precipitation (inches)												DTW Monthly Temperature (°F)		
	R-14	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	1.18	1.34	1.28	0.17*	1.86	1.45	1.85	0.10*	1.28	1.66	1.49	1.53	31	16	24
February	1.69	1.70	1.84	1.27*	2.22	1.94	2.53	1.11*	1.76	2.04	2.10	1.95	36	21	28
March	2.74	2.52	2.61	2.65	2.46	2.46	3.27	2.24	2.37	2.67	2.79	1.14*	43	26	34
April	6.46	6.09	5.39	5.45	5.82	4.84	5.29	4.93	5.62	5.09	4.78*	4.94	58	40	49
May	3.80	4.05	3.88	4.68	3.61	3.41*	5.15	3.69	3.87	4.28	3.95*	4.02*	69	49	59
June	4.21	2.23*	3.29	3.14	2.86	2.03*	3.06	3.17	1.98	1.41*	3.07	1.96*	78	59	68
July	4.30	2.40*	3.29*	3.30	2.63	2.43	3.92	0.73*	1.62*	1.80	1.51*	2.01	87	67	77
August	2.69	2.25	3.08	3.25	3.14	2.75	3.69	2.23	2.94	2.03	2.53	3.76	83	64	73
September	4.04	3.01*	3.49	3.67	3.44	3.98	4.86	2.77	2.83	3.34	3.55*	3.38	77	60	69
October	4.95	4.73	4.60	4.71	4.41	4.72	5.51	4.41	3.43	4.92	1.56*	4.99	63	45	54
Novembert	1.29*	1.30	1.22	1.58	1.65	0.94	1.28	0.57*	0.78	1.27	0.00*	1.71	42	29	36
December	2.30	2.14	0.59*	2.20	2.28	2.37	2.99	2.22	2.28	2.07	0.00*	2.38	42	28	35
Total	39.65*	33.76*	34.56*	36.07*	36.38	33.32*	43.40	28.17*	30.76*	32.58*	27.33*	33.77*	59	42	50

* Missing or suspect data

Table 5-3
Downriver Sewage Disposal System
Daily Precipitation for January 2019

Date	Daily Precipitation (inches)													DTW Daily Temperature (°F)		
	R-14	R-18	R-02	R-10	DTW	R-09	R-04	R-08	R-15	R-17	R-06	R-16	Max.	Min.	Avg.	
1/1/2019	0	0.01	0.04	0.01	0.03	0.01	0.05	0.01	0.01	0.02	0.01	0	41	26	34	
1/2/2019	0.01	0.02	0.02	0.08	0.03	0.02	0	0.04	0.03	0.01	0.02	0.01	35	26	31	
1/3/2019	0	0	0	0	0	0	0	0	0	0	0	0	37	31	34	
1/4/2019	0	0	0	0	0	0	0	0	0	0	0	0	50	30	40	
1/5/2019	0	0	0	0.01	0	0	0	0.01	0	0	0	0	50	30	40	
1/6/2019	0	0	0	0	0	0	0	0	0	0	0	0	42	32	37	
1/7/2019	0.09	0.05	0.03	0.05	0.05	0.04	0.06	0.02	0.03	0.04	0.04	0.06	53	31	42	
1/8/2019	0.05	0.02	0.02	0.02	0.02	0.03	0.03	0.02	0.02	0.03	0.02*	0.02	52	35	44	
1/9/2019	0	0	0.01	0	0.01	0	0	0	0	0	0	0.01	35	23	29	
1/10/2019	0	0	0	0	T	0	0	0	0	0	0	0	28	20	24	
1/11/2019	0	0	0	0	0	0	0	0	0	0	0	0	30	17	24	
1/12/2019	0	0	0	0	T	0	0	0	0	0	0	0	31	25	28	
1/13/2019	0	0	0	0	0	0	0	0	0	0	0	0	33	20	27	
1/14/2019	0	0	0	0	0	0	0	0	0	0	0	0	35	15	25	
1/15/2019	0	0	0	0	T	0	0	0	0	0	0	0	28	25	27	
1/16/2019	0	0	0	0	T	0	0	0	0	0	0	0	34	20	27	
1/17/2019	0	0.01	0.02	0	0.03	0.01	0.02	0	0	0.02	0.02	0.02	31	21	26	
1/18/2019	0	0	0	0	T	0	0	0	0	0	0	0	32	27	30	
1/19/2019	0.02	0.17	0.21	0*	0.33	0.19	0.38	0	0.12	0.30	0.19	0.18	27	18	23	
1/20/2019	0	0	0	0*	T	0	0	0	0	0	0	0	18	-1	9	
1/21/2019	0	0	0	0*	0	0	0	0	0	0.02	0	0	15	-7	4	
1/22/2019	0.31	0.25	0.09	0*	0.17	0.10	0.08	0*	0.17	0.08	0.07	0.09	30	1	16	
1/23/2019	0.51	0.60	0.49	0*	0.70	0.67	0.77	0*	0.68	0.68	0.77	0.69	43	30	37	
1/24/2019	0	0	0	0*	T	0	0	0*	0	0	0	0	31	23	27	
1/25/2019	0	0	0	0*	T	0	0	0*	0	0	0	0	24	11	18	
1/26/2019	0.02	0.05	0.07	0*	0.07	0.07	0.10	0*	0.04	0.07	0.05	0.07	20	8	14	
1/27/2019	0.09	0.05	0.08	0*	0.08	0.08	0.09	0*	0.06	0.08	0.11	0.09	19	0	10	
1/28/2019	0.08	0.11	0.20	0*	0.34	0.23	0.27	0*	0.12	0.31	0.19	0.29	36	-2	17	
1/29/2019	0	0	0	0*	T	0	0	0*	0	0	0	0	25	1	13	
1/30/2019	0	0	0	0*	0	0	0	0*	0	0	0	0	1	-13	-6	
1/31/2019	0	0	0	0*	0	0	0	0*	0	0	0	0	3	-14	-6	
Total	1.18	1.34	1.28	0.17*	1.86	1.45	1.85	0.10*	1.28	1.66	1.49	1.53	31	16	24	

* Missing or suspect data

Table 5-4
Downriver Sewage Disposal System
Daily Precipitation for February 2019

Date	Daily Precipitation (inches)													DTW Daily Temperature (°F)		
	R-14	R-18	R-02	R-10	DTW	R-09	R-04	R-08	R-15	R-17	R-06	R-16	Max.	Min.	Avg.	
2/1/2019	0	0	0	0*	0	0	0	0*	0	0	0	0	16	-1	8	
2/2/2019	0	0	0	0*	0	0	0	0*	0	0	0	0	40	8	24	
2/3/2019	0	0	0	0*	0	0	0	0*	0	0	0	0	55	35	45	
2/4/2019	0.15	0.13	0.12	0*	0.16	0.15	0.15	0*	0.13	0.12	0.12*	0.13	53	40	47	
2/5/2019	0	0	0	0*	0	0	0	0*	0	0	0*	0	49	29	39	
2/6/2019	0.47	0.45	0.52	0*	0.50	0.51	0.72	0*	0.49	0.58	0.61	0.54	35	29	32	
2/7/2019	0.04	0.04	0.04	0.04*	0.05	0.05	0.07	0.04	0.04	0.06	0.08	0.06	56	32	44	
2/8/2019	0	0	0	0	T	0	0	0.01	0	0	0	0	36	15	26	
2/9/2019	0	0	0	0	T	0	0	0	0	0	0	0	26	11	19	
2/10/2019	0.02	0.02	0.02	0.01	0.04	0.02	0.04	0	0.01	0.02	0.02	0.01	27	16	22	
2/11/2019	0	0	0.01	0	0.01	0	0.01	0.03	0	0.01	0	0.01	31	23	27	
2/12/2019	0.50	0.58	0.59	0.61	0.64	0.59	0.82	0.44	0.59	0.71	0.70	0.65	35	27	31	
2/13/2019	0	0	0.01	0	0.10	0.01	0.05	0	0.01	0	0.01	0	30	20	25	
2/14/2019	0	0	0	0	T	0	0	0	0	0	0	0	45	18	32	
2/15/2019	0	0	0	0	T	0	0	0	0	0	0	0	42	20	31	
2/16/2019	0	0	0	0	T	0	0	0	0	0	0	0	28	20	24	
2/17/2019	0.05	0.13	0.08	0.09	0.13	0.09	0.09	0	0.08	0.11	0.07	0.11	27	23	25	
2/18/2019	0.03	0.02	0.02	0.04	0.05	0.02	0.02	0.15	0.02	0.03	0.02	0.01	30	15	23	
2/19/2019	0	0	0	0	0	0	0	0	0	0	0	0	32	9	21	
2/20/2019	0.04	0.03	0.06	0.05	0.09	0.05	0.11	0.06	0.04	0.07	0.06	0.06	37	23	30	
2/21/2019	0	0	0	0	0	0	0	0	0	0	0	0	40	29	35	
2/22/2019	0	0	0	0	0	0	0	0	0	0	0	0	37	24	31	
2/23/2019	0.05	0.04	0.03	0.03	0.05	0.04	0.06	0.05	0.04	0.03	0.04	0.03	40	28	34	
2/24/2019	0.23	0.18	0.24	0.32	0.23	0.30	0.22	0.22	0.23	0.17	0.28	0.22	48	27	38	
2/25/2019	0	0	0	0	T	0	0	0	0	0	0	0	28	18	23	
2/26/2019	0	0	0	0	0.01	0	0	0	0	0	0	0	24	17	21	
2/27/2019	0.09	0.08	0.10	0.08	0.16	0.11	0.17	0	0.08	0.13	0.09	0.12	27	17	22	
2/28/2019	0.02	0	0	0	0	0	0	0.11	0	0	0	0	29	8	19	
Total	1.69	1.70	1.84	1.27*	2.22	1.94	2.53	1.11*	1.76	2.04	2.10	1.95	36	21	28	

* Missing or suspect data

Table 5-5
Downriver Sewage Disposal System
Daily Precipitation for March 2019

Date	Daily Precipitation (inches)													DTW Daily Temperature (°F)		
	R-14	R-18	R-02	R-10	DTW	R-09	R-04	R-08	R-15	R-17	R-06	R-16	Max.	Min.	Avg.	
3/1/2019	0	0	0	0	0	0	0	0	0	0	0	0	34	16	25	
3/2/2019	0	0	0	0	T	0	0	0	0	0	0	0	36	26	31	
3/3/2019	0	0	0.01	0	0.01	0.01	0.07	0	0	0.05	0.07	0.05	30	15	23	
3/4/2019	0	0	0	0	0.01	0	0	0	0	0	0	0	20	8	14	
3/5/2019	0	0	0	0	T	0	0	0	0	0	0	0	22	8	15	
3/6/2019	0	0	0	0	T	0	0	0	0	0	0	0	22	9	16	
3/7/2019	0	0	0	0	T	0	0	0	0	0	0	0	28	18	23	
3/8/2019	0	0	0	0	0	0	0	0	0	0	0	0	39	17	28	
3/9/2019	0.65	0.68	0.60	0.63	0.62	0.60	0.67	0.53	0.59	0.58	0.62	0.58	39	22	31	
3/10/2019	0.01	0.01	0.01	0.02	0.03	0.02	0.03	0.02	0.01	0.03	0.03	0.03	47	35	41	
3/11/2019	0	0	0	0	0	0	0	0	0	0	0	0	42	28	35	
3/12/2019	0	0	0	0	0	0	0	0	0	0	0	0	45	21	33	
3/13/2019	0.01	0	0	0	T	0	0	0	0	0	0*	0	57	32	45	
3/14/2019	0.44	0.40	0.30	0.30	0.27	0.27	0.33	0.24	0.23	0.27	0.24*	0.28	65	45	55	
3/15/2019	0.12	0.10	0.11	0.09	0.08	0.13	0.12	0.08	0.12	0.10	0.08*	0.10	47	34	41	
3/16/2019	0	0	0.01	0.02	0.01	0	0.08	0.01	0	0	0	0	39	26	33	
3/17/2019	0	0	0	0	T	0	0	0	0	0	0	0	39	20	30	
3/18/2019	0	0	0	0	0	0	0	0	0	0	0	0	45	27	36	
3/19/2019	0	0	0	0	0	0	0	0	0	0	0	0	49	27	38	
3/20/2019	0.07	0.07	0.05	0.09	0.07	0.10	0.07	0.06	0.08	0.07	0.11	0.09	50	30	40	
3/21/2019	0	0	0	0.01	T	0	0	0	0	0	0	0.01	43	37	40	
3/22/2019	0	0	0	0	0.01	0	0	0	0	0	0	0	46	30	38	
3/23/2019	0	0	0	0	0	0	0	0	0	0	0	0*	50	23	37	
3/24/2019	0	0	0	0	0	0	0	0	0	0	0*	0*	55	30	43	
3/25/2019	0	0	0	0	0	0	0	0	0	0	0	0*	46	28	37	
3/26/2019	0	0	0	0	0	0	0	0	0	0	0	0*	47	25	36	
3/27/2019	0	0	0	0	0	0	0	0	0	0	0	0*	53	26	40	
3/28/2019	0.01	0.02	0.14	0.01	0.01	0.04	0.17	0.02	0.01	0.04	0.08	0*	68	37	53	
3/29/2019	0.02	0.04	0.03	0.02	T	0.01	0.02	0.02	0.02	0	0.02*	0*	52	40	46	
3/30/2019	1.41	1.20	1.35	1.45	1.34	1.28	1.70	1.22	1.30	1.52	1.53	0*	45	32	39	
3/31/2019	0	0	0	0.01	T	0	0.01	0.04	0.01	0.01	0.01	0*	33	24	29	
Total	2.74	2.52	2.61	2.65	2.46	2.46	3.27	2.24	2.37	2.67	2.79	1.14*	43	26	34	

* Missing or suspect data

Table 5-6
Downriver Sewage Disposal System
Daily Precipitation for April 2019

Date	Daily Precipitation (inches)												DTW Daily Temperature (°F)		
	R-14	R-18	R-02	R-10	DTW	R-09	R-04	R-08	R-15	R-17	R-06	R-16	Max.	Min.	Avg.
4/1/2019	0	0	0	0	0	0	0	0.03	0	0	0	0*	44	22	33
4/2/2019	0	0	0*	0*	0	0	0	0	0	0	0	0	56	32	44
4/3/2019	0	0	0	0	0	0	0	0	0	0	0*	0	55	39	47
4/4/2019	0	0	0	0	T	0	0	0	0	0	0	0	43	35	39
4/5/2019	0	0	0.02	0.02	0.02	0.02	0.04	0.02	0.01	0.03	0.02*	0.02	59	36	48
4/6/2019	0	0	0	0	0	0	0	0	0	0	0*	0	67	41	54
4/7/2019	0.02	0.04	0	0.02	0.01	0.04	0.01	0.04	0.02	0.05	0*	0.05	72	43	58
4/8/2019	0	0	0	0	T	0	0.01	0	0	0	0*	0	74	54	64
4/9/2019	0	0	0	0	0	0	0	0	0	0	0*	0	64	48	56
4/10/2019	0	0	0	0	T	0	0	0	0	0	0.01*	0	48	35	42
4/11/2019	0	0	0	0	T	0	0	0	0	0	0	0	49	33	41
4/12/2019	0.18	0.16	0.14	0.13	0.13	0.12	0.16	0.11	0.10	0.11	0.13*	0.10	65	44	55
4/13/2019	0	0	0	0	0	0	0	0	0	0	0*	0	60	39	50
4/14/2019	0.75	0.67	0.67	0.73	0.66	0.61	0.80	0.57	0.60	0.63	0.63	0.59	43	35	39
4/15/2019	0	0	0	0	T	0	0	0.01	0	0	0	0	55	34	45
4/16/2019	0.01	0.01	0	0.01	0.01	0.01	0	0.01	0.01	0	0.01	0.02	65	39	52
4/17/2019	0.06	0.05	0.03	0.05	0.03	0.04	0.04	0.03	0.03	0.03	0.04*	0.02	58	45	52
4/18/2019	0.16	0.12	0.14	0.18	0.14	0.11	0.10	0.10	0.12	0.08	0.03*	0.09	70	48	59
4/19/2019	0.45	0.43	0.41	0.47	0.39	0.39	0.69	0.53	0.45	0.65	0.64*	0.64	48	40	44
4/20/2019	0.76	0.71	0.74	0.81	0.76	0.63	0.87	0.66	0.73	0.92	0.89*	0.78	45	39	42
4/21/2019	0.03	0.03	0	0	T	0	0	0	0	0	0*	0	66	43	55
4/22/2019	0	0	0	0	0	0	0	0	0	0	0.09*	0	69	46	58
4/23/2019	0.01	0	0	0	T	0	0.02	0	0	0	0*	0	71	46	59
4/24/2019	0	0	0	0	0	0	0	0	0	0	0*	0	61	38	50
4/25/2019	1.30	0.59	0.40	0.36	0.42	0.42	0.46	0.47	0.44	0.47	0.43*	0.49	59	48	54
4/26/2019	0.61	0.39	0.47	0.54	0.47	0.32	0.40	0.45	0.45	0.41	0.45*	0.47	63	45	54
4/27/2019	0.27	0.29	0.30	0.25	0.26	0.23	0.33	0.27	0.25	0.27	0.29*	0.27	54	38	46
4/28/2019	0.09	0.05	0.08	0.12	0.07	0.07	0.11	0.10	0.08	0.10	0.10*	0.09	56	36	46
4/29/2019	0.38	0.38	0.34	0.36	0.35	0.32	0.38	0.30	0.31	0.34	0*	0.34	46	39	43
4/30/2019	1.38	2.17	1.65	1.40	2.10	1.51*	0.87*	1.23*	2.02	1.00*	1.02*	0.97	50	42	46
Total	6.46	6.09	5.39	5.45	5.82	4.84	5.29	4.93	5.62	5.09	4.78*	4.94	58	40	49

* Missing or suspect data

Table 5-7
Downriver Sewage Disposal System
Daily Precipitation for May 2019

Date	Daily Precipitation (inches)												DTW Daily Temperature (°F)		
	R-14	R-18	R-02	R-10	DTW	R-09	R-04	R-08	R-15	R-17	R-06	R-16	Max.	Min.	Avg.
5/1/2019	0.75	0.80	0.79	1.66	1.18	0.68	1.08	0.94	1.10	0.89	0*	0.93	69	45	57
5/2/2019	0.13	0.17	0.14	0.19	0.14	0.13	0.12	0.12	0.12	0.10	0.16*	0.11	60	48	54
5/3/2019	0.11	0.12	0.14	0.14	0.13	0.17	0.15	0.13	0.12	0.17	0*	0.14	54	45	50
5/4/2019	0	0	0	0	0	0	0	0	0	0	0*	0	62	47	55
5/5/2019	0	0	0	0	0	0	0	0	0	0	0*	0	69	41	55
5/6/2019	0.06	0.03	0	0.02	0.01	0	0	0	0.02	0.01	0.01*	0	76	48	62
5/7/2019	0.26	0.17	0.16	0.22	0.16	0.20	0.17	0.18	0.19	0.22	0.16*	0.24	51	41	46
5/8/2019	0	0	0	0	0	0	0	0	0	0	0*	0	61	41	51
5/9/2019	0.11	0.11	0.10	0.10	0.06	0.10	0.27	0.07	0.07	0.15	0.25*	0.17	73	48	61
5/10/2019	0	0.02	0.03	0.01	T	0.02	0.03	0.02	0.03	0.02	0.06*	0.04	64	47	56
5/11/2019	0.01	0.01	0	0	T	0	0	0	0.01	0	0*	0	58	42	50
5/12/2019	0.07	0.14	0.28	0.23	0.06	0.32	0.39	0.30	0.29	0.35	0.36*	0.32	55	43	49
5/13/2019	0.02	0.03	0.05	0.05	0.05	0.06	0.07	0.07	0.05	0.08	0.10*	0.07	56	46	51
5/14/2019	0	0	0	0	0	0	0	0	0	0	0	0	70	42	56
5/15/2019	0	0	0	0	T	0	0	0	0	0	0	0	74	45	60
5/16/2019	0	0	0	0	0	0	0	0	0	0	0	0	76	53	65
5/17/2019	0.03	0.03	0.01	0	T	0	0.02	0	0	0	0.01	0	65	54	60
5/18/2019	0.35	0.41	0.46	0.50	0.46	0.52	0.57	0.47	0.37	0.65	0.66	0.50	72	49	61
5/19/2019	0.79	0.56	0.46	0.27	0.34	0.48	0.78	0.39	0.38	0.51	0.76	0.82	80	56	68
5/20/2019	0	0	0	0	0	0	0	0	0	0	0	0.01	63	47	55
5/21/2019	0	0	0	0	0	0	0	0	0	0	0	0	62	42	52
5/22/2019	0.33	0.37	0.34	0.30	0.27	0.26	0.29	0.20	0.22	0.24	0.25	0.27	68	51	60
5/23/2019	0.11	0.09	0.14	0.08	0.10	0.07	0.12	0.08	0.12	0.07	0.12	0.10	79	56	68
5/24/2019	0	0	0	0	T	0	0	0	0	0	0	0	71	53	62
5/25/2019	0.04	0.05	0.08	0.05	0.05	0.16	0.37	0.17	0.10	0.09	0.28	0.26	87	58	73
5/26/2019	0.02	0.02	0.03	0.02	0.02	0.02	0.01	0.02	0.01	0.01	0.03	0.04	71	55	63
5/27/2019	0.28	0.42	0.27	0.23	0.14	0.17	0.21	0.21	0.21	0.21	0.25	0*	73	50	62
5/28/2019	0	0	0	0	T	0.05	0	0	0	0.15	0	0*	83	57	70
5/29/2019	0.15	0.20	0.21	0.21	0.19	0*	0.17	0.22	0.22	0.02	0.19	0*	71	56	64
5/30/2019	0.18	0.29	0.18	0.40	0.25	0*	0.33	0.10	0.23	0.34	0.30	0*	72	60	66
5/31/2019	0	0.01*	0.01	0	0	0*	0	0	0.01*	0	0	0*	81	55	68
Total	3.80	4.05	3.88	4.68	3.61	3.41*	5.15	3.69	3.87	4.28	3.95*	4.02*	69	49	59

* Missing or suspect data

Table 5-8
Downriver Sewage Disposal System
Daily Precipitation for June 2019

Date	Daily Precipitation (inches)												DTW Daily Temperature (°F)		
	R-14	R-18	R-02	R-10	DTW	R-09	R-04	R-08	R-15	R-17	R-06	R-16	Max.	Min.	Avg.
6/1/2019	1.17	1.04	0.96	0.82	0.64	0*	1.08	0.81	0.57	0.82	0.86	0*	78	61	70
6/2/2019	0	0	0.01	0.01	T	0*	0.01	0.01	0	0	0	0*	72	53	63
6/3/2019	0	0	0	0	0	0*	0	0	0	0	0	0*	67	45	56
6/4/2019	0.02	0.02	0.08	0.04	0.04	0	0.13	0	0	0.04	0.05	0	75	51	63
6/5/2019	0.18	0.16	0.20	0.16	0.17	0	0.21	0.17	0.16	0.18	0.20	0	83	62	73
6/6/2019	0	0	0	0	0	0	0	0	0	0	0	0*	73	58	66
6/7/2019	0.54	0	0.10	0.10	0	0.11	0.10	0.11	0	0.11	0	0	79	57	68
6/8/2019	0	0	0	0	0	0	0	0	0	0	0	0	81	57	69
6/9/2019	0.27	0.23	0.05	0.06	0.04	0	0	0	0	0.02	0	0	77	67	72
6/10/2019	0.42	0.17	0.17	0.22	0.17	0.27	0.15	0.24	0.27	0.16	0.13	0.16	73	55	64
6/11/2019	0	0	0	0	0	0.01	0	0	0	0	0	0	78	49	64
6/12/2019	0.16	0.51	0.22	0.09	0.05	0.05	0.09	0.06	0.07	0.08	0.09	0.08	77	58	68
6/13/2019	0.21	0.09	0.14	0.59	0.15	0.11	0.13	0.17	0.15	0*	0.34	0.23	64	52	58
6/14/2019	0	0	0	0	0	0	0	0	0	0*	0	0	75	48	62
6/15/2019	0	0.01	0.06	0.04	0.04	0.08	0.01	0.06	0.03	0*	0.02	0.08	71	61	66
6/16/2019	0.53	0*	0.45	0.45	0.44	0.50	0.49	0.62	0.64	0*	0.57	0.65	64	56	60
6/17/2019	0.01	0*	0	0	T	0	0	0	0	0*	0	0	73	58	66
6/18/2019	0	0*	0	0	0	0	0	0	0	0*	0	0	78	58	68
6/19/2019	0	0*	0	0	T	0	0	0	0	0*	0	0	81	61	71
6/20/2019	0.57	0*	0.74	0.50	0.51	0.87	0.66	0.72	0.07	0*	0.81	0.66	68	57	63
6/21/2019	0	0*	0	0	0	0	0	0	0.01	0*	0	0	78	55	67
6/22/2019	0	0*	0	0	0	0	0	0	0.01	0*	0	0	77	54	66
6/23/2019	0	0*	0	0	T	0	0	0	0	0*	0	0	79	54	67
6/24/2019	0.09	0*	0.06	0.04	0.06	0.02	0	0.03	0	0*	0	0.01	81	67	74
6/25/2019	0	0*	0.01	0	0	0	0	0	0	0*	0	0	85	63	74
6/26/2019	0	0*	0	0	0	0	0	0	0	0*	0	0	87	67	77
6/27/2019	0	0*	0.03	0	T	0	0	0	0	0*	0	0	88	68	78
6/28/2019	0	0*	0	0.01	0.53	0.01	0	0.07	0	0*	0	0.02	91	68	80
6/29/2019	0.04	0*	0.01	0.01	0.02	0	0	0.10	0	0*	0	0.07	89	72	81
6/30/2019	0	0*	0	0	0	0	0	0	0	0*	0	0	86	69	78
Total	4.21	2.23*	3.29	3.14	2.86	2.03*	3.06	3.17	1.98	1.41*	3.07	1.96*	78	59	68

* Missing or suspect data

Table 5-9
Downriver Sewage Disposal System
Daily Precipitation for July 2019

Date	Daily Precipitation (inches)													DTW Daily Temperature (°F)		
	R-14	R-18	R-02	R-10	DTW	R-09	R-04	R-08	R-15	R-17	R-06	R-16	Max.	Min.	Avg.	
7/1/2019	0	0*	0	0	0	0	0	0	0	0*	0	0	88	65	77	
7/2/2019	0.05	0*	0.01	0.02	0.02	0.02	0.03	0.02	0	0*	0.03	0.04	92	73	83	
7/3/2019	0	0*	0*	0.01	0.01	0	0	0	0	0*	0	0	85	71	78	
7/4/2019	0.20	0*	0*	0	T	0	0.19	0.10	0	0*	0	0	88	69	79	
7/5/2019	0	0*	0*	0.23	0.21	0.45	0.11	0.41	0	0*	0*	0.36	92	72	82	
7/6/2019	0.44	0*	0*	0.12	0.21	0.09	0.19	0.16	0*	0*	0*	0.14	89	71	80	
7/7/2019	0	0*	0*	0	T	0	0	0	0*	0*	0*	0	83	66	75	
7/8/2019	0	0*	0*	0	0	0	0	0	0*	0*	0*	0	81	59	70	
7/9/2019	0	0	0*	0	0	0	0	0	0*	0	0*	0	83	60	72	
7/10/2019	0	0	0	0	0	0	0	0	0	0	0	0	92	65	79	
7/11/2019	0	0	0	0	0	0	0	0	0	0	0	0	88	67	78	
7/12/2019	0	0	0	0	0	0	0	0	0	0	0	0	81	61	71	
7/13/2019	0	0	0	0	0	0	0	0	0	0	0	0	92	64	78	
7/14/2019	0	0	0	0	0	0	0	0	0	0	0	0	87	68	78	
7/15/2019	0	0.02	0	0.31	0.15	0.20	0.11	0.02	0.27	0.11	0.04	0.13	89	65	77	
7/16/2019	0.86	0.17	0.16	0.03	0.03	0.02	0.14	0*	1.10	0.42	0.08	0.38	85	72	79	
7/17/2019	0.01	0.04	0	0.04	0.09	0.09	0.04	0*	0.10	0	0.03	0.09	91	73	82	
7/18/2019	0.23	0.13	0.34	0.02	0.01	0.07	0.43	0*	0.01	0.16	0.07	0.07	89	67	78	
7/19/2019	2.04	1.61	2.27	2.05	1.61	1.37	2.24	0*	0*	0.87	0.74	0.35	94	72	83	
7/20/2019	0.04	0.07	0.14	0.01	T	0.09	0	0*	0*	0.02	0.05	0.06	97	74	86	
7/21/2019	0.13	0.09	0.13	0.24	0.16	0.02	0.33	0*	0*	0.13	0.31	0.09	84	66	75	
7/22/2019	0.02	0.01	0.02	0.04	0.03	0	0.04	0*	0*	0.05	0.08	0.05	77	63	70	
7/23/2019	0.12	0.14	0.01	0.09	0.01	0.01	0.01	0*	0.02*	0.01	0.01	0.12	80	58	69	
7/24/2019	0	0	0.01	0.01	0	0	0	0	0.01	0	0	0.01	81	58	70	
7/25/2019	0	0	0	0	0	0	0	0	0	0	0	0	84	63	74	
7/26/2019	0	0	0	0	0	0	0	0	0	0	0	0	84	65	75	
7/27/2019	0	0	0	0	0	0	0	0	0	0	0	0.07	87	69	78	
7/28/2019	0.01	0	0	0	0.03	0	0	0	0.03	0	0	0.02	90	72	81	
7/29/2019	0.15	0.12	0.16	0.08	0.06	0	0.03	0.01	0.08	0.03	0.07	0.03	90	71	81	
7/30/2019	0	0	0.04	0	0	0	0.03	0.01	0	0	0	0	85	68	77	
7/31/2019	0	0	0	0	0	0	0	0	0	0	0	0	81	64	73	
Total	4.30	2.40*	3.29*	3.30	2.63	2.43	3.92	0.73*	1.62*	1.80	1.51*	2.01	87	67	77	

* Missing or suspect data

Table 5-10
Downriver Sewage Disposal System
Daily Precipitation for August 2019

Date	Daily Precipitation (inches)												DTW Daily Temperature (°F)		
	R-14	R-18	R-02	R-10	DTW	R-09	R-04	R-08	R-15	R-17	R-06	R-16	Max.	Min.	Avg.
8/1/2019	0	0	0	0	0	0	0	0	0.10	0.10	0	83	59	71	
8/2/2019	0	0	0	0	0	0	0	0	0	0	0	84	59	72	
8/3/2019	0	0	0	0	0	0	0	0	0	0	0	87	61	74	
8/4/2019	0	0	0	0.11	0.29	0	0	0	0.51	0.10	0*	1.40	89	67	78
8/5/2019	0	0	0	0	0	0	0	0.01	0	0	0*	0	89	67	78
8/6/2019	0.12	0.20	0.26	0.20	0.15	0	0.13	0	0.07	0.05	0.11*	0.06	80	70	75
8/7/2019	0.05	0	0.01	0	0	0	0	0	0.10	0	0*	0	86	67	77
8/8/2019	0	0	0	0	0	0	0	0	0	0	0	0	85	65	75
8/9/2019	0	0	0	0	0	0	0	0	0	0	0	0	83	59	71
8/10/2019	0	0	0	0	0	0	0	0	0	0	0	0	83	59	71
8/11/2019	0	0	0	0	0	0	0	0	0	0	0	0	85	62	74
8/12/2019	0	0	0	0	T	0.01	0.56	0	0.13	0.04	0.01	0.03	85	70	78
8/13/2019	0.01	0	0	0	T	0	0	0	0	0	0.02*	0	88	71	80
8/14/2019	0	0	0	0	0	0	0	0	0	0	0	0	84	65	75
8/15/2019	0.33	0.14	0.09	0.52	0.32	0.29	0.51	0.08	0.27	0.08	0.09	0.11	81	66	74
8/16/2019	0.10	0	0	0	0	0	0	0	0	0	0	0	80	63	72
8/17/2019	0.04	0.09	0.44	0.09	0.19	0.28	0.34	0.13	0.11	0.15	0.37	0.08	86	68	77
8/18/2019	0.56	0.68	1.41	1.10	1.28	1.47	1.41	1.51	1.02	0.90	1.22	1.42	86	67	77
8/19/2019	0	0	0.01	0	0	0	0	0.01	0	0	0	0.01	84	66	75
8/20/2019	0.32	0.04	0.03	0.09	0.05	0.05	0.16	0.02	0.04	0.04	0.04	0.03	87	71	79
8/21/2019	0.24	0.05	0.01	0.03	0.05	0.01	0	0	0	0	0	0	89	68	79
8/22/2019	0	0	0	0	0	0	0	0	0	0	0	0	79	63	71
8/23/2019	0	0	0	0	0	0	0	0	0	0	0	0	77	57	67
8/24/2019	0	0	0	0	0	0	0	0	0	0	0	0	74	55	65
8/25/2019	0	0	0	0	0	0	0	0	0	0	0	0	77	61	69
8/26/2019	0.48	0.50	0.59	0.64	0.47	0.39	0.29	0.23	0.32	0.32	0.47	0.36	74	62	68
8/27/2019	0.42	0.54	0.21	0.47	0.34	0.25	0.29	0.24	0.37	0.25	0.10	0.26	82	68	75
8/28/2019	0	0	0.01	0	T	0	0	0	0	0	0	0	78	62	70
8/29/2019	0	0.01	0	0	T	0	0	0	0	0	0	0	81	59	70
8/30/2019	0.02	0	0.01	0	T	0	0	0	0	0	0	0	78	62	70
8/31/2019	0	0	0	0	0	0	0	0	0	0	0	0	73	56	65
Total	2.69	2.25	3.08	3.25	3.14	2.75	3.69	2.23	2.94	2.03	2.53	3.76	83	64	73

* Missing or suspect data

Table 5-11
Downriver Sewage Disposal System
Daily Precipitation for September 2019

Date	Daily Precipitation (inches)												DTW Daily Temperature (°F)		
	R-14	R-18	R-02	R-10	DTW	R-09	R-04	R-08	R-15	R-17	R-06	R-16	Max.	Min.	Avg.
9/1/2019	0.14	0.14	0.13	0.11	0.13	0.11	0.08	0.08	0.14	0.07	0.11	0.09	68	61	65
9/2/2019	0.31	0.27	0.20	0.45	0.37	0.83	0.51	0.10	0.14	0.16	0.12	0.15	82	63	73
9/3/2019	0.04	0.55	0.10	0.26	0.10	0.31	0.10	0.15	0.20	0.19	0.09	0.10	78	64	71
9/4/2019	0.25	0	0.01	0.01	0.15	0	0	0.01	0	0	0	0	73	60	67
9/5/2019	0	0	0	0	0	0	0	0	0	0	0	0	75	56	66
9/6/2019	0	0	0	0	0.01	0.01	0	0	0.01	0	0	0	72	57	65
9/7/2019	0	0	0	0	0	0	0	0	0	0	0	0	76	62	69
9/8/2019	0	0	0	0	0	0	0	0	0	0	0	0	70	57	64
9/9/2019	0	0	0	0	T	0	0	0	0	0	0	0	71	57	64
9/10/2019	0	0	0	0	0	0	0	0	0	0	0	0	87	62	75
9/11/2019	1.33	1.39	1.45	1.23	0.94	0.92	1.71	0.87	0.90	0.94	2.11	1.04	89	69	79
9/12/2019	0.21	0.19	0.25	0.11	0.16	0.11	0.22	0.12	0.07	0.10	0.10	0.10	73	65	69
9/13/2019	0.60	0.44	0.37	0.39	0.40	0.41	0.93	0.41	0.36	0.77	0.57	0.73	86	65	76
9/14/2019	0	0	0	0	0	0	0	0	0	0	0	0	76	58	67
9/15/2019	0.05	0.03	0.04	0.05	0.08	0.05	0.04	0.04	0.04	0.03	0.04	0.04	75	59	67
9/16/2019	0	0	0	0	0	0	0	0	0	0	0	0	80	66	73
9/17/2019	0	0	0	0	0	0	0	0	0	0	0	0	76	62	69
9/18/2019	0	0	0	0	0	0	0	0	0	0	0	0	78	59	69
9/19/2019	0	0	0	0	0	0	0	0	0	0	0	0	77	59	68
9/20/2019	0	0	0	0	0	0	0	0	0	0	0	0	84	63	74
9/21/2019	0.01	0	0.03	0.14	0.23	0.13	0.07	0.09	0.15	0.06	0.27	0.10	85	67	76
9/22/2019	0	0*	0	0.02	T	0	0	0	0	0	0	0	86	72	79
9/23/2019	0	0*	0.05	0	0.01	0.04	0.03	0.03	0.02	0.01	0.02	0.03	77	59	68
9/24/2019	0	0*	0	0	0	0	0	0	0	0	0	0	77	56	67
9/25/2019	0	0*	0	0	T	0	0	0	0	0	0	0	77	59	68
9/26/2019	0.02	0*	0.01	0.01	0.01	0.01	0	0.01	0.01	0	0	0.01	71	53	62
9/27/2019	0.25	0*	0.61	0.54	0.33	0.68	0.89	0.55	0.54	0.70	0*	0.72	77	50	64
9/28/2019	0.59	0*	0.17	0.19	0.41	0.19	0.20	0.17	0.17	0.17	0*	0.18	71	56	64
9/29/2019	0.14	0*	0.06	0.08	0.06	0.06	0.03	0.04	0.07	0.04	0.04	0.05	63	54	59
9/30/2019	0.10	0*	0.01	0.08	0.05	0.12	0.05	0.10	0.01	0.10	0.08	0.04	77	57	67
Total	4.04	3.01*	3.49	3.67	3.44	3.98	4.86	2.77	2.83	3.34	3.55*	3.38	77	60	69

* Missing or suspect data

Table 5-12
Downriver Sewage Disposal System
Daily Precipitation for October 2019

Date	Daily Precipitation (inches)													DTW Daily Temperature (°F)		
	R-14	R-18	R-02	R-10	DTW	R-09	R-04	R-08	R-15	R-17	R-06	R-16	Max.	Min.	Avg.	
10/1/2019	0	0.01	0	0.01	0	0	0	0	0	0	0	0	89	67	78	
10/2/2019	0.46	0.39	0.51	0.46	0.46	0.43	0.64	0.54	0*	0.58	0.55	0.61	76	55	66	
10/3/2019	0.54	0.51	0.46	0.52	0.49	0.51	0.50	0.46	0*	0.49	0.52	0.51	71	55	63	
10/4/2019	0	0	0	0	0	0	0	0	0*	0	0	0	61	47	54	
10/5/2019	0	0	0	0	T	0	0	0	0*	0	0	0.01	63	47	55	
10/6/2019	0.05	0.08	0.04	0.11	0.12	0.08	0.08	0.09	0*	0.08	0.13	0.10	71	58	65	
10/7/2019	0	0	0	0	0	0	0	0	0*	0	0	0	70	51	61	
10/8/2019	0	0	0	0	0	0	0	0	0*	0	0	0	69	45	57	
10/9/2019	0	0	0	0	0	0	0	0	0	0	0	0	69	48	59	
10/10/2019	0	0	0	0	0	0	0	0	0	0	0	0	71	49	60	
10/11/2019	0.24	0.34	0.30	0.28	0.21	0.32	0.38	0.27	0.27	0.33	0.26	0.32	69	48	59	
10/12/2019	0.18	0.03	0.05	0.04	0.13	0.07	0.06	0.04	0.06	0.04	0.07	0.07	51	39	45	
10/13/2019	0	0	0	0	0	0	0	0	0	0	0	0	63	44	54	
10/14/2019	0	0	0	0	0	0	0	0	0	0	0	0	54	40	47	
10/15/2019	0	0	0	0	0	0	0	0	0	0	0	0	63	37	50	
10/16/2019	0.15	0.10	0.17	0.19	0.16	0.19	0.15	0.14	0.15	0.12	0.02	0.14	63	47	55	
10/17/2019	0	0	0	0	0	0	0	0	0	0	0	0	56	42	49	
10/18/2019	0	0	0	0	0	0	0	0	0	0	0	0	56	36	46	
10/19/2019	0	0	0	0	0	0	0	0	0	0	0	0	61	36	49	
10/20/2019	0	0	0	0	0	0	0	0	0	0	0.01	0	69	45	57	
10/21/2019	0.18	0.14	0.14	0.15	0.15	0.15	0.13	0.12	0.14	0.15	0*	0.19	66	49	58	
10/22/2019	0.07	0.02	0.02	0.02	0.04	0.02	0.06	0.02	0.05	0.04	0*	0.03	62	47	55	
10/23/2019	0	0	0	0	0	0	0	0	0	0	0*	0	61	43	52	
10/24/2019	0	0	0	0	0	0	0	0	0	0	0*	0	56	47	52	
10/25/2019	0	0	0	0	0	0	0	0	0	0	0*	0	51	37	44	
10/26/2019	1.43	1.43	1.35	1.39	1.37	1.42	1.38	1.21	1.26	1.27	0*	1.29	57	34	46	
10/27/2019	0.11	0.18	0.03	0.07	0.01	0.03	0.08	0.06	0.06	0.05	0*	0.05	59	44	52	
10/28/2019	0	0	0	0	0	0	0.01	0	0	0.10	0*	0	65	40	53	
10/29/2019	0	0.10	0.10	0.10	T	0	0.10	0.10	0.10	0.15	0*	0.11	60	45	53	
10/30/2019	0.47	0.36	0.37	0.38	0.38	0.51	0.58	0.42	0.43	1.21	0*	0.53	47	42	45	
10/31/2019	4.95	1.04	1.06	0.99	0.89	0.99	1.36	0.94	0.91	0.31	0*	1.03	47	35	41	
Total	4.95	4.73	4.60	4.71	4.41	4.72	5.51	4.41	3.43	4.92	1.56*	4.99	63	45	54	

* Missing or suspect data

Table 5-13
Downriver Sewage Disposal System
Daily Precipitation for November 2019

Date	Daily Precipitation (inches)													DTW Daily Temperature (°F)		
	R-14	R-18	R-02	R-10	DTW	R-09	R-04	R-08	R-15	R-17	R-06	R-16	Max.	Min.	Avg.	
11/1/2019	0.01	0	0	0	T	0	0	0	0	0	0*	0	42	35	39	
11/2/2019	0.01	0.03	0.02	0.04	0.03	0.01	0.09	0.05	0.01	0.03	0*	0.08	48	37	43	
11/3/2019	0.01	0	0	0	T	0	0	0	0	0.01	0*	0	47	33	40	
11/4/2019	0.03	0.01	0.01	0.02	0.02	0.02	0.02	0.01*	0.01	0	0*	0.02	54	42	48	
11/5/2019	0	0	0	0	0	0	0	0	0	0	0*	0	48	31	40	
11/6/2019	0	0	0	0	T	0	0	0	0	0	0*	0	43	27	35	
11/7/2019	0.01	0	0	0.01	0.03	0	0	0.01	0.01	0	0*	0.01	38	25	32	
11/8/2019	0	0	0	0	0	0	0	0	0	0	0*	0	39	22	31	
11/9/2019	0	0	0	0	0	0	0	0	0	0	0*	0	41	27	34	
11/10/2019	0.02	0.02	0.03	0.03	0.03	0.02	0.03	0.05	0.03	0.09	0*	0.04	47	34	41	
11/11/2019	0*	0.21	0.27	0.30	0.81	0.26	0.36	0*	0.13	0.09	0*	0.87	34	23	29	
11/12/2019	0*	0	0	0.02	0.05	0	0.13	0*	0	0	0*	0.01	25	13	19	
11/13/2019	0	0	0	0	0	0	0	0*	0	0	0*	0	25	7	16	
11/14/2019	0	0	0.04	0.01	T	0.05	0.02	0	0.02	0.14	0*	0	33	24	29	
11/15/2019	0.04	0.03	0.22	0.01	0	0*	0.10	0*	0*	0	0*	0.10	36	26	31	
11/16/2019	0	0.03	0	0.02	0	0	0	0	0	0	0*	0	34	22	28	
11/17/2019	0	0.02	0	0.19	T	0	0	0	0	0	0*	0	40	21	31	
11/18/2019	0	0	0	0	0	0	0	0	0	0	0*	0	50	31	41	
11/19/2019	0	0	0	0	0	0	0	0	0	0	0*	0	41	29	35	
11/20/2019	0	0.10	0	0.10	0	0	0	0	0	0.01	0*	0	44	36	40	
11/21/2019	0.10	0.03	0.02	0.04	0.06	0.03	0.07	0.02	0.04	0.03	0*	0.04	52	39	46	
11/22/2019	0	0	0	0	T	0.01	0	0	0	0	0*	0	46	27	37	
11/23/2019	0	0	0	0	0	0	0	0	0	0	0*	0	39	24	32	
11/24/2019	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.02	0	0.01	0*	0.01	47	29	38	
11/25/2019	0.01	0	0	0.01	T	0	0	0	0	0	0*	0	51	37	44	
11/26/2019	0.05	0.14	0.15	0.12	0.05	0.13	0.08	0.12	0.12	0.47	0*	0.13	53	36	45	
11/27/2019	0.98	0.66	0.44	0.64	0.55	0.39	0.37	0.29	0.41	0	0*	0.40	56	39	48	
11/28/2019	0	0	0	0	0	0	0	0	0	0	0*	0	41	33	37	
11/29/2019	0	0	0	0	0	0	0	0	0	0	0*	0	38	32	35	
11/30/2019	0	0	0	0	0	0	0	0	0	0.39	0*	0	40	32	36	
Total	1.29*	1.30	1.22	1.58	1.65	0.94	1.28	0.57*	0.78	1.27	0.00*	1.71	42	29	36	

* Missing or suspect data

Table 5-14
Downriver Sewage Disposal System
Daily Precipitation for December 2019

Date	Daily Precipitation (inches)													DTW Daily Temperature (°F)		
	R-14	R-18	R-02	R-10	DTW	R-09	R-04	R-08	R-15	R-17	R-06	R-16	Max.	Min.	Avg.	
12/1/2019	0.46	0.43	0.39	0.40	0.38	0.40	0.65	0.47	0.48	0.16	0*	0.55	44	36	40	
12/2/2019	0	0.01	0.01	0	0.01	0	0	0.01	0	0	0*	0.01	38	31	35	
12/3/2019	0	0	0	0	T	0	0	0	0	0	0*	0	35	29	32	
12/4/2019	0	0	0	0	T	0	0	0.01	0.01	0.01	0*	0	39	33	36	
12/5/2019	0	0	0	0	T	0	0	0.01	0	0	0*	0	39	32	36	
12/6/2019	0	0	0	0	0	0	0	0	0	0	0*	0	42	26	34	
12/7/2019	0	0	0	0	0	0	0	0	0	0	0*	0	34	23	29	
12/8/2019	0	0	0	0	0	0	0	0	0	0	0*	0	49	30	40	
12/9/2019	0.29	0.23	0.18	0.23	0.22	0.22	0.22	0.16	0.19	0.22	0*	0.22	51	47	49	
12/10/2019	0.02	0	0.01	0	0.04	0.01	0.01	0.01	0	0	0*	0.01	48	22	35	
12/11/2019	0	0	0	0	T	0	0	0	0	0	0*	0	26	17	22	
12/12/2019	0	0	0	0	0	0	0	0	0	0	0*	0	35	15	25	
12/13/2019	0	0	0	0	0	0	0	0	0	0	0*	0	43	27	35	
12/14/2019	0	0	0	0	T	0	0	0.01	0	0	0*	0	43	31	37	
12/15/2019	0	0	0	0	T	0	0	0	0	0	0*	0	34	26	30	
12/16/2019	0	0	0	0	0	0	0	0	0	0	0*	0	36	28	32	
12/17/2019	0	0	0	0	T	0	0	0	0	0	0*	0	35	28	32	
12/18/2019	0	0	0	0.01	0.02	0	0.01	0	0	0	0*	0	30	11	21	
12/19/2019	0	0	0	0	0	0	0	0	0	0	0*	0	31	10	21	
12/20/2019	0	0	0	0	0	0	0	0	0	0	0*	0	36	20	28	
12/21/2019	0	0	0	0	0	0	0	0	0	0	0*	0	47	26	37	
12/22/2019	0	0	0	0	0	0	0	0	0	0	0*	0	51	27	39	
12/23/2019	0	0	0	0	0	0	0	0	0	0	0*	0	54	33	44	
12/24/2019	0	0	0	0	0	0	0	0	0	0	0*	0	41	31	36	
12/25/2019	0	0	0	0	0	0	0	0	0	0	0*	0	54	31	43	
12/26/2019	0	0	0	0	0	0	0	0	0	0	0*	0	58	34	46	
12/27/2019	0	0	0	0	0	0	0	0	0	0	0*	0	56	36	46	
12/28/2019	0	0	0	0	0	0	0	0	0	0	0*	0	40	33	37	
12/29/2019	0.93	1.05	0	1.09	0.95	1.07	1.32	1.05	1.03	1.17	0*	1.10	50	36	43	
12/30/2019	0.59	0.41	0*	0.45	0.62	0.64	0.69	0.48	0.50	0.49	0*	0.46	51	33	42	
12/31/2019	0.01	0.01	0*	0.02	0.04	0.03	0.09	0.01	0.07	0.02	0*	0.03	34	29	31	
Total	2.30	2.14	0.59*	2.20	2.28	2.37	2.99	2.22	2.28	2.07	0.00*	2.38	42	28	35	

* Missing or suspect data

Table 5-15
Downriver Sewage Disposal System
Summary of Precipitation Data for Significant Storm Events

Period: 1/1/2019 through 12/31/2019

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	-	180	3/29/2019	3/31/2019	0.02	1.22	1.40	1.71	0.15	11%
2	-	203	4/18/2019	4/21/2019	1.00	1.13	1.39	1.66	0.17	12%
3	A	407	4/30/2019	5/1/2019	2.65	1.89	2.46	3.28	0.54	22%
4	-	191	5/18/2019	5/19/2019	0.13	0.75	1.04	1.42	0.24	23%
5	-	85	7/19/2019	7/19/2019	1.10	0.35	1.52	2.27	0.67	44%
6	-	98	8/18/2019	8/18/2019	0.48	0.56	1.17	1.51	0.32	27%
7	-	98	9/11/2019	9/13/2019	0.00	1.33	1.91	2.86	0.50	26%
8	-	169	10/2/2019	10/3/2019	1.10	0.90	1.01	1.14	0.08	8%
9	-	186	10/26/2019	10/27/2019	0.25	1.27	1.41	1.61	0.10	7%
10	-	193	10/29/2019	10/31/2019	1.54	1.27	1.49	1.94	0.19	13%
11	-	188	12/29/2019	12/30/2019	0.00	1.46	1.61	2.01	0.16	10%

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-11.
- 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

Tables 6-1 to 6-3 list 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. Exceedences 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. Tables 6-4 to 6-5 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. Exceedences of the incremental MAFLs are highlighted (if any).

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

Table 6-1
Downriver Sewage Disposal System
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 1 March 29-31, 2019 1.40 inches	Start of First Exceedence	3/30/19 11:55	--	--
	End of Last Exceedence	3/31/19 2:15	--	--
	Total Time of Exceedence	6:30	--	--
	Total Volume Above MAFL	--	0.01 MG	--
	Peak Hourly Flow Rate	--	11.45 cfs	3/30/19 23:35
Significant Storm Event 2 April 13-21, 2019 1.39 inches	Start of First Exceedence	4/20/19 13:25	--	--
	End of Last Exceedence	4/21/19 15:00	--	--
	Total Time of Exceedence	25:30	--	--
	Total Volume Above MAFL	--	0.50 MG	--
	Peak Hourly Flow Rate	--	12.58 cfs	--
Significant Storm Event 3 Major Storm Event A April 30, 2019 - May 1, 2019 2.46 inches	Start of First Exceedence	--	--	4/30/19 23:10
	End of Last Exceedence	--	--	5/2/19 4:15
	Total Time of Exceedence	--	--	15:55
	Total Volume Above MAFL	--	--	0.71 MG
	Peak Hourly Flow Rate	--	10.95 cfs	--
Significant Storm Event 4 May 18-19, 2019 1.04 inches	Start of First Exceedence	5/19/19 16:30	--	--
	End of Last Exceedence	5/20/19 10:10	--	--
	Total Time of Exceedence	17:45	--	--
	Total Volume Above MAFL	--	0.32 MG	--
	Peak Hourly Flow Rate	--	12.27 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 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 6-2
Downriver Sewage Disposal System
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 5 July 19, 2019 1.52 inches	Start of First Exceedence	--	--	--
	End of Last Exceedence	--	--	--
	Total Time of Exceedence	--	--	--
	Total Volume Above MAFL	--	--	--
	Peak Hourly Flow Rate	--	9.56 cfs	13.44 cfs
Significant Storm Event 6 August 18, 2019 1.17 inches	Start of First Exceedence	8/18/19 21:40	--	8/18/19 20:20
	End of Last Exceedence	--	--	8/18/19 21:30
	Total Time of Exceedence	13:10	--	1:15
	Total Volume Above MAFL	--	0.11 MG	0.04 MG
	Peak Hourly Flow Rate	--	11.97 cfs	25.31 cfs
Significant Storm Event 7 September 11-13, 2019 1.91 inches	Start of First Exceedence	--	--	--
	End of Last Exceedence	--	--	--
	Total Time of Exceedence	--	--	--
	Total Volume Above MAFL	--	--	--
	Peak Hourly Flow Rate	--	11.19 cfs	19.82 cfs
Significant Storm Event 8 October 2-3, 2019 1.01 inches	Start of First Exceedence	--	--	--
	End of Last Exceedence	--	--	--
	Total Time of Exceedence	--	--	--
	Total Volume Above MAFL	--	--	--
	Peak Hourly Flow Rate	--	10.95 cfs	20.47 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 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
Downriver Sewage Disposal System
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 October 26-27, 2019 1.41 inches	Start of First Exceedence	10/27/19 3:15	--	--
	End of Last Exceedence	10/27/19 7:10	--	--
	Total Time of Exceedence	1:50	--	--
	Total Volume Above MAFL	--	0.00 MG	--
	Peak Hourly Flow Rate	--	11.34 cfs	--
Significant Storm Event 10 October 29-31, 2019 1.49 inches	Start of First Exceedence	10/31/19 12:50	--	--
	End of Last Exceedence	10/31/19 13:40	--	--
	Total Time of Exceedence	0:55	--	--
	Total Volume Above MAFL	--	0.00 MG	--
	Peak Hourly Flow Rate	--	11.49 cfs	--
Significant Storm Event 11 December 29-30, 2019 1.61 inches	Start of First Exceedence	--	--	--
	End of Last Exceedence	--	--	--
	Total Time of Exceedence	--	--	--
	Total Volume Above MAFL	--	--	--
	Peak Hourly Flow Rate	--	11.21 cfs	--

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%

Table 6-4
Downriver Sewage Disposal System
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 29-31, 2019 1.40 inches	Start of First Exceedence	Total Metered Flow Rates did not Exceed MAFL by more than 5%. Incremental Flow Rates not Computed or Compared to the 5% Threshold.						3/30/19 2:05
	End of Last Exceedence							4/2/19 11:45
	Total Time of Exceedence							42:00
	Total Volume Above MAFL							-- 15.58 MG
	Peak Hourly Flow Rate							4/1/19 7:25 63.30 cfs
Significant Storm Event 2 April 13-21, 2019 1.39 inches	Start of First Exceedence	4/20/19 13:25	--	4/20/19 11:40	--	4/20/19 10:50	--	4/19/19 15:10
	End of Last Exceedence	4/21/19 15:00	--	4/20/19 13:35	--	4/20/19 12:35	--	4/20/19 10:05
	Total Time of Exceedence	25:30	--	2:00	--	1:50	--	6:20
	Total Volume Above MAFL	--	0.50 MG	--	0.06 MG	--	0.18 MG	-- 0.00 MG
	Peak Hourly Flow Rate	--	12.58 cfs	--	13.99 cfs	--	48.54 cfs	-- 31.75 cfs
Significant Storm Event 3 Major Storm Event A April 30, 2019 - May 1, 2019 2.46 inches	Start of First Exceedence	--	--	4/30/19 23:05	--	4/30/19 14:05	--	4/30/19 4:45
	End of Last Exceedence	--	--	5/2/19 7:00	--	5/2/19 1:55	--	5/2/19 4:35
	Total Time of Exceedence	--	--	31:45	--	17:00	--	10:35
	Total Volume Above MAFL	--	--	--	3.88 MG	--	1.27 MG	-- 0.38 MG
	Peak Hourly Flow Rate	--	10.95 cfs	--	21.75 cfs	--	47.83 cfs	-- 36.47 cfs
Significant Storm Event 4 May 18-19, 2019 1.04 inches	Start of First Exceedence	5/19/19 16:30	--	5/19/19 15:20	--	5/19/19 15:40	--	5/18/19 6:00
	End of Last Exceedence	5/20/19 10:10	--	5/19/19 16:35	--	5/19/19 16:10	--	5/20/19 22:30
	Total Time of Exceedence	17:45	--	1:20	--	0:35	--	27:00
	Total Volume Above MAFL	--	0.32 MG	--	0.04 MG	--	0.02 MG	-- 2.64 MG
	Peak Hourly Flow Rate	--	12.27 cfs	--	13.72 cfs	--	44.06 cfs	-- 45.47 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 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 6-5
Downriver Sewage Disposal System
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 19, 2019 1.52 inches	Start of First Exceedence	<i>Total Metered Flow Rates did not Exceed MAFL by more than 5%. Incremental Flow Rates not Computed or Compared to the 5% Threshold.</i>						7/19/19 15:15
	End of Last Exceedence							7/20/19 2:35
	Total Time of Exceedence							4:55
	Total Volume Above MAFL							-- 0.44 MG
	Peak Hourly Flow Rate							-- 40.43 cfs
Significant Storm Event 6 August 18, 2019 1.17 inches	Start of First Exceedence	8/18/19 21:40	--	8/18/19 19:50	--	8/18/19 20:15	--	8/18/19 12:20
	End of Last Exceedence	8/19/19 10:45	--	8/18/19 21:50	--	8/18/19 20:55	--	8/19/19 23:55
	Total Time of Exceedence	13:10	--	2:05	--	0:45	--	26:15
	Total Volume Above MAFL	--	0.11 MG	--	0.24 MG	--	0.07 MG	-- 6.44 MG
	Peak Hourly Flow Rate	--	11.97 cfs	--	19.87 cfs	--	48.22 cfs	-- 52.44 cfs
Significant Storm Event 7 September 11-13, 2019 1.91 inches	Start of First Exceedence	<i>Total Metered Flow Rates did not Exceed MAFL by more than 5%. Incremental Flow Rates not Computed or Compared to the 5% Threshold.</i>						9/11/19 16:35
	End of Last Exceedence							9/11/19 21:25
	Total Time of Exceedence							3:35
	Total Volume Above MAFL							-- 0.13 MG
	Peak Hourly Flow Rate							-- 34.15 cfs
Significant Storm Event 8 October 2-3, 2019 1.01 inches	Start of First Exceedence	<i>Total Metered Flow Rates did not Exceed MAFL by more than 5%. Incremental Flow Rates not Computed or Compared to the 5% Threshold.</i>						10/2/19 16:20
	End of Last Exceedence							10/4/19 16:50
	Total Time of Exceedence							41:20
	Total Volume Above MAFL							-- 9.58 MG
	Peak Hourly Flow Rate							-- 52.26 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 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 6-6
Downriver Sewage Disposal System
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 October 26-27, 2019 1.41 inches	Start of First Exceedence	<i>Total Metered Flow Rates did not Exceed MAFL by more than 5%. Incremental Flow Rates not Computed or Compared to the 5% Threshold.</i>						10/26/19 15:45
	End of Last Exceedence							--
	Total Time of Exceedence							10/28/19 23:55
	Total Volume Above MAFL							38:30
	Peak Hourly Flow Rate							-- 5.40 MG
Significant Storm Event 10 October 29-31, 2019 1.49 inches	Start of First Exceedence	<i>Total Metered Flow Rates did not Exceed MAFL by more than 5%. Incremental Flow Rates not Computed or Compared to the 5% Threshold.</i>						10/30/19 22:25
	End of Last Exceedence							--
	Total Time of Exceedence							11/1/19 4:50
	Total Volume Above MAFL							5:30
	Peak Hourly Flow Rate							-- 0.24 MG
Significant Storm Event 11 December 29-30, 2019 1.61 inches	Start of First Exceedence	<i>Total Metered Flow Rates did not Exceed MAFL by more than 5%. Incremental Flow Rates not Computed or Compared to the 5% Threshold.</i>						10/30/19 22:25
	End of Last Exceedence							--
	Total Time of Exceedence							11/1/19 4:50
	Total Volume Above MAFL							5:30
	Peak Hourly Flow Rate							-- 35.64 cfs

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. Exceedences 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 sludge deposits for Meter SW. Details of these corrections 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
Downriver Sewage Disposal System
Peak 96 Hour Total Volumes for Non-Controlled Flow Communities

Community	Total Volume (MG)	
	4.42 inch Design Storm	
Allen Park (part)	29.23	58.07
Belleville	4.86	7.15
Brownstown Twp.	20.90	14.41
Dearborn Heights	43.76	73.63
Riverview	28.30	20.97
Romulus	88.43	91.05
Southgate (part)	31.24	96.00
Taylor	164.45	202.23
Van Buren Twp.	7.04	10.24
Total	418.21	573.77

Legend:

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

Notes:

- 1) Wastewater levels at meters APO-1, APO-2, CHPO, CPO, PDO, and PM-1 exceeded the level sensors top of range. Consequently, the peak hourly flow rates for these meters could not be estimated from level and the peak 96-hour volumes were estimated. The total DRSTS peak 96 hour volume was estimated as the difference in the DWTF and upstream metered volume ($DRSTS = ([IPS] + [TPS]) - ([P-1] + [RV-1] + [RV-1] + [SW] + [SWB])$). The total DRSTS 96-hour volume was allocated to the individual meters based on a ratio to the 4.42-inch design storm. These estimated flow rates are allocated to Allen Park (part), Southgate (part), and Taylor.

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

Community	Meter District	Year 2010 Incremental Population	Major Storm Event A April 30, 2019 - May 1, 2019 2.46 inches
			Peak 96 Hour Incremental Volume (MG)
Allen Park	PC-1	1,019	3.49
	P-1	3,332	27.45
	RD-1	18,179	37.57
	APO-1 + APO-2	0	27.14
	Total	22,531	95.64
Belleville	PA-4	3,993	7.15
Brownstown Twp.	P-2	10,397	13.89
	PA-2	248	0.52
	Total	10,645	14.41
Dearborn Hts.	TB-1	19,152	73.63
Ecorse	EC-6	9,515	15.25
Lincoln Park	EC-6	3,795	6.08
	RD-1	34,347	70.97
	Total	38,142	77.06
River Rouge	RR-1	7,903	28.35
Riverview	RV-1	12,486	20.97
Romulus	DMA-1	0	1.77
	PA-3	11,371	38.03
	DMA-2	0	11.99
	PD-2	9,532	39.26
	Total	20,904	91.05
Southgate	P-1	10,637	87.61
	PB-1	4,459	6.75
	SW	14,752	27.70
	TPS+IPS	199	1.64
	Total	30,047	123.70
Taylor	P-2	262	0.35
	PA-2	13,270	27.98
	PB-1	6,462	10.13
	TB-1	5,339	20.53
	PC-1	25,700	87.93
	PD-1	12,100	55.32
	Total	63,131	202.23
Van Buren Twp.	PA-4	5,719	10.24
Wyandotte	SW	25,883	48.61

Notes:

1) [P-1] = [P-2] + [PA-2] + [PB-1] + [PC-1] + [PD-1] + [P-1 Inc. Pop. / (P-2 Cum. Pop. + P2-1 Cum. Pop. + PB-1 Cum. Pop. + PC-1 Cum. Pop. + PD-1 Cum. Pop.)]

x ([P-2] + [PA-2] + [PB-1] + [PC-1] + [PD-1] + [TSO] + [CPO] + [CHPO] + [PDO] + [APO-1] + [APO-2] + [ER-1])

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

3) Wastewater levels at meters APO-1, APO-2, CHPO, CPO, PDO, and PM-1 exceeded the level sensors top of range. Consequently, the peak hourly flow rates for these meters could not be estimated from level and the peak 96-hour volumes were estimated. The total DRSTS peak 96 hour volume was estimated as the difference in the DWTF and upstream metered volume (DRSTS = ([IPS] + [TPS]) - ([P-1] + [RV-1] + [RV-1] + [SW] + [SWB])). The total DRSTS 96-hour volume was allocated to the individual meters based on a ratio to the 4.42-inch design storm.

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

Meter District	Incremental Meter District Formula	Community	Year 2010 Incremental Population	Meter District Percentage	Major Storm Event A April 30, 2019 - May 1, 2019 2.46 inches	
					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%	27.1	27.1
DMA-1	[DMA-1]	Romulus	0	100.0%	1.8	1.8
DMA-2	[DMA-2]	Romulus	0	100.0%	12.0	12.0
EC-6	[EC-6]-[RR-1]	Ecorse	9,515	71.5%	21.3	15.3
		Lincoln Park	3,795	28.5%		6.1
		Total	13,310	100%		21.3
P-1	[P-1]+[PM-1]-[P-2] -[PA-2]-[PB-1]-[PD-1]-[PC-1]	Allen Park	3,332	23.9%	115.1	27.4
		Southgate	10,637	76.1%		87.6
		Total	13,969	100%		115.1
P-2	[P-2]	Brownstown Twp.	10,397	97.5%	14.2	13.9
		Taylor	262	2.5%		0.3
		Total	10,659	100%		14.2
PA-2	[PA-2]+[ER-1] -[PA-3]-[ER-2]	Brownstown Twp.	248	1.8%	28.5	0.5
		Taylor	13,270	98.2%		28.0
		Total	13,517	100%		28.5
PA-3	[PA-3]+[ER-2]	Romulus	11,371	100.0%	38.0	38.0
PA-4	[PA-4]	Belleville	3,993	41.1%	17.4	7.2
		Van Buren Twp.	5,719	58.9%		10.2
		Total	9,712	100%		17.4
PB-1	[PB-1]	Southgate	4,459	40.0%	16.9	6.8
		Taylor	6,462	60.0%		10.1
		Total	10,921	100%		16.9
PC-1	[PC-1]+[CPO] +[CHPO]-[TB-1]	Allen Park	1,019	3.8%	91.4	3.5
		Taylor	25,700	96.2%		87.9
		Total	26,719	100%		91.4
PD-1	[PD-1]-[PD-2]+[PDO]	Taylor	12,100	100.0%	55.3	55.3
PD-2	[PD-2] - [DMA-2]	Romulus	9,532	100.0%	39.3	39.3
RD-1	[RD-1]-[EC-6]	Allen Park	18,179	34.6%	108.5	37.6
		Lincoln Park	34,347	65.4%		71.0
		Total	52,526	100%		108.5
RR-1	[RR-1]	River Rouge	7,903	100.0%	28.4	28.4
RV-1	[RV-1]	Riverview	12,486	100.0%	21.0	21.0
SW	[SW]+[SWB]	Southgate	14,752	36.3%	76.3	27.7
		Wyandotte	25,883	63.7%		48.6
		Total	40,635	100%		76.3
TB-1	[TB-1]+[TSO]	Dearborn Hts.	19,152	78.2%	94.2	73.6
		Taylor	5,339	21.8%		20.5
		Total	24,491	100%		94.2
TPS+IPS	Population Ratio of Meter District P-1	Southgate	199	100.0%	1.6	1.6

Notes:

1) [P-1] = [P-2] + [PA-2] + [PB-1] + [PC-1] + [PD-1] + (P-1 Inc. Pop. / (P-2 Cum. Pop. + P-2 Cum. Pop. + PB-1 Cum. Pop. + PC-1 Cum. Pop. + PD-1 Cum. Pop.))

x ([P-2] + [PA-2] + [PB-1] + [PC-1] + [PD-1] + [TSO]+ [CPO] + [CHPO] + [PDO] + [APO-1] + [APO-2] + [ER-1])

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

3) PB-1 flow rates were estimated to be 60% Taylor and 40% Southgate of the total Meter PB-1 flow rates.

4) Wastewater levels at meters APO-1, APO-2, CHPO, CPO, PDO, and PM-1 exceeded the level sensors top of range. Consequently, the peak hourly flow rates for these meters could not be estimated from level and the peak 96-hour volumes were estimated. The total DRSTS peak 96 hour volume was estimated as the difference in the DWTF and upstream metered volume (DRSTS = ([IPS] + [TPS]) - ((P-1) + [RV-1] + [RV-1] + [SW] + [SWB])). The total DRSTS 96-hour volume was allocated to the individual meters based on a ratio to the 4.42-inch design storm.

Table 7-4
Downriver Sewage Disposal System
Peak Flow Rates for Major Storm Events

System	Meter	Location	Major Storm Event A April 30, 2019 - May 1, 2019 2.46 inches			
			Peak Hour		Peak 96 Hour	
			Date/Time	Flow Rate (cfs)	Date/Time	Cumulative Volume (MG)
Tunnel (Non-Controlled)	TB-1	Taylor Basin	4/30/19 5:50	16.2	5/1/19 8:25	37.2
	PC-1	Pelham Interceptor North of Goddard Road	5/1/19 0:30	37.7	5/1/19 0:30	66.3
	DMA-2	Goddard near Harrison	5/1/19 2:25	7.5	4/29/19 18:10	12.0
	PD-2	Goddard Interceptor West of Inkster Road	5/1/19 14:25	41.7	4/30/19 21:25	51.3
	PD-1	Goddard Interceptor West of Allen Road	5/1/19 17:25	35.4	4/30/19 21:35	53.6
	PB-1	Northline Interceptor West of Fordline Road	5/1/19 1:30	16.7	4/30/19 21:30	16.9
	PA-4	Eureka Interceptor near Hannan Road	5/1/19 6:05	13.2	5/1/19 0:20	17.4
	DMA-1	Detroit Metropolitan Airport	4/30/19 14:15	1.2	4/30/19 4:50	1.8
	PA-3	Eureka Interceptor at Inkster Road	5/1/19 1:05	18.5	4/30/19 21:30	38.2
	PA-2	Eureka Interceptor at Allen Road	5/1/19 0:55	28.6	4/30/19 21:55	54.4
	PA-1	Eureka Interceptor West of Fordline Road	5/1/19 1:20	40.3	4/30/19 21:30	66.4
	P-2	Pennsylvania Interceptor East of Dix-Toledo Road	5/1/19 3:25	14.8	4/29/19 18:25	14.2
	P-1	Pennsylvania Interceptor East of Fort Street	5/1/19 3:45	135.7	4/30/19 21:30	252.5
	RV-1	Pennsylvania Interceptor West of Jefferson Avenue	5/1/19 1:20	35.5	4/29/19 15:35	21.0
Riverdrive (Controlled)	RR-1	River Rouge CSO Basin Outlet Jefferson North of Victoria	5/4/19 15:40	12.3	5/1/19 23:55	28.4
	EC-6	Riverdrive Interceptor South of Southfield Road	5/1/19 13:30	27.0	4/30/19 21:15	49.7
	RD-1	Riverdrive Interceptor North of Northline Road	5/1/19 0:05	69.7	5/1/19 0:00	158.2
	SW + SWB	Southgate-Wyandotte Connection	4/30/19 11:40	36.5	5/1/19 23:55	76.3
Tunnel Connection Meters	TSO	At Pelham Basin	5/1/19 7:45	69.4	4/30/19 21:25	57.0
	APO-1	Belmont and Rosedale	Top of Range	Top of Range	5/1/19 1:00	15.3
	APO-2	Belmont and Quandt	Top of Range	Top of Range	5/1/19 1:00	11.9
	CHPO	Pelham Road South of R.R.	Top of Range	Top of Range	5/1/19 1:00	32.9
	CPO	Pelham Road North of Haskell	Top of Range	Top of Range	5/1/19 1:00	29.3
	PDO	Allen Road and Goddard	Top of Range	Top of Range	5/1/19 1:00	53.0
	ER-2	Eureka Road and Inkster	5/1/19 5:20	20.3	4/29/19 0:00	19.0
	ER-1	Allen Road and Eureka Road	5/1/19 0:35	28.4	4/29/19 0:00	31.3
	PM-1	Pennsylvania Ave. at Fordline	Top of Range	Top of Range	5/1/19 1:00	67.8
DWTF	IPS + TPS	DWTF Influent	5/1/19 18:00	406.9	4/30/19 23:00	755.7

Notes:

1) Wastewater levels at meters APO-1, APO-2, CHPO, CPO, PDO, and PM-1 exceeded the level sensors top of range. Consequently, the peak hourly flow rates for these meters could not be estimated from level and the peak 96-hour volumes were estimated. The total DRSTS peak 96 hour volume was estimated as the difference in the DWTF and upstream metered volume ($DRSTS = ([IPS] + [TPS]) - ([P-1] + [RV-1] + [RV-1] + [SW] + [SWB])$). The total DRSTS 96-hour volume was allocated to the individual meters based on a ratio to the 4.42-inch design storm.

Table 7-5
Downriver Sewage Disposal System
Peak Hydraulic Grade Lines for Major Storm Events

System	Meter	Location	Rim Elevation (ft)	Invert Elevation (ft)	Diameter (ft)	Major Storm Event A April 30, 2019 - May 1, 2019 2.46 inches		
						Date/Time of Occurrence	Peak Depth (ft)	Peak HGL (ft)
Tunnel (Non-Controlled)	PC-1	Pelham Interceptor North of Goddard Road	601.95	564.96	4.5	5/1/19 3:20	21.6	586.6
	PD-2	Goddard Interceptor West of Inkster Road	623.35	598.32	4.5	5/1/19 6:20	14.5	612.8
	PD-1	Goddard Interceptor West of Allen Road	602.25	575.55	4.0	5/1/19 4:20	11.7	587.2
	PB-1	Northline Interceptor West of Fordline Road	596.15	569.55	3.0	5/1/19 2:05 - 5/1/19 10:15	≥3.0	572.5
	PA-4	Eureka Interceptor near Hannan Road	656.95	635.14	3.5	5/1/19 5:45	5.3	640.5
	PA-3	Eureka Interceptor at Inkster Road	622.65	601.02	3.5	5/1/19 0:55	2.4	603.4
	PA-2	Eureka Interceptor at Allen Road	601.55	576.18	4.0	5/1/19 2:45	4.7	580.9
	PA-1	Eureka Interceptor West of Fordline Road	594.95	570.40	4.0	5/1/19 2:45	6.4	576.8
	P-2 ²	Pennsylvania Interceptor East of Dix-Toledo Road	598.95	577.35	3.0	5/1/19 3:45	2.3	579.6
	P-1	Pennsylvania Interceptor East of Fort Street	591.45	545.45	6.5	5/1/19 1:05 - 5/1/19 7:00	≥18.0	563.4
Riverdrive (Controlled)	RV-1	Pennsylvania Interceptor West of Jefferson Avenue	578.33	544.07	3.5	5/1/19 1:10	17.8	561.8
	RR-1	Riverdrive Interceptor South of Visger Road	582.25	566.21	3.0	5/1/19 2:45	11.2	577.4
	EC-6	Riverdrive Interceptor South of Southfield Road	579.35	554.54	4.5	5/1/19 1:05 - 5/1/19 4:05	≥18.3	572.8
	RD-1	Riverdrive Interceptor North of Northline Road	577.85	550.66	6.0	5/1/19 1:40	18.3	569.0
Tunnel Connection Meters	SW	On Southgate-Wyandotte Connection	578.00	538.00	6.5	5/1/19 1:35	19.6	557.6
	TSO	Connection to Tunnel at Pelham Basin	609.16	585.34	4.0	5/1/19 5:35	5.9	591.2
	APO-1	Allen Park Overflow at Belmont Road and Rosedale Road	594.56	565.46	3.0	4/30/19 23:45 - 5/1/19 19:15	≥10.2	575.7
	APO-2	Allen Park Overflow at Belmont Road and Quandt Road	597.16	571.00	3.0	4/30/19 22:55 - 5/1/19 19:00	≥4.8	575.8
	CHPO	Pelham Interceptor South of R.R.	602.96	566.46	4.5	5/1/19 0:35 - 5/1/19 13:45	≥13.2	579.7
	CPO	Pelham Interceptor North of Haskell Road	601.46	568.00	4.5	5/1/19 0:40 - 5/1/19 17:30	≥10.9	578.9
	PDO	Goddard Interceptor at Allen Road	601.96	569.97	4.0	5/1/19 0:55 - 5/1/19 13:55	≥8.7	578.7
	ER-2	Eureka Relief Sewer Extention on Eureka Road at Inkster Road	623.73	591.48	4.5	5/1/19 5:00	2.3	593.8
	ER-1	Eureka Relief Sewer at Allen Road	602.81	560.47	4.5	5/1/19 0:55 - 5/1/19 7:45	≥12.4	572.9
Tunnel Level Sensors	PM-1	Pennsylvania Interceptor at Fordline Road	593.06	548.92	6.5	5/1/19 1:30 - 5/1/19 3:40	≥18.4	567.3
	L-3	Allen and I-75 (North)	602.56	543.04	7.0	5/1/19 0:40 - 5/1/19 23:25	≥9.1	552.1
	L-5	Pelham and Champaign	601.35	546.84	7.0	5/1/19 0:20 - 5/2/19 3:35	≥9.7	556.5
	L-7	Rosedale and Belmont	593.21	552.86	6.5	5/1/19 0:45 - 5/2/19 1:40	≥10.0	562.9
DWTF	L-8	Pennsylvania Ave. at Fordline	592.21	537.49	7.5	5/1/19 1:05 - 5/2/19 4:10	≥7.3	544.8
	IPS	Main Influent Pump Station Wet Well	-	528.46	NA	5/1/19 1:45	25.4	553.9
	TPS	Tunnel Pump Station Wet Well	-	524.71	NA	5/1/19 1:05 - 5/1/19 19:15	≥25.0	549.7

Notes:

1) Elevations are referenced to the North American Vertical Datum of 1988 (NAVD 88).

Key
Within sewer:

Surcharging sewer, grade elevation unknown:

Surcharging sewer, surcharging level exceeded top of range for level sensor:

Surcharging sewer, grade elevation known:

Above grade:

Data not available: -

Table 8-1
Downriver Sewage Disposal System
Meter Data Review and Fixes for 2019

Meter	Start	Stop	Description of the Problem	Dry Period	Wet Period	Fix
DMA-1	1/4/2019	6/24/2019	Battery ran out of power due to site access restriction	X	X	Diurnal pattern
DMA-2	1/4/2019	2/23/2019	Meter decommissioned at end of service contract	X	X	Correlation to WCAA Pond 3 West
	4/13/2019	4/16/2019	Data unavailable due to a fuse that tripped	X	X	The fuse was replaced Diurnal pattern
	7/24/2019	7/26/2019	Data unavailable	X		Diurnal pattern
EC-6	1/4/2019	1/5/2019	Meter decommissioned at end of service contract	X		Diurnal pattern
	1/6/2019	3/9/2019		X	X	Correlation to Meter RD-1
ER-1	1/4/2019	2/28/2019	Meter decommissioned at end of service contract	X	X	Flow rate assumed to be zero
ER-2	1/21/2019	4/12/2019	Meter decommissioned at end of service contract	X	X	Flow rate assumed to be zero
L-5	3/8/2019	3/27/2019	Battery ran out of power	X	X	No fix
P-2	1/4/2019	1/9/2019	Meter decommissioned at end of service contract	X		Diurnal pattern
	2/16/2019	3/29/2019		X	X	Correlation to Meter PA-3
PA-1	1/4/2019	2/14/2019	Meter decommissioned at end of service contract	X	X	Correlation to Meter P-1
	6/17/2019	6/30/2019	Data unavailable due to a monitor malfunction	X	X	The meter was replaced Correlation to Meter PA-2
PA-2	1/4/2019	2/14/2019	Meter decommissioned at end of service contract	X	X	Correlation to Meter P-1
PA-3	2/24/2019	2/25/2019	No data	X		Diurnal pattern
	6/25/2019	10/2/2019	Control module removed to repair Meter SW	X	X	Correlation to Meter PA-2
PA-4	1/4/2019	2/19/2019	Meter decommissioned at end of service contract	X	X	Correlation to Meter PA-3
PB-1	1/30/2019	3/29/2019	Meter decommissioned at end of service contract	X	X	Correlation to Meter PA-3
PC-1	7/12/2019	7/18/2019	GFCI outlet tripped causing meter to lose power	X	X	GFCI outlet was reset and meter returned to normal operations Correlation to Meter P-1
PD-1	1/28/2019	3/29/2019	Meter decommissioned at end of service contract	X	X	Correlation to Meter PD-2
	5/1/2019	7/11/2019	Velocity sensor under reporting after May 1, 2019 event	X	X	Rating curve to depth
	7/24/2019	8/5/2019		X	X	
PDO	1/30/2019	2/6/2019	Level dropped to zero	X	X	Flow rate assumed to be zero
RR-1	1/4/2019	1/5/2019	Meter decommissioned at end of service contract	X		Diurnal pattern
	1/6/2019	2/17/2019		X	X	Correlation to Meter RD-1
RR-1	12/20/2019	12/31/2019	Water intrusion in the meter	X	X	Meter was replaced Correlation to Meter EC-6
RV-1	1/1/2019	1/10/2019	Accusonic monitor failed	X	X	Accusonic monitor replaced Correlation to Meter P-2
SW	4/19/2019	6/5/2019	Intermittent periods of missing data due to failing control module	X	X	Linear interpolation
	6/6/2019	6/19/2019	Extended period of missing data due to failing control module	X	X	Correlation to Meter RD-1
	6/21/2019	6/25/2019	Extended period of missing data due to failing control module	X	X	Control module replaced with unit from Meter PA-3 Correlation to Meter RD-1
TB-1	4/17/2019	4/22/2019	No data	X	X	Correlation to Meter PC-1
TSO	1/4/2019	3/2/2019	Meter decommissioned at end of service contract	X	X	Flow rate assumed to be zero

Appendix A

Additional Monthly Summary Tables

Table A-1
Downriver Sewage Disposal System
Incremental Flow Rates Summarized by Meter District with Community Components

Meter District	Community	Year 2010 Incremental Population	Meter District Percentage	January 2019			February 2019			March 2019			April 2019			May 2019			June 2019				
				Total	Dry Weather	Average Daily Flow Rate (cfs)	Total	Dry Weather	Average Daily Flow Rate (cfs)	Average Per Capita Flow Rate (gpcd)	Total	Dry Weather	Average Daily Flow Rate (cfs)	Average Per Capita Flow Rate (gpcd)	Total	Dry Weather	Average Daily Flow Rate (cfs)	Average Per Capita Flow Rate (gpcd)	Total	Dry Weather	Average Daily Flow Rate (cfs)	Average Per Capita Flow Rate (gpcd)	
TB-1	Dearborn Heights	19,152	78.2%	5.35	4.06		5.97	4.50			5.06	4.07			7.03	4.51		9.00	4.99		3.86	3.11	
	Taylor	5,339	21.8%	1.49	1.13		1.67	1.26			1.41	1.13			1.96	1.26		2.51	1.39		1.08	0.87	105
	Total	24,491	100.0%	6.84	5.20		7.64	5.76			6.46	5.20			8.99	5.77		11.51	6.39		4.94	3.98	
PC-1	Allen Park	1,019	3.8%	0.25	0.20		0.29	0.22			0.25	0.20			0.32	0.22		0.42	0.24		0.22	0.18	
	Taylor	25,700	96.2%	6.21	4.98		7.22	5.58			6.29	5.06			8.07	5.46		10.47	6.17		5.50	4.55	114
	Total	26,719	100.0%	6.45	5.18		7.51	5.80			6.54	5.27			8.39	5.68		10.88	6.42		5.72	4.73	
DMA-2	Romulus	0	100.0%	1.54	1.48	--	1.17	1.17	--		1.74	1.69	--		3.70	3.49	--	3.46	3.51	--	2.90	2.70	--
PD-2	Romulus	9,532	100.0%	2.81	2.43	165	3.77	2.80	190	3.34	2.83	192	4.62	3.31	224	5.90	4.26	289	3.72	3.34	226		
PD-1	Taylor	12,100	100.0%	2.47	2.19	117	2.52	2.49	133	2.55	2.49	133	2.23	1.88	101	4.74	1.97	105	1.99	1.79	95		
PB-1 ¹	Taylor	6,462	60.0%	1.26	1.10	110	1.53	1.27	128	1.46	1.26	126	1.68	1.22	122	1.77	1.27	128	1.19	1.03	103		
	Southgate	4,459	40.0%	0.84	0.73	106	1.02	0.85	123	0.97	0.84	122	1.12	0.82	118	1.18	0.85	123	0.80	0.68	99		
	Total	10,921	100.0%	2.11	1.84	109	2.56	2.12	126	2.44	2.10	124	2.81	2.04	121	2.95	2.12	126	1.99	1.71	101		
PA-4	Belleville	3,993	41.1%	0.88	0.82		0.95	0.85			0.87	0.82			1.04	0.88		1.40	1.13		0.94	0.86	
	Van Buren Twp	5,719	58.9%	1.26	1.18		1.35	1.22			1.25	1.17			1.48	1.27		2.01	1.61		1.35	1.23	139
	Total	9,712	100.0%	2.14	2.00		2.30	2.07			2.12	1.98			2.52	2.15		3.41	2.74		2.29	2.09	
DMA-1	Romulus (Airport)	0	100.0%	0.66	0.67	--	0.67	0.67	--		0.67	0.67	--		0.67	0.67	--	0.67	0.66	--	0.72	0.77	--
PA-3	Romulus	11,371	100.0%	4.57	4.18	238	5.22	4.59	261	5.03	4.62	262	5.60	4.58	260	7.04	5.39	306	4.55	4.06	231		
PA-2	Taylor	13,270	98.2%	2.68	2.13		3.36	2.92			3.39	2.93			3.74	2.90		4.60	3.24		2.80	2.39	
	Brownstown Twp	248	1.8%	0.05	0.04		0.06	0.05			0.06	0.05			0.07	0.05		0.09	0.06		0.05	0.04	117
	Total	13,517	100.0%	2.73	2.17		3.42	2.98			3.45	2.99			3.81	2.95		4.69	3.30		2.85	2.44	
P-2	Brownstown Twp	10,397	97.5%	2.62	2.47		2.93	2.59			2.78	2.55			2.95	2.51		3.24	2.72		2.63	2.40	
	Taylor	262	2.5%	0.07	0.06		0.07	0.07			0.07	0.06			0.07	0.06		0.08	0.07		0.07	0.06	149
	Total	10,659	100.0%	2.69	2.53		3.01	2.66			2.85	2.61			3.02	2.58		3.33	2.79		2.70	2.46	
P-1	Allen Park	3,332	23.9%	0.90	0.77		1.03	0.86			0.96	0.84			1.21	0.91		2.35	1.02		0.89	0.78	
	Southgate	10,637	76.1%	2.89	2.46		3.28	2.73			3.07	2.67			3.85	2.89		7.51	3.26		2.83	2.48	151
	Total	13,969	100.0%	3.79	3.23		4.31	3.59			4.04	3.51			5.05	3.80		9.87	4.28		3.72	3.26	
RV-1	Riverview	12,486	100.0%	2.73	2.30	119	3.15	2.35	121	2.79	2.06	107	3.48	2.13	110	3.70	2.44	126	2.70	2.10	109		
RR-1	River Rouge	7,903	100.0%	3.79	3.03	248	4.56	3.08	252	3.75	3.07	251	6.02	4.17	341	8.14	6.84	559	6.22	5.71	467		
EC-6	Ecorse	9,515	71.5%	2.08	1.84		2.57	2.33			2.11	2.03			2.11	1.91		3.19	2.87		3.26	3.38	
	Lincoln Park	3,795	28.5%	0.83	0.73		1.02	0.93			0.84	0.81			0.84	0.76		1.27	1.15		1.30	1.35	230
	Total	13,310	100.0%	2.91	2.58		3.59	3.25			2.95	2.84			2.95	2.68		4.46	4.02		4.56	4.73	
RD-1	Allen Park	18,179	34.6%	5.75	3.85		6.89	4.72			5.66	4.18			8.87	4.83		8.52	5.94		5.97	4.52	
	Lincoln Park	34,347	65.4%	10.87	7.28		13.01	8.91			10.69	7.90			16.76	9.12		16.09	11.22		11.27	8.53	161
	Total	52,526	100.0%	16.62	11.13		19.90	13.63			16.34	12.08			25.64	13.94		24.61	17.15		17.24	13.05</	

Table A-1
Downriver Sewage Disposal System
Incremental Flow Rates Summarized by Meter District with Community Components

Meter District	Community	Year 2010 Incremental Population	Meter District Percentage	July 2019			August 2019			September 2019			October 2019			November 2019			December 2019			
				Total	Dry Weather	Average Daily Flow Rate (cfs)	Total	Dry Weather	Average Daily Flow Rate (cfs)	Average Per Capita Flow Rate (gpcd)	Total	Dry Weather	Average Daily Flow Rate (cfs)	Average Per Capita Flow Rate (gpcd)	Total	Dry Weather	Average Daily Flow Rate (cfs)	Average Per Capita Flow Rate (gpcd)	Total	Dry Weather	Average Daily Flow Rate (cfs)	Average Per Capita Flow Rate (gpcd)
TB-1	Dearborn Heights	19,152	78.2%	3.08	2.46	83	2.61	2.27	77	2.85	2.40	81	3.56	2.60	88	4.16	3.39	114	3.87	3.09	104	
	Taylor	5,339	21.8%	0.86	0.69		0.73	0.63		0.80	0.67		0.99	0.72		1.16	0.94		1.08	0.86		1.04
	Total	24,491	100.0%	3.94	3.15		3.33	2.90		3.65	3.06		4.56	3.32		5.32	4.33		4.94	3.95		
PC-1	Allen Park	1,019	3.8%	0.15	0.14	89	0.14	0.12	77	0.14	0.12	75	0.18	0.13	85	0.21	0.18	112	0.20	0.16	101	
	Taylor	25,700	96.2%	3.75	3.52		3.49	3.05		3.52	2.98		4.62	3.37		5.28	4.46		5.14	4.02		101
	Total	26,719	100.0%	3.90	3.66		3.63	3.17		3.65	3.10		4.80	3.50		5.49	4.64		5.34	4.18		
DMA-2	Romulus	0	100.0%	1.71	1.93	--	0.50	0.51	--	0.23	0.21	--	0.22	0.20	--	1.56	1.97	--	0.87	0.91	--	
PD-2	Romulus	9,532	100.0%	3.01	3.19	217	2.21	2.20	149	1.83	1.70	115	2.07	1.82	123	2.97	2.80	190	2.73	2.48	168	
PD-1	Taylor	12,100	100.0%	1.28	1.24	66	1.55	1.52	81	1.78	1.82	97	2.33	2.12	113	1.95	1.71	91	2.13	1.86	99	
PB-1 ¹	Taylor	6,462	60.0%	0.97	0.90	90	0.92	0.88	88	0.94	0.86	86	1.06	0.90	90	1.11	1.00	100	1.13	0.96	96	
	Southgate	4,459	40.0%	0.65	0.60	87	0.61	0.58	85	0.63	0.58	83	0.71	0.60	87	0.74	0.67	96	0.76	0.64	93	
	Total	10,921	100.0%	1.62	1.51	89	1.53	1.46	86	1.57	1.44	85	1.77	1.51	89	1.86	1.66	98	1.89	1.60	95	
PA-4	Belleville	3,993	41.1%	0.67	0.65	105	0.59	0.58	93	0.61	0.60	97	0.61	0.56	91	0.74	0.69	111	0.89	0.92	149	
	Van Buren Twp	5,719	58.9%	0.96	0.93		0.85	0.82		0.87	0.86		0.87	0.81		1.06	0.99		1.28	1.32		149
	Total	9,712	100.0%	1.63	1.57		1.44	1.40		1.48	1.46		1.48	1.37		1.79	1.68		2.17	2.24		
DMA-1	Romulus (Airport)	0	100.0%	0.89	0.86	--	0.86	0.85	--	0.74	0.73	--	0.70	0.71	--	0.68	0.67	--	0.64	0.63	--	
PA-3	Romulus	11,371	100.0%	3.53	3.29	187	3.16	3.10	176	3.55	3.33	189	4.02	3.69	209	4.79	4.46	253	4.63	4.29	244	
PA-2	Taylor	13,270	98.2%	1.78	1.61	78	1.48	1.42	69	1.49	1.35	66	1.56	1.31	64	1.86	1.62	79	1.94	1.59	77	
	Brownstown Twp	248	1.8%	0.03	0.03		0.03	0.03		0.03	0.03		0.03	0.02		0.03	0.03		0.04	0.03		77
	Total	13,517	100.0%	1.82	1.64		1.50	1.45		1.52	1.37		1.59	1.34		1.89	1.65		1.98	1.62		
P-2	Brownstown Twp	10,397	97.5%	2.29	2.14	133	2.10	2.01	125	2.21	2.05	128	2.29	2.10	130	2.47	2.34	145	2.50	2.28	142	
	Taylor	262	2.5%	0.06	0.05		0.05	0.05		0.06	0.05		0.06	0.05		0.06	0.06		0.06	0.06		142
	Total	10,659	100.0%	2.35	2.20		2.15	2.06		2.26	2.10		2.35	2.15		2.53	2.40		2.56	2.34		
P-1	Allen Park	3,332	23.9%	0.66	0.63	121	0.57	0.53	103	0.58	0.53	102	0.67	0.56	109	0.80	0.72	140	0.77	0.67	131	
	Southgate	10,637	76.1%	2.12	2.00		1.81	1.70		1.84	1.68		2.14	1.79		2.54	2.30		2.47	2.15		131
	Total	13,969	100.0%	2.78	2.63		2.38	2.23		2.41	2.20		2.81	2.35		3.34	3.03		3.24	2.82		
RV-1	Riverview	12,486	100.0%	1.85	1.71	89	2.09	1.89	98	2.48	1.90	98	2.73	1.89	98	2.46	2.05	106	2.57	1.89	98	
RR-1	River Rouge	7,903	100.0%	6.73	5.79	473	4.90	4.22	345	4.27	3.63	297	4.00	3.23	264	3.75	3.28	268	3.65	2.99	245	
EC-6	Ecorse	9,515	71.5%	3.14	3.31	225	3.35	3.31	225	2.48	2.35	160	2.18	1.95	132	2.04	2.00	136	2.00	1.84	125	
	Lincoln Park	3,795	28.5%	1.25	1.32		1.34	1.32		0.99	0.94		0.87	0.78		0.81	0.80		0.80	0.73		125
	Total	13,310	100.0%	4.39	4.63		4.69															

Table A-2
Downriver Sewage Disposal System
Incremental Flow Rates by Meter District

Meter District	Incremental Meter District Formula	Year 2010 Incremental Population	January 2019			February 2019			March 2019			April 2019			May 2019			June 2019		
			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]	24,491	6.84	5.20	137	7.64	5.76	152	6.46	5.20	137	8.99	5.77	152	11.51	6.39	169	4.94	3.98	105
PC-1	[PC-1]+[CPO] +[CHPO]-[TB-1]	26,719	6.45	5.18	125	7.51	5.80	140	6.54	5.27	127	8.39	5.68	137	10.88	6.42	155	5.72	4.73	114
DMA-2	[DMA-2]	0	1.54	1.48	-	1.17	1.17	-	1.74	1.69	-	3.70	3.49	-	3.46	3.51	-	2.90	2.70	-
PD-2	[PD-2] - [DMA-2]	9,532	2.81	2.43	165	3.77	2.80	190	3.34	2.83	192	4.62	3.31	224	5.90	4.26	289	3.72	3.34	226
PD-1	[PD-1]-[PD-2]+[PDO]	12,100	2.47	2.19	117	2.52	2.49	133	2.55	2.49	133	2.23	1.88	101	4.74	1.97	105	1.99	1.79	95
PB-1	[PB-1]	10,921	2.11	1.84	109	2.56	2.12	126	2.44	2.10	124	2.81	2.04	121	2.95	2.12	126	1.99	1.71	101
PA-4	[PA-4]	9,712	2.14	2.00	133	2.30	2.07	138	2.12	1.98	132	2.52	2.15	143	3.41	2.74	182	2.29	2.09	139
DMA-1	[DMA-1]	0	0.66	0.67	-	0.67	0.67	-	0.67	0.67	-	0.67	0.67	-	0.67	0.66	-	0.72	0.77	-
PA-3	[PA-3]+[ER-2] -[PA-4]-[DMA-1]	11,371	4.57	4.18	238	5.22	4.59	261	5.03	4.62	262	5.60	4.58	260	7.04	5.39	306	4.55	4.06	231
PA-2	[PA-2]+[ER-1] -[PA-3]-[ER-2]	13,517	2.73	2.17	104	3.42	2.98	142	3.45	2.99	143	3.81	2.95	141	4.69	3.30	158	2.85	2.44	117
P-2	[P-2]	10,659	2.69	2.53	153	3.01	2.66	161	2.85	2.61	158	3.02	2.58	156	3.33	2.79	169	2.70	2.46	149
P-1	[P-1]+[PM-1]-[P-2] -[PA-2]-[PB-1]-[PD-1]-[PC-1]	13,969	3.79	3.23	150	4.31	3.59	166	4.04	3.51	163	5.05	3.80	176	9.87	4.28	198	3.72	3.26	151
RV-1	[RV-1]	12,486	2.73	2.30	119	3.15	2.35	121	2.79	2.06	107	3.48	2.13	110	3.70	2.44	126	2.70	2.10	109
RR-1	[RR-1]	7,903	3.79	3.03	248	4.56	3.08	252	3.75	3.07	251	6.02	4.17	341	8.14	6.84	559	6.22	5.71	467
EC-6	[EC-6]-[RR-1]	13,310	2.91	2.58	125	3.59	3.25	158	2.95	2.84	138	2.95	2.68	130	4.46	4.02	195	4.56	4.73	230
RD-1	[RD-1]-[EC-6]	52,526	16.62	11.13	137	19.90	13.63	168	16.34	12.08	149	25.64	13.94	172	24.61	17.15	211	17.24	13.05	161
APO-1 + APO-2	[APO-1]+[APO-2]	0	0.00	0.00	-	0.00	0.00	-	0.09	0.00	-	0.31	0.00	-	1.29	0.00	-	0.00	0.00	-
SW+SWB	[SW]+[SWB]	40,635	17.68	13.02	207	22.77	14.02	223	17.82	13.25	211	25.22	16.54	263	25.36	19.88	316	31.82	28.16	448
TPS+IPS ¹	Population Ratio of Meter District P-1	199	0.05	0.05	150	0.06	0.05	166	0.06	0.05	163	0.07	0.05	176	0.14	0.06	198	0.05	0.05	151

Notes:

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

Table A-2
Downriver Sewage Disposal System
Incremental Flow Rates by Meter District

Meter District	Incremental Meter District Formula	Year 2010 Incremental Population	July 2019			August 2019			September 2019			October 2019			November 2019			December 2019		
			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]	24,491	3.94	3.15	83	3.33	2.90	77	3.65	3.06	81	4.56	3.32	88	5.32	4.33	114	4.94	3.95	104
PC-1	[PC-1]+[CPO] +[CHPO]-[TB-1]	26,719	3.90	3.66	89	3.63	3.17	77	3.65	3.10	75	4.80	3.50	85	5.49	4.64	112	5.34	4.18	101
DMA-2	[DMA-2]	0	1.71	1.93	-	0.50	0.51	-	0.23	0.21	-	0.22	0.20	-	1.56	1.97	-	0.87	0.91	-
PD-2	[PD-2] - [DMA-2]	9,532	3.01	3.19	217	2.21	2.20	149	1.83	1.70	115	2.07	1.82	123	2.97	2.80	190	2.73	2.48	168
PD-1	[PD-1]-[PD-2]+[PDO]	12,100	1.28	1.24	66	1.55	1.52	81	1.78	1.82	97	2.33	2.12	113	1.95	1.71	91	2.13	1.86	99
PB-1	[PB-1]	10,921	1.62	1.51	89	1.53	1.46	86	1.57	1.44	85	1.77	1.51	89	1.86	1.66	98	1.89	1.60	95
PA-4	[PA-4]	9,712	1.63	1.57	105	1.44	1.40	93	1.48	1.46	97	1.48	1.37	91	1.79	1.68	111	2.17	2.24	149
DMA-1	[DMA-1]	0	0.89	0.86	-	0.86	0.85	-	0.74	0.73	-	0.70	0.71	-	0.68	0.67	-	0.64	0.63	-
PA-3	[PA-3]+[ER-2] -[PA-4]-[DMA-1]	11,371	3.53	3.29	187	3.16	3.10	176	3.55	3.33	189	4.02	3.69	209	4.79	4.46	253	4.63	4.29	244
PA-2	[PA-2]+[ER-1] -[PA-3]-[ER-2]	13,517	1.82	1.64	78	1.50	1.45	69	1.52	1.37	66	1.59	1.34	64	1.89	1.65	79	1.98	1.62	77
P-2	[P-2]	10,659	2.35	2.20	133	2.15	2.06	125	2.26	2.10	128	2.35	2.15	130	2.53	2.40	145	2.56	2.34	142
P-1	[P-1]+[PM-1]-[P-2] -[PA-2]-[PB-1]-[PD-1]-[PC-1]	13,969	2.78	2.63	121	2.38	2.23	103	2.41	2.20	102	2.81	2.35	109	3.34	3.03	140	3.24	2.82	131
RV-1	[RV-1]	12,486	1.85	1.71	89	2.09	1.89	98	2.48	1.90	98	2.73	1.89	98	2.46	2.05	106	2.57	1.89	98
RR-1	[RR-1]	7,903	6.73	5.79	473	4.90	4.22	345	4.27	3.63	297	4.00	3.23	264	3.75	3.28	268	3.65	2.99	245
EC-6	[EC-6]-[RR-1]	13,310	4.39	4.63	225	4.69	4.63	225	3.48	3.29	160	3.05	2.73	132	2.85	2.80	136	2.79	2.57	125
RD-1	[RD-1]-[EC-6]	52,526	14.60	11.59	143	13.53	10.78	133	12.78	9.83	121	15.23	10.06	124	16.00	11.45	141	14.45	10.08	124
APO-1 + APO-2	[APO-1]+[APO-2]	0	0.00	0.00	-	0.06	0.00	-	0.00	0.00	-	0.08	0.00	-	0.00	0.00	-	0.03	0.00	-
SW+SWB	[SW]+[SWB]	40,635	20.47	17.20	274	18.89	15.07	240	18.29	13.12	209	17.11	11.63	185	18.50	13.90	221	16.61	12.91	205
TPS+IPS ¹	Population Ratio of Meter District P-1	199	0.04	0.04	121	0.03	0.03	103	0.03	0.03	102	0.04	0.03	109	0.05	0.04	140	0.05	0.04	131

Notes:

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

Table A-3
Downriver Sewage Disposal System
Monthly Flow Rates by Meter for 2019

System	Meter	Location	Year 2010 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	24,491	6.84	7.64	6.46	8.90	8.64	4.94	3.92	3.33	3.65	4.56	5.32	4.94	5.75
	PC-1	Pelham Interceptor North of Goddard Road	51,210	13.17	15.05	12.79	16.82	16.45	10.64	7.80	6.93	7.30	9.18	10.81	10.13	11.39
	DTW Pond 3 West	Detroit Metro Airport	0	0.96	0.44	1.06	3.98	4.11	3.04	2.33	0.59	0.00	0.00	1.75	0.83	1.59
	DMA-2	Detroit Metro Airport	0	1.54	1.17	1.74	3.70	3.46	2.90	1.71	0.50	0.23	0.22	1.56	0.87	1.63
	PD-2	Goddard Interceptor West of Inkster Road	9,532	4.34	4.94	5.09	8.32	9.36	6.62	4.72	2.72	2.06	2.28	4.53	3.60	4.88
	PD-1	Goddard Interceptor West of Allen Road	21,632	6.81	7.46	7.63	10.55	11.45	8.62	6.00	4.27	3.84	4.62	6.48	5.74	6.95
	PB-1	Northline Interceptor West of Fordline Road	10,921	2.11	2.56	2.44	2.81	2.95	1.99	1.62	1.53	1.57	1.77	1.86	1.89	2.09
	PA-4	Eureka Interceptor near Hannan Road	9,712	2.14	2.30	2.12	2.52	3.41	2.29	1.63	1.44	1.48	1.48	1.79	2.17	2.06
	DMA-1	Detroit Metro Airport Connection to the Eureka Interceptor	0	0.66	0.67	0.67	0.67	0.67	0.72	0.89	0.86	0.74	0.70	0.68	0.64	0.72
	PA-3	Eureka Interceptor at Inkster Road	21,084	7.37	8.19	7.82	8.72	9.86	7.54	6.04	5.47	5.78	6.20	7.26	7.44	7.30
	PA-2	Eureka Interceptor at Allen Road	34,601	10.09	11.61	11.25	12.40	13.56	10.35	7.84	6.97	7.30	7.79	9.15	9.43	9.80
	PA-1	Eureka Interceptor West of Fordline Road	38,730	10.49	12.73	12.36	14.17	16.41	11.18	8.02	7.41	7.83	8.48	9.80	9.93	10.72
	P-2	Pennsylvania Interceptor East of Dix-Toledo Road	10,659	2.69	3.01	2.85	3.02	3.33	2.70	2.35	2.15	2.26	2.35	2.53	2.56	2.65
	P-1	Pennsylvania Interceptor East of Fort Street	142,992	38.66	43.99	41.00	50.65	54.22	38.01	28.39	24.23	24.69	28.52	34.18	32.98	36.56
	RV-1	Pennsylvania Interceptor West of Jefferson Avenue	12,486	2.73	3.15	2.79	3.48	3.70	2.70	1.85	2.09	2.48	2.73	2.46	2.57	2.72
Riverdrive (Controlled)	RR-1	River Rouge CSO Basin Outlet	7,903	3.79	4.56	3.75	6.02	8.14	6.22	6.73	4.90	4.27	4.00	3.75	3.65	4.98
	EC-6	Riverdrive Interceptor South of Southfield Road	21,213	6.70	8.15	6.70	8.97	12.60	10.78	11.12	9.58	7.75	7.05	6.60	6.44	8.54
	RD-1	Riverdrive Interceptor North of Northline Road	73,739	23.32	28.05	23.04	34.61	37.22	28.02	25.73	23.11	20.53	22.28	22.61	20.89	25.76
	SW	On Southgate-Wyandotte Connection	40,635	16.46	21.04	16.80	22.90	20.63	19.58	17.89	16.69	16.27	15.63	16.99	15.75	18.02
	SWB	Southgate-Wyandotte Basin	0	1.22	1.73	1.02	2.33	4.73	12.24	2.59	2.20	2.02	1.48	1.52	0.85	2.82
Tunnel Connection Meters	TSO	Connection to Tunnel at Pelham Basin	0	0.00	0.00	0.00	0.10	2.87	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.25
	APO-1	Allen Park Connection to Tunnel at Belmont and Rosedale Road	0	0.00	0.00	0.00	0.08	0.70	0.00	0.00	0.02	0.00	0.02	0.00	0.00	0.07
	APO-2	Allen Park Connection to Tunnel at Belmont and Quandt Road	0	0.00	0.00	0.09	0.23	0.59	0.00	0.00	0.04	0.00	0.07	0.00	0.03	0.09
	CHPO	Pelham Interceptor Connection to Tunnel North of Haskell Road	0	0.12	0.09	0.21	0.44	1.62	0.01	0.02	0.03	0.00	0.16	0.00	0.14	0.24
	CPO	Pelham Interceptor Connection to Tunnel South of R.R.	0	0.00	0.00	0.00	0.02	1.45	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.13
	PDO	Goddard Interceptor Connection to Tunnel at Allen Road	0	0.00	0.00	0.00	0.00	2.65	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.22
	ER-2	Eureka Relief Sewer Extention Connection to Tunnel at Inkster Road	0	0.00	0.00	0.00	0.07	1.25	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.11
	ER-1	Eureka Relief Sewer Connection to Tunnel at Allen Road	0	0.01	0.00	0.01	0.19	2.24	0.06	0.02	0.00	0.00	0.00	0.00	0.00	0.22
	PM-1	Pennsylvania Interceptor Connection to Tunnel at Fordline Road	0	0.00	0.00	0.00	0.00	3.39	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.29
DWTF	P-1+RD-1+RV-1+SW+SWB +Tunnel Connections	End of Interceptor System Meters	269,853	82.53	98.05	84.97	115.03	136.01	100.63	76.51	68.41	65.99	70.90	77.75	73.23	87.39
	IPS+TPS	DWTF	270,052	79.50	88.82	92.33	122.88	145.92	110.41	86.89	73.68	74.80	76.96	78.59	76.95	92.29

Table A-4
Downriver Sewage Disposal System
Average Flow Rates by Meter

System	Meter	Year 2010 Cumulative Population	January 2019			February 2019			March 2019			April 2019			May 2019			June 2019		
			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	24,491	6.84	5.20	137	7.64	5.76	152	6.46	5.20	137	8.90	5.77	152	8.64	6.39	169	4.94	3.98	105
	PC-1	51,210	13.17	10.37	131	15.05	11.56	146	12.79	10.44	132	16.82	11.45	144	16.45	12.80	162	10.64	8.71	110
	DTW Pond 3 West	0	0.96	0.82	-	0.44	0.40	-	1.06	0.95	-	3.98	3.60	-	4.11	4.10	-	3.04	2.69	-
	DMA-2	0	1.54	1.48	-	1.17	1.17	-	1.74	1.69	-	3.70	3.49	-	3.46	3.51	-	2.90	2.70	-
	PD-2	9,532	4.34	3.91	265	4.94	3.96	269	5.09	4.52	306	8.32	6.80	461	9.36	7.77	527	6.62	6.04	409
	PD-1	21,632	6.81	6.10	182	7.46	6.45	193	7.63	7.01	209	10.55	8.68	259	11.45	9.74	291	8.62	7.82	234
	PB-1	10,921	2.11	1.84	109	2.56	2.12	126	2.44	2.10	124	2.81	2.04	121	2.95	2.12	126	1.99	1.71	101
	PA-4	9,712	2.14	2.00	133	2.30	2.07	138	2.12	1.98	132	2.52	2.15	143	3.41	2.74	182	2.29	2.09	139
	DMA-1	0	0.66	0.67	-	0.67	0.67	-	0.67	0.67	-	0.67	0.67	-	0.67	0.66	-	0.72	0.77	-
	PA-3	21,084	7.37	6.86	210	8.19	7.34	225	7.82	7.27	223	8.72	7.41	227	9.86	8.65	265	7.54	6.92	212
	PA-2	34,601	10.09	9.02	169	11.61	10.32	193	11.25	10.26	192	12.40	10.36	194	13.56	11.69	218	10.35	9.36	175
	PA-1	38,730	10.49	9.08	152	12.73	11.02	184	12.36	10.94	183	14.17	11.10	185	16.41	14.15	236	11.18	9.66	161
	P-2	10,659	2.69	2.53	153	3.01	2.66	161	2.85	2.61	158	3.02	2.58	156	3.33	2.79	169	2.70	2.46	149
	P-1 ¹	142,992	38.66	33.10	150	43.99	36.70	166	41.00	35.93	162	50.65	38.91	176	54.22	43.42	196	38.01	33.32	151
	RV-1	12,486	2.73	2.30	119	3.15	2.35	121	2.79	2.06	107	3.48	2.13	110	3.70	2.44	126	2.70	2.10	109
Riverdrive (Controlled)	RR-1	7,903	3.79	3.03	248	4.56	3.08	252	3.75	3.07	251	6.02	4.17	341	8.14	6.84	559	6.22	5.71	467
	EC-6	21,213	6.70	5.61	171	8.15	6.33	193	6.70	5.91	180	8.97	6.85	209	12.60	10.86	331	10.78	10.45	318
	RD-1	73,739	23.32	16.73	147	28.05	19.96	175	23.04	17.99	158	34.61	20.79	182	37.22	28.01	245	28.02	23.50	206
	SW (with sludge depth)	40,635	16.46	12.71	202	21.04	13.98	222	16.80	13.23	211	22.90	16.18	257	20.63	17.59	280	19.58	16.60	264
	SWB	0	1.22	0.30	-	1.73	0.05	-	1.02	0.01	-	2.33	0.36	-	4.73	2.29	-	12.24	11.56	-
Tunnel Connection Meters	TSO	0	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.10	0.00	-	2.87	0.00	-	0.00	0.00	-
	APO-1	0	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.08	0.00	-	0.70	0.00	-	0.00	0.00	-
	APO-2	0	0.00	0.00	-	0.00	0.00	-	0.09	0.00	-	0.23	0.00	-	0.59	0.00	-	0.00	0.00	-
	CHPO	0	0.12	0.00	-	0.09	0.00	-	0.21	0.03	-	0.44	0.00	-	1.62	0.00	-	0.01	0.00	-
	CPO	0	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.02	0.00	-	1.45	0.00	-	0.00	0.00	-
	PDO	0	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	2.65	0.00	-	0.00	0.00	-
	ER-2	0	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.07	0.00	-	1.25	0.14	-	0.02	0.00	-
	ER-1	0	0.01	0.00	-	0.00	0.00	-	0.01	0.00	-	0.19	0.00	-	2.24	0.40	-	0.06	0.00	-
	PM-1	0	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	3.39	0.00	-	0.00	0.00	-
	Total	0	0.14	0.00	-	0.09	0.00	-	0.32	0.03	-	1.07	0.00	-	15.51	0.40	-	0.07	0.00	-
DWTF	P-1+RV-1+RD-1+SW+SWB +Tunnel Connections	269,853	82.53	65.15	156	98.05	73.03	175	84.97	69.26	166	115.03	78.37	188	136.01	94.15	225	100.63	87.08	209
	IPS+TPS	270,052	79.50	73.43	176	88.82	87.80	210	92.33	80.19	192	122.88	87.62	210	145.92	107.69	258	110.41	101.78	244

Notes:

1) [P-1] = [P-2] + [PA-2] + [PB-1] + [PC-1] + [PD-1] + (P-1 Inc. Pop. / (P-2 Cum. Pop. + PA-2 Cum. Pop. + PB-1 Cum. Pop. + PC-1 Cum. Pop. + PD-1 Cum. Pop.)) x ([P-2] + [PA-2] + [PB-1] + [PC-1] + [PD-1] + [TSO] + [CPO] + [CHPO] + [PDO] + [APO-1] + [APO-2] + [ER-1])

Table A-4 continued
Downriver Sewage Disposal System
Average Flow Rates by Meter

System	Meter	Year 2010 Cumulative Population	July 2019			August 2019			September 2019			October 2019			November 2019			December 2019		
			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 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 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)
Tunnel (Non-Controlled)	TB-1	24,491	3.92	3.15	83	3.33	2.90	77	3.65	3.06	81	4.56	3.32	88	5.32	4.33	114	4.94	3.95	104
	PC-1	51,210	7.80	6.81	86	6.93	6.07	77	7.30	6.16	78	9.18	6.82	86	10.81	8.97	113	10.13	8.13	103
	DTW Pond 3 West	0	2.33	2.81	-	0.59	0.75	-	0.00	0.00	-	0.00	0.00	-	1.75	2.20	-	0.83	0.83	-
	DMA-2	0	1.71	1.93	-	0.50	0.51	-	0.23	0.21	-	0.22	0.20	-	1.56	1.97	-	0.87	0.91	-
	PD-2	9,532	4.72	5.12	347	2.72	2.71	184	2.06	1.91	130	2.28	2.02	137	4.53	4.77	323	3.60	3.38	229
	PD-1	21,632	6.00	6.36	190	4.27	4.22	126	3.84	3.73	112	4.62	4.14	124	6.48	6.48	193	5.74	5.24	157
	PB-1	10,921	1.62	1.51	89	1.53	1.46	86	1.57	1.44	85	1.77	1.51	89	1.86	1.66	98	1.89	1.60	95
	PA-4	9,712	1.63	1.57	105	1.44	1.40	93	1.48	1.46	97	1.48	1.37	91	1.79	1.68	111	2.17	2.24	149
	DMA-1	0	0.89	0.86	-	0.86	0.85	-	0.74	0.73	-	0.70	0.71	-	0.68	0.67	-	0.64	0.63	-
	PA-3	21,084	6.04	5.72	175	5.47	5.35	164	5.78	5.52	169	6.20	5.77	177	7.26	6.80	208	7.44	7.16	220
	PA-2	34,601	7.84	7.37	138	6.97	6.80	127	7.30	6.89	129	7.79	7.10	133	9.15	8.45	158	9.43	8.78	164
	PA-1	38,730	8.02	7.48	125	7.41	7.19	120	7.83	7.33	122	8.48	7.53	126	9.80	8.87	148	9.93	8.89	148
	P-2	10,659	2.35	2.20	133	2.15	2.06	125	2.26	2.10	128	2.35	2.15	130	2.53	2.40	145	2.56	2.34	142
	P-1 ¹	142,992	28.39	26.87	121	24.23	22.84	103	24.69	22.53	102	28.52	24.07	109	34.18	30.98	140	32.98	28.92	131
	RV-1	12,486	1.85	1.71	89	2.09	1.89	98	2.48	1.90	98	2.73	1.89	98	2.46	2.05	106	2.57	1.89	98
Riverdrive (Controlled)	RR-1	7,903	6.73	5.79	473	4.90	4.22	345	4.27	3.63	297	4.00	3.23	264	3.75	3.28	268	3.65	2.99	245
	EC-6	21,213	11.12	10.42	317	9.58	8.84	269	7.75	6.93	211	7.05	5.96	181	6.60	6.08	185	6.44	5.56	169
	RD-1	73,739	25.73	22.00	193	23.11	19.62	172	20.53	16.76	147	22.28	16.01	140	22.61	17.52	154	20.89	15.64	137
	SW (with sludge depth)	40,635	17.89	16.16	257	16.69	14.75	235	16.27	13.11	209	15.63	11.63	185	16.99	13.89	221	15.75	12.76	203
	SWB	0	2.59	1.04	-	2.20	0.32	-	2.02	0.01	-	1.48	0.00	-	1.52	0.01	-	0.85	0.15	-
Tunnel Connection Meters	TSO	0	0.02	0.01	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-
	APO-1	0	0.00	0.00	-	0.02	0.00	-	0.00	0.00	-	0.02	0.00	-	0.00	0.00	-	0.00	0.00	-
	APO-2	0	0.00	0.00	-	0.04	0.00	-	0.00	0.00	-	0.07	0.00	-	0.00	0.00	-	0.03	0.00	-
	CHPO	0	0.02	0.00	-	0.03	0.00	-	0.00	0.00	-	0.16	0.00	-	0.00	0.00	-	0.14	0.00	-
	CPO	0	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.01	0.00	-	0.00	0.00	-	0.00	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	0.01	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-
	ER-1	0	0.02	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	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	0.06	0.01	-	0.09	0.00	-	0.00	0.00	-	0.25	0.00	-	0.00	0.00	-	0.18	0.00	-
DWTF	P-1+RV-1+RD-1+SW+SWB +Tunnel Connections	269,853	76.51	67.80	162	68.41	59.42	142	65.99	54.30	130	70.90	53.60	128	77.75	64.46	154	73.23	59.36	142
	IPS+TPS	270,052	86.89	75.45	181	73.68	61.27	147	74.80	65.03	156	76.96	56.82	136	78.59	65.51	157	76.95	60.96	146

Notes:

1) [P-1] = [P-2] + [PA-2] + [PB-1] + [PC-1] + [PD-1] + [P-1 Inc. Pop. / (P-2 Cum. Pop. + PA-2 Cum. Pop. + PB-1 Cum. Pop. + PC-1 Cum. Pop. + PD-1 Cum. Pop.)] x ([P-2] + [PA-2] + [PB-1] + [PC-1] + [PD-1] + [TSO] + [CPO] + [CHPO] + [PDO] + [APO-1] + [APO-2] + [ER-1])

Appendix B

Precipitation Data for Significant/Major Storm Events

Table B-1
Downriver Sewage Disposal System
Rainfall Event Summary Table

Significant Storm Event 1

Start Date: 3/29/2019

Stop Date: 3/31/2019

Gauge ID	Peak Rainfall (in)								
	1-Hour	2-Hour	3-Hour	6-Hour	12-Hour	24-Hour	2-Day	3-Day	Event Total
R14	0.17	0.30	0.43	0.71	1.05	1.42	1.42	1.42	1.42
R18	0.16	0.28	0.37	0.60	0.89	1.22	1.23	1.23	1.23
R02	0.14	0.27	0.38	0.62	0.92	1.36	1.36	1.36	1.36
R10	0.18	0.31	0.43	0.68	1.01	1.46	1.46	1.46	1.46
DTW	0.14	0.28	0.37	0.63	0.93	1.34	1.34	1.34	1.34
R09	0.14	0.27	0.40	0.67	0.97	1.28	1.28	1.28	1.28
R04	0.18	0.29	0.43	0.76	1.10	1.71	1.71	1.71	1.71
R08	0.13	0.25	0.35	0.63	0.93	1.22	1.26	1.29	1.22
R15	0.14	0.26	0.36	0.64	0.92	1.30	1.31	1.31	1.30
R17	0.17	0.27	0.41	0.72	1.02	1.53	1.53	1.53	1.53
R06	0.18	0.26	0.38	0.70	0.99	1.54	1.54	1.54	1.54
R16	0.00*	0.00*	0.00*	0.00*	0.00*	0.00*	0.00*	0.00*	0.00*
Minimum (in):	0.13	0.25	0.35	0.60	0.89	1.22	1.23	1.23	1.22
Average (in):	0.16	0.28	0.39	0.67	0.98	1.40	1.40	1.41	1.40
Maximum (in):	0.18	0.31	0.43	0.76	1.10	1.71	1.71	1.71	1.71
									Standard Deviation (in):
X.XX*	Missing or suspect data (not used).								0.15
									Coefficient of Variation:
X.XX*									11%

Gauge ID	Recurrence Interval (years)								
	1-Hour	2-Hour	3-Hour	6-Hour	12-Hour	24-Hour	2-Day	3-Day	Maximum
R14	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
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	-	-	-	-	-	-	-	-	-
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
Downriver Sewage Disposal System
Rainfall Event Summary Table

Significant Storm Event 2

Start Date: 4/18/2019

Stop Date: 4/21/2019

Gauge ID	Peak Rainfall (in)								
	1-Hour	2-Hour	3-Hour	6-Hour	12-Hour	24-Hour	2-Day	3-Day	Event Total
R14	0.24	0.44	0.56	0.75	0.76	0.79	1.35	1.40	1.39
R18	0.23	0.41	0.52	0.71	0.71	0.74	1.25	1.29	1.29
R02	0.23	0.45	0.59	0.71	0.72	0.75	1.29	1.29	1.29
R10	0.25	0.46	0.66	0.79	0.80	0.83	1.45	1.46	1.46
DTW	0.22	0.41	0.62	0.74	0.74	0.76	1.29	1.29	1.29
R09	0.21	0.39	0.52	0.61	0.62	0.64	1.13	1.13	1.13
R04	0.32	0.60	0.74	0.84	0.84	0.90	1.66	1.66	1.66
R08	0.21	0.38	0.51	0.63	0.63	0.69	1.29	1.29	1.29
R15	0.23	0.42	0.59	0.71	0.71	0.75	1.30	1.30	1.30
R17	0.30	0.59	0.74	0.88	0.88	0.98	1.65	1.65	1.65
R06	0.35*	0.60*	0.75*	0.86*	0.87*	0.94*	1.56*	1.56*	1.56*
R16	0.27	0.49	0.64	0.75	0.75	0.84	1.51	1.51	1.51
Minimum (in):	0.21	0.38	0.51	0.61	0.62	0.64	1.13	1.13	1.13
Average (in):	0.25	0.46	0.61	0.74	0.74	0.79	1.38	1.39	1.39
Maximum (in):	0.32	0.60	0.74	0.88	0.88	0.98	1.66	1.66	1.66
									Standard Deviation (in):
X.XX*	Missing or suspect data (not used).								0.17
									Coefficient of Variation:
X.XX*	Missing or suspect data (not used).								12%

Gauge ID	Recurrence Interval (years)								
	1-Hour	2-Hour	3-Hour	6-Hour	12-Hour	24-Hour	2-Day	3-Day	Maximum
R14	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
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	-	-	-	-	-	-	-	-	-
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-3
Downriver Sewage Disposal System
Rainfall Event Summary Table

Significant Storm Event 3

Start Date: 4/30/2019

Stop Date: 5/1/2019

Gauge ID	Peak Rainfall (in)								
	1-Hour	2-Hour	3-Hour	6-Hour	12-Hour	24-Hour	2-Day	3-Day	Event Total
R14	0.63	0.87	1.23	1.82	2.13	2.13	2.25	2.37	2.13
R18	1.24	1.58	2.02	2.64	2.95	2.97	3.13	3.26	2.97
R02	0.67	1.09	1.52	2.22	2.38	2.44	2.58	2.72	2.44
R10	0.88	1.33	2.02	2.73	3.04	3.06	3.23	3.39	3.06
DTW	1.05	1.56	1.97	2.88	3.20	3.28	3.41	3.55	3.28
R09	0.74	1.18	1.45	2.01	2.13	2.19	2.31	2.49	2.19
R04	1.10	1.19	1.38	1.87	1.91	1.95	2.06	2.22	1.95
R08	0.79	1.19	1.47	2.03	2.13	2.17	2.29	2.42	2.16
R15	1.22	1.73	2.21	2.81	3.06	3.12	3.23	3.36	3.12
R17	0.86	1.03	1.24	1.82	1.86	1.89	1.99	2.16	1.89
R06	0.77*	0.88*	1.02*	1.02*	1.02*	1.02*	1.18*	1.18*	1.02*
R16	0.89	1.09	1.35	1.80	1.85	1.90	2.01	2.15	1.90
Minimum (in):	0.63	0.87	1.23	1.80	1.85	1.89	1.99	2.15	1.89
Average (in):	0.92	1.26	1.62	2.24	2.42	2.46	2.59	2.74	2.46
Maximum (in):	1.24	1.73	2.21	2.88	3.20	3.28	3.41	3.55	3.28
									Standard Deviation (in):
X.XX*	Missing or suspect data (not used).								0.54
									Coefficient of Variation:
X.XX*									22%

Gauge ID	Recurrence Interval (years)								
	1-Hour	2-Hour	3-Hour	6-Hour	12-Hour	24-Hour	2-Day	3-Day	Maximum
R14	< 1	< 1	< 1	2	2	1	< 1	< 1	2
R18	3	4	6	11	11	7	4	4	11
R02	< 1	< 1	2	5	4	3	2	1	5
R10	< 1	2	6	13	12	7	5	4	13
DTW	1	3	5	16	16	10	6	5	16
R09	< 1	< 1	2	3	2	1	< 1	< 1	3
R04	2	1	1	3	1	< 1	< 1	< 1	3
R08	< 1	1	2	4	2	1	< 1	< 1	4
R15	3	5	9	14	13	8	5	4	14
R17	< 1	< 1	< 1	2	1	< 1	< 1	< 1	2
R06	-	-	-	-	-	-	-	-	-
R16	< 1	< 1	1	2	1	< 1	< 1	< 1	2
Minimum:	< 1	< 1	< 1	2	1	< 1	< 1	< 1	2
Average:	1	2	3	7	6	4	3	2	7
Maximum:	3	5	9	16	16	10	6	5	16

-	Missing or suspect data (not used).
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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
Downriver Sewage Disposal System
Rainfall Event Summary Table

Significant Storm Event 4

Start Date: 5/18/2019

Stop Date: 5/19/2019

Gauge ID	Peak Rainfall (in)								
	1-Hour	2-Hour	3-Hour	6-Hour	12-Hour	24-Hour	2-Day	3-Day	Event Total
R14	0.56	0.74	0.76	0.79	0.79	0.79	1.14	1.14	1.14
R18	0.36	0.54	0.54	0.56	0.56	0.56	0.97	0.97	0.97
R02	0.42	0.43	0.46	0.46	0.46	0.46	0.92	0.92	0.92
R10	0.43	0.48	0.50	0.50	0.50	0.50	0.77	0.77	0.76
DTW	0.29	0.46	0.46	0.46	0.46	0.46	0.80	0.80	0.80
R09	0.44	0.50	0.52	0.52	0.52	0.52	1.00	1.00	1.00
R04	0.73	0.75	0.78	0.78	0.78	0.78	1.35	1.35	1.35
R08	0.39	0.46	0.47	0.47	0.47	0.47	0.86	0.86	0.86
R15	0.35	0.37	0.38	0.38	0.38	0.38	0.75	0.75	0.75
R17	0.55	0.63	0.65	0.65	0.65	0.65	1.16	1.16	1.16
R06	0.71	0.73	0.76	0.76	0.76	0.76	1.42	1.42	1.42
R16	0.78	0.80	0.82	0.82	0.83	0.83	1.33	1.33	1.32
Minimum (in):	0.29	0.37	0.38	0.38	0.38	0.38	0.75	0.75	0.75
Average (in):	0.50	0.57	0.59	0.60	0.60	0.60	1.04	1.04	1.04
Maximum (in):	0.78	0.80	0.82	0.82	0.83	0.83	1.42	1.42	1.42
									Standard Deviation (in):
X.XX*	Missing or suspect data (not used).								0.24
									Coefficient of Variation:
X.XX*									23%

Gauge ID	Recurrence Interval (years)								
	1-Hour	2-Hour	3-Hour	6-Hour	12-Hour	24-Hour	2-Day	3-Day	Maximum
R14	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
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-5
Downriver Sewage Disposal System
Rainfall Event Summary Table

Significant Storm Event 5

Start Date: 7/19/2019

Stop Date: 7/19/2019

Gauge ID	Peak Rainfall (in)								
	1-Hour	2-Hour	3-Hour	6-Hour	12-Hour	24-Hour	2-Day	3-Day	Event Total
R14	0.87	1.22	1.46	1.78	2.04	2.04	2.12	2.23	2.04
R18	0.60	0.97	1.24	1.56	1.61	1.61	1.69	1.78	1.61
R02	1.10	2.03	2.16	2.25	2.27	2.27	2.49	2.56	2.27
R10	0.95	1.30	1.60	2.05	2.05	2.05	2.26	2.34	2.05
DTW	0.65	1.14	1.55	1.61	1.61	1.61	1.71	1.80	1.61
R09	0.61	0.99	1.17	1.37	1.37	1.37	1.48	1.48	1.37
R04	1.40	2.07	2.22	2.24	2.24	2.24	2.52	2.61	2.24
R08	0.00*	0.00*	0.00*	0.00*	0.00*	0.00*	0.00*	0.00*	0.00*
R15	0.00*	0.00*	0.00*	0.00*	0.00*	0.00*	0.00*	0.00*	0.00*
R17	0.50	0.79	0.87	0.87	0.87	0.87	0.96	1.07	0.87
R06	0.51	0.68	0.74	0.74	0.74	0.74	1.05	1.18	0.74
R16	0.25	0.34	0.35	0.35	0.35	0.35	0.47	0.55	0.35
Minimum (in):	0.25	0.34	0.35	0.35	0.35	0.35	0.47	0.55	0.35
Average (in):	0.74	1.15	1.34	1.48	1.52	1.52	1.68	1.76	1.52
Maximum (in):	1.40	2.07	2.22	2.25	2.27	2.27	2.52	2.61	2.27
									Standard Deviation (in):
X.XX*	Missing or suspect data (not used).								0.67
									Coefficient of Variation:
X.XX*									44%

Gauge ID	Recurrence Interval (years)								
	1-Hour	2-Hour	3-Hour	6-Hour	12-Hour	24-Hour	2-Day	3-Day	Maximum
R14	< 1	1	2	2	2	< 1	< 1	< 1	2
R18	< 1	< 1	< 1	1	< 1	< 1	< 1	< 1	1
R02	2	10	9	5	3	2	1	< 1	10
R10	< 1	2	2	4	2	< 1	< 1	< 1	4
DTW	< 1	< 1	2	1	< 1	< 1	< 1	< 1	2
R09	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
R04	5	10	9	5	3	2	2	1	10
R08	-	-	-	-	-	-	-	-	-
R15	-	-	-	-	-	-	-	-	-
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	3	3	2	1	< 1	< 1	< 1	3
Maximum:	5	10	9	5	3	2	2	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.

Table B-6
Downriver Sewage Disposal System
Rainfall Event Summary Table

Significant Storm Event 6

Start Date: 8/18/2019

Stop Date: 8/18/2019

Gauge ID	Peak Rainfall (in)								
	1-Hour	2-Hour	3-Hour	6-Hour	12-Hour	24-Hour	2-Day	3-Day	Event Total
R14	0.44	0.47	0.50	0.50	0.56	0.56	0.82	1.06	0.56
R18	0.48	0.52	0.55	0.55	0.68	0.68	0.68	0.72	0.68
R02	0.99	1.02	1.09	1.09	1.41	1.42	1.42	1.46	1.41
R10	0.89	0.93	0.97	0.99	1.10	1.10	1.10	1.19	1.10
DTW	0.86	1.09	1.11	1.15	1.28	1.28	1.28	1.33	1.28
R09	1.14	1.18	1.26	1.33	1.47	1.47	1.47	1.52	1.47
R04	0.67	0.70	0.70	0.71	1.41	1.41	1.41	1.57	1.41
R08	1.29	1.32	1.40	1.45	1.51	1.52	1.52	1.54	1.51
R15	0.80	0.86	0.92	0.96	1.02	1.02	1.02	1.06	1.02
R17	0.46	0.49	0.63	0.69	0.90	0.90	0.90	0.94	0.90
R06	0.49	0.54	0.72	0.72	1.22	1.22	1.22	1.26	1.22
R16	1.11	1.16	1.32	1.36	1.42	1.43	1.43	1.46	1.42
Minimum (in):	0.44	0.47	0.50	0.50	0.56	0.56	0.68	0.72	0.56
Average (in):	0.80	0.86	0.93	0.96	1.17	1.17	1.19	1.26	1.17
Maximum (in):	1.29	1.32	1.40	1.45	1.51	1.52	1.52	1.57	1.51
									Standard Deviation (in):
X.XX*	Missing or suspect data (not used).								0.32
									Coefficient of Variation:
X.XX*									27%

Gauge ID	Recurrence Interval (years)								
	1-Hour	2-Hour	3-Hour	6-Hour	12-Hour	24-Hour	2-Day	3-Day	Maximum
R14	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
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	2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	2
R04	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
R08	3	2	1	< 1	< 1	< 1	< 1	< 1	3
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	2	< 1	1	< 1	< 1	< 1	< 1	< 1	2
Minimum:	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Average:	1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	1
Maximum:	3	2	1	< 1	< 1	< 1	< 1	< 1	3

- 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
Downriver Sewage Disposal System
Rainfall Event Summary Table

Significant Storm Event 7

Start Date: 9/11/2019

Stop Date: 9/13/2019

Gauge ID	Peak Rainfall (in)								
	1-Hour	2-Hour	3-Hour	6-Hour	12-Hour	24-Hour	2-Day	3-Day	Event Total
R14	1.03	1.23	1.28	1.37	1.50	1.53	2.11	2.14	2.14
R18	0.64	0.85	0.92	1.00	1.39	1.57	1.62	2.02	2.02
R02	0.67	0.81	0.86	0.95	1.45	1.69	1.70	2.07	2.07
R10	0.58	0.93	0.97	1.08	1.23	1.34	1.57	1.73	1.73
DTW	0.41	0.79	0.83	0.95	1.03	1.10	1.43	1.50	1.50
R09	0.44	0.64	0.68	0.79	0.92	1.02	1.34	1.44	1.44
R04	0.93	1.09	1.12	1.21	1.71	1.92	2.35	2.86	2.86
R08	0.46	0.66	0.69	0.83	0.90	0.98	1.32	1.40	1.40
R15	0.51	0.75	0.76	0.86	0.94	0.96	1.31	1.33	1.33
R17	0.57	0.77	0.77	0.77	0.94	1.03	1.60	1.81	1.81
R06	1.18	1.18	1.18	1.20	2.11	2.21	2.21	2.78	2.78
R16	0.66	0.83	0.85	0.98	1.07	1.14	1.76	1.87	1.87
Minimum (in):	0.41	0.64	0.68	0.77	0.90	0.96	1.31	1.33	1.33
Average (in):	0.67	0.88	0.91	1.00	1.27	1.37	1.69	1.91	1.91
Maximum (in):	1.18	1.23	1.28	1.37	2.11	2.21	2.35	2.86	2.86
									Standard Deviation (in):
X.XX*	Missing or suspect data (not used).								0.50
									Coefficient of Variation:
X.XX*									26%

Gauge ID	Recurrence Interval (years)								
	1-Hour	2-Hour	3-Hour	6-Hour	12-Hour	24-Hour	2-Day	3-Day	Maximum
R14	1	1	< 1	< 1	< 1	< 1	< 1	< 1	1
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	2	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	2	< 1	< 1	< 1	2	2	< 1	2	2
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	2	2	1	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-8
Downriver Sewage Disposal System
Rainfall Event Summary Table

Significant Storm Event 8

Start Date: 10/2/2019

Stop Date: 10/3/2019

Gauge ID	Peak Rainfall (in)								
	1-Hour	2-Hour	3-Hour	6-Hour	12-Hour	24-Hour	2-Day	3-Day	Event Total
R14	0.32	0.51	0.52	0.54	0.68	1.00	1.00	1.00	1.00
R18	0.32	0.48	0.49	0.51	0.66	0.89	0.90	0.90	0.90
R02	0.28	0.43	0.44	0.46	0.75	0.97	0.97	0.97	0.97
R10	0.31	0.49	0.50	0.53	0.72	0.98	0.98	0.98	0.98
DTW	0.30	0.40	0.46	0.49	0.66	0.94	0.95	0.95	0.94
R09	0.34	0.49	0.50	0.52	0.71	0.94	0.94	0.94	0.94
R04	0.32	0.47	0.48	0.52	0.83	1.14	1.14	1.14	1.14
R08	0.30	0.43	0.45	0.47	0.69	0.99	1.00	1.00	1.00
R15	0.00*	0.00*	0.00*	0.00*	0.00*	0.00*	0.00*	0.00*	0.00*
R17	0.32	0.48	0.49	0.51	0.80	1.07	1.07	1.07	1.07
R06	0.35	0.51	0.51	0.53	0.78	1.07	1.07	1.07	1.07
R16	0.33	0.49	0.50	0.53	0.75	1.11	1.12	1.12	1.12
Minimum (in):	0.28	0.40	0.44	0.46	0.66	0.89	0.90	0.90	0.90
Average (in):	0.32	0.47	0.49	0.51	0.73	1.01	1.01	1.01	1.01
Maximum (in):	0.35	0.51	0.52	0.54	0.83	1.14	1.14	1.14	1.14
									Standard Deviation (in):
X.XX*	Missing or suspect data (not used).								0.08
									Coefficient of Variation:
X.XX*									8%

Gauge ID	Recurrence Interval (years)								
	1-Hour	2-Hour	3-Hour	6-Hour	12-Hour	24-Hour	2-Day	3-Day	Maximum
R14	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
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	-	-	-	-	-	-	-	-	-
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
Downriver Sewage Disposal System
Rainfall Event Summary Table

Significant Storm Event 9

Start Date: 10/26/2019

Stop Date: 10/27/2019

Gauge ID	Peak Rainfall (in)								
	1-Hour	2-Hour	3-Hour	6-Hour	12-Hour	24-Hour	2-Day	3-Day	Event Total
R14	0.50	0.73	0.95	1.30	1.43	1.54	1.54	1.54	1.54
R18	0.54	0.78	0.98	1.31	1.47	1.61	1.61	1.71	1.61
R02	0.33	0.56	0.72	1.13	1.35	1.38	1.38	1.48	1.38
R10	0.55	0.77	0.96	1.27	1.39	1.46	1.46	1.56	1.45
DTW	0.44	0.73	0.91	1.23	1.37	1.38	1.38	1.38	1.38
R09	0.53	0.76	0.96	1.30	1.42	1.45	1.45	1.45	1.45
R04	0.47	0.69	0.90	1.26	1.38	1.46	1.47	1.57	1.46
R08	0.45	0.66	0.84	1.11	1.21	1.27	1.27	1.37	1.27
R15	0.48	0.68	0.88	1.15	1.26	1.32	1.32	1.42	1.32
R17	0.44	0.64	0.86	1.15	1.27	1.32	1.32	1.42	1.32
R06	0.00*	0.00*	0.00*	0.00*	0.00*	0.00*	0.00*	0.00*	0.00*
R16	0.48	0.66	0.86	1.17	1.29	1.34	1.34	1.45	1.34
Minimum (in):	0.33	0.56	0.72	1.11	1.21	1.27	1.27	1.37	1.27
Average (in):	0.47	0.70	0.89	1.22	1.35	1.41	1.41	1.49	1.41
Maximum (in):	0.55	0.78	0.98	1.31	1.47	1.61	1.61	1.71	1.61
									Standard Deviation (in):
X.XX*	Missing or suspect data (not used).								0.10
									Coefficient of Variation:
X.XX*									7%

Gauge ID	Recurrence Interval (years)								
	1-Hour	2-Hour	3-Hour	6-Hour	12-Hour	24-Hour	2-Day	3-Day	Maximum
R14	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
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	-	-	-	-	-	-	-	-	-
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-10
Downriver Sewage Disposal System
Rainfall Event Summary Table

Significant Storm Event 10

Start Date: 10/29/2019

Stop Date: 10/31/2019

Gauge ID	Peak Rainfall (in)								
	1-Hour	2-Hour	3-Hour	6-Hour	12-Hour	24-Hour	2-Day	3-Day	Event Total
R14	0.23	0.36	0.52	0.90	0.98	1.28	1.55	1.55	1.53
R18	0.25	0.37	0.49	0.91	0.98	1.27	1.40	1.40	1.40
R02	0.19	0.31	0.42	0.71	0.96	1.07	1.43	1.43	1.43
R10	0.19	0.33	0.46	0.80	0.91	1.18	1.37	1.37	1.37
DTW	0.17	0.26	0.40	0.71	0.83	1.04	1.27	1.27	1.27
R09	0.22	0.32	0.42	0.67	0.92	1.04	1.50	1.50	1.50
R04	0.26	0.38	0.54	0.85	1.25	1.40	1.94	1.94	1.94
R08	0.21	0.29	0.42	0.65	0.84	1.04	1.36	1.36	1.36
R15	0.24	0.34	0.47	0.71	0.83	1.10	1.34	1.34	1.34
R17	0.23	0.35	0.49	0.78	1.03	1.28	1.67	1.67	1.67
R06	0.00*	0.00*	0.00*	0.00*	0.00*	0.00*	0.00*	0.00*	0.00*
R16	0.25	0.34	0.49	0.77	0.94	1.22	1.56	1.56	1.56
Minimum (in):	0.17	0.26	0.40	0.65	0.83	1.04	1.27	1.27	1.27
Average (in):	0.22	0.33	0.47	0.77	0.95	1.17	1.49	1.49	1.49
Maximum (in):	0.26	0.38	0.54	0.91	1.25	1.40	1.94	1.94	1.94
									Standard Deviation (in):
X.XX*	Missing or suspect data (not used).								0.19
									Coefficient of Variation:
X.XX*									13%

Gauge ID	Recurrence Interval (years)								
	1-Hour	2-Hour	3-Hour	6-Hour	12-Hour	24-Hour	2-Day	3-Day	Maximum
R14	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
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	-	-	-	-	-	-	-	-	-
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
Downriver Sewage Disposal System
Rainfall Event Summary Table

Significant Storm Event 11

Start Date: 12/29/2019

Stop Date: 12/30/2019

Gauge ID	Peak Rainfall (in)								
	1-Hour	2-Hour	3-Hour	6-Hour	12-Hour	24-Hour	2-Day	3-Day	Event Total
R14	0.32	0.49	0.61	0.78	0.78	1.52	1.53	1.53	1.51
R18	0.34	0.51	0.63	0.83	0.83	1.45	1.46	1.47	1.46
R02	0.00*	0.00*	0.00*	0.00*	0.00*	0.00*	0.00*	0.00*	0.00*
R10	0.34	0.51	0.67	0.86	0.86	1.54	1.55	1.56	1.54
DTW	0.26	0.43	0.58	0.76	0.81	1.53	1.58	1.61	1.57
R09	0.30	0.49	0.68	0.85	0.86	1.71	1.74	1.74	1.71
R04	0.44	0.69	0.92	1.08	1.08	2.00	2.06	2.10	2.01
R08	0.30	0.52	0.70	0.85	0.85	1.52	1.53	1.54	1.53
R15	0.30	0.49	0.70	0.83	0.83	1.53	1.55	1.60	1.53
R17	0.39	0.62	0.84	0.98	0.98	1.66	1.67	1.68	1.65
R06	0.00*	0.00*	0.00*	0.00*	0.00*	0.00*	0.00*	0.00*	0.00*
R16	0.35	0.59	0.78	0.90	0.90	1.55	1.58	1.59	1.56
Minimum (in):	0.26	0.43	0.58	0.76	0.78	1.45	1.46	1.47	1.46
Average (in):	0.33	0.53	0.71	0.87	0.88	1.60	1.63	1.64	1.61
Maximum (in):	0.44	0.69	0.92	1.08	1.08	2.00	2.06	2.10	2.01
									Standard Deviation (in):
X.XX*	Missing or suspect data (not used).								0.16
									Coefficient of Variation:
X.XX*									10%

Gauge ID	Recurrence Interval (years)								
	1-Hour	2-Hour	3-Hour	6-Hour	12-Hour	24-Hour	2-Day	3-Day	Maximum
R14	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
R18	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
R02	-	-	-	-	-	-	-	-	-
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	-	-	-	-	-	-	-	-	-
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:

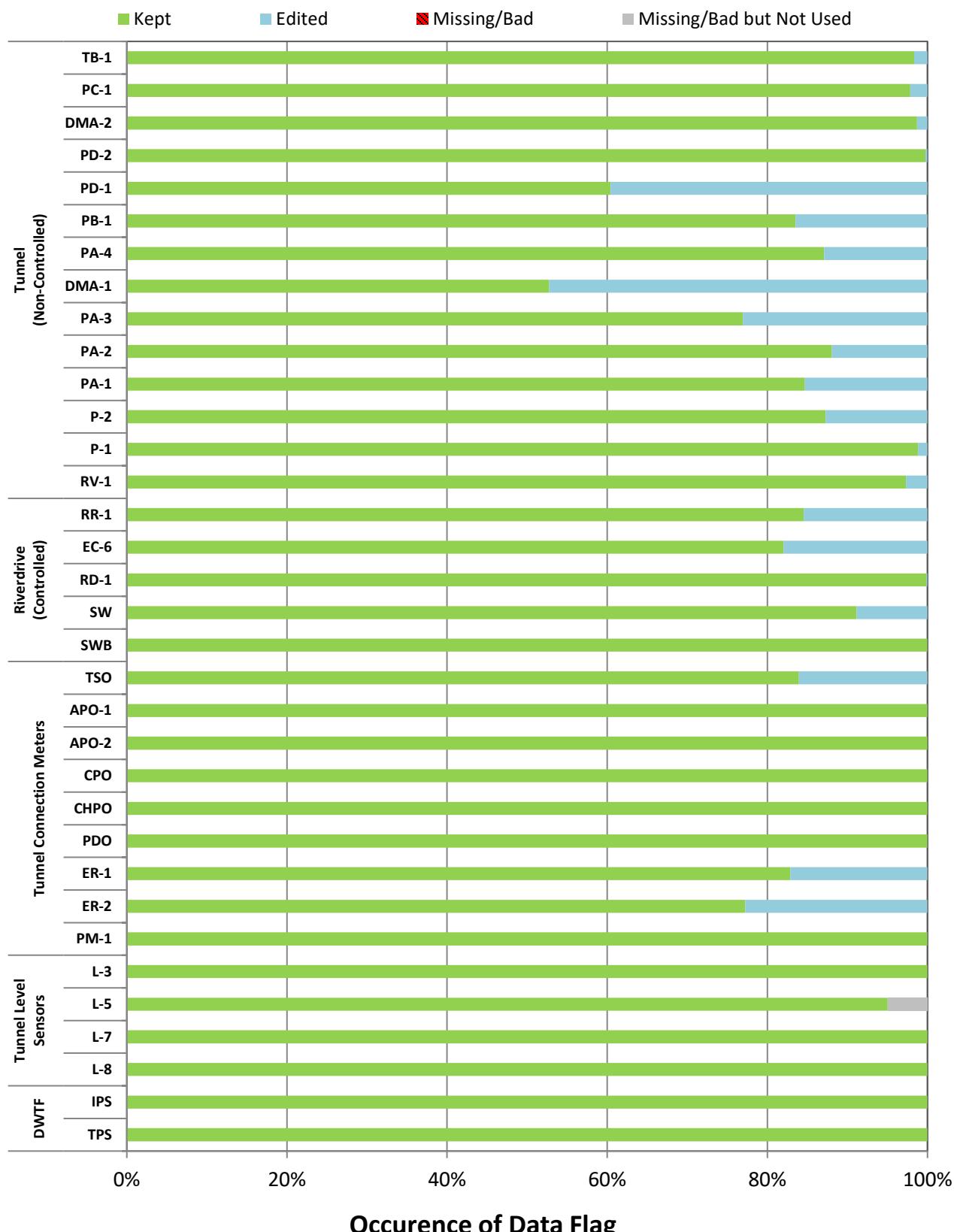
- 1) Return periods determined from point precipitation frequency (PF) estimates from NOAA Atlas 14, Volume 8, Version 2 published in 2013. NOAA Atlas 14 is the current reference document for return frequency as of 2013.
- 2) Return periods calculated by linear interpolation between the published whole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

Appendix C

Meter Data Summaries

Downriver Sewage Disposal System

2019 Data Flags



Downriver Sewage Disposal System

Meter Report

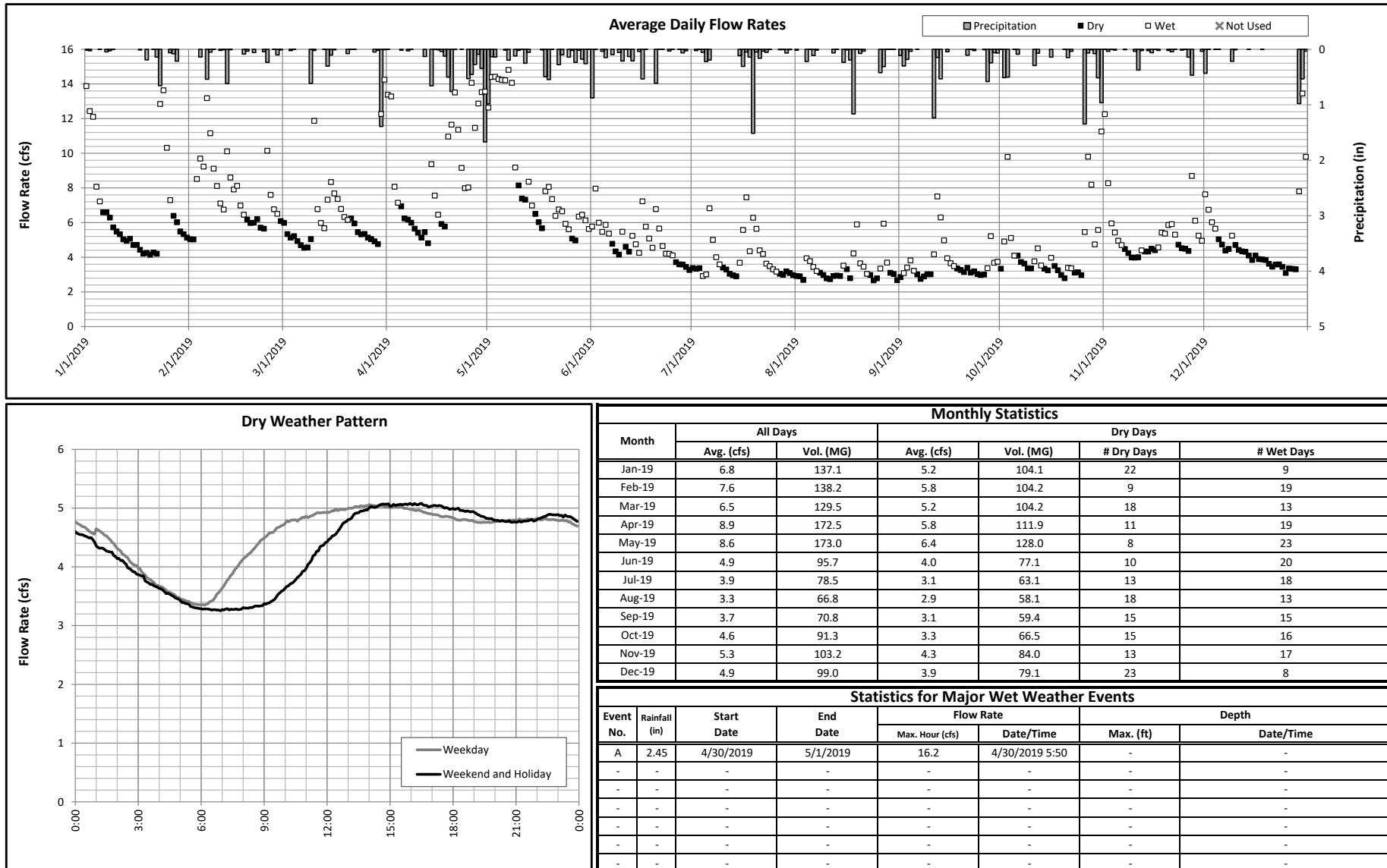
Meter: TB-1

Type: Magmeter

Location: Taylor Basin

System Meter Type: Interceptor Flow Meter

Period: 1/1/2019 through 12/31/2019



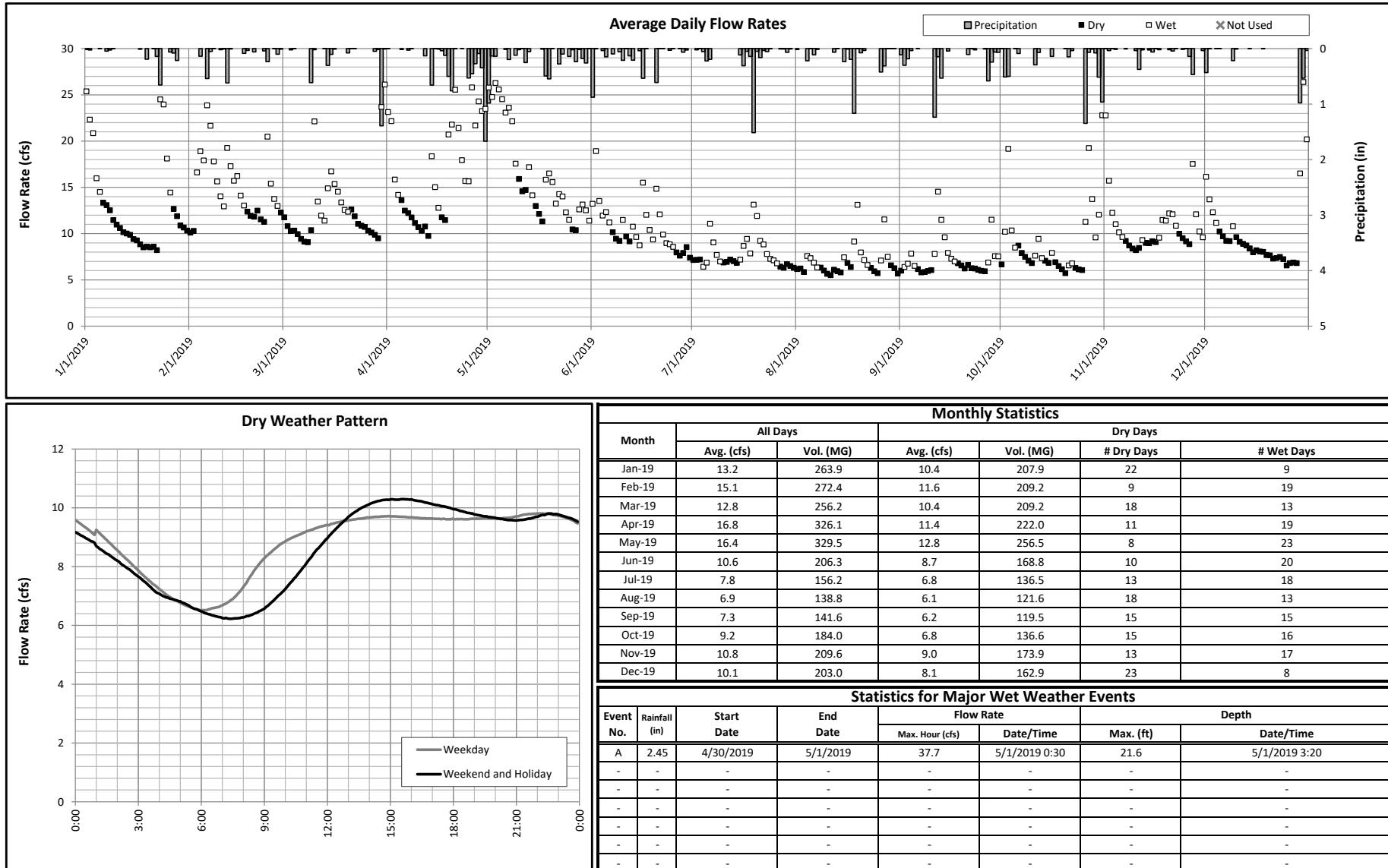
Downriver Sewage Disposal System

Meter Report

Meter: PC-1
Type: ACCUSONIC 7510

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

Period: 1/1/2019 through 12/31/2019



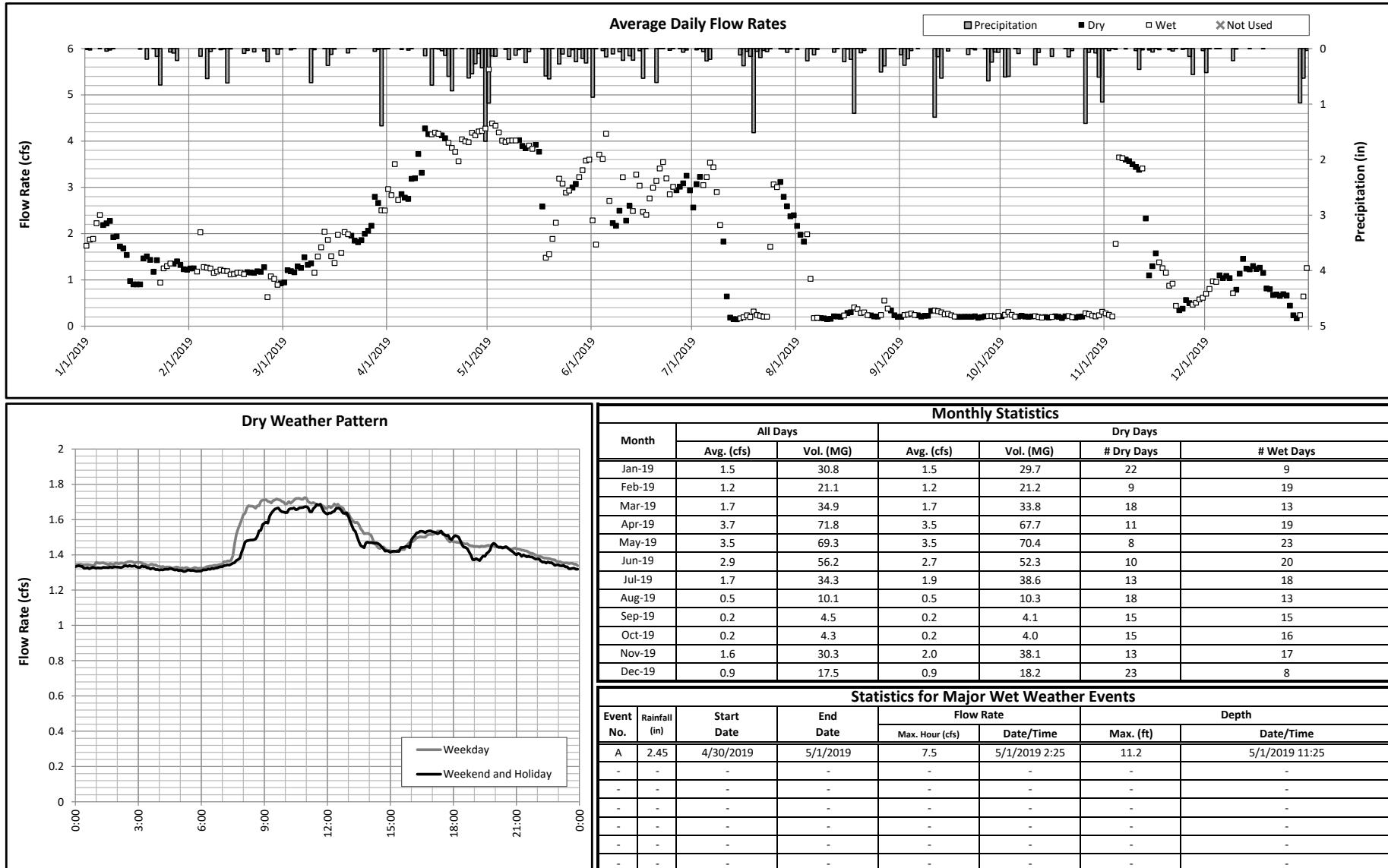
Downriver Sewage Disposal System

Meter Report

Meter: DMA-2
Type: ADS Triton

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

Period: 1/1/2019 through 12/31/2019



Downriver Sewage Disposal System

Meter Report

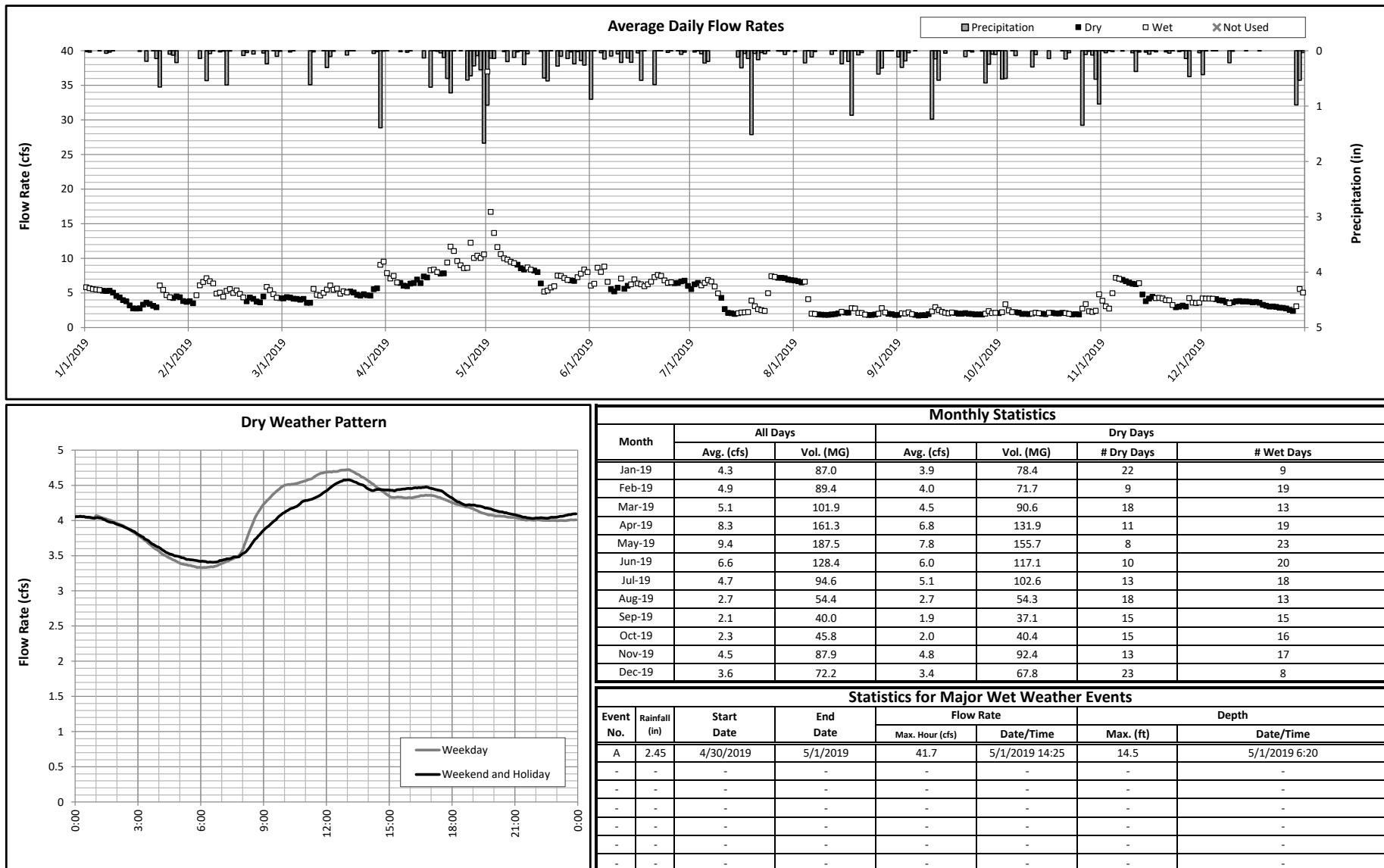
Meter: PD-2

Type: Accusonic 7510

Location: Goddard Interceptor West of Inkster Road

System Meter Type: Interceptor Flow Meter

Period: 1/1/2019 through 12/31/2019



Downriver Sewage Disposal System

Meter Report

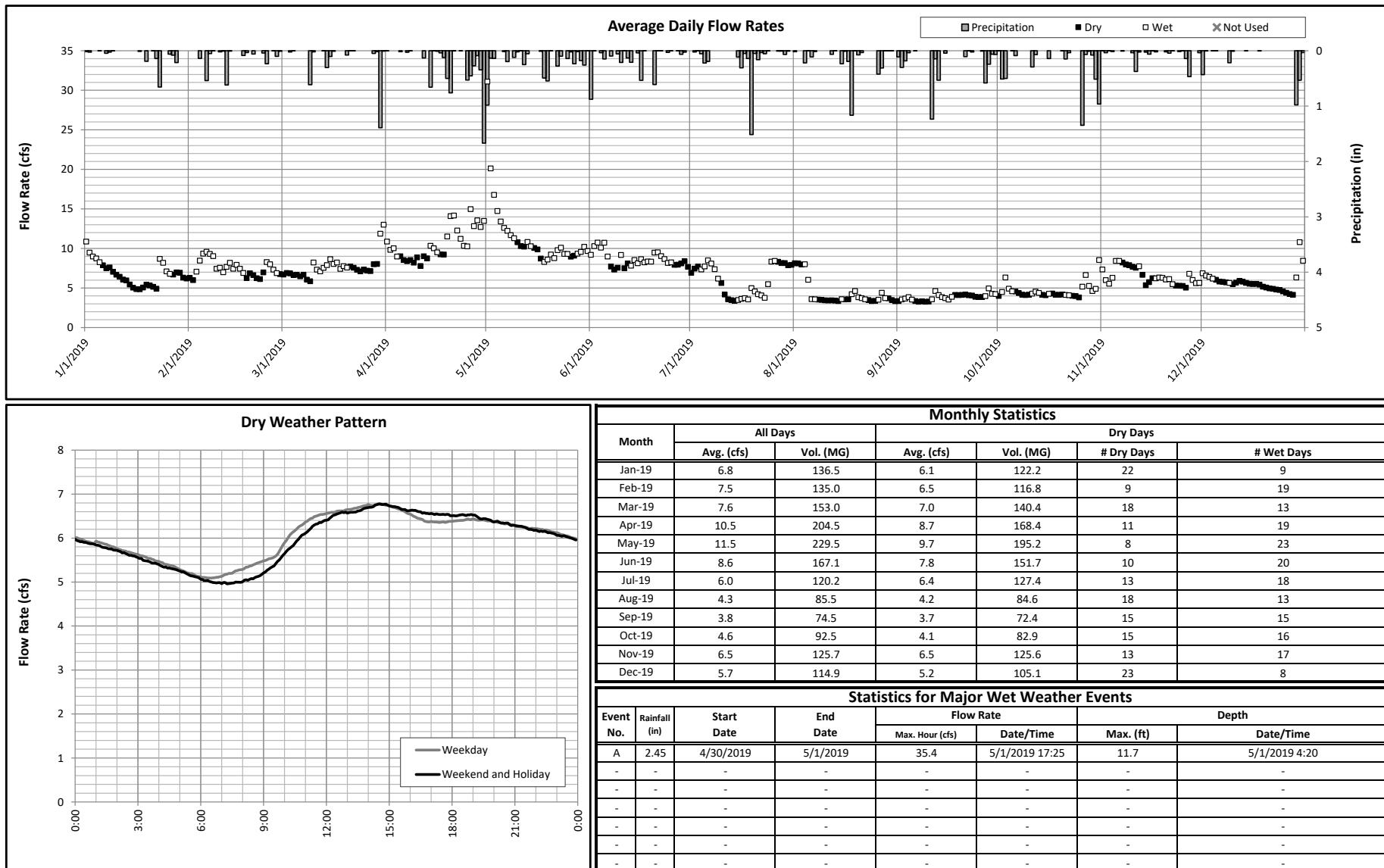
Meter: PD-1

Type: ADS Triton+

Location: Goddard Interceptor West of Allen Road

System Meter Type: Interceptor Flow Meter

Period: 1/1/2019 through 12/31/2019



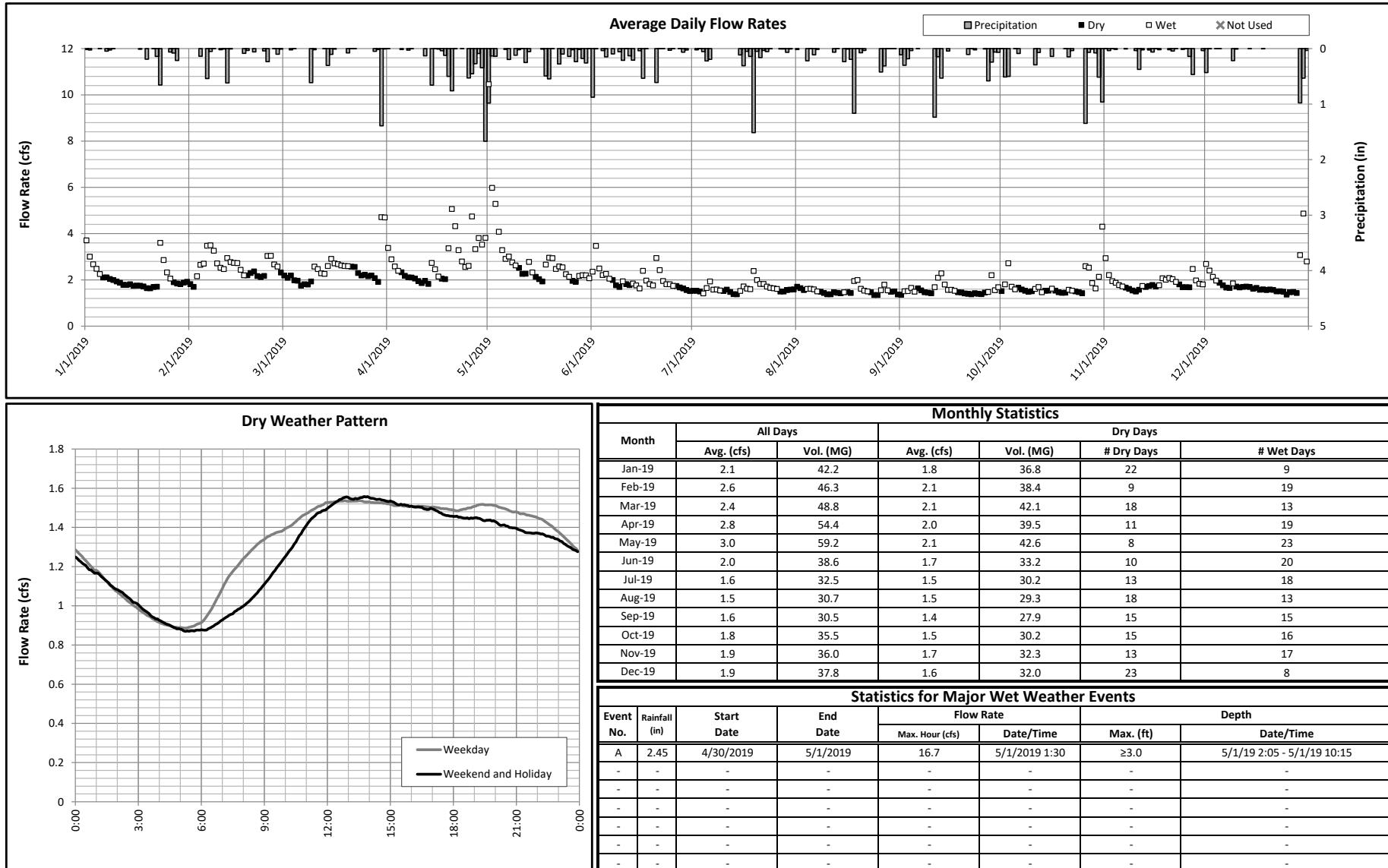
Downriver Sewage Disposal System

Meter Report

Meter: PB-1
Type: ADS Triton

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

Period: 1/1/2019 through 12/31/2019



Downriver Sewage Disposal System

Meter Report

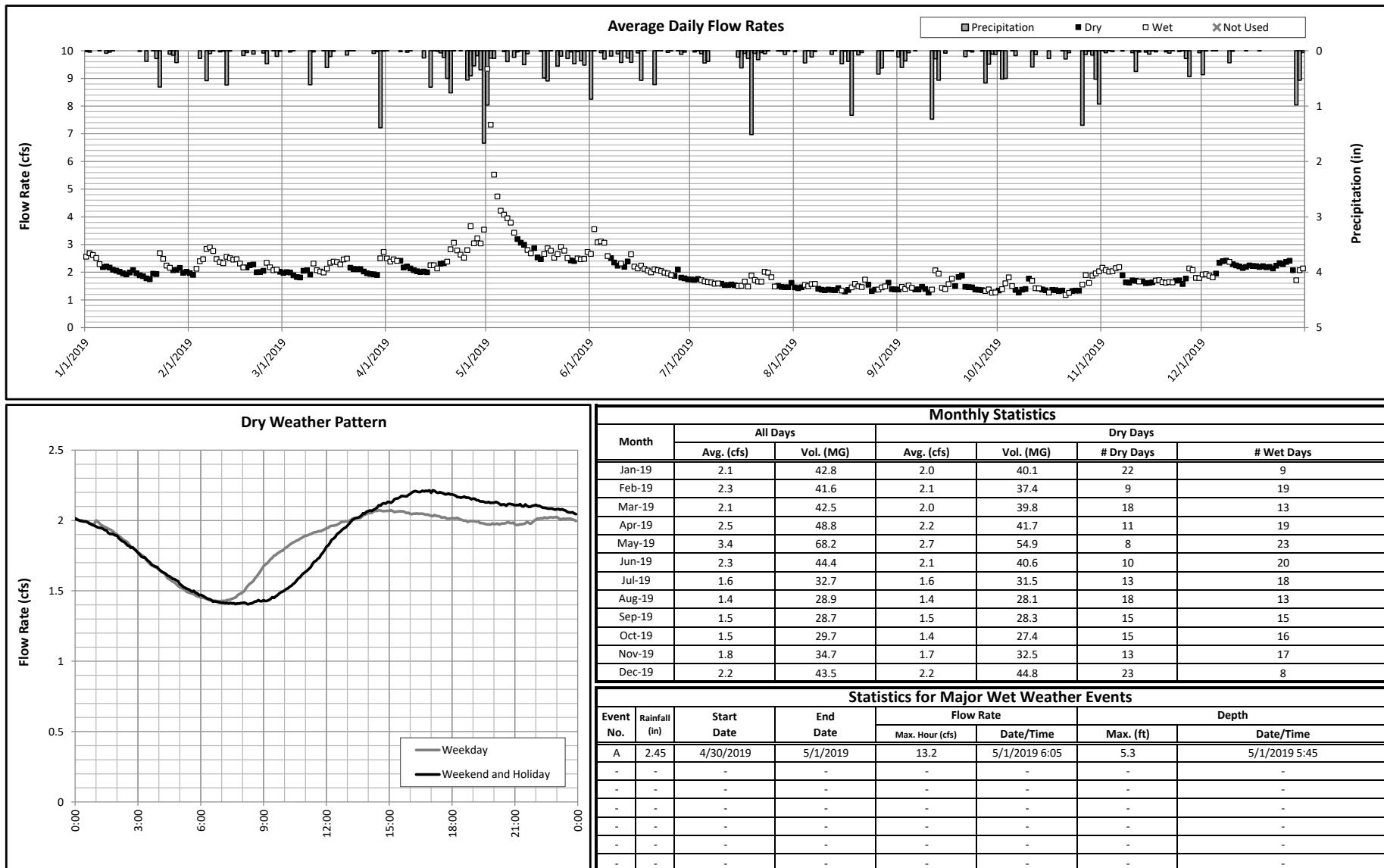
Meter: PA-4

Type: ADS Triton+

Location: Eureka Interceptor near Hannan Road

System Meter Type: Interceptor Flow Meter

Period: 1/1/2019 through 12/31/2019



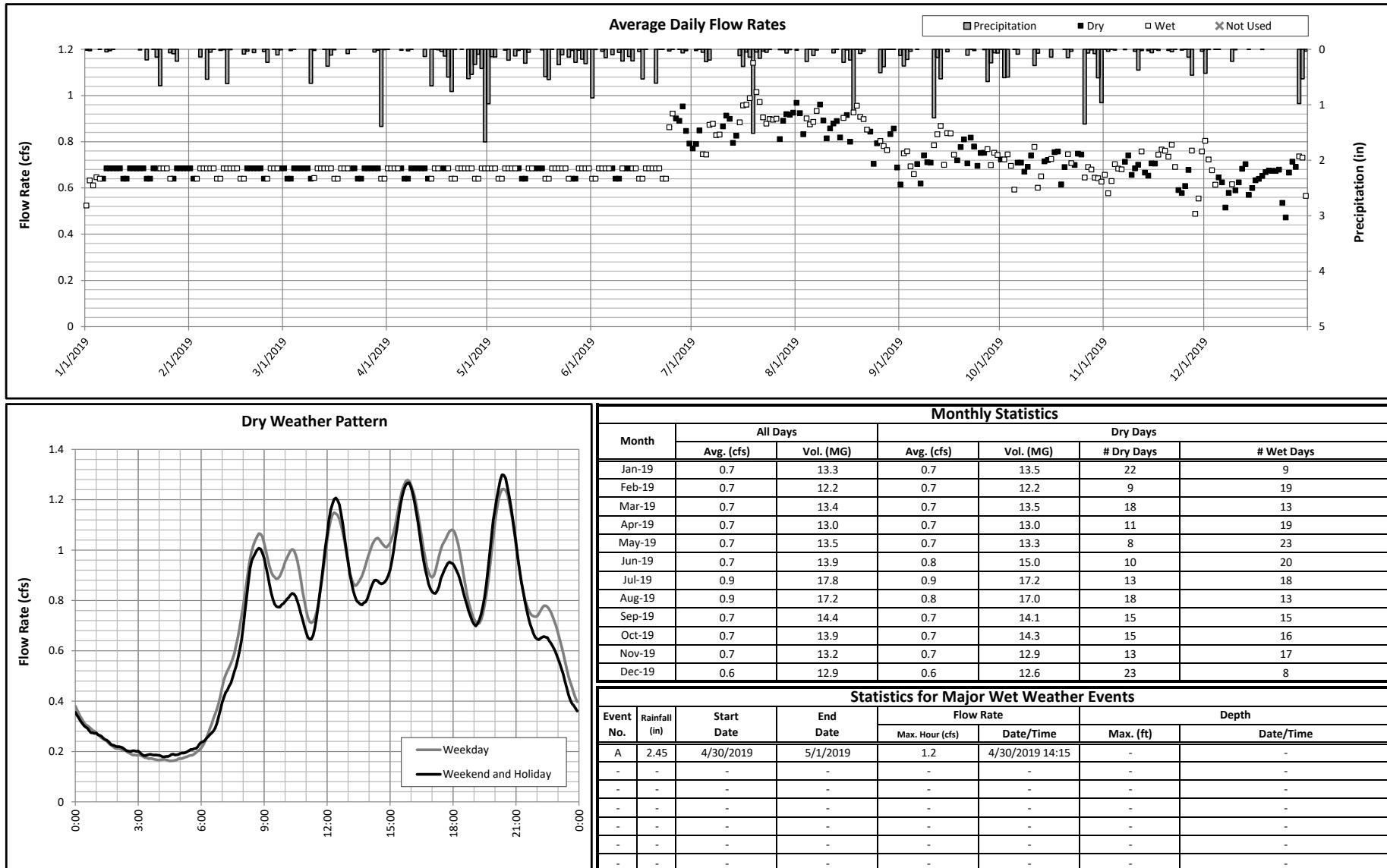
Downriver Sewage Disposal System

Meter Report

Meter: DMA-1
Type: ADS Triton+

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

Period: 1/1/2019 through 12/31/2019



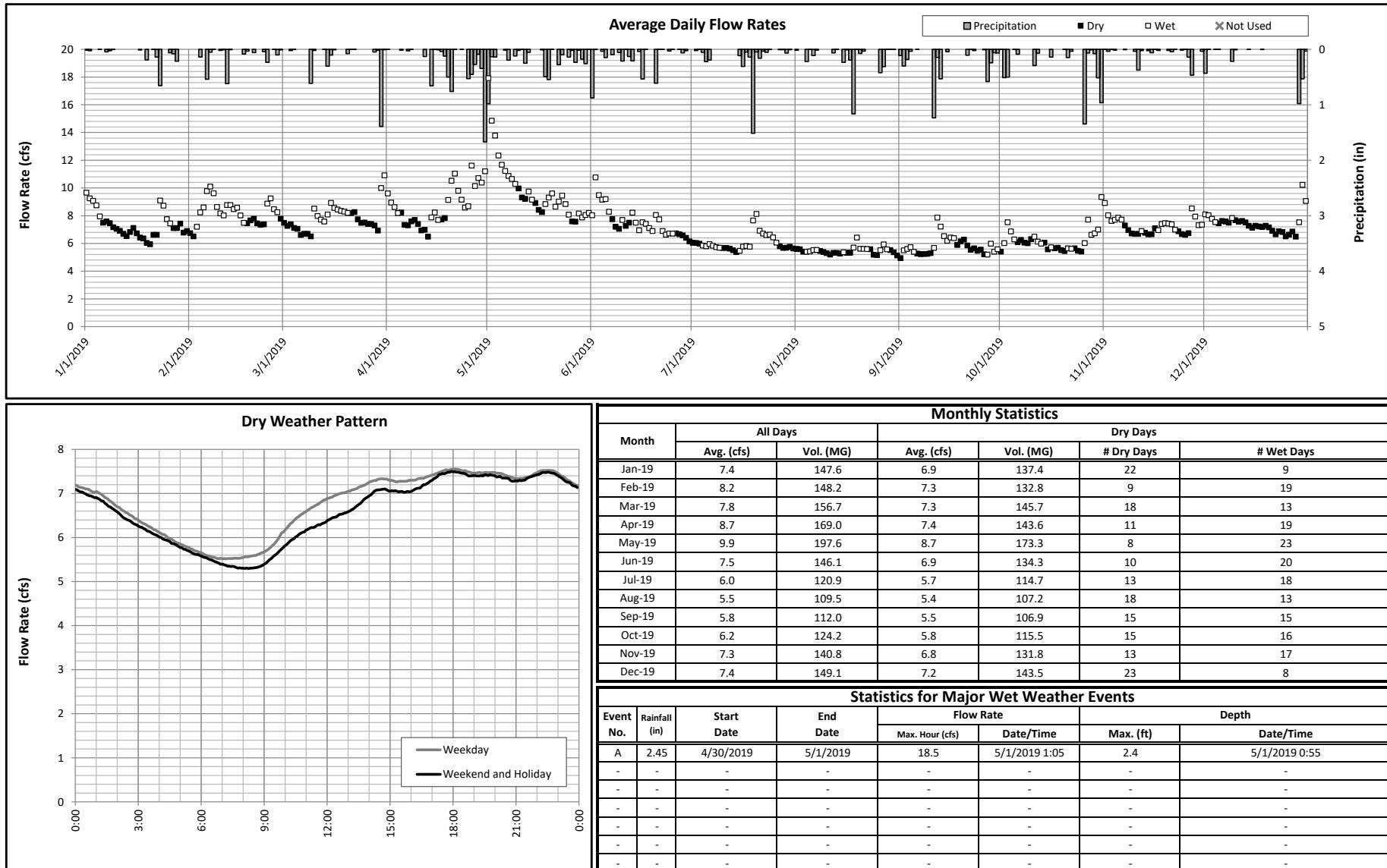
Downriver Sewage Disposal System

Meter Report

Meter: PA-3
Type: Accusonic 7510

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

Period: 1/1/2019 through 12/31/2019



Downriver Sewage Disposal System

Meter Report

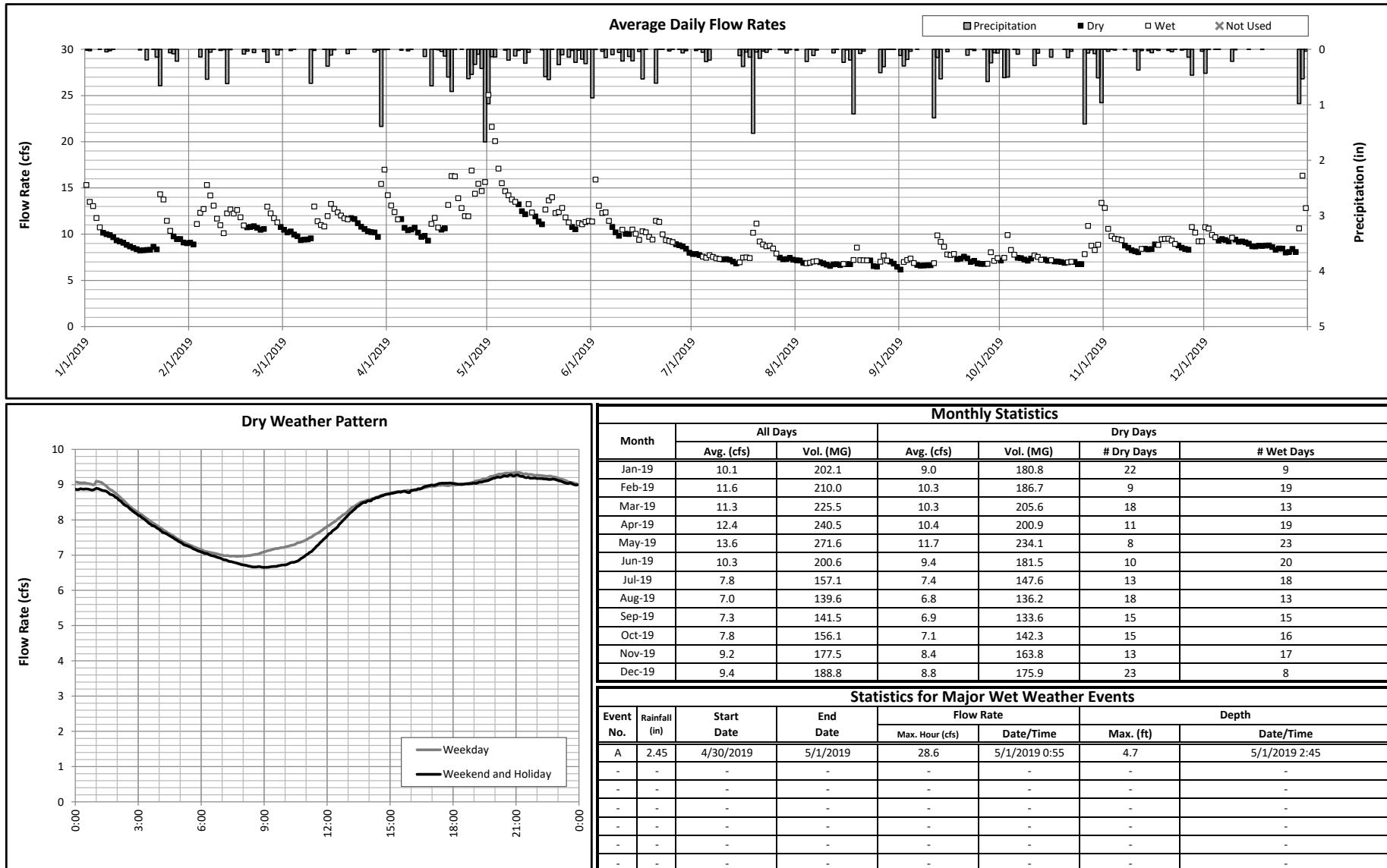
Meter: PA-2

Type: ADS Triton+

Location: Eureka Interceptor at Allen Road

System Meter Type: Interceptor Flow Meter

Period: 1/1/2019 through 12/31/2019



Downriver Sewage Disposal System

Meter Report

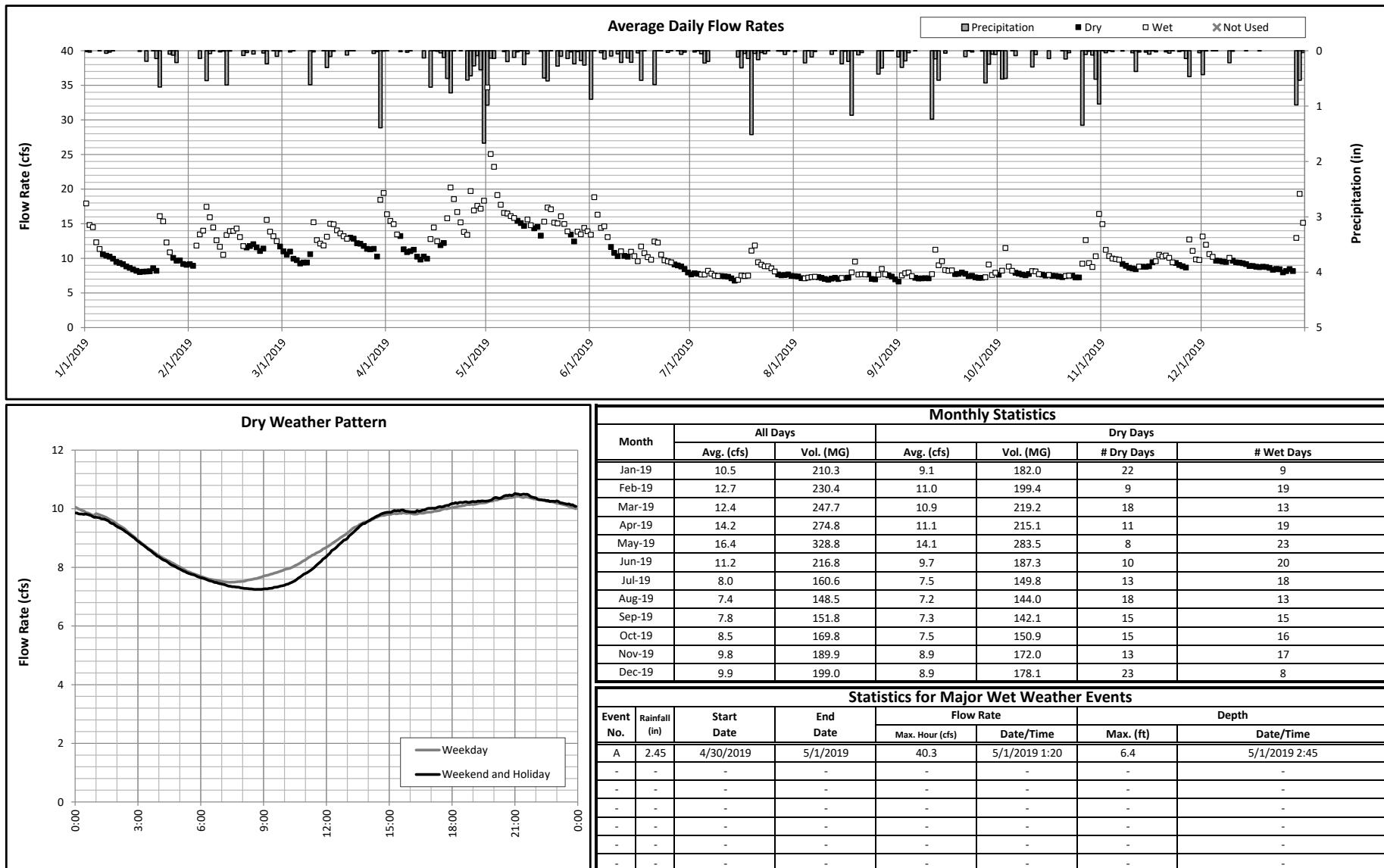
Meter: PA-1

Type: ADS Triton+

Location: Eureka Interceptor West of Fordline Road

System Meter Type: Interceptor Flow Meter

Period: 1/1/2019 through 12/31/2019



Downriver Sewage Disposal System

Meter Report

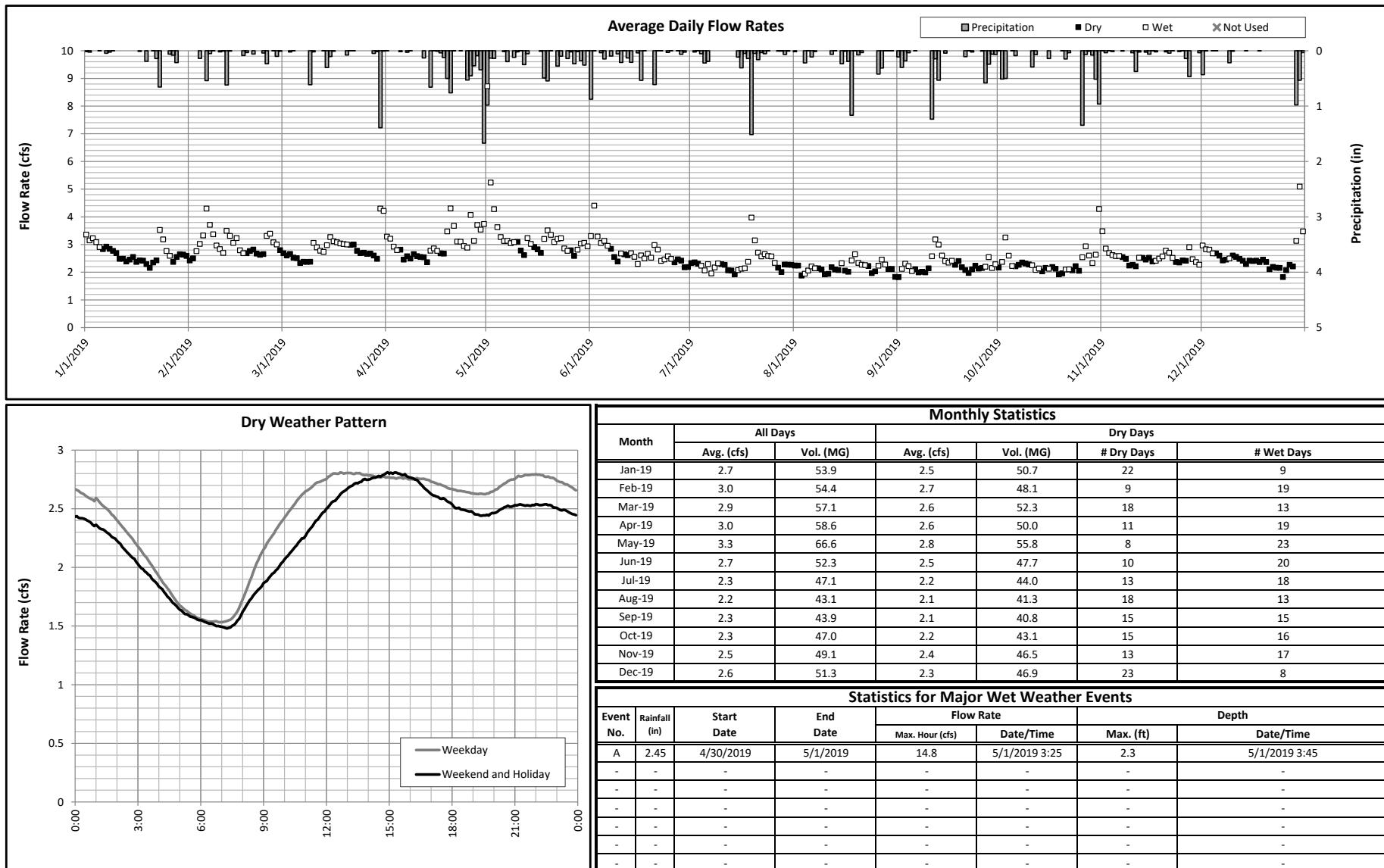
Meter: P-2

Type: ADS Triton+

Location: Pennsylvania Interceptor East of Dix-Toledo Road

System Meter Type: Interceptor Flow Meter

Period: 1/1/2019 through 12/31/2019



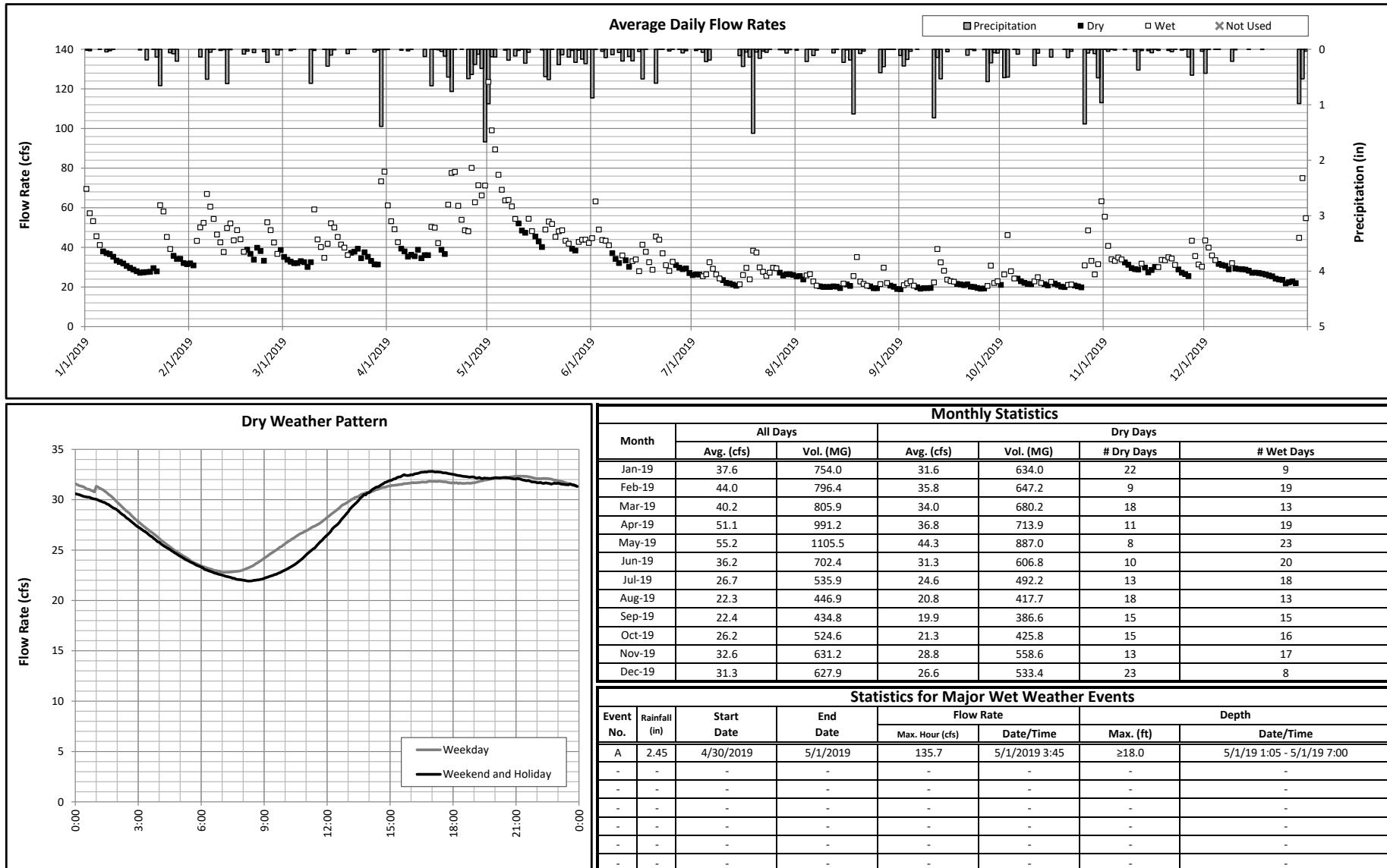
Downriver Sewage Disposal System

Meter Report

Meter: P-1
Type: Accusonic 7510

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

Period: 1/1/2019 through 12/31/2019



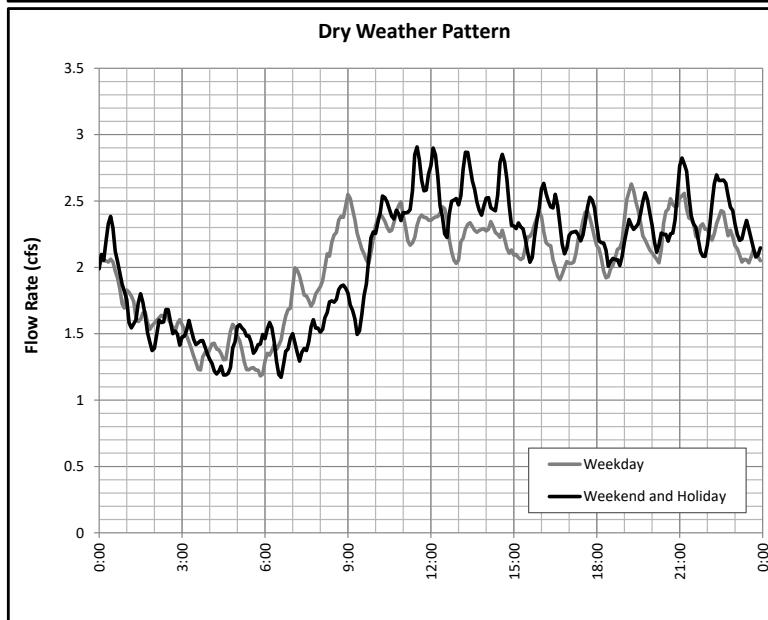
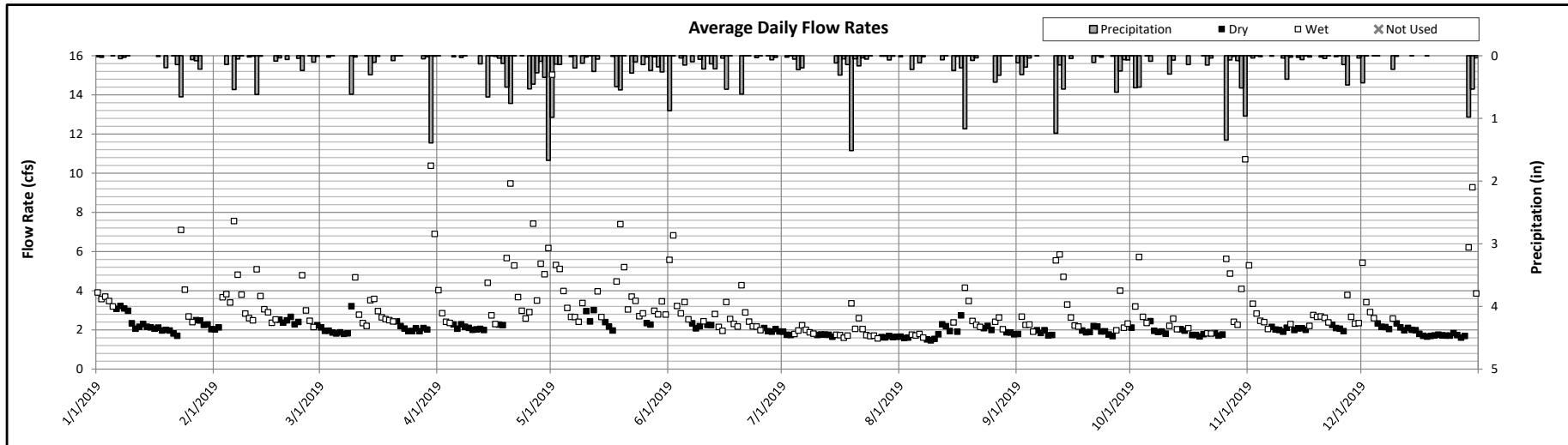
Downriver Sewage Disposal System

Meter Report

Meter: RV-1
Type: Accusonic 7510

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

Period: 1/1/2019 through 12/31/2019



Month	All Days			Dry Days	
	Avg. (cfs)	Vol. (MG)	Avg. (cfs)	Vol. (MG)	# Dry Days
Jan-19	2.7	54.8	2.3	46.1	22
Feb-19	3.1	57.0	2.3	42.5	9
Mar-19	2.8	55.9	2.1	41.3	18
Apr-19	3.5	67.5	2.1	41.4	11
May-19	3.7	74.1	2.4	49.0	8
Jun-19	2.7	52.4	2.1	40.7	10
Jul-19	1.9	37.1	1.7	34.3	13
Aug-19	2.1	41.8	1.9	37.8	18
Sep-19	2.5	48.1	1.9	36.8	15
Oct-19	2.7	54.8	1.9	37.8	15
Nov-19	2.5	47.6	2.1	39.7	13
Dec-19	2.6	51.6	1.9	37.9	23

Event No.	Rainfall (in)	Start Date	End Date	Flow Rate		Depth	
				Max. Hour (cfs)	Date/Time	Max. (ft)	Date/Time
A	2.45	4/30/2019	5/1/2019	35.5	5/1/2019 1:20	17.8	5/1/2019 1:10
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-

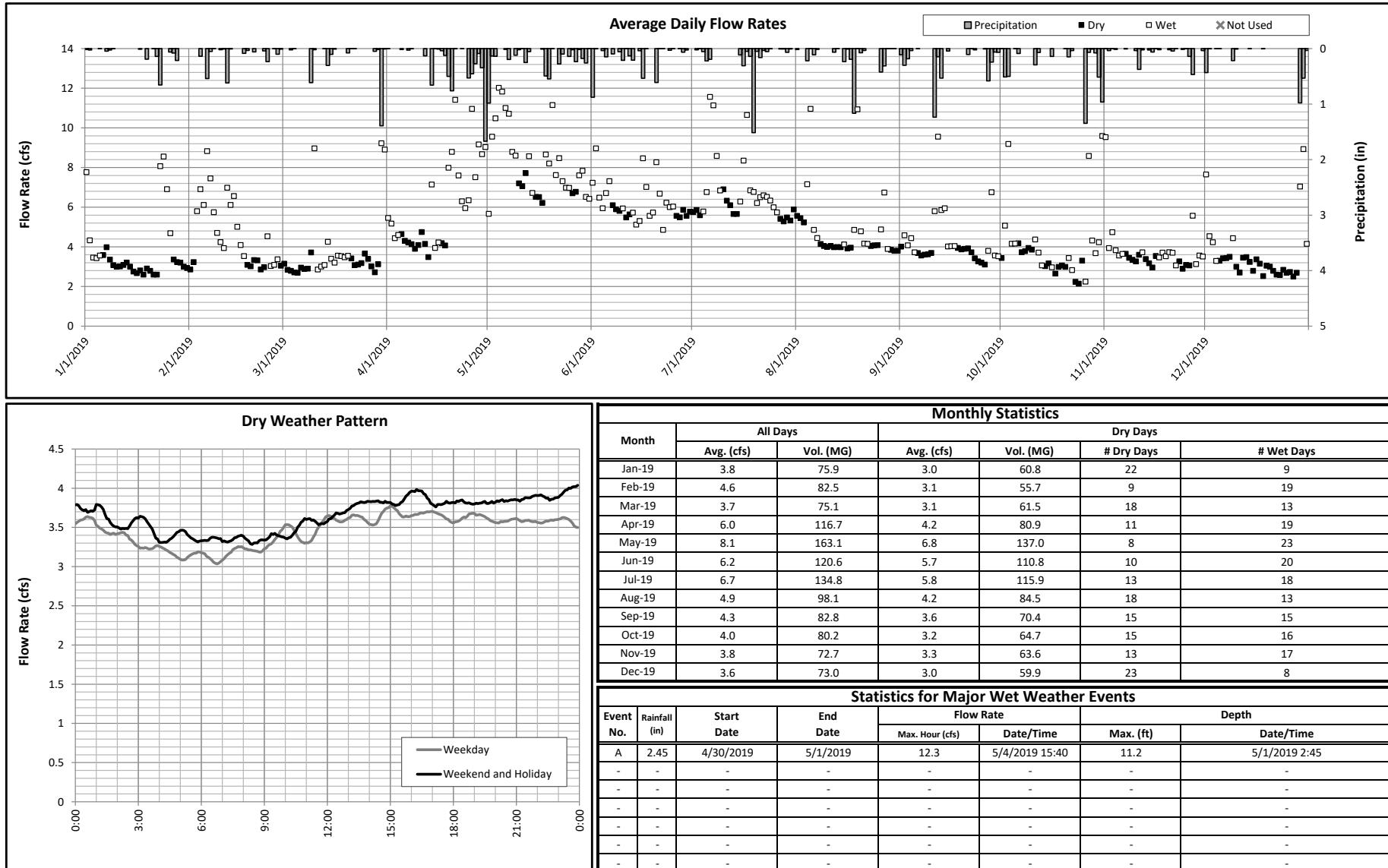
Downriver Sewage Disposal System

Meter Report

Meter: RR-1
Type: ADS Triton

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

Period: 1/1/2019 through 12/31/2019



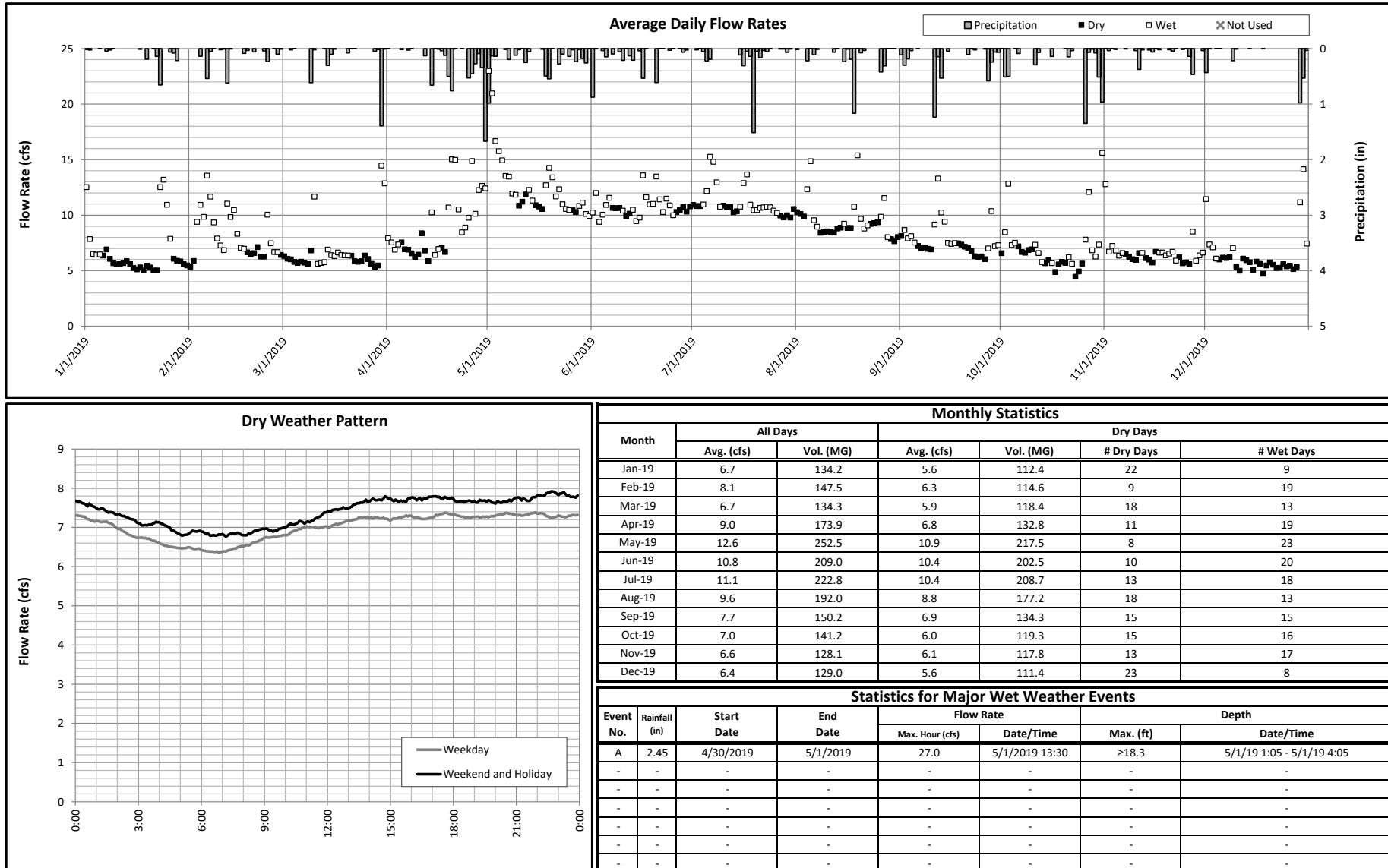
Downriver Sewage Disposal System

Meter Report

Meter: EC-6
Type: ADS Triton

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

Period: 1/1/2019 through 12/31/2019



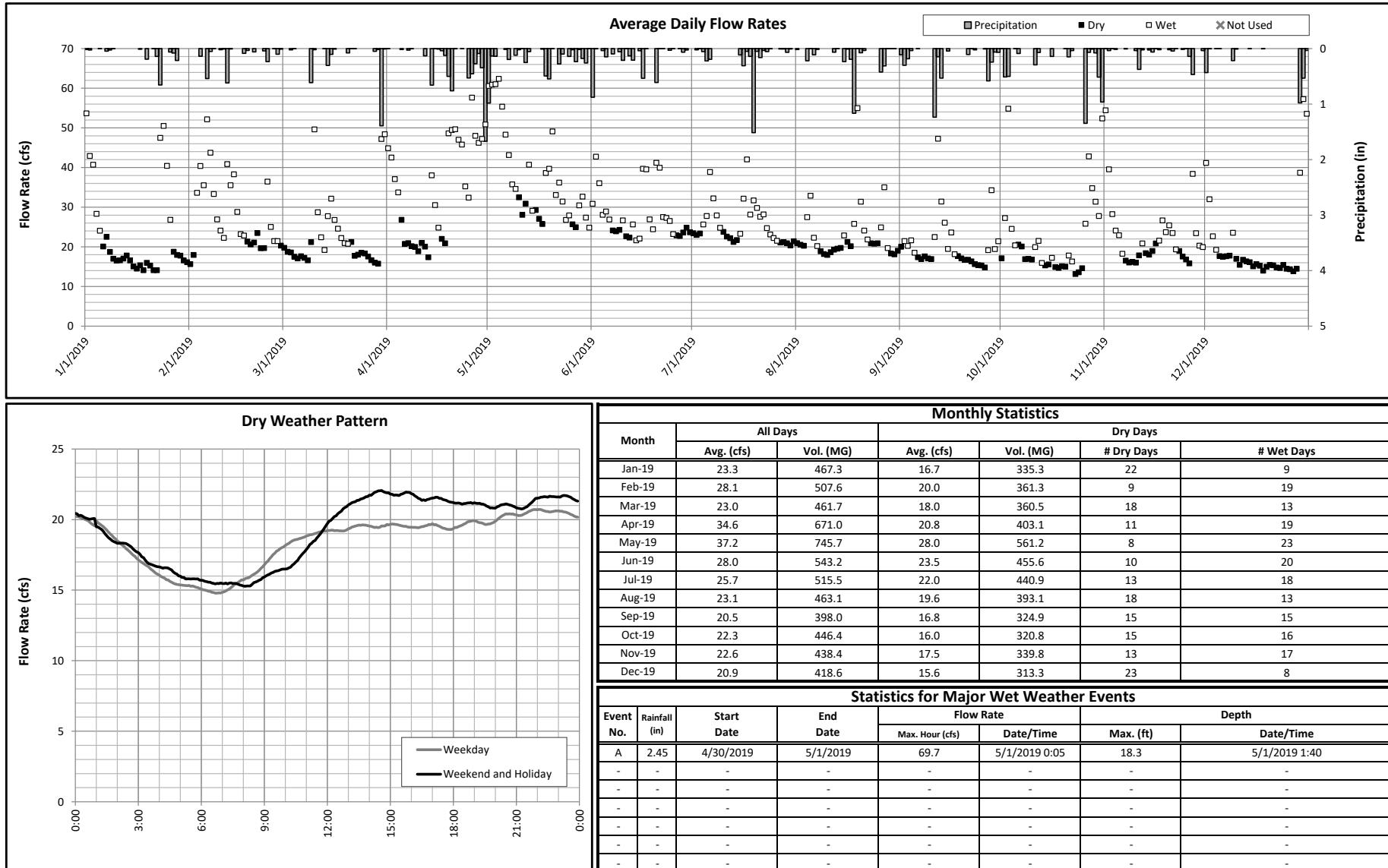
Downriver Sewage Disposal System

Meter Report

Meter: RD-1
Type: Accusonic 7510

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

Period: 1/1/2019 through 12/31/2019



Downriver Sewage Disposal System

Meter Report

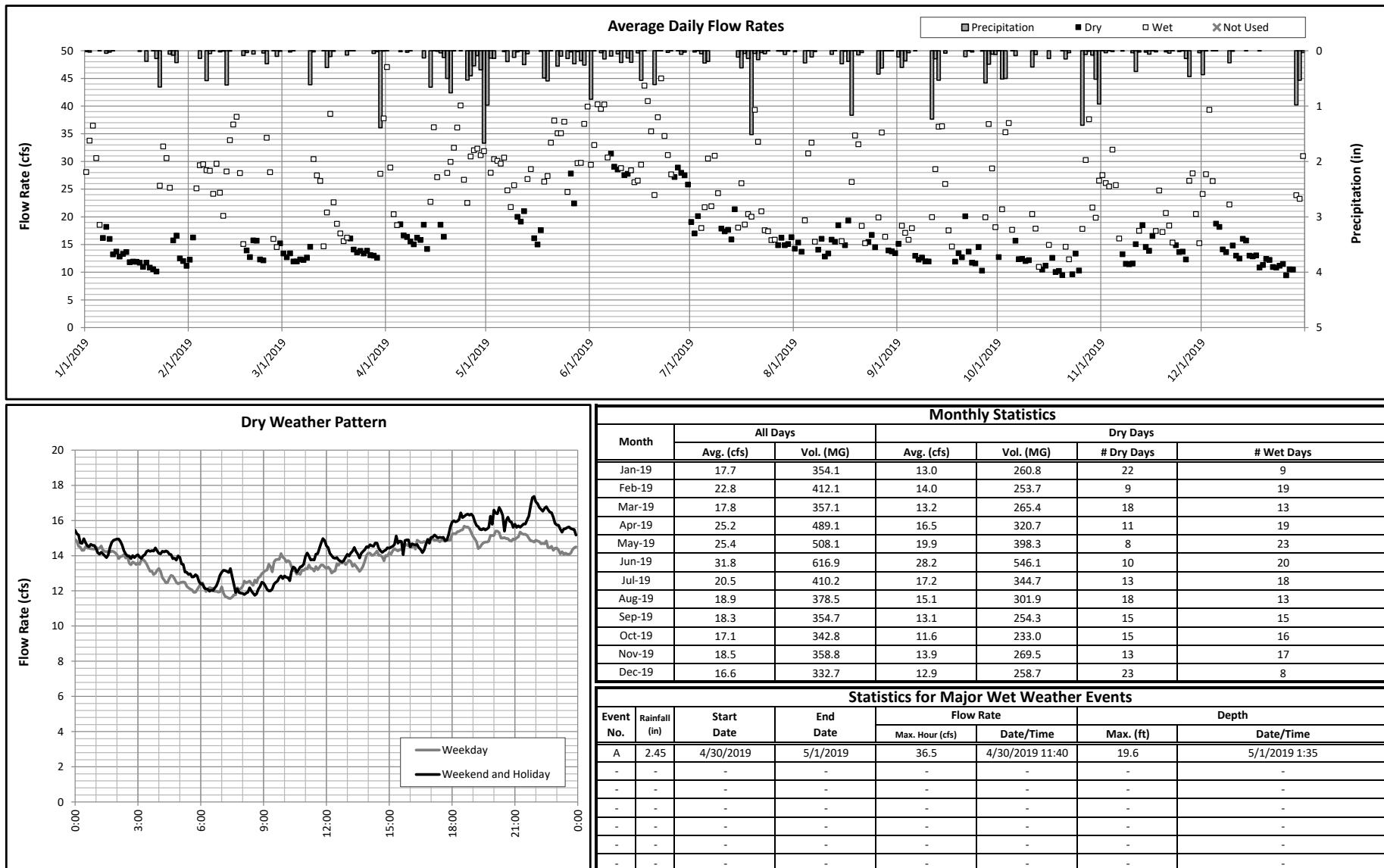
Meter: [SW] + [SWB]

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

Location: Southgate / Wyandotte

System Meter Type: Total for SWDDD

Period: 1/1/2019 through 12/31/2019



Downriver Sewage Disposal System

Meter Report

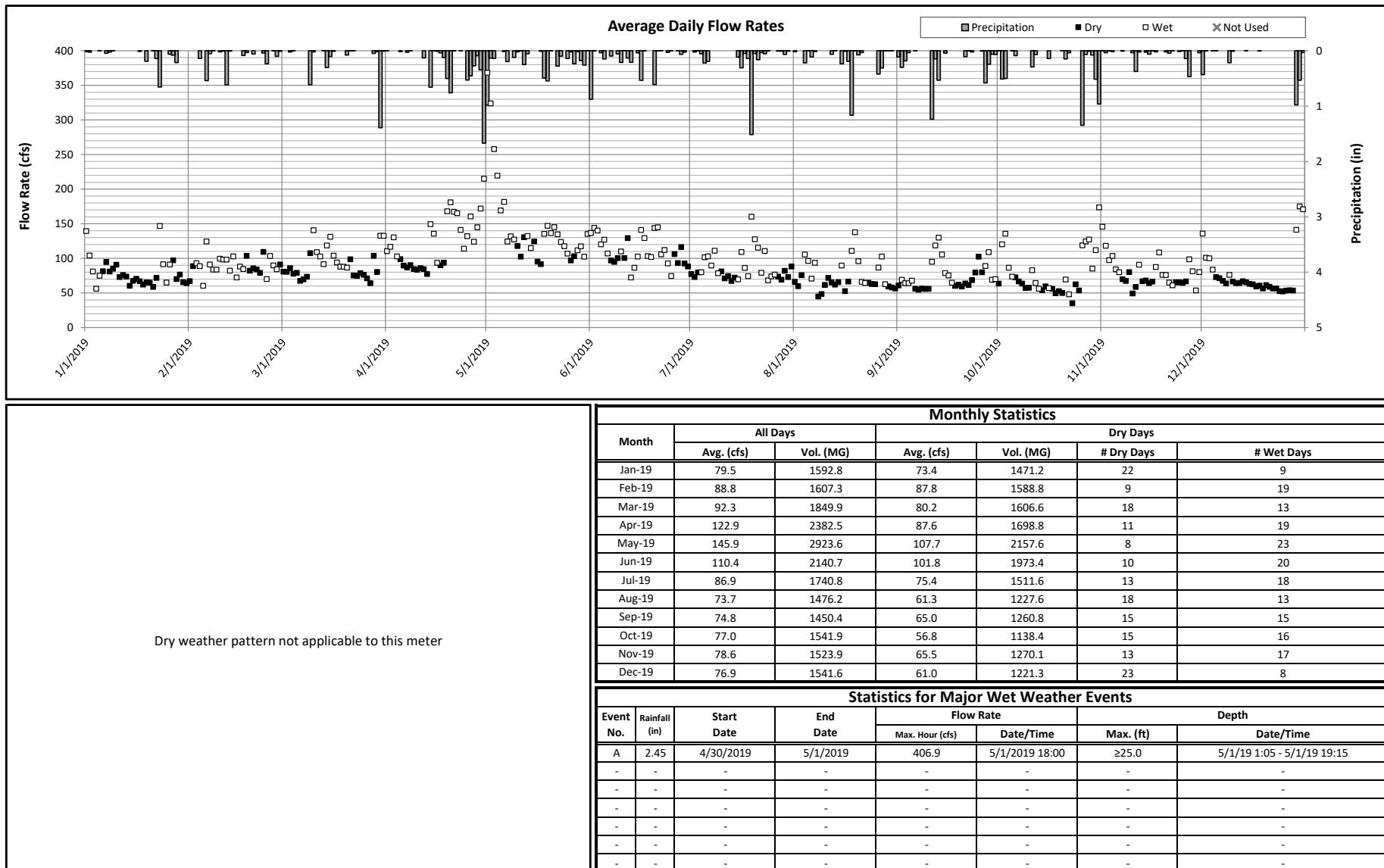
Meter: [IPS] + [TPS]

Type: Magmeters

Location: Main Influent Pump Station and Tunnel Pump Station

System Meter Type: DWTF

Period: 1/1/2019 through 12/31/2019



Downriver Sewage Disposal System

Meter Report

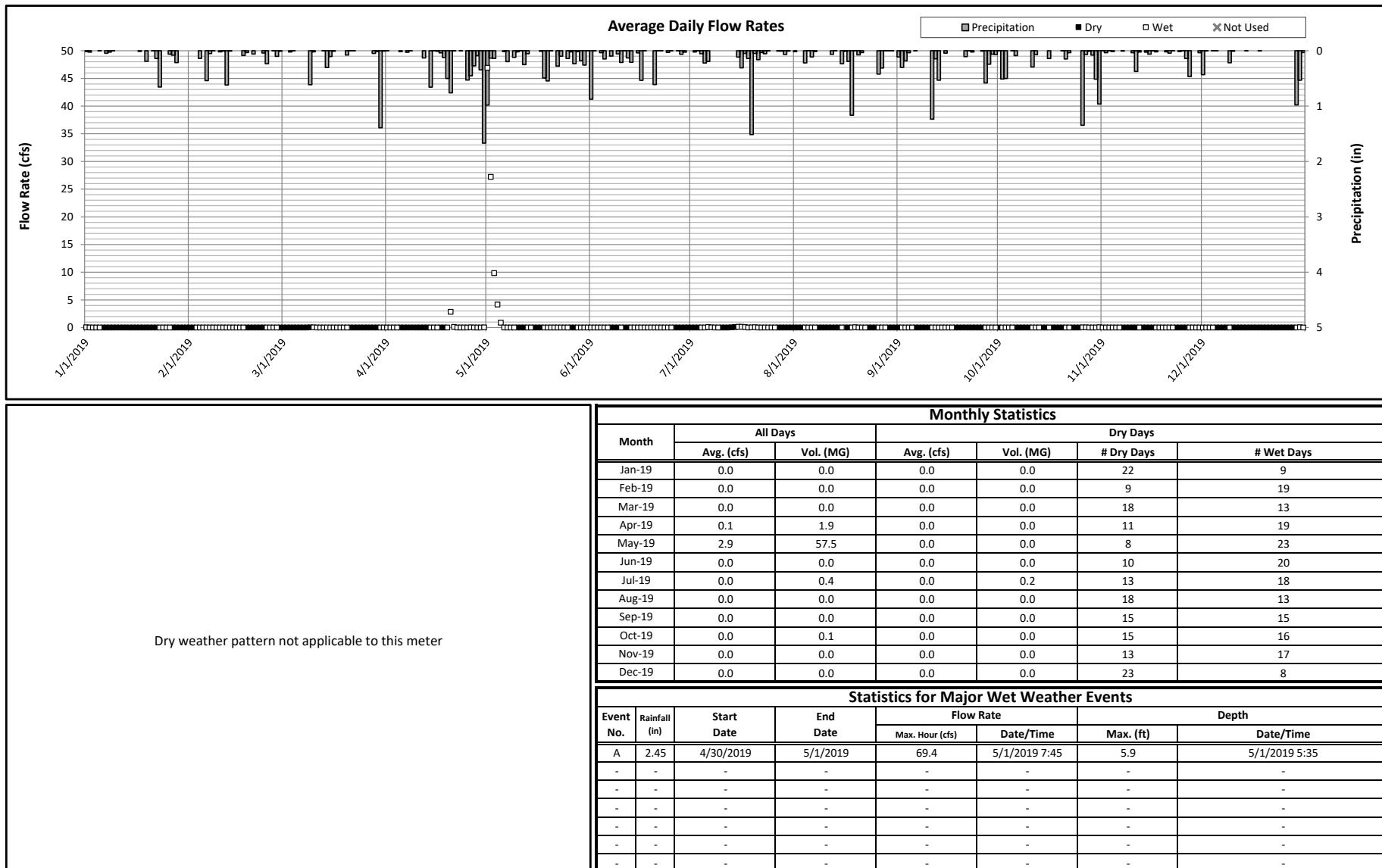
Meter: TSO

Type: ADS Triton+

Location: At Pelham Basin

System Meter Type: Tunnel System Flow Meter

Period: 1/1/2019 through 12/31/2019



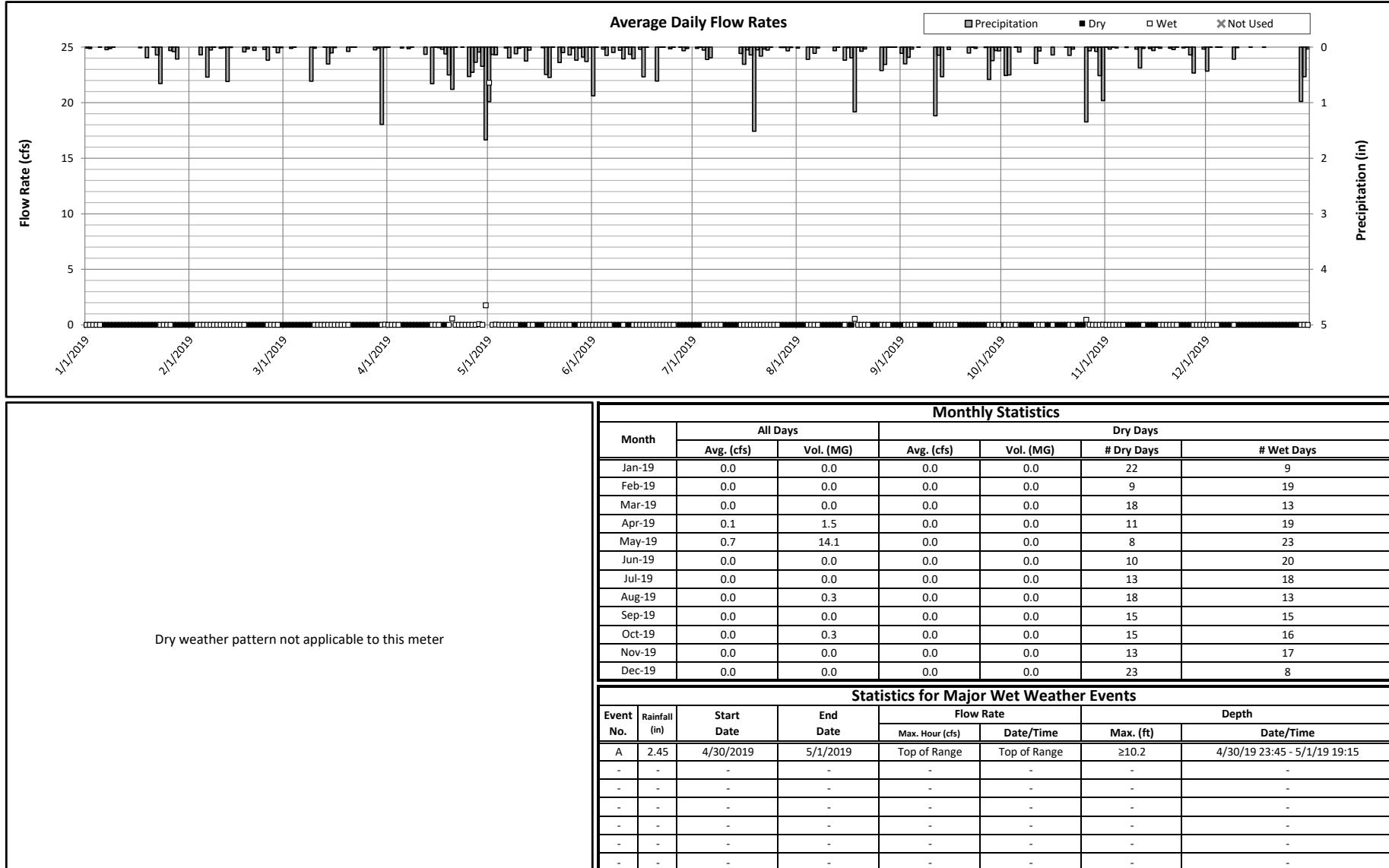
Downriver Sewage Disposal System

Meter Report

Meter: APO-1
Type: Telog 3307

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

Period: 1/1/2019 through 12/31/2019



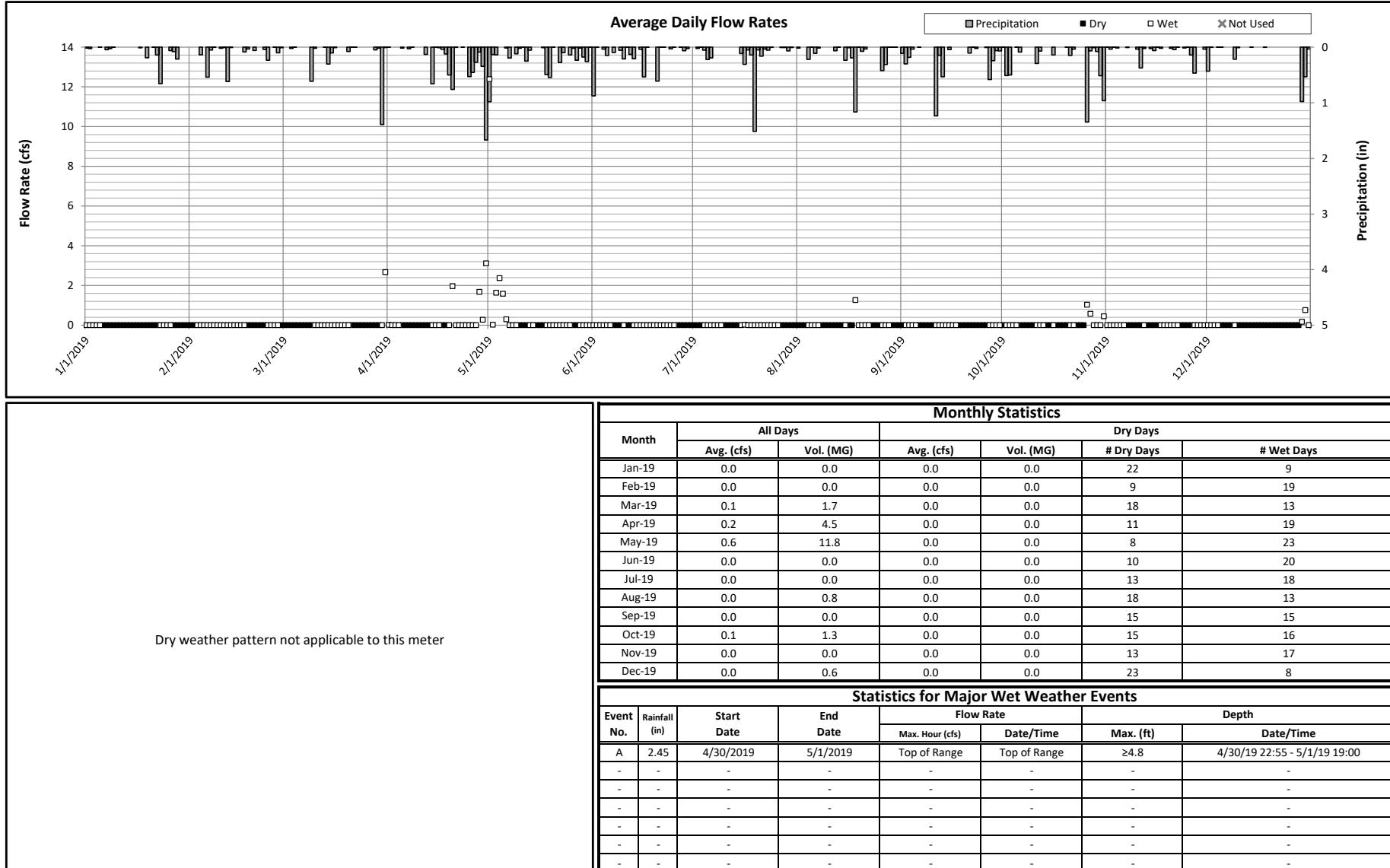
Downriver Sewage Disposal System

Meter Report

Meter: APO-2
Type: Telog 3307

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

Period: 1/1/2019 through 12/31/2019



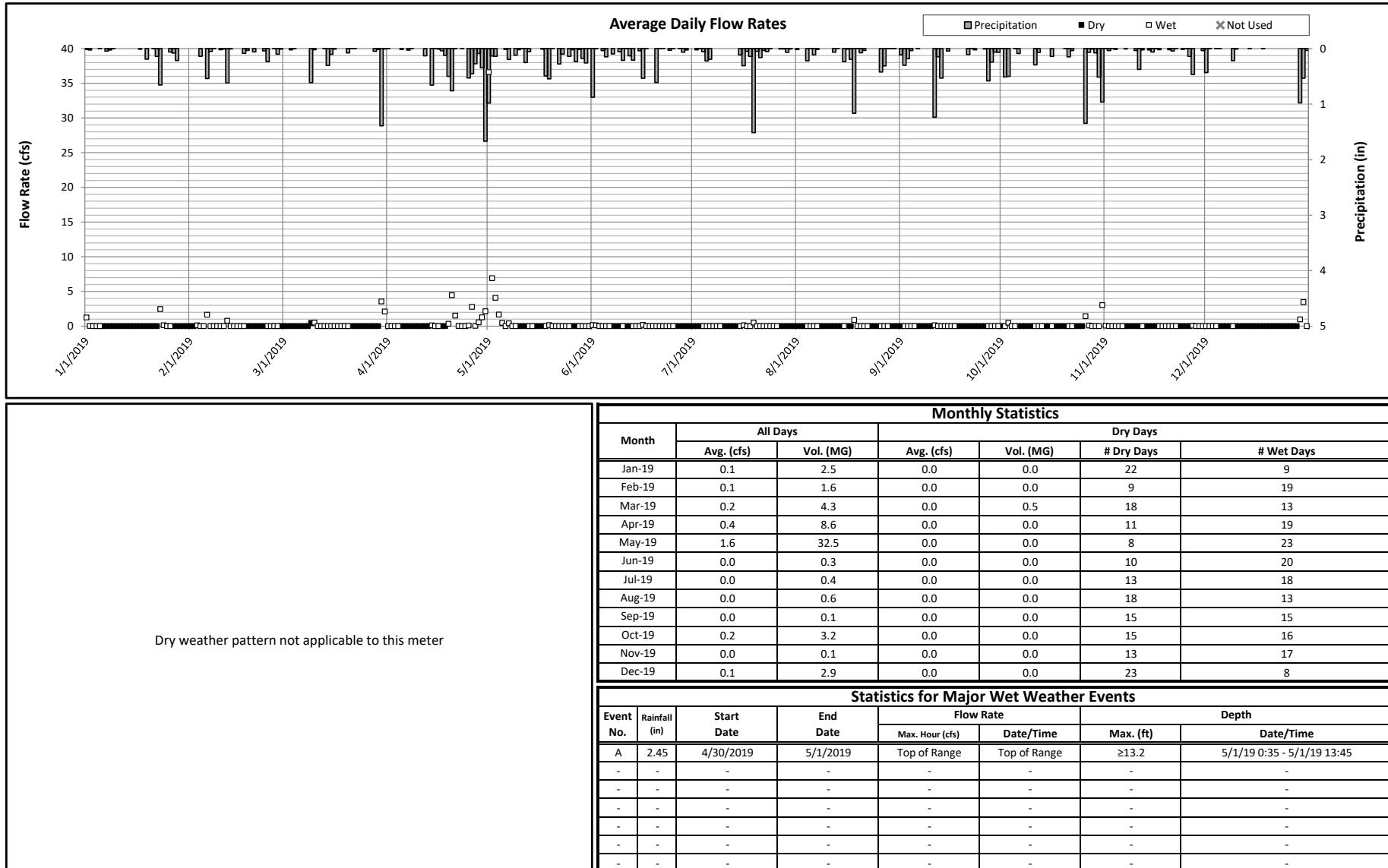
Downriver Sewage Disposal System

Meter Report

Meter: CHPO
Type: Telog 3307

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

Period: 1/1/2019 through 12/31/2019



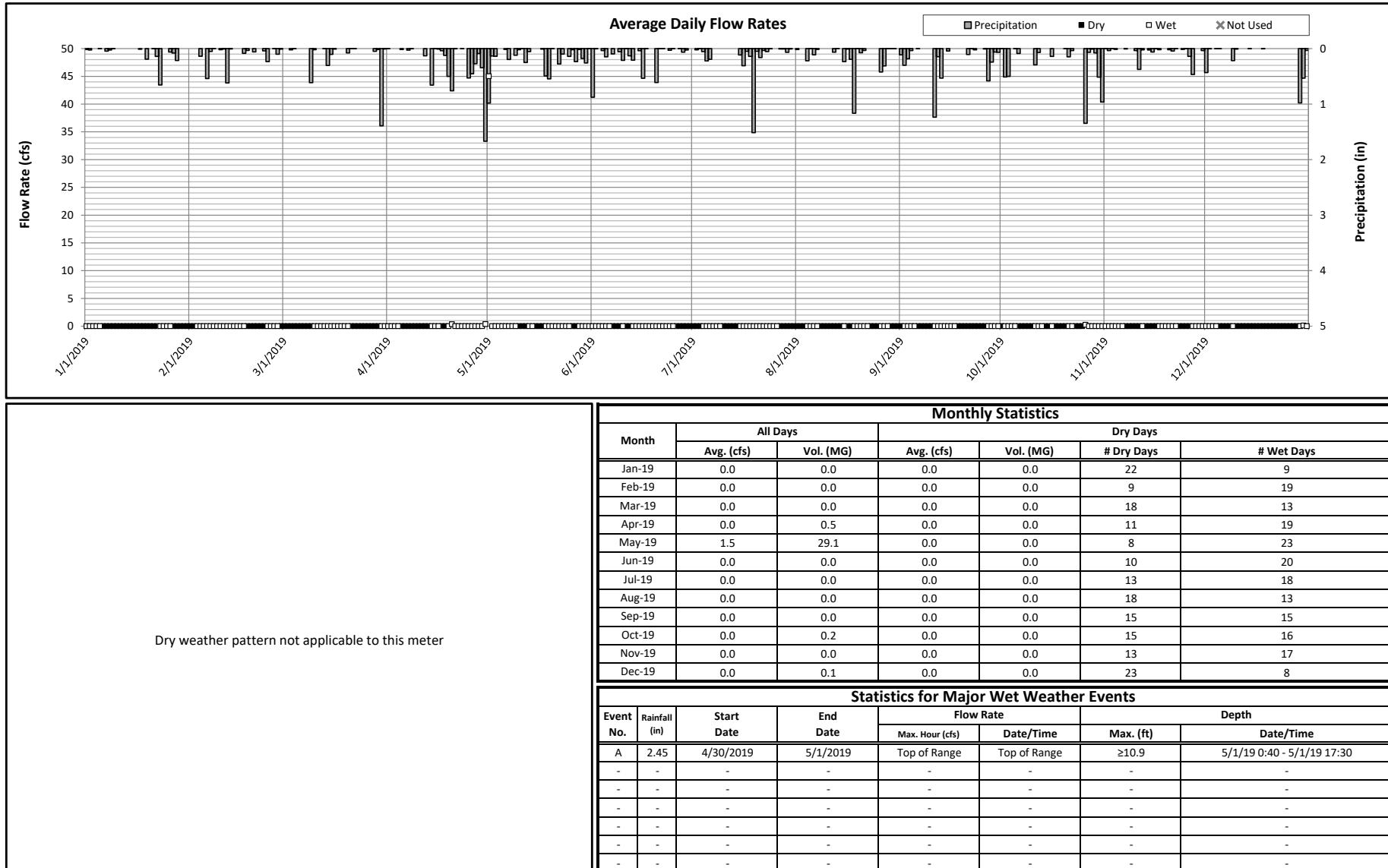
Downriver Sewage Disposal System

Meter Report

Meter: CPO
Type: Telog 3307

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

Period: 1/1/2019 through 12/31/2019



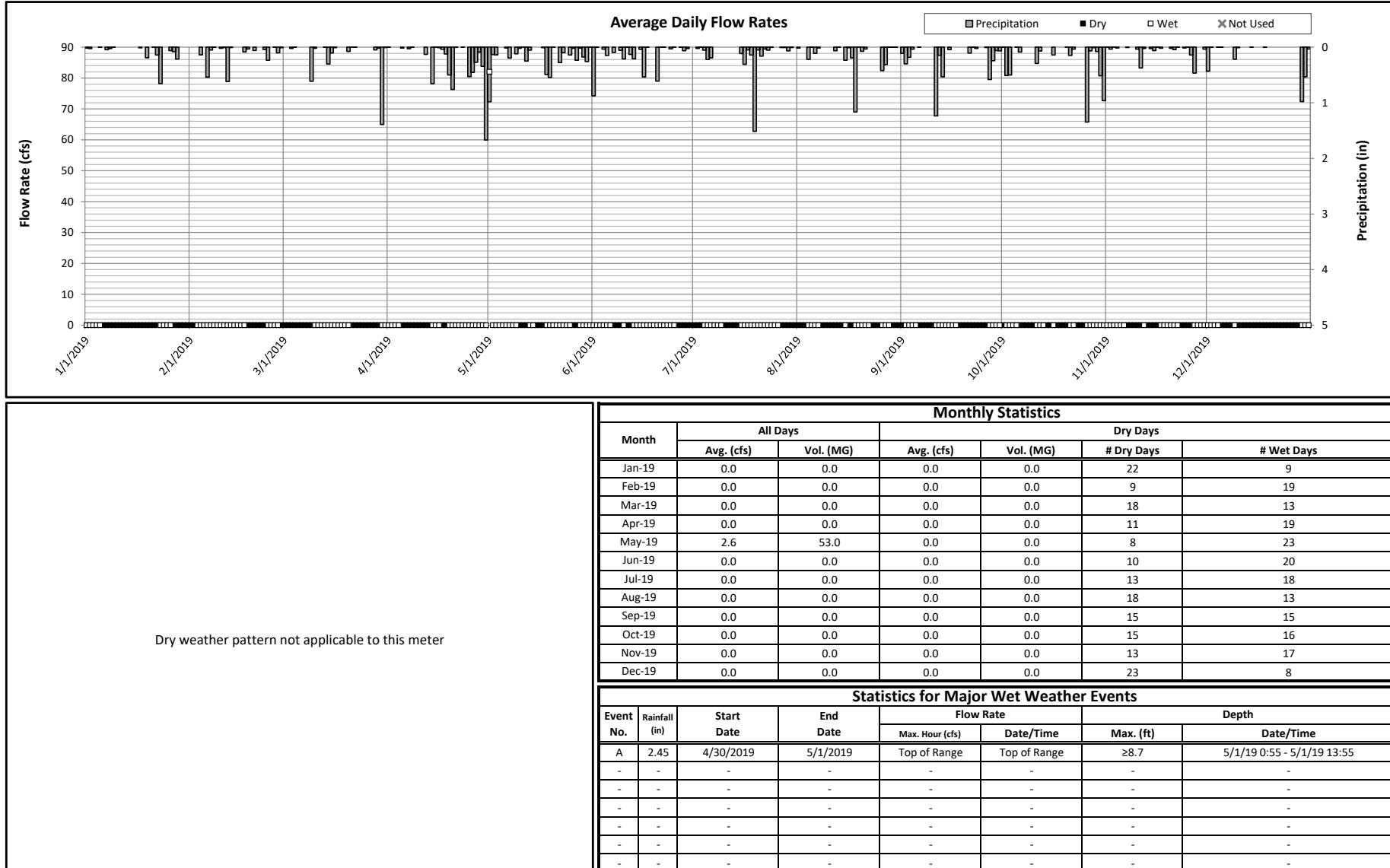
Downriver Sewage Disposal System

Meter Report

Meter: PDO
Type: Telog 3307

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

Period: 1/1/2019 through 12/31/2019



Downriver Sewage Disposal System

Meter Report

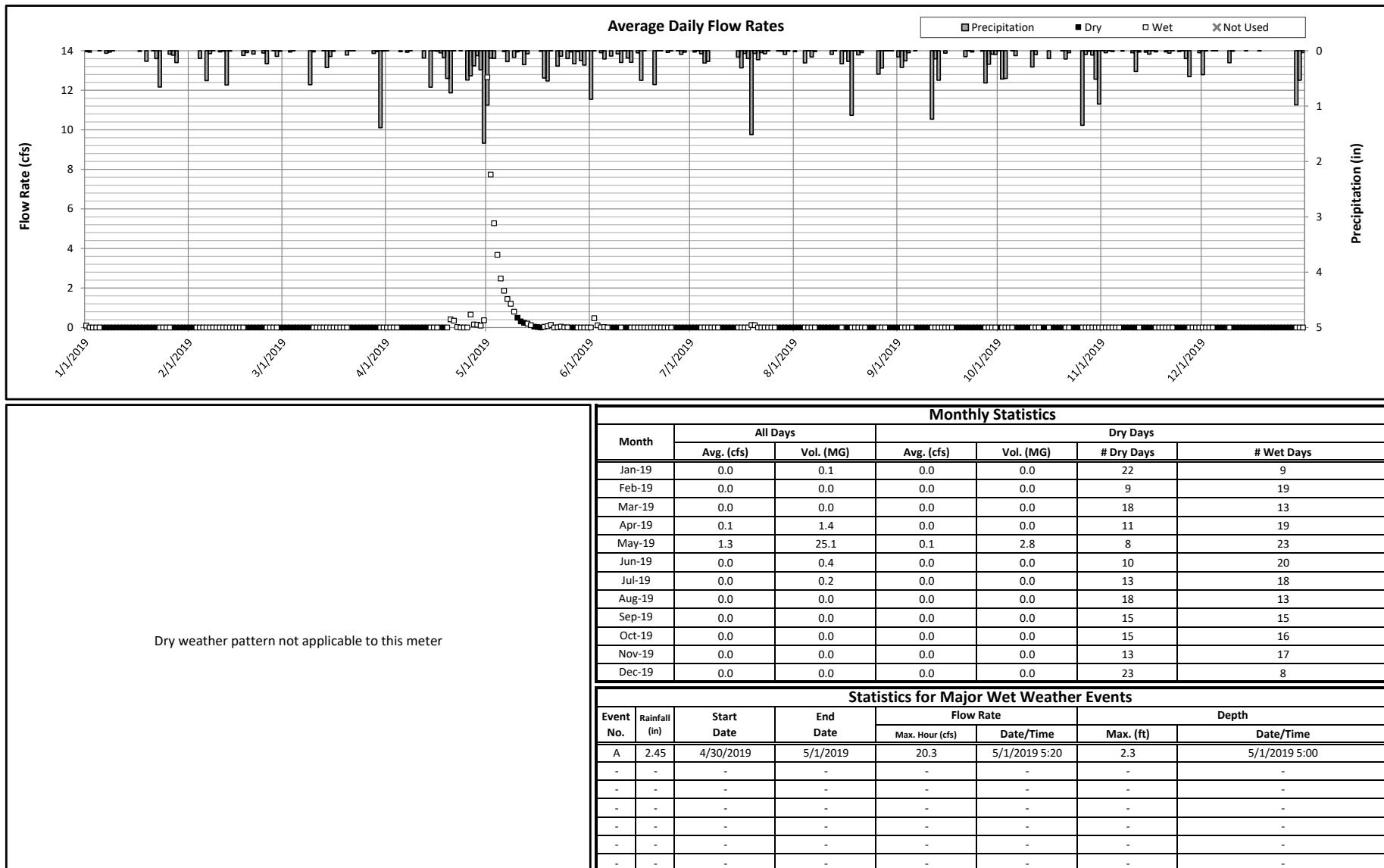
Meter: ER-2

Type: ADS Triton+

Location: Eureka Road and Inkster

System Meter Type: Tunnel System Flow Meter

Period: 1/1/2019 through 12/31/2019



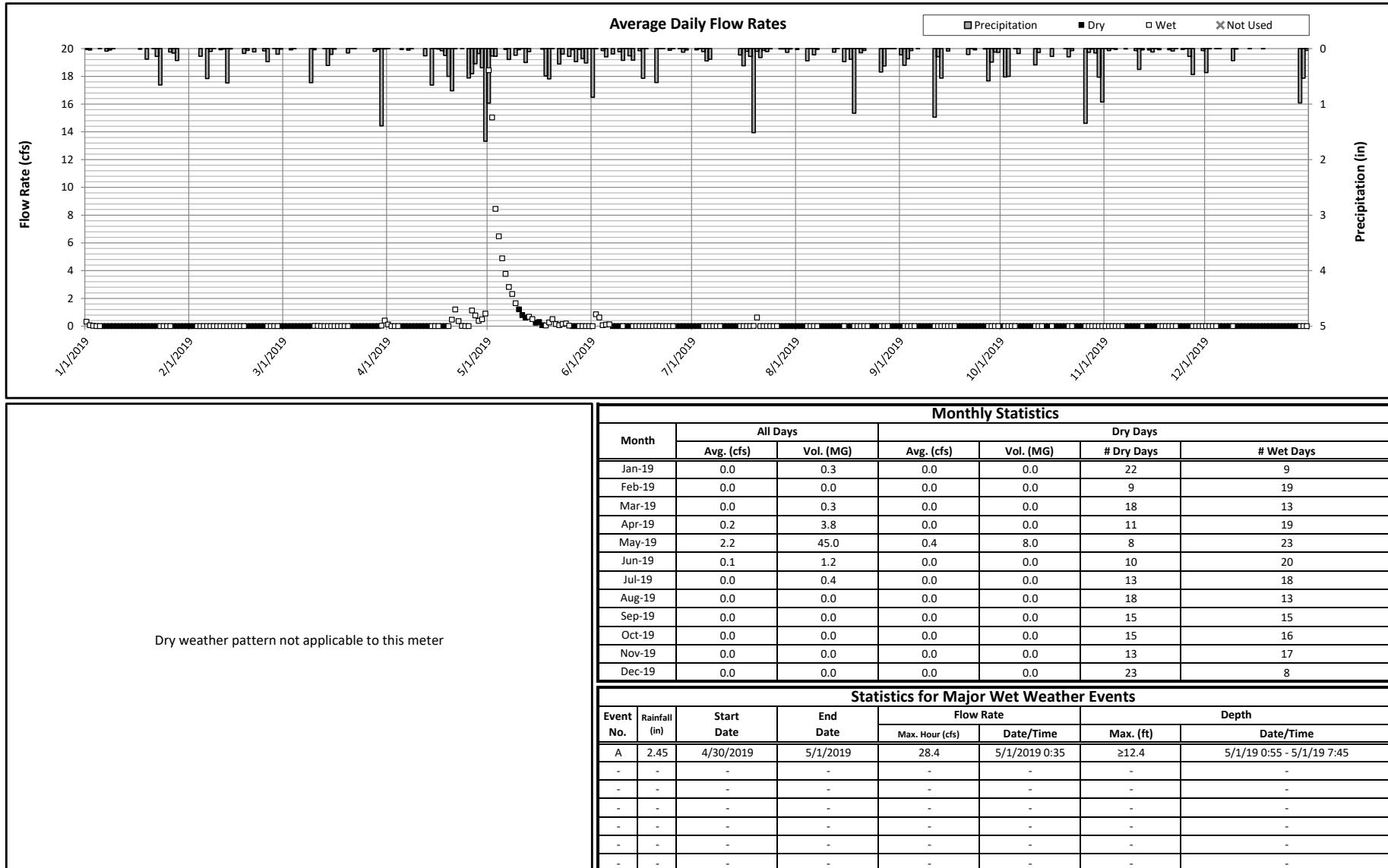
Downriver Sewage Disposal System

Meter Report

Meter: ER-1
Type: ADS Triton+

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

Period: 1/1/2019 through 12/31/2019



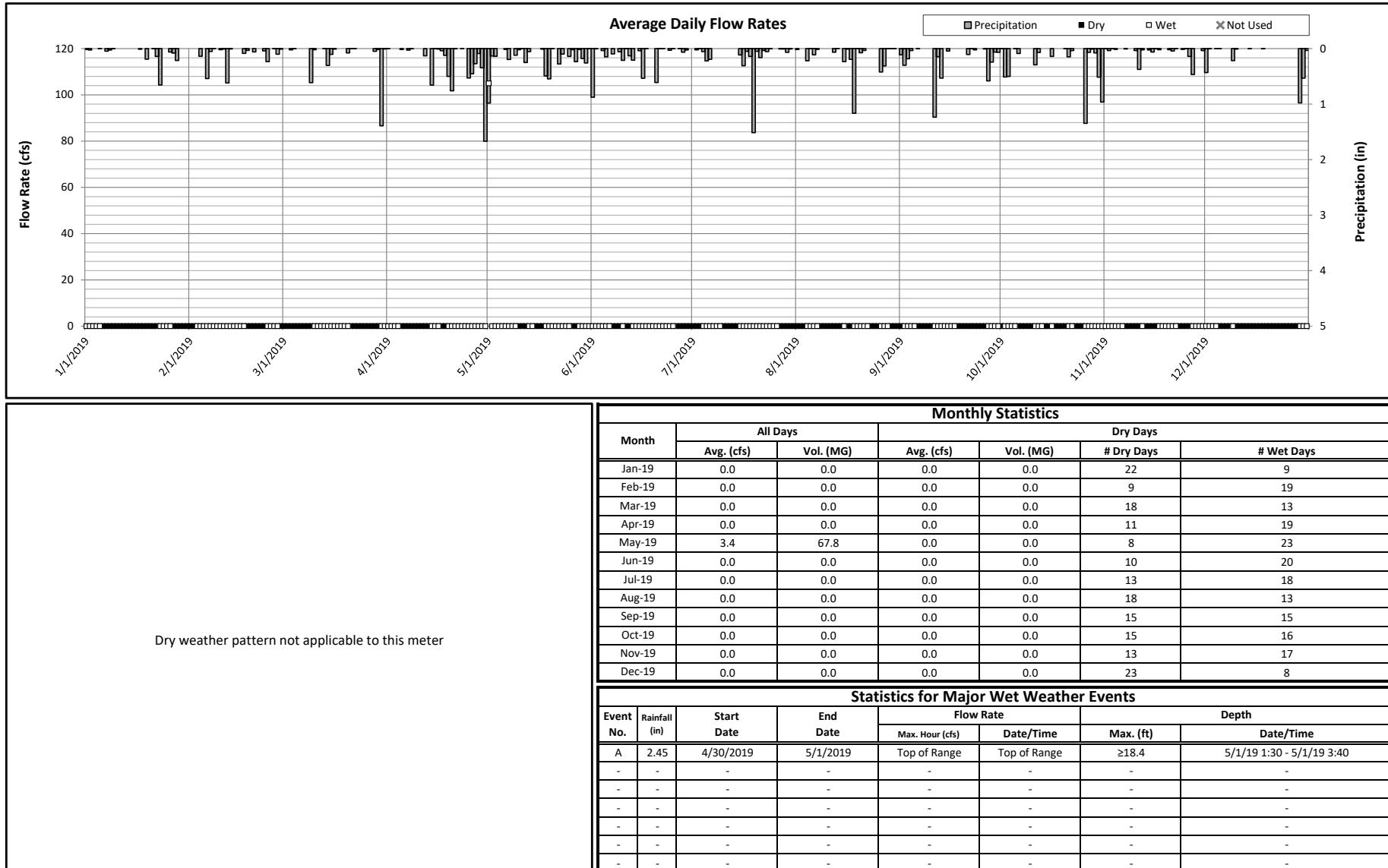
Downriver Sewage Disposal System

Meter Report

Meter: PM-1
Type: Telog 3307

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

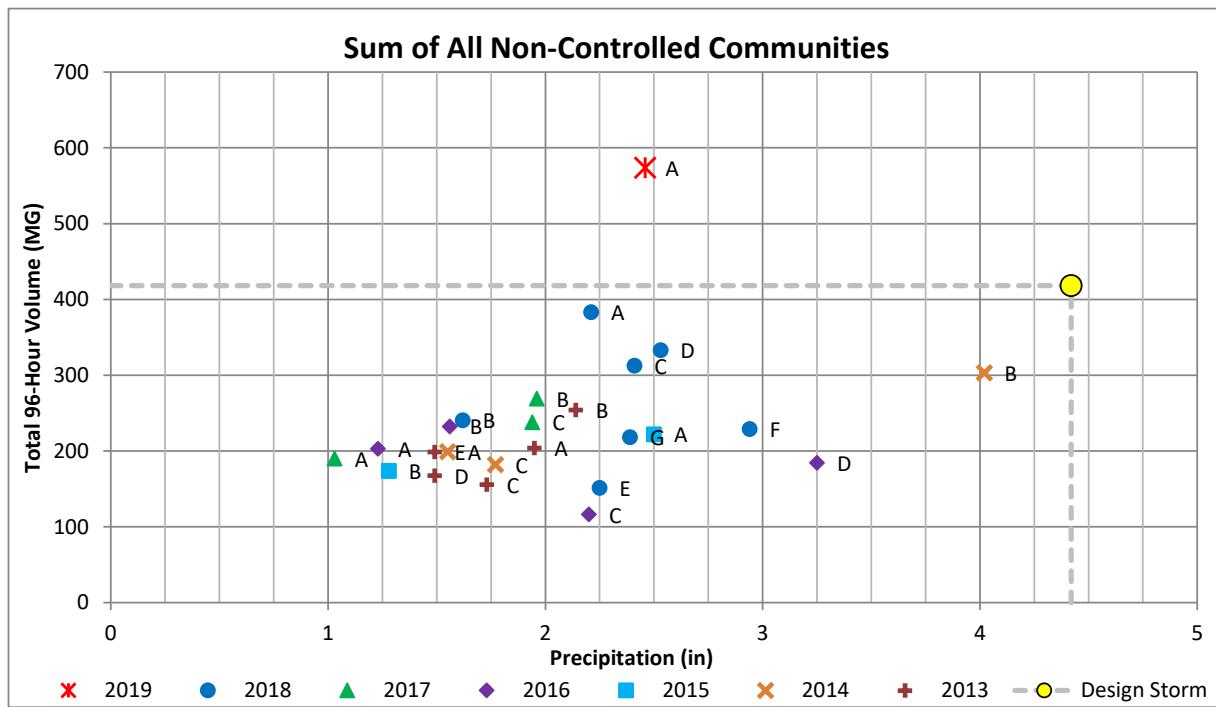
Period: 1/1/2019 through 12/31/2019



Appendix D

Major Storm Event Wet Weather Summary Figures

Figure D-1
Downriver Sewage Disposal System
Total 96-Hour Volume versus Precipitation
for Major Storm Events for 2013 through 2019



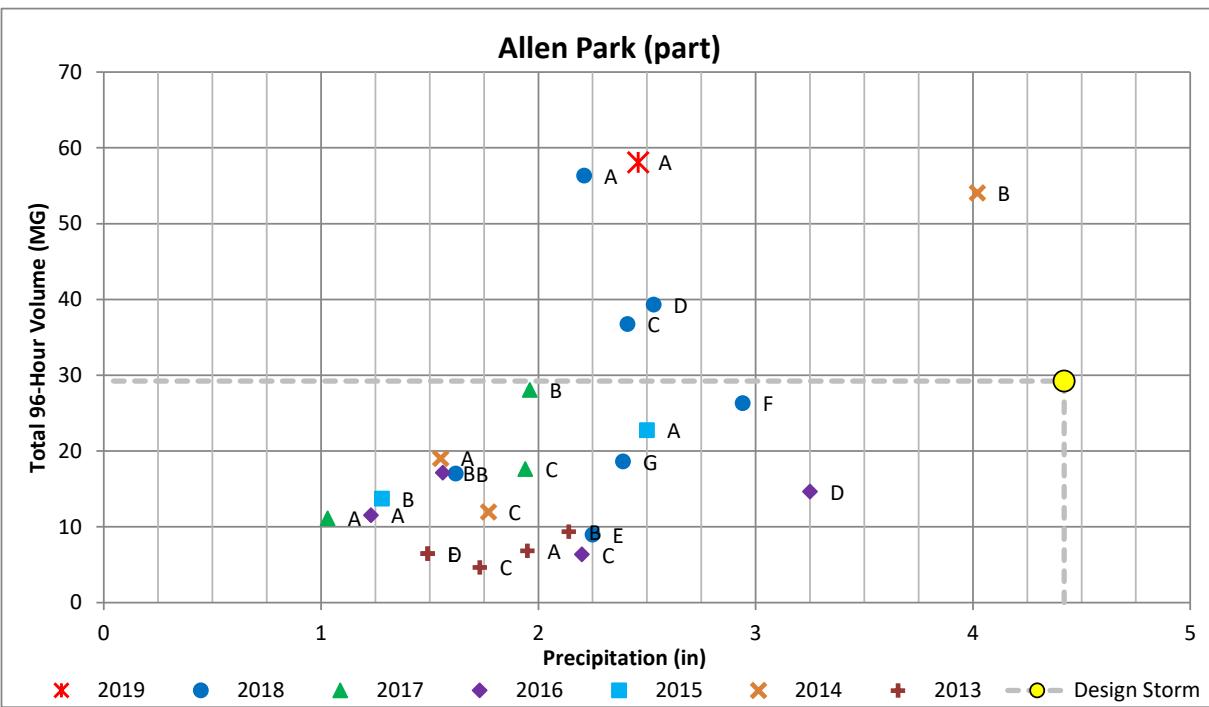
Major Storm Event		Sum of All Non-Controlled Communities	
		DTW Precipitation (in)	96-hour Volume (MG)
2013	A	1.95	204.09
	B	2.14	254.06
	C	1.73	155.58
	D	1.49	167.49
	E	1.49	198.64
2014	A	1.55	199.00
	B	4.02	303.24
	C	1.77	181.86
2015	A	2.50	222.10
	B	1.28	173.53
2016	A	1.23	203.08
	B	1.56	232.53
	C	2.20	116.28
	D	3.25	184.44
2017	A	1.03	189.85
	B	1.96	269.24
	C	1.94	237.78
2018	A	2.21	383.06
	B	1.62	240.58
	C	2.41	312.53
	D	2.53	333.10
	E	2.25	151.20
	F	2.94	229.20
2019	G	2.39	218.15
	A	2.46	573.77
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
Downriver Sewage Disposal System
Total 96-Hour Volume versus Precipitation
for Major Storm Events for 2013 through 2019



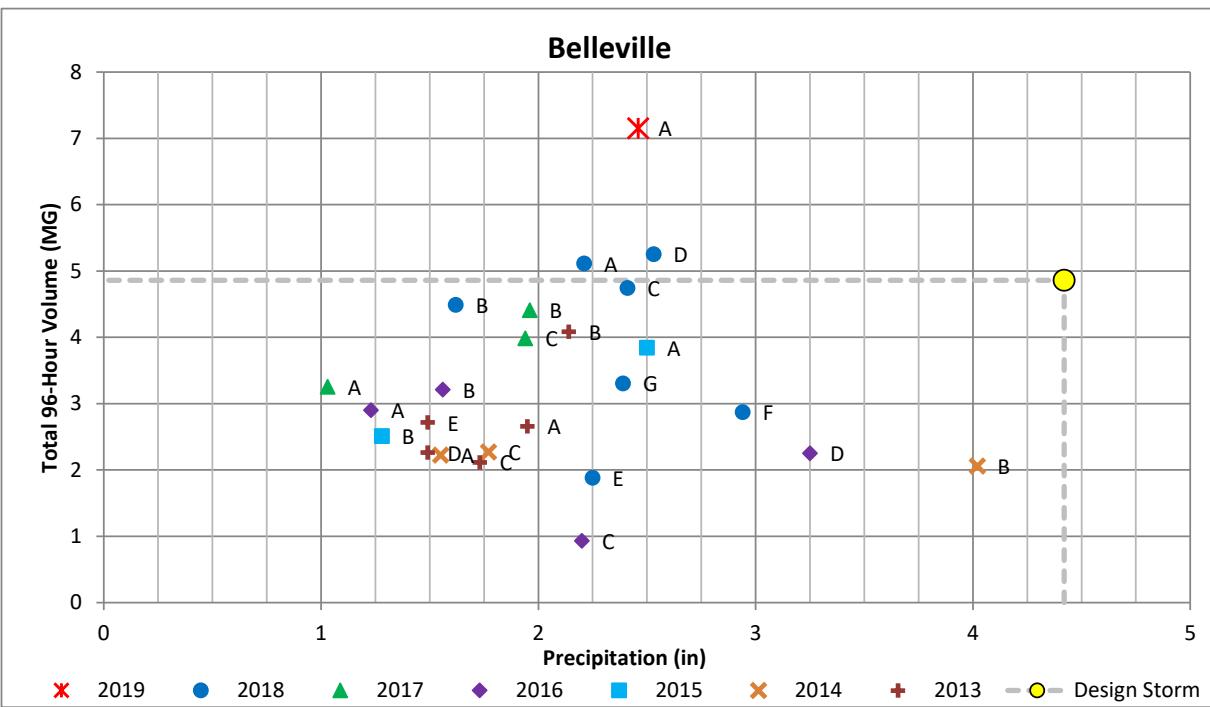
Major Storm Event		Allen Park (part)	
		DTW Precipitation (in)	96-hour Volume (MG)
2013	A	1.95	6.83
	B	2.14	9.35
	C	1.73	4.64
	D	1.49	6.47
	E	1.49	6.47
2014	A	1.55	19.02
	B	4.02	54.05
	C	1.77	11.98
2015	A	2.50	22.77
	B	1.28	13.71
2016	A	1.23	11.52
	B	1.56	17.14
	C	2.20	6.35
	D	3.25	14.64
2017	A	1.03	11.11
	B	1.96	28.07
	C	1.94	17.62
2018	A	2.21	56.35
	B	1.62	17.04
	C	2.41	36.76
	D	2.53	39.31
	E	2.25	8.98
	F	2.94	26.34
2019	G	2.39	18.62
	A	2.46	58.07
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 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-3
Downriver Sewage Disposal System
Total 96-Hour Volume versus Precipitation
for Major Storm Events for 2013 through 2019



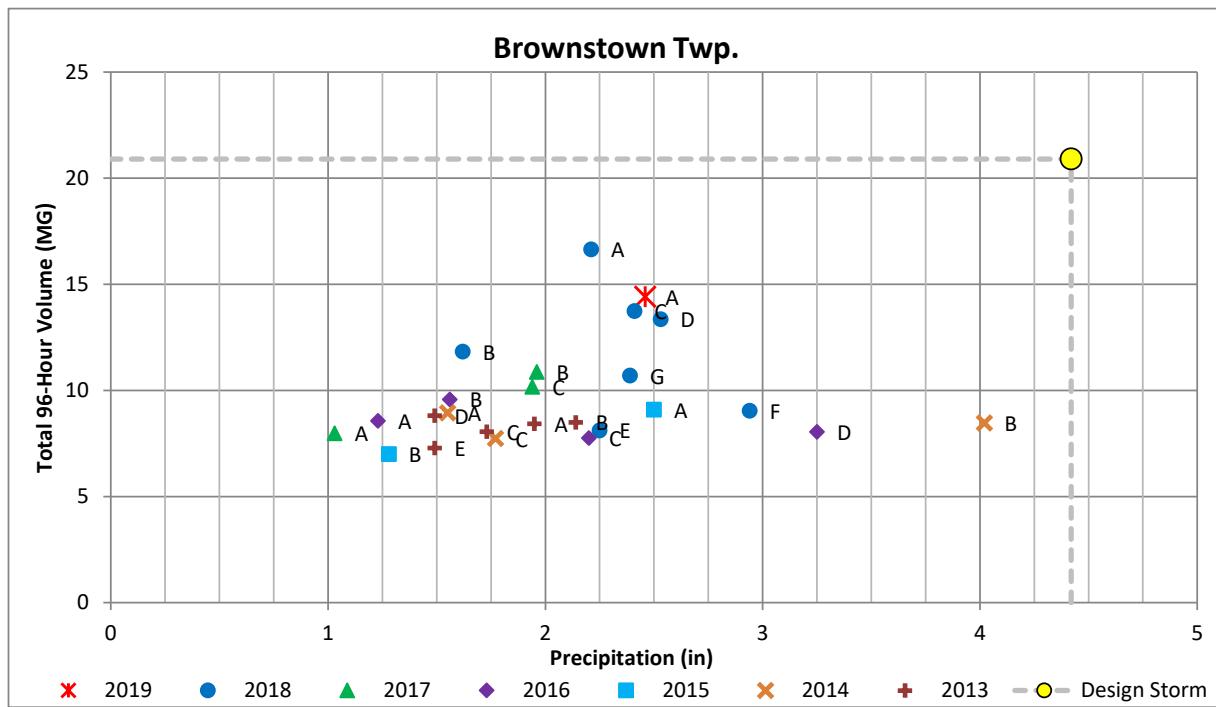
Major Storm Event		Belleville	
		DTW Precipitation (in)	96-hour Volume (MG)
2013	A	1.95	2.66
	B	2.14	4.08
	C	1.73	2.11
	D	1.49	2.26
	E	1.49	2.72
2014	A	1.55	2.22
	B	4.02	2.06
	C	1.77	2.27
2015	A	2.50	3.84
	B	1.28	2.51
2016	A	1.23	2.90
	B	1.56	3.21
	C	2.20	0.93
	D	3.25	2.25
2017	A	1.03	3.25
	B	1.96	4.41
	C	1.94	3.99
2018	A	2.21	5.11
	B	1.62	4.49
	C	2.41	4.75
	D	2.53	5.25
	E	2.25	1.88
2019	F	2.94	2.87
	G	2.39	3.30
Design Storm	A	4.42	7.15
			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 DTW 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
Downriver Sewage Disposal System
Total 96-Hour Volume versus Precipitation
for Major Storm Events for 2013 through 2019



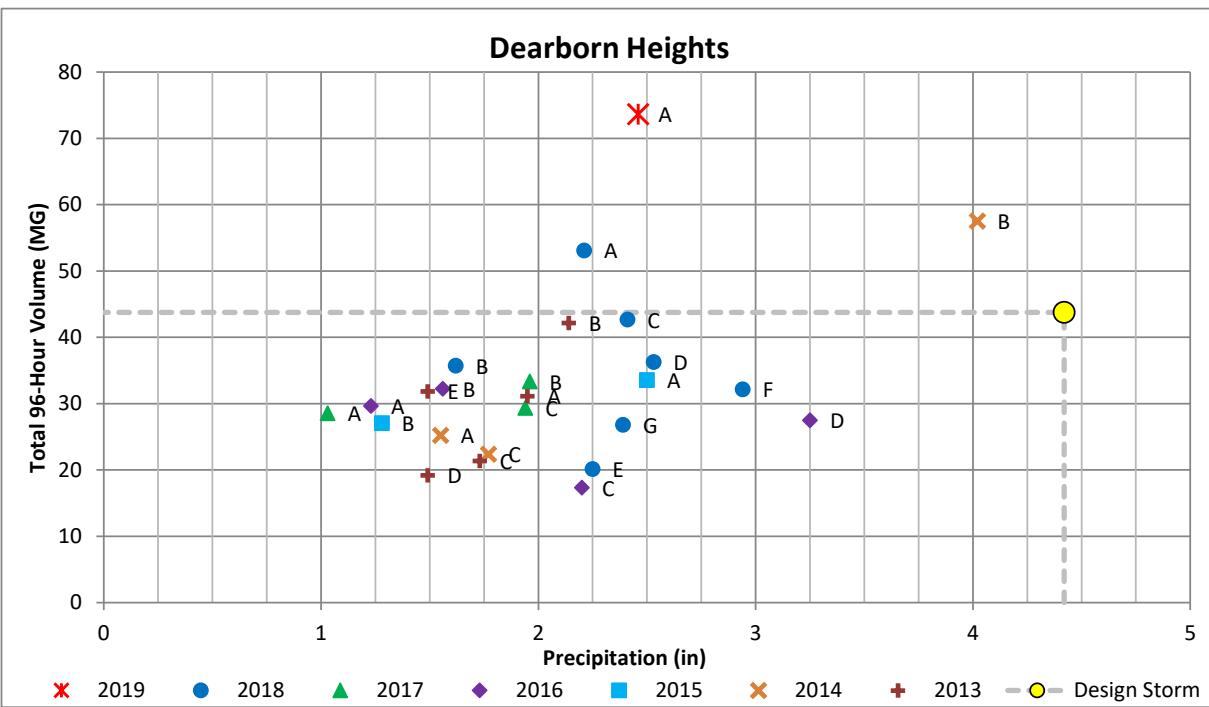
Major Storm Event		Brownstown Twp.	
		DTW Precipitation (in)	96-hour Volume (MG)
2013	A	1.95	8.42
	B	2.14	8.49
	C	1.73	8.05
	D	1.49	8.81
	E	1.49	7.29
2014	A	1.55	8.95
	B	4.02	8.47
	C	1.77	7.73
2015	A	2.50	9.10
	B	1.28	6.99
2016	A	1.23	8.57
	B	1.56	9.58
	C	2.20	7.75
	D	3.25	8.04
2017	A	1.03	7.98
	B	1.96	10.87
	C	1.94	10.17
2018	A	2.21	16.65
	B	1.62	11.83
	C	2.41	13.74
	D	2.53	13.36
	E	2.25	8.11
2019	F	2.94	9.04
	G	2.39	10.70
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 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-5
Downriver Sewage Disposal System
Total 96-Hour Volume versus Precipitation
for Major Storm Events for 2013 through 2019



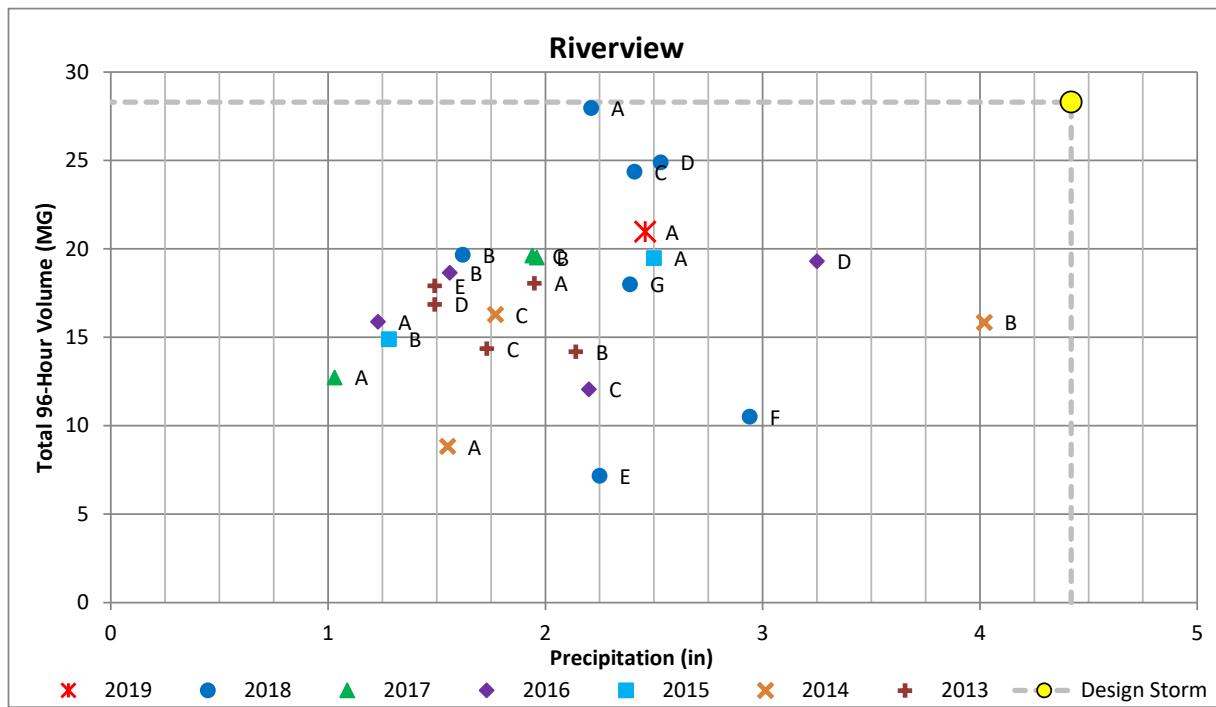
Major Storm Event		Dearborn Heights	
		DTW Precipitation (in)	96-hour Volume (MG)
2013	A	1.95	31.13
	B	2.14	42.18
	C	1.73	21.35
	D	1.49	19.18
	E	1.49	31.85
2014	A	1.55	25.21
	B	4.02	57.54
	C	1.77	22.36
2015	A	2.50	33.56
	B	1.28	27.04
2016	A	1.23	29.65
	B	1.56	32.22
	C	2.20	17.36
	D	3.25	27.50
2017	A	1.03	28.55
	B	1.96	33.33
	C	1.94	29.38
2018	A	2.21	53.10
	B	1.62	35.72
	C	2.41	42.69
	D	2.53	36.29
	E	2.25	20.13
	F	2.94	32.16
2019	G	2.39	26.80
	A	2.46	73.63
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 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-6
Downriver Sewage Disposal System
Total 96-Hour Volume versus Precipitation
for Major Storm Events for 2013 through 2019



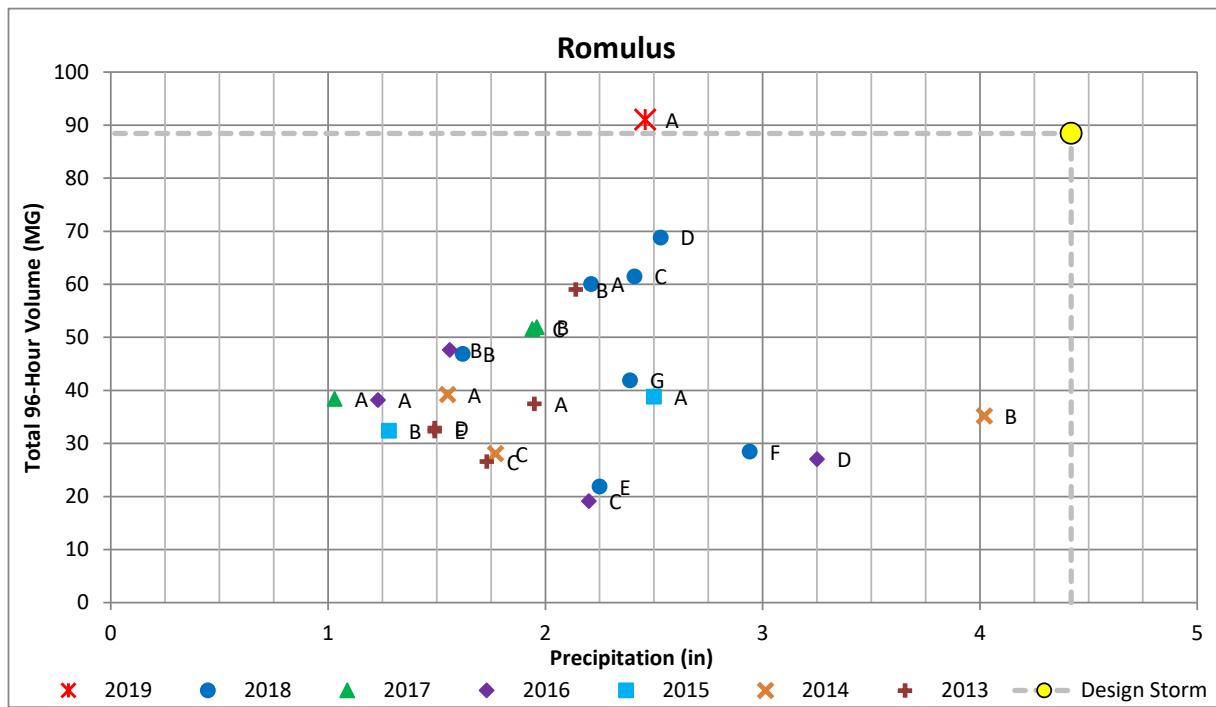
Major Storm Event		Riverview	
		DTW Precipitation (in)	96-hour Volume (MG)
2013	A	1.95	18.06
	B	2.14	14.19
	C	1.73	14.36
	D	1.49	16.87
	E	1.49	17.91
2014	A	1.55	8.83
	B	4.02	15.84
	C	1.77	16.29
2015	A	2.50	19.48
	B	1.28	14.89
2016	A	1.23	15.88
	B	1.56	18.65
	C	2.20	12.07
	D	3.25	19.31
2017	A	1.03	12.73
	B	1.96	19.51
	C	1.94	19.63
2018	A	2.21	27.97
	B	1.62	19.66
	C	2.41	24.38
	D	2.53	24.89
	E	2.25	7.18
	F	2.94	10.51
2019	G	2.39	18.01
	A	2.46	20.97
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
Downriver Sewage Disposal System
Total 96-Hour Volume versus Precipitation
for Major Storm Events for 2013 through 2019



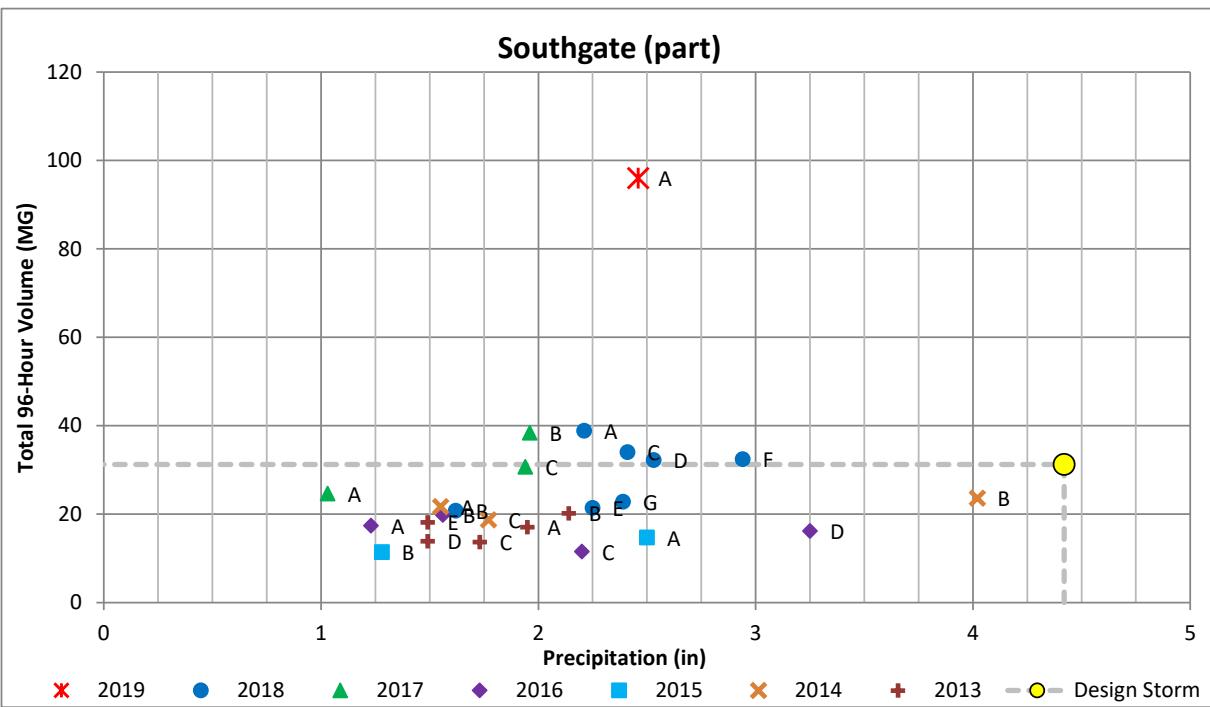
Major Storm Event		DTW Precipitation (in)	Romulus
			96-hour Volume (MG)
2013	A	1.95	37.45
	B	2.14	59.02
	C	1.73	26.57
	D	1.49	32.88
	E	1.49	32.32
2014	A	1.55	39.20
	B	4.02	35.18
	C	1.77	28.09
2015	A	2.50	38.82
	B	1.28	32.41
2016	A	1.23	38.16
	B	1.56	47.64
	C	2.20	19.10
	D	3.25	27.02
2017	A	1.03	38.42
	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
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 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-8
Downriver Sewage Disposal System
Total 96-Hour Volume versus Precipitation
for Major Storm Events for 2013 through 2019



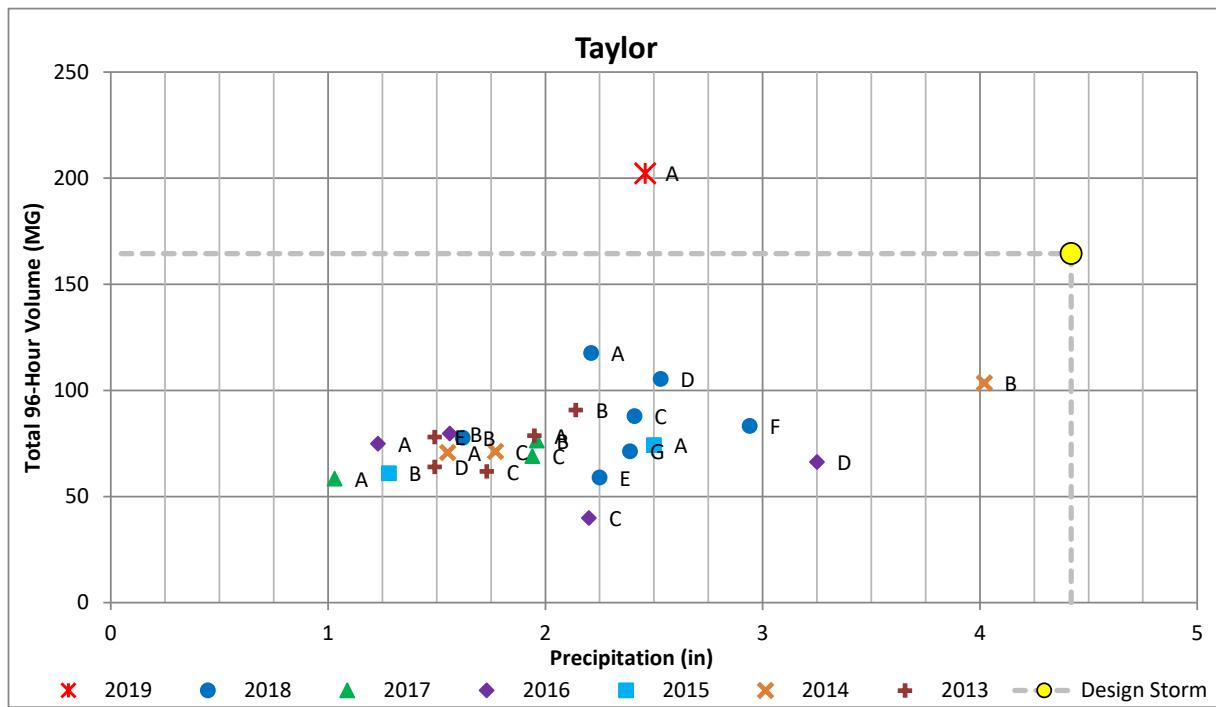
Major Storm Event		Southgate (part)	
		DTW Precipitation (in)	96-hour Volume (MG)
2013	A	1.95	17.09
	B	2.14	20.21
	C	1.73	13.71
	D	1.49	13.86
	E	1.49	18.16
2014	A	1.55	21.73
	B	4.02	23.64
	C	1.77	18.70
2015	A	2.50	14.73
	B	1.28	11.43
2016	A	1.23	17.41
	B	1.56	19.81
	C	2.20	11.53
	D	3.25	16.18
2017	A	1.03	24.66
	B	1.96	38.45
	C	1.94	30.75
2018	A	2.21	38.86
	B	1.62	20.78
	C	2.41	34.04
	D	2.53	32.25
	E	2.25	21.41
	F	2.94	32.45
2019	G	2.39	22.82
	A	2.46	96.00
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 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-9
Downriver Sewage Disposal System
Total 96-Hour Volume versus Precipitation
for Major Storm Events for 2013 through 2019



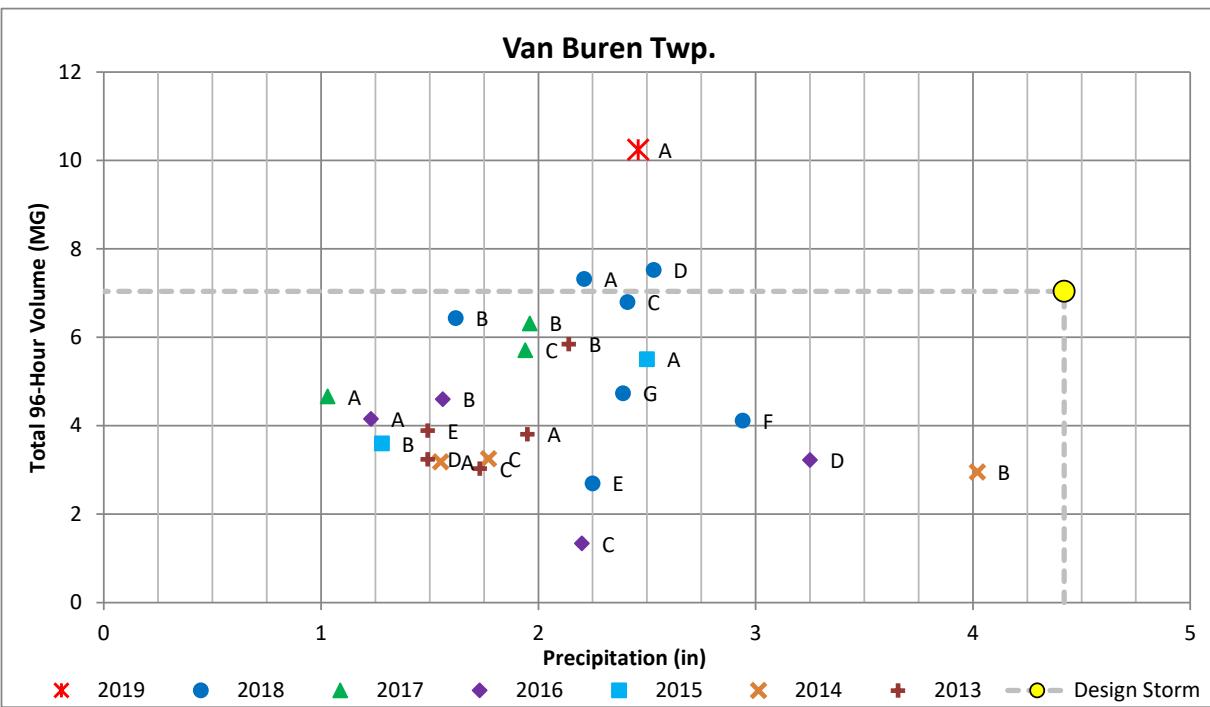
Major Storm Event		Taylor	
		DTW Precipitation (in)	96-hour Volume (MG)
2013	A	1.95	78.64
	B	2.14	90.69
	C	1.73	61.76
	D	1.49	63.93
	E	1.49	78.04
2014	A	1.55	70.66
	B	4.02	103.51
	C	1.77	71.19
2015	A	2.50	74.29
	B	1.28	60.95
2016	A	1.23	74.83
	B	1.56	79.66
	C	2.20	39.85
	D	3.25	66.28
2017	A	1.03	58.48
	B	1.96	76.34
	C	1.94	69.01
2018	A	2.21	117.61
	B	1.62	77.72
	C	2.41	87.89
	D	2.53	105.41
	E	2.25	58.92
2019	F	2.94	83.23
	G	2.39	71.27
Design Storm	A	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 DTW 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
Downriver Sewage Disposal System
Total 96-Hour Volume versus Precipitation
for Major Storm Events for 2013 through 2019



Major Storm Event		Van Buren Twp.	
		DTW Precipitation (in)	96-hour Volume (MG)
2013	A	1.95	3.81
	B	2.14	5.85
	C	1.73	3.03
	D	1.49	3.24
	E	1.49	3.89
2014	A	1.55	3.19
	B	4.02	2.95
	C	1.77	3.26
2015	A	2.50	5.51
	B	1.28	3.60
2016	A	1.23	4.16
	B	1.56	4.60
	C	2.20	1.34
	D	3.25	3.22
2017	A	1.03	4.66
	B	1.96	6.32
	C	1.94	5.71
2018	A	2.21	7.32
	B	1.62	6.43
	C	2.41	6.80
	D	2.53	7.52
	E	2.25	2.70
2019	F	2.94	4.12
	G	2.39	4.73
Design Storm	A	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 - April 30, 2019 - May 1, 2019

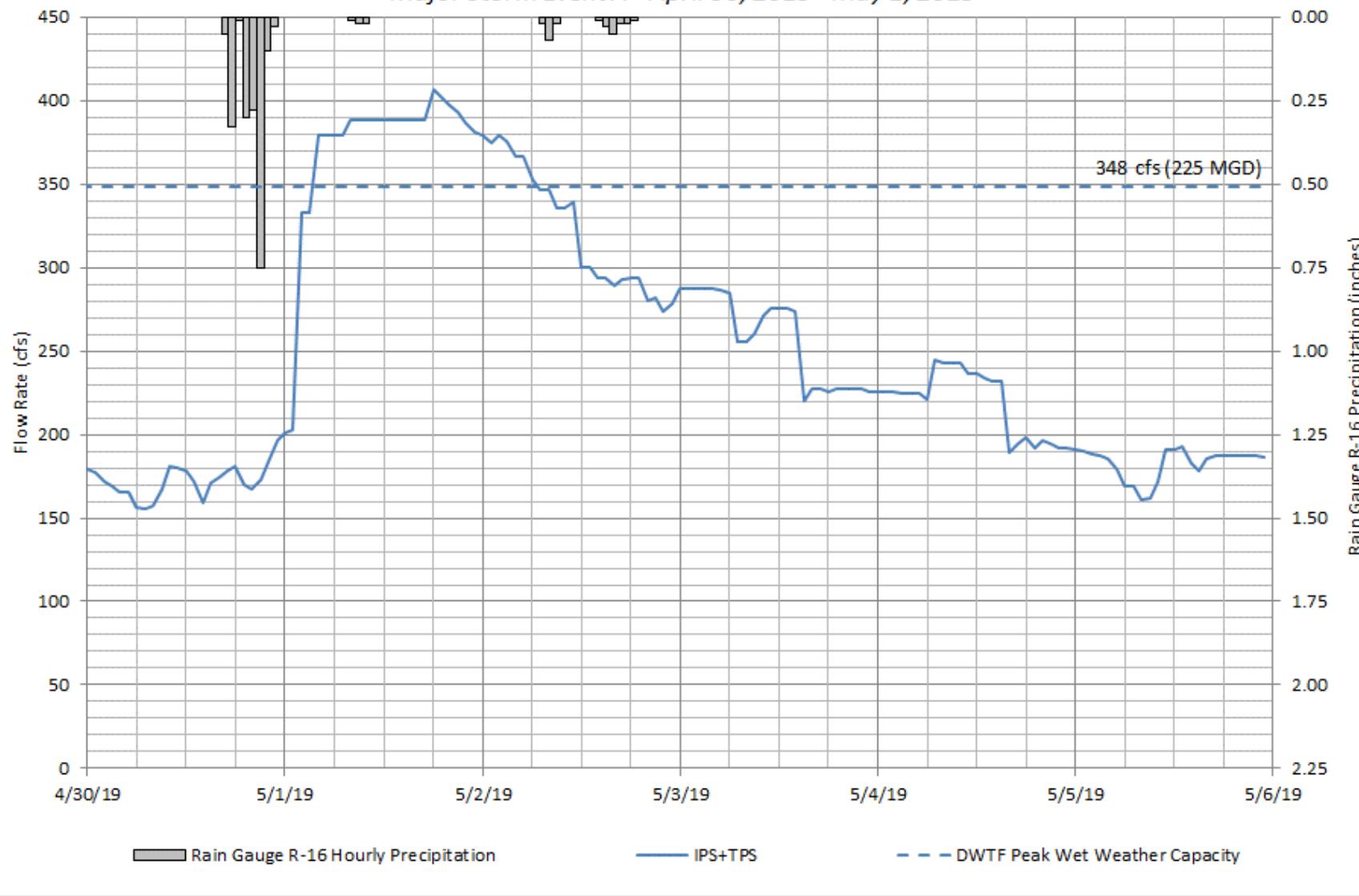


Figure D-12
Riverdrive Interceptor
Major Storm Event A - April 30, 2019 - May 1, 2019

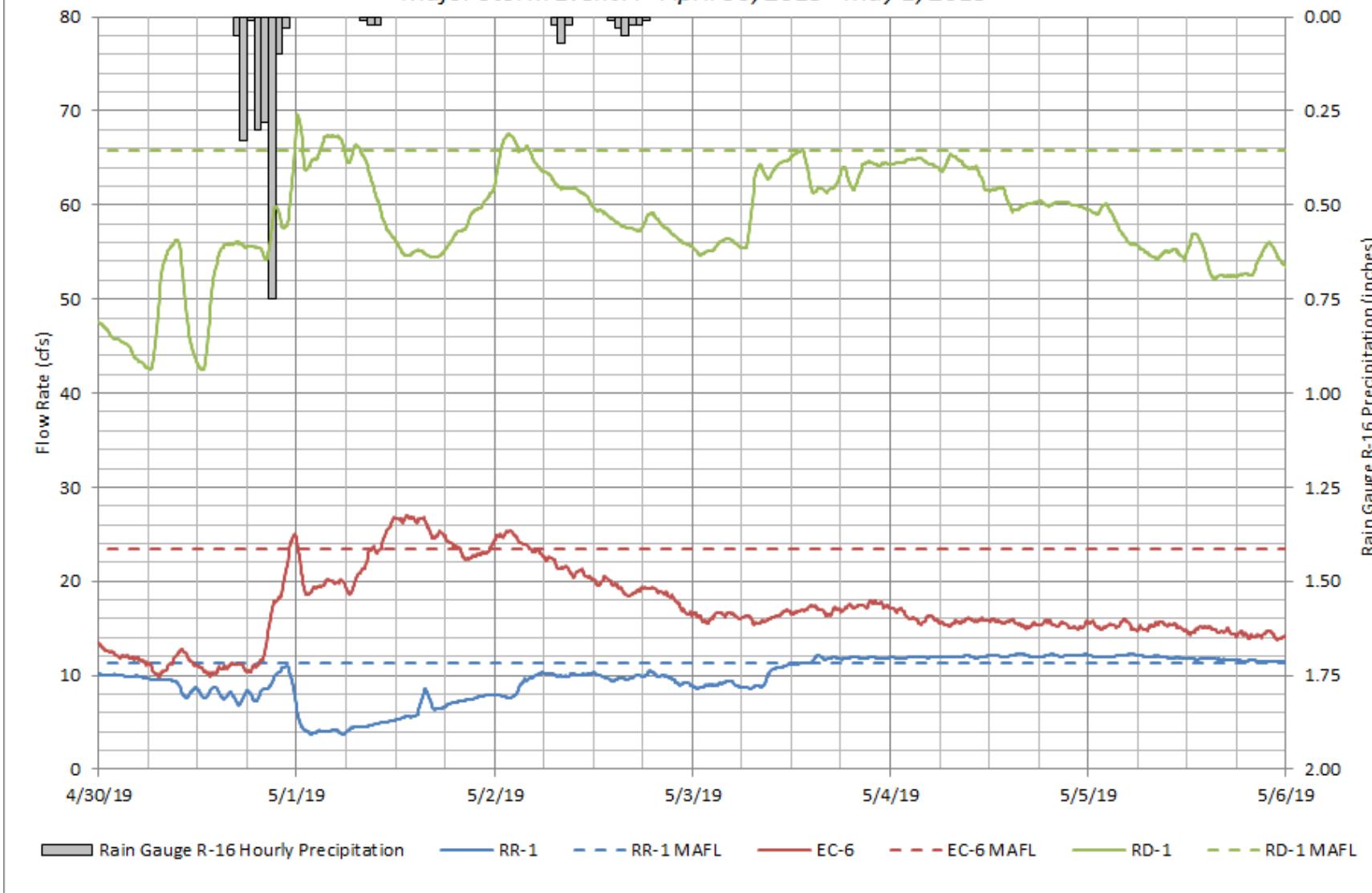


Figure D-13
Riverdrive Interceptor
Major Storm Event A - April 30, 2019 - May 1, 2019

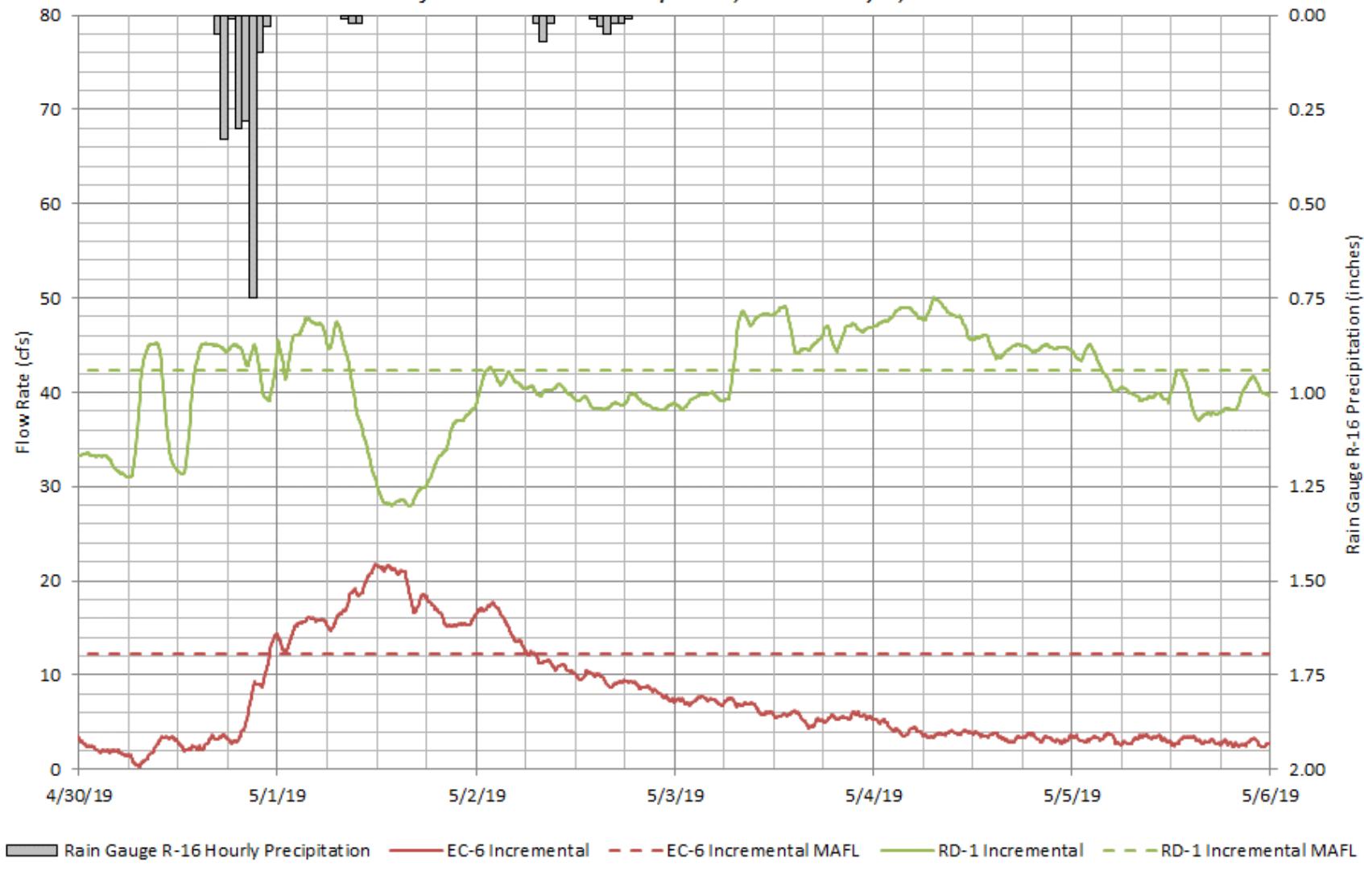
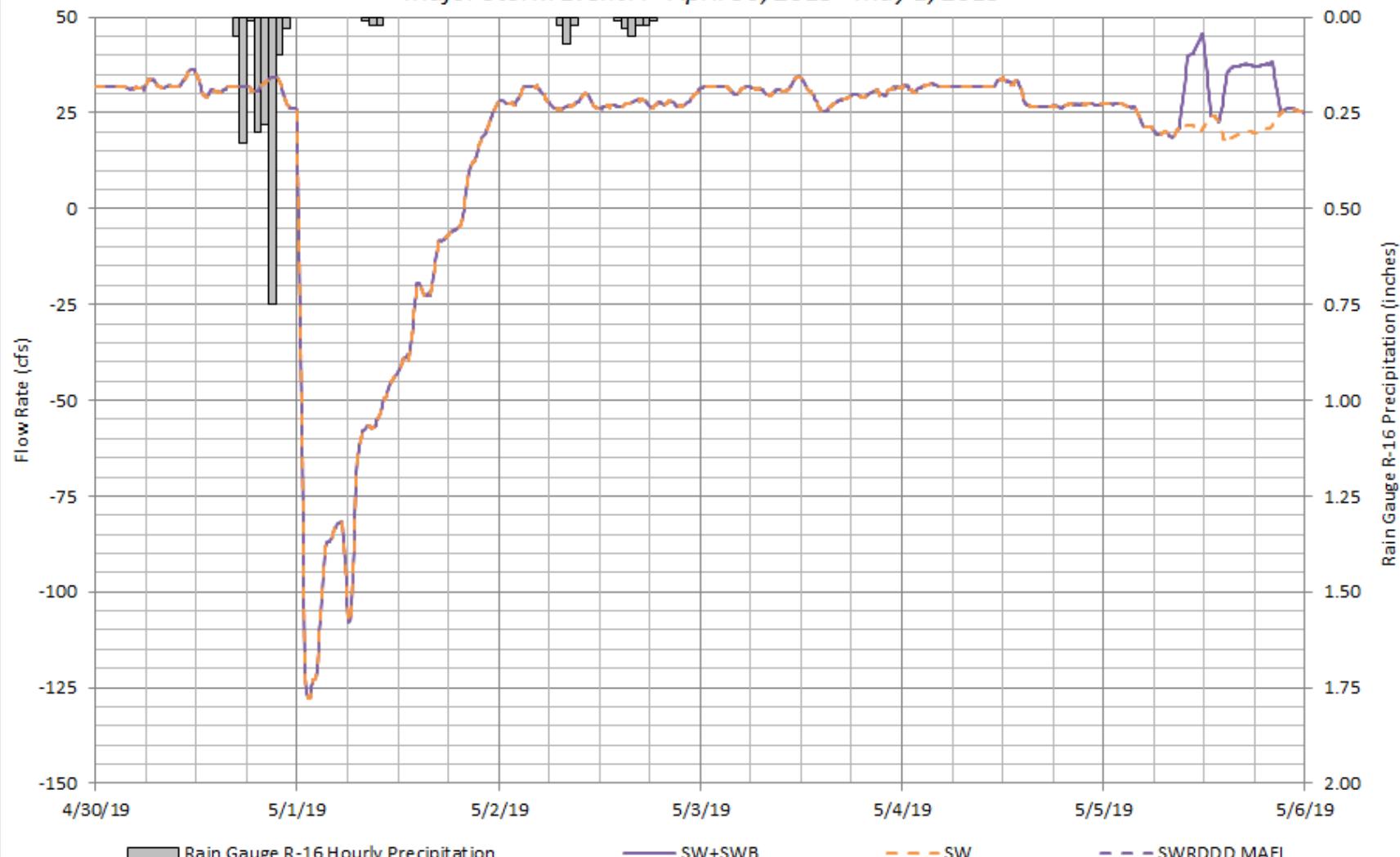


Figure D-14
SWRDDD Connection
Major Storm Event A - April 30, 2019 - May 1, 2019



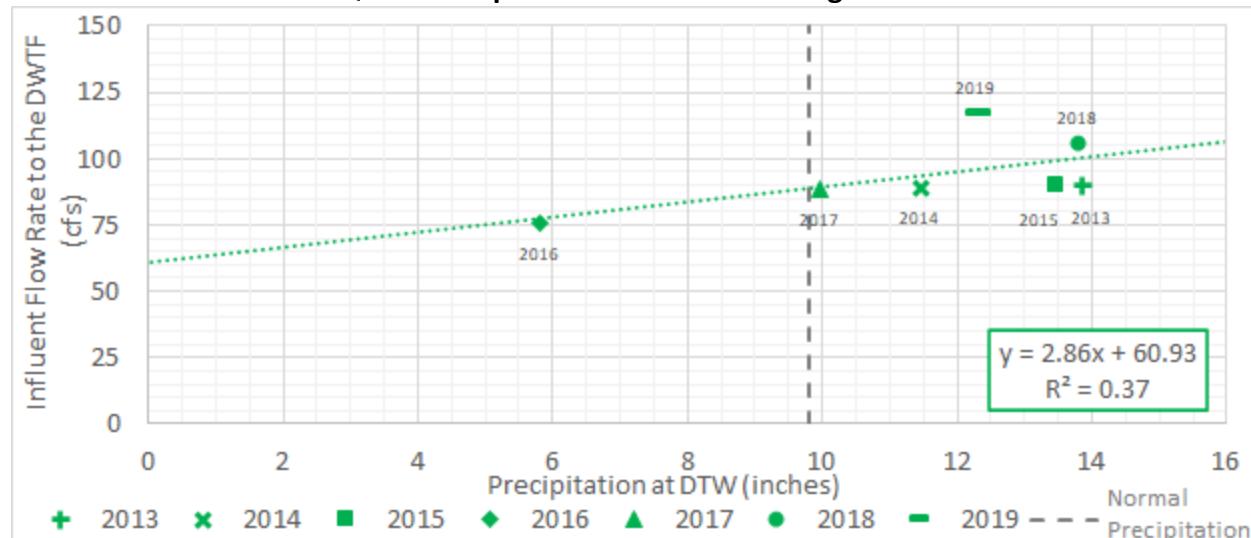
Appendix E

Spring 2019 Quarterly Average Flow Rates

Spring 2019 Quarterly Average Flow Rates

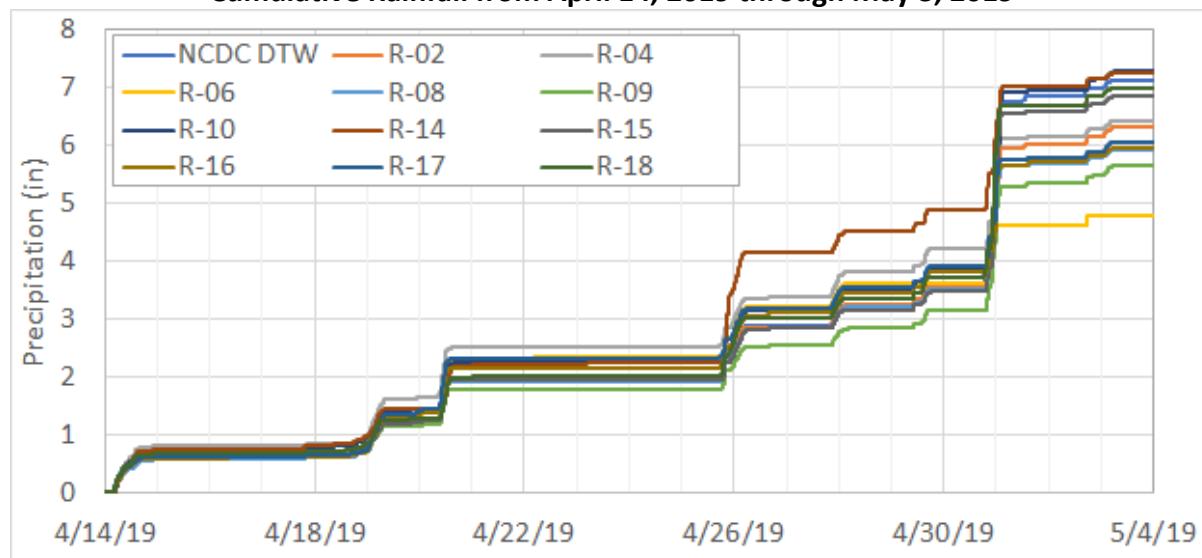
The spring 2019 quarterly average flow rate did not fit the trend of the previous 6-year spring quarterly average flow rates. The flow rate for this quarter was the highest of the past seven years, but the rainfall was not the highest of these years. Figure E1 plots the average influent flow rate to the DWTF (interceptor system flow meters) versus the total precipitation at DTW for Q2 for years 2013 through 2019.

Figure E1
Average Influent Flow Rate to DWTF versus Total Precipitation at DTW
Quarter 2 April – June for 2013 through 2019



Spring 2019 had higher than average rainfall. Figure E2 shows the cumulative rainfall from April 14, 2019 through May 3, 2019. This 20-day rainfall totaled over 7-inches and had a return interval of about 10-years.

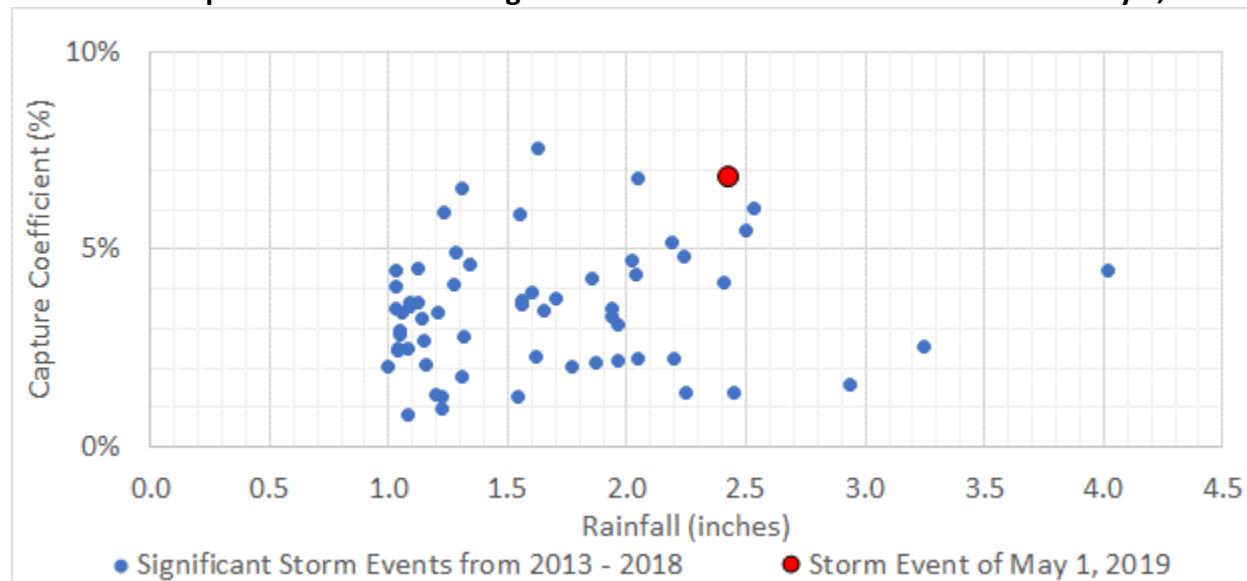
Figure E2
Cumulative Rainfall from April 14, 2019 through May 3, 2019



These back-to-back storm events resulted in high antecedent moisture conditions and increasing capture for subsequent events. Figure E3 shows the estimated capture coefficient for the significant storm events from 2013 through 2018 and for the May 1, 2019 event. The May 1, 2019 event is estimated to have the second highest capture coefficients of all storms over the past 6 years.

Figure E3

Estimated Capture Coefficient for Significant Storm Events from 2013 - 2018 & May 1, 2019



Notes:

- 1) Capture coefficient is estimated using TPS+IPS total volume less dry weather volume based on dry days before and after the event; average rainfall measured by DSDS rain gauges; and the DSDS total developed land area from SEMCOG 2008 (54,110 acres).
- 2) Rainfall is the average rainfall measured by DSDS rain gauges for significant storm events (≥ 1 inch).
- 3) The capture coefficient for this event was one of the highest at about 6.9%, likely due to the wet antecedent conditions. There was only one event with a larger capture and it was in December of 2013 when the ground was likely frozen.

Figures E4 and E5 show the average influent flow rate to the DWTF by month. The red line shows the 2019 flow rates, the blue line shows the 2013-2018 average flow rate, the black bars show the maximum and minimum flow rates and corresponding years are labeled. Figure E4 shows the average total influent flow rate and Figure E5 shows the average dry weather influent flow rate. These figures show that the DSDS dry weather flow rate and total flow rate were about average from January through March 2019. The April 2019 dry weather flow continued to be about average, but the total flow was about equal to the 2013-2018 maximum. The 2019 total flow and 2019 dry weather flow were the highest for May and is likely due to the significant wet weather in late April 2019 and in May 2019 with high capture coefficients. In June through August 2019, the total flow rate and dry weather flow rate receded back to values in the range of the 2013-2018 average flow rates.

Figure E4
Average Total Influent Flow Rate to the DWTF

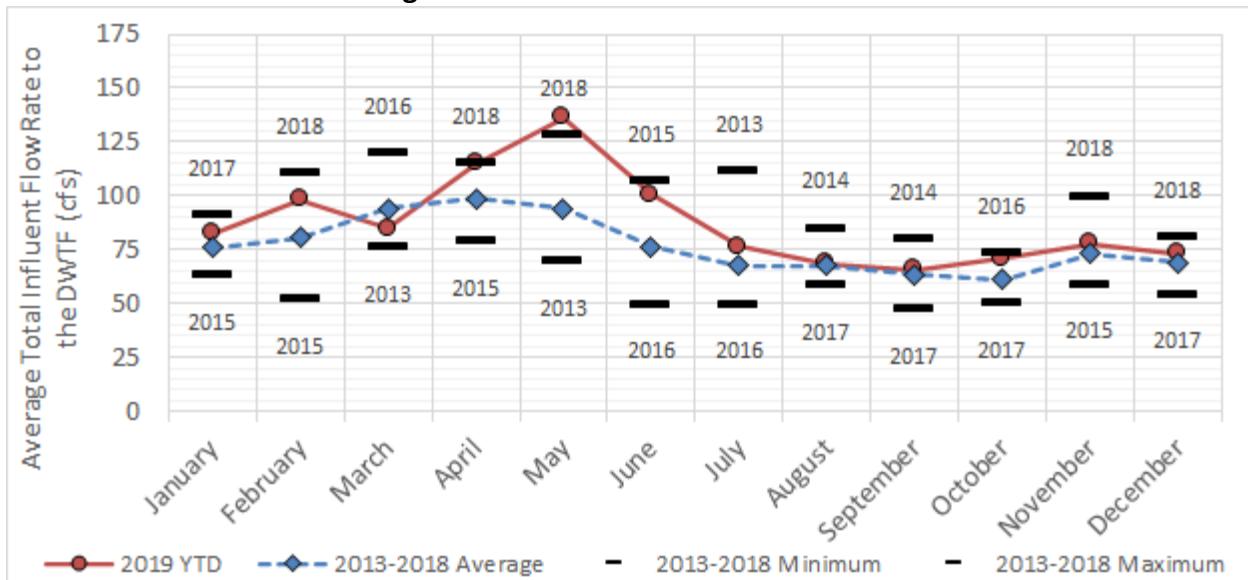
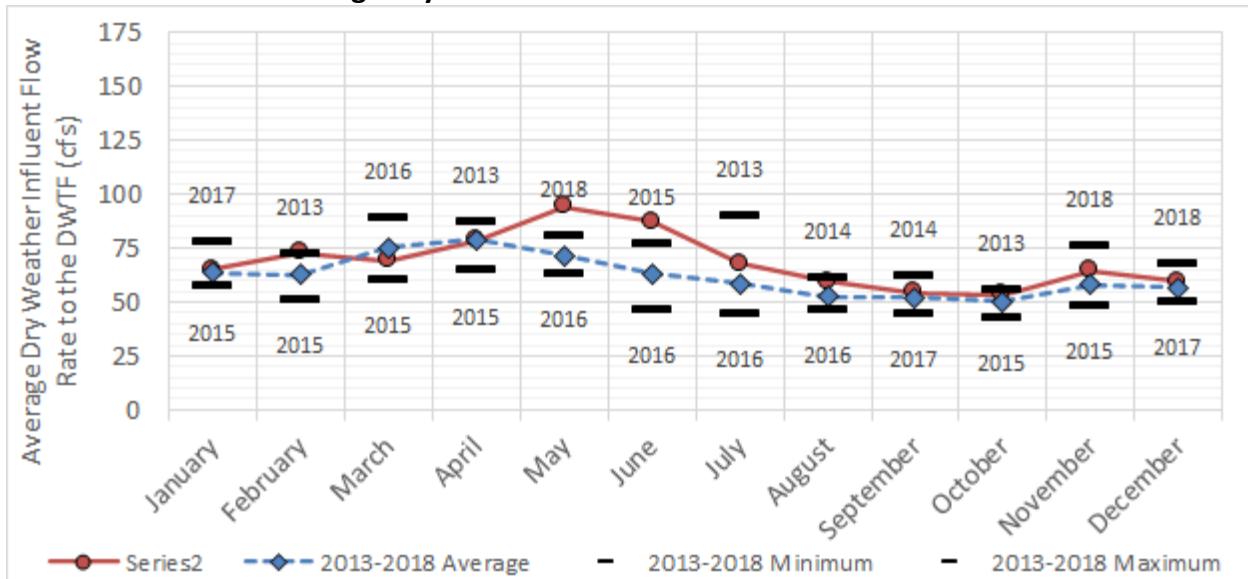


Figure E5
Average Dry Weather Influent Flow Rate to the DWTF



Therefore, the spring 2019 average influent flow rate to the DWTF (interceptor system flow meters) versus the total precipitation at DTW shown in Figure A1 is reasonable. For this quarter, the total quarterly precipitation at DTW was 12.29 inches, which is 2.49 inches above normal, and the influent flow rate was the highest of the past 7-years. The Q2 2019 influent flow rate was elevated due to high captures for the April and May storm events which had high antecedent conditions.