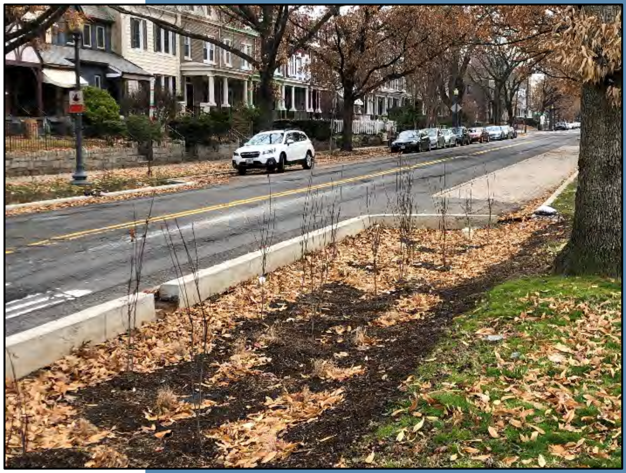

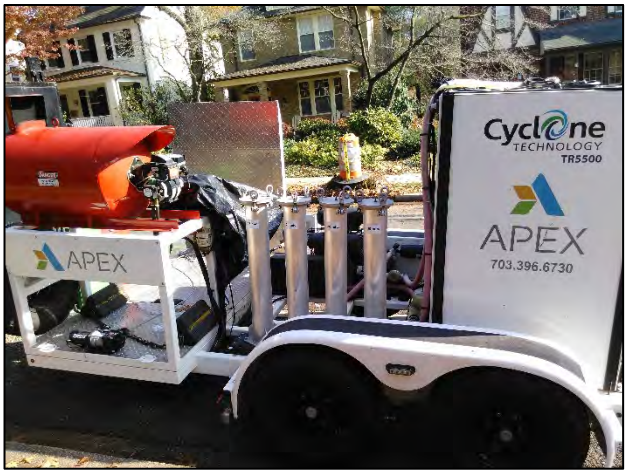

RiverSmart Washington Post-Implementation Monitoring Phase 2

September 2020 Final Report

Prepared for:
Department of Energy and Environment

FINAL

September 29, 2020

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Post-Implementation Monitoring Phase 2

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Prepared for:
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1 Introduction

The RiverSmart Washington Low-Impact Development (LID) demonstration sites are the culmination of ten years of projects intended to help quantify the potential effectiveness of LID in Washington, D.C. In 2006, EPA commissioned LimnoTech and Casey Trees to develop the Green Build-Out Model (GBOM), a tool designed to estimate potential reductions in stormwater volumes and combined sewer overflows that might be achieved through intensive city-wide installation of a variety of green infrastructure practices. The GBOM estimated that such widespread implementation of LID retrofit practices could lead to significant decreases in both stormwater runoff volumes and peak flow rates.

Since the GBOM, RiverSmart Washington has progressed through many stages: site selection, pre-construction monitoring, private land LID installation, public land design and construction, and the initial phase of post-construction monitoring. Throughout the process, the Department of Energy and Environment (DOEE) has collaborated with other agencies such as the District Department of Transportation (DDOT) and engaged with public and private stakeholders.

This report covers the 2019-2020 post-construction monitoring phase, analysis, and modeling. This phase of RiverSmart included the rehabilitation of LID practices, with monitoring occurring both before and after rehabilitation activities. Practice rehabilitations were considered necessary because most maintenance activities had been deferred since the LID practices came online in 2015. This monitoring phase also included monitoring of some individual LID practices, to supplement the site-wide sewer metering. The modeling task includes re-calibration of detailed SWMM models of the RiverSmart sites, and projections of performance – based on the SWMM calibration – using the original GBOM. This report also documents obstacles that were encountered during this phase of RiverSmart, and offers suggestions for future investigations.

2 Site Descriptions and Locations

There are three sites that were monitored during the 2019-2020 period: the Control site, the MacFarland demonstration site in the Petworth area of Northwest Washington, and the Lafayette demonstration site in the Broad Branch area of Northwest Washington. All three sites are in the Rock Creek watershed. The three sewer metering locations are identical to the locations monitored during previous phases in 2010 (pre-construction) and 2015-2016 (post-construction). Previous RiverSmart reports, *Pre-Implementation Stormwater Volume Monitoring for Large Scale Low Impact Development Implementation* (2011), and *Post-Implementation Stormwater Monitoring and Analysis for RiverSmart Washington* (2017), contain additional information on previous monitoring activities.

Control Site

The Control site (sewershed code CSO-049G) is within the combined sewer portion of the city, specifically the large Piney Branch sewershed in the Rock Creek watershed. It is roughly bounded by New Hampshire Avenue, 3rd Street, 4th Street, and Delafield Place. Its land use is primarily residential. This site is 10.4 acres and is 60% impervious. Its location, as well as its sewer network and the location of its flow meter, are depicted on Figure 2-1.

Figure 2-1. Control Site Map

MacFarland Site

The MacFarland site (sewershed code CSO-049A) is also within the Piney Branch combined sewershed, and is about six blocks west of the Control site. It is roughly bounded by Georgia Avenue, 13th Street, and

Buchanan Street. Its land use is mixed residential and commercial and also includes MacFarland Middle School. The site is 13.9 acres and its pre-construction imperviousness was 59%. LID practices were installed in 2015 and treat 42% of the impervious area (as specified by design drawings).

MacFarland's LID installations include a variety of practice types and surfaces. Practices with sufficient soil infiltration rates were installed without underdrains, while practices without sufficient infiltration rates were installed with underdrains that connected to the sewer network. The practice types installed in MacFarland were:

- Permeable surfaces: These surfaces are either permeable concrete, interlocking pavers, or flexible permeable sidewalk material that allow infiltration of rainfall. They are primarily designed to infiltrate only rain that falls onto each practice footprint, and so do not have contributing area beyond each footprint. They are installed in alleys, several stretches of sidewalk, a parking lot at the middle school, and in many of the curbside parking areas of roads. In MacFarland, there are thirteen permeable surface practices; eleven have underdrains.
- Bioretention cells: These practices are installed as curb-bumpouts in road rights-of-way, and consist of layers of aggregate beneath an engineered soil mix in which ground cover, grasses, shrubs, and trees are planted. These practices have contributing impervious areas consisting of road surfaces, and have inlets designed to accommodate those flows. There are twelve total bioretention installations at the MacFarland site; nine have underdrains.
- Infiltration gallery: This practice is on the MacFarland Middle School grounds, and receives stormwater from the roof of the middle school building.

There were several issues with MacFarland LID installations that likely affected their performance over portions of the initial post-construction monitoring period in 2015-2016. One issue was construction of a new high school just outside of the monitored area during the second half of 2015. During site visits it was observed that erosion and sediment control (ESC) measures blocked inlets to the bioretention cells near the construction site. Also, the construction site appeared to contribute to clogging of the permeable surfaces nearest to the construction. These factors contributed to the need for practice rehabilitation in 2019.

The MacFarland site location, LID installations, sewer network, the location of its flow meter, and the location of the rain gauge, are depicted in Figure 2-2.

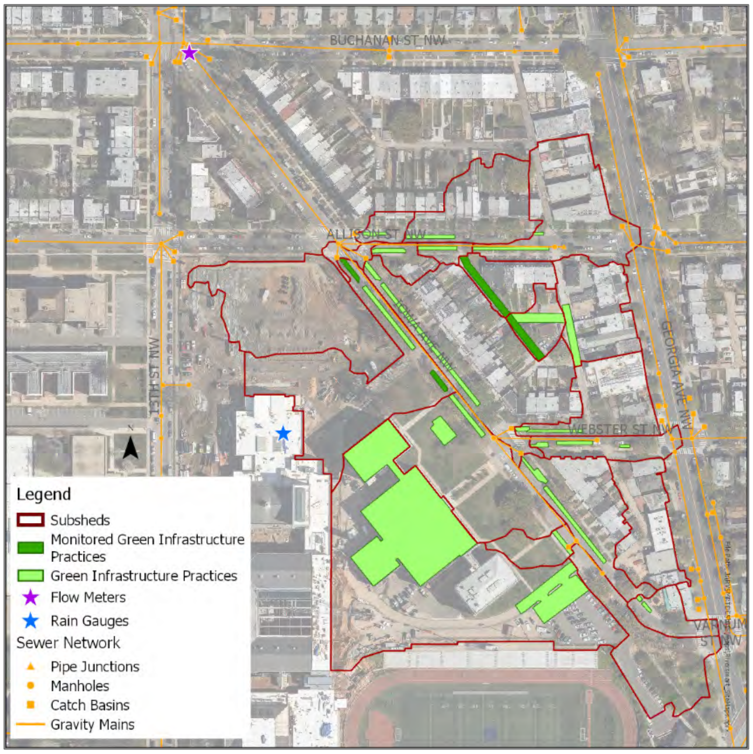


Figure 2-2. MacFarland Site Map

Lafayette Site

The Lafayette site (sewershed code SW-RC68) is in the MS4 area of the Rock Creek watershed. It is roughly bounded by 32nd and 34th Streets along a two-block portion of Quesada Street. Its land is primarily residential, and consists of single-family homes. The site is 13 acres and its pre-construction imperviousness was 36%. LID practices were installed in 2015 and treat 55% of the impervious area (as specified by design drawings).

Lafayette's LID practice types are almost identical to those at the MacFarland site. The exception is the absence of an infiltration gallery at the Lafayette site. There are four bioretention cells installed at the Lafayette site, three with underdrains. There are 18 permeable surface practices in Lafayette, nine with underdrains.

There was a potential issue with clogging of the permeable surfaces at the Lafayette site that was discovered during cleaning-equipment testing by the Interlocking Concrete Pavement Institute (ICPI) in June 2015. The authors of a subsequent paper were "surprised" at the amount of clogging that they measured pre-cleaning, for surfaces that had all been installed less than a year prior to their testing (Smith, 2015). This served as another argument for the necessity of the 2019 rehabilitation activities.

The Lafayette site location, LID installations, sewer network, the location of its flow meter, and the location of the rain gauge, are depicted on the Figure 2-3 map.

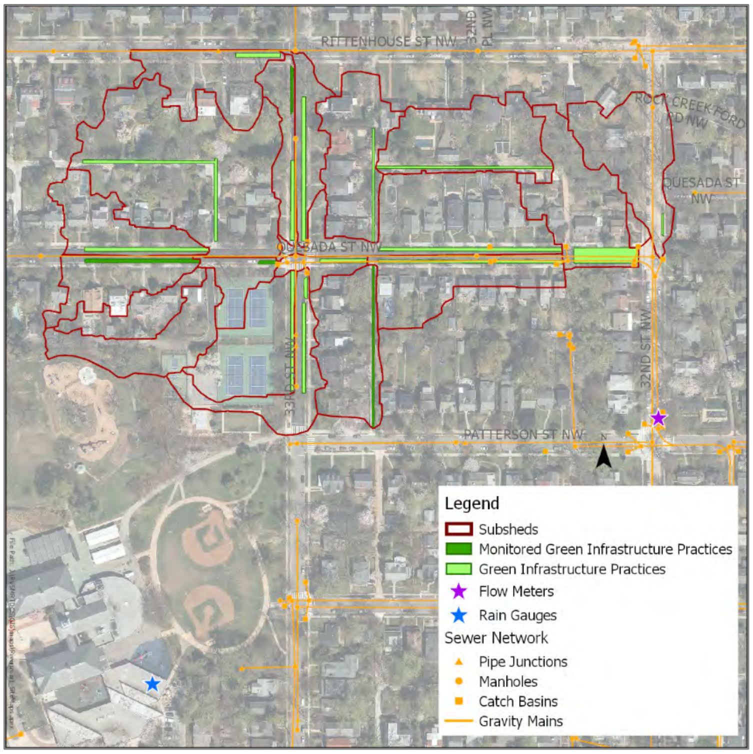


Figure 2-3. Lafayette Site Map

3 Methods

Rainfall Monitoring

Rain Gauges

LimnoTech installed, maintained, and collected data from two tipping-bucket rain gauges (Davis Vantage Pro 2) with associated data loggers (EnviroDIY). One gauge was installed on the rooftop of MacFarland Middle School in the MacFarland area on June 7, 2019, and provided rain data for both that site and the nearby Control site. The other gauge was installed on the roof of Broad Branch Market in the Lafayette area on June 7, 2019. Both installation sites were the same sites at which rain gauges were deployed for the previous round of monitoring in 2015-2016. LimnoTech calibrated the gauges and reviewed collected data periodically to ensure quality. Data were collected in real-time, at five-minute intervals, with a precision of 0.01 inches. Data loggers transmitted measurements wirelessly to LimnoTech servers every ten minutes.

Rainfall Data QA/QC

Observed rainfall data for MacFarland and Lafayette gauges were compared with each other and with National Airport data. Figure 3-1 is a plot of rainfall hyetographs and cumulative rainfall for both RiverSmart gauges and National Airport.

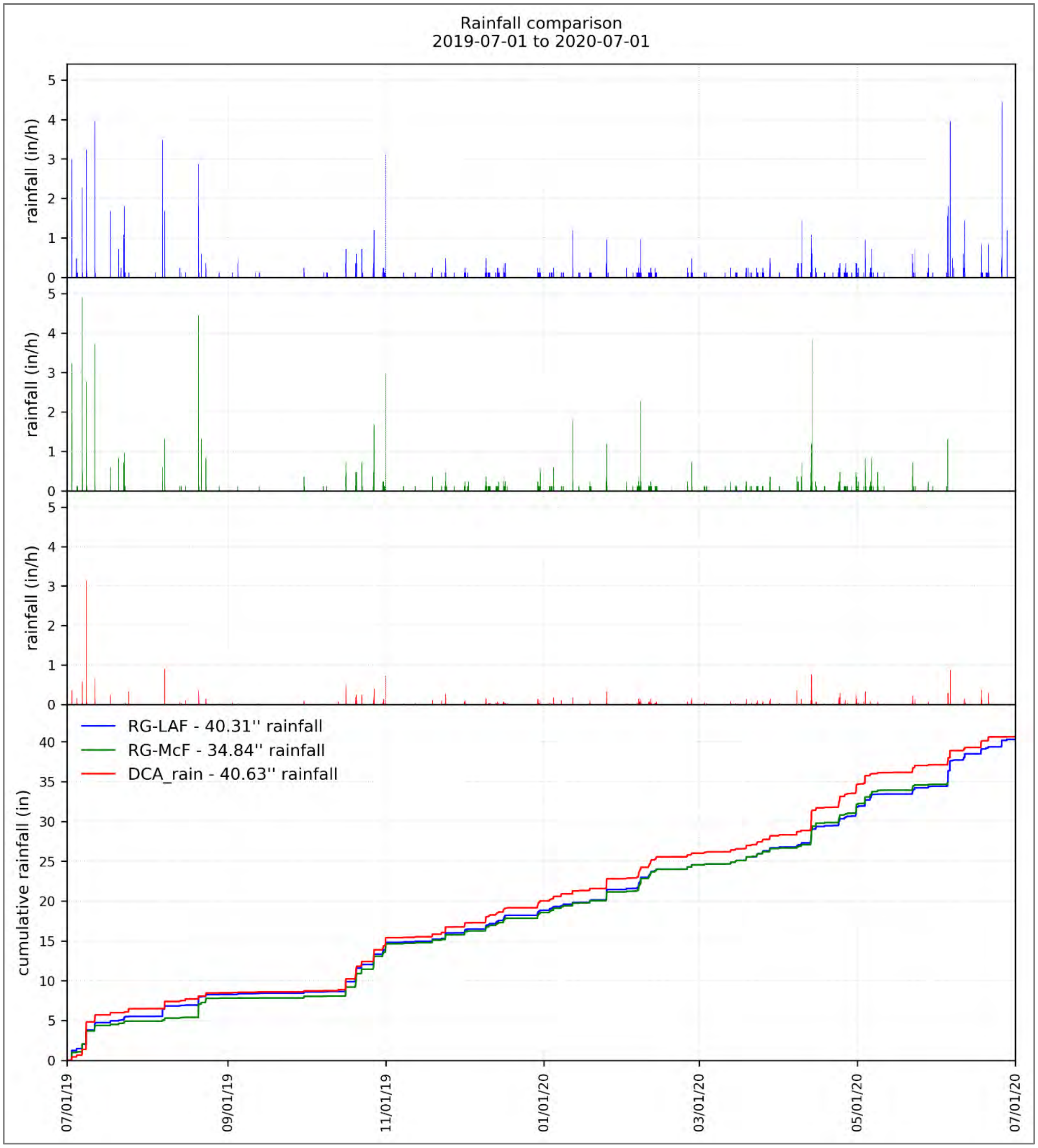


Figure 3-1. Rainfall Comparison Plots

Rainfall Event Criteria and Summary

In order to provide a basis for analysis, individual rainfall events were defined for each rain gauge. Rain events were defined based on a six-hour maximum inter-event duration; that is, an event was considered to be concluded after six hours passed without any recorded rainfall. The six-hour duration was chosen strictly for the purpose of isolating portions of data for further analysis. The definition of events was not intended to be used for assigning a return period or for making any other statistical inference related to rainfall. Additionally, events smaller than 0.1" were not considered for analysis, since amounts of rainfall under 0.1" do not typically generate measurable runoff.

Based on the six-hour and 0.1" criteria, 73 individual rain events were identified at the MacFarland and Control sites for the period June 10, 2019 to June 27, 2020.. The largest observed event was 2.32 inches. Eleven events were recorded with rainfall depths greater than 1 inch. Total rainfall during the monitoring period was 39.27 inches. The events for June and July 2020 for the MacFarland gauge were not available, due to a thunderstorm rendering the gauge inoperable; for that period, the Lafayette rain gauge data were used as a substitute.

At the Lafayette site, 41.19 inches of rain over 77 events were recorded during the monitoring period of June 10, 2019 to June 27, 2020. The largest observed event was 1.94 inches, and 12 events were recorded with rainfall depths greater than 1 inch.

Flow Monitoring

Flow Meters

Flow monitoring was conducted at each site using flow meters (ADS Flowshark) for the monitoring period installed directly into the sewer pipe downgradient of the ultimate collection point at each site. The flow meters employed four ultrasonic level sensors to record stage data in the pipe, a low-profile digital Doppler velocity meter, and a pressure sensor to measure surcharging conditions and provide additional stage data. The meters were linked to a local data logger that, similar to the rain gauges, employed built-in cellular communications technology to facilitate real-time remote access.

The meter associated with the MacFarland site was installed in a manhole located in the crosswalk at the intersection of Buchanan Street NW and Iowa Avenue NW. The Control Site meter was installed in a manhole next to 424 Crittenden Street NW. The flow meter for the Lafayette Demonstration Site was installed in a manhole just north of the intersection of Patterson Street NW and 32nd Street NW. All three locations were identical to the locations used for both the 2010 pre-construction and 2015-2016 post-construction flow monitoring.

Flow Data QA/QC

Flow gauges underwent continuous QA/QC by ADS according to their QAPP. Depth and velocity readings were reviewed by a Lead Scientist. When necessary, subsequent meter-specific adjustments were made. Flow rate approximations were found using the metered data and validated against a geometric estimate of flow rate (calculated from the Manning's equation). LimnoTech reviewed monthly reports and data upon receipt of all finalized flows from ADS.

Additional QA/QC was conducted by LimnoTech as part of the flow data processing, described in the following section.

Flow Data Processing

Flow data underwent several processing steps before it could be used for analysis. For short periods of missing data, interpolation was used to provide flow values. Dry weather flow at all three meters was identified for the purposes of estimating a diurnal pattern. Dry weather flows were subtracted from total flows, to yield wet weather flows; the wet weather period was extended six hours beyond the last measured rainfall. Finally, an additional round of QA/QC was conducted which consisted of filtering and removing events from the analysis.

Dry Weather Flows

For purposes of this study, dry weather flow is considered a combination of sanitary wastewater flow (at the combined sewer sites) and infiltration and inflow (at both the separate and combined sewer sites). To establish a dry weather flow diurnal, metered flow data that were preceded by at least 72 hours of no recorded rainfall at associated rain gauges were averaged based on the hour of day in which the data was collected. Note that the "Diurnal Factor" is the hourly average dry weather flow rate divided by the overall average dry weather flow rate.

Flow Data QC

Because monitoring small water depths and high velocities within neighborhood-scale collection pipes is a challenging endeavor (particularly when the terrain and sewer system includes considerable slopes), consistent and reliable metering data was not available during all of the monitored precipitation events. Such events were filtered out of the analysis after performing several quality assurance reviews.

After review of flow metering data, 17 events were flagged and removed from the Lafayette site's analysis set, leaving 60 events for further analysis. Similarly, 9 events were flagged and removed from the Control site's analysis set, leaving 64 events for analysis. Only 2 events were flagged and removed from the MacFarland analysis set, leaving 71 events for analysis.

Practice Monitoring

One of the conclusions of the initial 2015-2016 post-construction monitoring and subsequent data analysis was that the sewer-based flow monitoring was not sufficient to quantify LID performance. There was no way to distinguish between performances of different practice types; for example, if bioretention practices were functioning better than permeable surfaces, it would not be possible to determine that from flow monitoring data alone. Additionally, there was significant noise in the flow monitoring data that often made flow reduction difficult to quantify. As will be discussed further in the monitoring results and analysis section, some of those data noise problems have persisted in the 2019-2020 flow monitoring data. There has also been an upward 'drift' observed in runoff at the Control site from the pre-rehab to post-rehab period, that mirrors a similar drift that was observed from the 2010 pre-construction period to the 2015-2016 post-construction period. Practice-level monitoring of select practices in both MacFarland and Lafayette serve both as a means of quantifying performance of individual practices, and as a check on the shed-wide flow monitoring data.

Eight LID practices were selected for individual monitoring following on-site consultation with both DOEE and DDOT staff. Four bioretention practices – two at each site – were selected, as were four permeable surface practices – again, two at each site. Two monitored bioretention practices have underdrains, while two do not. While selecting permeable surface practices for monitoring, every attempt was made to monitor different surface types (asphalt, concrete, pavers), but the limiting factors were that (a) only some practices had monitoring wells installed, and (b) monitoring well caps could be successfully removed for only a small subset of those practices with wells. Ultimately, there were two permeable paver and two porous asphalt practices selected for monitoring. As with the monitored bioretention practices, two monitored permeable surface practices have underdrains, while the other two do not.

Bioretention Practice Monitoring

Bioretention practice monitoring consisted of monitoring water levels in monitoring wells that extend to the bottom of each monitored practice, and soil moisture sensor monitoring at various levels of bioretention media. The rationale deploying two different sensor types – water level and soil moisture – was that it could offer insight as to which sensor type was more reliable, easier to deploy, and easier to maintain. It was expected that under typical operating conditions, the water level and soil moisture data would be in agreement in characterizing the rates at which flows enter and leave practices.

Table 3-1 summarizes the sensor deployments in bioretention practices during the 2019-2020 monitoring period. In some cases, sensors were replaced due to equipment failure. Sensors were also installed on different dates; difficulties installing monitoring wells in BIO-22 in MacFarland meant that water level sensors could only be deployed post-rehabilitation, when a well was installed by DDOT contractors. For BIO-14 in Lafayette, a monitoring well was not installed during rehabilitation, so there is no water level data for that practice.

Table 3-1. Bioretention Practice Monitoring Summary

Practice ID, Site, Underdrain y/n	Sensor Type	Sensor Model	Date(s)	Notes
BIO-19, Lafayette, no underdrain	Water Level	Onset HOBO	5/24/19 – 6/7/19	Temporary install
		eTape	7/31/19 – 10/30/19	Equipment pulled in advance of rehab activities
		Sonar	12/6/19 – 12/23/19	Re-installation post-rehab; replaced failed eTape w/sonar
		Pressure transducer	12/23/19 – 6/30/20	Replaced error-prone sonar
	Soil Moisture	Teros (x2 – at 6" and 24" below surface)	7/31/19 – 10/30/19	Equipment pulled in advance of rehab activities
		Teros (x2 – at 6" and 15" below surface)	12/6/19 – 6/30/20	Re-installation post-rehab
BIO-14, Lafayette, underdrain	Soil Moisture	Teros (x2 – at 6" and 24" below surface)	7/31/19 – 10/30/19	Equipment pulled in advance of rehab activities
		Teros (x2 – at 6" and 20" below surface)	12/6/19 – 6/30/20	Re-installation post-rehab
BIO-05, MacFarland, no underdrain	Water Level	Sonar	7/31/19 – 9/16/19	Equipment pulled in advance of rehab activities
			12/6/19 – 12/23/19	Re-installation post-rehab
		Pressure transducer	12/23/19 – 6/30/20	Replaced error-prone sonar
	Soil Moisture	Teros (x2 – at 6" and 24" below surface)	7/31/19 – 9/16/19	Equipment pulled in advance of rehab activities
		Teros (at 6" below surface)	12/6/19 – 6/30/20	Re-installation post-rehab; failed bottom sensor
BIO-22, MacFarland, underdrain	Water Level	Sonar	12/6/19 – 12/23/19	No monitoring well pre-rehabilitation
		Pressure transducer	12/23/19 – 6/30/20	Replaced error-prone sonar
	Soil Moisture	Teros (x2 – at 6" and 24" below surface)	7/31/19 – 9/16/19	Equipment pulled in advance of rehab activities
		Teros (x2 – at 6" and 15" below surface)	12/6/19 - 6/30/20	Re-installation post-rehab

Permeable Surface Practice Monitoring

Permeable surface practice monitoring consisted of monitoring water levels in monitoring wells that extended to the bottom of each monitored practice. Table 3-2 summarizes the sensor deployments in permeable surface practices during the 2019-2020 monitoring period. Since deployment of data loggers was not practical for these practice types, stand-alone Onset HOBO sensors without radio capabilities were installed in all permeable surface practice monitoring wells. These sensors' data were downloaded via Bluetooth to the Onset mobile app during site visits.

Table 3-2. Permeable Surface Practice Monitoring Summary

Practice ID, Site, Underdrain Y/N	Practice Type & Location	Date(s)
PPF-17, Lafayette, no underdrain	Porous concrete, alley	5/24/19 – 6/30/20
PPF-36, Lafayette, no underdrain	Porous concrete, street parking lane	6/7/19 - 6/30/20
PPF-09N, MacFarland, underdrain	Permeable pavers, alley	5/24/19 – 6/30/20
PPF-09S, MacFarland, underdrain	Permeable pavers, alley	5/24/19 – 6/30/20

4 Practice Rehabilitation and Infiltration Testing

An important aspect of this phase of RiverSmart was practice rehabilitation. Since construction in 2015, practices had not had significant or regular maintenance performed; some bioretention practices had re-plantings and some permeable surfaces were swept as part of normal DPW street sweeping, but other practices had no maintenance. During the last round of post-construction monitoring and analysis, the lack of significant measurable stormwater volume reduction led to development of a list of suggested maintenance activities, including: alterations to bioretention curb cuts to minimize flow bypass, installation of bioretention check dams to prevent media washout and/or clogging at inlets and outlets, and regular permeable surface cleaning (cyclonic cleaning equipment or equivalent).

The scope of this RiverSmart grant included subcontracting with a company that specializes in restorative cleaning of LID practices. In consultation with DOEE, LimnoTech selected Apex Companies to conduct infiltration testing and cleaning on as many RiverSmart practices as possible. Practices were cleaned in two stages; the first stage in October and November 2019, the second in late-February and early-March 2020. The December and January months were not considered to be suitable for cleaning, due to the potential difficulties in operating the equipment in colder temperatures. There were a handful of practices that could not be cleaned, either due to access issues, or due to COVID restrictions that lifted street-sweeping parking restrictions. Practices that could not be cleaned are identified in the summary table later in this section.

The current RiverSmart grant work that this report summarizes does not include the rehabilitation of the bioretention LID practices. These were conducted by DDOT and its contractors, and therefore those activities will not be directly addressed in this report. The outcome of those rehabilitation activities will be examined in the monitoring results and analysis section.

Infiltration Testing

Infiltration ring testing was conducted by Apex at multiple stages of the permeable surface rehabilitation process, in order to quantify the efficacy of the restorative cleaning, and to provide some idea of how quickly cleaned surfaces could be re-clogging. Infiltration testing was conducted over the course of the project:

- Pre-cleaning infiltration testing (all practices), to establish baseline infiltration rates;
- Infiltration testing after test cleaning (eight practices), to help determine whether restorative cleaning was worthwhile for all practice types. Those results are not presented in this report, but infiltration rates following test-cleaning of representative practices covering all three types of permeable surface indicated that it was worthwhile to proceed with full cleaning for all practices;
- Post-cleaning infiltration testing (all cleaned practices), to quantify the effects of restorative cleaning, and;
- Follow-up infiltration testing (selected cleaned practices), conducted over two different periods, to attempt to determine whether, and how quickly, permeable surfaces may start to experience clogging after being cleaned. This follow-up testing was conducted in February and March 2020 for practices that were cleaned in October and November 2019, and again in July 2020, for practices cleaned in February/March 2020 as well as for some of the practices cleaned in October/November 2019.

Infiltration testing by Apex adhered to ASTM standards 1701 (for pervious concrete and porous asphalt) and 1781 (for permeable pavers). Apex identified testing areas for each practice and tested at the same location for any subsequent tests. The caveats for infiltration testing are that testing at one location on a practice surface may not be indicative of the average infiltration rate for the practice, and that the testing quantifies surface infiltration only – it is not able to quantify or infer infiltration rates through lower layers of a practice or infiltration into the underlying soil.

Restorative Cleaning

The restorative cleaning of the RiverSmart permeable surface LID practices was conducted using special equipment that was designed specifically to clean LID surfaces. The equipment used to clean permeable concrete and asphalt surfaces, operating under the brand name Cyclone Technology, features a trailer-mounted water tank, water recycling unit with filtration, and pressure pump that can produce a maximum of 3,600 psi (Cyclone TR5500), paired with a pressure washer unit (Cyclone CY210). The pavers were cleaned with a hydrovac truck coupled with a PaveDrain cleaning head. Figures 4-1 through 4-3 are photos from November 2019 cleaning of LID practices at the Lafayette site.

Figure 4-1. Apex Cyclone TR5500

Figure 4-2. Apex Cyclone CY210

Figure 4-3. Apex Equipment Deployed in Lafayette

Cleaning Results

The restorative cleaning achieved the desired result for many of the RiverSmart LID practices: a restoration of surface infiltration rates. The extent of that restoration varied greatly across individual practices however. Likewise, follow-up infiltration testing months after cleaning occurred indicated that the staying power of the cleaning also varied across practices. Table 4-1 is a summary of the infiltration test results for pre-cleaning, post-cleaning, and follow-up periods.

Table 4-1. Practice Cleaning Infiltration Test Results

Practice ID	Site & Location	Material	Cleaning Date	Pre-cleaning infil. rate (in/hr)	Post-cleaning infil. rate (in/hr)	Feb/Mar 2020 follow-up infil. rate (in/hr)	July 2020 follow-up infil. rate (in/hr)
PPF-1	MacFarland, street	concrete	10/15/19	4.62	71.48	14.03	n/a
PPF-2	MacFarland, street	concrete	10/23/19	4.16	62.28	13.96	n/a
PPF-8	MacFarland, street	concrete	10/16/19	fail	208.01	13.87	fail
PPF-9	MacFarland, alley	pavers	10/15/19	69.34	64.1	277.34	108.06
PPF-24	MacFarland, street	concrete	10/16/19	14.6	224.87	13.64	n/a
PPF-25	MacFarland, alley	pavers	10/15/19	138.67	177.03	312.79	n/a
PPF-26	MacFarland, alley	pavers	10/15/19	69.34	172.62	14.07	17.7
PPF-38	MacFarland, street	pavers	10/16/19	3.47	174.8	177.3	n/a
PPF-39	MacFarland, street	pavers	10/16/19	2.77	51.49	13.6	n/a
PPF-3	MacFarland, street	pavers	n/a	5.94	Not cleaned: COVID restrictions		
PPF-7	MacFarland, street	pavers	n/a	6.3	Not cleaned: COVID restrictions		
School lot	MacFarland	pavers	n/a	n/a	Not cleaned: access and equipment clearance issues		
"Alley 8"	Lafayette, alley	concrete	2/25/20	13.27	89.47	n/a	11.56
PCC	Lafayette, street	pavers	3/3/20	n/a	71.11	n/a	57.78
PPF-10	Lafayette, street	concrete	2/28/20	21.33	93.49	n/a	fail
PPF-11	Lafayette, alley	asphalt	10/17/19	fail	25.63	fail	n/a

Practice ID	Site & Location	Material	Cleaning Date	Pre-cleaning infil. rate (in/hr)	Post-cleaning infil. rate (in/hr)	Feb/Mar 2020 follow-up infil. rate (in/hr)	July 2020 follow-up infil. rate (in/hr)
PPF-12	Lafayette, street	concrete	11/19/19	4.32	224.87	241.87	10.25
PPF-13	Lafayette, street	pavers	3/3/20	63.03	489.43	n/a	23.37
PPF-14	Lafayette, street	concrete	11/20/19	10.27	202.93	13.33	5.78
PPF-15	Lafayette, street	pavers	3/3/20	32.76	64.5	n/a	27.88
PPF-17	Lafayette, alley	asphalt	11/20/19	fail	227.33	fail	n/a
PPF-19, PPF-27	Lafayette, street	concrete	2/25/20	21.6	48.83	n/a	fail
PPF-30, PPF-32	Lafayette, street	concrete	2/27/20	2.3	84.9	n/a	12.13
PPF-33	Lafayette, street	concrete	2/28/20	20.29	151.28	n/a	fail
PPF-36	Lafayette, street	concrete	2/25/20	4.28	83.2	n/a	fail
PPF-37	Lafayette, street	concrete	2/25/20	4.89	55.47	n/a	fail
PPF-16	Lafayette, alley	pavers	n/a	17.16	Not cleaned: equipment clearance issues		
PPF-18	Lafayette, alley	concrete	n/a	37.7	Not cleaned: equipment clearance issues		

Figures 4-4 through 4-6 are box-and-whisker plots that show the distribution of infiltration test values for each stage of testing, with each plot depicting data-sorting by a different category. Figure 4-4 shows surface infiltration test rates by surface type (porous asphalt is not shown because there are only two practices of this type). Figure 4-5 sorts infiltration rates by site, Lafayette or MacFarland. Figure 4-6 categorizes rates by practice location, street or alley.

That all three plots look very similar speaks to the difficulty in isolating a single factor most responsible for cleaning efficacy or the rate at which practices clog following cleaning. Lafayette has more tree canopy, and also more yards that may be contributing runoff from pervious areas onto practices (especially in alleys). MacFarland has a higher ratio of paver to concrete practices than does Lafayette. There are many more street than alley practices, which makes for an uneven comparison. Finally, the number of observations for each category are small; at the most, there are 14 observations per category, at the least there are seven observations. The low number of observations does not make for a statistically-significant data set. There would need to be more frequent infiltration tests to determine surface infiltration rates over time.

Still, some inferences can be made from the infiltration test results. It appears that in general, paver LID practices respond best to restorative cleaning, and also maintain relatively high surface infiltration rates for longer than do the other surface types. Even though the data on asphalt practices are limited due to only two practices, both of those practices had failing infiltration rates in pre-cleaning testing, and failing rates in follow-up testing. Concrete LID practices showed the most variability, with some responding well to cleaning and maintaining good follow-up rates, but with others having failing rates in follow-up testing. The differences between the two sites may be explained by the previously-mentioned greater tree canopy and pervious yard runoff in Lafayette than in MacFarland.

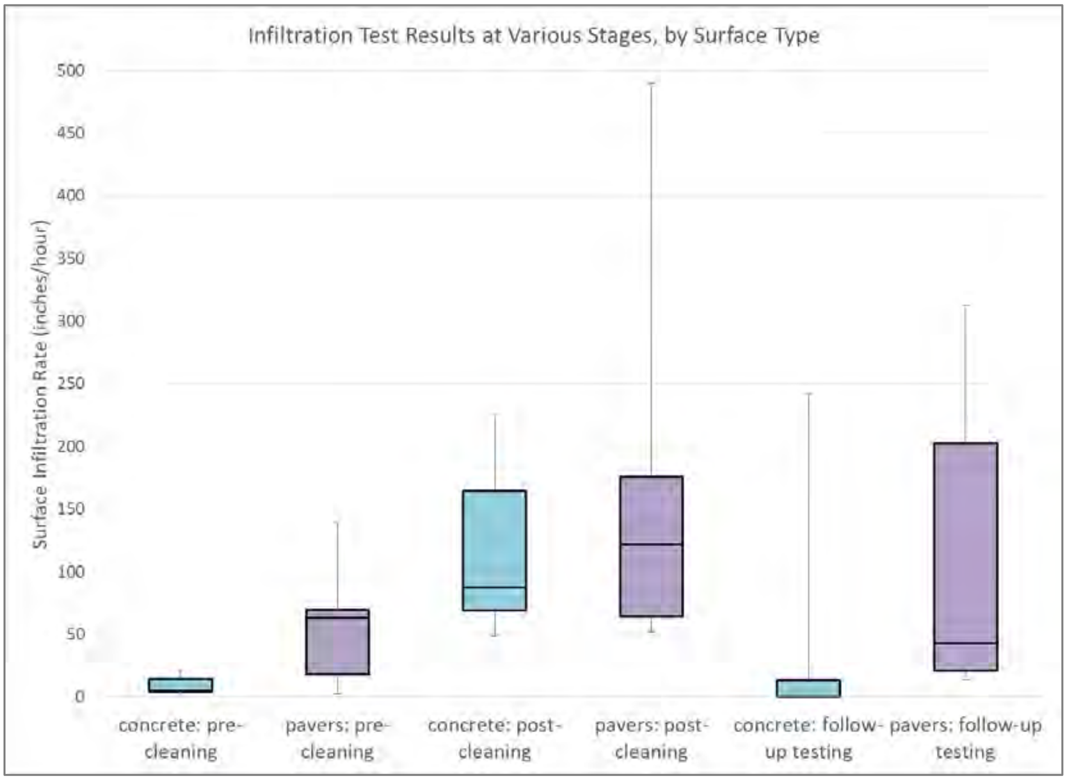


Figure 4-4. Infiltration Rates, by Surface Type

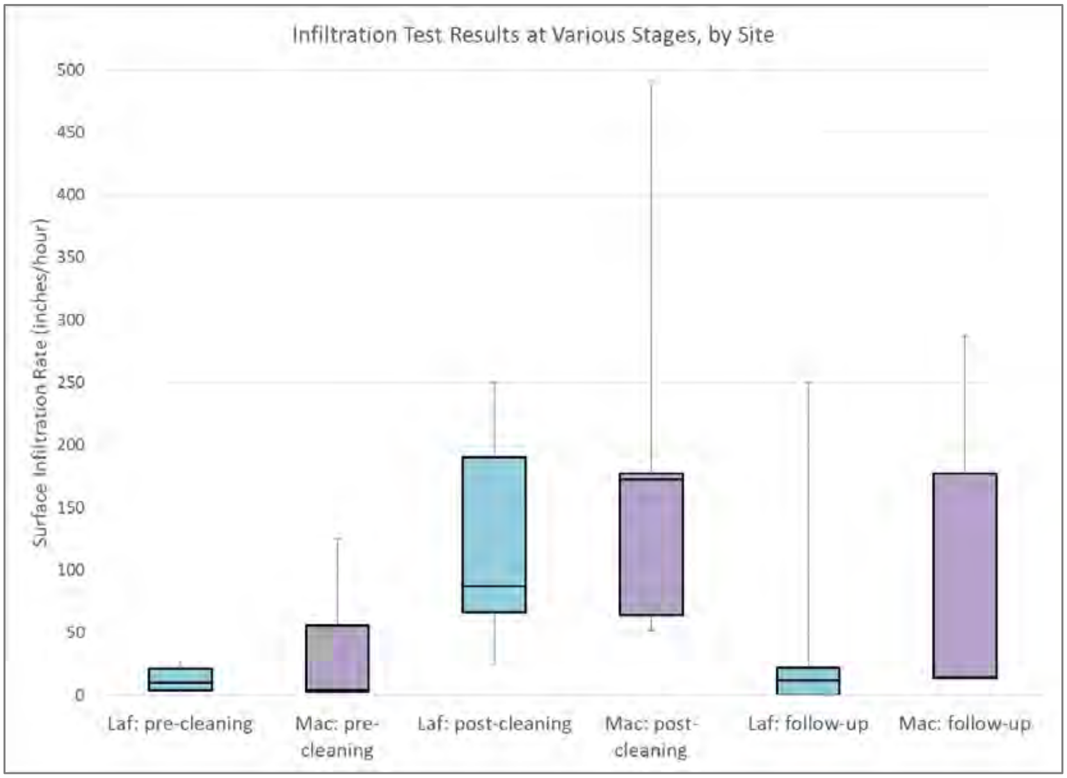


Figure 4-5. Infiltration Rates, by Site

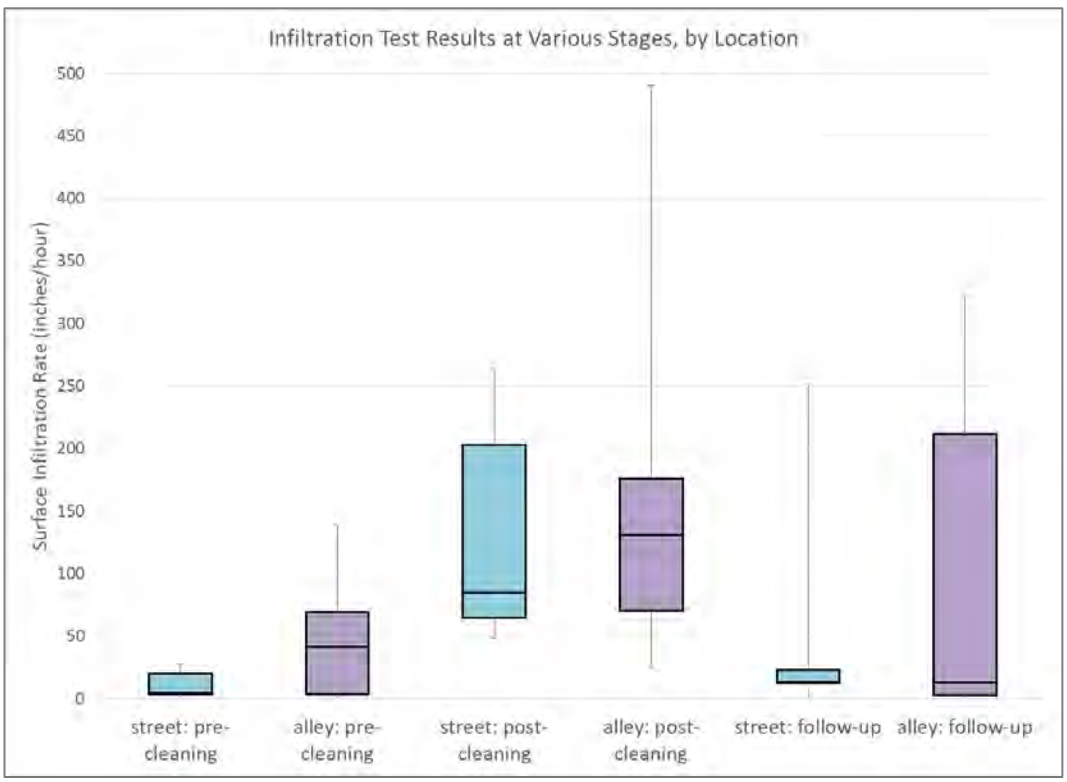


Figure 4-6. Infiltration Rates, by Location

5 Monitoring Results and Analysis

The previous phase of RiverSmart compared with 2010 pre-construction flow data with the 2015-2016 post-construction flow data, with that comparison yielding the unexpected finding of runoff *increases* from pre- to post-construction. This was tempered somewhat by the fact that runoff increases for the Control site were much greater than for either of the LID sites, which indicated that the LID practices were capturing flows. However, the difference in magnitude of runoff increase from pre- to post-construction for Control versus LID sites made quantification of LID performance difficult. Table 5-1 is taken directly from the 2017 RiverSmart report, and compares the aggregate wet weather responses between the different sites and construction periods.

Table 5-1. Comparison of Aggregate Responses, Pre- and Post-Construction.

<table>
<tr><th>Site</th><th>Construction Period</th><th>Total Rainfall (inches)</th><th>Wet Weather Response (MG)</th><th>MG/inch of rainfall</th><th>Difference</th><th>Average Time Since Last Rainfall (hrs)</th></tr>
<tr><td rowspan="2">Control</td><td>Pre- (2010)</td><td>9.63</td><td>1.0</td><td>0.100</td><td rowspan="2">72%</td><td>100</td></tr>
<tr><td>Post- (2015-2016)</td><td>7.86</td><td>1.4</td><td>0.172</td><td>55</td></tr>
<tr><td rowspan="2">MacFarland</td><td>Pre- (2010)</td><td>9.59</td><td>1.3</td><td>0.136</td><td rowspan="2">14%</td><td>99</td></tr>
<tr><td>Post- (2015-2016)</td><td>26.13</td><td>4.0</td><td>0.155</td><td>56</td></tr>
<tr><td rowspan="2">Lafayette</td><td>Pre- (2010)</td><td>10.11</td><td>0.6</td><td>0.059</td><td rowspan="2">26%*</td><td>87</td></tr>
<tr><td>Post- (2015-2016)</td><td>10.15</td><td>0.8</td><td>0.075</td><td>56</td></tr>
</table>

**Difference between Pre/Post response drops to 4% when removing a 0.44" rain event with a wet weather flow response that is over 50% larger than the response from any other event.*

That analysis of wet weather response from the previous report was one of the drivers for supplementing sewer flow meter data for the 2019-2020 pre- versus post-rehabilitation period with practice-level data collection that could potentially tell a different story about LID performance.

Sewer Flow Data

Event-based analysis of sewer flow data defined the pre-rehabilitation period for MacFarland as June to August 2019, and the post-rehabilitation period as March to July 2020. For Lafayette, the pre-rehabilitation period extended into mid-October, while the post-rehabilitation period was the same as for MacFarland. The interim period, from September/October 2019 to February 2020, was the period during which rehabilitation activities were occurring. This period was long due to the time-consuming nature of the bioretention rehabilitation work, the availability of contractors, and weather restrictions.

Problems with data quality in Lafayette for June-August 2019 which showed an unexpected diurnal flow pattern that introduced significant noise to the flow signal, further reduced the pre-rehabilitation analysis period, to a total of only three events in September and October 2019. Figure 5-1 is a plot of the large-magnitude Lafayette dry weather flow pattern that was observed from June through August 2019.

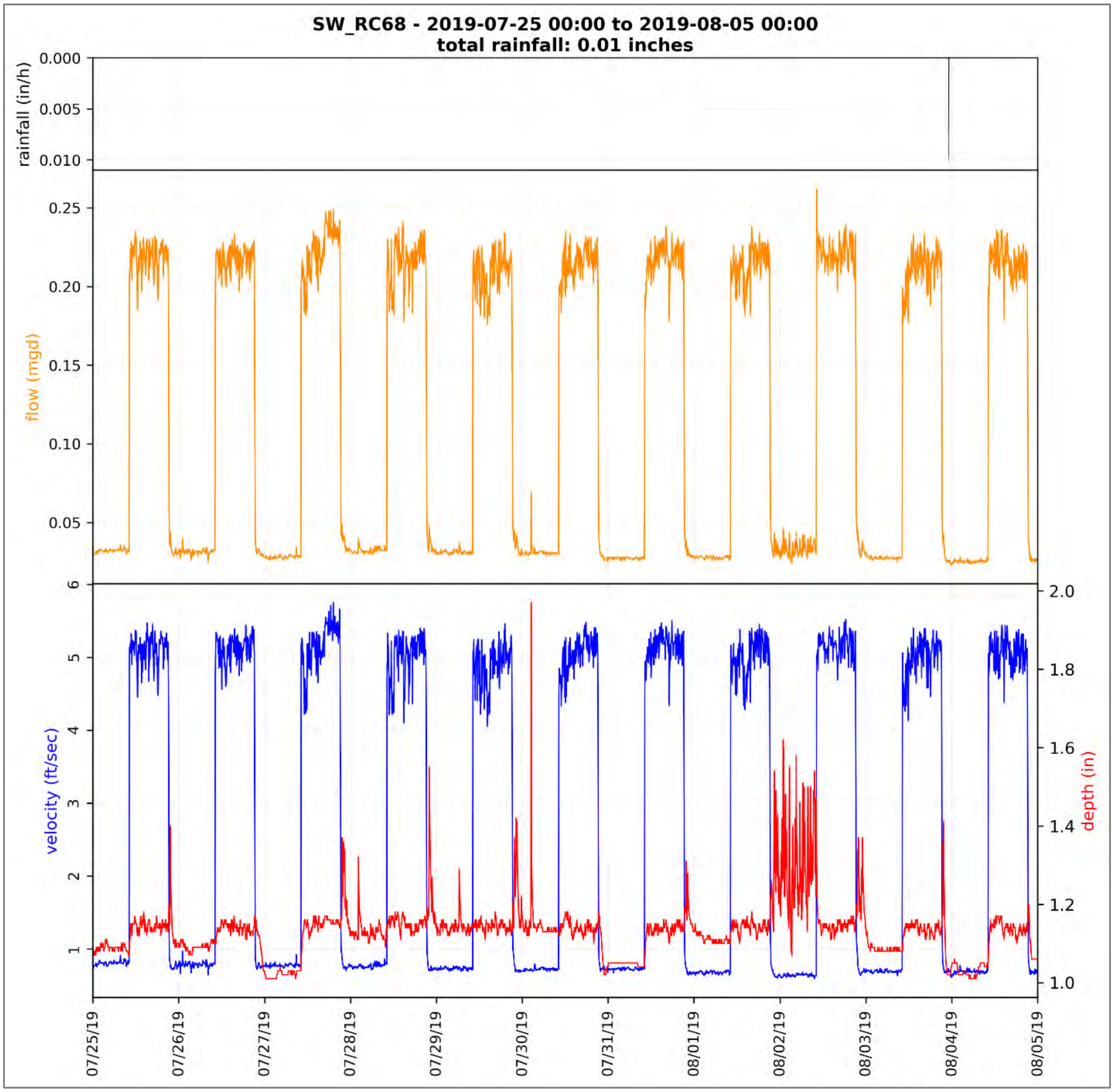


Figure 5-1. Lafayette Summer 2019 Dry Weather Diurnal Pattern

Table 5-2 summarizes the aggregate responses for all three sites for the pre- and post-rehabilitation periods. The few pre-rehab events for Lafayette means that the pre/post comparison in the case of that site does not carry much weight. For the Control and MacFarland sites though, the pattern looks similar to what was observed during the previous phase of RiverSmart analysis (and summarized in Table 5-1): an increase in wet weather response from pre- to post-rehabilitation, but with a smaller increase for MacFarland than for the Control site. Also of note is that the unit response (millions of gallons of runoff per inch of rain) in all cases – other than for the small 3-event Lafayette pre-rehab period – indicate greater wet weather response than was observed in the 2010 pre-construction and the 2015-2016 post-construction data.

Table 5-2. Comparison of Aggregate Responses 2019-2020, Pre- and Post-Rehabilitation.

Site	Rehab Period	Total Rainfall (inches)	Number of events	# of Events with Peak Intensity > 1"/hr	Wet Weather Response (MG)	MG/inch of rainfall	Difference
Control	Pre- (2019)	3.69	12	4	0.99	0.27	+21%
	Post- (2020)	13.46	25	5	4.39	0.33	
MacFarland	Pre- (2019)	9.25	16	9	1.81	0.20	+12%
	Post- (2020)	13.22	24	5	2.90	0.22	
Lafayette	Pre- (2019)	1.49	3	0	0.13	0.09	+95%
	Post- (2020)	14.31	29	6	2.38	0.17	

Figures 5.2 through 5.4 are one-to-one plots that compare the pre- and post-rehabilitation event wet weather volumes with rainfall totals. These plots reinforce the data summary from Table 5-2, that the sewer meter data does not discern much difference between pre- and post-rehabilitation period wet weather responses.

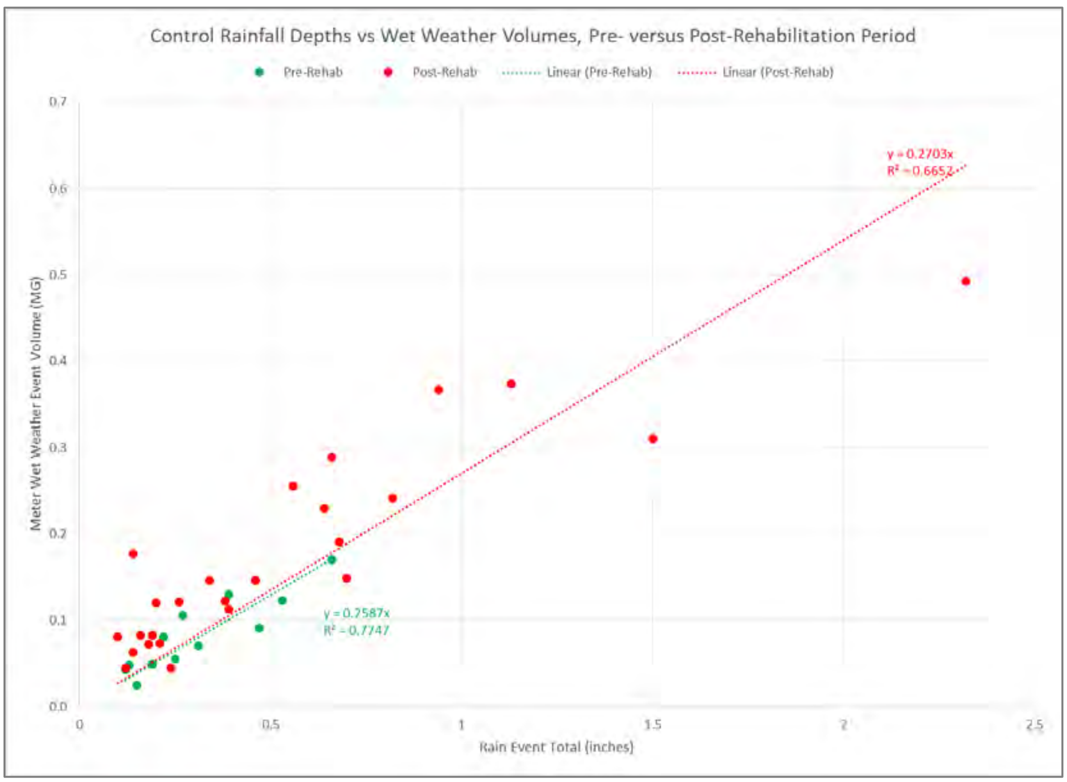


Figure 5-2. Control Site: Rainfall Depths versus Wet Weather Volumes

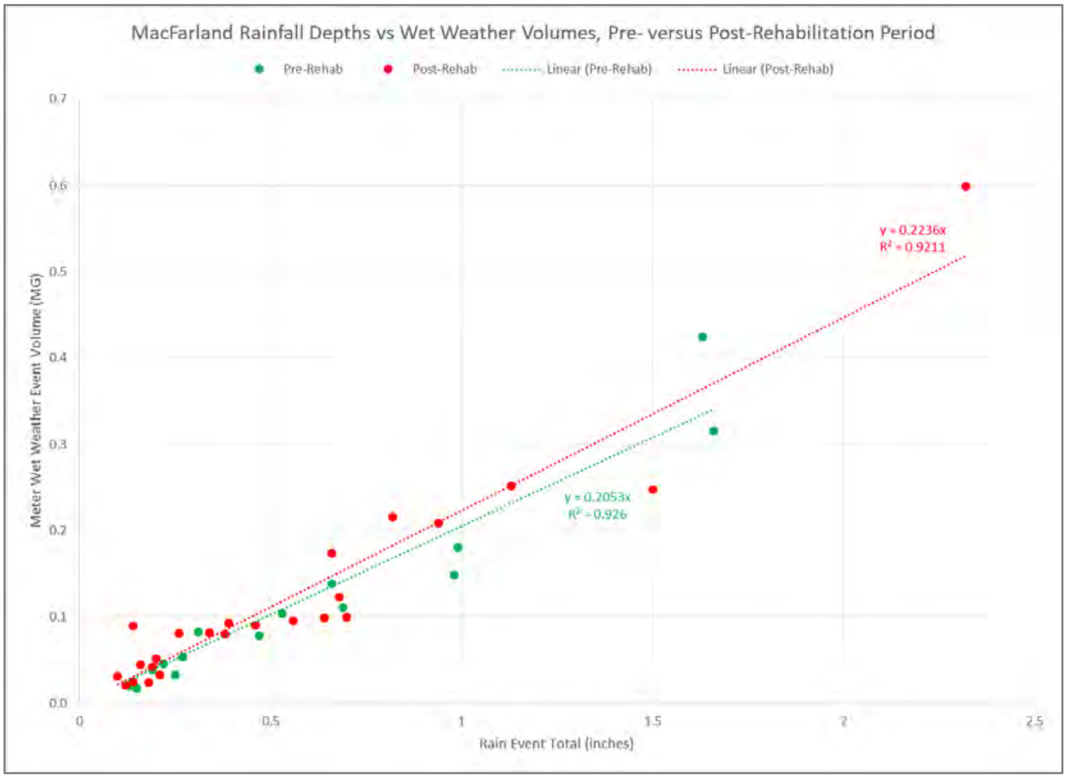


Figure 5-3. MacFarland Site: Rainfall Depths versus Wet Weather Volumes

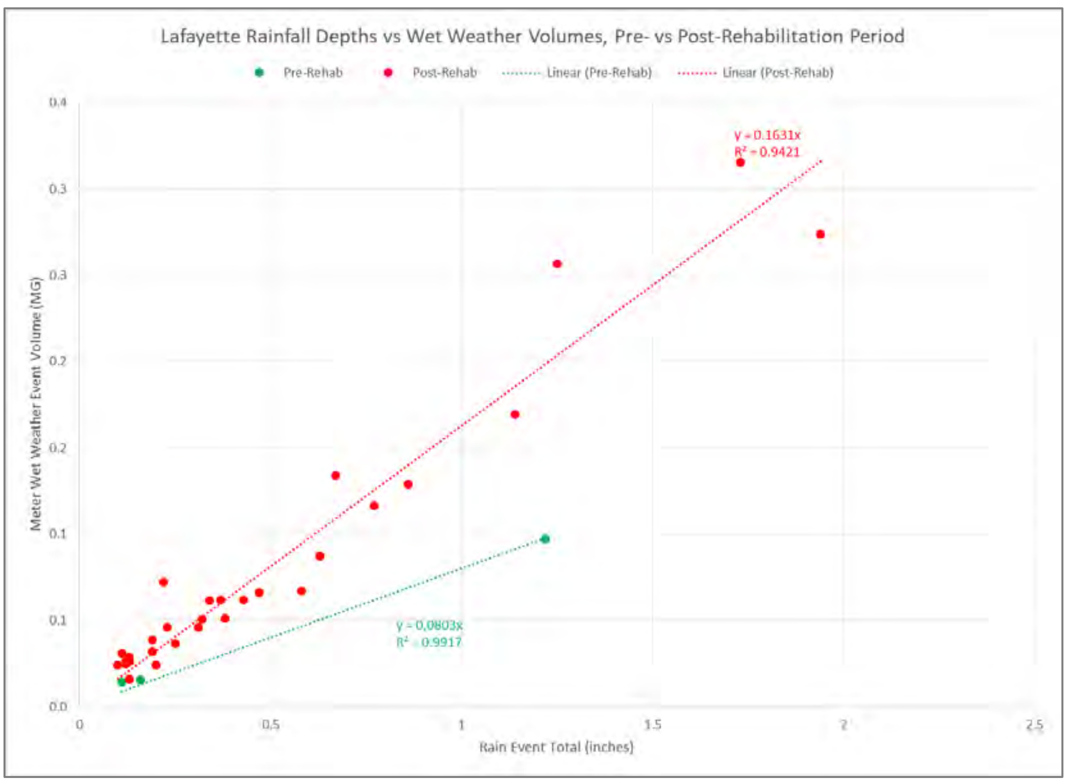


Figure 5-4. Lafayette Site: Rainfall Depths versus Wet Weather Volumes

Figures 5.5 through 5.7 are one-to-one plots that compare the event peak flow responses with peak rainfall intensities. Comparing the Control and MacFarland plots, the Control plot peak flows increase for the post-rehabilitation period, while peak flows decrease in MacFarland for that same period. This may indicate that while wet weather volume analysis of sewer meter data indicates that LID practices are not *retaining* (infiltrating) flows, they are decreasing peak flows by temporarily *detaining* (holding) flows.

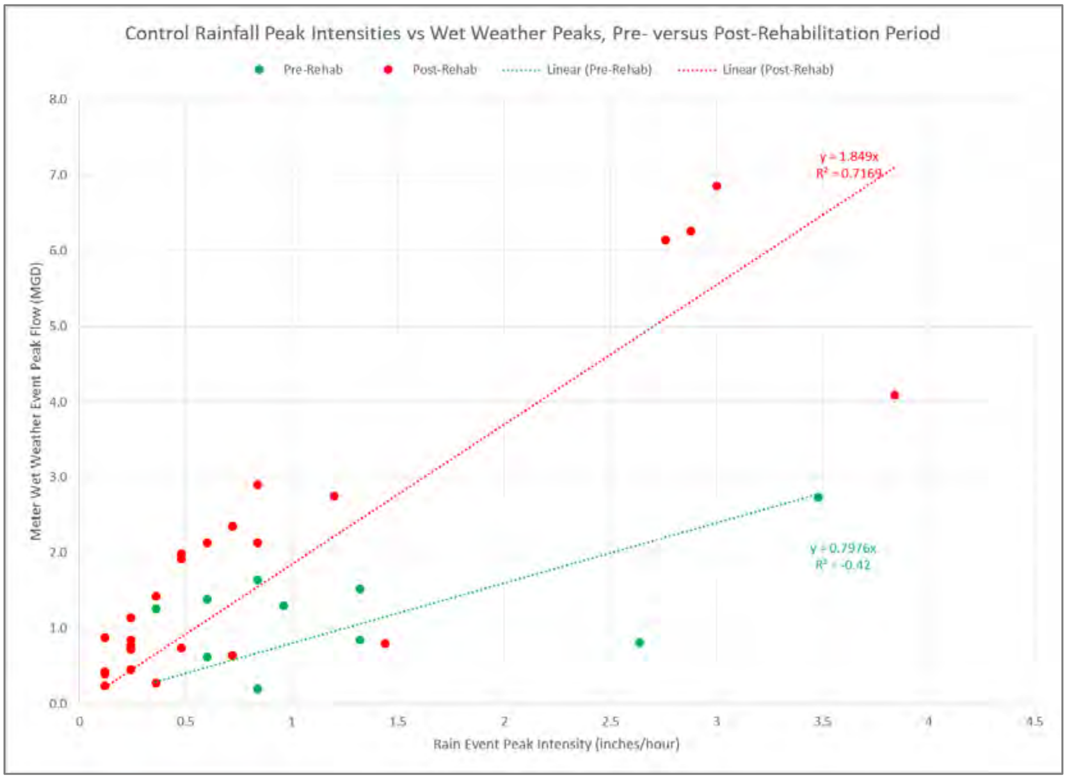


Figure 5-5. Control Site: Rainfall Peak Intensities versus Peak Flows

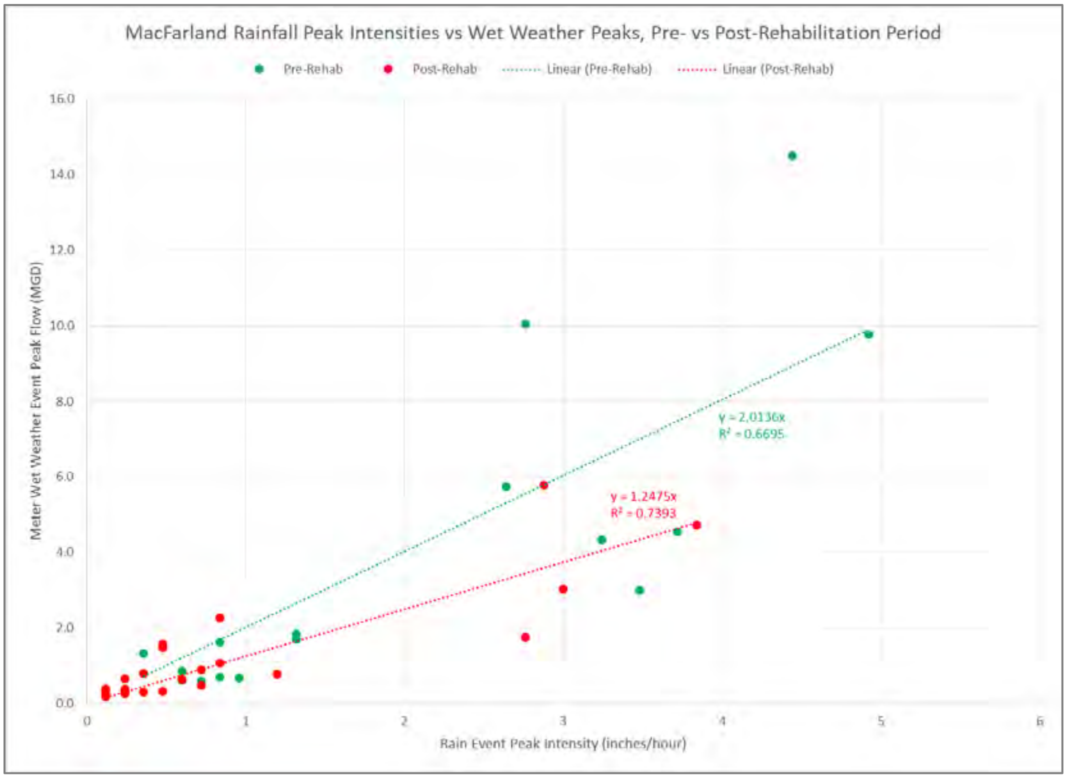


Figure 5-6. MacFarland Site: Rainfall Peak Intensities versus Peak Flows

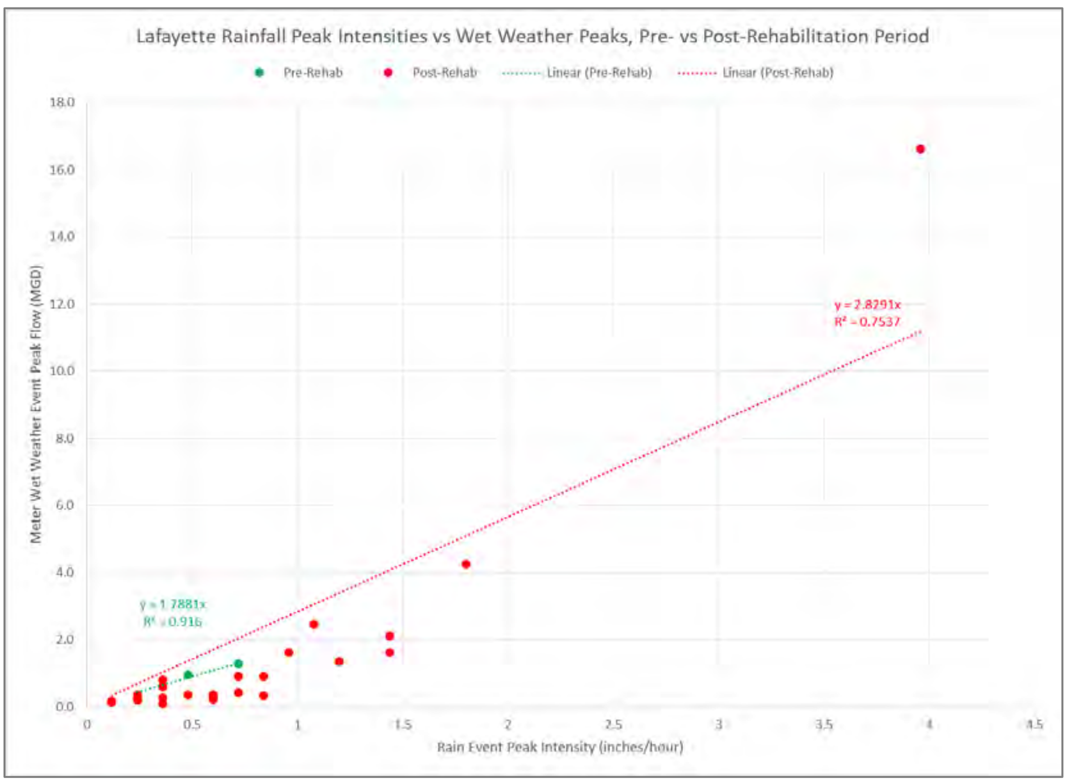


Figure 5-7. Lafayette Site: Rainfall Peak Intensities versus Peak Flows

LID Practice Data

Practice-level data sets indicate that runoff was entering the practices, that rehabilitation activities were largely effective in improving practice performance, and that – in the case of permeable surface practices – surface infiltration rates quickly regressed for some monitored practices (consistent with follow-up infiltration test results). The data sets for the bioretention practices are not as clear as for the permeable surface practices in demonstrating the effects of rehabilitation activities, but some of this can be attributed to reliability issues encountered with the bioretention sensors.

Sensor Reliability

One of the purposes of the practice-level monitoring was to act as a pilot program, to determine which sensor and data-logging equipment and deployment techniques were most reliable and cost-effective. The permeable surface sensors were all off-the-shelf commercial water level pressure transducers; over the course of the entire project, one of the four deployed sensors experienced a failure relatively late in the monitoring period and was replaced immediately. The bioretention sensors and data loggers that were initially deployed included a number of different water level sensor technologies ("eTape" and sonar), which either failed early on in the project (eTape) or experienced frequent errors and issues with data quality. The soil moisture sensors that were used experienced fewer problems, but there were issues with multiple sensors in a single practice sending conflicting signals to the data logger, resulting in one sensor effectively blocking and canceling out the data for the other sensor. Some of these sensor issues cannot be completely isolated from the EnviroDIY data loggers that were deployed initially at each monitored bioretention practice. These loggers were replaced with commercial Campbell loggers in late-December 2019.

Bioretention Practices

Figure 5-8 demonstrates both the possible effects of rehabilitation and the issues with sensor data in a single plot.

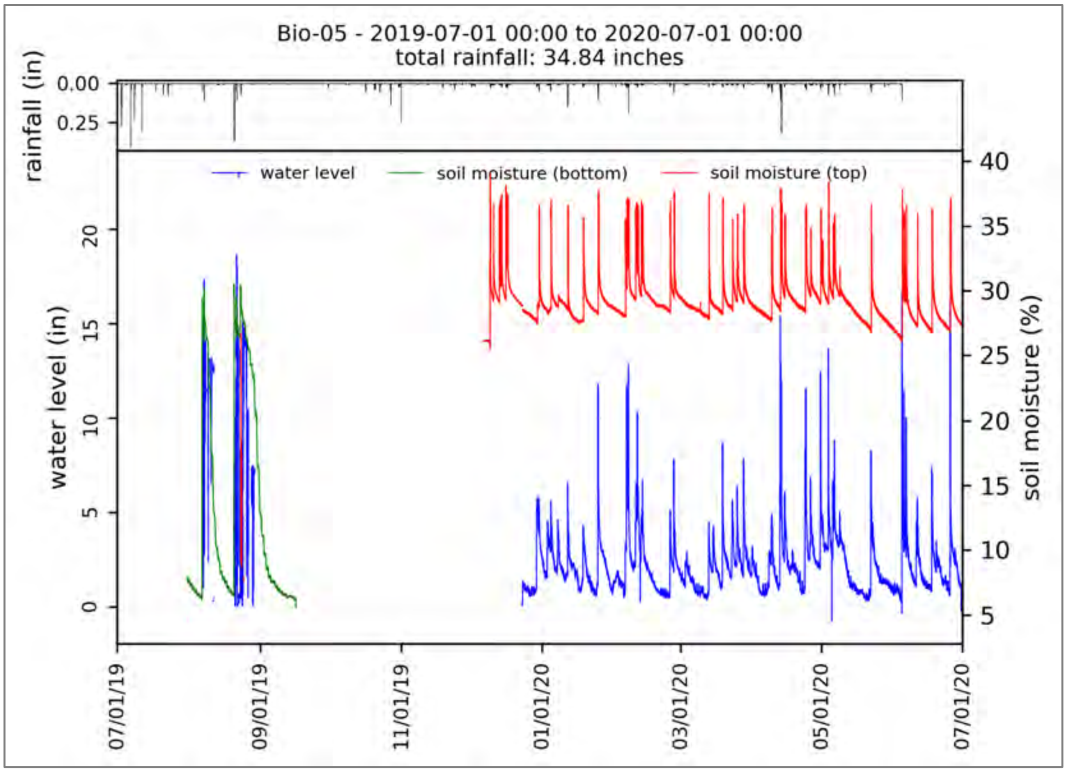


Figure 5-8. BIO-05 Practice-Level Monitoring

This plot of BIO-05 (MacFarland practice, no underdrain) shows that during the July-September 2019 pre-rehab period:

- The top soil moisture sensor was likely malfunctioning, either due to the sensor itself or to conflicts with the lower soil moisture sensor's data signal;
- The bottom soil moisture sensor does appear to be recording and transmitting data correctly, but shows soil moisture percentages that recede very slowly (over periods of a week or more) following a rain event.

After the rehabilitation period, the water level sonar was replaced with a pressure transducer, and only the top soil moisture probe was placed in operation. It is difficult to determine whether the change in sensors or the rehabilitation activities were responsible for the change in performance, but post-rehab, there are regular fluctuations in both water levels and soil moisture that occur within a few days of each rain event. The post-rehab soil moisture percentage for the top (6" below the surface) soil moisture sensor is also higher than for the pre-rehab probe that was 24" below the surface.

Figures 5-9 through 5-11 show that post-rehabilitation response for BIO-14, BIO-19, and BIO-22, improve upon pre-rehabilitation data, in that soil moisture percentages are consistently higher for top and bottom sensors, even for very small rainfall events, and – for BIO-19 – water levels show a consistent response to rainfall events.

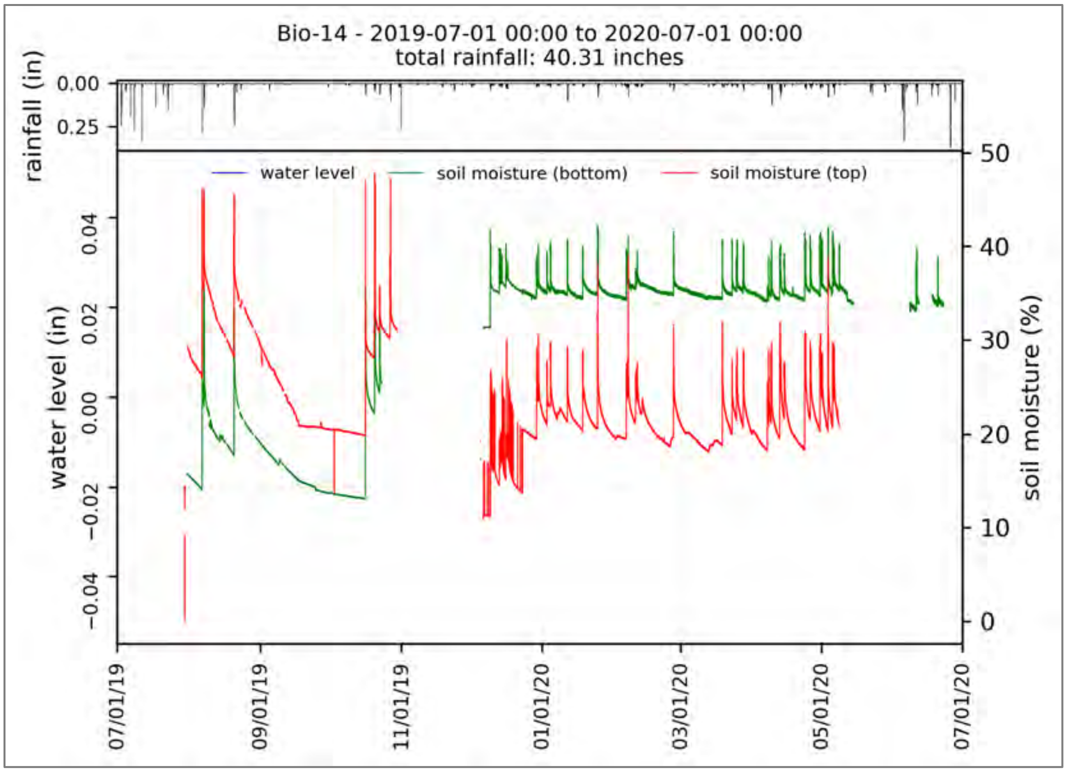


Figure 5-9. BIO-14 Practice-Level Monitoring

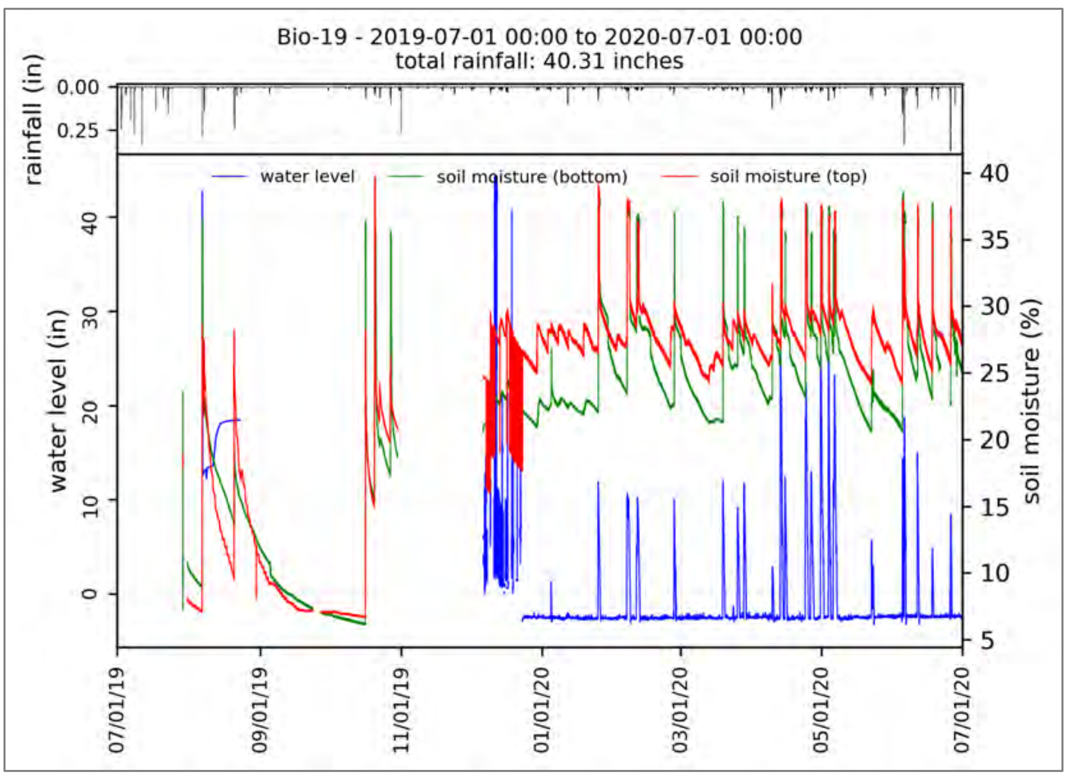


Figure 5-10. BIO-19 Practice-Level Monitoring

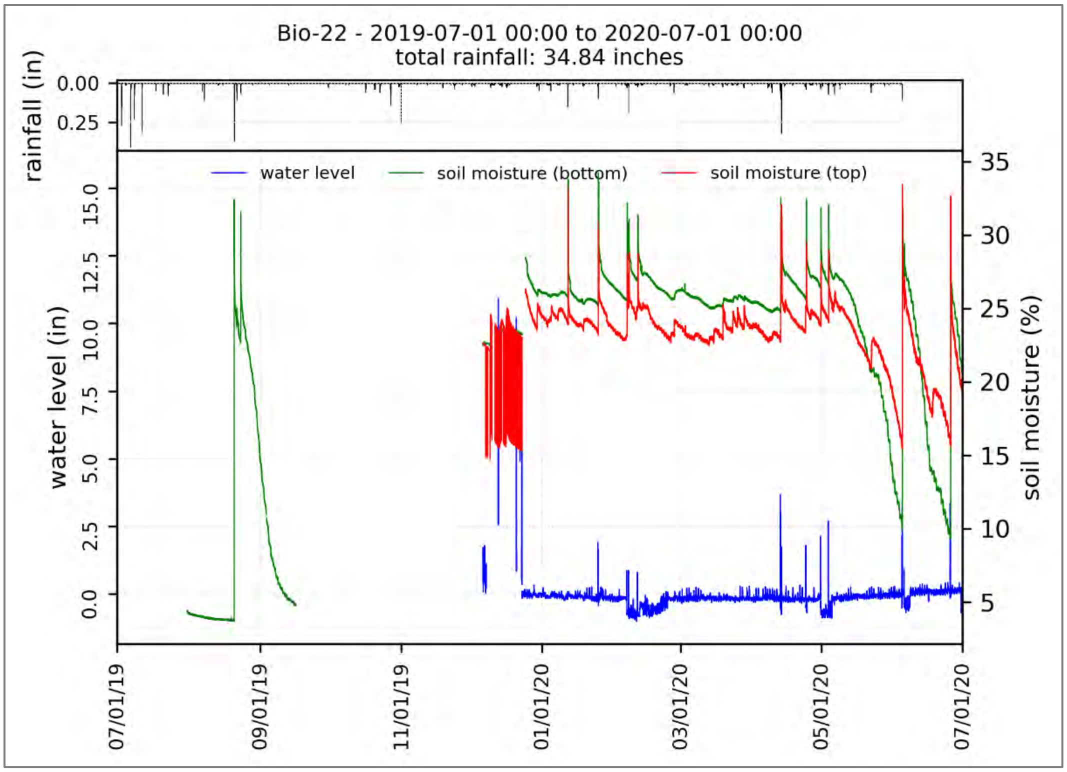


Figure 5-11. BIO-22 Practice-Level Monitoring

Permeable Surface Practices

The practice water level data for the four monitored permeable surfaces is in many ways easier to interpret than the bioretention data; there were few known issues with sensors, and having a known rehabilitation date for each practice allows for clearer interpretation of data. However, observed data indicate that observed maximum water levels, surface infiltration rates, and drawdown rates are sometimes in excess of values that could be reasonably expected, given practice contributing drainage areas (CDAs) and underlying conditions (presence or absence of an underdrain, realistic bottom infiltration rates into the soil, reasonable storage layer porosities). The modeling and discussion sections will explore some of these potential problems with the data, and possible explanations, in more detail. The data are inconsistent though; for some events, observed water levels and rates of change appear to be reasonable, while for other events of similar magnitude, that is not the case.

For purposes of interpreting the plots in this section, Table 5-3 summarizes the monitored practices' characteristics, cleaning information, and infiltration test rates at various stages (all of this information can also be found in earlier tables). Note that PPF-9 in MacFarland has two different 'cells' that each drain in opposite directions; it is effectively two practices, and is treated as such for practice monitoring.

Table 5-3. Summary of Monitored Permeable Surfaces

Practice ID	Site, Location, Underdrain	Material	Cleaning Date	Pre-cleaning infil rate (in/hr)	Post-cleaning infil rate (in/hr)	Feb/Mar 2020 follow-up infil rate (in/hr)	July 2020 follow-up infil rate (in/hr)
PPF-9	MacFarland, alley, underdrain	pavers	10/15/19	69.34	64.1	277.34	108.06
PPF-17	Lafayette, alley, no underdrain	asphalt	11/20/19	fail	227.33	fail	n/a
PPF-36	Lafayette, street, no underdrain	concrete	2/25/20	4.28	83.2	n/a	fail

Figure 5-12 shows all four of the monitored practices' water levels prior to any practice cleaning (the first practice was cleaned on 10/15/19). From this figure, observed water levels indicate that:

- PPF-9 water levels respond to the group of August 2019 events, with relatively rapid increase and drawdown of water levels;
- The installed water level sensors are not immune to calibration issues, as can be seen with the negative values in September and October;
- Consistent with pre-cleaning infiltration testing, the Lafayette practices (PPF-17 and PPF-36) show very little response to rain events.

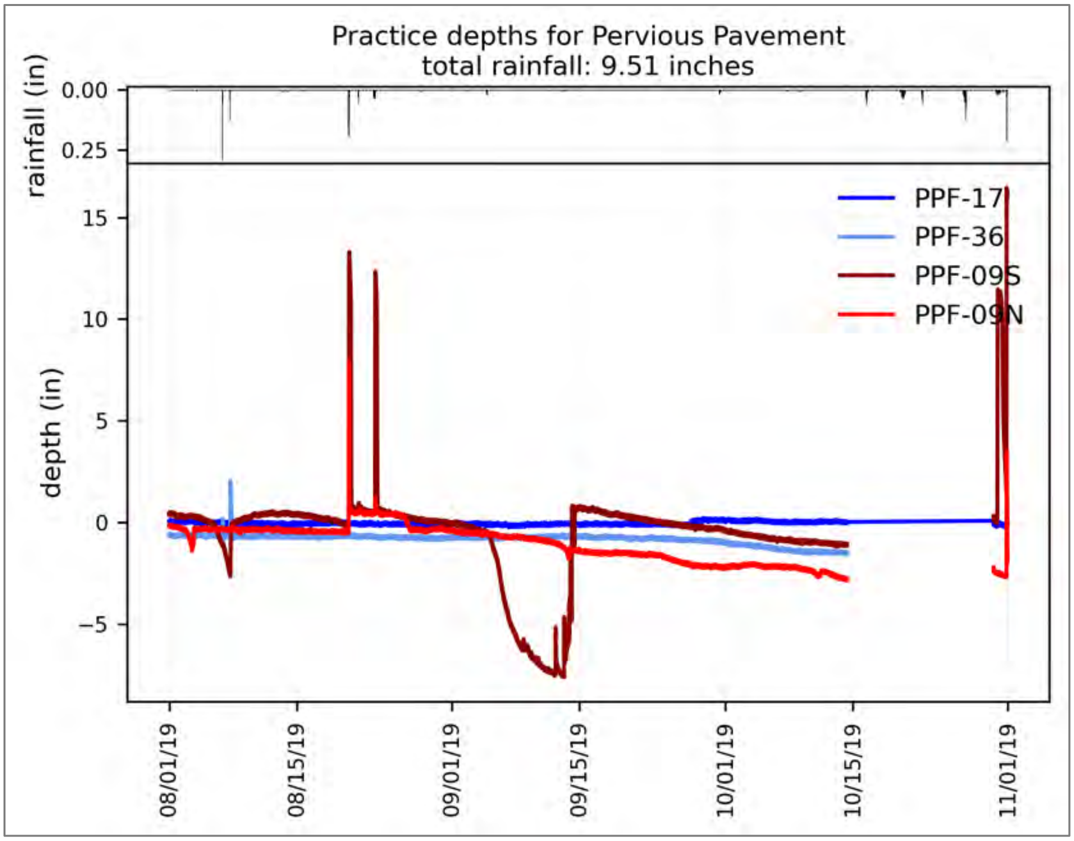


Figure 5-12. Observed Pre-Cleaning Practice Water Levels

Figure 5-13 is a plot of PPF-17 water levels post-cleaning. Consistent with the follow-up infiltration test results that indicate failure 3-4 months after cleaning, there is a decrease in maximum water levels over time. There is also some inconsistency in observed drawdown times for this practice; there is rapid decrease in water levels in January and February, but slower recession for events from March-May.

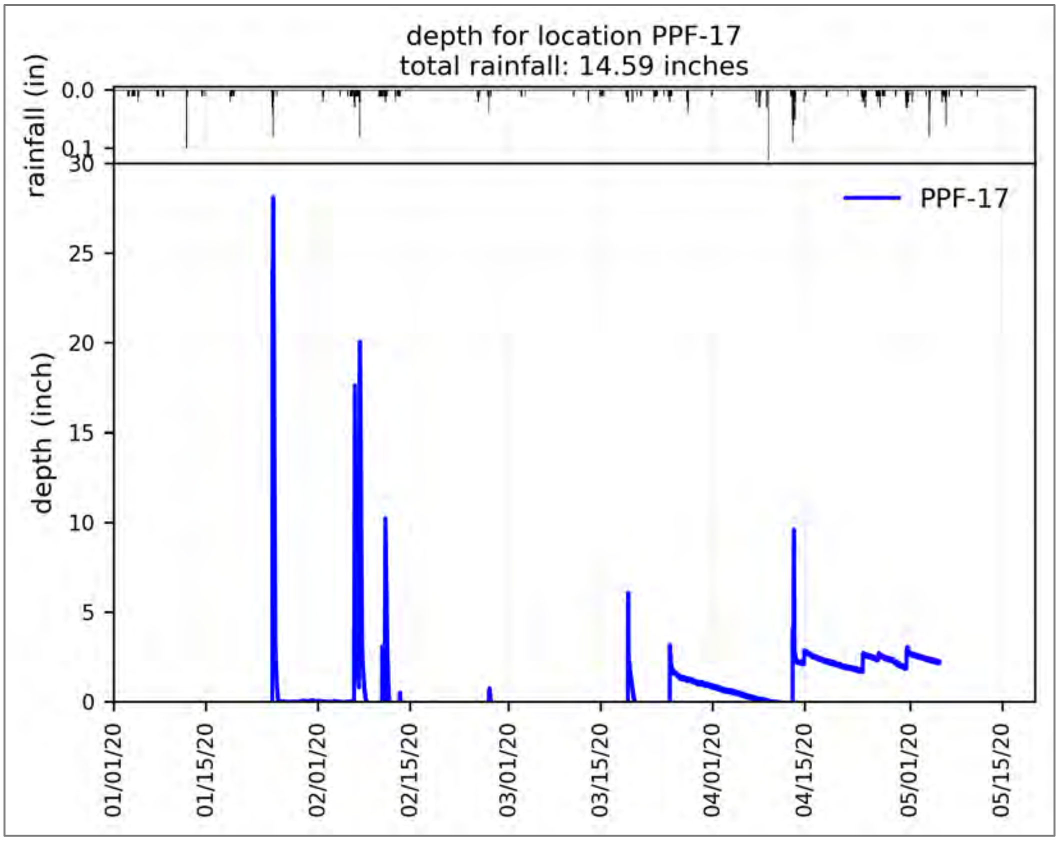


Figure 5-13. PPF-17 Observed Water Levels, Post-Cleaning

Figure 5-14 shows water levels in April 2020, after all monitored practices have been cleaned. This plot covers a few rainfall events, and shows varying responses from all four practices. Two of the practices have slower drawdowns in water level following the large 4/13/20 event, while the other two practices show rapid drawdown after that same event, as well as little-to-no response to the 4/15/20 event.

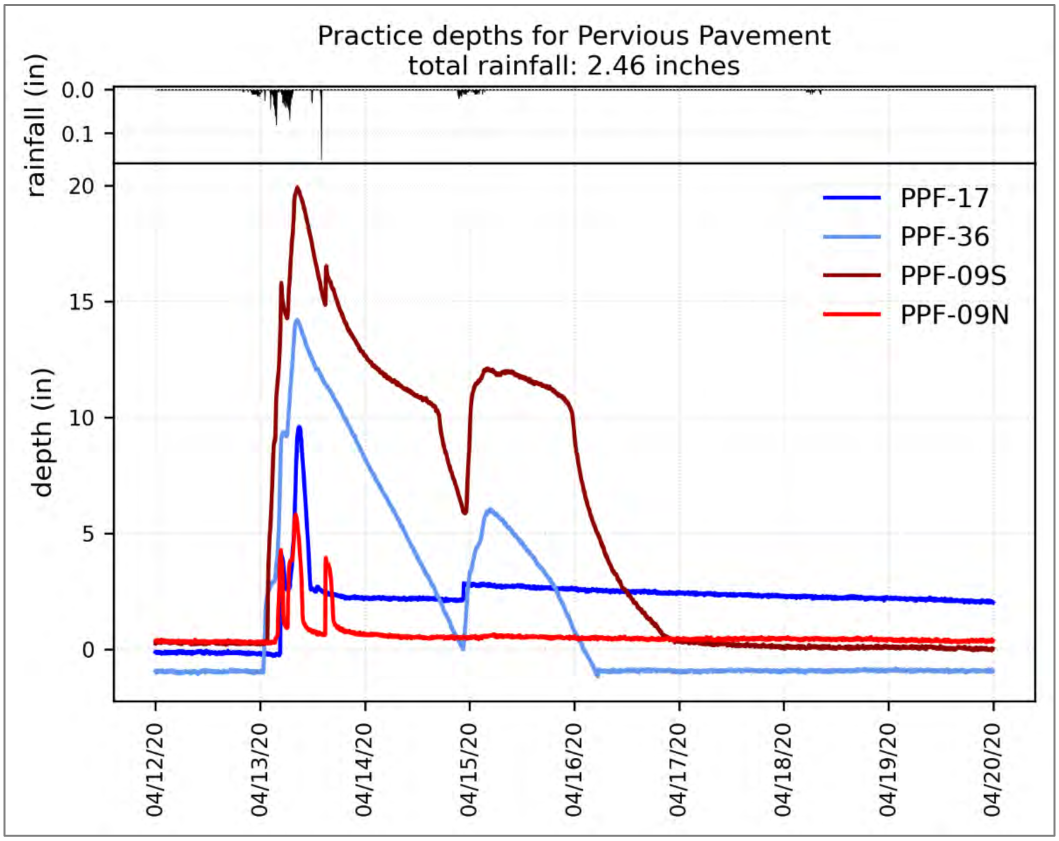


Figure 5-14. Observed Practice Water Levels, April 2020 Events

6 Model Re-Calibration and Application

The precursor to the RiverSmart site-specific hydrologic and hydraulic models was the Green Build Out Model (GBOM), a city-wide hydrologic assessment of wide-scale implementation of green infrastructure in the city. It was a simple Mike Urban model that utilized DC Water's existing collection system model, with revised runoff sheds that used modified storage and infiltration values to mimic a variety of LID practices.

The RiverSmart concept plans were developed using input from site-specific SWMM models of the Lafayette, MacFarland, and control sites. The concept plan LID practices were aggregated within each modeled subshed, and each model was initially calibrated to 2010 pre-construction flow metering data. The post-construction SWMM model (SWMM LID model) for RiverSmart is a more refined version of the concept plan model. It represents individual practices as they were constructed, and individual practice infiltration rates are based partially on practice-specific soil boring data that were collected pre-construction. The subsheds are more finely delineated using a digital elevation model (DEM) and detailed flow path data generated from GIS tools. The pre-construction model was calibrated to the 2010 metering data. A calibration to the collected post-construction data from 2015-2016 was not performed due to data quality issues as described in the 2017 RiverSmart report.

In consideration of the increased unit wet weather response indicated by the 2019-2020 sewer meter data and compared to the previous monitoring time periods (see Table 5-2, compared with Table 5-1), it was decided to re-calibrate the SWMM LID model based on the Control site, and to carry over revised model parameters from the Control site to the two LID demonstration sites.

There was also a version of the SWMM LID model that was calibrated based on the practice-level data, since it appeared that the observed flows in the sewers did not fully reflect the performance of the installed LID practices, and the model calculated in-practice water levels under-simulated the observations. This provided another method through which LID performance could be quantified. The revised SWMM practice-level model parameters were also well-suited for translation back to the parameters used by the original GBOM, which was applied to provide an updated assessment of expected wide-scale LID implementation, based on the 2019-2020 practice-monitoring data and related SWMM model.

Model Re-calibration

Calibration to Shed-Level Flow Data (& Average Year Results)

As described previously, a change in the model calibration methodology was necessary due to the observed trend in increased wet weather responses across all sites. The baseline model for the Control site was re-calibrated to the 2019-2020 flow metering data after an initial model run with the existing parameterization showed the model under-predicting flow volumes as well as flow peaks. Runoff parameters for percent impervious, flow path length, slope and Horton soil infiltration rates were adjusted to match the observations. One-to-one plots for wet weather event volumes are shown in Figure 6-1 and plots for wet weather peak flows are shown in Figure 6-2. The statistical model-data match is satisfactory, with the model over-predicting volume with less than 1% on average and an R-squared value of 0.91 for the wet weather volumes, and an over-prediction of less than 10% for wet weather peak flows with an R-squared value of 0.83. A total of 64 wet weather events were used for the model calibration at the Control Site.

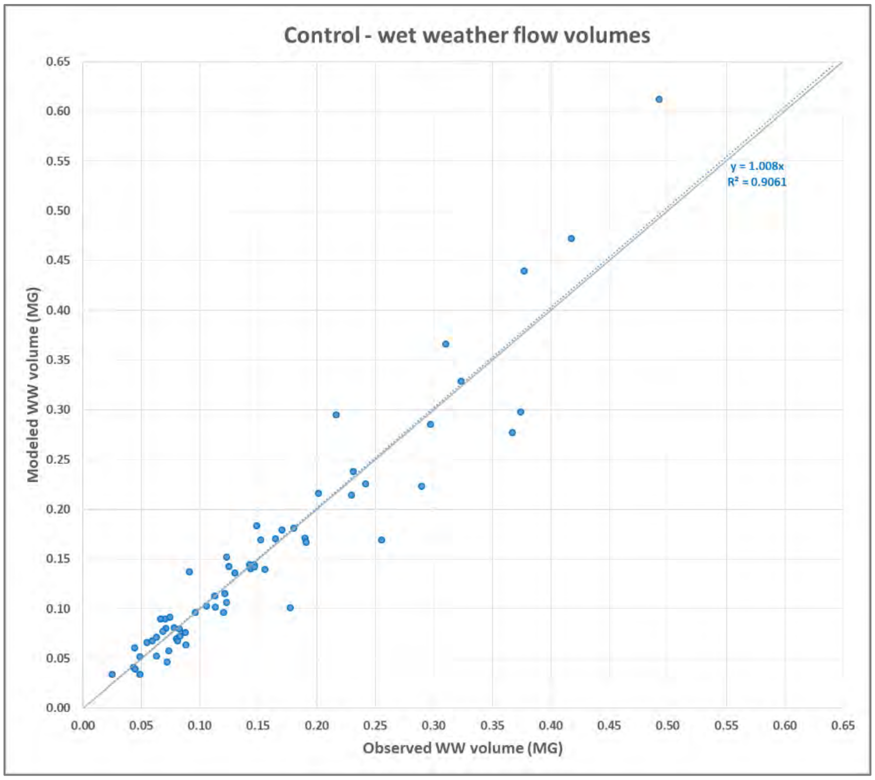


Figure 6-1. Model-Data Match for Wet Weather Flow Volumes at the Control Site

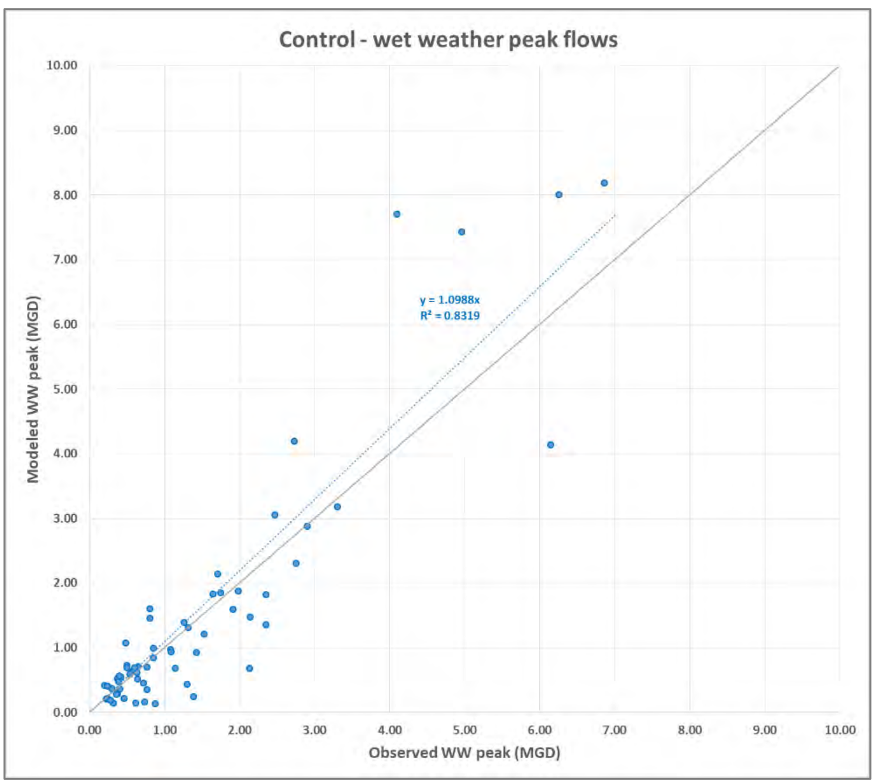


Figure 6-2. Model-Data Match for Wet Weather Peaks at the Control Site

Adjustments were made to the diurnal dry weather flows as well, with the observed average dry weather flow in 2019-2020 being approximately twice as high as observed during the initial 2010 pre-construction monitoring period (0.12 MGD vs 0.05 MGD for the Control Site and 0.42 MGD vs 0.22 MGD for the MacFarland project site).The runoff parameters in Table 6-1 were adjusted for the Control site and then transferred to the Lafayette and MacFarland LID project sites.

Table 6-1: Runoff Parameter Adjustments

Parameter	Factor
Percent impervious	1.45
Subshed width	1.5
Subshed slope	1.75
Maximum Infiltration rate	0.5
Minimum infiltration rate	0.5

Results for the re-calibrated base model (with design LID specifications) were then compared with the sewer meter information both in Lafayette and MacFarland. The runoff model and sewer network are assumed to be calibrated at both sites through the parameter transfer from the Control site. Remaining differences between modeled and observed flow data were associated with the performance of the installed LID practices. SWMM LID practice parameters were adjusted to better match the meter data for wet weather events; those parameters included the size of the CDA, storage porosity, effective size of the underdrain, and practice infiltration values. Table 6-2 summarizes the LID practice parameter edits.

Table 6-2. SWMM Model LID Practice Parameters for Sewer Meter Calibration.

Parameter	Practice type	Lafayette	MacFarland
CDA (percent of design)	all	10%	10%
Bottom seepage rate (in/h)	all	0.05 in/h	0.2 in/h
PP surface infiltration value (in/h)	Pervious Parking Pervious Alley	2 in/h	10 in/h
Storage porosity (percent)	all	13%	13%
Effective underdrain capacity (percent of design)	All practices with underdrain	10%	10%

Those edits resulted in a satisfactory model response when compared with the observed flow metering data. One-to-one plots for wet weather flow volumes and peak flows show the overall model-data match in Figures 6-3 through 6-6. Event flow hydrograph comparisons for all analyzed wet weather events are provided in Appendix B. The model was not individually calibrated to the pre- and post-rehabilitation timeframe since the effect of the practice rehabilitations was not evident in the flow metering data.

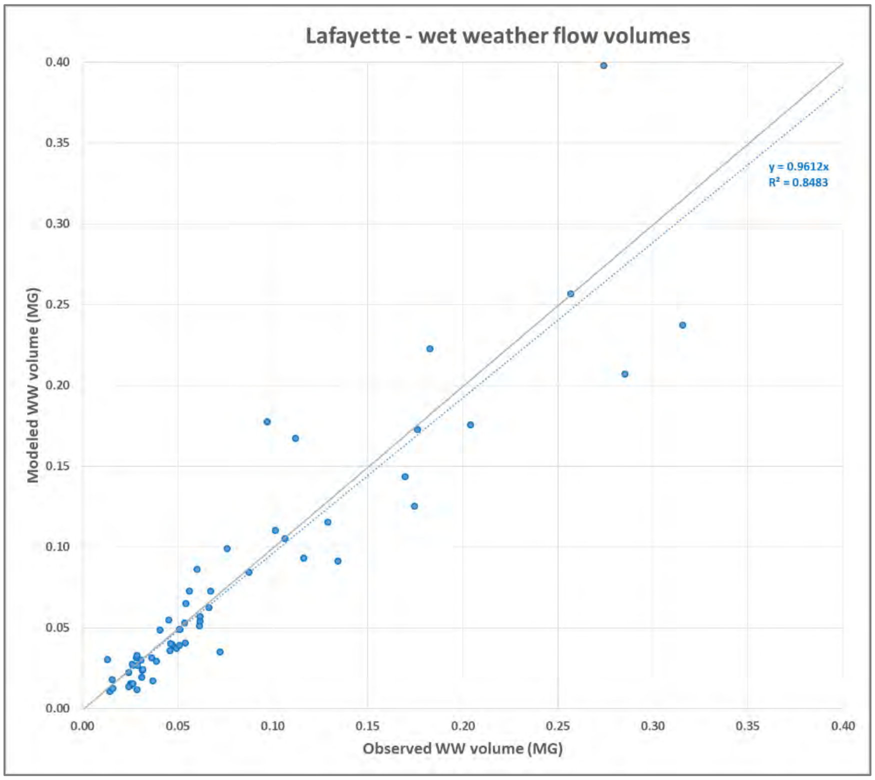


Figure 6-3. Model-Data Match for Wet Weather Flow Volumes at the Lafayette Site

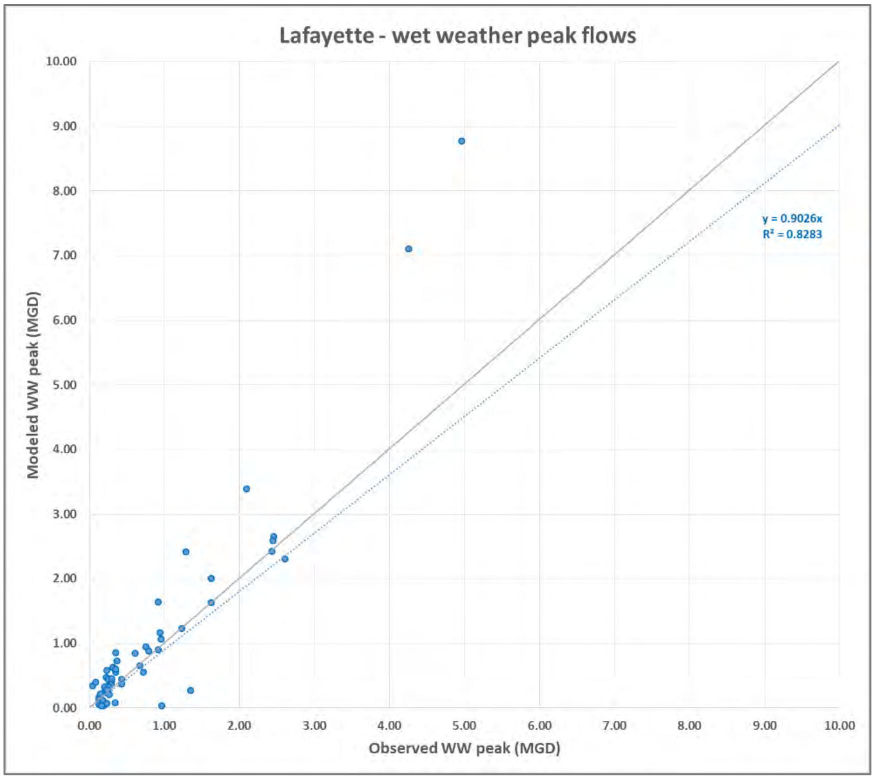


Figure 6-4. Model-Data Match for Wet Weather Peaks at the Lafayette Site

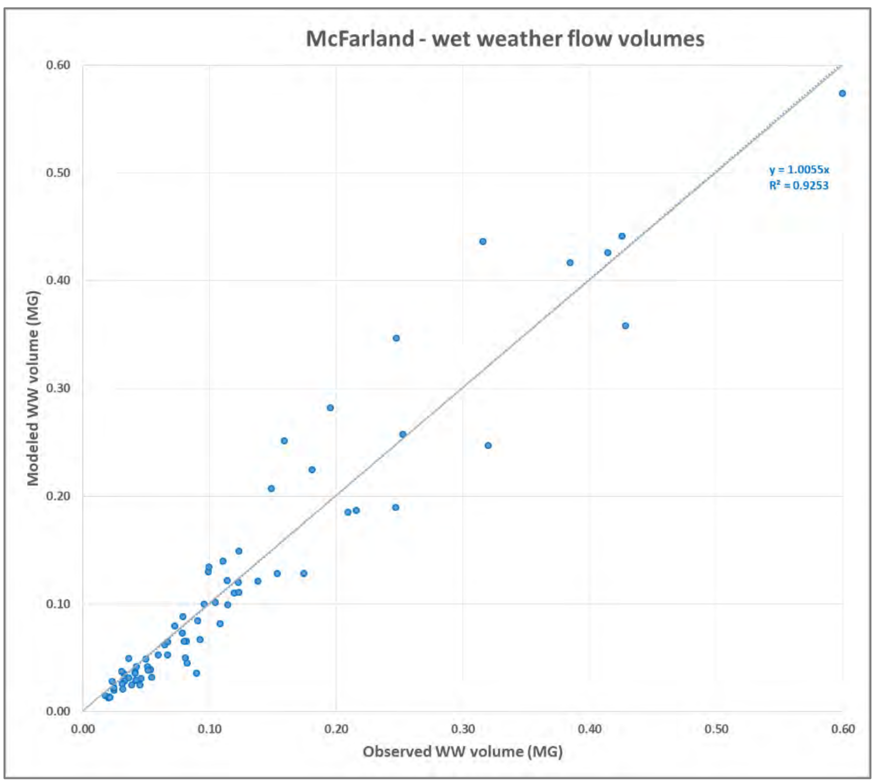


Figure 6-5. Model-Data Match for Wet Weather Peaks at the MacFarland Site

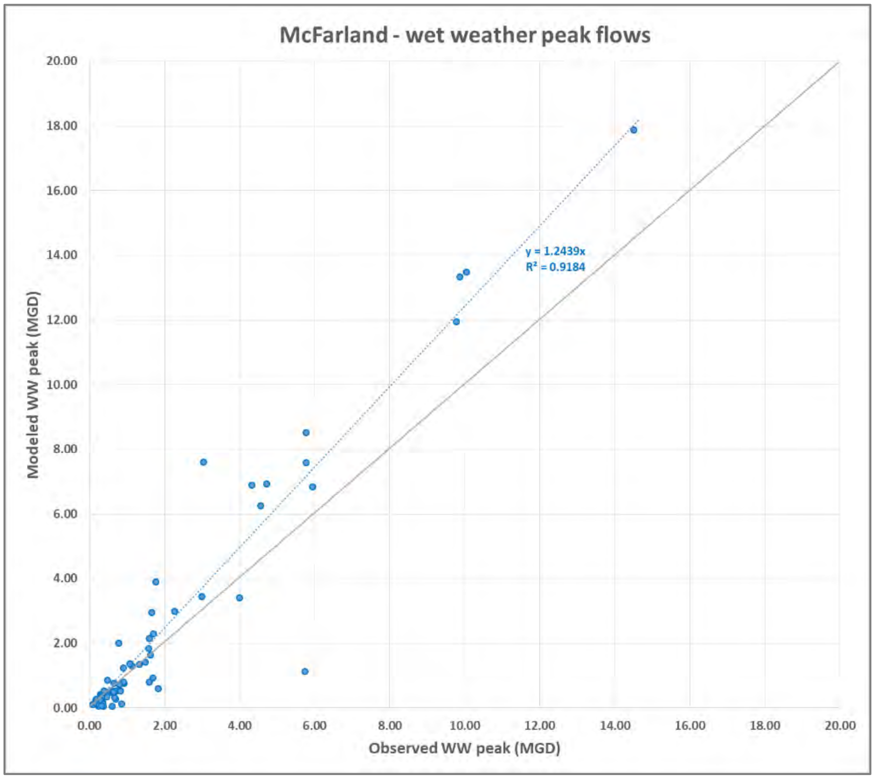


Figure 6-6. Model-Data Match for Wet Weather Peaks at the MacFarland Site

The calibrated model was then compared to the pre-construction scenario to assess the impact of the installed LID facilities on wet weather flow volumes and peak flows. This comparison was done for the entire 2019 – 2020 monitoring time frame (6/10/19 – 7/3/20) as well as the identified average year of 1990 (see previous RiverSmart reports). The calculated wet weather reductions are provided below in Table 6-3. The table includes the results from previous SWMM modeling conducted in 2017 that used the design drawing specifications.

Table 6-3. SWMM Predicted LID Performance

Timeframe	Lafayette % wet weather volume reduction	Lafayette % wet weather peak reduction	MacFarland % wet weather volume reduction	MacFarland % wet weather peak reduction
2019-2020	15.3%	15.0%	24.8%	28.4%
Average year (1990)	15.6%	N/A (*)	24.4%	N/A
Design-spec Average year (1990)	59%	N/A	49%	N/A

(*) an event analysis was not performed for the average year of 1990, therefore individual event peak flows were not compared.

Calibration to Practice-Level Data

The practice level monitoring data indicated that after the rehabilitation phase, significant wet weather volumes were stored in some of the monitored LID practices. This effect of increased practice performance was not observed in the sewer monitoring data and the model that was calibrated to that sewer monitoring data. Furthermore, model-data comparisons for in-practice water levels indicated that the model was under-predicting those in-practice observations, while showing a good fit at the sewer meter.

Model parameters for the monitored practices were updated and re-calibrated to better match the in-practice observations. The resulting parameters were later used to setup the GBOM model. The in-practice calibration was not extended, however, to other non-monitored practices or used to assess general LID performance, due to the variability in the observed data and the fact that a small percentage of practices were monitored.

Calibrations were made to the observed storage water levels individually for each of the monitored facilities. A calibration to the observed soil moisture rates in bioretention practices was not deemed to be feasible and was not attempted. In general, calibration to larger rainfall events was emphasized, sometimes at the expense of matching observations for smaller events.

BIO-05 (MacFarland)

Significant in-practice water levels were not observed during the pre-rehabilitation phase, indicating poor practice performance. Observations after the practice rehabilitation show increased performance. The practice was re-calibrated in the SWMM model for the entire post-rehabilitation timeframe (January 2020 to July 2020). Related SWMM parameters have been updated as listed in Table 6-4. Figure 6-7 shows a comparison between observed and modeled water levels (observations in red, model in blue).

Table 6-4. BIO-05 Practice Calibration Parameters

Parameter	Calibrated Value	Effect
Storage porosity (%) (*)	30%	Storage volume, impact on practice effectivity
Bottom seepage (in/h)	0.05	Infiltration into native soil, impact on practice drain rate (drawdown time)
CDA size (% of design)	67%	Volume and magnitude of inflow, impact on practice utilization
Surface depth (in)	0.1	Limits inflow for large and intense events, mimics practice outlets
Underdrain diameter (in)	N/A	Effective underdrain size, impact on practice drain rate (drawdown time); no underdrain in BIO-05

(*) The storage porosity and CDA size are directly linked. Storage porosity has been assumed to be at 75% of the design value to account for potential compaction and sedimentation of the storage layer.

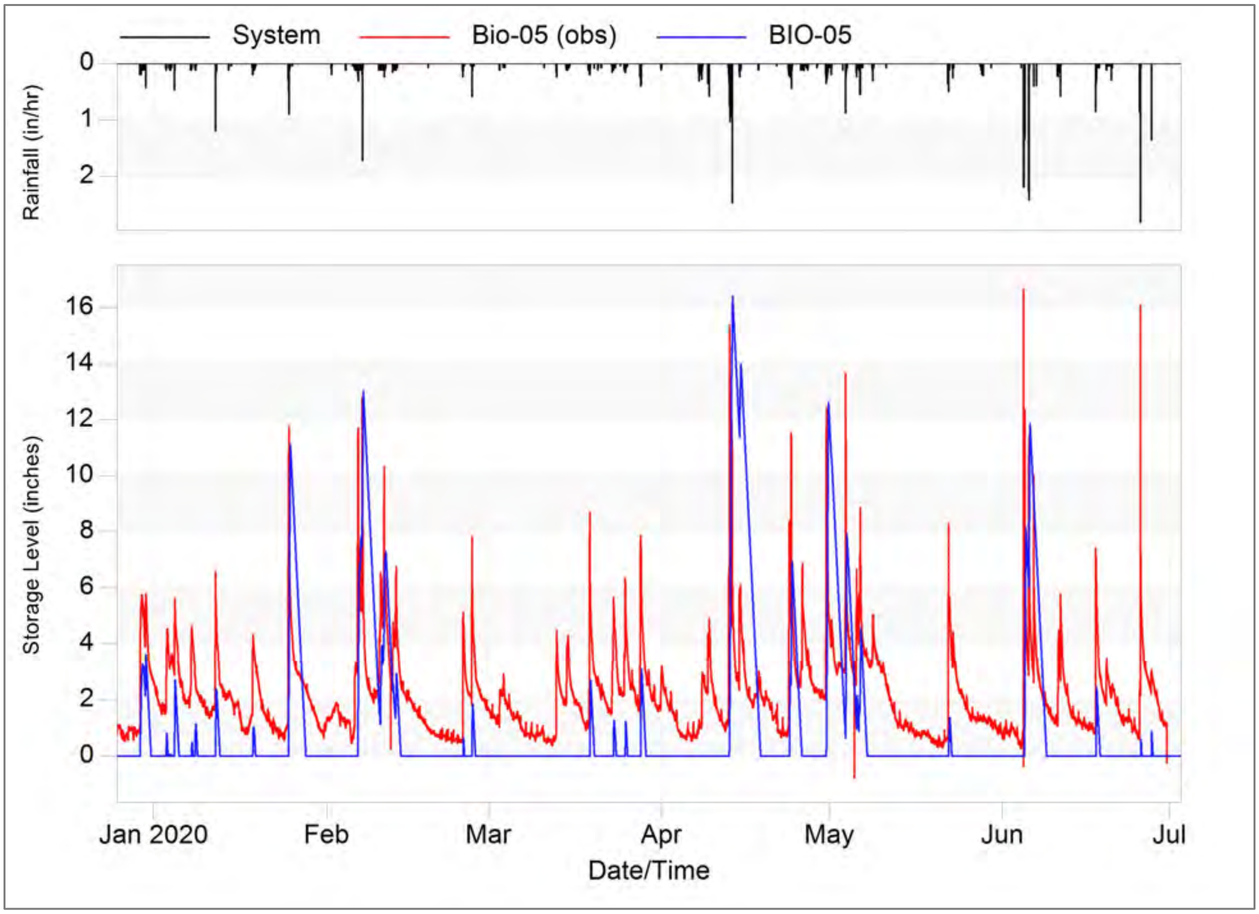


Figure 6-7. BIO-05 Practice Calibration Result

BIO-22 (MacFarland)

Water level data were not available during the pre-rehabilitation phase; a water level sensor was installed after the rehabilitation was completed, and the practice was re-calibrated in the SWMM model for the timeframe of January 2020 to July 2020. The re-calibrated SWMM parameters are listed in Table 6-5. Figure 6-8 shows a comparison between observed and modeled water levels.

Table 6-5. BIO-22 Practice Calibration Parameters

Parameter	Calibrated Value	Effect
Storage porosity (%)	30%	Storage volume, impact on practice effectivity
Bottom seepage (in/h)	0.3	Infiltration into native soil, impact on practice drain rate (drawdown time)
CDA size (% of design)	110%	Volume and magnitude of inflow, impact on practice utilization
Surface depth (in)	0.1	Limits inflow for large and intense events, mimics practice outlets
Underdrain diameter (in)	6	Effective underdrain size, impact on practice drain rate (drawdown time)

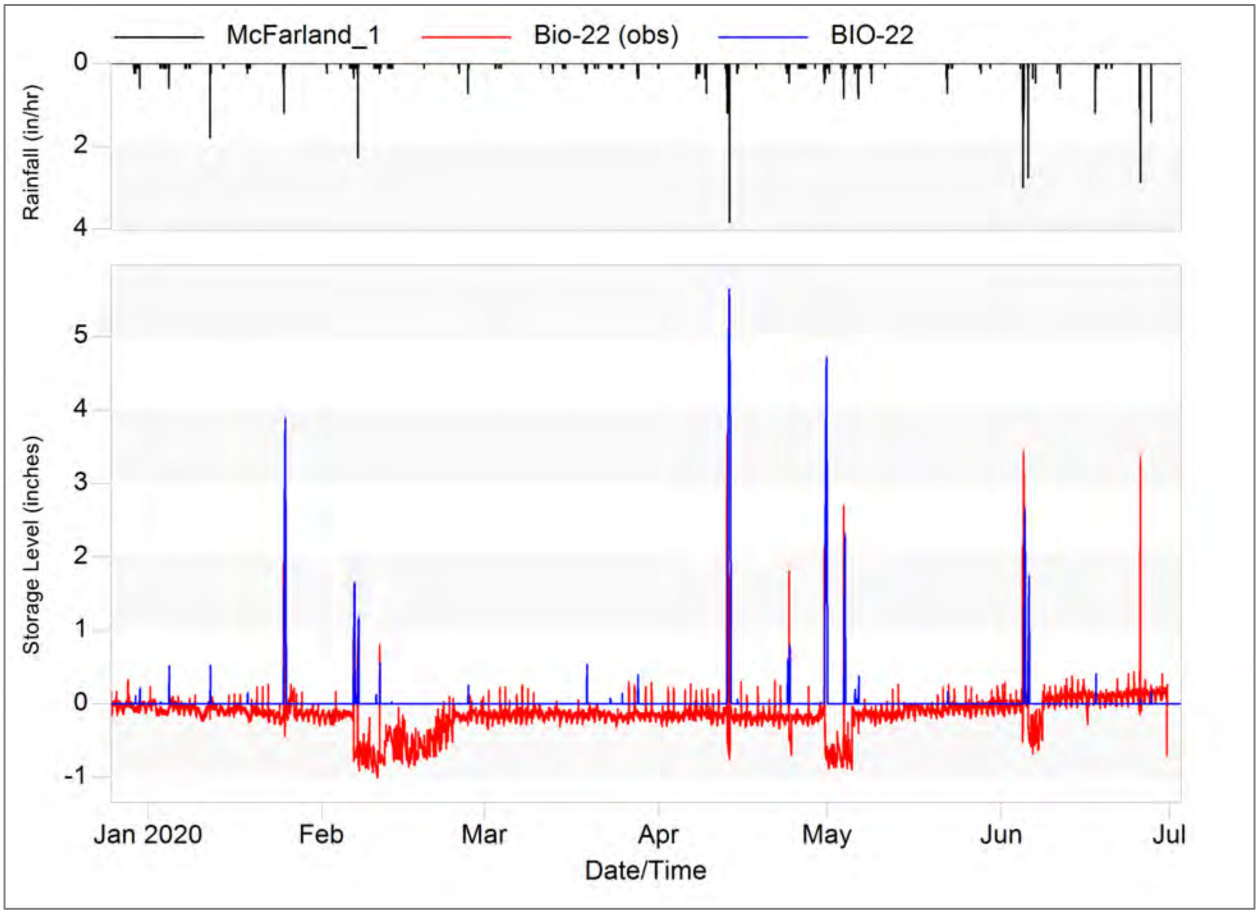


Figure 6-8. BIO-22 Practice Calibration Result

BIO-19 (Lafayette)

Water level monitoring data were mostly unavailable during the pre-rehabilitation time due to issues with the installed sensor. Soil moisture data indicated only limited performance of the practice. Water level data collected after the practice rehabilitation shows a significant increase in practice performance. The practice was re-calibrated in the SWMM model for the timeframe of January 2020 to July 2020. The re-calibrated SWMM parameters are listed in Table 6-6. Figure 6-9 shows a comparison between observed and modeled water levels.

Table 6-6. BIO-19 Practice Calibration Parameters

Parameter	Calibrated Value	Effect
Storage porosity (%)	30%	Storage volume, impact on practice effectivity
Bottom seepage (in/h)	0.05	Infiltration into native soil, impact on practice drain rate (drawdown time)
CDA size (% of design)	110%	Volume and magnitude of inflow, impact on practice utilization
Surface depth (in)	0.1	Limits inflow for large and intense events, mimics practice outlets
Underdrain diameter (in)	N/A	Effective underdrain size, impact on practice drain rate (drawdown time); no underdrain in BIO-19

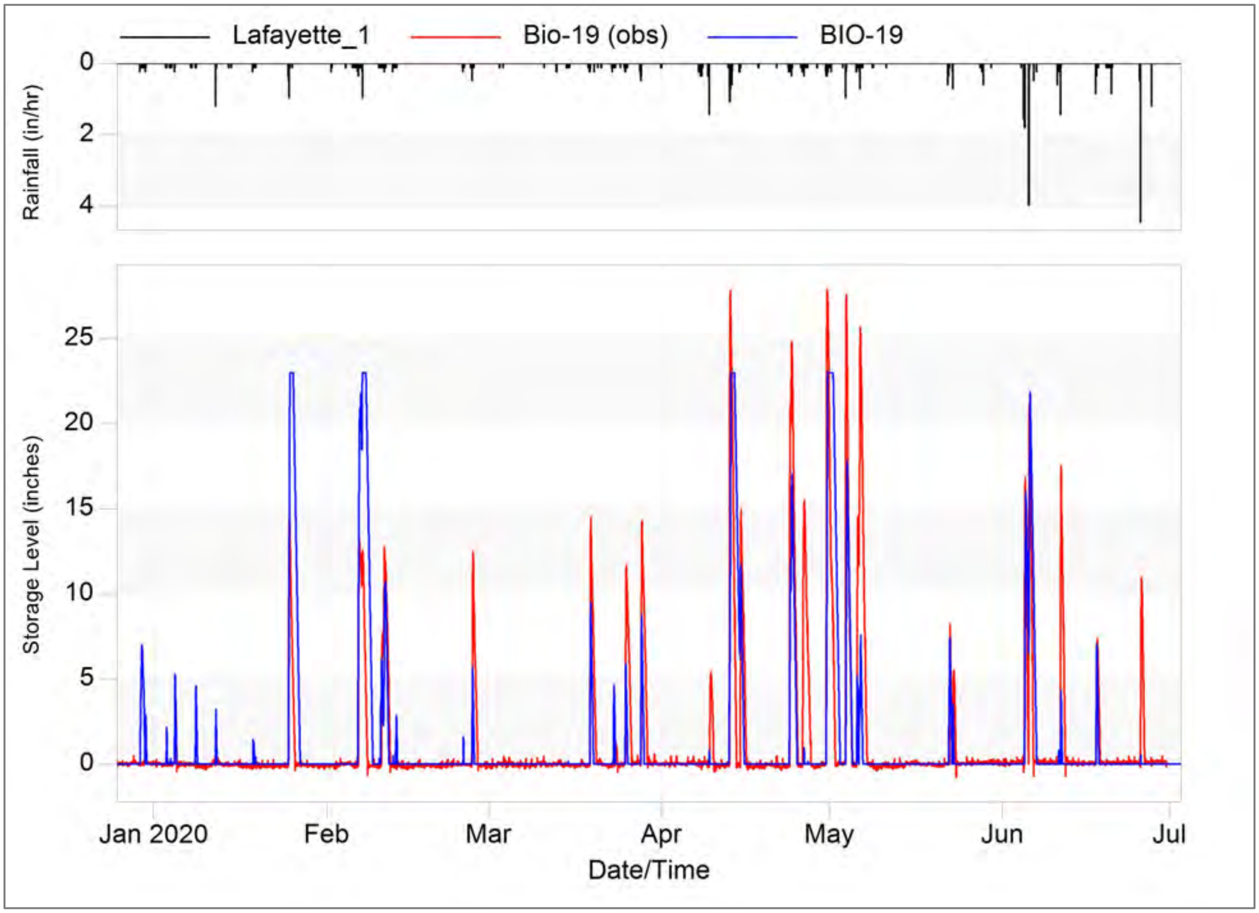


Figure 6-9. BIO-19 Practice Calibration Result

BIO-14 (Lafayette)

No practice water level data was available, not in-practice recalibration of the SWMM model was attempted.

PPF-09 (MacFarland)

Pervious pavement practice PPF-09 is a large alley in MacFarland with a permeable paver surface and a crest in the middle. Water level sensors were installed in both ends and the practice was recalibrated in the model to both water-level datasets. Monitor PPF-09N on the northern end of the practice indicated only a limited performance, and improvements due to the practice cleaning are not evident in the data. The practice was re-calibrated in the SWMM model for the entire monitoring timeframe of June 2019 to July 2020. The re-calibrated SWMM parameters are listed in Table 6-7. Figure 6-10 shows a comparison between observed and modeled water levels. Noise (negative trend) in the water level observations between August 2019 and February 2020 were accounted for in the comparisons.

Table 6-7. PPF-09N Practice Calibration Parameters

Parameter	Calibrated Value	Effect
Storage porosity (%)	30%	Storage volume, impact on practice effectivity
Bottom seepage (in/h)	0.1	Infiltration into native soil, impact on practice drain rate (drawdown time)
CDA size (% of design)	147%	Volume and magnitude of inflow, impact on practice utilization
Pavement infiltration capacity (in/h)	2	Limits inflow for large and intense events, mimics practice outlets
Underdrain diameter (in)	6	Effective underdrain size, impact on practice drain rate (drawdown time)

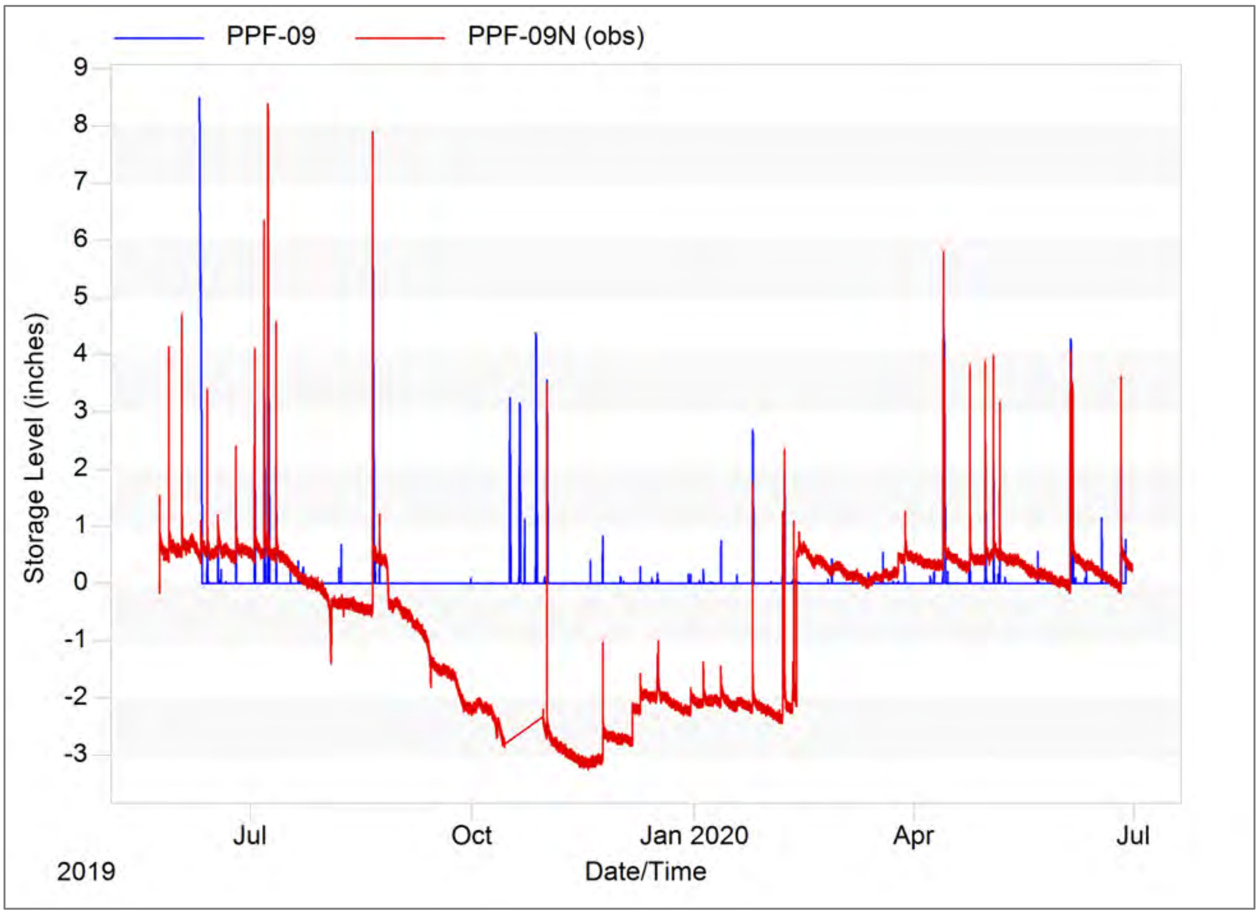


Figure 6-10. PPF-09N Practice Calibration Result

Monitor PPF-09S on the southern end of the practice indicated better performance than PPF-09N, but further improvements due to the practice cleaning are not evident in the data. The practice was re-calibrated in the SWMM model for the entire monitoring timeframe of June 2019 to July 2020. The re-calibrated SWMM parameters are listed in Table 6-8. Figure 6-11 shows a comparison between observed and modeled water levels. Faulty sensor data in September 2019 was ignored for the purposes of calibration.

Table 6-8. PPF-09S Practice Calibration Parameters

Parameter	Calibrated Value	Effect
Storage porosity (%)	10%	Storage volume, impact on practice effectivity
Bottom seepage (in/h)	0.1	Infiltration into native soil, impact on practice drain rate (drawdown time)
CDA size (% of design)	172%	Volume and magnitude of inflow, impact on practice utilization
Pavement infiltration capacity (in/h)	10 (*)	Limits inflow for large and intense events, mimics practice outlets
Underdrain diameter (in)	6	Effective underdrain size, impact on practice drain rate (drawdown time)

(*) The storage layer capacity had to be lowered to 10% in order to reach the observed water levels in the model given the available potential drainage area.

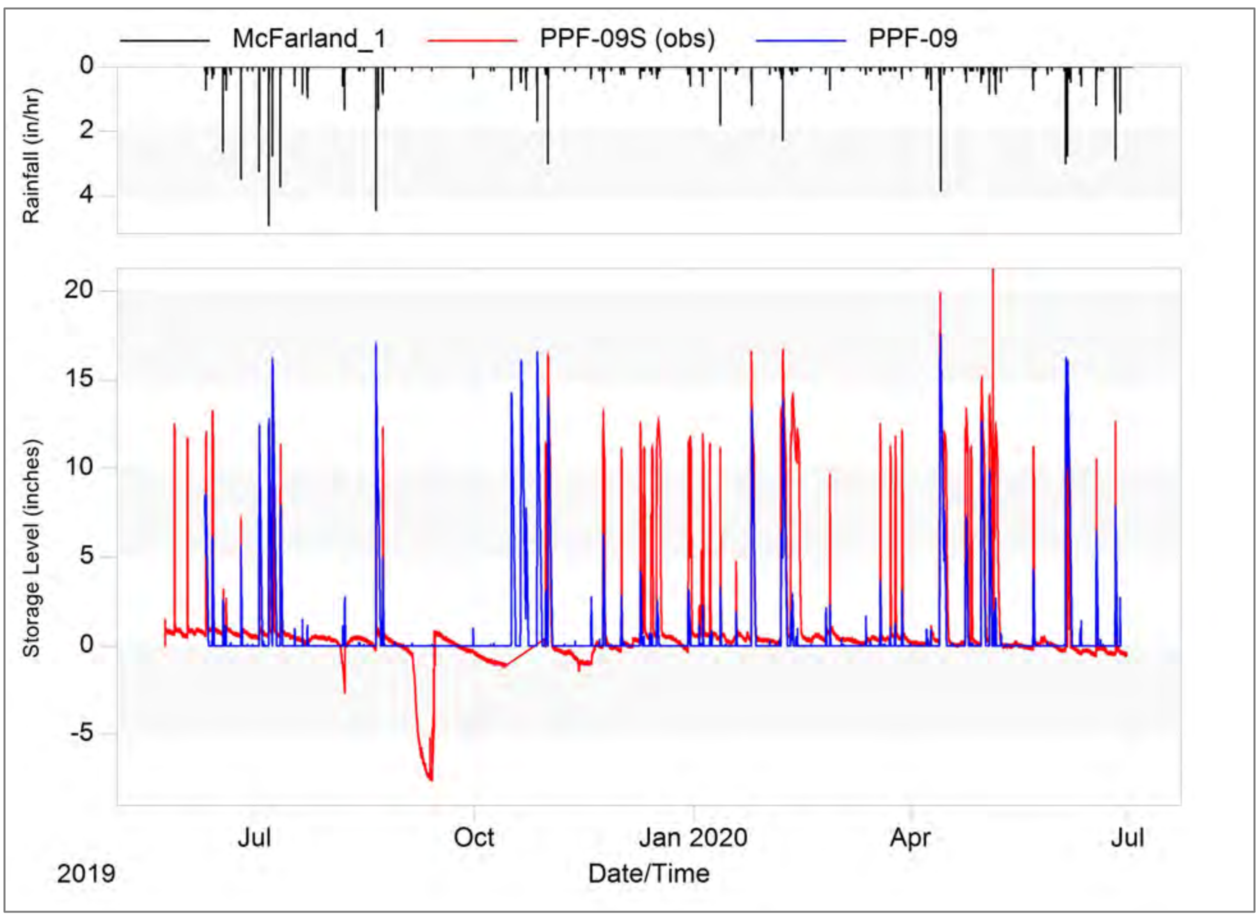


Figure 6-11. PPF-09S Practice Calibration Result

PPF-17 (Lafayette)

Practice PPF-17 is a porous concrete practice in the Lafayette area with heavy leaf coverage and a high potential for yard runoff. Collected water level data for the pre-cleaning timeframe showed only very limited practice performance, consistent with poor infiltration testing results. Water level data immediately after the cleaning showed a greatly improved performance but also indicated rapid regression to pre-cleaning performance due to re-clogging of the surface (consistent with follow-up infiltration testing). The practice was recalibrated in the SWMM model for the post-cleaning timeframe of November 2019 to July 2020, the practice re-clogging was accounted for and resulted in a modeled reduction of the surface infiltration rates down to a complete obstruction within six months after cleaning. Re-calibrated SWMM parameters are listed in Table 6-9. Figure 6-12 shows a comparison between observed and modeled water levels, while Figure 6-13 highlights the changes in practice performance before and immediately after the cleaning, including the rapid drop in performance due to the re-clogging of the surface.

Table 6-9. PPF-17 Practice Calibration Parameters

Parameter	Calibrated Value	Effect
Storage porosity (%)	10%	Storage volume, impact on practice effectivity
Bottom seepage (in/h)	0.1	Infiltration into native soil, impact on practice drain rate (drawdown time)
CDA size (% of design)	322% (*)	Volume and magnitude of inflow, impact on practice utilization
Pavement infiltration capacity (in/h)	100 (**)	Limits inflow for large and intense events, mimics practice outlets
Underdrain diameter (in)	n/a	Effective underdrain size, impact on practice drain rate (drawdown time); no underdrain in PPF-17

(*) The model calibrated CDA is much larger than the design CDA. This might indicate additional runoff from adjacent yards which had not been accounted for in the design of the practice.

(**) Starting infiltration rate was calibrated to 100 in/h which matches the observed infiltration rates directly after the practice was cleaned. This rate drops to zero in the model over a six month timeframe.

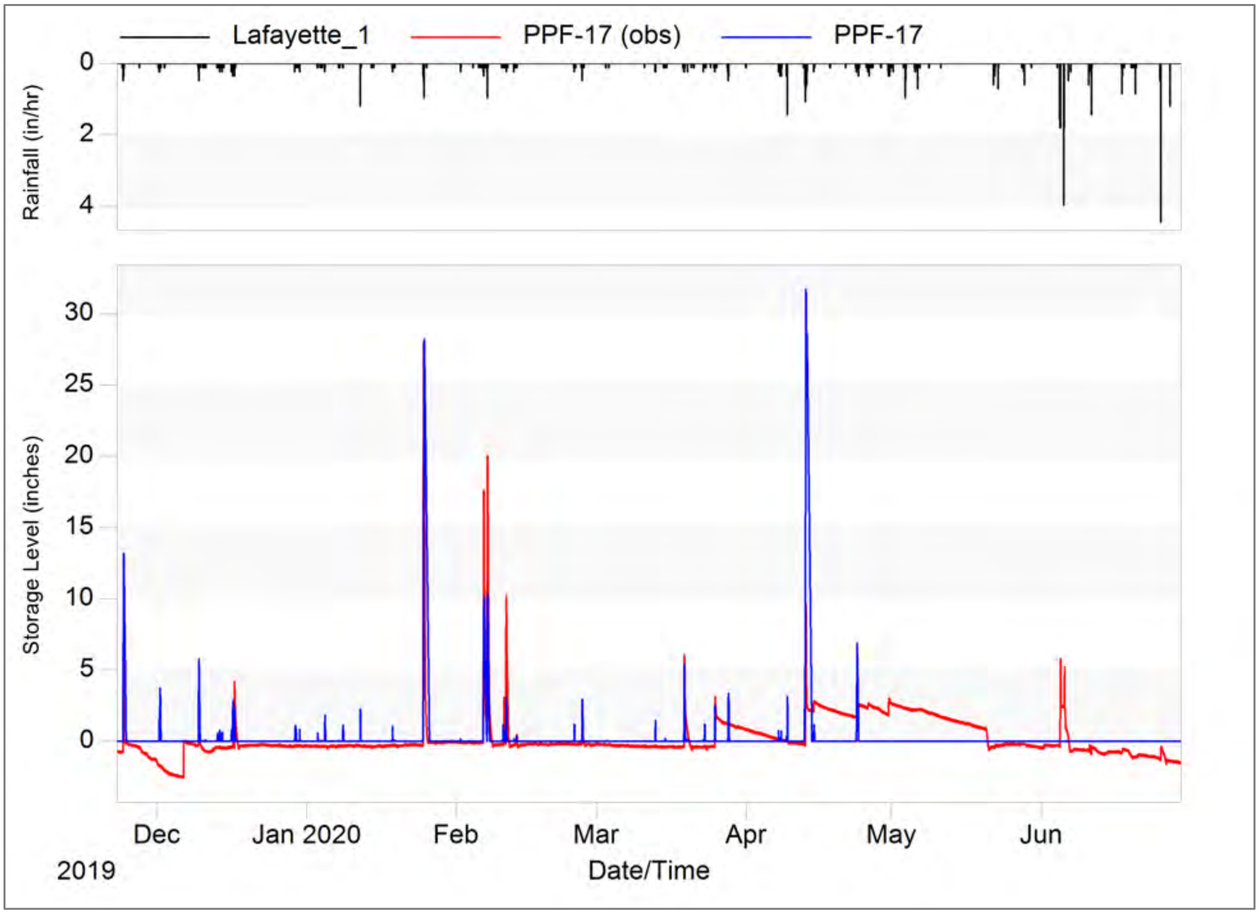


Figure 6-12. PPF-17 Practice Calibration Result

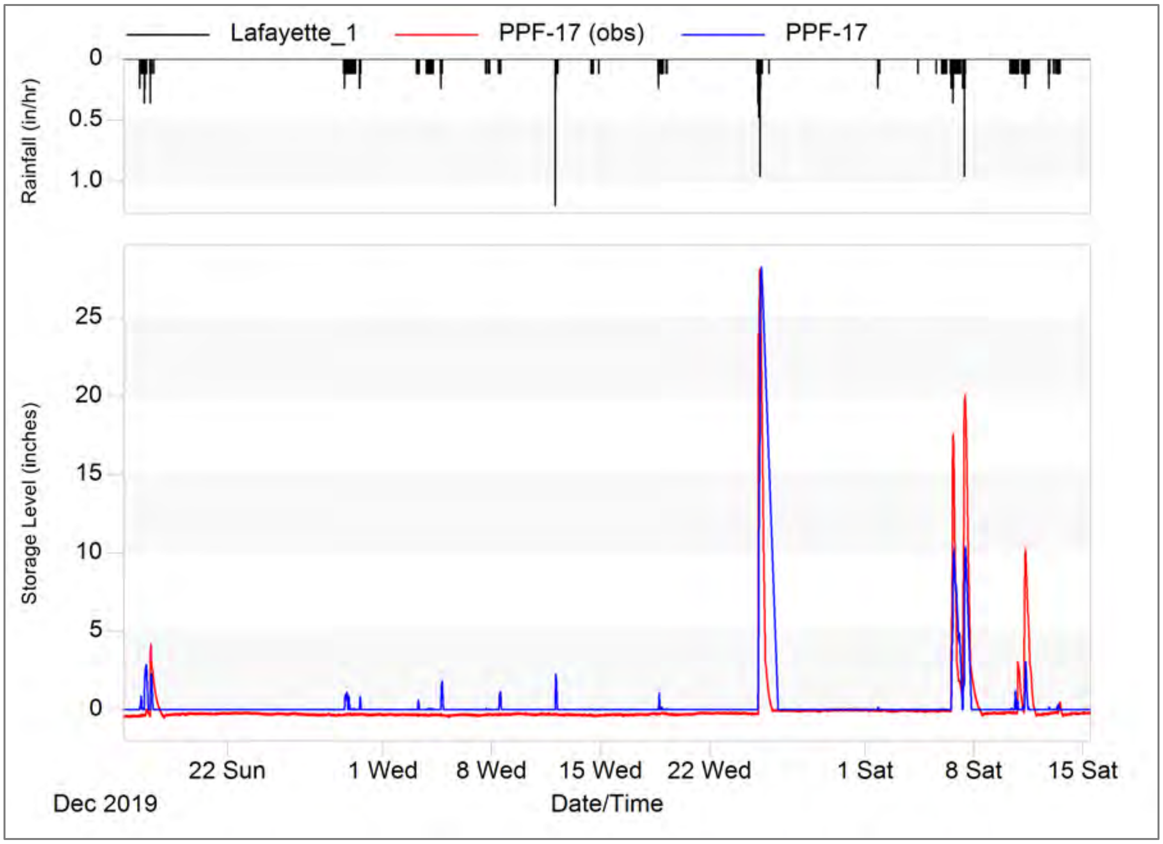


Figure 6-13. PPF-17 Practice Calibration Result around Cleaning Timeframe

PPF-36 (Lafayette)

Practice PPF-36 is a porous concrete parking lane in the Lafayette area. The practice was test-cleaned in October 2019 and fully-cleaned in February 2020. Surface infiltration tests indicated an initially low infiltration rate, which was significantly improved through the cleaning but also quickly regressed back to its original performance. Monitored water levels supported these infiltration rates. The practice was recalibrated in the SWMM model for the timeframe from the test cleaning in October 2019 until July 2020. The calibration resulted in a clogging of 50% within four months; the full cleaning in February 2020 was accounted for in the model. Re-calibrated SWMM parameters are listed in Table 6-10. Figure 6-14 shows a comparison between observed and modeled water levels.

Table 6-10. PPF-36 Practice Calibration Parameters

Parameter	Calibrated Value	Effect
Storage porosity (%)	13%	Storage volume, impact on practice effectivity
Bottom seepage (in/h)	0.05	Infiltration into native soil, impact on practice drain rate (drawdown time)
CDA size (% of design)	128%	Volume and magnitude of inflow, impact on practice utilization
Pavement infiltration capacity (in/h)	5 (*)	Limits inflow for large and intense events, mimics practice outlets
Underdrain diameter (in)	N/A	Effective underdrain size, impact on practice drain rate (drawdown time); no underdrain in PPF-36

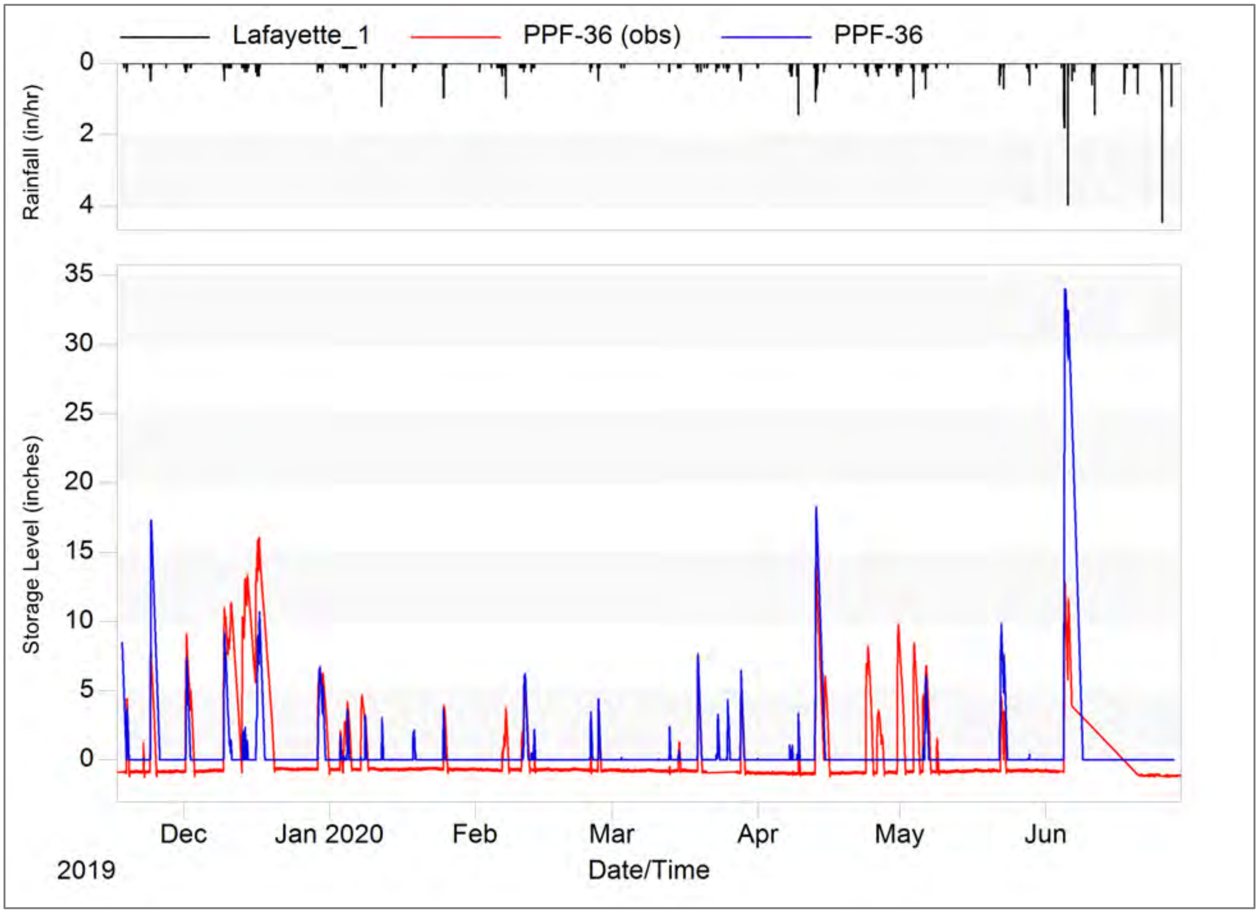


Figure 6-14. PPF-36 Practice Calibration Result

GBOM Application

The GBOM is a coarse runoff model of both the CSS and MS4 areas of Washington, DC, that originally served to project runoff reductions that may be possible, given a mix of green infrastructure implemented on both moderate and intensive scales. It uses runoff model parameters such as infiltration rates and depression storage values as proxies for LID performance. For the purposes of RiverSmart, revisiting the GBOM involved only model scenarios that addressed bioretention bumpouts and permeable pavement; RiverSmart data and models cannot be used to revisit other aspects of green infrastructure (GI)/LID that were evaluated with the original GBOM, such as green roofs or increased tree canopy. The assumptions for the GBOM bioretention bumpouts and permeable pavement were:

- Bioretention:
  - Moderate LID:
    - 10:1 ratio of practice footprint to CDA.
    - Once eligible CDAs were identified, those areas were reclassified in the model from impervious areas to pervious areas with high infiltration rates (Hydrologic Soil Groups A/B). There was no consideration that some practices could require underdrains.

        - GIS analysis identified 5,421 “block segments” that would be appropriate for practice siting, assumed 0.5 planters per block.
    - Intensive LID:
        - Same assumptions as moderate scenario, but with 4 planters per block (8x CDA).
- Permeable Pavement:
    - Moderate LID:
        - Eligible (via GIS analysis) parking lots and alleys at a 50% application rate.
        - As with bioretention bump-outs, identified CDAs were reclassified in the model from impervious areas to pervious/high-infiltration areas. Also as with bioretention, there was no consideration that some practices could require underdrains.
    - Intensive LID:
        - Same assumptions as with moderate scenario, but with eligible (via GIS analysis) parking lots and alleys at a 90% application rate.

Based upon the model calibrations for both versions of the RiverSmart SWMM LID models – the model calibrated to shed-level flow meter data, and the model calibrated to practice-monitoring data – the GBOM assumptions were altered to develop two new GBOM scenarios. The primary change in assumptions is related to the GBOM’s re-classification of bioretention and permeable surface CDAs from impervious to pervious. This re-classification did not account for the presence of underdrains, and the use of HSG-A/B infiltration rates was very optimistic, compared to native soil rates that were obtained via soil borings prior to RiverSmart construction. The assumptions for all GBOM versions are summarized in Table 6-11.

Table 6-11. GBOM Scenario Assumptions

LID Practice Type	GBOM Scenario	Assumptions
Bioretention	original GBOM LID: moderate	**0.5** practices per eligible block, **10:1** CDA to footprint ratio, re-classification of CDA from impervious to pervious: **HSG A/B**
	Original GBOM LID: intensive	**4.0** practices per eligible block, **10:1** CDA to footprint ratio, re-classification of CDA from impervious to pervious: **HSG A/B**
	SWMM (practice-level): moderate	**0.3** practices per eligible block, **5:1** CDA to footprint ratio, re-classification of CDA from impervious to pervious: **HSG C**
	SWMM (practice-level): intensive	**2.4** practices per eligible block, **5:1** CDA to footprint ratio, re-classification of CDA from impervious to pervious: **HSG C**
Permeable Surfaces	original GBOM LID: moderate	**50%** application per eligible parking lot and alley; re-classification of CDA from impervious to pervious: **HSG A/B**
	Original GBOM LID: intensive	**90%** application per eligible parking lot and alley; re-classification of CDA from impervious to pervious: **HSG A/B**
	SWMM (practice-level): moderate	**25%** application per eligible parking lot and alley; re-classification of CDA from impervious to pervious: **HSG D**
	SWMM (practice-level): intensive	**45%** application per eligible parking lot and alley; re-classification of CDA from impervious to pervious: **HSG D**

The changes in parameters from the original GBOM, based on practice monitoring data and SWMM modeling, are as follows:

- Bioretention:
  - Reduction in practices per eligible block was 60%, based on the average value of 60% of design volume from SWMM practice-level modeling.
  - Re-assignment of CDA area from impervious to pervious HSG-A was changed to pervious HSG-C, to reflect the average infiltration rate from SWMM practice-level modeling.
- Permeable Surfaces:
  - Reduction in application per eligible parking lot and alley was 50%, based on the average value of 50% of design volume from SWMM practice-level modeling.
  - Re-assignment of CDA area from impervious to pervious HSG-A was changed to pervious HSG-D, to reflect the average infiltration rate from SWMM practice-level modeling.

Although the new GBOM scenarios are based on the 2019-2020 practice monitoring and modeling, they are still based on broad assumptions, since the practice-level data used to re-parameterize the GBOM are average values across all monitored practices, there is great variability in practice responses, and monitored practices are a small subset of all RiverSmart LID practices.

The original GBOM was evaluated for the 1990 rainfall year, which was considered an average year in terms of rainfall conditions. Table 6-12 summarizes the updated GBOM results, after setting up and running the model with the new SWMM-based scenarios.

Table 6-12. Updated GBOM Results

Model Version	Practice Type	Runoff Volume (MG)	Percent Reduction
Original GBOM: *moderate*	Baseline (same for all scenarios)	16,423	n/a
	Bioretention	16,146	1.7%
	Permeable surface	15,930	3.0%
SWMM (practice-level): *moderate*	Bioretention	16,369	0.34%
	Permeable surface	16,022	2.45%
Original GBOM: *intensive*	Bioretention	15,318	6.7%
	Permeable surface	15,535	5.4%
SWMM (practice-level): *intensive*	Bioretention	15,695	4.4%
	Permeable surface	15,848	3.5%

The new GBOM scenarios based on SWMM practice-level monitoring and modeling, resulted in lower predicted reductions in stormwater volumes for all scenarios.

7 Discussion and Recommendations

This section will focus on observations, lessons learned, obstacles encountered, and suggested recommendations based primarily on the 2019-2020 grant period. There are some topics of discussion that also draw on experiences and observations from previous phases of RiverSmart.

2019-2020 Goals & Performance

The 2019-2020 phase of RiverSmart was undertaken with several goals in mind. The follow items describe those goals and a brief assessment of the performance of the project in relation to those goals:

1. In light of difficulties during previous project phases in using sewer flow meter data alone to quantify stormwater volume reductions, individual practice monitoring would be introduced in order to provide information about how individual practices were performing. By monitoring several practices of each type, this could also allow comparison of the relative performance of practice types. This would also serve as a pilot program of sorts for practice monitoring technologies and techniques. Sewer flow meters would still be put into service to record overall site responses.
    a) As implemented in this project phase, practice monitoring provided valuable data about practice performance, which enabled parameterization of new GBOM scenarios (see #3 below). The practice monitoring for permeable surfaces showed the effects of restorative cleaning for some practices; that data also reinforced the findings of infiltration testing, specifically the follow-up testing that indicated deterioration of surface infiltration rates within months after cleaning. Practice monitoring was not as successful in quantifying the effects of bioretention rehabilitation, due mostly to sensor and data-logger issues.
    b) The pilot-study nature of the practice monitoring was successful, in that it clearly demonstrated which sensors and monitoring techniques worked, and which did not. The monitoring of the permeable surface water levels was largely problem-free, however the bioretention monitoring was plagued – especially early on – with sensor failures, data transmission issues, and absence of monitoring wells (and inability to retrofit monitoring wells in some practices).
2. Since construction of LID practices in 2015, there had been minimal maintenance conducted on the RiverSmart LID practices. DOEE and DDOT coordinated for this project phase, such that contractors for each organization would address practice rehabilitation for permeable surfaces (DOEE) and bioretention cells (DDOT). The sewer flow meters and practice monitoring would be able to quantify the benefits of rehabilitation activities.
    a) As previously stated, this report cannot address many of the details of the DDOT bioretention rehabilitation. The restorative cleaning of permeable surfaces that was conducted by Apex was largely successful; Apex was able to access most facilities, and various rounds of infiltration testing showed that the cleanings were effective in restoring surface infiltration rates. Follow-up testing, however, indicated that in many cases the improvements were short-lived. Access to some facilities was an issue, due to equipment clearance issues and due to circumstances beyond control (COVID shutdown that suspended street sweeping and parking restrictions). The permitting process for closing sections of streets for sweeping was difficult to navigate and led to delays.
    b) Site-wide flow meter data were not able to provide a signal that rehabilitation activities were successful in reducing stormwater volumes. The flow meter data did indicate that peak flow reductions occurred following rehabilitation activities. Practice monitoring data provided a strong

signal that rehab was effective for permeable surfaces. Due to previously-discussed equipment issues, the signal from bioretention practice monitoring provided less clarity about those practices' rehabilitations.

3. The previous (post construction monitoring, 2015-2016) phase of RiverSmart was unable to provide a broad city-level projection as was provided by the GBOM in 2009. The GBOM would be applied to observed performance post-rehabilitation, using the latest sewer flow data, practice monitoring data, and SWMM LID modeling of RiverSmart sites.
   a) The practice monitoring data were evaluated in a version of the SWMM LID model, and parameter sets were developed based on those data that established upper and lower bounds and average performance for each of the two major practice types (bioretention, permeable surfaces) that the original GBOM had evaluated. Those parameters were interpreted so that they could be used as inputs for new GBOM scenarios. The GBOM was run for those new scenarios, and results were compared with 2009 GBOM results.

Discussion & Recommendations

This report section is divided into topics that approximately mirror the three project goals described above. There is significant overlap, however, between the monitoring, rehabilitation and maintenance, and modeling components of RiverSmart. Much of the discussion and recommendations will feature overlaps between those three topics; this reflects the holistic nature of RiverSmart, and the difficulty in isolating various components of the project.

Monitoring & LID Performance Assessment

The primary challenge related to monitoring of the RiverSmart sites continues to be the difficulties in quantifying wet weather volume reductions. For the past two phases of RiverSmart (2015-2016 post-construction, as well as current 2019-2020 phase), the sewer flow meter data have indicated that unit wet weather response - volume per inch of rain – has increased for each phase, when compared with the 2010 pre-construction period. Absent changes to contributing surfaces or subsurface changes that would be difficult to identify (increases in non-runoff sewer inflows during wet weather), flow reductions in Lafayette and MacFarland would be expected. Even accounting for the observations that flows can move through LID practices quickly, around 40% of practices do not have underdrains, so volume reductions due to infiltration would be expected when analyzing flow meter data. That flow meter data do not show the expected runoff reductions associated with LID performance may speak to the difficulties in flow metering in such small sheds. Any data noise can lead to inaccurate results; such noise is more likely in pipes where maximum water levels may constitute a small portion of the pipe's cross-sectional area.

Difficulties in quantifying volume reductions were mitigated in this phase of the project by using the SWMM model to adjust the baseline conditions based on flow data from the Control site. Reliance on such a method is only valid when the Control site data are of decent quality, and the signal from the Control site trends in the same direction as for the LID sites.

The introduction of practice monitoring provided valuable information about what may be happening within each practice, and – unlike the sewer flow meter data – indicated that rehabilitation activities were largely successful. The practice monitoring did not measure all practices though, and its water level and soil moisture data can't be translated to flow volumes.

Water quality is unaddressed in this and past phases of RiverSmart. While water quality could be modeled simplistically using literature-value event mean concentrations for TSS in stormwater, this approach would not be able to account for reductions within a practice due to infiltration, possible capture of suspended solids within a practice, or even possible re-suspension of solids and transport via underdrain flows.

Recommendations

- Aggressive practice monitoring, coupled with hydrant testing of practices, could help to develop lookup tables or curves that would link incoming volumes with water levels and provide estimates of infiltration rates into underlying soil. This exercise could also include temporary blocking of underdrains and monitoring of water levels in underdrains.
- Several types of practice-monitoring sensors and data-logging equipment were tested during this project. Based on the performance of these sensors, any future RiverSmart practice monitoring should move forward with proven commercial sensor and data collection technology; the risks of data loss and increased technical hours needed for more "DIY" solutions are not warranted for smaller data collection efforts such as RiverSmart, where troubleshooting could consume a significant part of the monitoring budget.
- If sewer flow metering continues in future phases of RiverSmart, it is imperative to continue to monitor the Control site. Without its data, it would not have been possible to provide SWMM LID model results that quantified LID performance.
- Anecdotal evidence of flow into practices and flow bypass has been helpful in past phases to try to understand what is happening during rain events at the LID sites. More regular collection of photos and videos would aid in understanding how and whether flows enter practices.
- Water quality sampling feasibility could be explored. Is it feasible to attempt to sample incoming surface flows, outgoing surface flows (via outlets, during periods of high flow and full practices), and underdrain flows?

Rehabilitation & Maintenance

As the practice-level data showed, the RiverSmart rehabilitation activities were largely successful in restoring functionality or improving performance of LID practices. There were difficulties in coordinating all of the activities though, due to delays with obtaining permits due to the complexity of the DC permitting system. The rehabilitation of the bioretention practices also occurred over an extended time frame of two to three months, during which data were not being collected. Also, when bioretention rehabilitation was completed, some practices' inlets and outlets still had sandbags blocking them for extended periods, which rendered monitoring less useful over those periods.

The results of infiltration testing of permeable surface practices showed that, for many practices, restored post-cleaning increases in surface infiltration rates were not sustainable; in follow-up testing three to four months after cleaning, many practices showed a significant decrease in infiltration rates.

Recommendations

- Advance coordination of any permitting necessary for maintenance/rehab activities. Alternately, the time required for obtaining permits could be included as a line item in contracts with cleaning/rehab companies.
- Determining appropriate cleaning intervals going forward would be crucial to any modeling projections of expected performance.

- Cleaning and infiltration test results should be considered when planning for future LID installations; more data are needed, but indications thus far are that permeable pavers retain good surface infiltration rates for longer periods following cleaning.

Modeling

The SWMM LID model of RiverSmart sites continues to be a suitable tool for evaluation of LID on a shed or individual practice level. It has limitations, but SWMM is a widely-accepted model with a well-established LID model. As a planning-level model, the GBOM remains suitable for providing rough estimates of LID performance, however it makes broad assumptions that do not account for the complexities of LID installation, performance, and maintenance.

Recommendations

- Explore alternative model frameworks for detailed modeling of LID processes. While SWMM LID remains suitable for this task, evaluation of other models would be worthwhile.
- Consider migrating the GBOM to another modeling platform that can model actual LID processes, and use that model to approximate "lumped" LID on a subwatershed basis. This could potentially be a major endeavor, but could leverage more sophisticated LID modeling techniques and GIS tools to create a more versatile and powerful planning-level tool.

Appendix A: Full-Sized LID Shed Maps

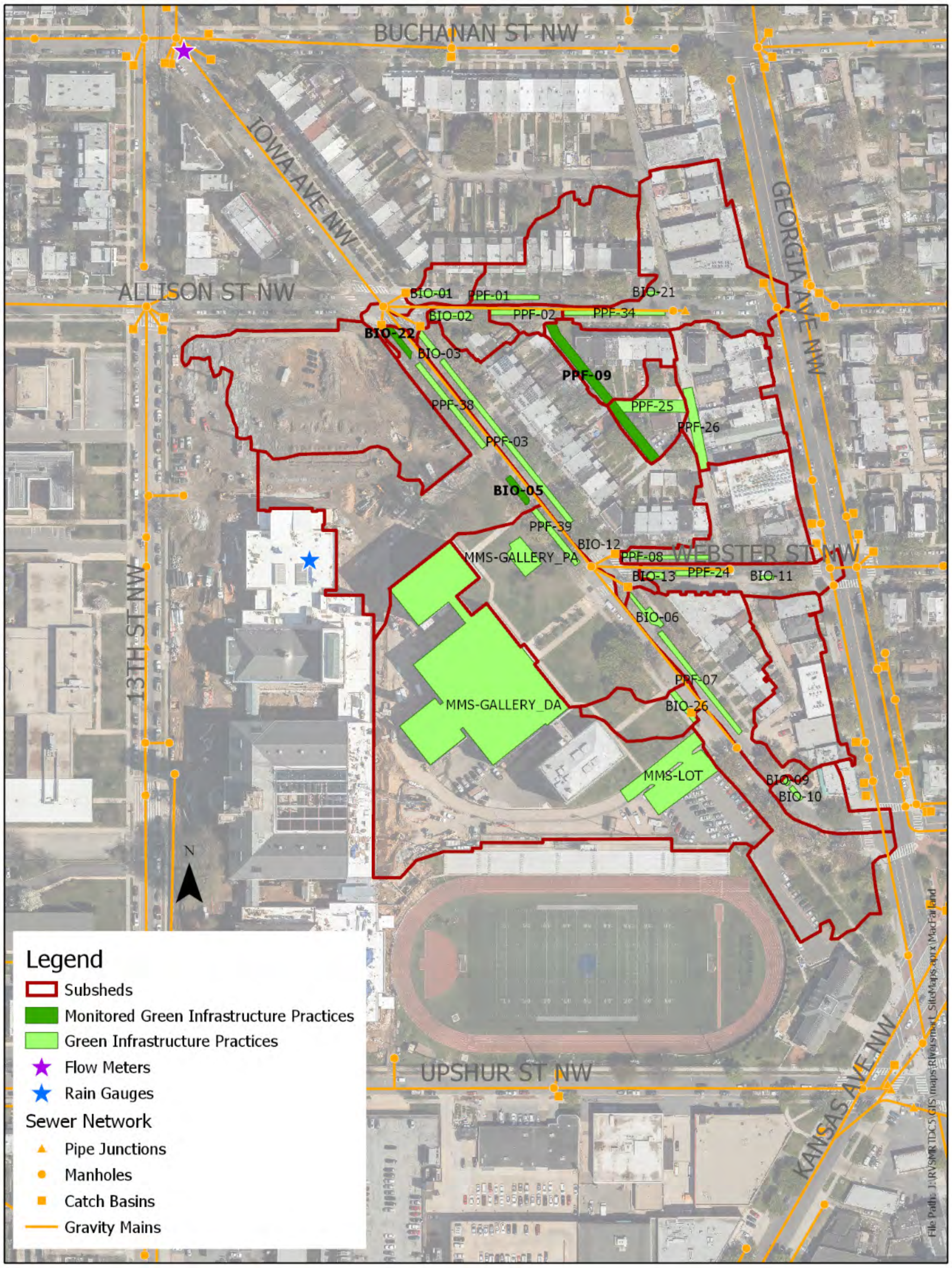


Figure A-1. MacFarland LID Site Map

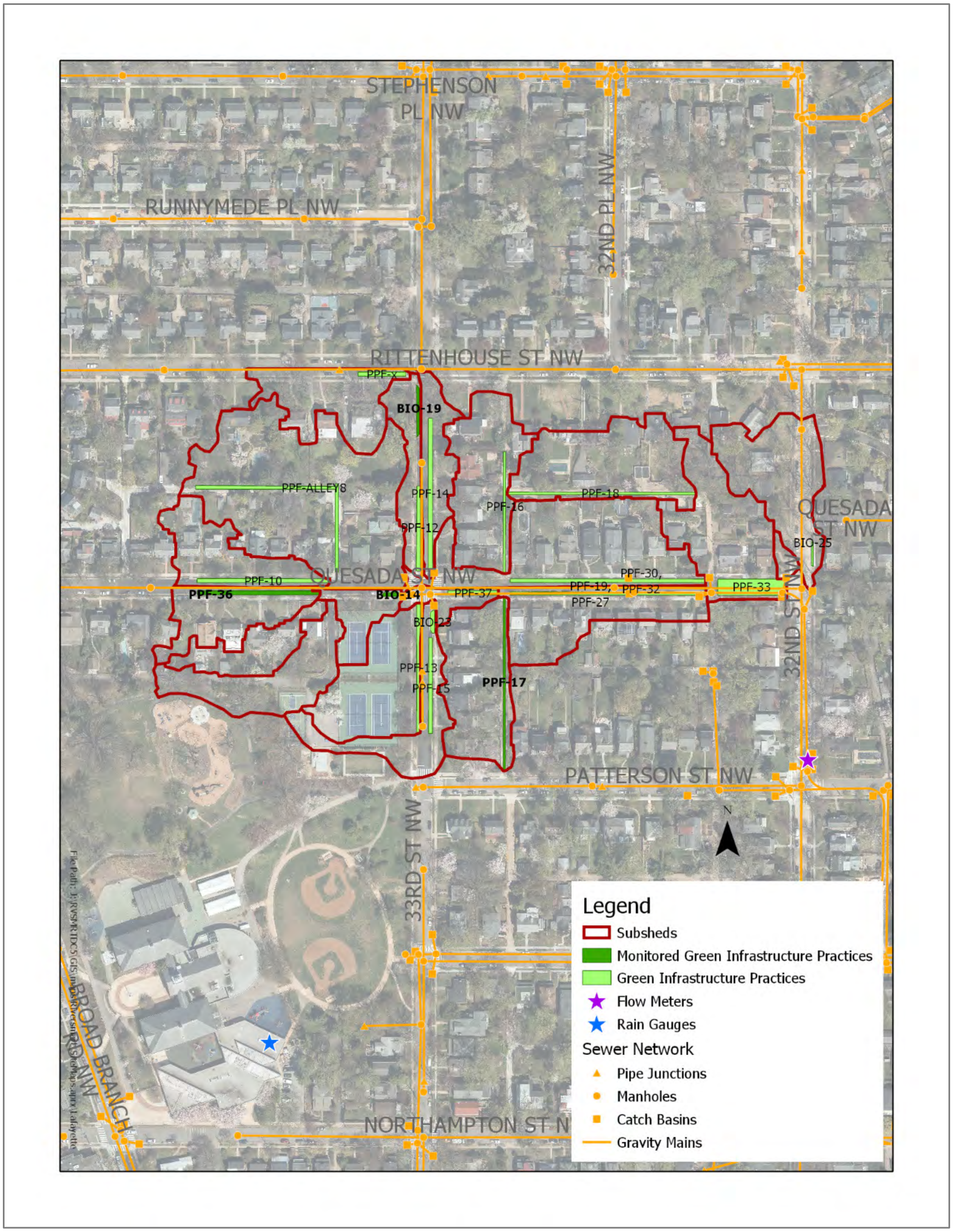
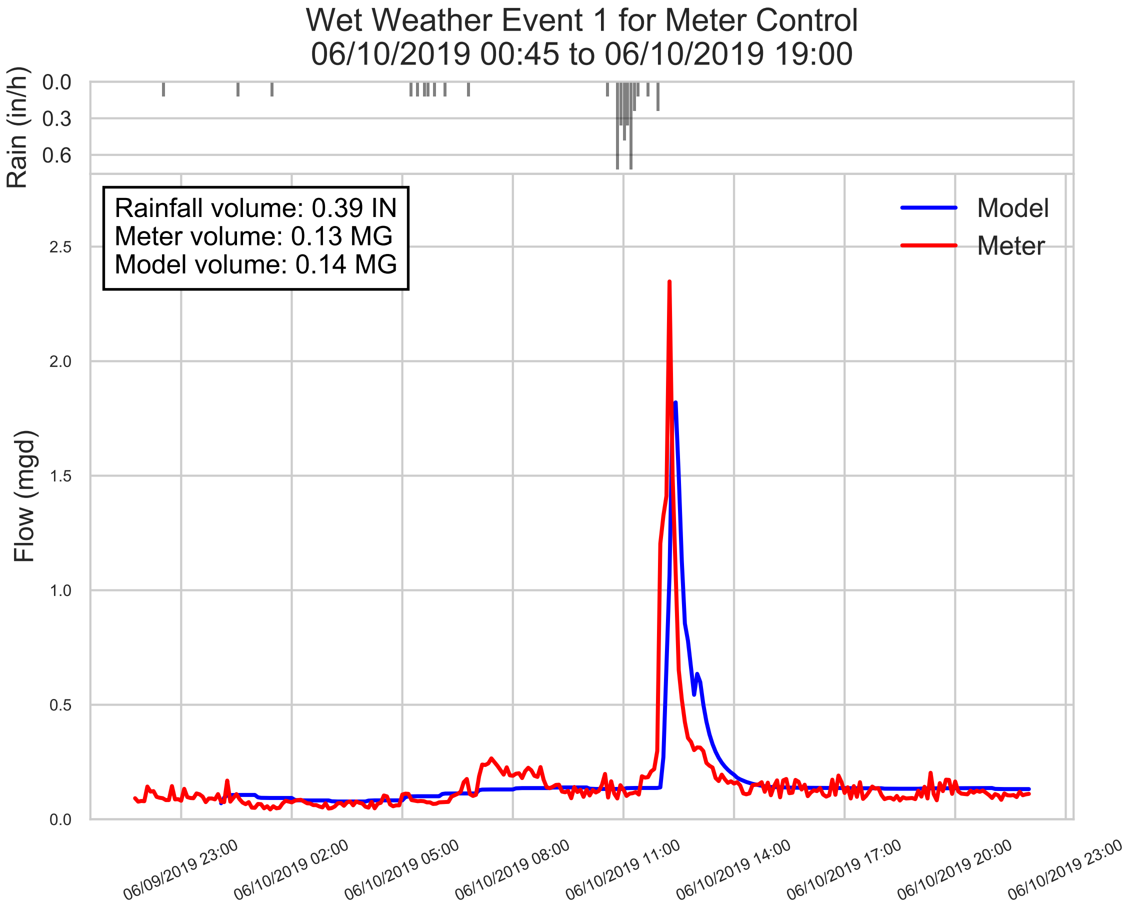
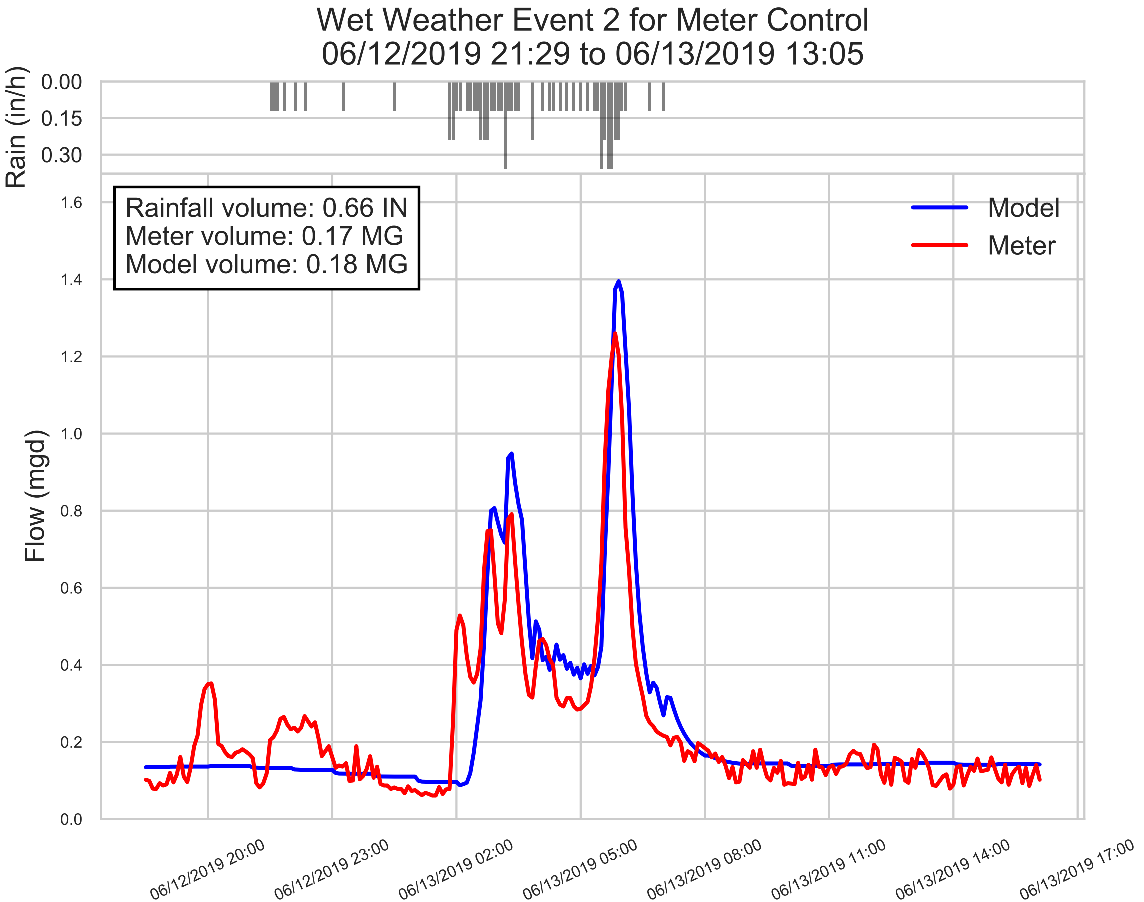


Figure A-2. Lafayette LID Site Map

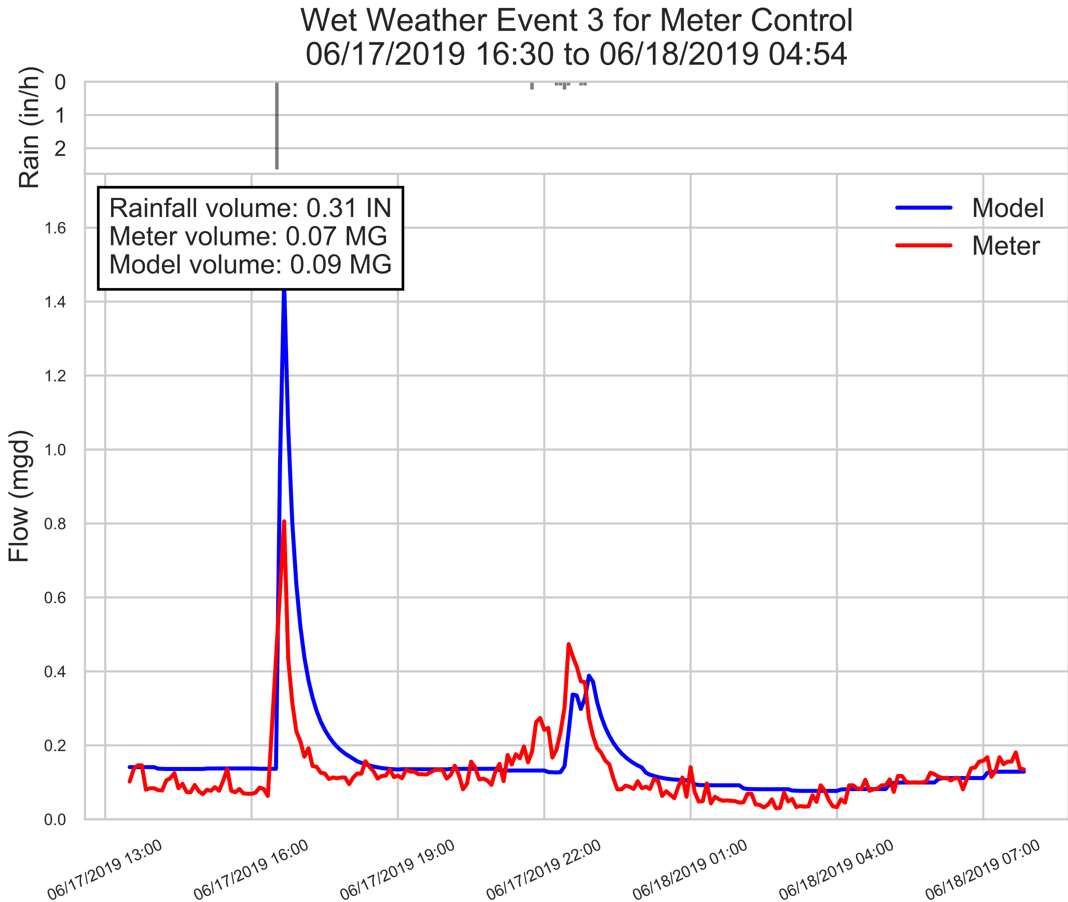
Appendix B: Model-Meter Event Hydrographs

The following pages contain hydrographs for all wet weather events in the 2019-2020 calibration periods for all three monitored RiverSmart sites (Control, MacFarland, and Lafayette).

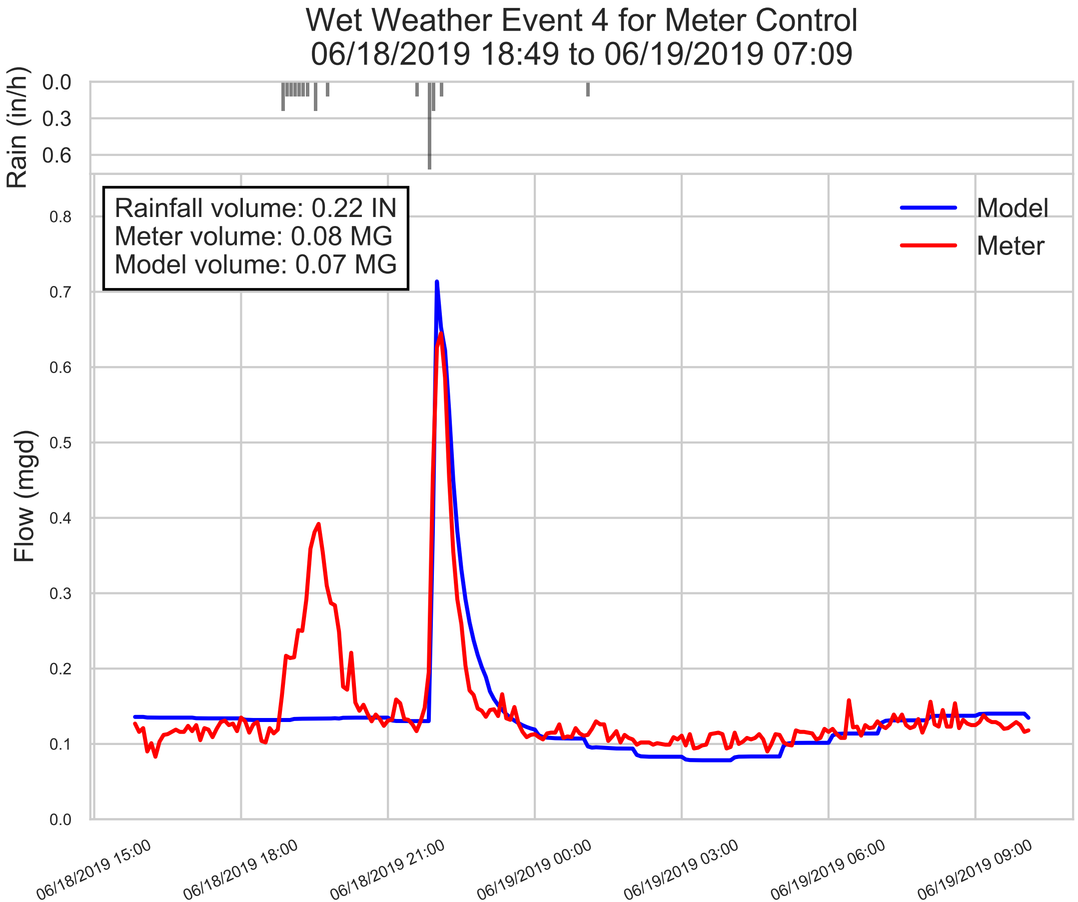

Wet Weather Event 1 for Meter Control
06/10/2019 00:45 to 06/10/2019 19:00
Rain (in/h)
0.0
0.3
0.6
Rainfall volume: 0.39 IN
Meter volume: 0.13 MG
Model volume: 0.14 MG
Model
Meter
Flow (mgd)
2.5
2.0
1.5
1.0
0.5
0.0
06/09/2019 23:00
06/10/2019 02:00
06/10/2019 05:00
06/10/2019 08:00
06/10/2019 11:00
06/10/2019 14:00
06/10/2019 17:00
06/10/2019 20:00
06/10/2019 23:00



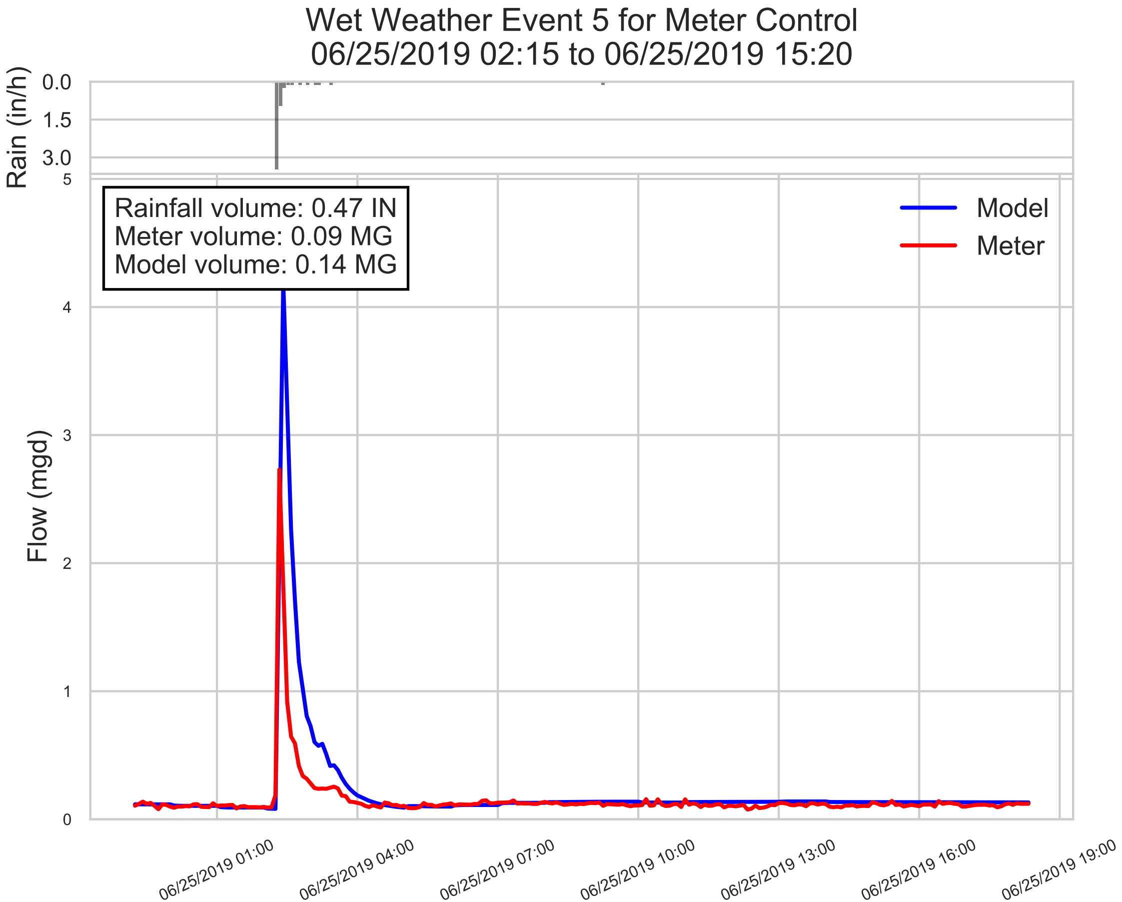
Wet Weather Event 2 for Meter Control
06/12/2019 21:29 to 06/13/2019 13:05
Rain (in/h)
0.00
0.15
0.30
Flow (mgd)
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
Rainfall volume: 0.66 IN
Meter volume: 0.17 MG
Model volume: 0.18 MG
Model
Meter
06/12/2019 20:00
06/12/2019 23:00
06/13/2019 02:00
06/13/2019 05:00
06/13/2019 08:00
06/13/2019 11:00
06/13/2019 14:00
06/13/2019 17:00

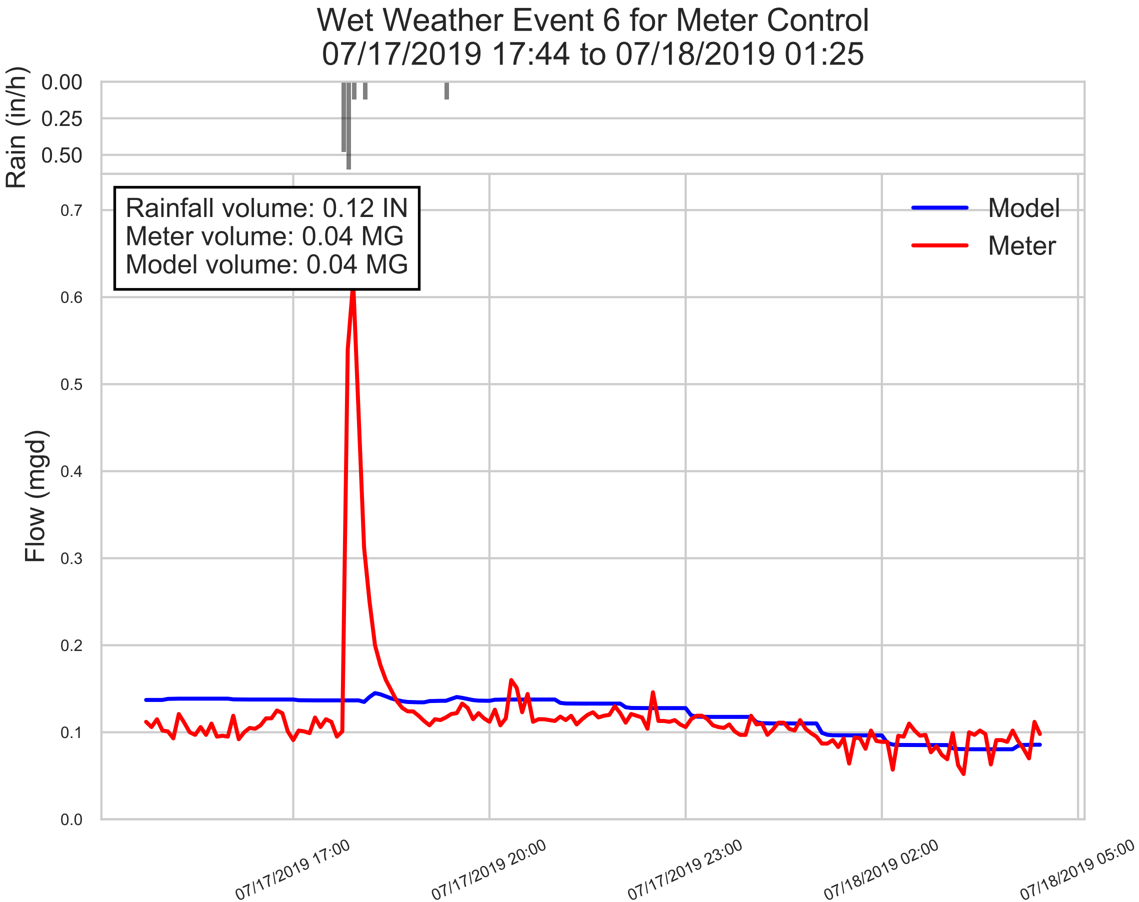


Wet Weather Event 3 for Meter Control
06/17/2019 16:30 to 06/18/2019 04:54
Rain (in/h)
0
1
2
Rainfall volume: 0.31 IN
Meter volume: 0.07 MG
Model volume: 0.09 MG
Model
Meter
Flow (mgd)
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
06/17/2019 13:00
06/17/2019 16:00
06/17/2019 19:00
06/17/2019 22:00
06/18/2019 01:00
06/18/2019 04:00
06/18/2019 07:00

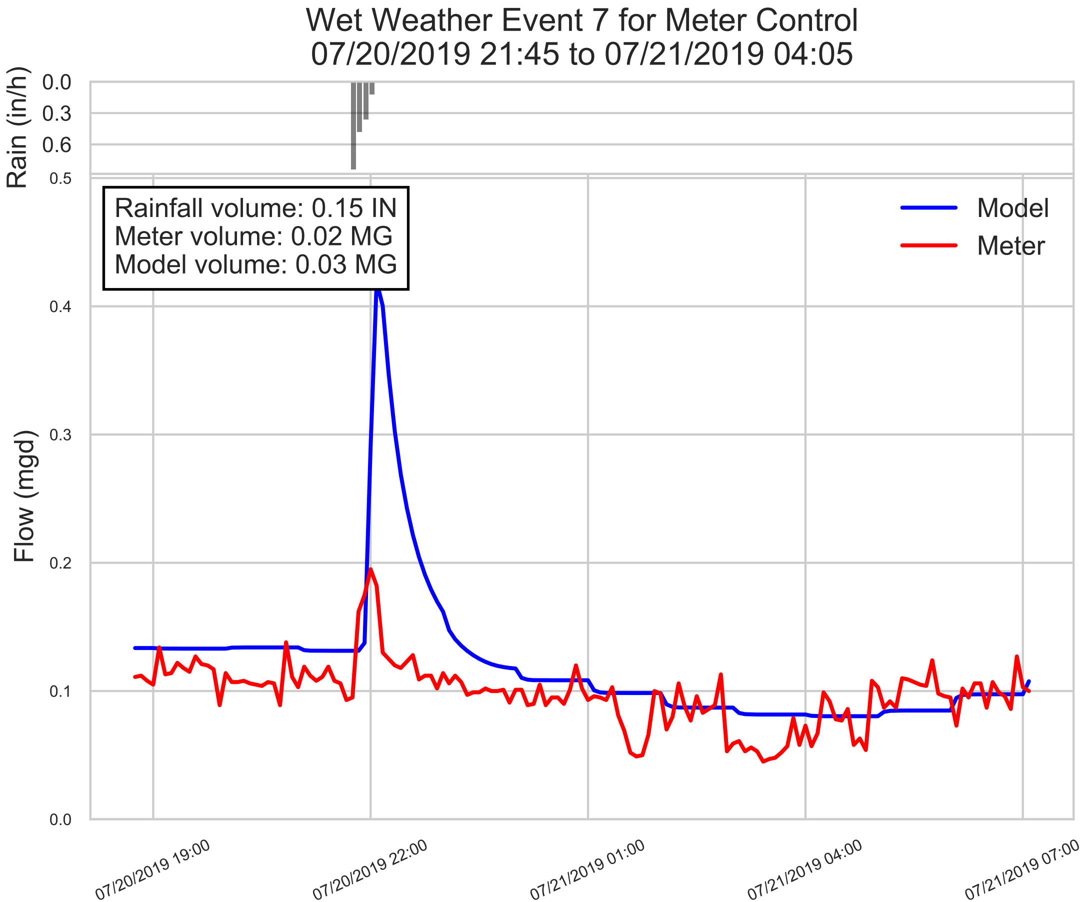


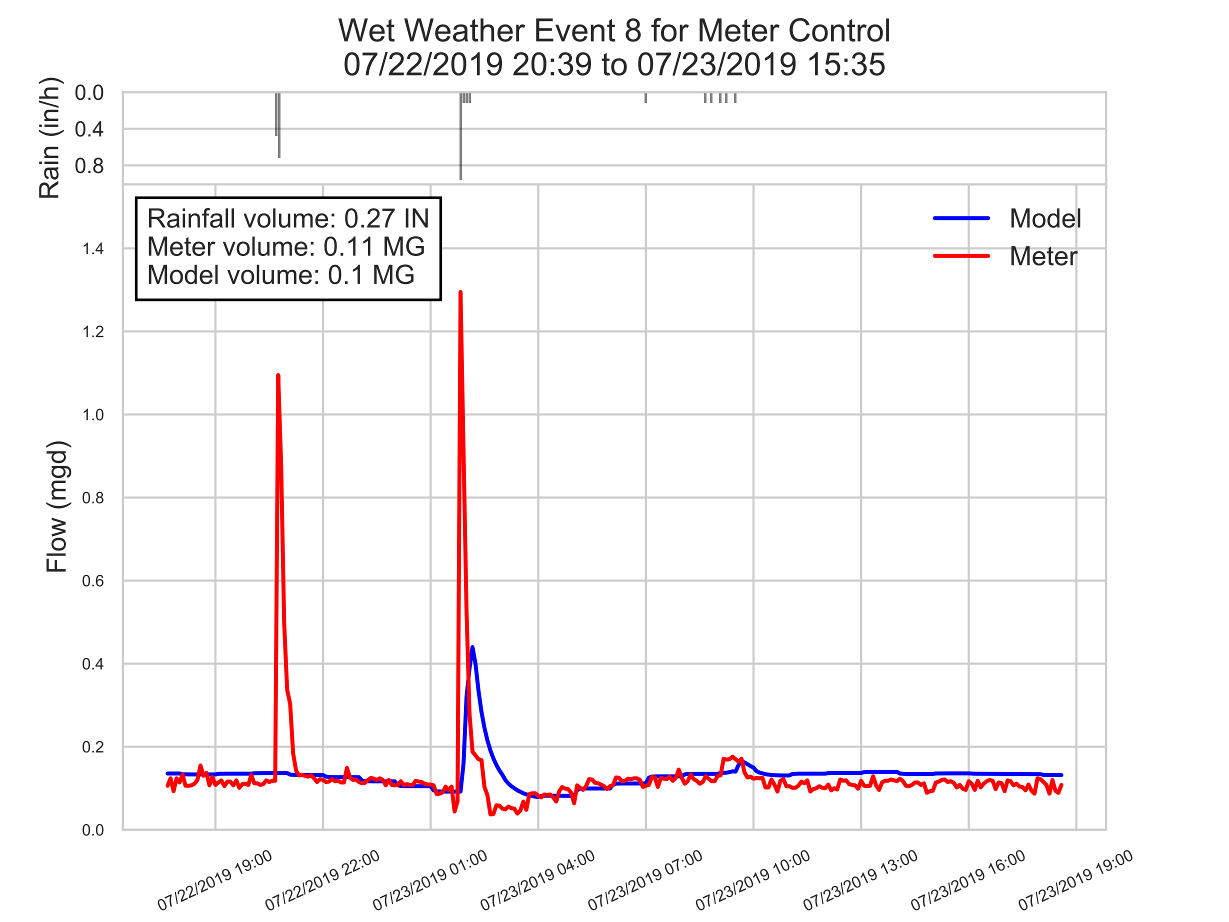
Wet Weather Event 4 for Meter Control
06/18/2019 18:49 to 06/19/2019 07:09
Rain (in/h)
0.0
0.3
0.6
Rainfall volume: 0.22 IN
Meter volume: 0.08 MG
Model volume: 0.07 MG
Model
Meter
Flow (mgd)
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
06/18/2019 15:00
06/18/2019 18:00
06/18/2019 21:00
06/19/2019 00:00
06/19/2019 03:00
06/19/2019 06:00
06/19/2019 09:00


Wet Weather Event 5 for Meter Control
06/25/2019 02:15 to 06/25/2019 15:20
Rain (in/h)
0.0
1.5
3.0
Flow (mgd)
0
1
2
3
4
5
Rainfall volume: 0.47 IN
Meter volume: 0.09 MG
Model volume: 0.14 MG
Model
Meter
06/25/2019 01:00
06/25/2019 04:00
06/25/2019 07:00
06/25/2019 10:00
06/25/2019 13:00
06/25/2019 16:00
06/25/2019 19:00

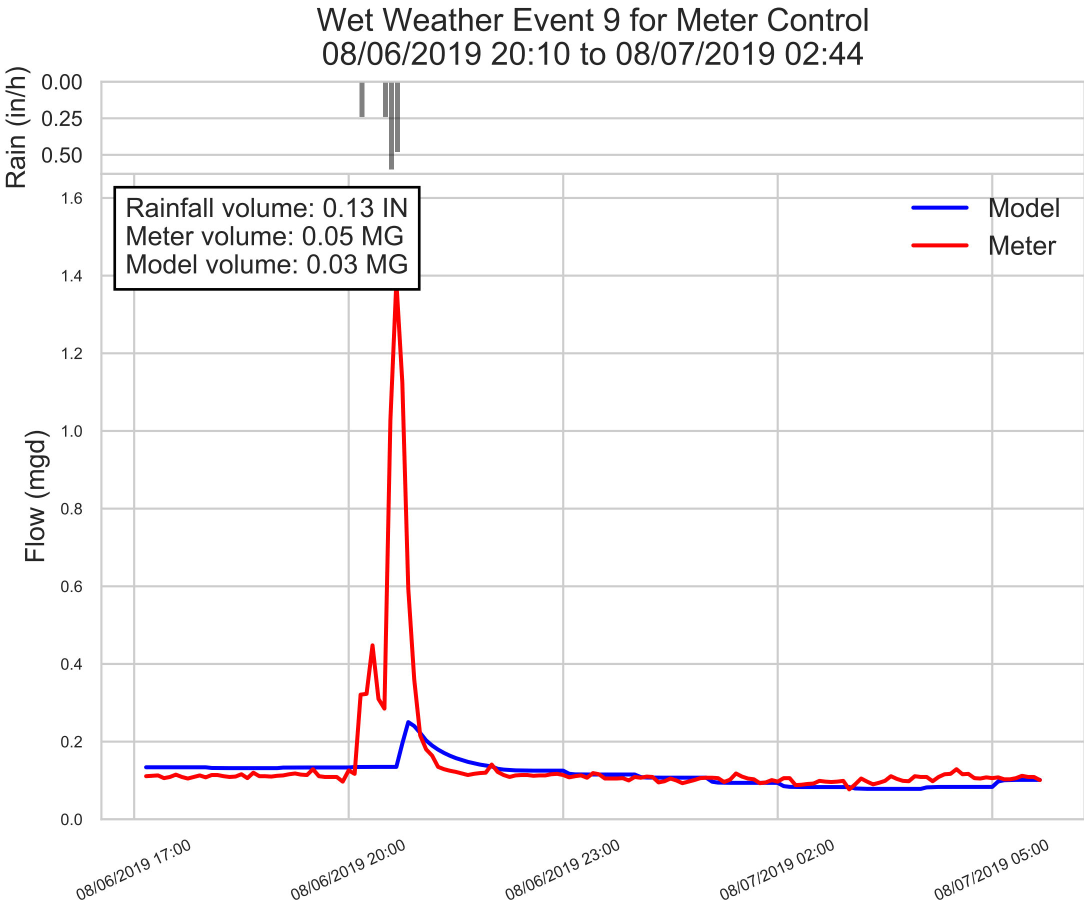


Wet Weather Event 6 for Meter Control
07/17/2019 17:44 to 07/18/2019 01:25
Rain (in/h)
0.00
0.25
0.50
Rainfall volume: 0.12 IN
Meter volume: 0.04 MG
Model volume: 0.04 MG
Model
Meter
Flow (mgd)
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
07/17/2019 17:00
07/17/2019 20:00
07/17/2019 23:00
07/18/2019 02:00
07/18/2019 05:00

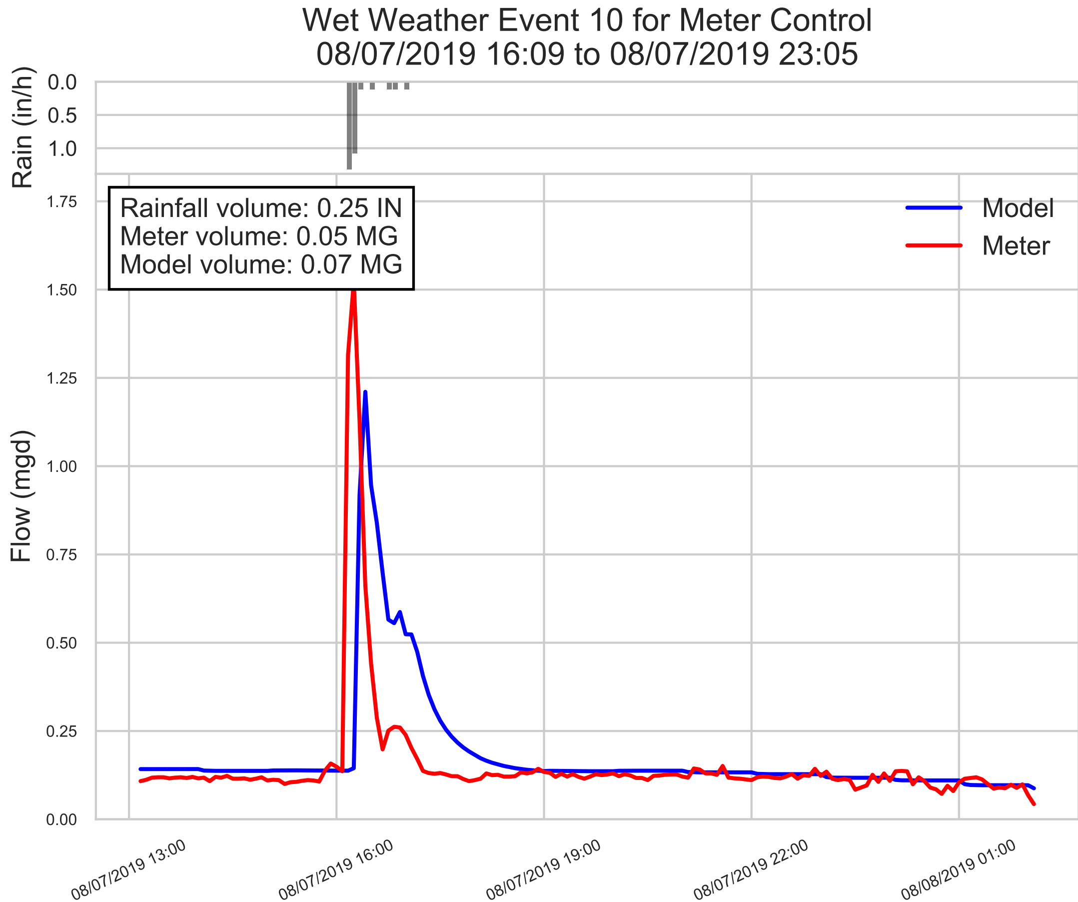

Wet Weather Event 7 for Meter Control
07/20/2019 21:45 to 07/21/2019 04:05
Rain (in/h)
0.0
0.3
0.6
Flow (mgd)
0.5
0.4
0.3
0.2
0.1
0.0
Rainfall volume: 0.15 IN
Meter volume: 0.02 MG
Model volume: 0.03 MG
Model
Meter
07/20/2019 19:00
07/20/2019 22:00
07/21/2019 01:00
07/21/2019 04:00
07/21/2019 07:00



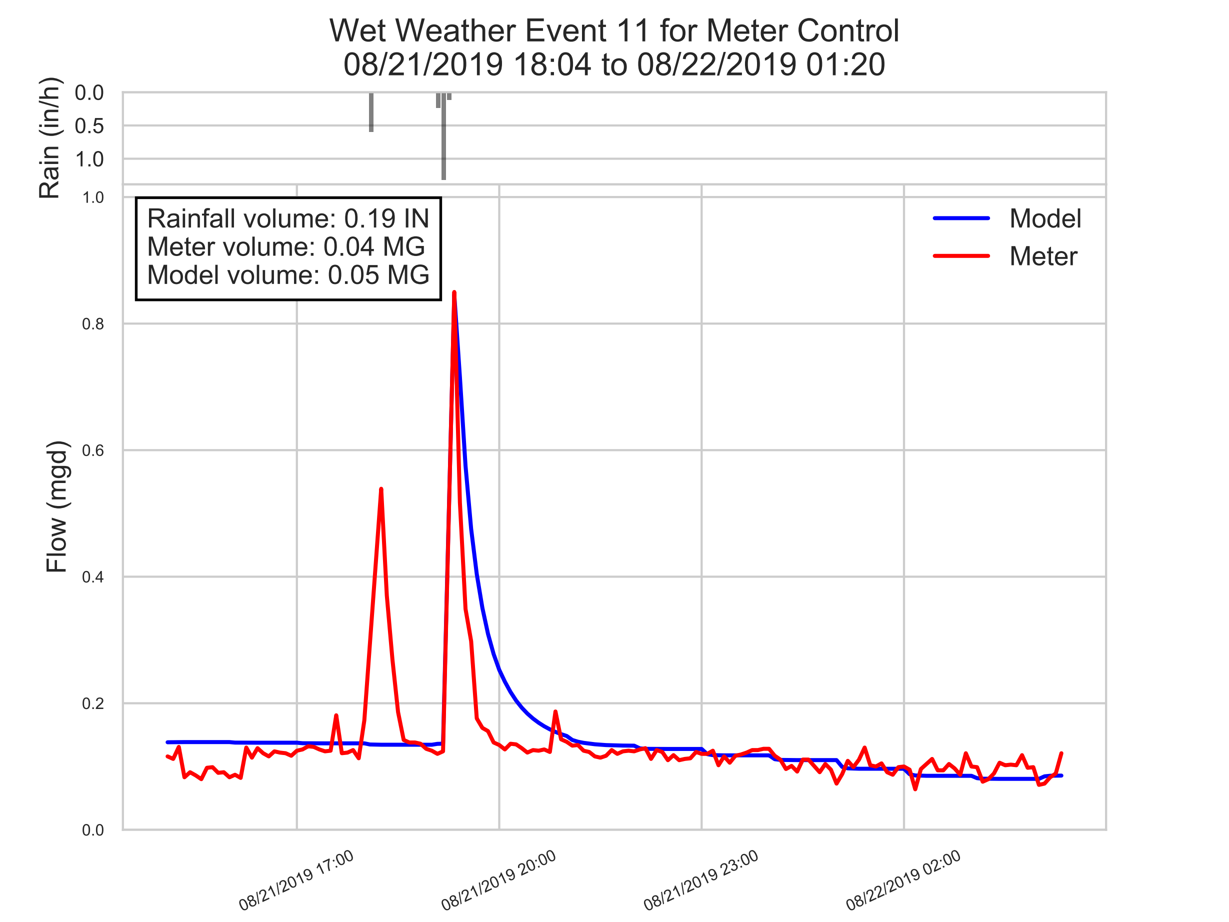
Wet Weather Event 8 for Meter Control
07/22/2019 20:39 to 07/23/2019 15:35
Rain (in/h)
0.0
0.4
0.8
Rainfall volume: 0.27 IN
Meter volume: 0.11 MG
Model volume: 0.1 MG
Model
Meter
Flow (mgd)
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
07/22/2019 19:00
07/22/2019 22:00
07/23/2019 01:00
07/23/2019 04:00
07/23/2019 07:00
07/23/2019 10:00
07/23/2019 13:00
07/23/2019 16:00
07/23/2019 19:00



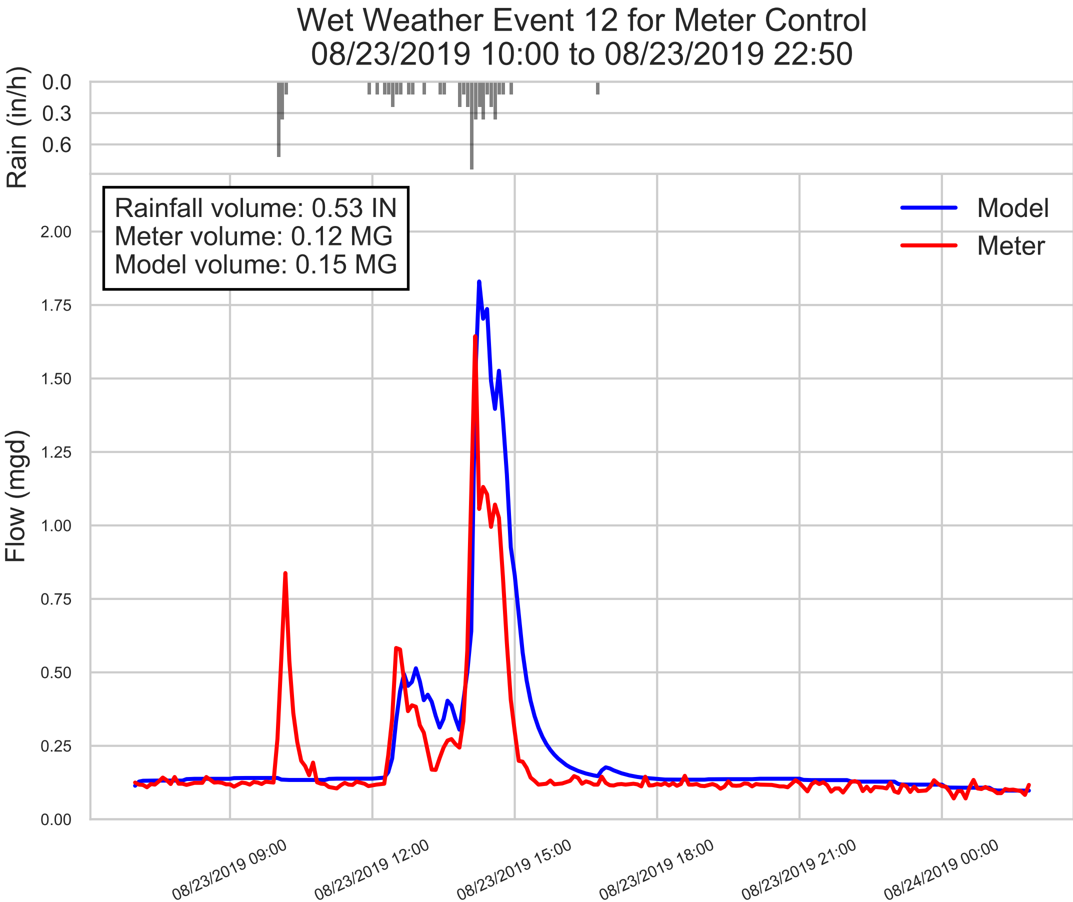
Wet Weather Event 9 for Meter Control
08/06/2019 20:10 to 08/07/2019 02:44
Rain (in/h)
0.00
0.25
0.50
Rainfall volume: 0.13 IN
Meter volume: 0.05 MG
Model volume: 0.03 MG
Model
Meter
Flow (mgd)
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
08/06/2019 17:00
08/06/2019 20:00
08/06/2019 23:00
08/07/2019 02:00
08/07/2019 05:00

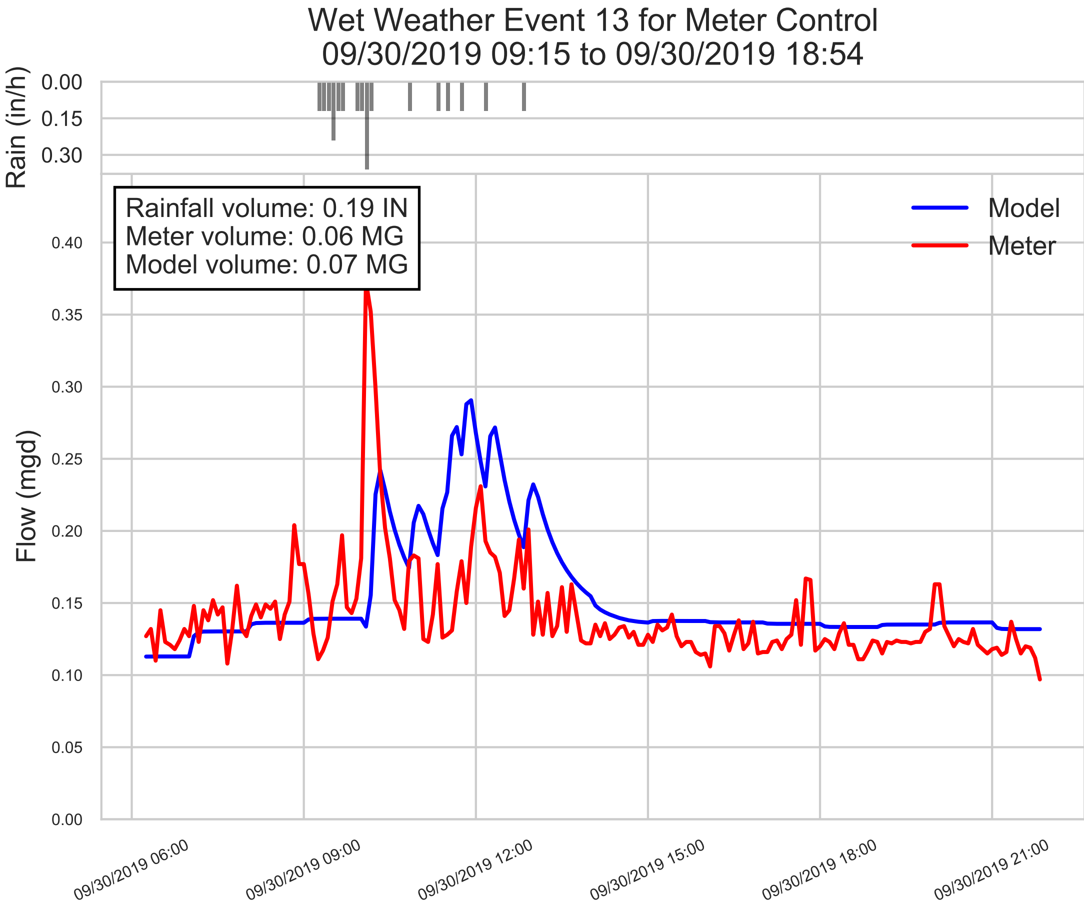


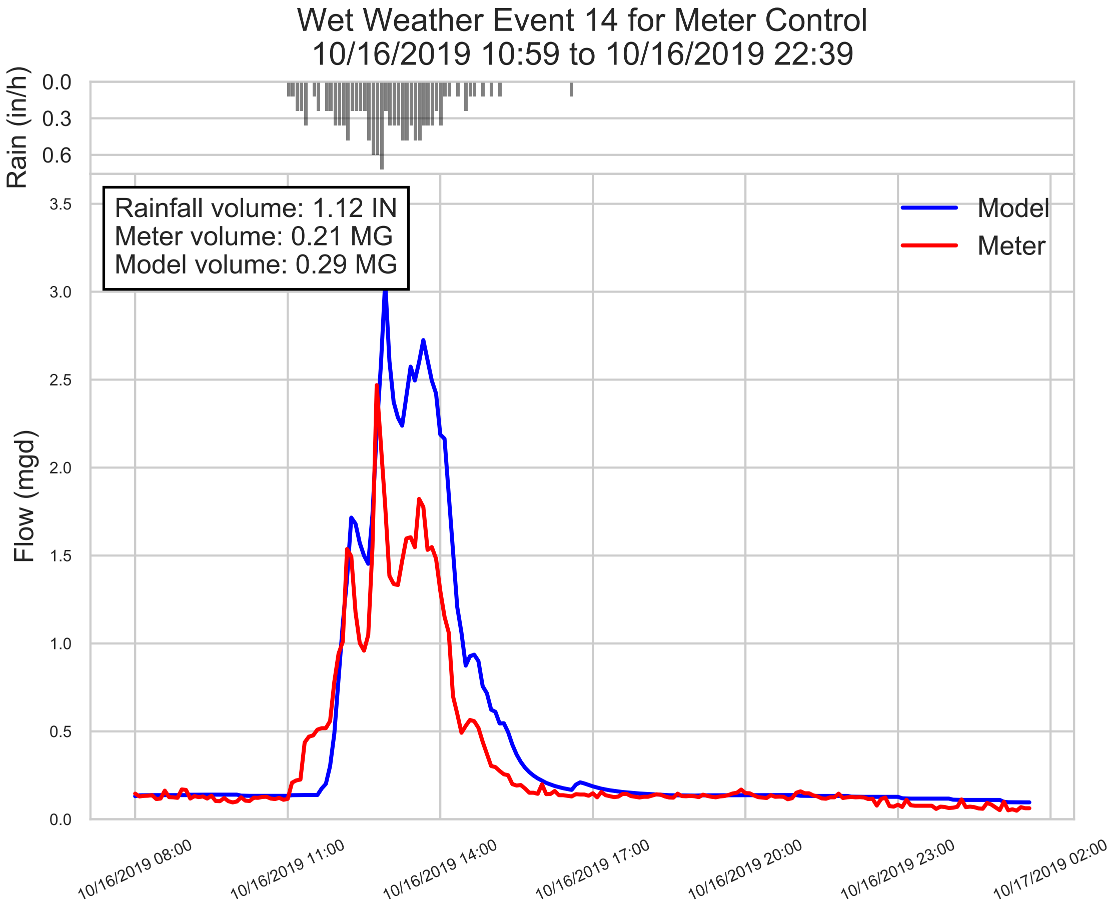
Wet Weather Event 10 for Meter Control
08/07/2019 16:09 to 08/07/2019 23:05
Rain (in/h)
0.0
0.5
1.0
Rainfall volume: 0.25 IN
Meter volume: 0.05 MG
Model volume: 0.07 MG
Model
Meter
Flow (mgd)
1.75
1.50
1.25
1.00
0.75
0.50
0.25
0.00
08/07/2019 13:00
08/07/2019 16:00
08/07/2019 19:00
08/07/2019 22:00
08/08/2019 01:00

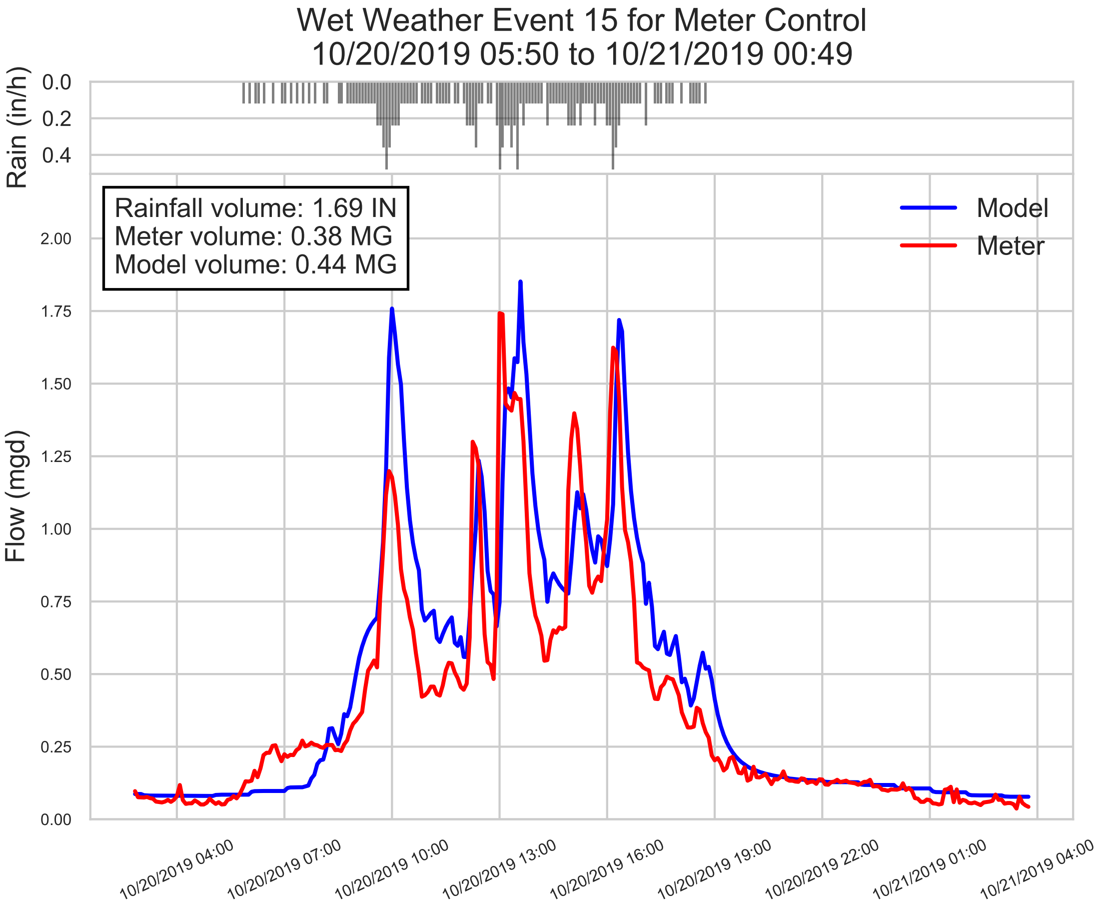


Wet Weather Event 11 for Meter Control
08/21/2019 18:04 to 08/22/2019 01:20
Rain (in/h)
0.0
0.5
1.0
1.0
0.8
0.6
0.4
0.2
0.0
Flow (mgd)
Rainfall volume: 0.19 IN
Meter volume: 0.04 MG
Model volume: 0.05 MG
Model
Meter
08/21/2019 17:00
08/21/2019 20:00
08/21/2019 23:00
08/22/2019 02:00

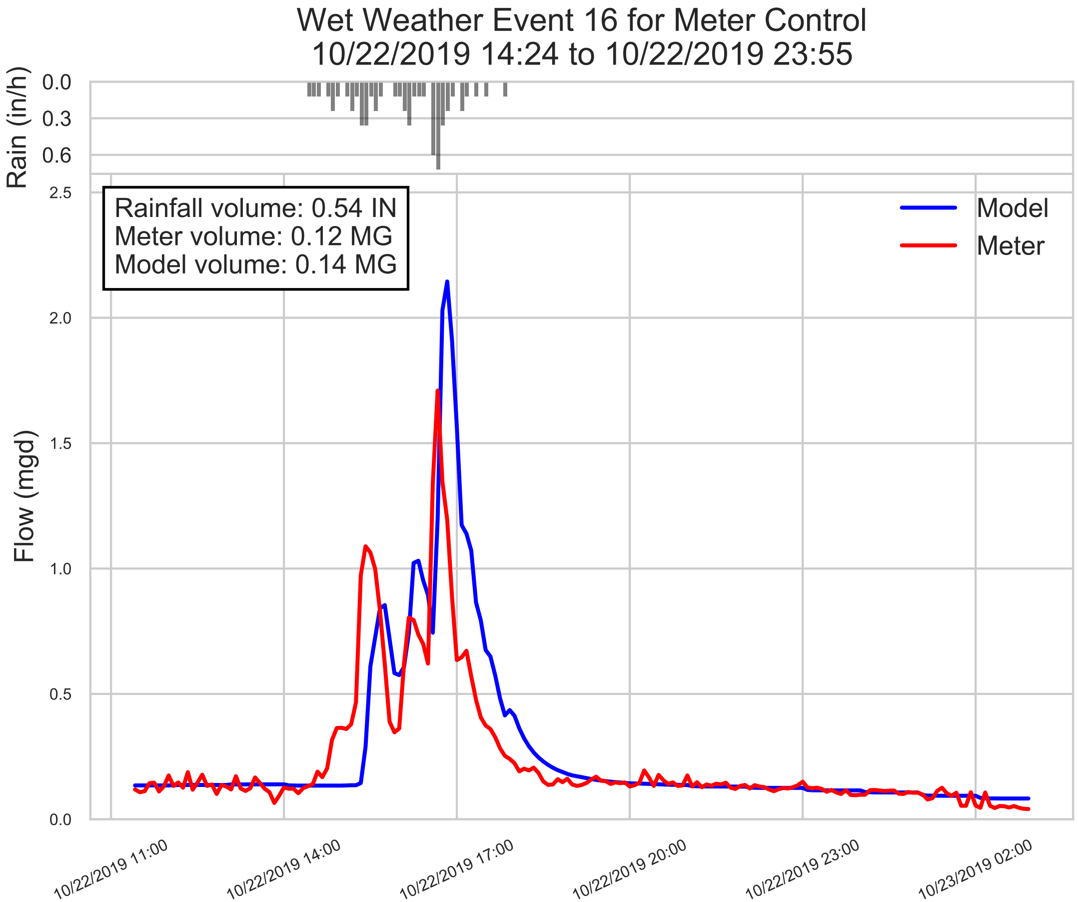

Wet Weather Event 12 for Meter Control
08/23/2019 10:00 to 08/23/2019 22:50
Rain (in/h)
0.0
0.3
0.6
Rainfall volume: 0.53 IN
Meter volume: 0.12 MG
Model volume: 0.15 MG
Model
Meter
Flow (mgd)
2.00
1.75
1.50
1.25
1.00
0.75
0.50
0.25
0.00
08/23/2019 09:00
08/23/2019 12:00
08/23/2019 15:00
08/23/2019 18:00
08/23/2019 21:00
08/24/2019 00:00


Wet Weather Event 13 for Meter Control
09/30/2019 09:15 to 09/30/2019 18:54
Rain (in/h)
0.00
0.15
0.30
Rainfall volume: 0.19 IN
Meter volume: 0.06 MG
Model volume: 0.07 MG
Model
Meter
Flow (mgd)
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
09/30/2019 06:00
09/30/2019 09:00
09/30/2019 12:00
09/30/2019 15:00
09/30/2019 18:00
09/30/2019 21:00

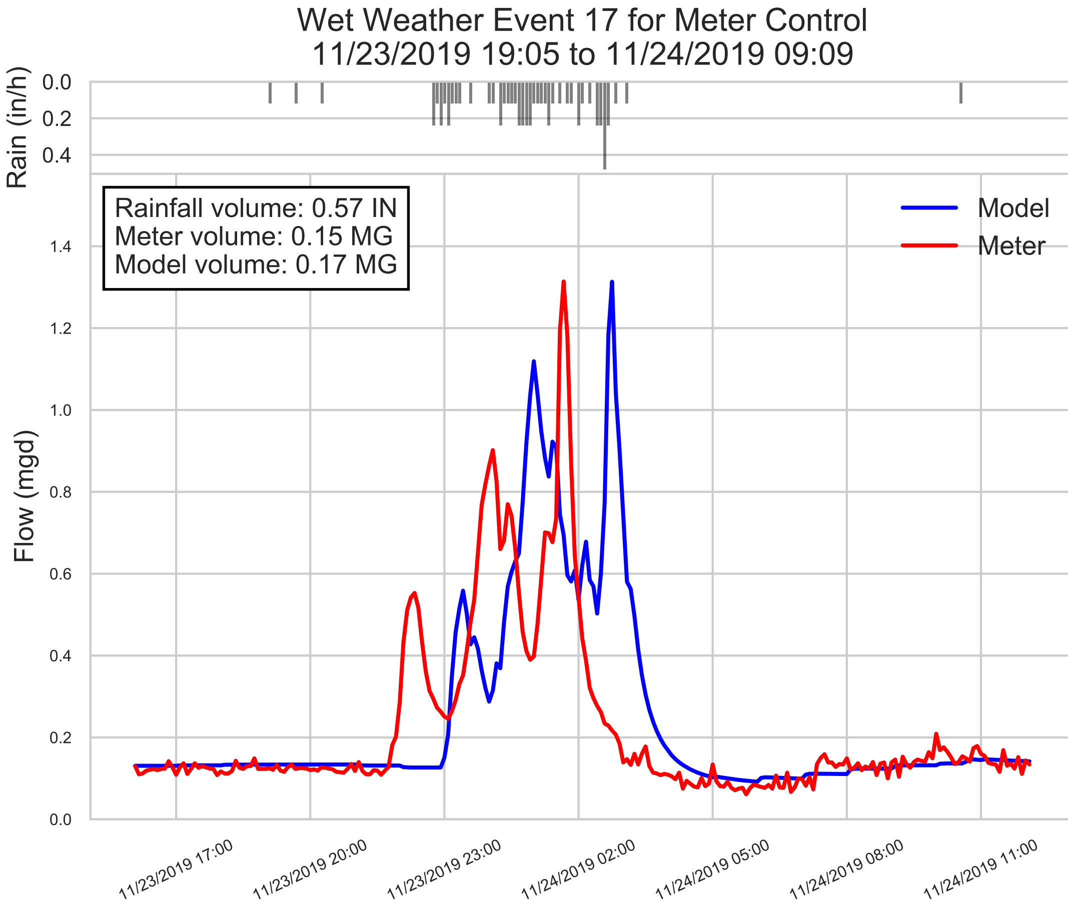

Wet Weather Event 14 for Meter Control
10/16/2019 10:59 to 10/16/2019 22:39
Rain (in/h)
0.0
0.3
0.6
Rainfall volume: 1.12 IN
Meter volume: 0.21 MG
Model volume: 0.29 MG
Model
Meter
Flow (mgd)
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
10/16/2019 08:00
10/16/2019 11:00
10/16/2019 14:00
10/16/2019 17:00
10/16/2019 20:00
10/16/2019 23:00
10/17/2019 02:00

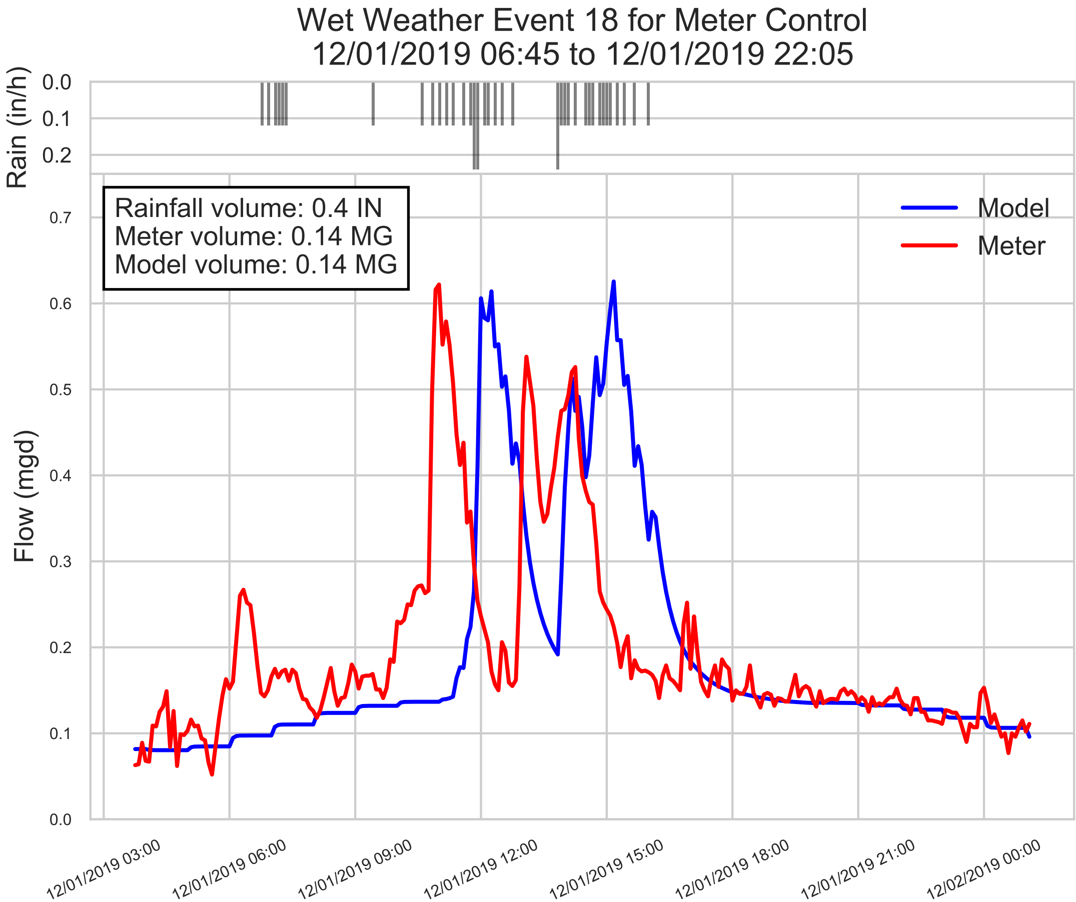


Wet Weather Event 15 for Meter Control
10/20/2019 05:50 to 10/21/2019 00:49
Rain (in/h)
0.0
0.2
0.4
Rainfall volume: 1.69 IN
Meter volume: 0.38 MG
Model volume: 0.44 MG
Model
Meter
Flow (mgd)
2.00
1.75
1.50
1.25
1.00
0.75
0.50
0.25
0.00
10/20/2019 04:00
10/20/2019 07:00
10/20/2019 10:00
10/20/2019 13:00
10/20/2019 16:00
10/20/2019 19:00
10/20/2019 22:00
10/21/2019 01:00
10/21/2019 04:00

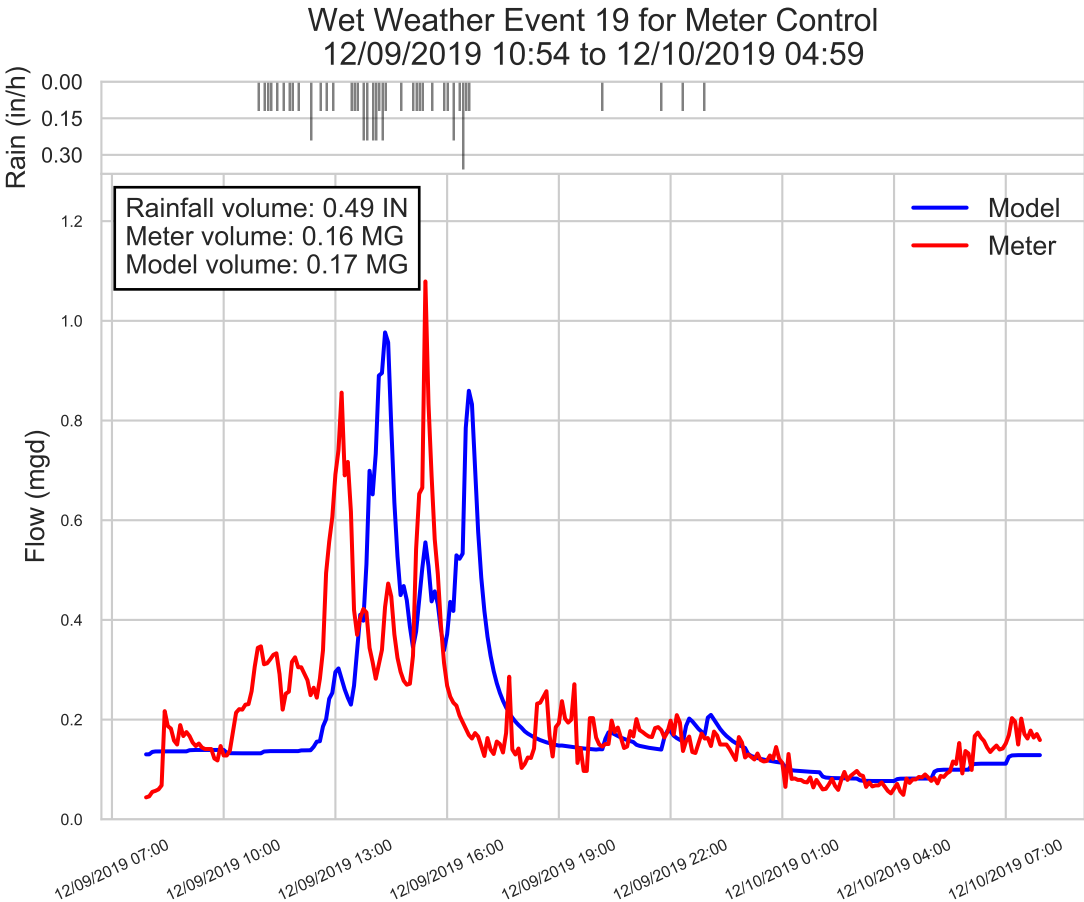


Wet Weather Event 16 for Meter Control
10/22/2019 14:24 to 10/22/2019 23:55
Rain (in/h)
0.0
0.3
0.6
Flow (mgd)
2.5
2.0
1.5
1.0
0.5
0.0
Rainfall volume: 0.54 IN
Meter volume: 0.12 MG
Model volume: 0.14 MG
Model
Meter
10/22/2019 11:00
10/22/2019 14:00
10/22/2019 17:00
10/22/2019 20:00
10/22/2019 23:00
10/23/2019 02:00

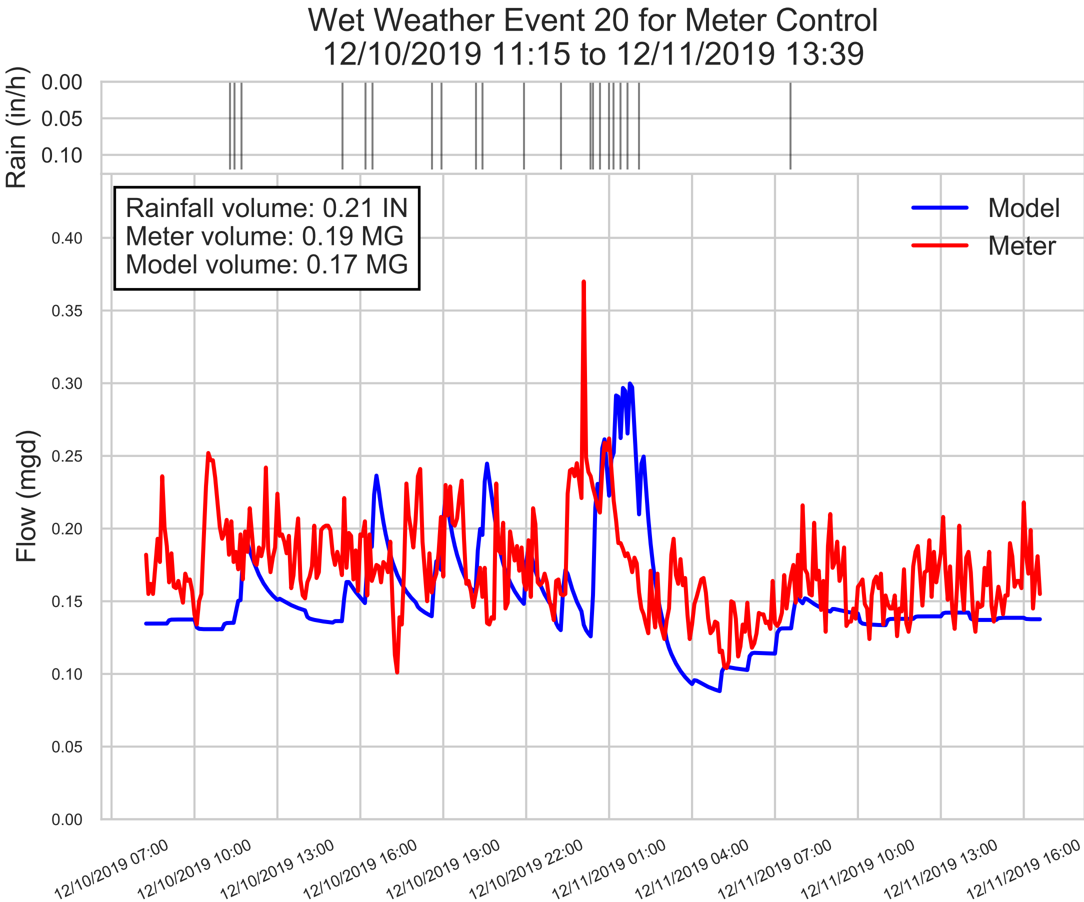

Wet Weather Event 17 for Meter Control
11/23/2019 19:05 to 11/24/2019 09:09
Rain (in/h)
0.0
0.2
0.4
Rainfall volume: 0.57 IN
Meter volume: 0.15 MG
Model volume: 0.17 MG
Model
Meter
Flow (mgd)
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
11/23/2019 17:00
11/23/2019 20:00
11/23/2019 23:00
11/24/2019 02:00
11/24/2019 05:00
11/24/2019 08:00
11/24/2019 11:00



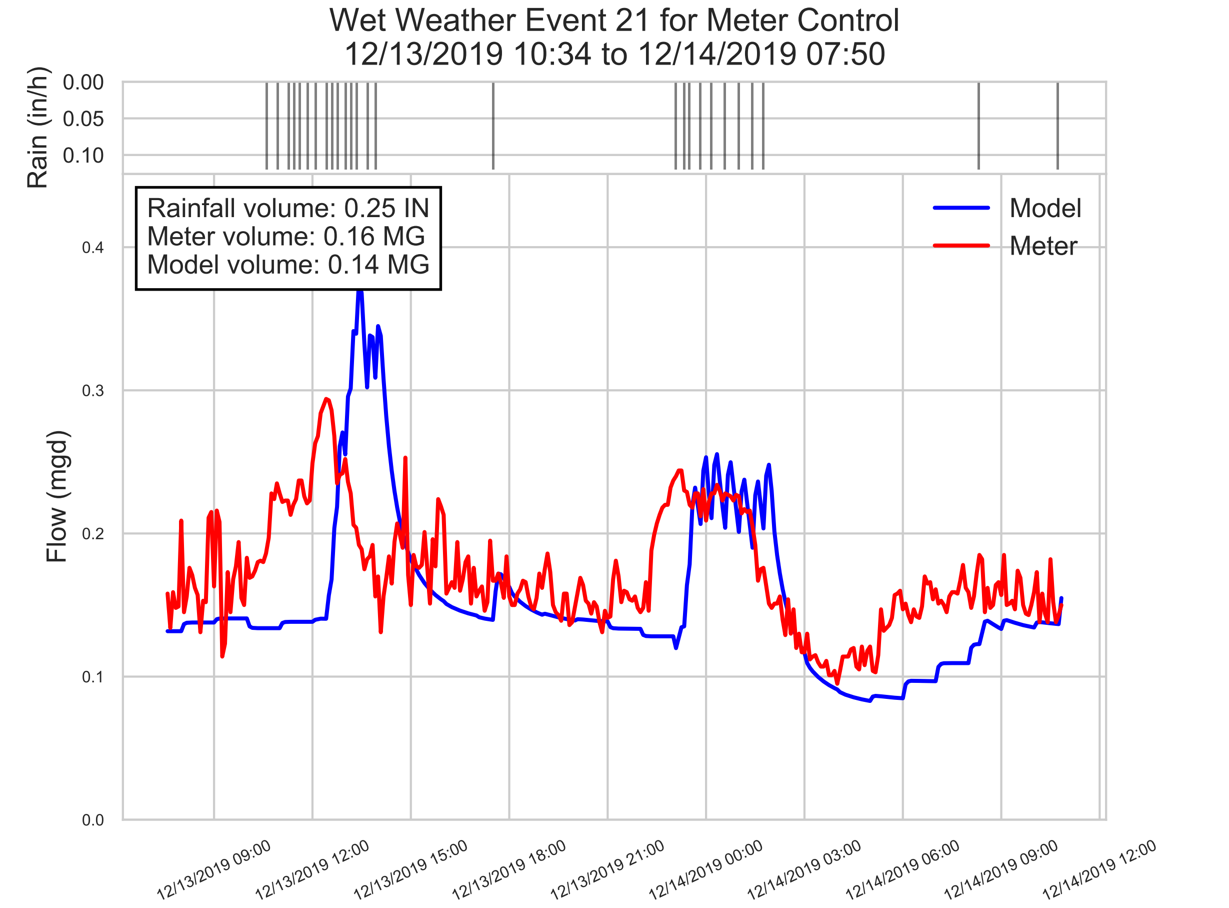
Wet Weather Event 18 for Meter Control
12/01/2019 06:45 to 12/01/2019 22:05
Rain (in/h)
0.0
0.1
0.2
Rainfall volume: 0.4 IN
Meter volume: 0.14 MG
Model volume: 0.14 MG
Model
Meter
Flow (mgd)
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
12/01/2019 03:00
12/01/2019 06:00
12/01/2019 09:00
12/01/2019 12:00
12/01/2019 15:00
12/01/2019 18:00
12/01/2019 21:00
12/02/2019 00:00



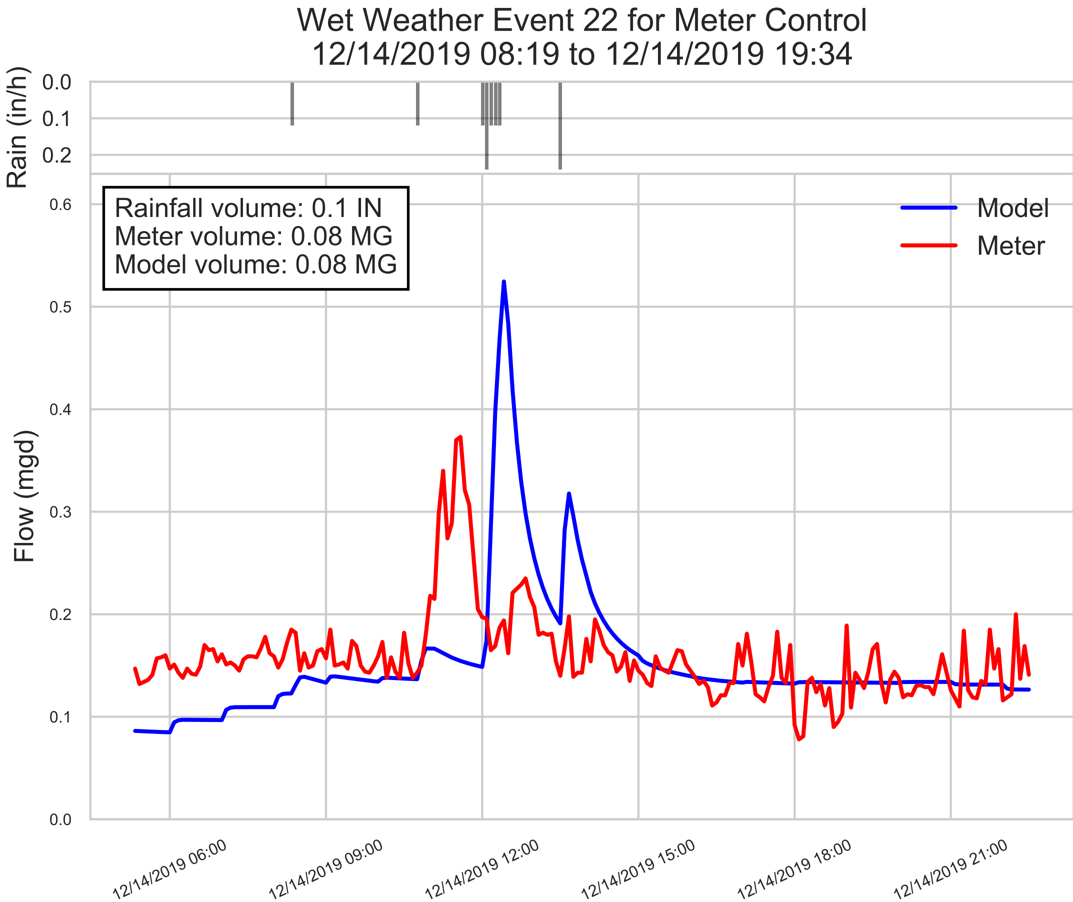
Wet Weather Event 19 for Meter Control
12/09/2019 10:54 to 12/10/2019 04:59
Rain (in/h)
0.00
0.15
0.30
Rainfall volume: 0.49 IN
Meter volume: 0.16 MG
Model volume: 0.17 MG
Model
Meter
Flow (mgd)
0.0
0.2
0.4
0.6
0.8
1.0
1.2
12/09/2019 07:00
12/09/2019 10:00
12/09/2019 13:00
12/09/2019 16:00
12/09/2019 19:00
12/09/2019 22:00
12/10/2019 01:00
12/10/2019 04:00
12/10/2019 07:00

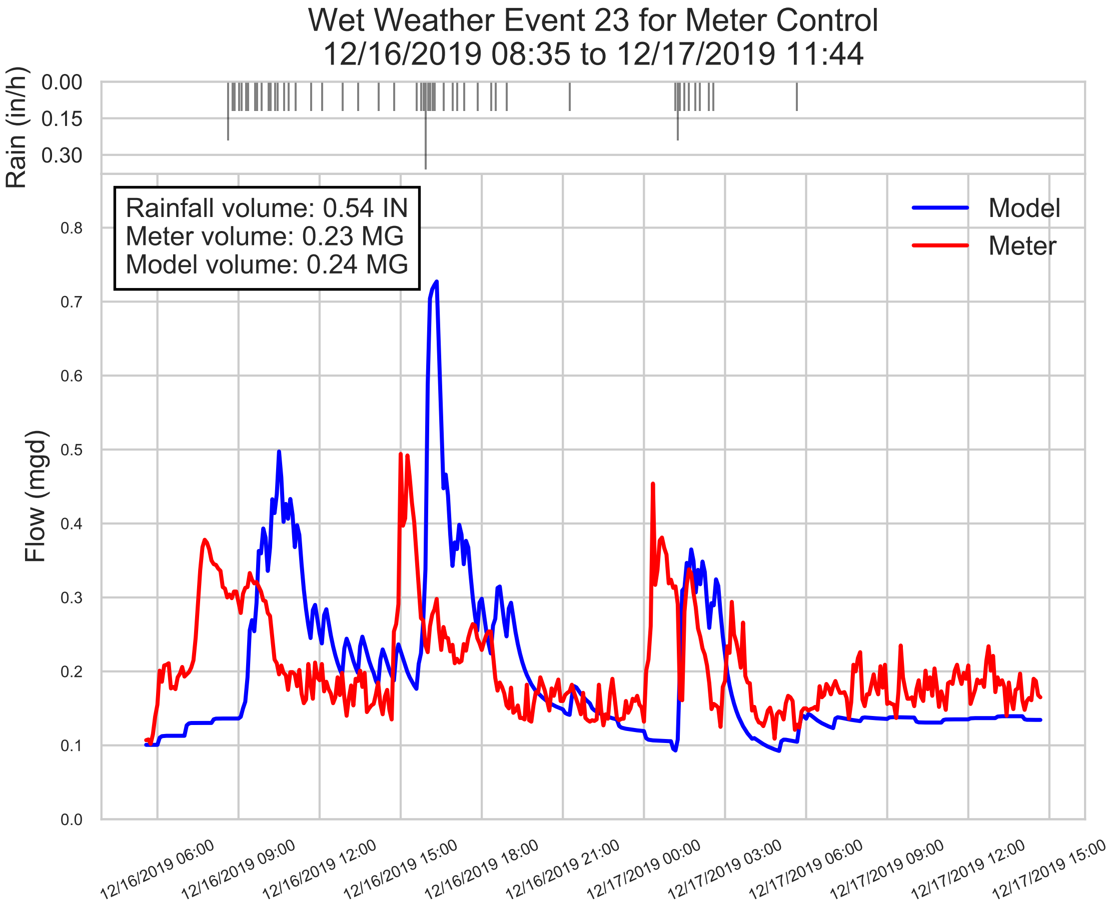


Wet Weather Event 20 for Meter Control
12/10/2019 11:15 to 12/11/2019 13:39
Rain (in/h)
0.00
0.05
0.10
Rainfall volume: 0.21 IN
Meter volume: 0.19 MG
Model volume: 0.17 MG
Model
Meter
Flow (mgd)
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
12/10/2019 07:00
12/10/2019 10:00
12/10/2019 13:00
12/10/2019 16:00
12/10/2019 19:00
12/10/2019 22:00
12/11/2019 01:00
12/11/2019 04:00
12/11/2019 07:00
12/11/2019 10:00
12/11/2019 13:00
12/11/2019 16:00

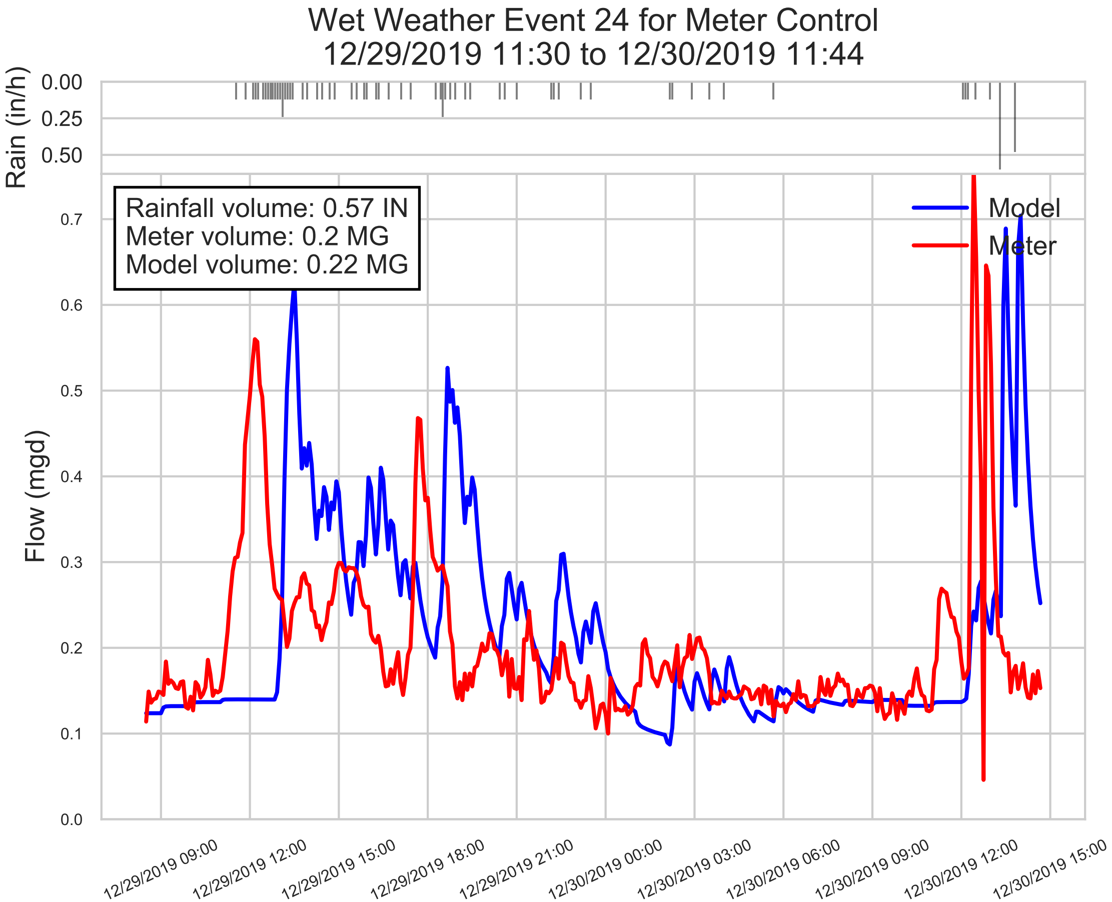


Wet Weather Event 21 for Meter Control
12/13/2019 10:34 to 12/14/2019 07:50
Rain (in/h)
0.00
0.05
0.10
Rainfall volume: 0.25 IN
Meter volume: 0.16 MG
Model volume: 0.14 MG
Model
Meter
Flow (mgd)
0.4
0.3
0.2
0.1
0.0
12/13/2019 09:00
12/13/2019 12:00
12/13/2019 15:00
12/13/2019 18:00
12/13/2019 21:00
12/14/2019 00:00
12/14/2019 03:00
12/14/2019 06:00
12/14/2019 09:00
12/14/2019 12:00

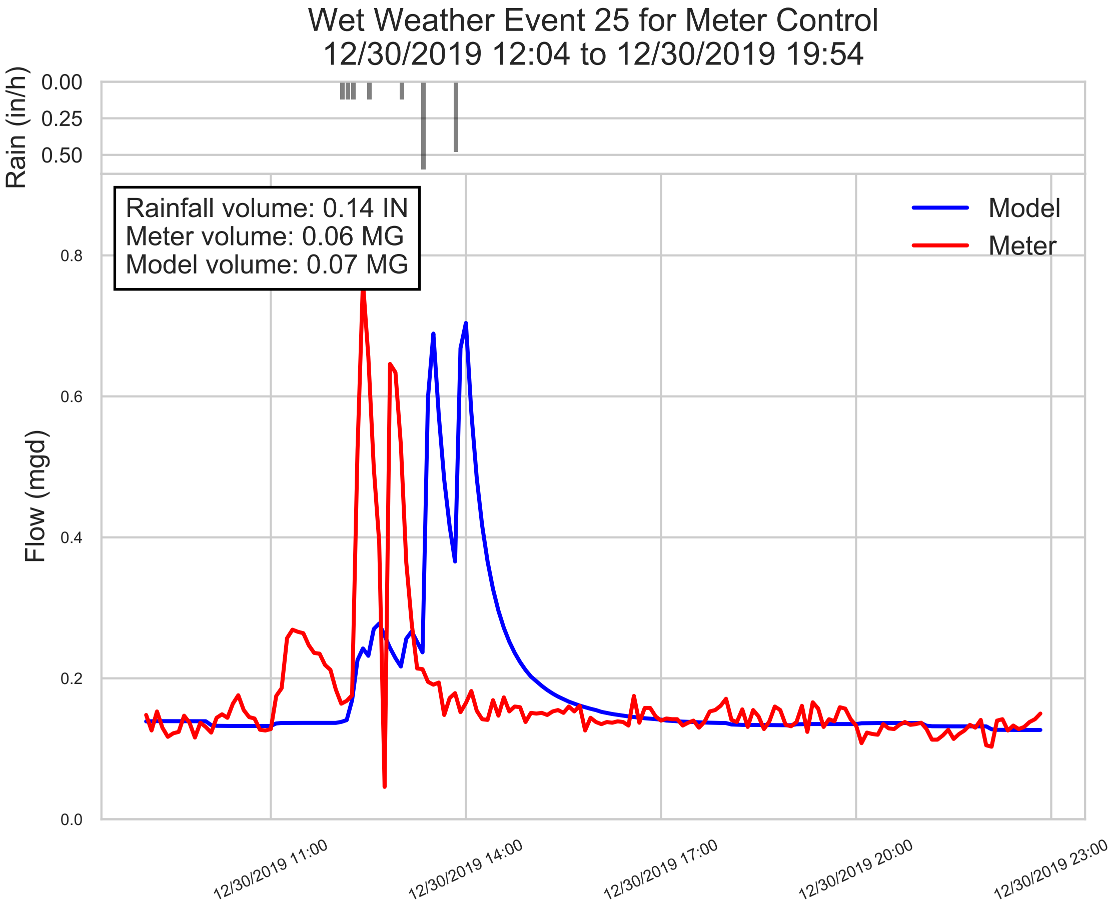

Wet Weather Event 22 for Meter Control
12/14/2019 08:19 to 12/14/2019 19:34
Rain (in/h)
0.0
0.1
0.2
Rainfall volume: 0.1 IN
Meter volume: 0.08 MG
Model volume: 0.08 MG
Model
Meter
Flow (mgd)
0.6
0.5
0.4
0.3
0.2
0.1
0.0
12/14/2019 06:00
12/14/2019 09:00
12/14/2019 12:00
12/14/2019 15:00
12/14/2019 18:00
12/14/2019 21:00



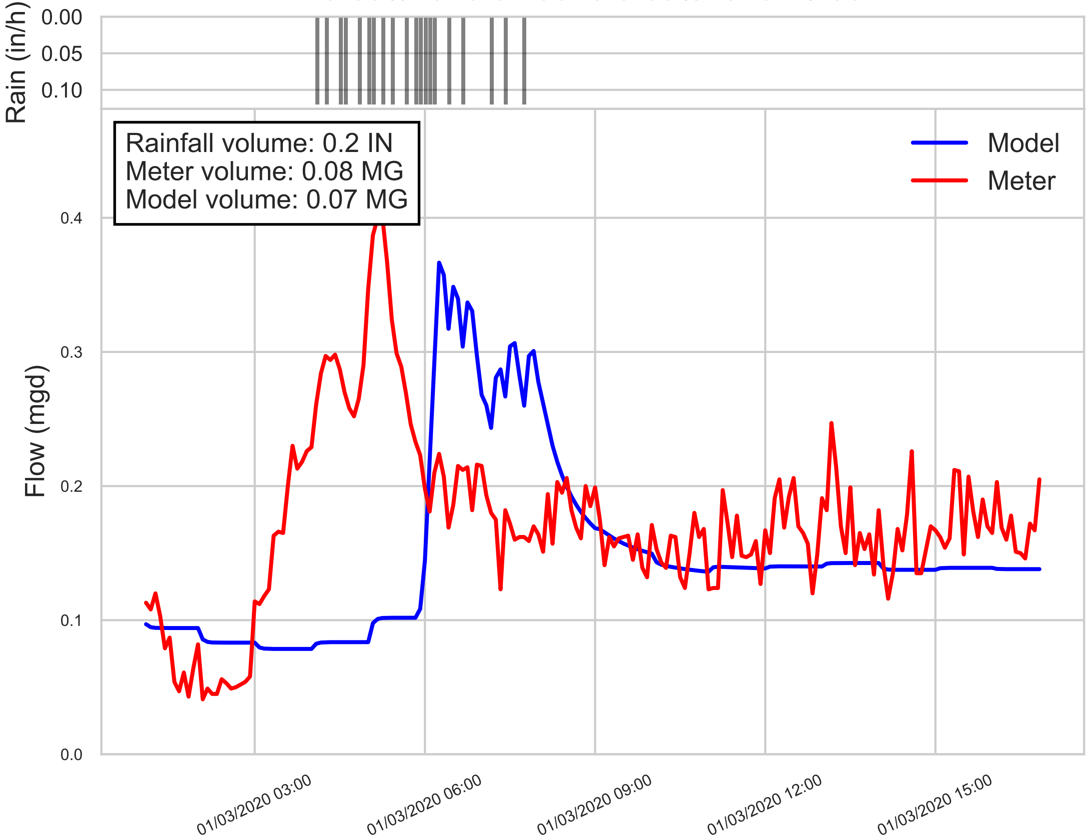
Wet Weather Event 23 for Meter Control
12/16/2019 08:35 to 12/17/2019 11:44
Rain (in/h)
0.00
0.15
0.30
Rainfall volume: 0.54 IN
Meter volume: 0.23 MG
Model volume: 0.24 MG
Model
Meter
Flow (mgd)
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
12/16/2019 06:00
12/16/2019 09:00
12/16/2019 12:00
12/16/2019 15:00
12/16/2019 18:00
12/16/2019 21:00
12/17/2019 00:00
12/17/2019 03:00
12/17/2019 06:00
12/17/2019 09:00
12/17/2019 12:00
12/17/2019 15:00

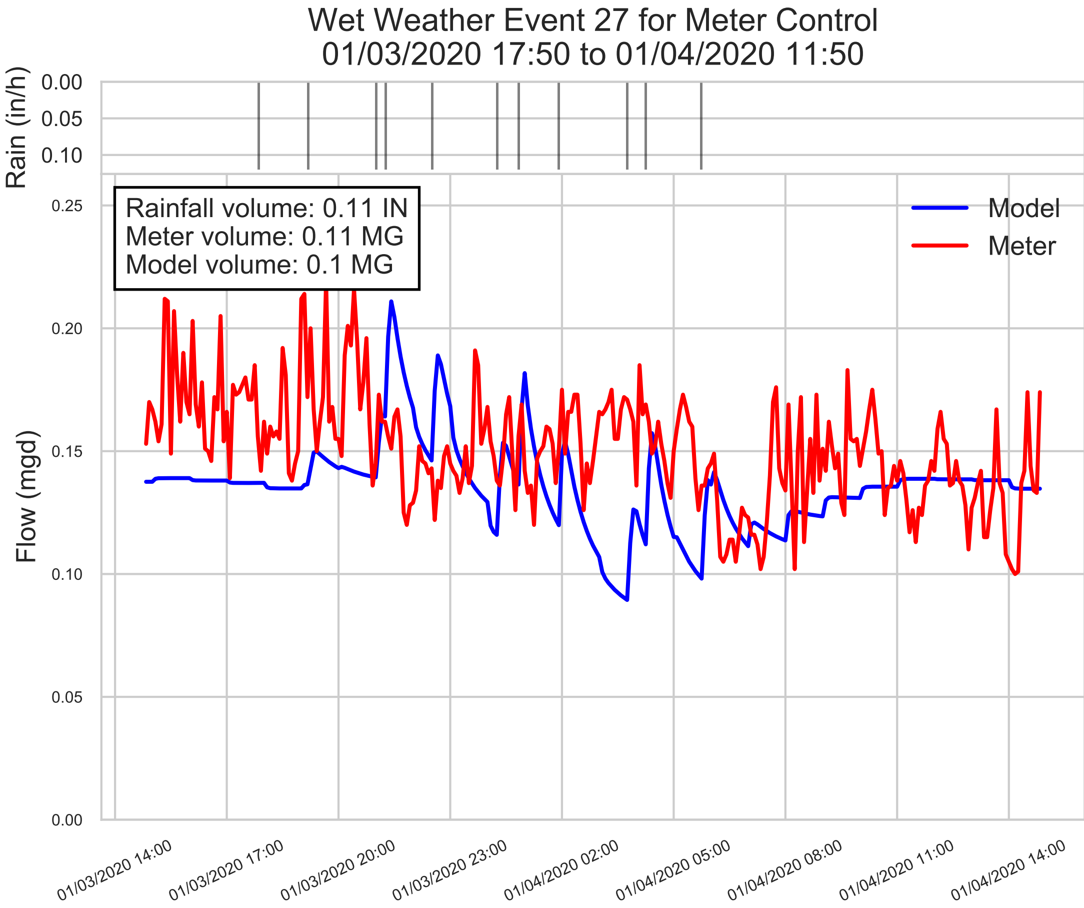


Wet Weather Event 24 for Meter Control
12/29/2019 11:30 to 12/30/2019 11:44
Rain (in/h)
0.00
0.25
0.50
Rainfall volume: 0.57 IN
Meter volume: 0.2 MG
Model volume: 0.22 MG
Model
Meter
Flow (mgd)
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
12/29/2019 09:00
12/29/2019 12:00
12/29/2019 15:00
12/29/2019 18:00
12/29/2019 21:00
12/30/2019 00:00
12/30/2019 03:00
12/30/2019 06:00
12/30/2019 09:00
12/30/2019 12:00
12/30/2019 15:00

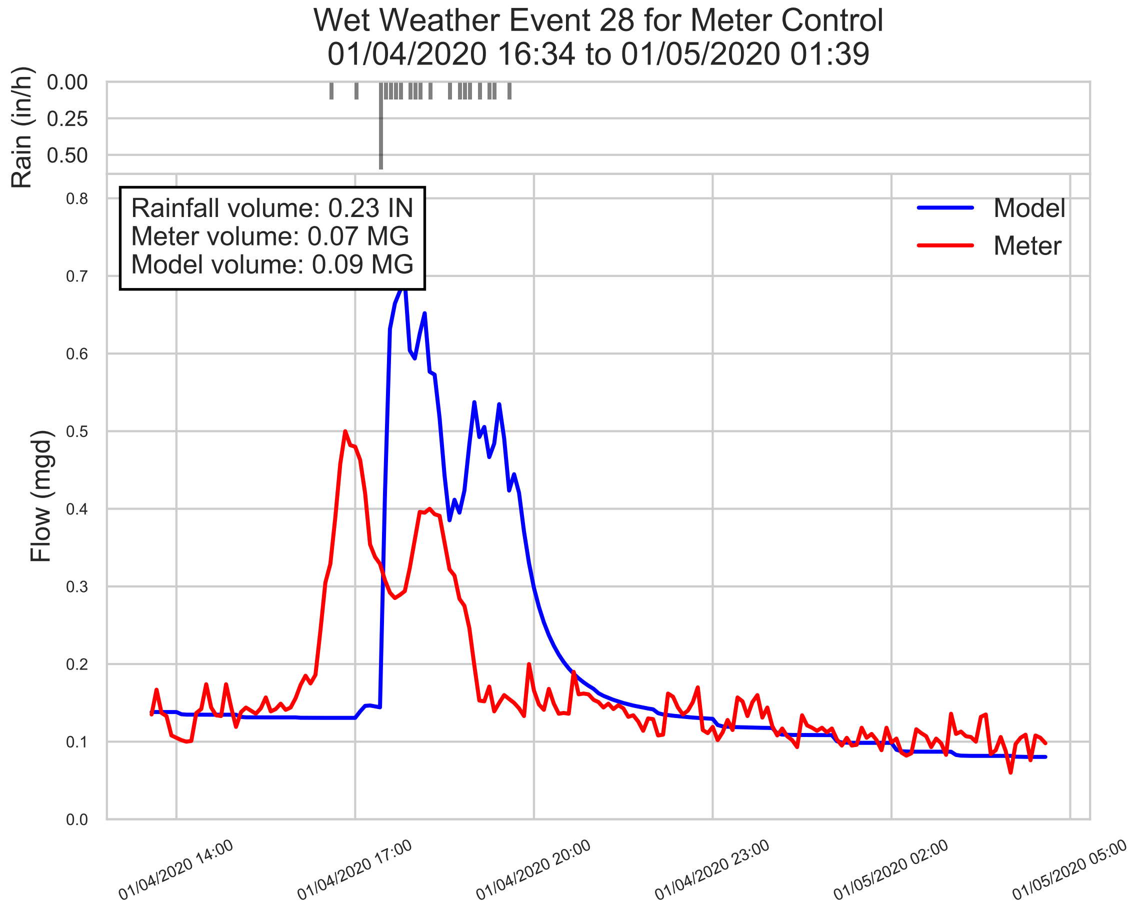

Wet Weather Event 25 for Meter Control
12/30/2019 12:04 to 12/30/2019 19:54
Rain (in/h)
0.00
0.25
0.50
Rainfall volume: 0.14 IN
Meter volume: 0.06 MG
Model volume: 0.07 MG
Model
Meter
Flow (mgd)
0.8
0.6
0.4
0.2
0.0
12/30/2019 11:00
12/30/2019 14:00
12/30/2019 17:00
12/30/2019 20:00
12/30/2019 23:00

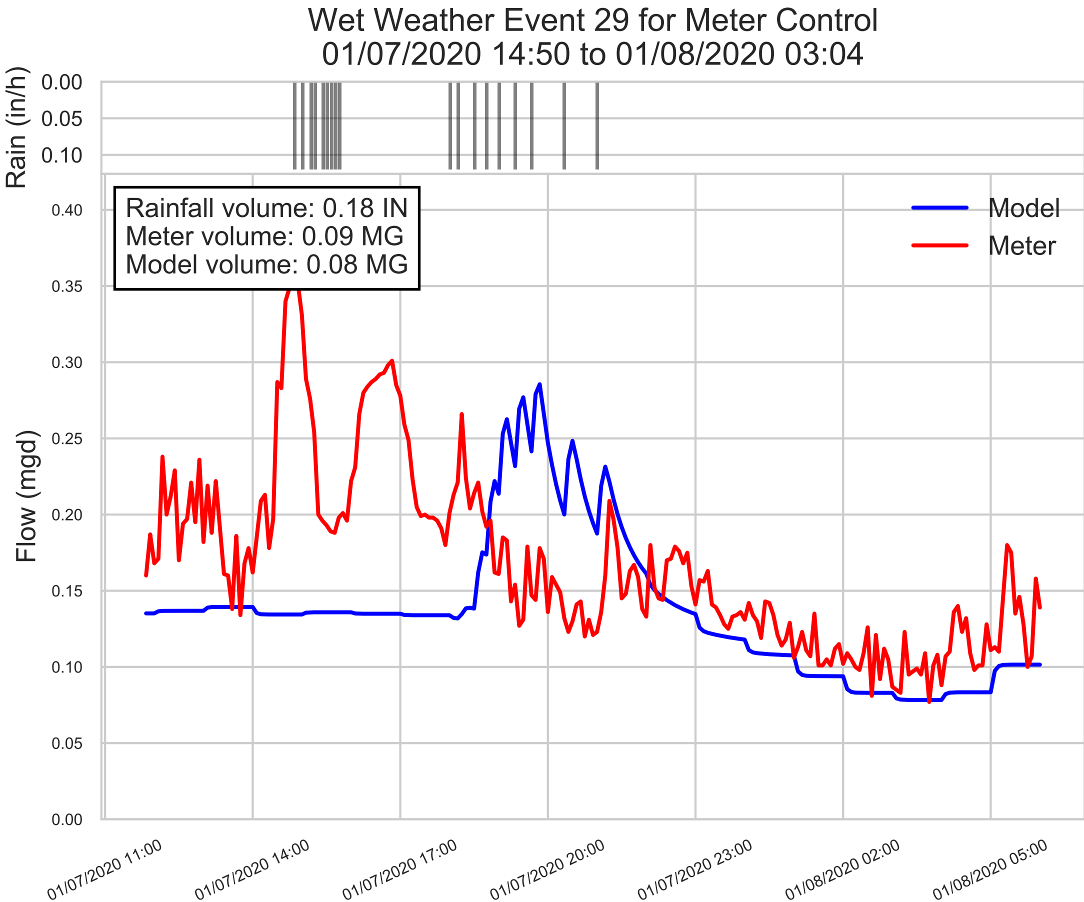
Wet Weather Event 26 for Meter Control
01/03/2020 04:05 to 01/03/2020 13:50



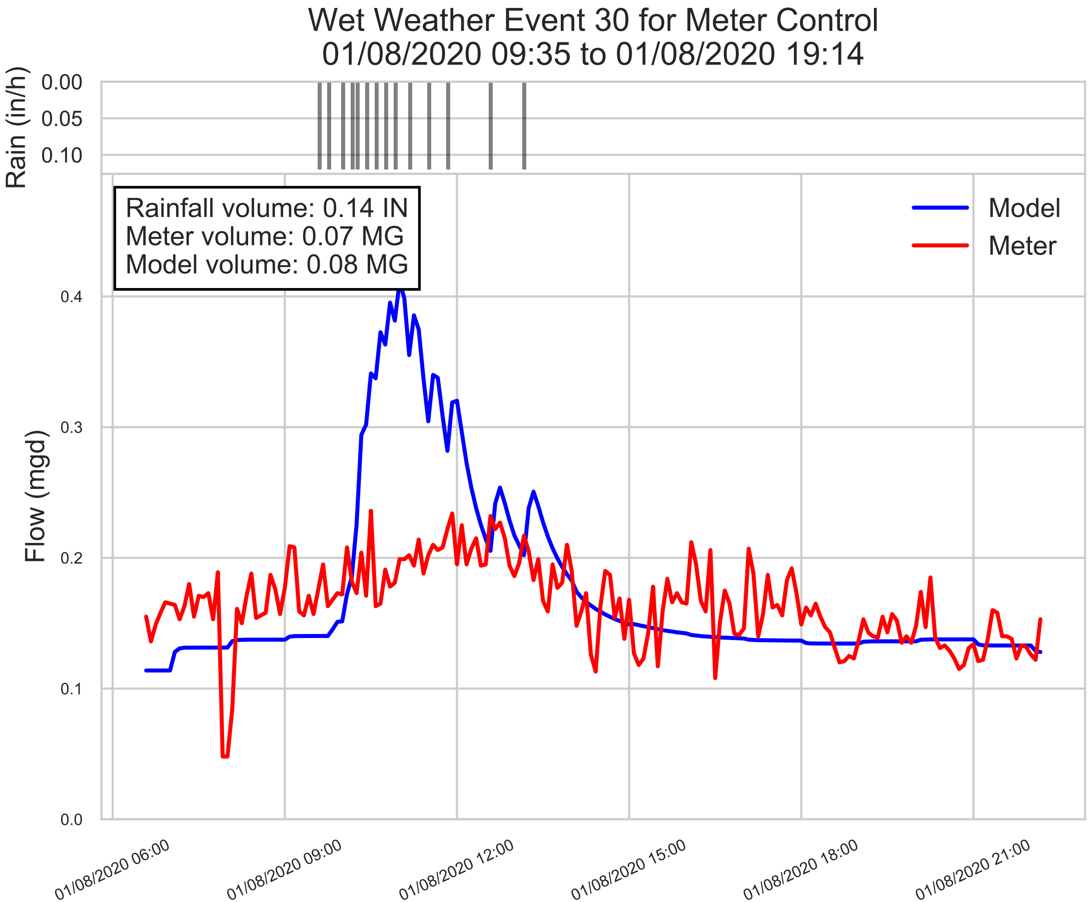


Wet Weather Event 27 for Meter Control
01/03/2020 17:50 to 01/04/2020 11:50
Rain (in/h)
0.00
0.05
0.10
Rainfall volume: 0.11 IN
Meter volume: 0.11 MG
Model volume: 0.1 MG
Model
Meter
Flow (mgd)
0.25
0.20
0.15
0.10
0.05
0.00
01/03/2020 14:00
01/03/2020 17:00
01/03/2020 20:00
01/03/2020 23:00
01/04/2020 02:00
01/04/2020 05:00
01/04/2020 08:00
01/04/2020 11:00
01/04/2020 14:00

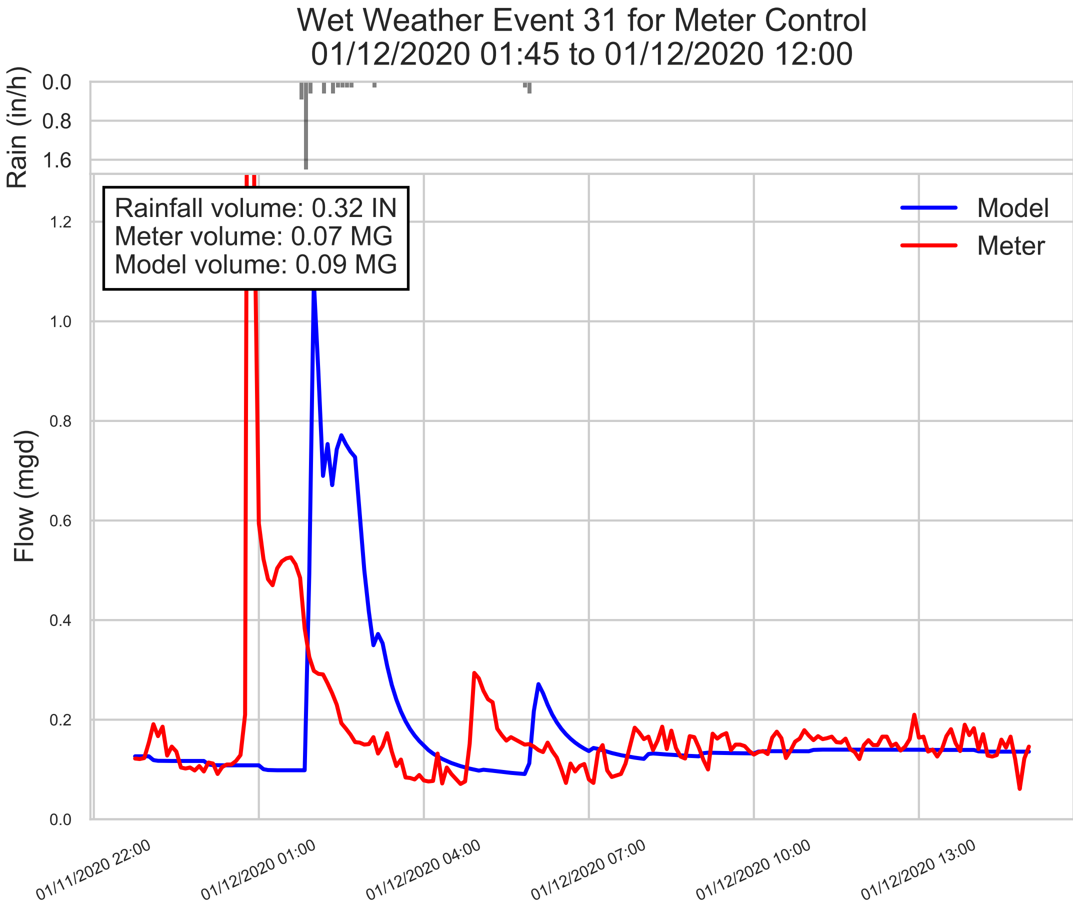

Wet Weather Event 28 for Meter Control
01/04/2020 16:34 to 01/05/2020 01:39
Rain (in/h)
0.00
0.25
0.50
Rainfall volume: 0.23 IN
Meter volume: 0.07 MG
Model volume: 0.09 MG
Model
Meter
Flow (mgd)
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
01/04/2020 14:00
01/04/2020 17:00
01/04/2020 20:00
01/04/2020 23:00
01/05/2020 02:00
01/05/2020 05:00



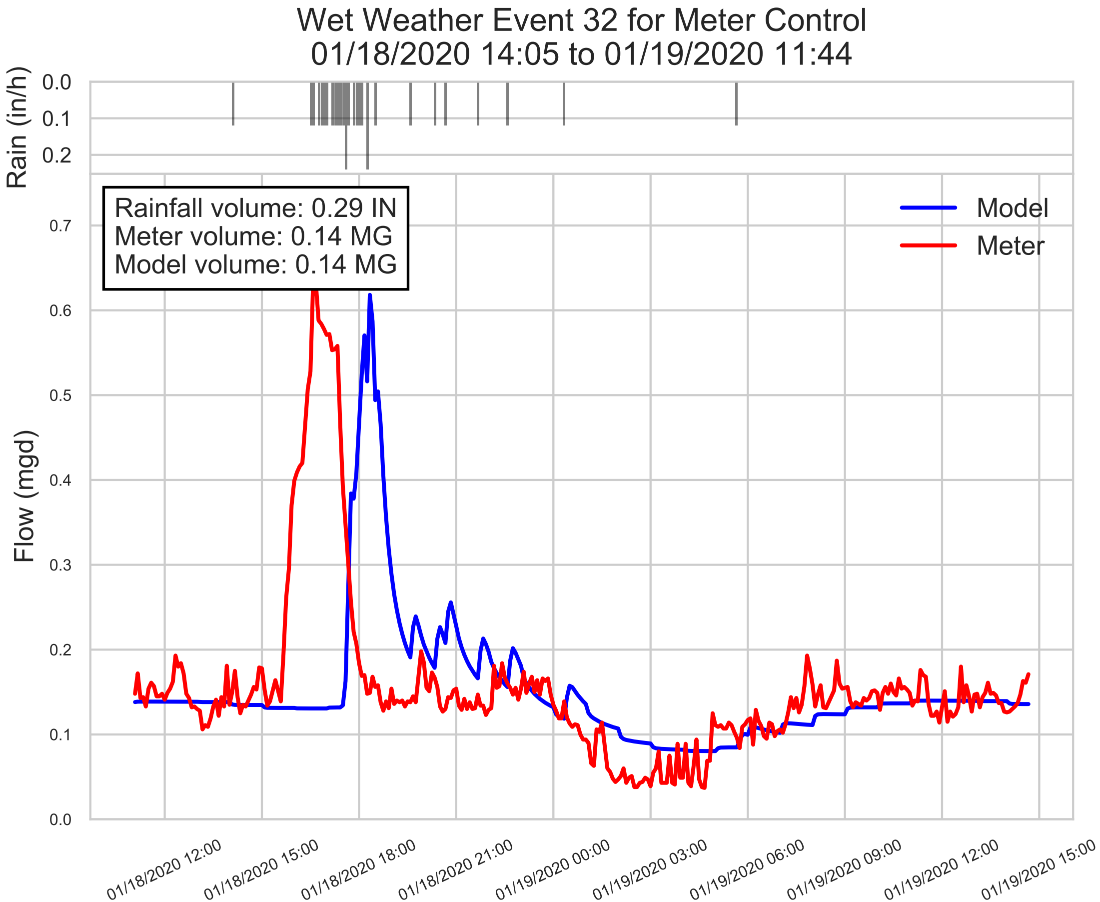
Wet Weather Event 29 for Meter Control
01/07/2020 14:50 to 01/08/2020 03:04
Rain (in/h)
0.00
0.05
0.10
Rainfall volume: 0.18 IN
Meter volume: 0.09 MG
Model volume: 0.08 MG
Model
Meter
Flow (mgd)
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
01/07/2020 11:00
01/07/2020 14:00
01/07/2020 17:00
01/07/2020 20:00
01/07/2020 23:00
01/08/2020 02:00
01/08/2020 05:00



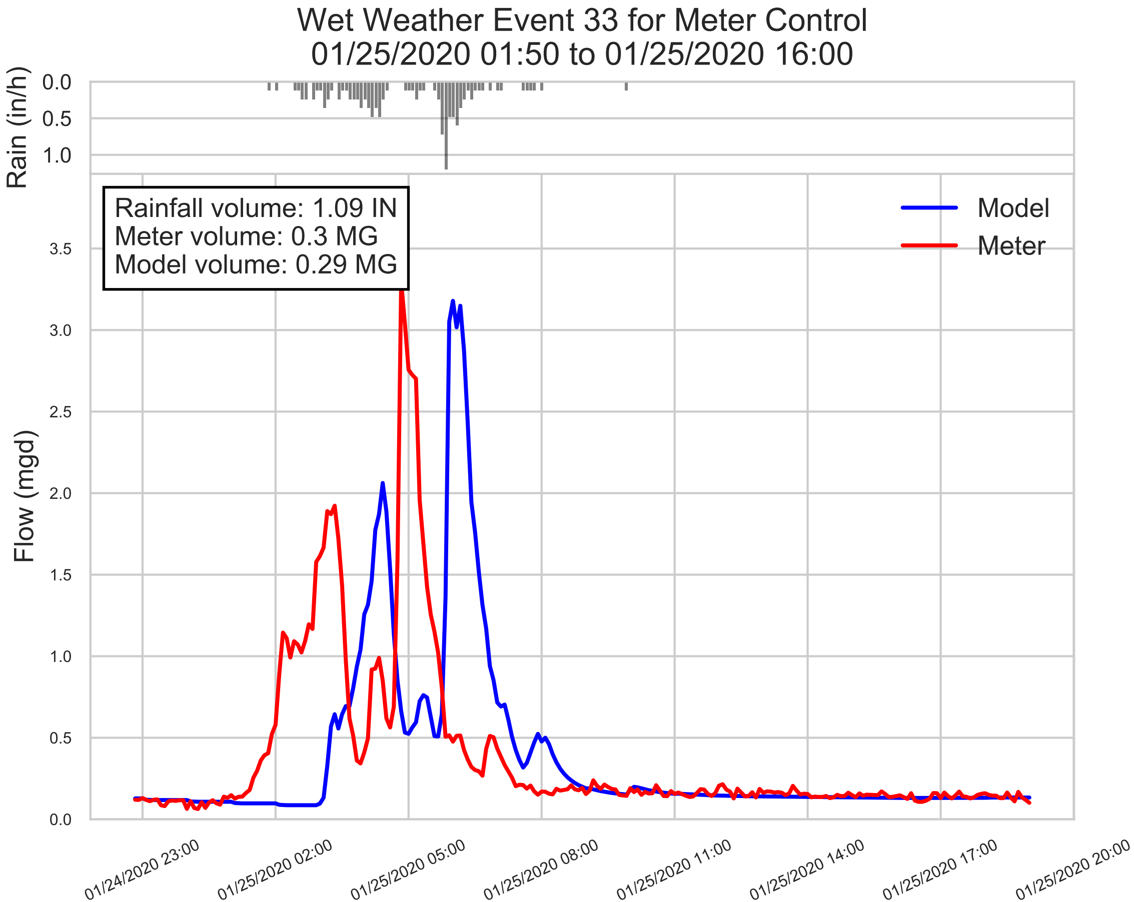
Wet Weather Event 30 for Meter Control
01/08/2020 09:35 to 01/08/2020 19:14
Rain (in/h)
0.00
0.05
0.10
Rainfall volume: 0.14 IN
Meter volume: 0.07 MG
Model volume: 0.08 MG
Model
Meter
Flow (mgd)
0.4
0.3
0.2
0.1
0.0
01/08/2020 06:00
01/08/2020 09:00
01/08/2020 12:00
01/08/2020 15:00
01/08/2020 18:00
01/08/2020 21:00



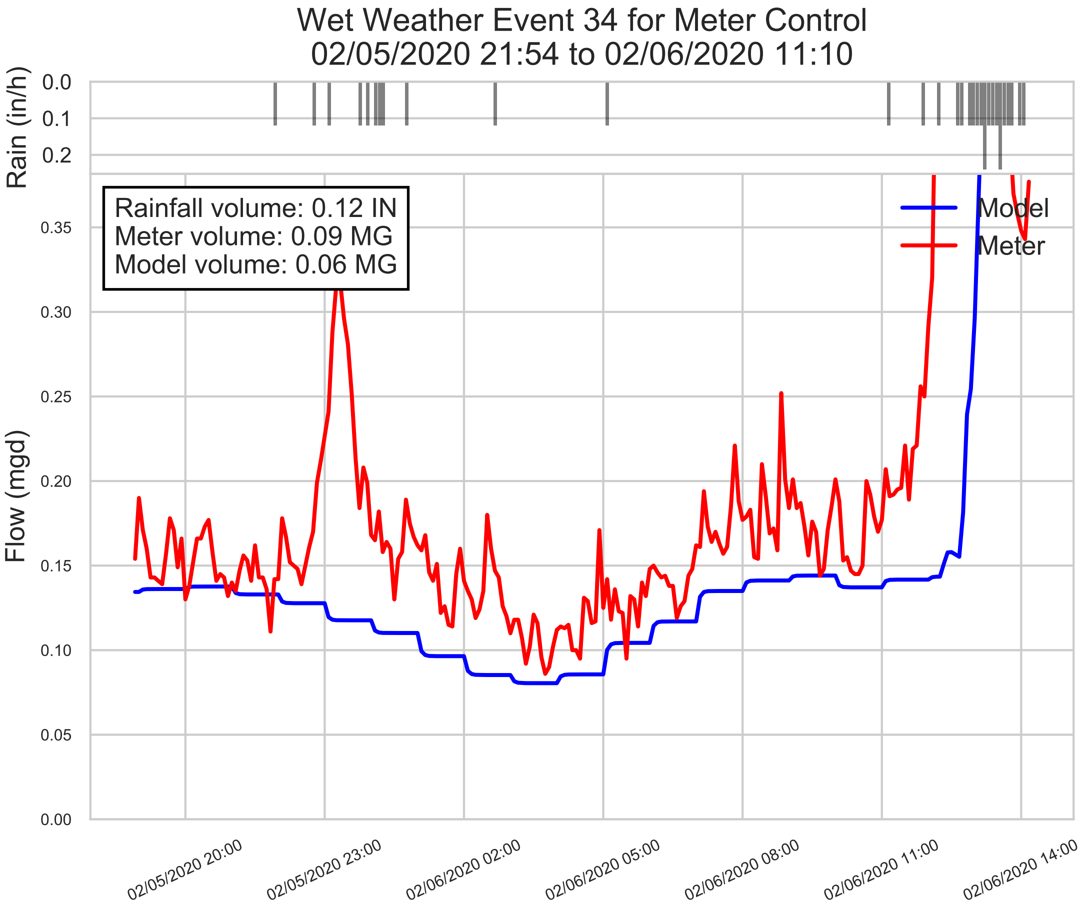
Wet Weather Event 31 for Meter Control
01/12/2020 01:45 to 01/12/2020 12:00
Rain (in/h)
0.0
0.8
1.6
Rainfall volume: 0.32 IN
Meter volume: 0.07 MG
Model volume: 0.09 MG
Model
Meter
Flow (mgd)
1.2
1.0
0.8
0.6
0.4
0.2
0.0
01/11/2020 22:00
01/12/2020 01:00
01/12/2020 04:00
01/12/2020 07:00
01/12/2020 10:00
01/12/2020 13:00

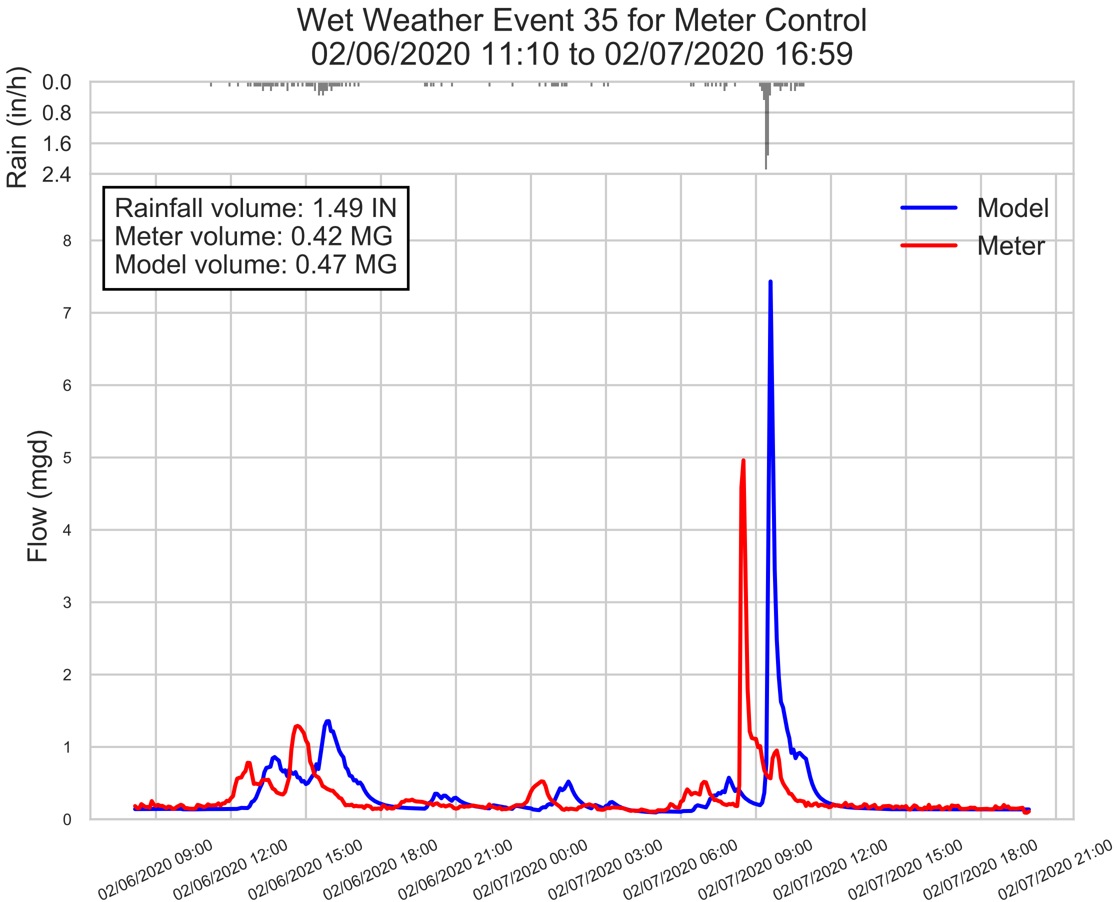


Wet Weather Event 32 for Meter Control
01/18/2020 14:05 to 01/19/2020 11:44
Rain (in/h)
0.0
0.1
0.2
Rainfall volume: 0.29 IN
Meter volume: 0.14 MG
Model volume: 0.14 MG
Model
Meter
Flow (mgd)
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
01/18/2020 12:00
01/18/2020 15:00
01/18/2020 18:00
01/18/2020 21:00
01/19/2020 00:00
01/19/2020 03:00
01/19/2020 06:00
01/19/2020 09:00
01/19/2020 12:00
01/19/2020 15:00

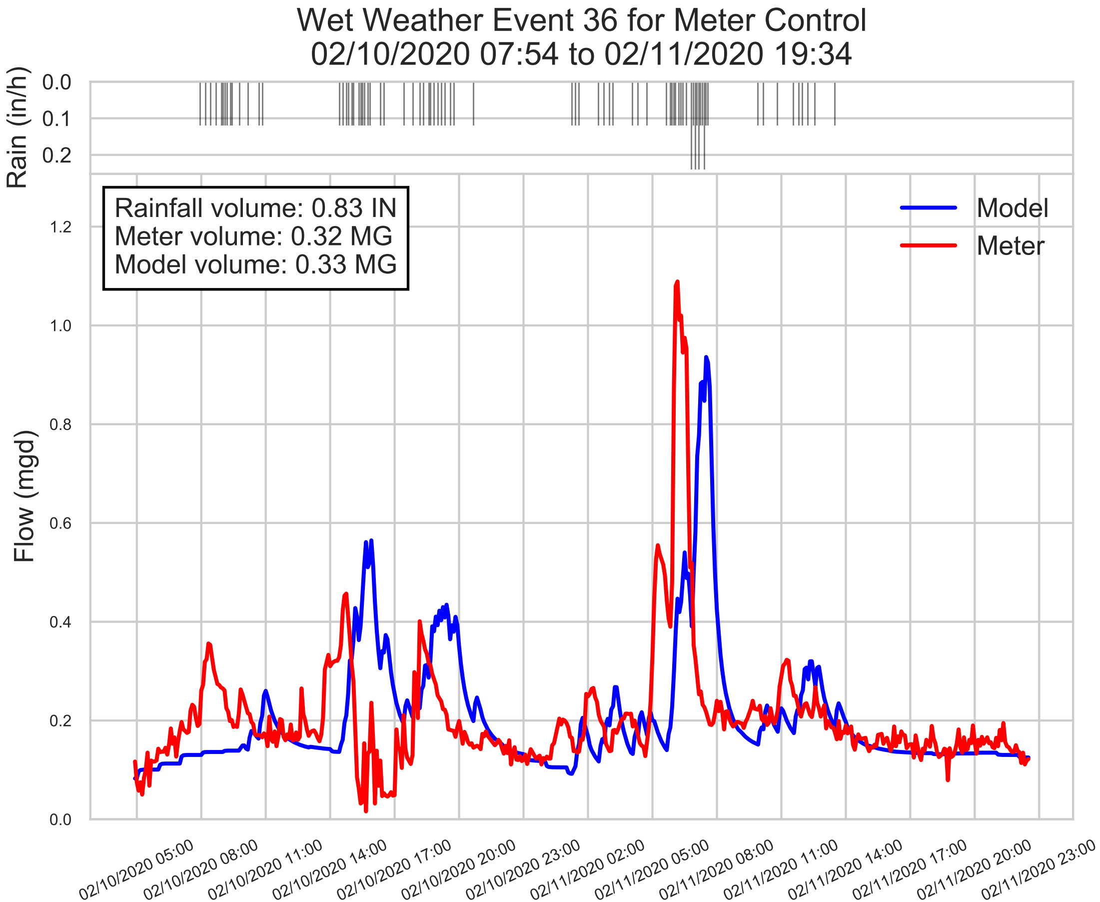


Wet Weather Event 33 for Meter Control
01/25/2020 01:50 to 01/25/2020 16:00
Rain (in/h)
0.0
0.5
1.0
Rainfall volume: 1.09 IN
Meter volume: 0.3 MG
Model volume: 0.29 MG
Model
Meter
Flow (mgd)
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
01/24/2020 23:00
01/25/2020 02:00
01/25/2020 05:00
01/25/2020 08:00
01/25/2020 11:00
01/25/2020 14:00
01/25/2020 17:00
01/25/2020 20:00

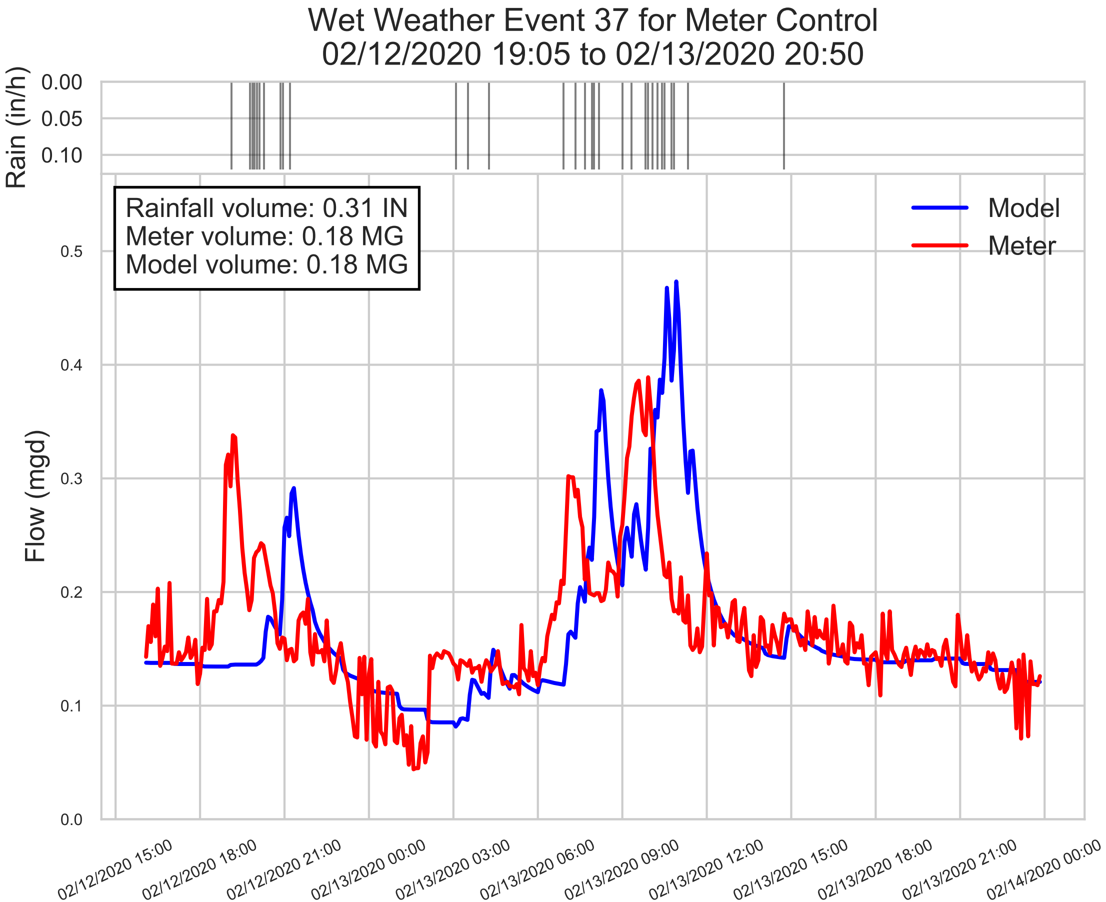

Wet Weather Event 34 for Meter Control
02/05/2020 21:54 to 02/06/2020 11:10
Rain (in/h)
0.0
0.1
0.2
Rainfall volume: 0.12 IN
Meter volume: 0.09 MG
Model volume: 0.06 MG
Model
Meter
Flow (mgd)
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
02/05/2020 20:00
02/05/2020 23:00
02/06/2020 02:00
02/06/2020 05:00
02/06/2020 08:00
02/06/2020 11:00
02/06/2020 14:00



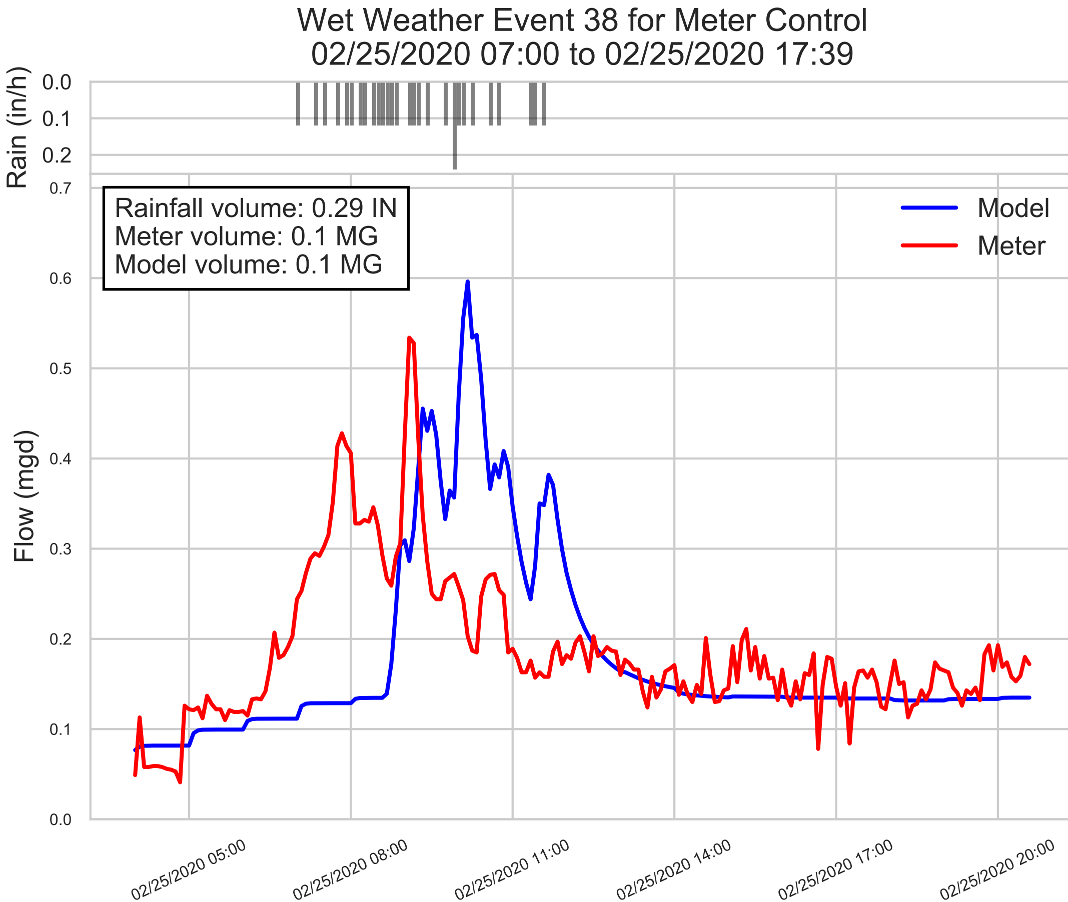
Wet Weather Event 35 for Meter Control
02/06/2020 11:10 to 02/07/2020 16:59
Rain (in/h)
0.0
0.8
1.6
2.4
Rainfall volume: 1.49 IN
Meter volume: 0.42 MG
Model volume: 0.47 MG
Model
Meter
Flow (mgd)
0
1
2
3
4
5
6
7
8
02/06/2020 09:00
02/06/2020 12:00
02/06/2020 15:00
02/06/2020 18:00
02/06/2020 21:00
02/07/2020 00:00
02/07/2020 03:00
02/07/2020 06:00
02/07/2020 09:00
02/07/2020 12:00
02/07/2020 15:00
02/07/2020 18:00
02/07/2020 21:00



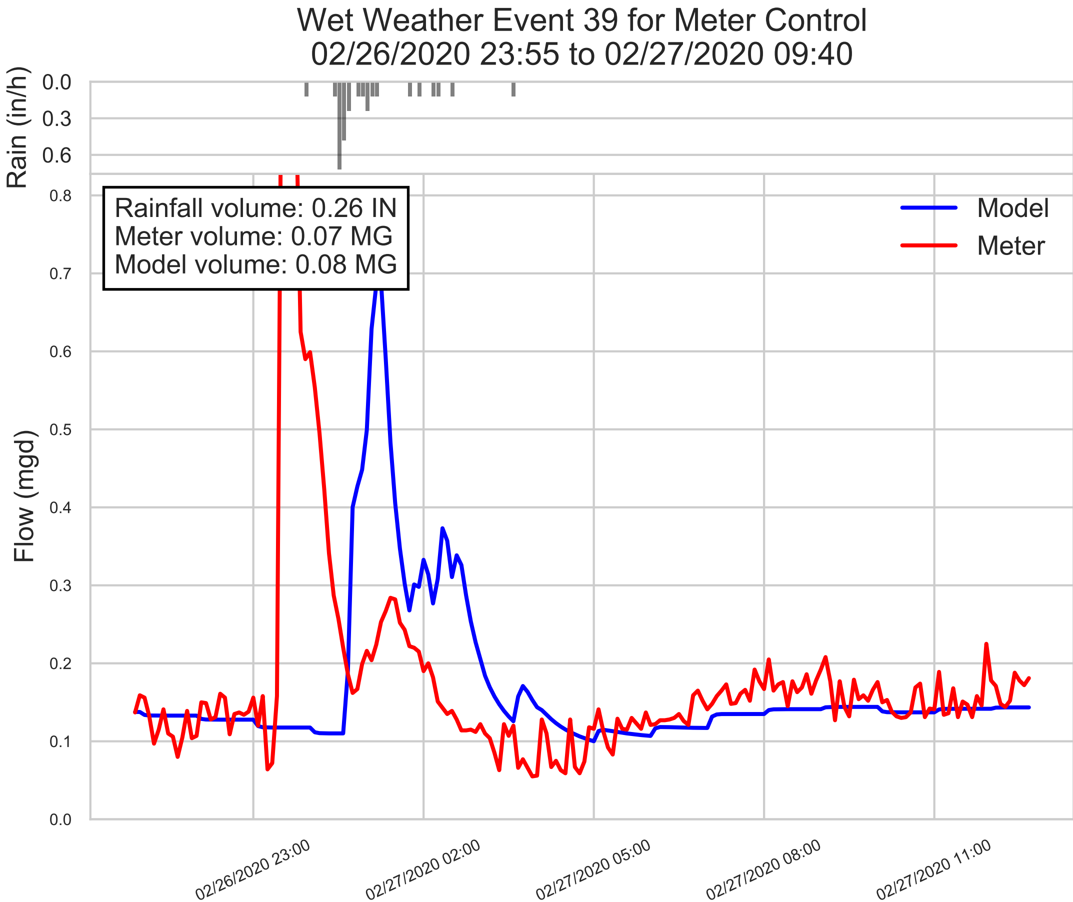
Wet Weather Event 36 for Meter Control
02/10/2020 07:54 to 02/11/2020 19:34
Rain (in/h)
0.0
0.1
0.2
Rainfall volume: 0.83 IN
Meter volume: 0.32 MG
Model volume: 0.33 MG
Model
Meter
Flow (mgd)
1.2
1.0
0.8
0.6
0.4
0.2
0.0
02/10/2020 05:00
02/10/2020 08:00
02/10/2020 11:00
02/10/2020 14:00
02/10/2020 17:00
02/10/2020 20:00
02/10/2020 23:00
02/11/2020 02:00
02/11/2020 05:00
02/11/2020 08:00
02/11/2020 11:00
02/11/2020 14:00
02/11/2020 17:00
02/11/2020 20:00
02/11/2020 23:00



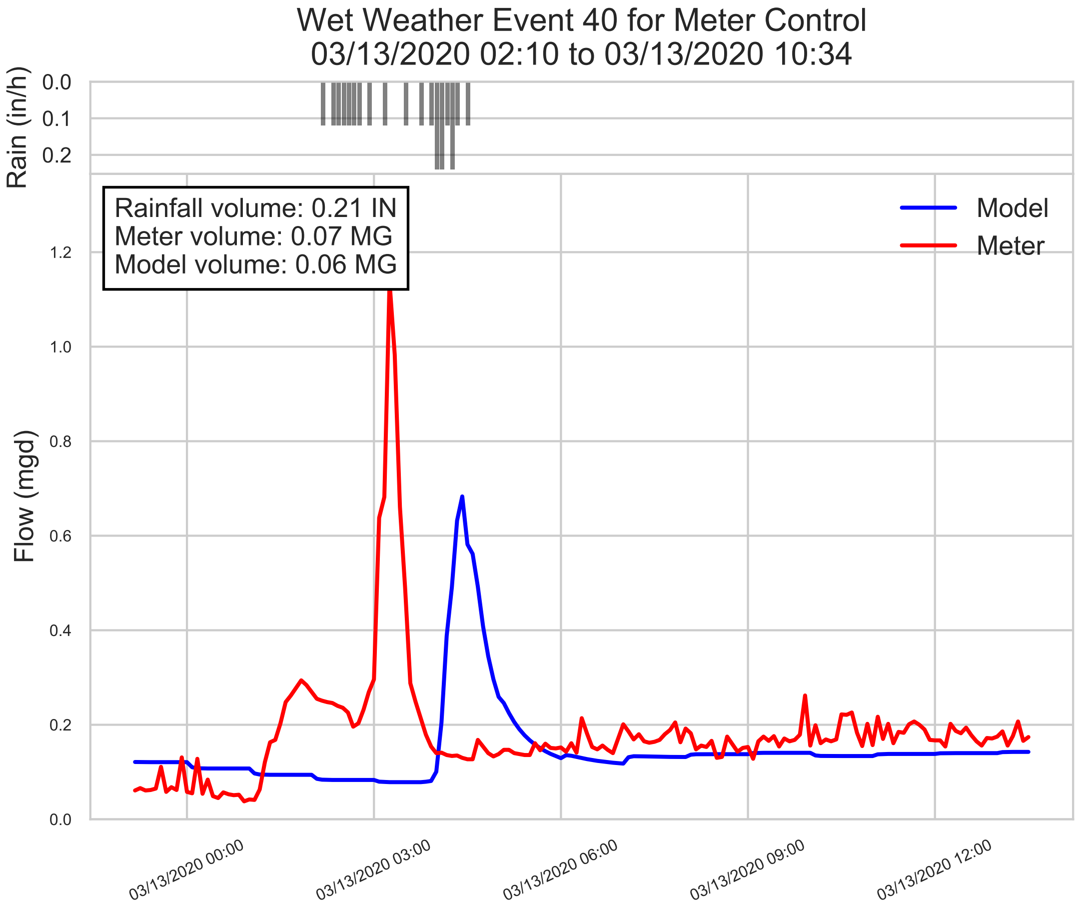
Wet Weather Event 37 for Meter Control
02/12/2020 19:05 to 02/13/2020 20:50
Rain (in/h)
0.00
0.05
0.10
Rainfall volume: 0.31 IN
Meter volume: 0.18 MG
Model volume: 0.18 MG
Model
Meter
Flow (mgd)
0.5
0.4
0.3
0.2
0.1
0.0
02/12/2020 15:00
02/12/2020 18:00
02/12/2020 21:00
02/13/2020 00:00
02/13/2020 03:00
02/13/2020 06:00
02/13/2020 09:00
02/13/2020 12:00
02/13/2020 15:00
02/13/2020 18:00
02/13/2020 21:00
02/14/2020 00:00



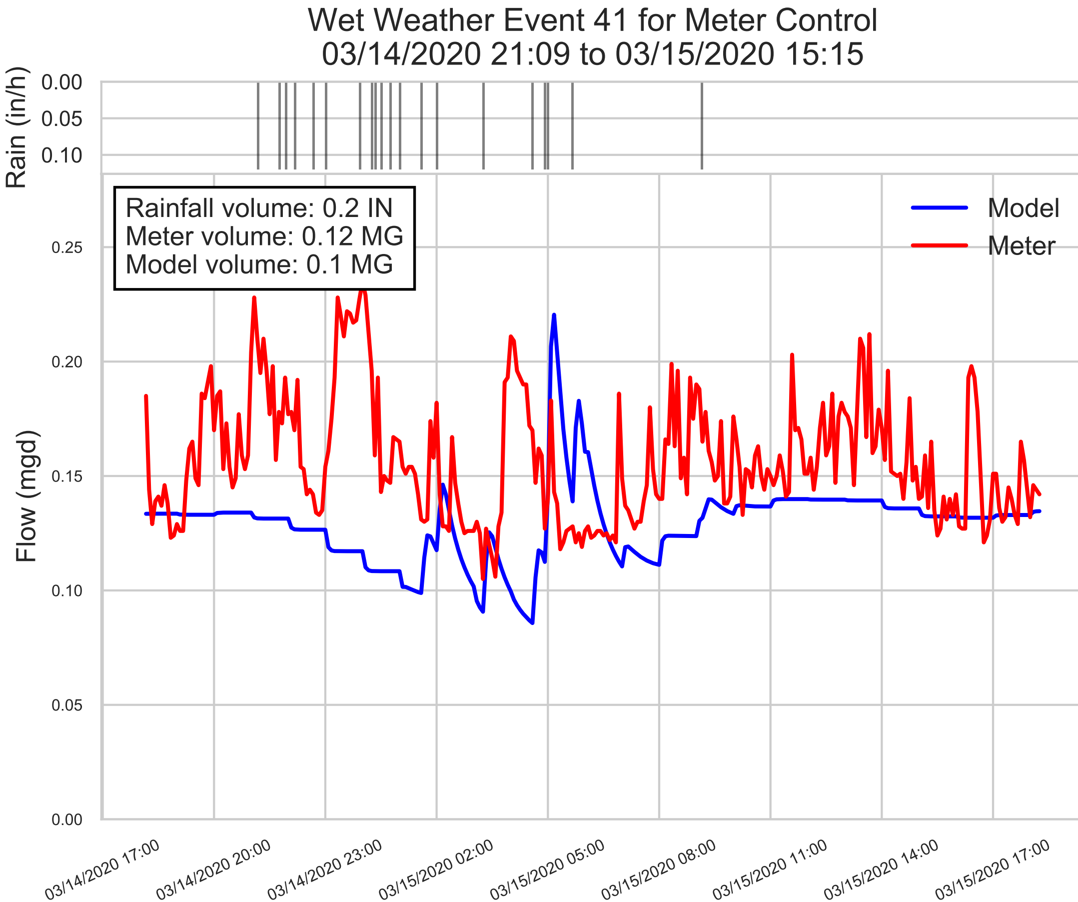
Wet Weather Event 38 for Meter Control
02/25/2020 07:00 to 02/25/2020 17:39
Rain (in/h)
0.0
0.1
0.2
Flow (mgd)
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
Rainfall volume: 0.29 IN
Meter volume: 0.1 MG
Model volume: 0.1 MG
Model
Meter
02/25/2020 05:00
02/25/2020 08:00
02/25/2020 11:00
02/25/2020 14:00
02/25/2020 17:00
02/25/2020 20:00



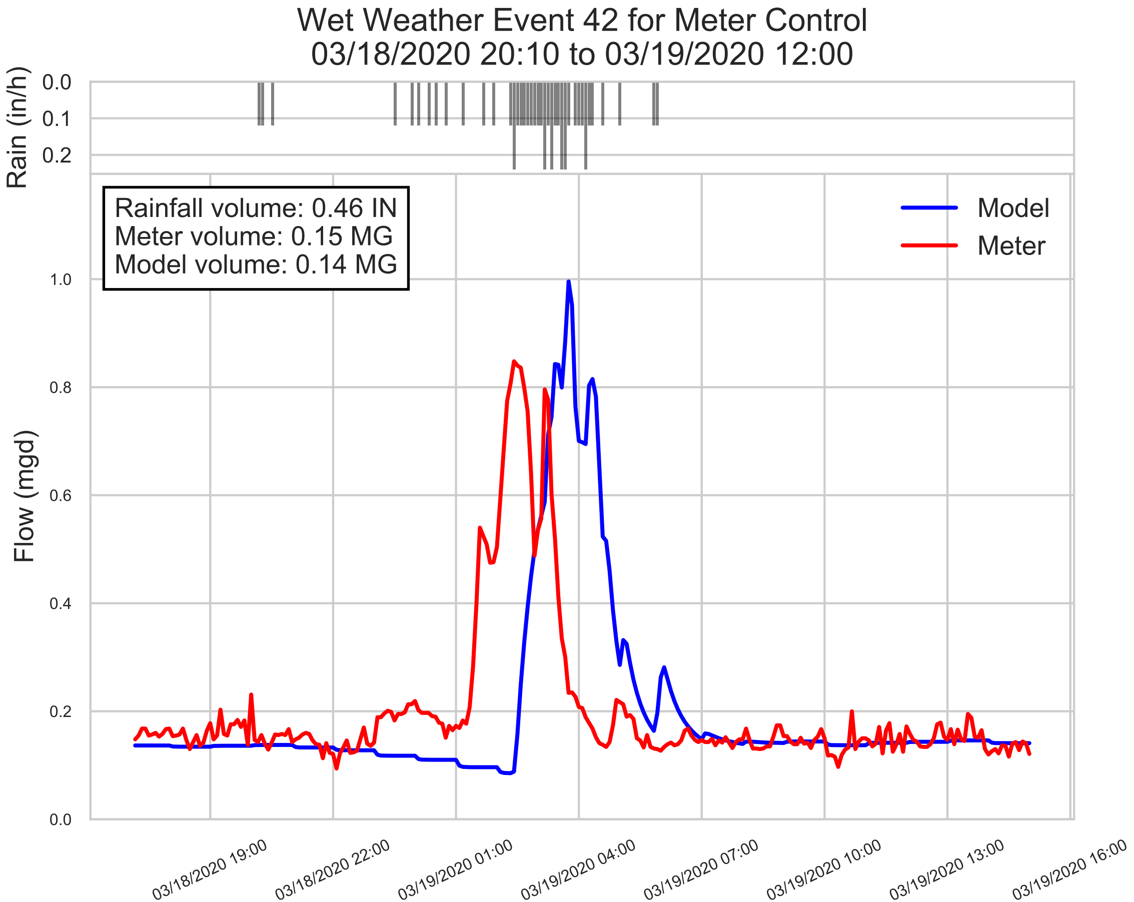
Wet Weather Event 39 for Meter Control
02/26/2020 23:55 to 02/27/2020 09:40
Rain (in/h)
0.0
0.3
0.6
Flow (mgd)
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
Rainfall volume: 0.26 IN
Meter volume: 0.07 MG
Model volume: 0.08 MG
Model
Meter
02/26/2020 23:00
02/27/2020 02:00
02/27/2020 05:00
02/27/2020 08:00
02/27/2020 11:00



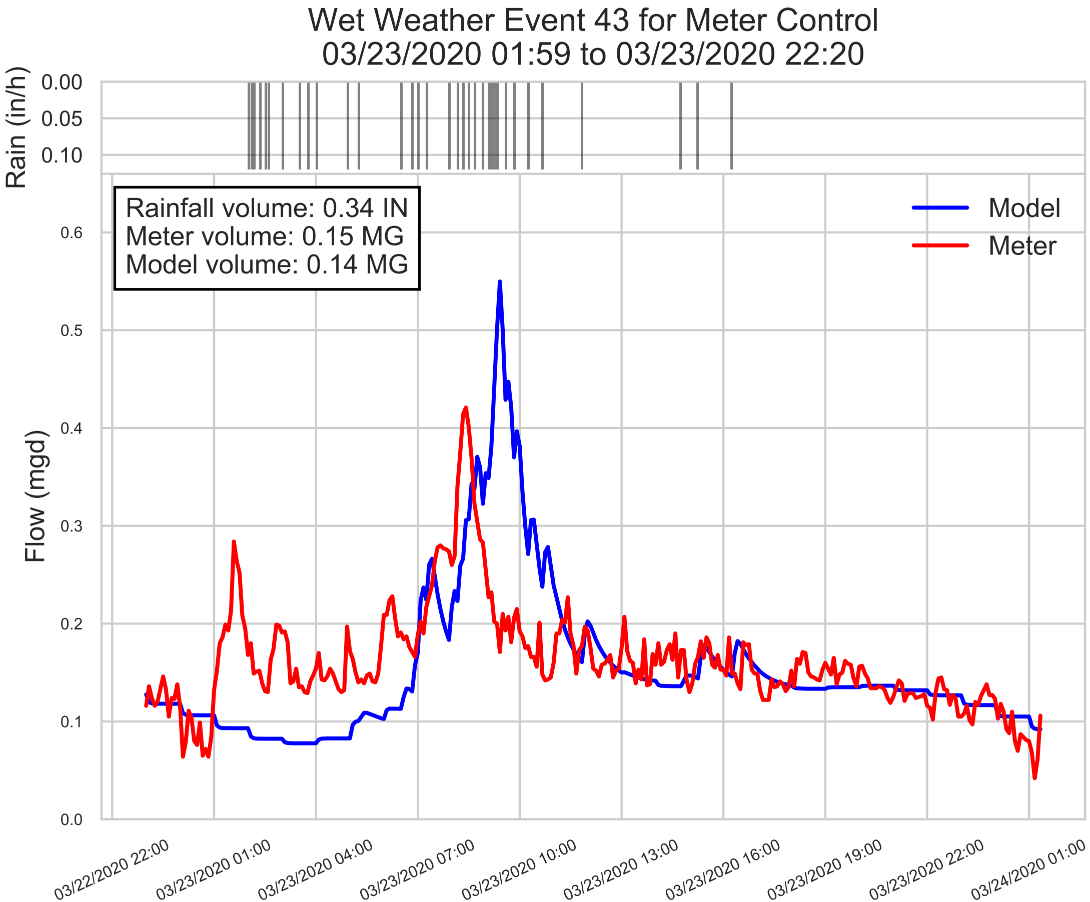
Wet Weather Event 40 for Meter Control
03/13/2020 02:10 to 03/13/2020 10:34
Rain (in/h)
0.0
0.1
0.2
Rainfall volume: 0.21 IN
Meter volume: 0.07 MG
Model volume: 0.06 MG
Model
Meter
Flow (mgd)
1.2
1.0
0.8
0.6
0.4
0.2
0.0
03/13/2020 00:00
03/13/2020 03:00
03/13/2020 06:00
03/13/2020 09:00
03/13/2020 12:00



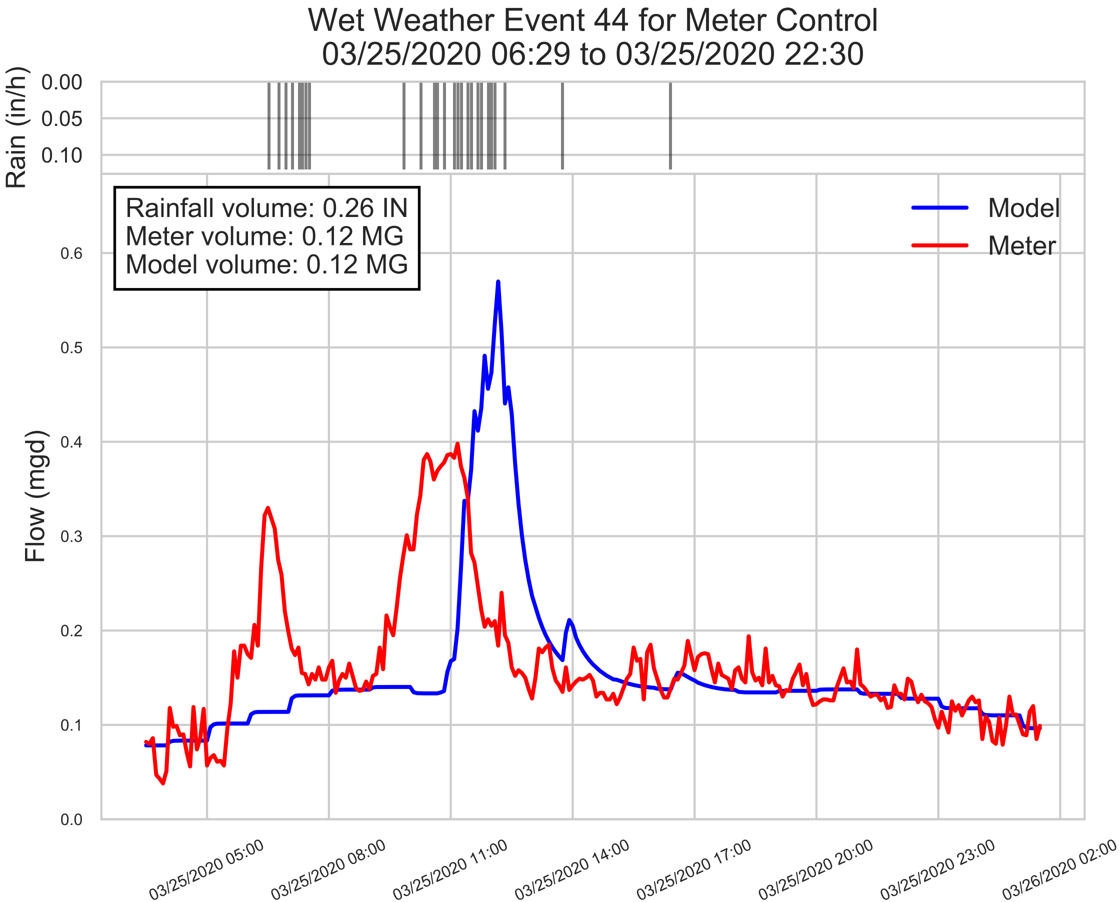
Wet Weather Event 41 for Meter Control
03/14/2020 21:09 to 03/15/2020 15:15
Rain (in/h)
0.00
0.05
0.10
Rainfall volume: 0.2 IN
Meter volume: 0.12 MG
Model volume: 0.1 MG
Model
Meter
Flow (mgd)
0.25
0.20
0.15
0.10
0.05
0.00
03/14/2020 17:00
03/14/2020 20:00
03/14/2020 23:00
03/15/2020 02:00
03/15/2020 05:00
03/15/2020 08:00
03/15/2020 11:00
03/15/2020 14:00
03/15/2020 17:00



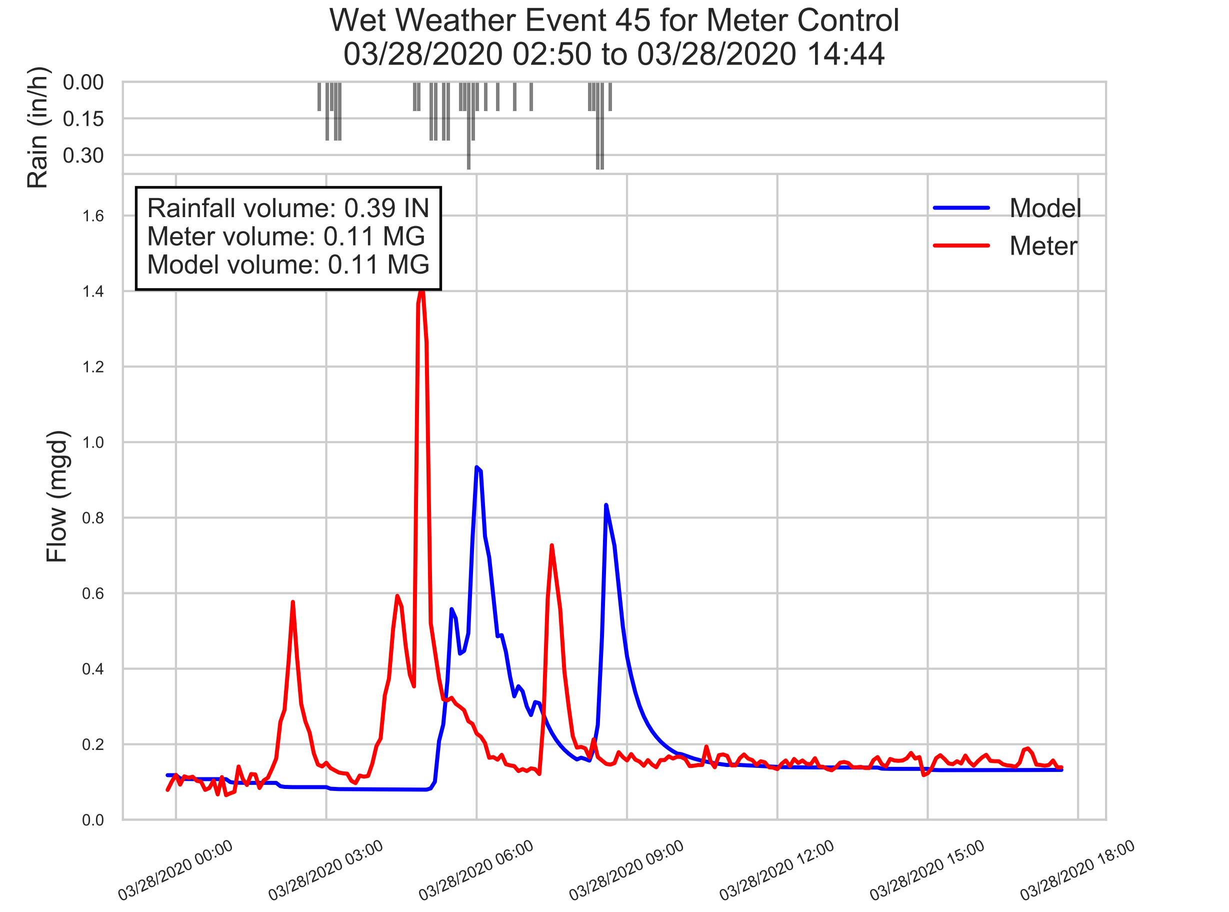
Wet Weather Event 42 for Meter Control
03/18/2020 20:10 to 03/19/2020 12:00
Rain (in/h)
0.0
0.1
0.2
Rainfall volume: 0.46 IN
Meter volume: 0.15 MG
Model volume: 0.14 MG
Model
Meter
Flow (mgd)
1.0
0.8
0.6
0.4
0.2
0.0
03/18/2020 19:00
03/18/2020 22:00
03/19/2020 01:00
03/19/2020 04:00
03/19/2020 07:00
03/19/2020 10:00
03/19/2020 13:00
03/19/2020 16:00



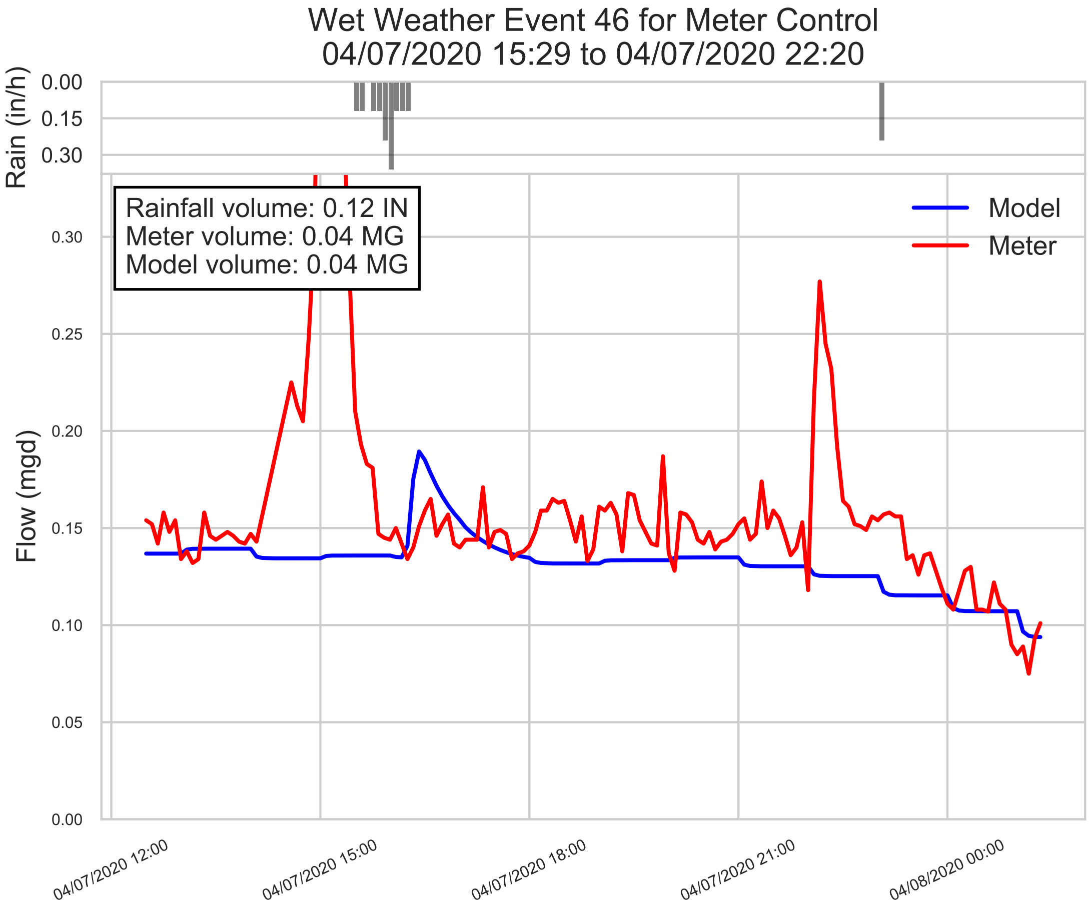
Wet Weather Event 43 for Meter Control
03/23/2020 01:59 to 03/23/2020 22:20
Rain (in/h)
0.00
0.05
0.10
Rainfall volume: 0.34 IN
Meter volume: 0.15 MG
Model volume: 0.14 MG
Model
Meter
Flow (mgd)
0.6
0.5
0.4
0.3
0.2
0.1
0.0
03/22/2020 22:00
03/23/2020 01:00
03/23/2020 04:00
03/23/2020 07:00
03/23/2020 10:00
03/23/2020 13:00
03/23/2020 16:00
03/23/2020 19:00
03/23/2020 22:00
03/24/2020 01:00



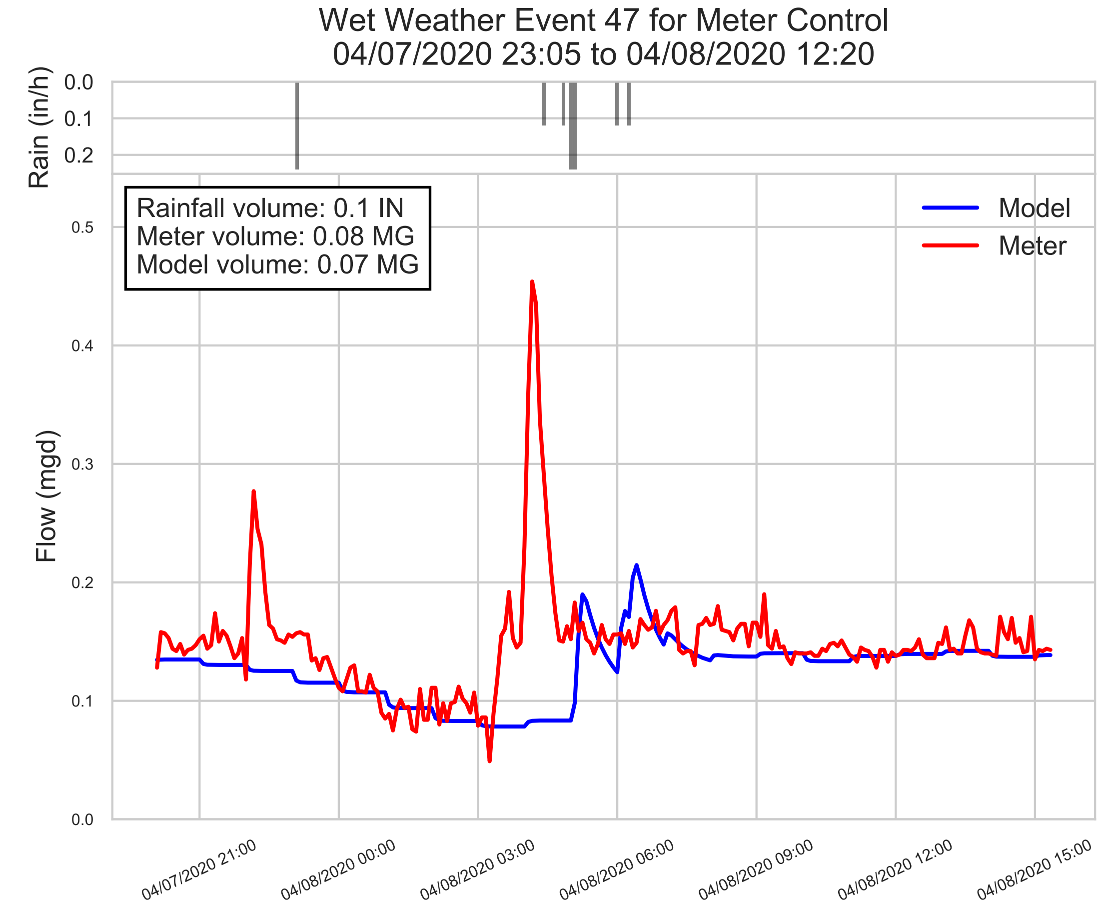
Wet Weather Event 44 for Meter Control
03/25/2020 06:29 to 03/25/2020 22:30
Rain (in/h)
0.00
0.05
0.10
Rainfall volume: 0.26 IN
Meter volume: 0.12 MG
Model volume: 0.12 MG
Model
Meter
Flow (mgd)
0.6
0.5
0.4
0.3
0.2
0.1
0.0
03/25/2020 05:00
03/25/2020 08:00
03/25/2020 11:00
03/25/2020 14:00
03/25/2020 17:00
03/25/2020 20:00
03/25/2020 23:00
03/26/2020 02:00

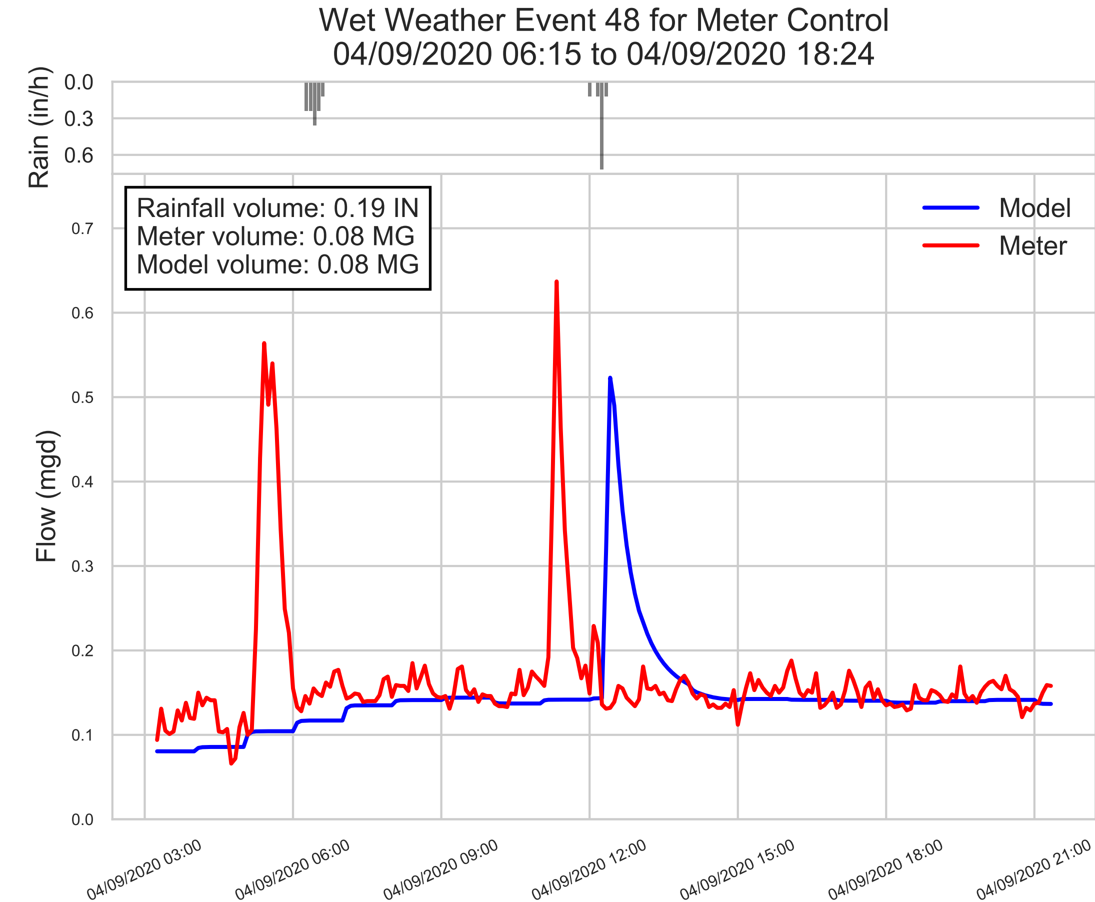


Wet Weather Event 45 for Meter Control
03/28/2020 02:50 to 03/28/2020 14:44
Rain (in/h)
0.00
0.15
0.30
Rainfall volume: 0.39 IN
Meter volume: 0.11 MG
Model volume: 0.11 MG
Model
Meter
Flow (mgd)
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
03/28/2020 00:00
03/28/2020 03:00
03/28/2020 06:00
03/28/2020 09:00
03/28/2020 12:00
03/28/2020 15:00
03/28/2020 18:00

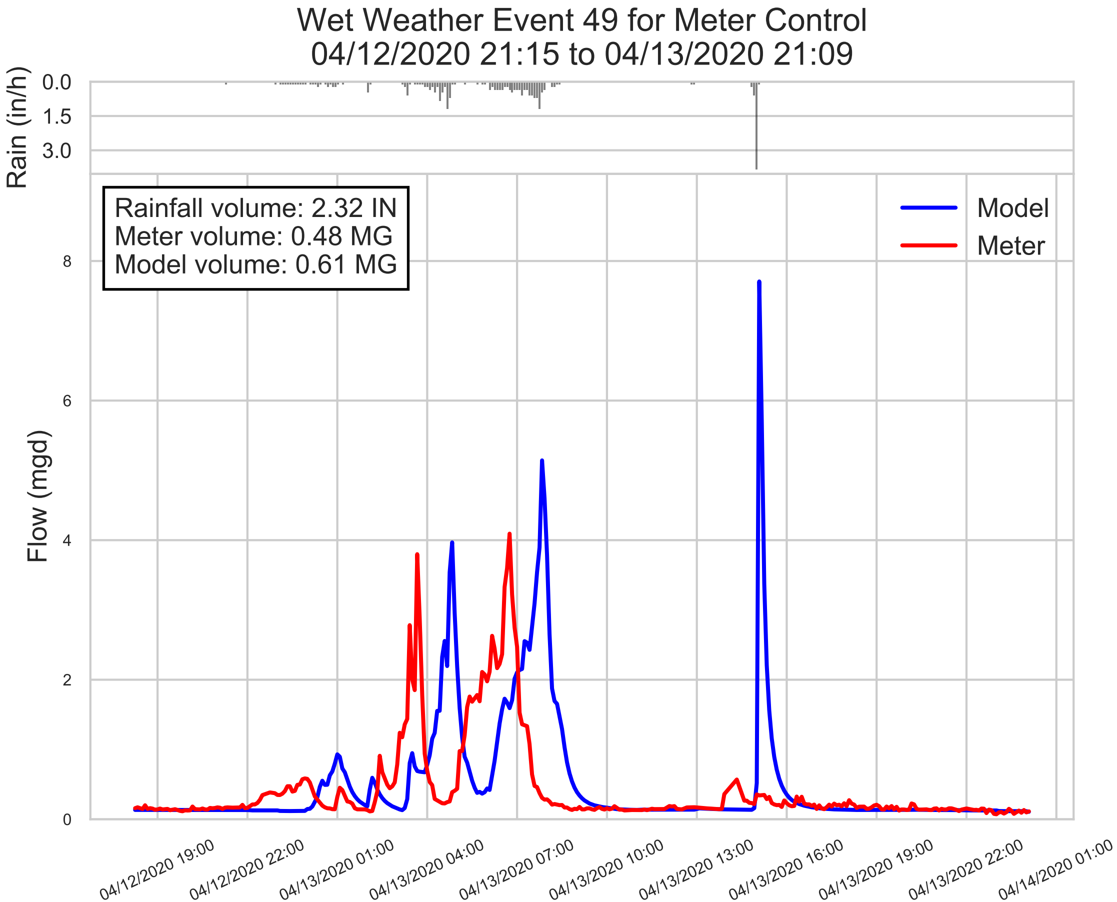


Wet Weather Event 46 for Meter Control
04/07/2020 15:29 to 04/07/2020 22:20
Rain (in/h)
0.00
0.15
0.30
Rainfall volume: 0.12 IN
Meter volume: 0.04 MG
Model volume: 0.04 MG
Model
Meter
Flow (mgd)
0.30
0.25
0.20
0.15
0.10
0.05
0.00
04/07/2020 12:00
04/07/2020 15:00
04/07/2020 18:00
04/07/2020 21:00
04/08/2020 00:00

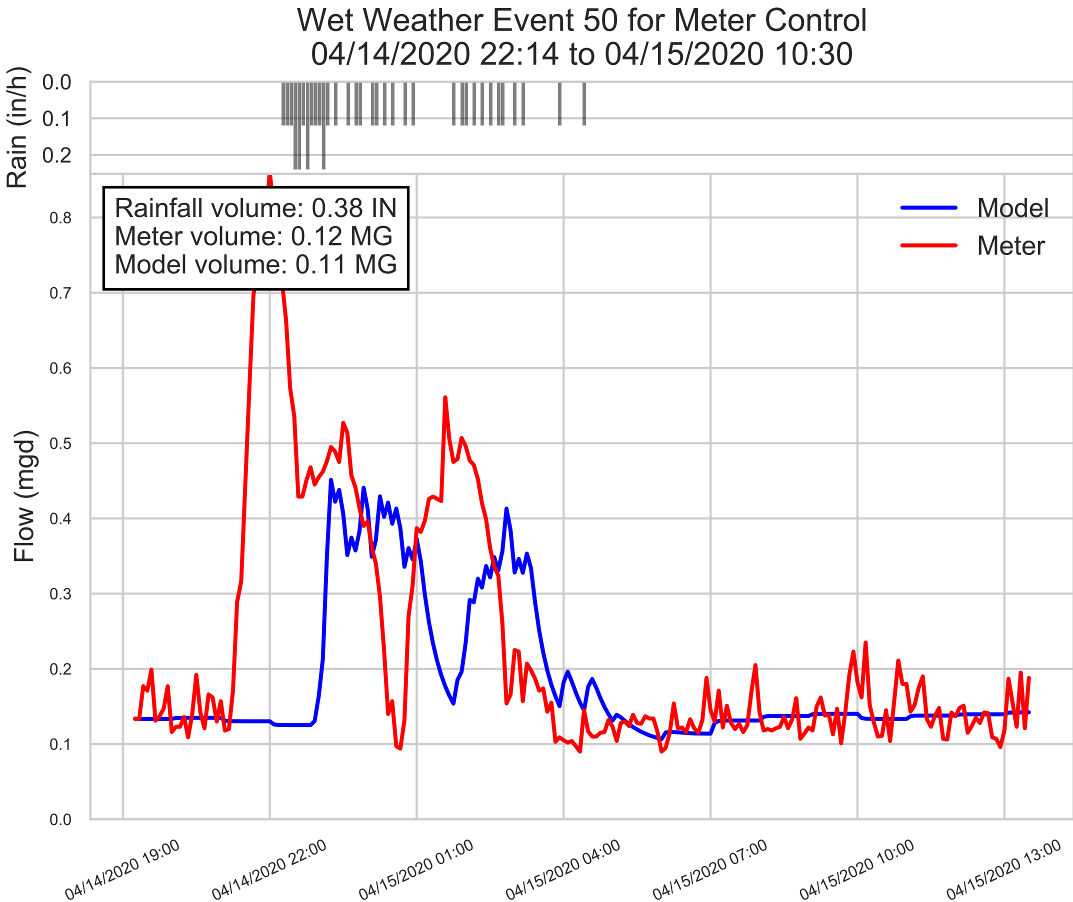

Wet Weather Event 47 for Meter Control
04/07/2020 23:05 to 04/08/2020 12:20
Rain (in/h)
0.0
0.1
0.2
Rainfall volume: 0.1 IN
Meter volume: 0.08 MG
Model volume: 0.07 MG
Model
Meter
Flow (mgd)
0.5
0.4
0.3
0.2
0.1
0.0
04/07/2020 21:00
04/08/2020 00:00
04/08/2020 03:00
04/08/2020 06:00
04/08/2020 09:00
04/08/2020 12:00
04/08/2020 15:00



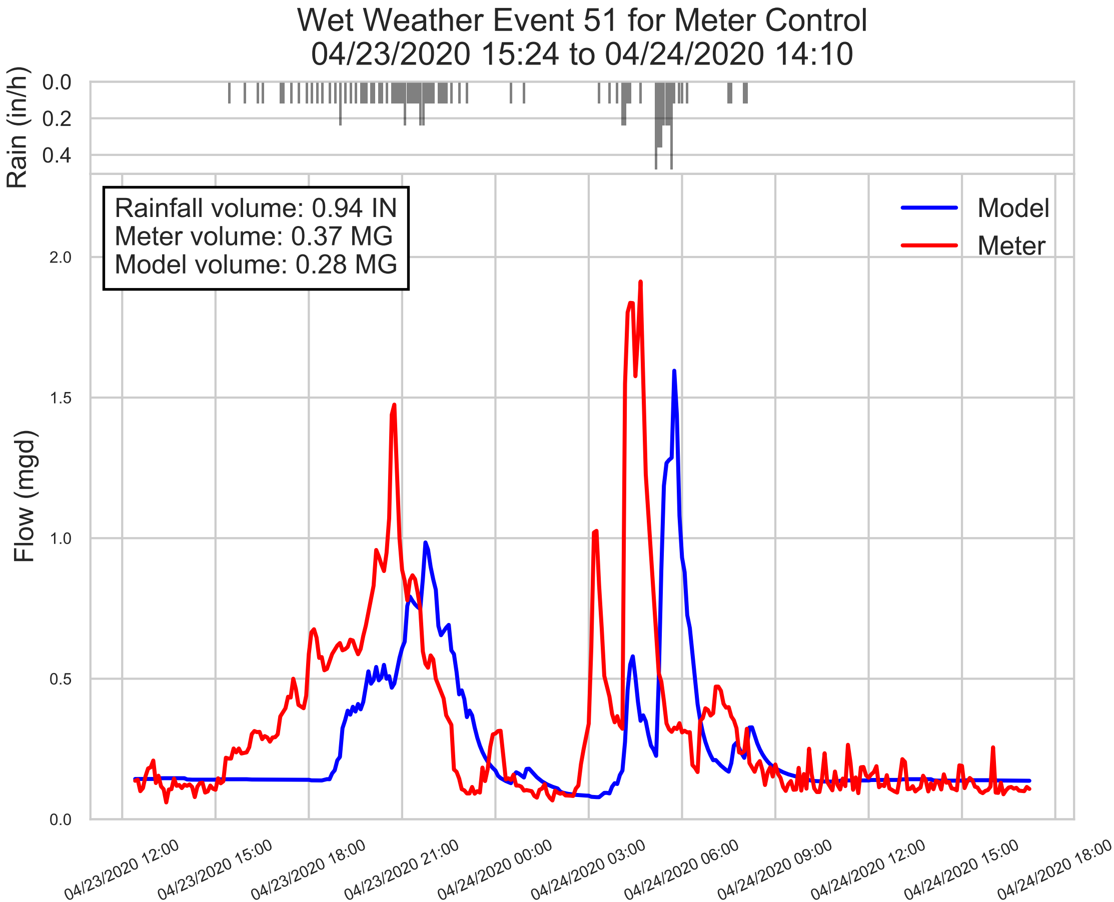
Wet Weather Event 48 for Meter Control
04/09/2020 06:15 to 04/09/2020 18:24
Rain (in/h)
0.0
0.3
0.6
Rainfall volume: 0.19 IN
Meter volume: 0.08 MG
Model volume: 0.08 MG
Model
Meter
Flow (mgd)
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
04/09/2020 03:00
04/09/2020 06:00
04/09/2020 09:00
04/09/2020 12:00
04/09/2020 15:00
04/09/2020 18:00
04/09/2020 21:00



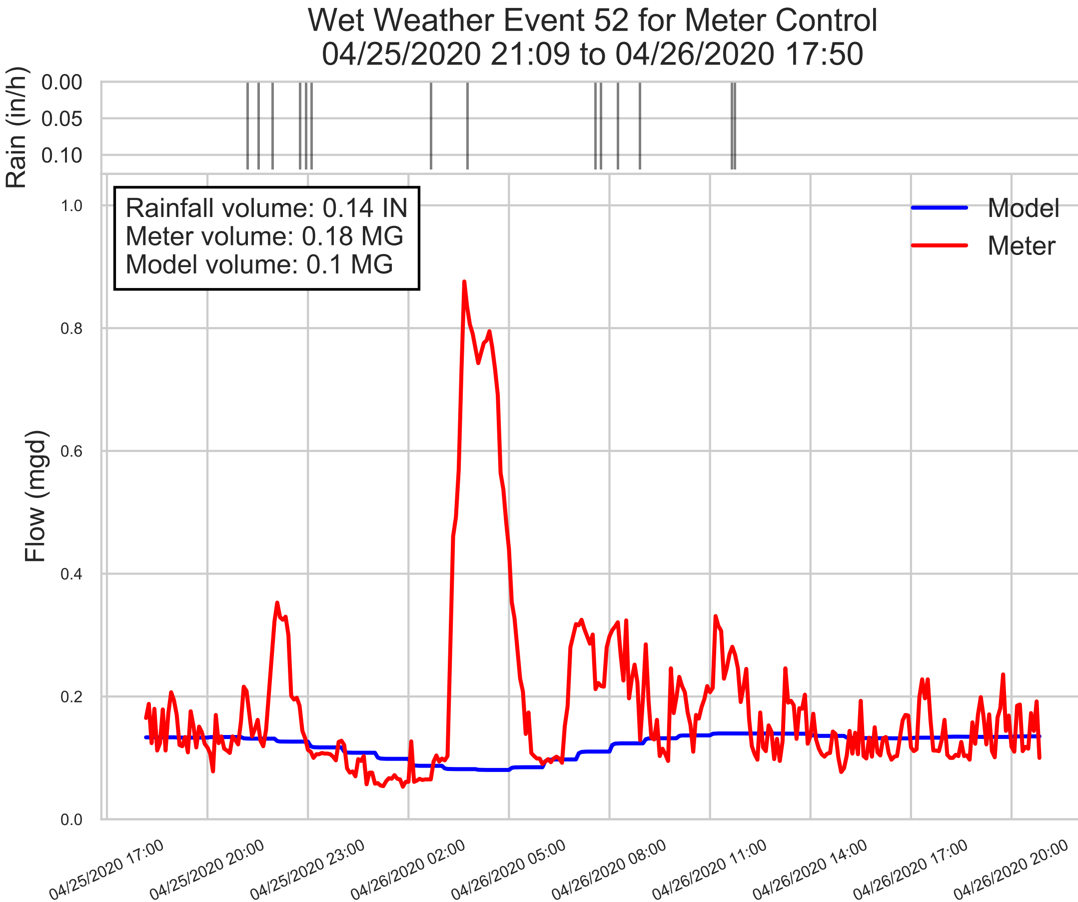
Wet Weather Event 49 for Meter Control
04/12/2020 21:15 to 04/13/2020 21:09
Rain (in/h)
0.0
1.5
3.0
Rainfall volume: 2.32 IN
Meter volume: 0.48 MG
Model volume: 0.61 MG
Model
Meter
Flow (mgd)
0
2
4
6
8
04/12/2020 19:00
04/12/2020 22:00
04/13/2020 01:00
04/13/2020 04:00
04/13/2020 07:00
04/13/2020 10:00
04/13/2020 13:00
04/13/2020 16:00
04/13/2020 19:00
04/13/2020 22:00
04/14/2020 01:00



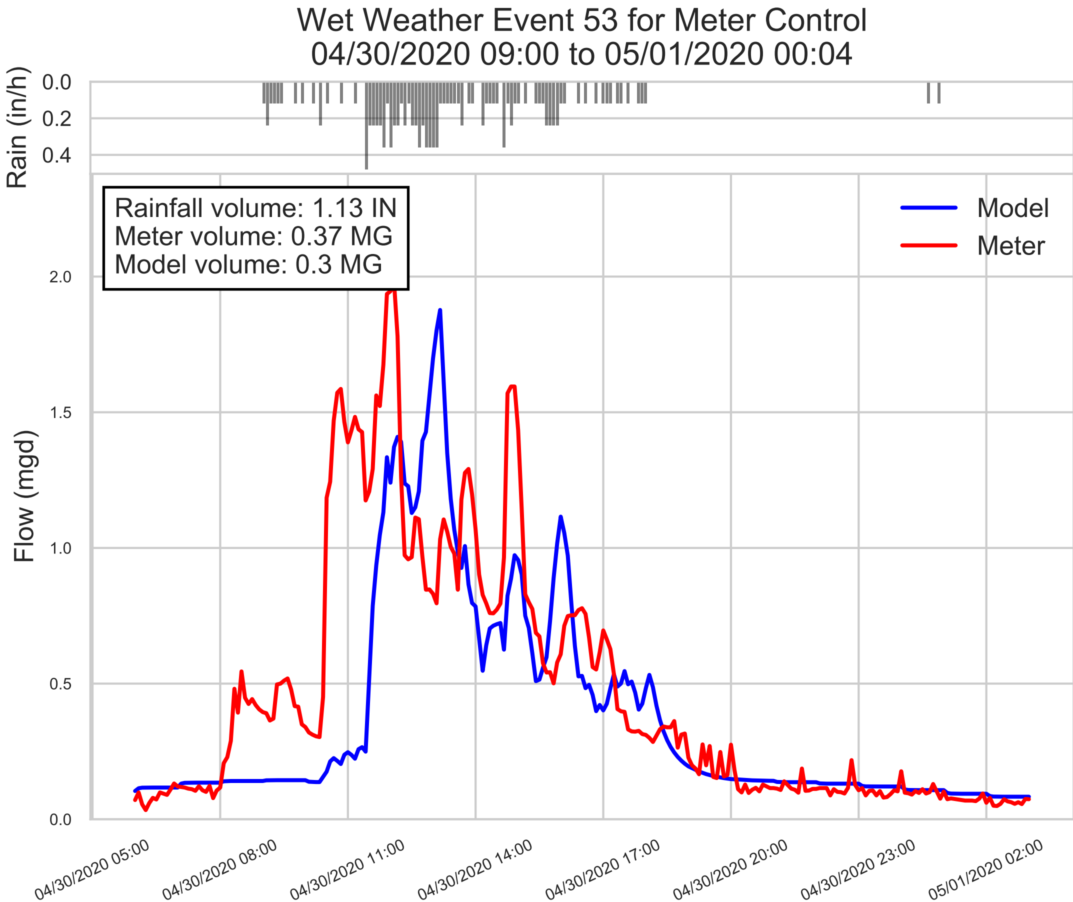
Wet Weather Event 50 for Meter Control
04/14/2020 22:14 to 04/15/2020 10:30
Rain (in/h)
0.0
0.1
0.2
Rainfall volume: 0.38 IN
Meter volume: 0.12 MG
Model volume: 0.11 MG
Model
Meter
Flow (mgd)
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
04/14/2020 19:00
04/14/2020 22:00
04/15/2020 01:00
04/15/2020 04:00
04/15/2020 07:00
04/15/2020 10:00
04/15/2020 13:00



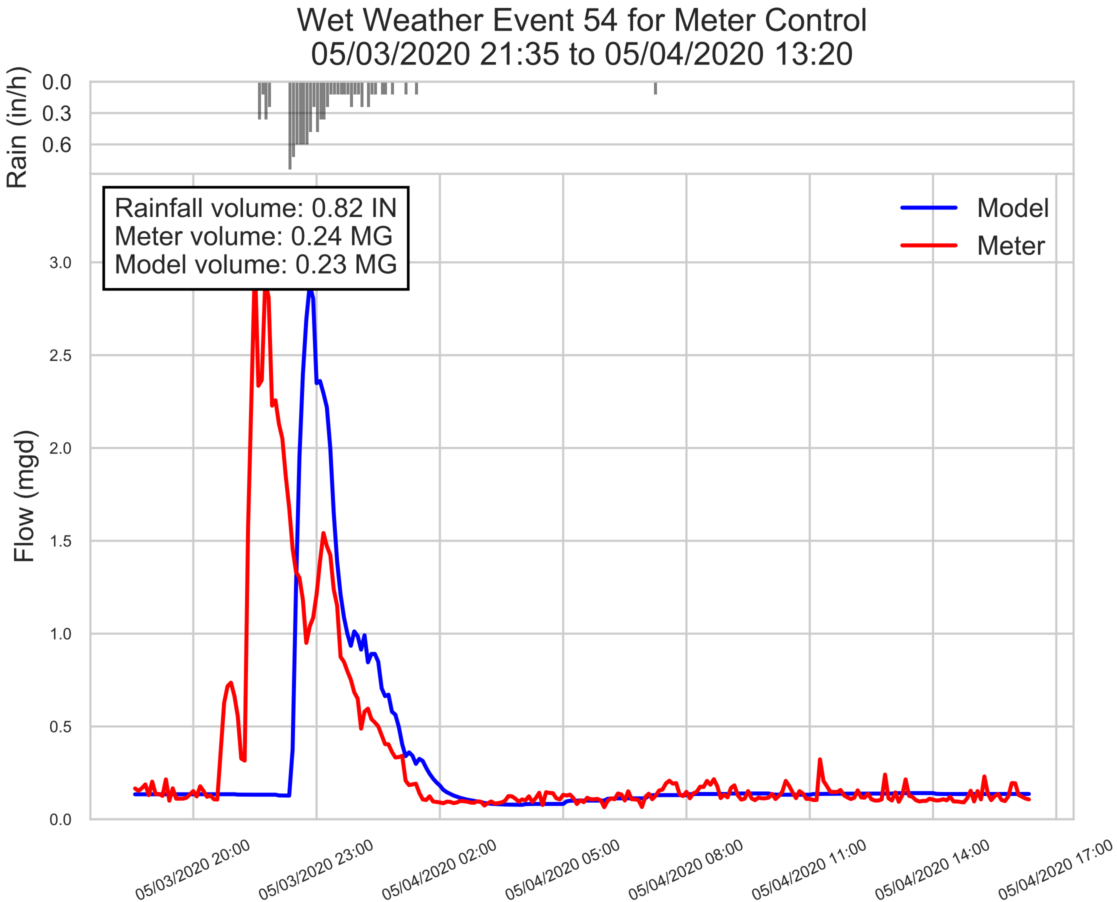
Wet Weather Event 51 for Meter Control
04/23/2020 15:24 to 04/24/2020 14:10
Rain (in/h)
0.0
0.2
0.4
Rainfall volume: 0.94 IN
Meter volume: 0.37 MG
Model volume: 0.28 MG
Model
Meter
Flow (mgd)
2.0
1.5
1.0
0.5
0.0
04/23/2020 12:00
04/23/2020 15:00
04/23/2020 18:00
04/23/2020 21:00
04/24/2020 00:00
04/24/2020 03:00
04/24/2020 06:00
04/24/2020 09:00
04/24/2020 12:00
04/24/2020 15:00
04/24/2020 18:00



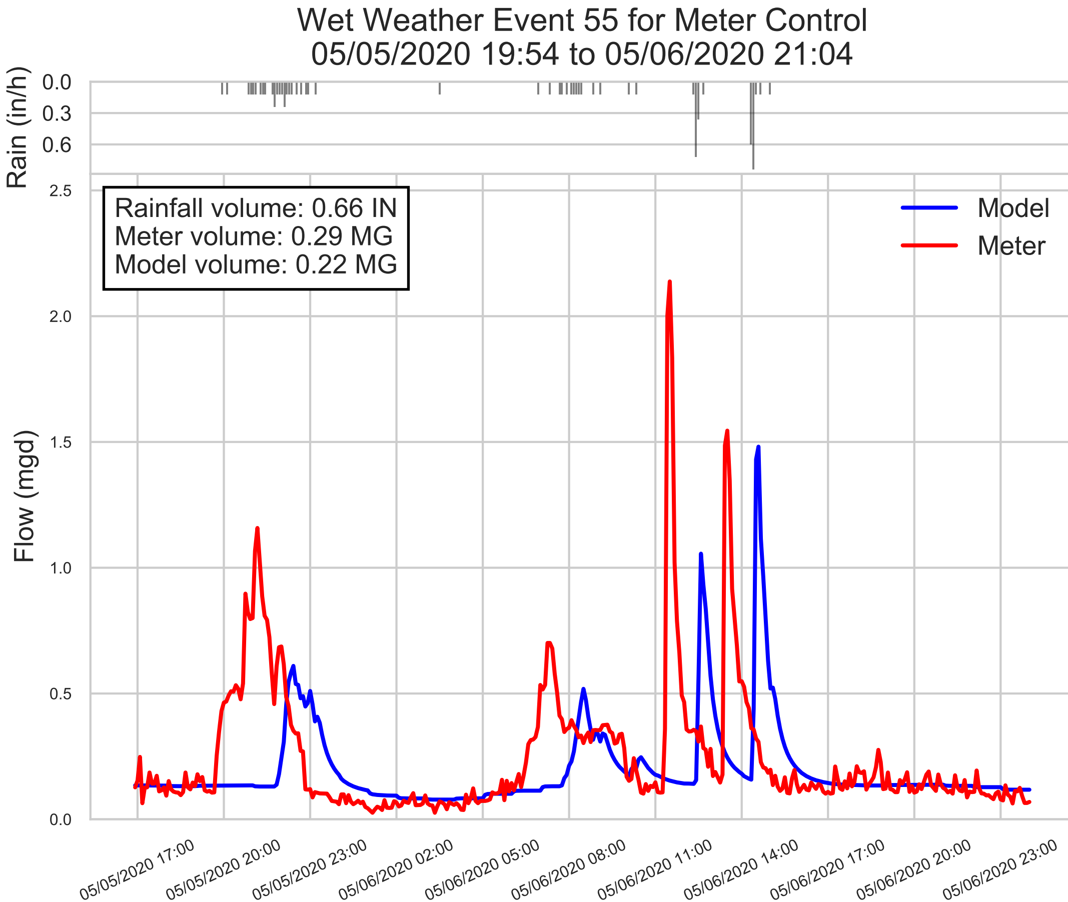
Wet Weather Event 52 for Meter Control
04/25/2020 21:09 to 04/26/2020 17:50
Rain (in/h)
0.00
0.05
0.10
Flow (mgd)
1.0
0.8
0.6
0.4
0.2
0.0
Rainfall volume: 0.14 IN
Meter volume: 0.18 MG
Model volume: 0.1 MG
Model
Meter
04/25/2020 17:00
04/25/2020 20:00
04/25/2020 23:00
04/26/2020 02:00
04/26/2020 05:00
04/26/2020 08:00
04/26/2020 11:00
04/26/2020 14:00
04/26/2020 17:00
04/26/2020 20:00

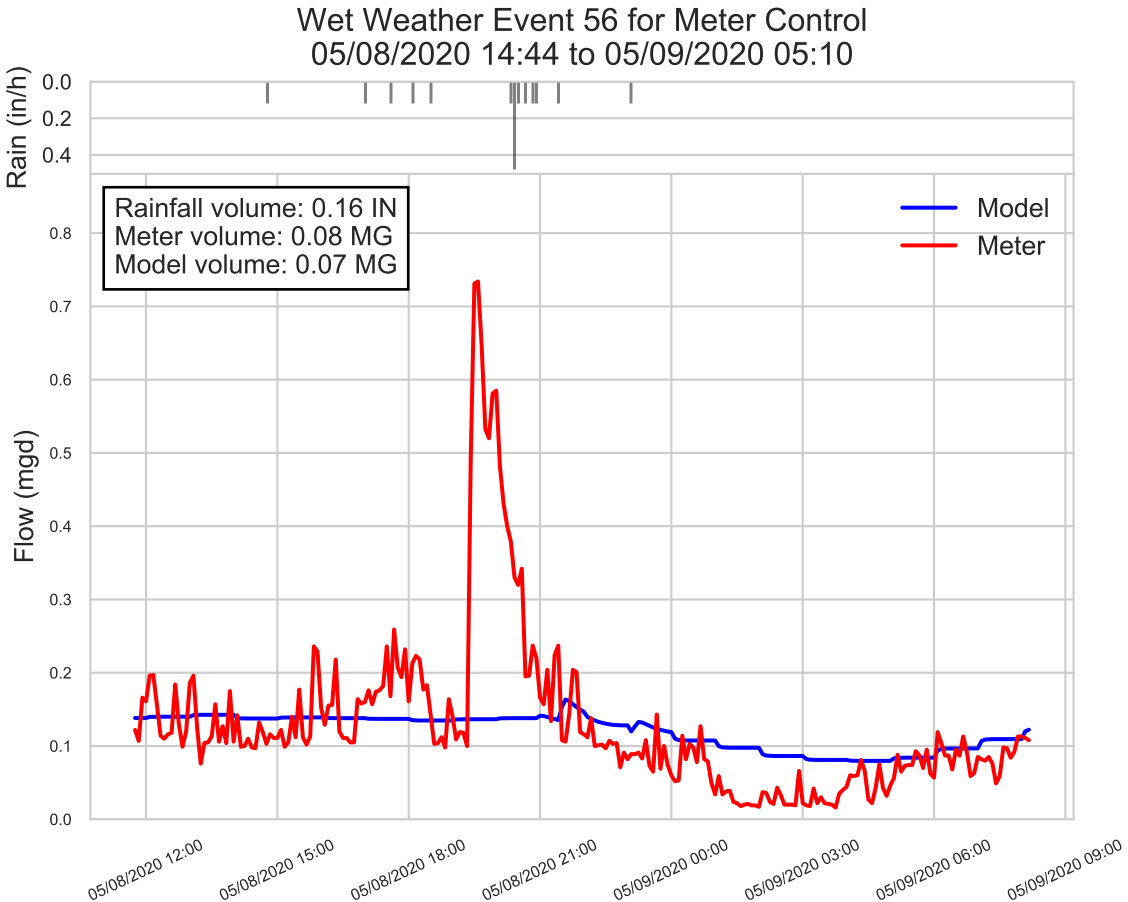


Wet Weather Event 53 for Meter Control
04/30/2020 09:00 to 05/01/2020 00:04
Rain (in/h)
0.0
0.2
0.4
Rainfall volume: 1.13 IN
Meter volume: 0.37 MG
Model volume: 0.3 MG
Model
Meter
Flow (mgd)
2.0
1.5
1.0
0.5
0.0
04/30/2020 05:00
04/30/2020 08:00
04/30/2020 11:00
04/30/2020 14:00
04/30/2020 17:00
04/30/2020 20:00
04/30/2020 23:00
05/01/2020 02:00

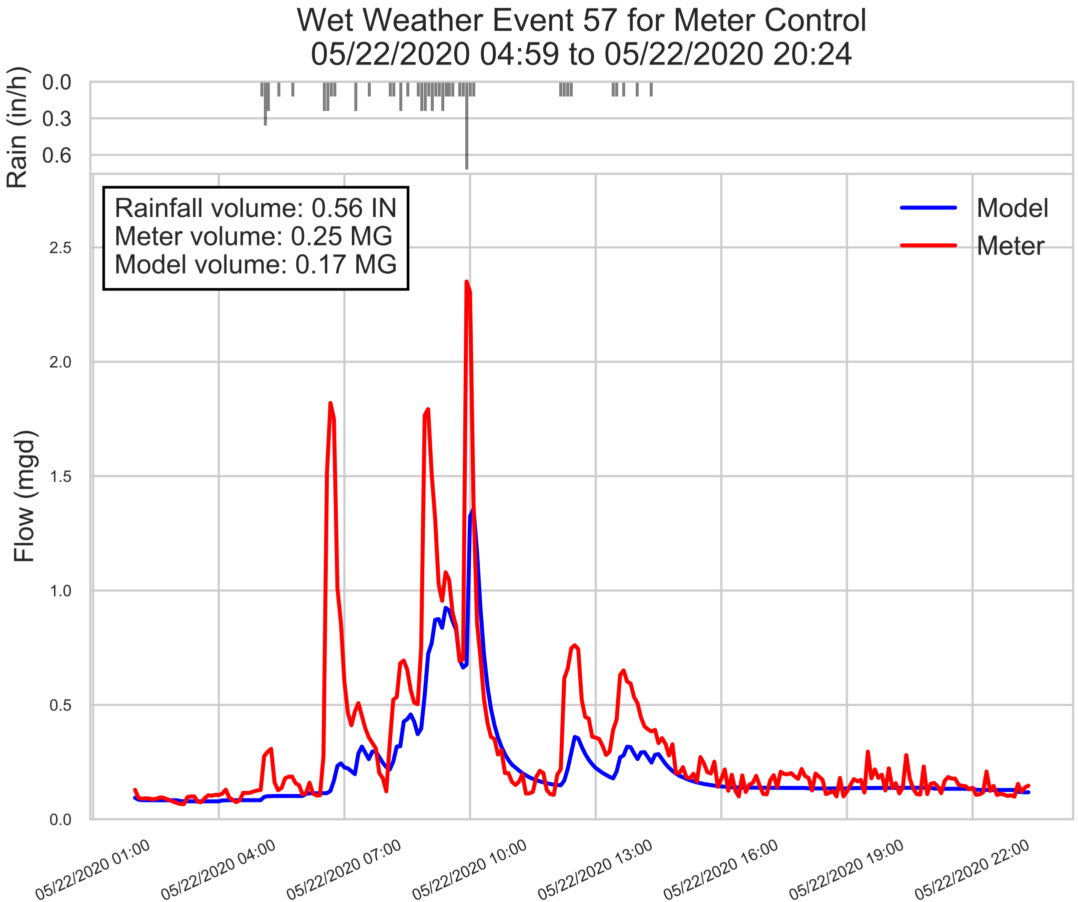


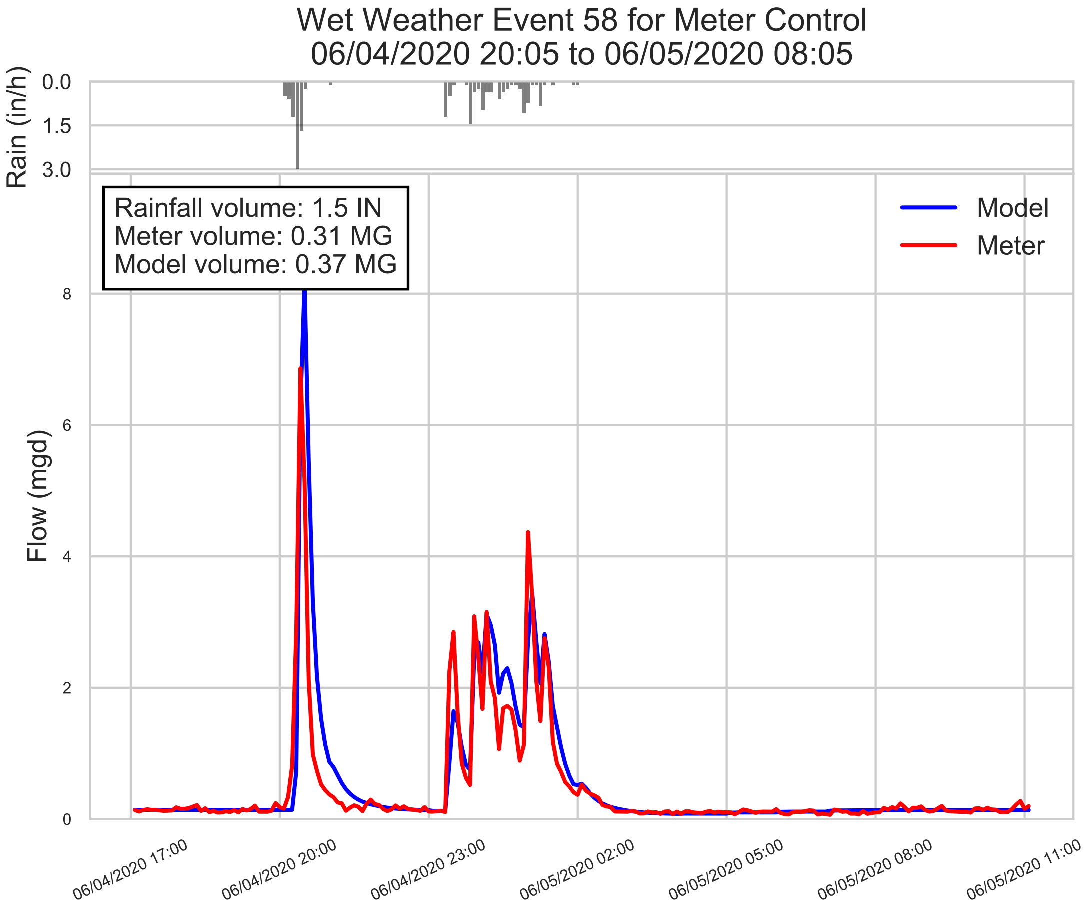
Wet Weather Event 54 for Meter Control
05/03/2020 21:35 to 05/04/2020 13:20
Rain (in/h)
0.0
0.3
0.6
Rainfall volume: 0.82 IN
Meter volume: 0.24 MG
Model volume: 0.23 MG
Model
Meter
Flow (mgd)
3.0
2.5
2.0
1.5
1.0
0.5
0.0
05/03/2020 20:00
05/03/2020 23:00
05/04/2020 02:00
05/04/2020 05:00
05/04/2020 08:00
05/04/2020 11:00
05/04/2020 14:00
05/04/2020 17:00


Wet Weather Event 55 for Meter Control
05/05/2020 19:54 to 05/06/2020 21:04
Rain (in/h)
0.0
0.3
0.6
Rainfall volume: 0.66 IN
Meter volume: 0.29 MG
Model volume: 0.22 MG
Model
Meter
Flow (mgd)
2.5
2.0
1.5
1.0
0.5
0.0
05/05/2020 17:00
05/05/2020 20:00
05/05/2020 23:00
05/06/2020 02:00
05/06/2020 05:00
05/06/2020 08:00
05/06/2020 11:00
05/06/2020 14:00
05/06/2020 17:00
05/06/2020 20:00
05/06/2020 23:00

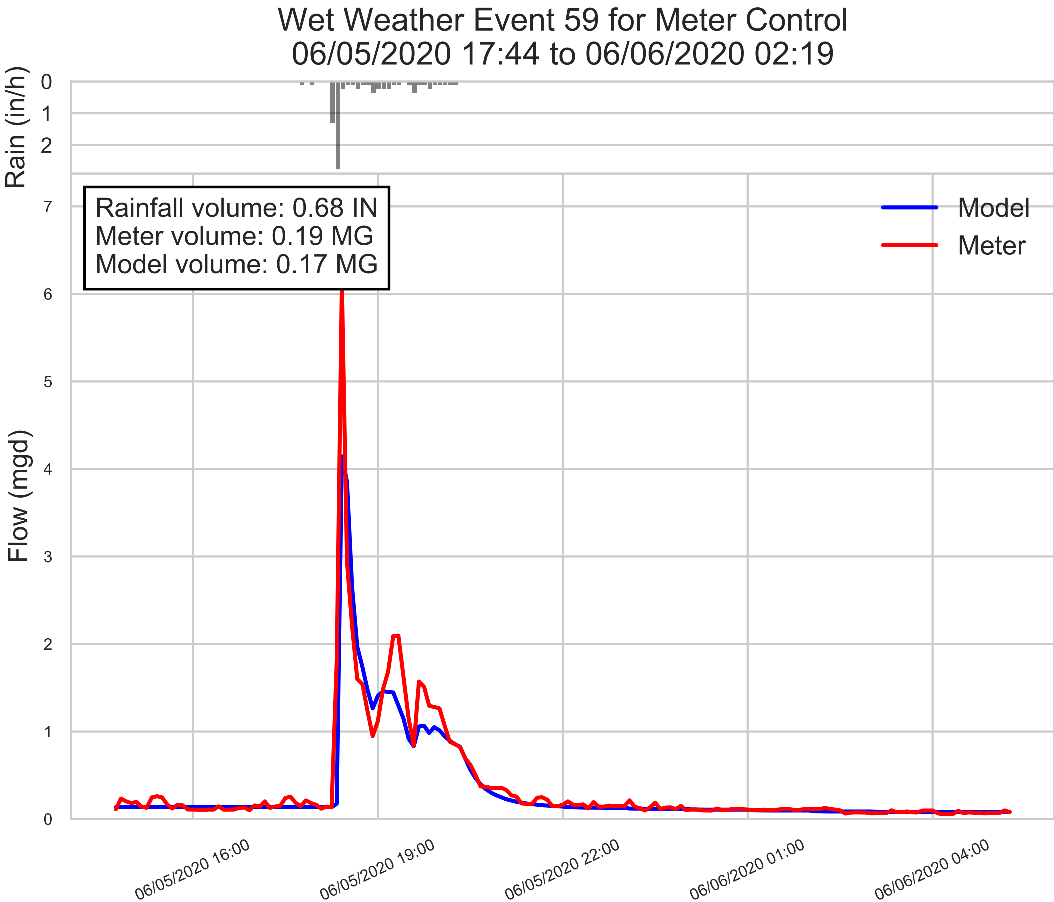


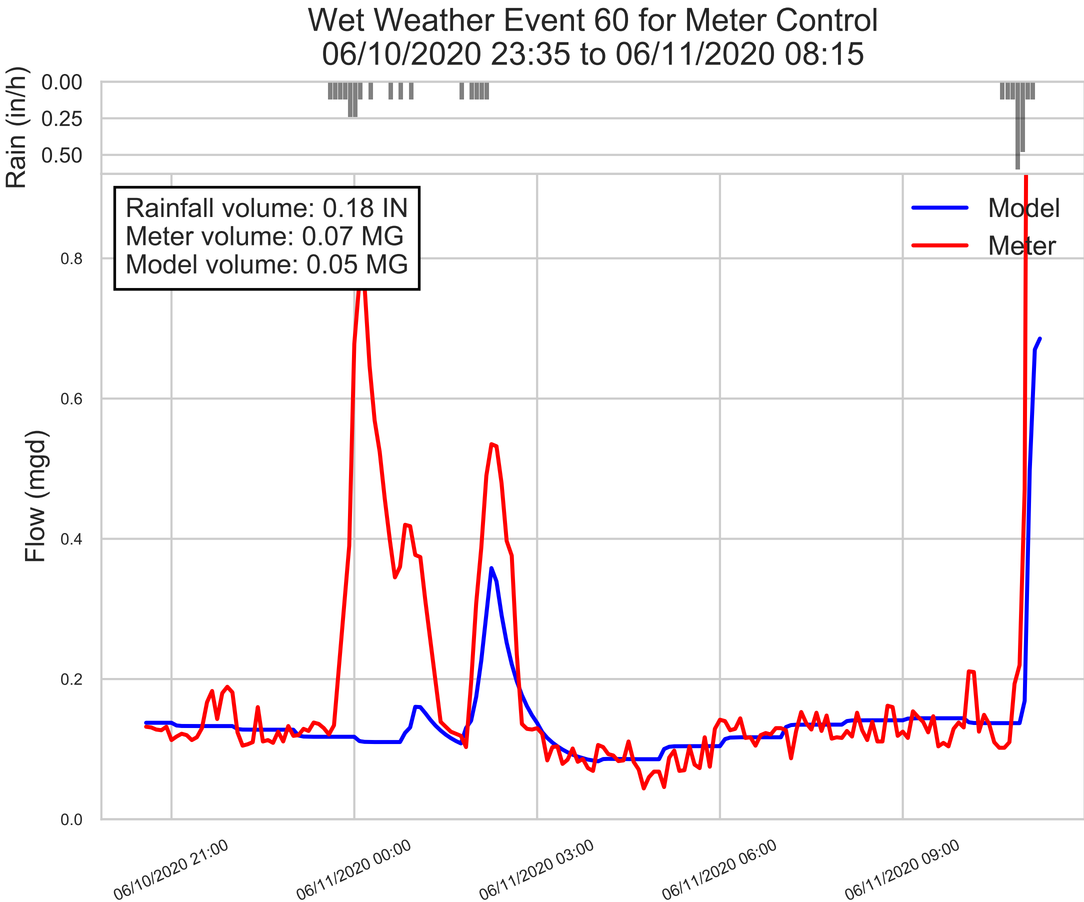
Wet Weather Event 56 for Meter Control
05/08/2020 14:44 to 05/09/2020 05:10
Rain (in/h)
0.0
0.2
0.4
Rainfall volume: 0.16 IN
Meter volume: 0.08 MG
Model volume: 0.07 MG
Model
Meter
Flow (mgd)
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
05/08/2020 12:00
05/08/2020 15:00
05/08/2020 18:00
05/08/2020 21:00
05/09/2020 00:00
05/09/2020 03:00
05/09/2020 06:00
05/09/2020 09:00


Wet Weather Event 57 for Meter Control
05/22/2020 04:59 to 05/22/2020 20:24
Rain (in/h)
0.0
0.3
0.6
Rainfall volume: 0.56 IN
Meter volume: 0.25 MG
Model volume: 0.17 MG
Model
Meter
Flow (mgd)
0.0
0.5
1.0
1.5
2.0
2.5
05/22/2020 01:00
05/22/2020 04:00
05/22/2020 07:00
05/22/2020 10:00
05/22/2020 13:00
05/22/2020 16:00
05/22/2020 19:00
05/22/2020 22:00

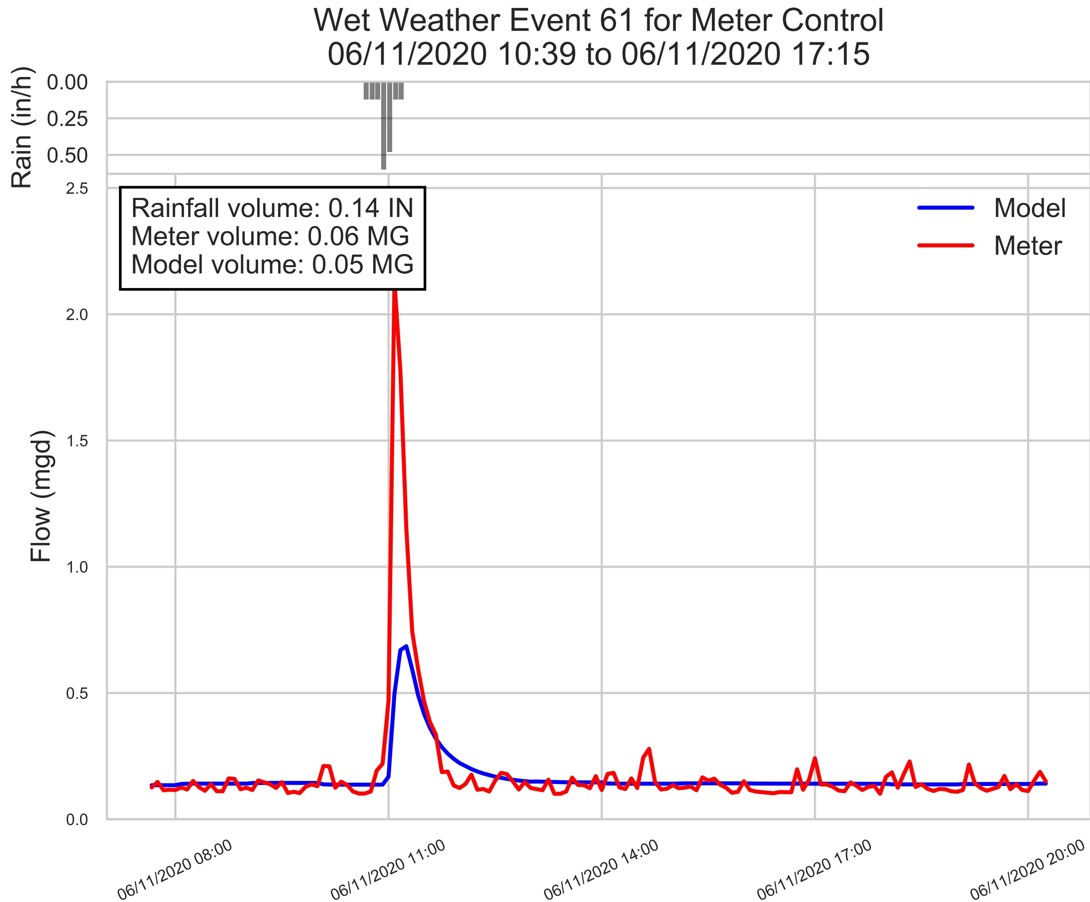


Wet Weather Event 58 for Meter Control
06/04/2020 20:05 to 06/05/2020 08:05
Rain (in/h)
0.0
1.5
3.0
Rainfall volume: 1.5 IN
Meter volume: 0.31 MG
Model volume: 0.37 MG
Model
Meter
Flow (mgd)
0
2
4
6
8
06/04/2020 17:00
06/04/2020 20:00
06/04/2020 23:00
06/05/2020 02:00
06/05/2020 05:00
06/05/2020 08:00
06/05/2020 11:00

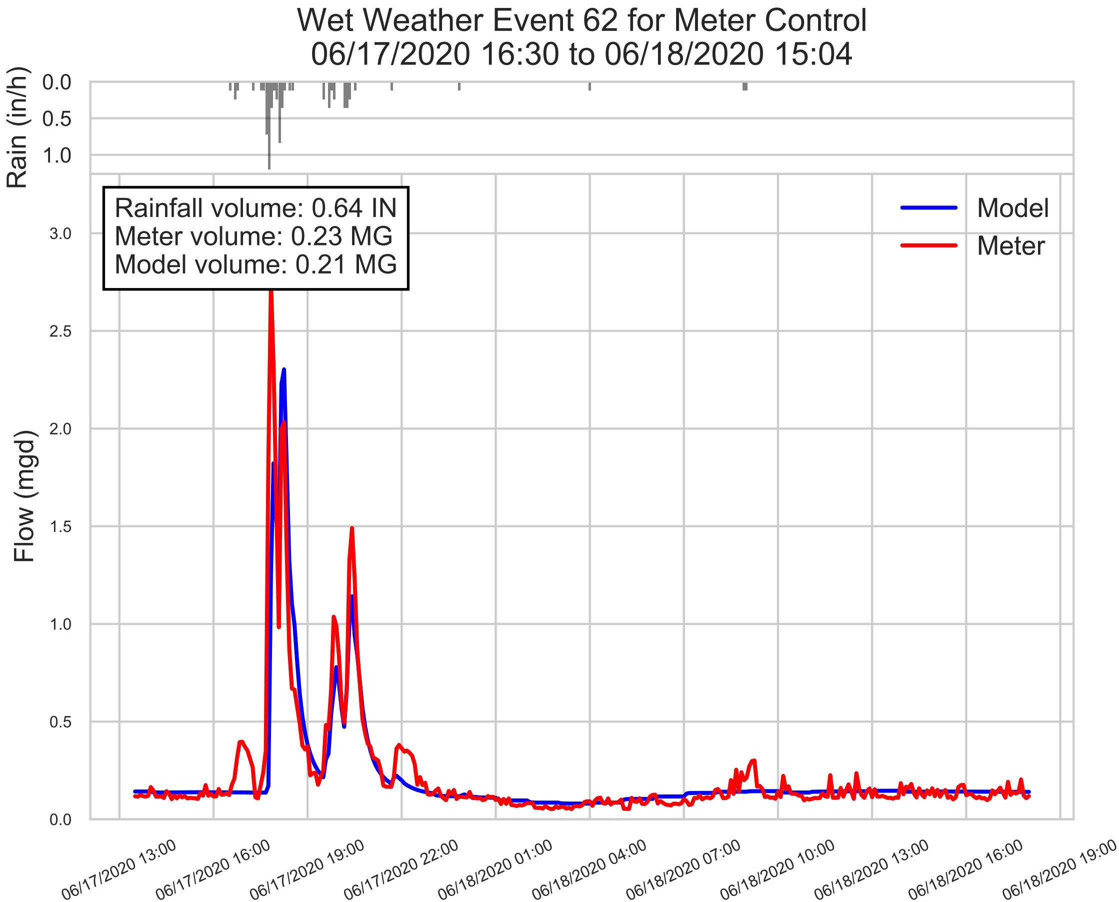

Wet Weather Event 59 for Meter Control
06/05/2020 17:44 to 06/06/2020 02:19
Rain (in/h)
0
1
2
Rainfall volume: 0.68 IN
Meter volume: 0.19 MG
Model volume: 0.17 MG
Model
Meter
Flow (mgd)
7
6
5
4
3
2
1
0
06/05/2020 16:00
06/05/2020 19:00
06/05/2020 22:00
06/06/2020 01:00
06/06/2020 04:00



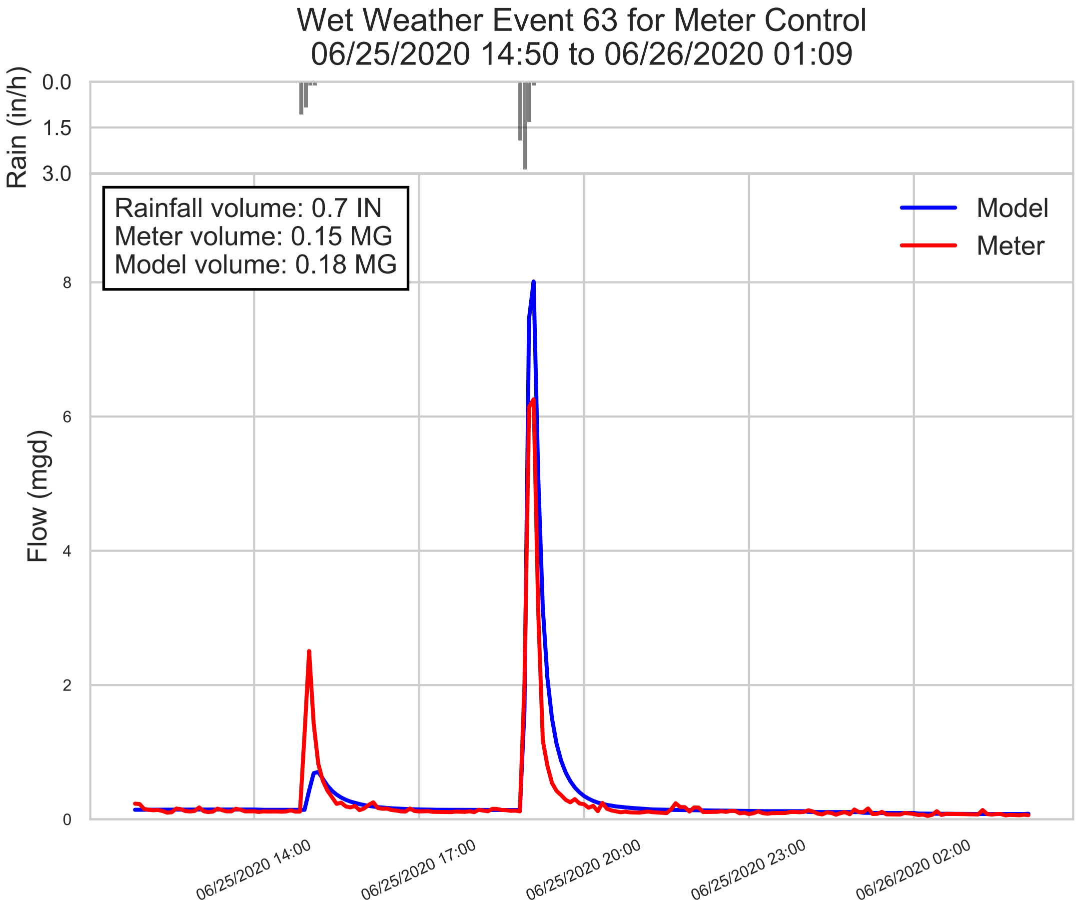
Wet Weather Event 60 for Meter Control
06/10/2020 23:35 to 06/11/2020 08:15
Rain (in/h)
0.00
0.25
0.50
Rainfall volume: 0.18 IN
Meter volume: 0.07 MG
Model volume: 0.05 MG
Model
Meter
Flow (mgd)
0.8
0.6
0.4
0.2
0.0
06/10/2020 21:00
06/11/2020 00:00
06/11/2020 03:00
06/11/2020 06:00
06/11/2020 09:00



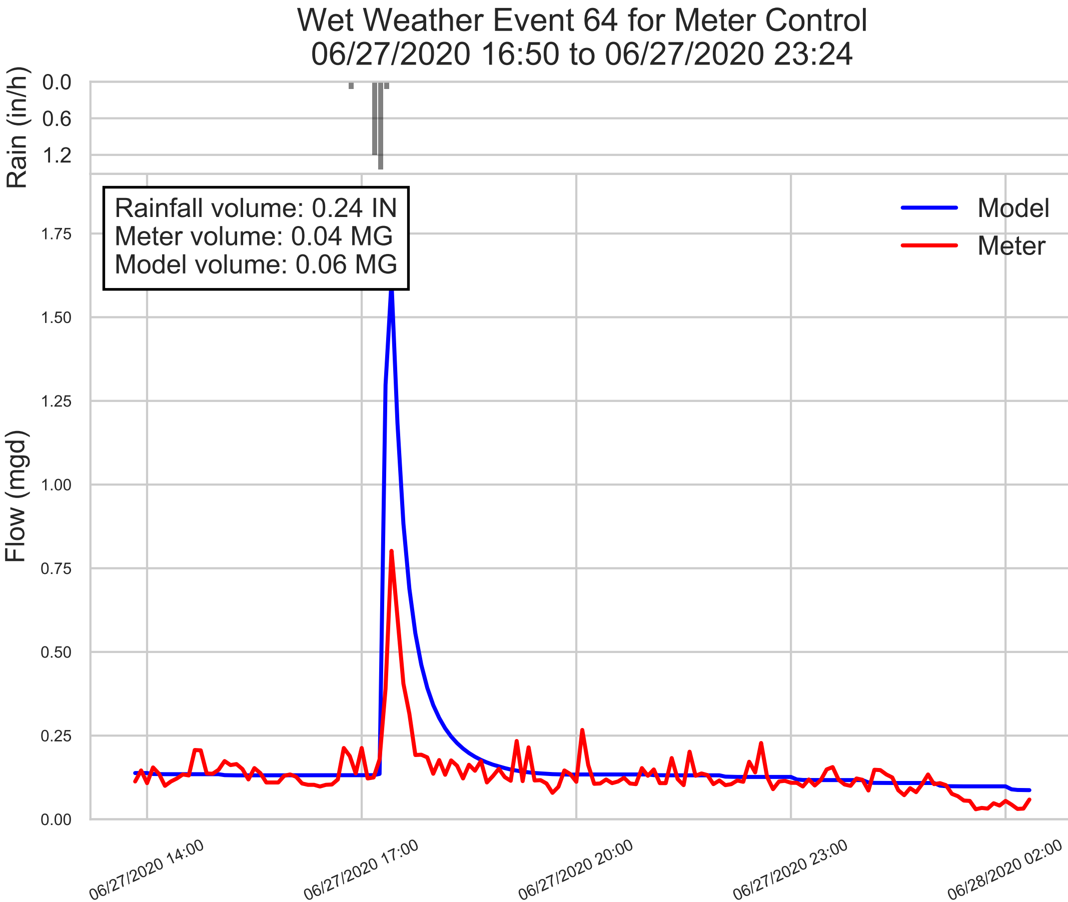
Wet Weather Event 61 for Meter Control
06/11/2020 10:39 to 06/11/2020 17:15
Rain (in/h)
0.00
0.25
0.50
Rainfall volume: 0.14 IN
Meter volume: 0.06 MG
Model volume: 0.05 MG
Model
Meter
Flow (mgd)
2.5
2.0
1.5
1.0
0.5
0.0
06/11/2020 08:00
06/11/2020 11:00
06/11/2020 14:00
06/11/2020 17:00
06/11/2020 20:00



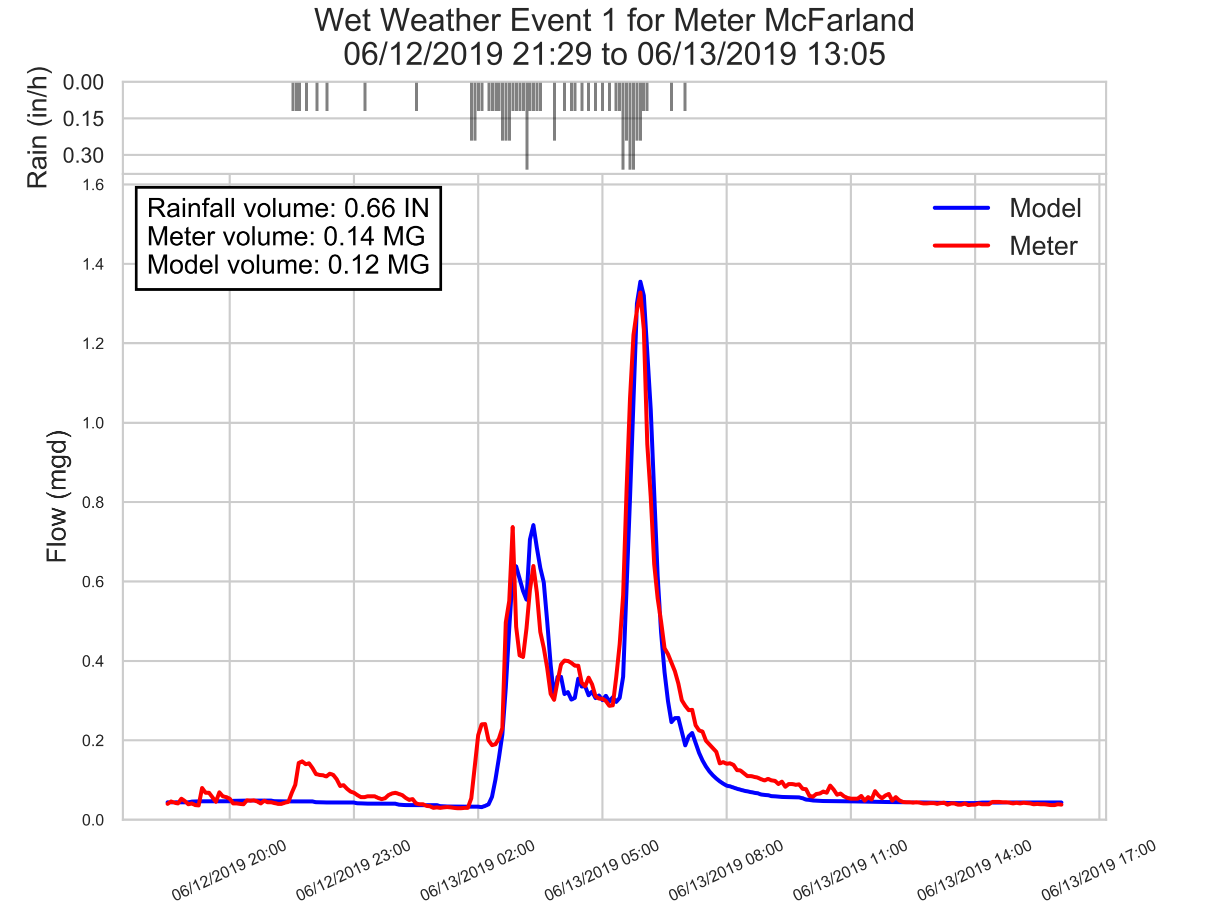
Wet Weather Event 62 for Meter Control
06/17/2020 16:30 to 06/18/2020 15:04
Rain (in/h)
0.0
0.5
1.0
Rainfall volume: 0.64 IN
Meter volume: 0.23 MG
Model volume: 0.21 MG
Model
Meter
Flow (mgd)
3.0
2.5
2.0
1.5
1.0
0.5
0.0
06/17/2020 13:00
06/17/2020 16:00
06/17/2020 19:00
06/17/2020 22:00
06/18/2020 01:00
06/18/2020 04:00
06/18/2020 07:00
06/18/2020 10:00
06/18/2020 13:00
06/18/2020 16:00
06/18/2020 19:00



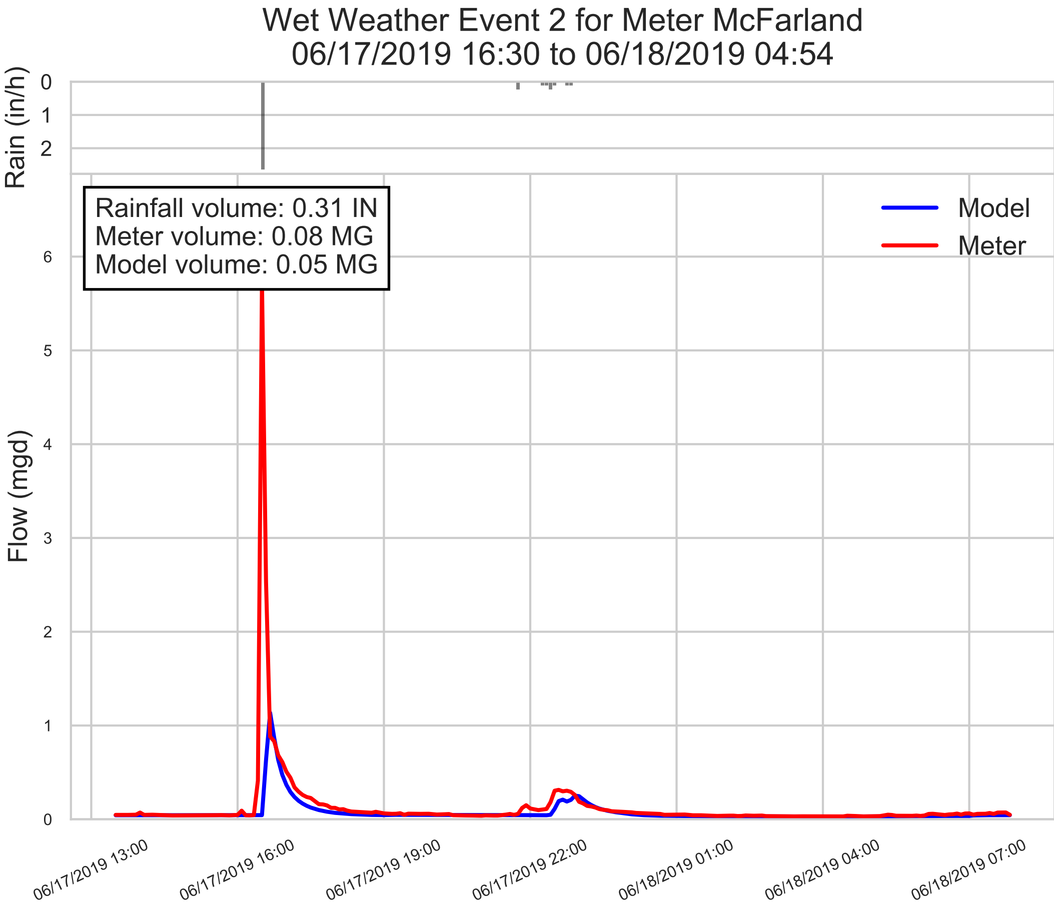
Wet Weather Event 63 for Meter Control
06/25/2020 14:50 to 06/26/2020 01:09
Rain (in/h)
0.0
1.5
3.0
Rainfall volume: 0.7 IN
Meter volume: 0.15 MG
Model volume: 0.18 MG
Model
Meter
Flow (mgd)
0
2
4
6
8
06/25/2020 14:00
06/25/2020 17:00
06/25/2020 20:00
06/25/2020 23:00
06/26/2020 02:00

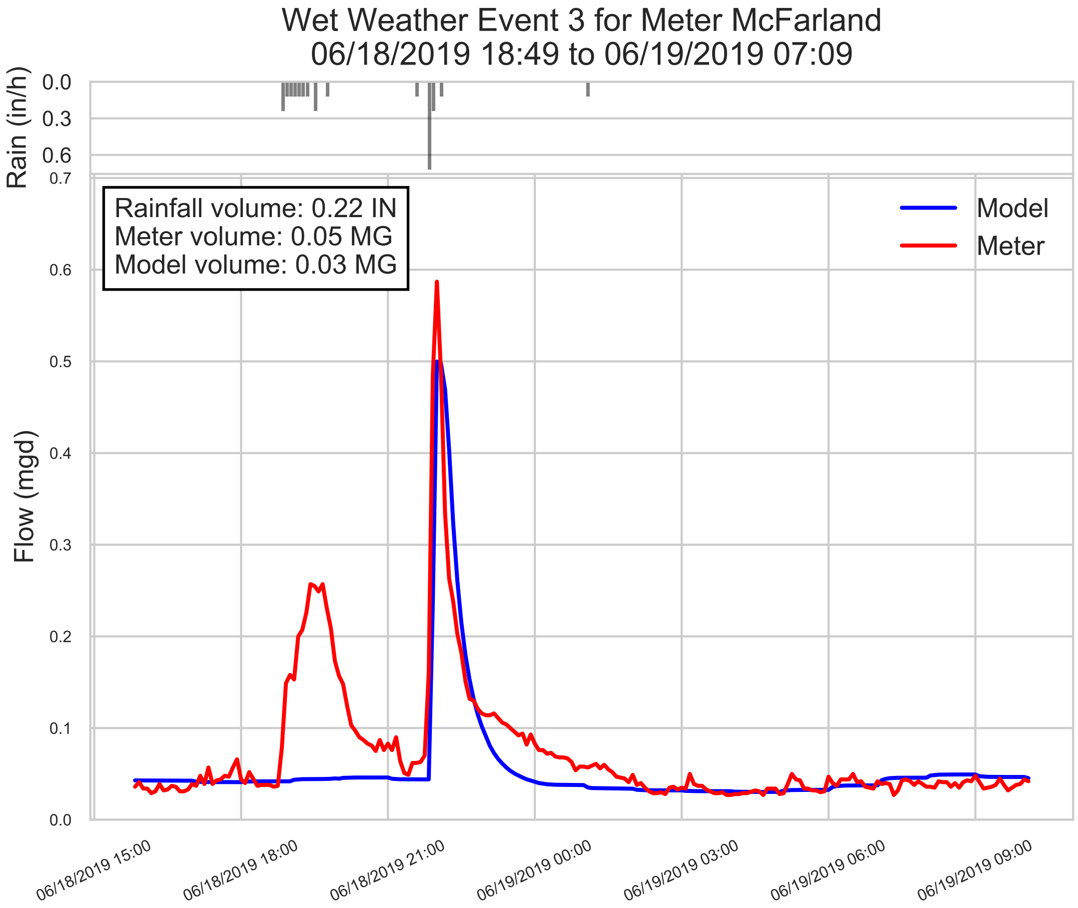


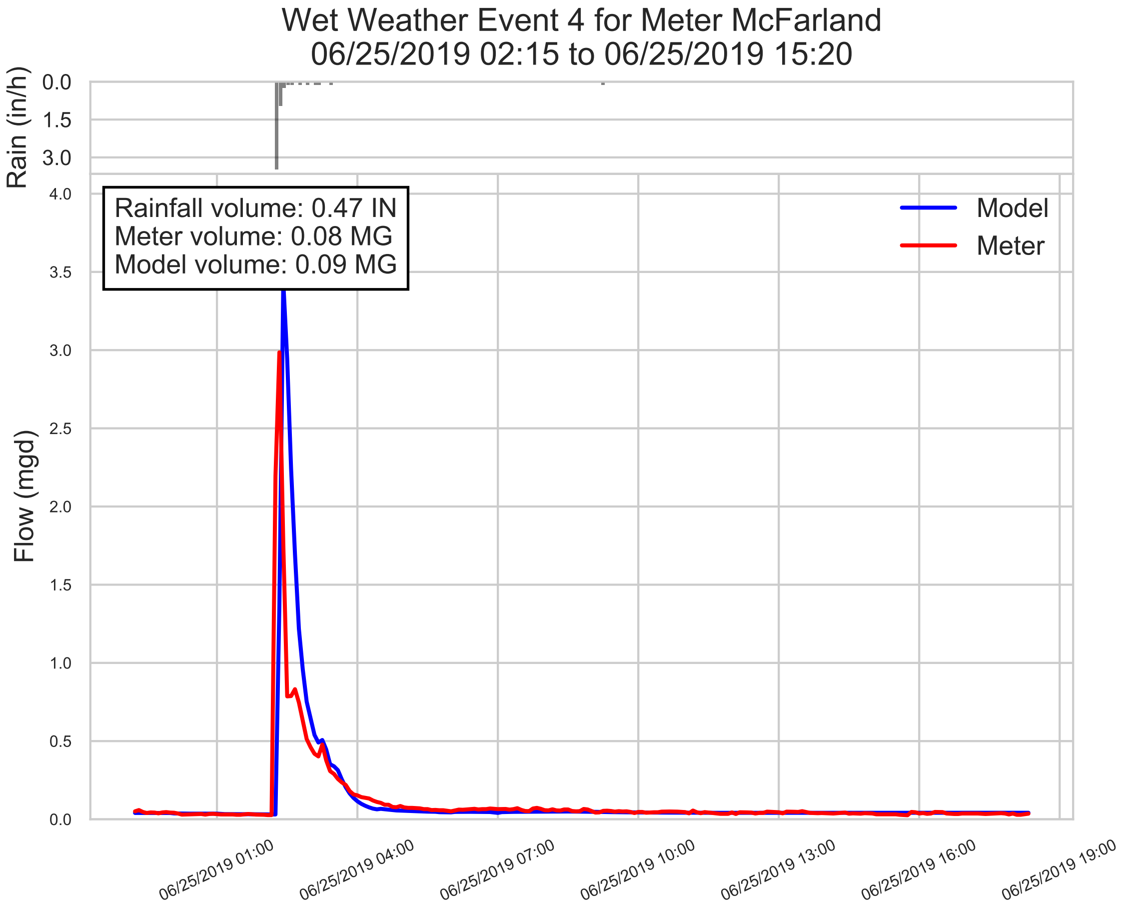
Wet Weather Event 64 for Meter Control
06/27/2020 16:50 to 06/27/2020 23:24
Rain (in/h)
0.0
0.6
1.2
Rainfall volume: 0.24 IN
Meter volume: 0.04 MG
Model volume: 0.06 MG
Model
Meter
Flow (mgd)
1.75
1.50
1.25
1.00
0.75
0.50
0.25
0.00
06/27/2020 14:00
06/27/2020 17:00
06/27/2020 20:00
06/27/2020 23:00
06/28/2020 02:00



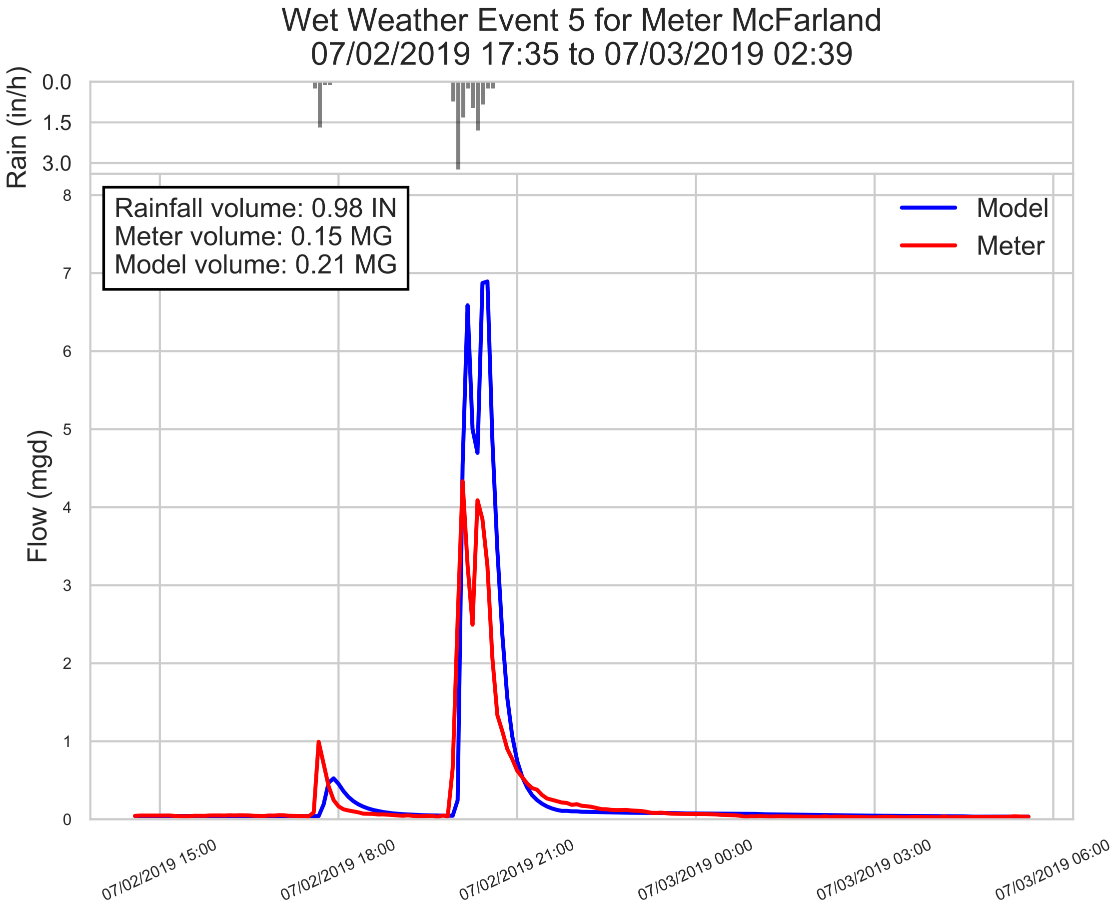
Wet Weather Event 1 for Meter McFarland
06/12/2019 21:29 to 06/13/2019 13:05
Rain (in/h)
0.00
0.15
0.30
Flow (mgd)
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
Rainfall volume: 0.66 IN
Meter volume: 0.14 MG
Model volume: 0.12 MG
Model
Meter
06/12/2019 20:00
06/12/2019 23:00
06/13/2019 02:00
06/13/2019 05:00
06/13/2019 08:00
06/13/2019 11:00
06/13/2019 14:00
06/13/2019 17:00


Wet Weather Event 2 for Meter McFarland
06/17/2019 16:30 to 06/18/2019 04:54
Rain (in/h)
0
1
2
Rainfall volume: 0.31 IN
Meter volume: 0.08 MG
Model volume: 0.05 MG
Model
Meter
Flow (mgd)
6
5
4
3
2
1
0
06/17/2019 13:00
06/17/2019 16:00
06/17/2019 19:00
06/17/2019 22:00
06/18/2019 01:00
06/18/2019 04:00
06/18/2019 07:00

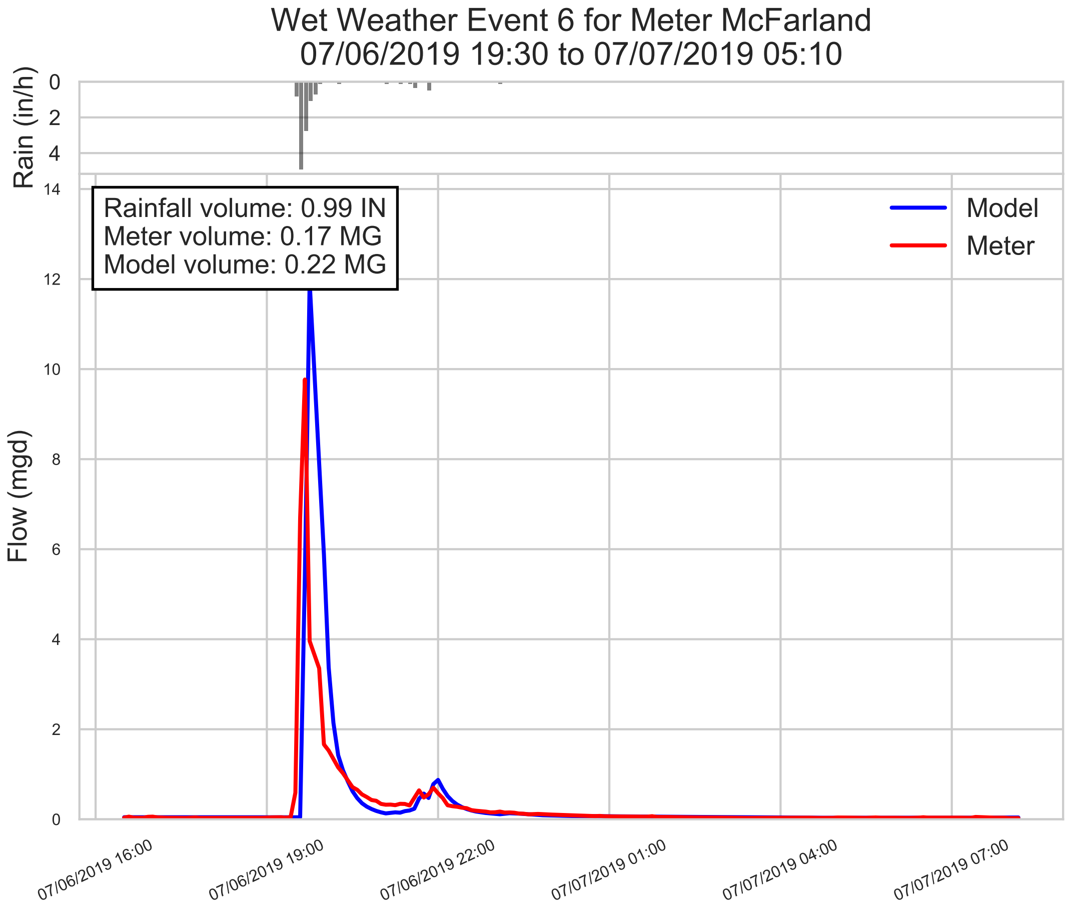

Wet Weather Event 3 for Meter McFarland
06/18/2019 18:49 to 06/19/2019 07:09
Rain (in/h)
0.0
0.3
0.6
Rainfall volume: 0.22 IN
Meter volume: 0.05 MG
Model volume: 0.03 MG
Model
Meter
Flow (mgd)
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
06/18/2019 15:00
06/18/2019 18:00
06/18/2019 21:00
06/19/2019 00:00
06/19/2019 03:00
06/19/2019 06:00
06/19/2019 09:00



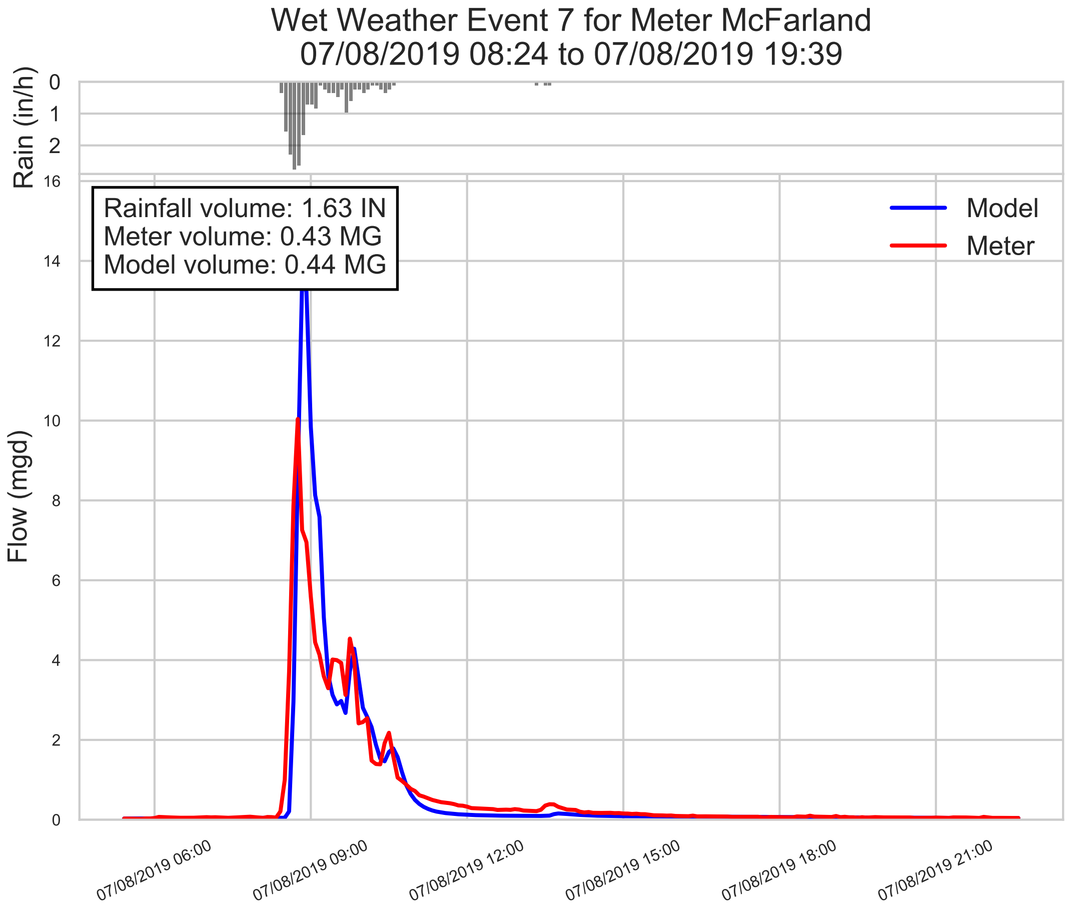
Wet Weather Event 4 for Meter McFarland
06/25/2019 02:15 to 06/25/2019 15:20
Rain (in/h)
0.0
1.5
3.0
Rainfall volume: 0.47 IN
Meter volume: 0.08 MG
Model volume: 0.09 MG
Model
Meter
Flow (mgd)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
06/25/2019 01:00
06/25/2019 04:00
06/25/2019 07:00
06/25/2019 10:00
06/25/2019 13:00
06/25/2019 16:00
06/25/2019 19:00



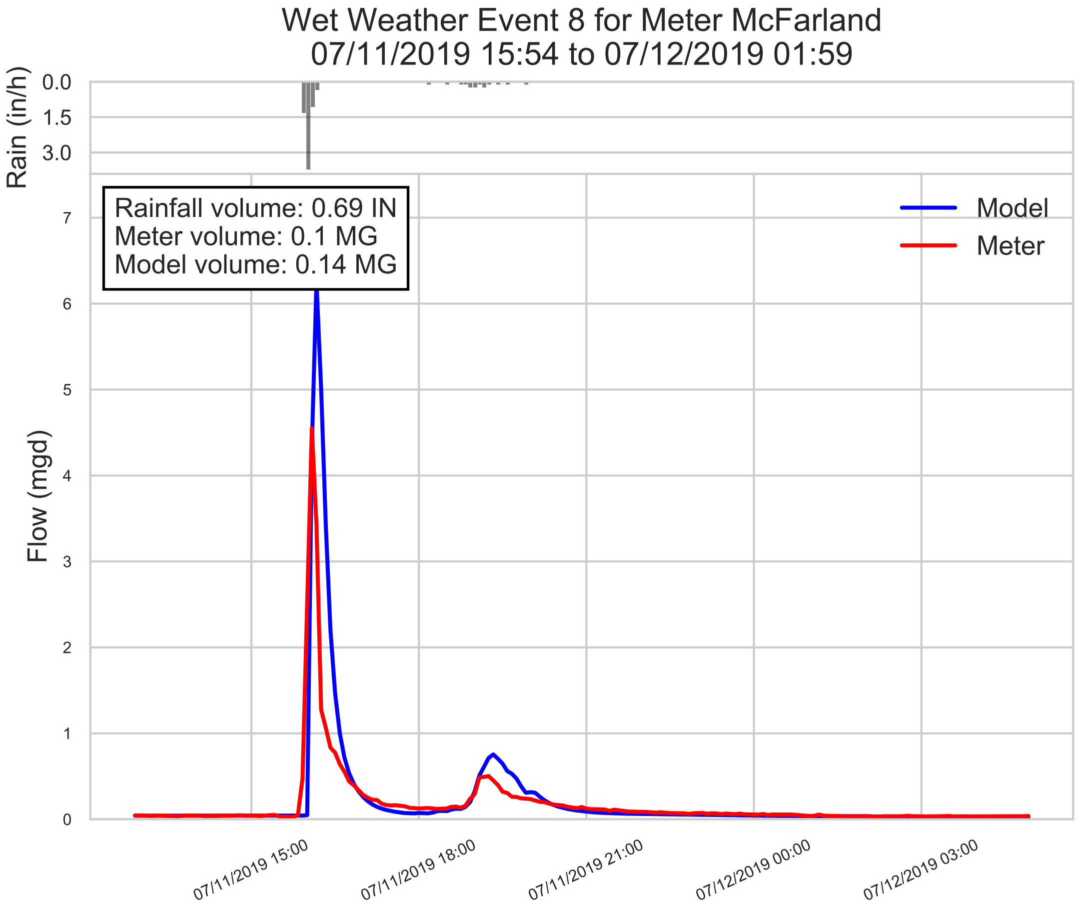
Wet Weather Event 5 for Meter McFarland
07/02/2019 17:35 to 07/03/2019 02:39
Rain (in/h)
0.0
1.5
3.0
Rainfall volume: 0.98 IN
Meter volume: 0.15 MG
Model volume: 0.21 MG
Model
Meter
Flow (mgd)
0
1
2
3
4
5
6
7
8
07/02/2019 15:00
07/02/2019 18:00
07/02/2019 21:00
07/03/2019 00:00
07/03/2019 03:00
07/03/2019 06:00



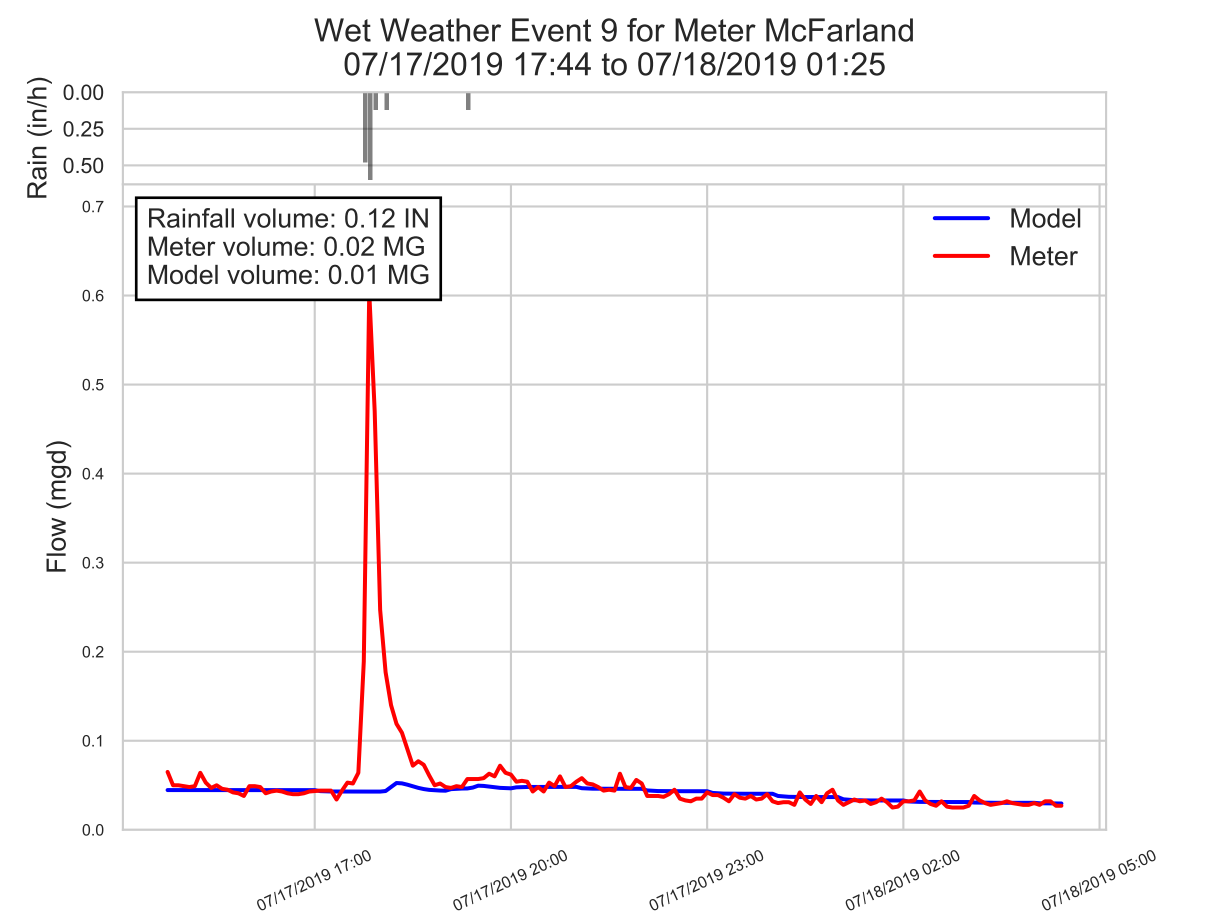
Wet Weather Event 6 for Meter McFarland
07/06/2019 19:30 to 07/07/2019 05:10
Rain (in/h)
Flow (mgd)
Rainfall volume: 0.99 IN
Meter volume: 0.17 MG
Model volume: 0.22 MG
Model
Meter
07/06/2019 16:00
07/06/2019 19:00
07/06/2019 22:00
07/07/2019 01:00
07/07/2019 04:00
07/07/2019 07:00



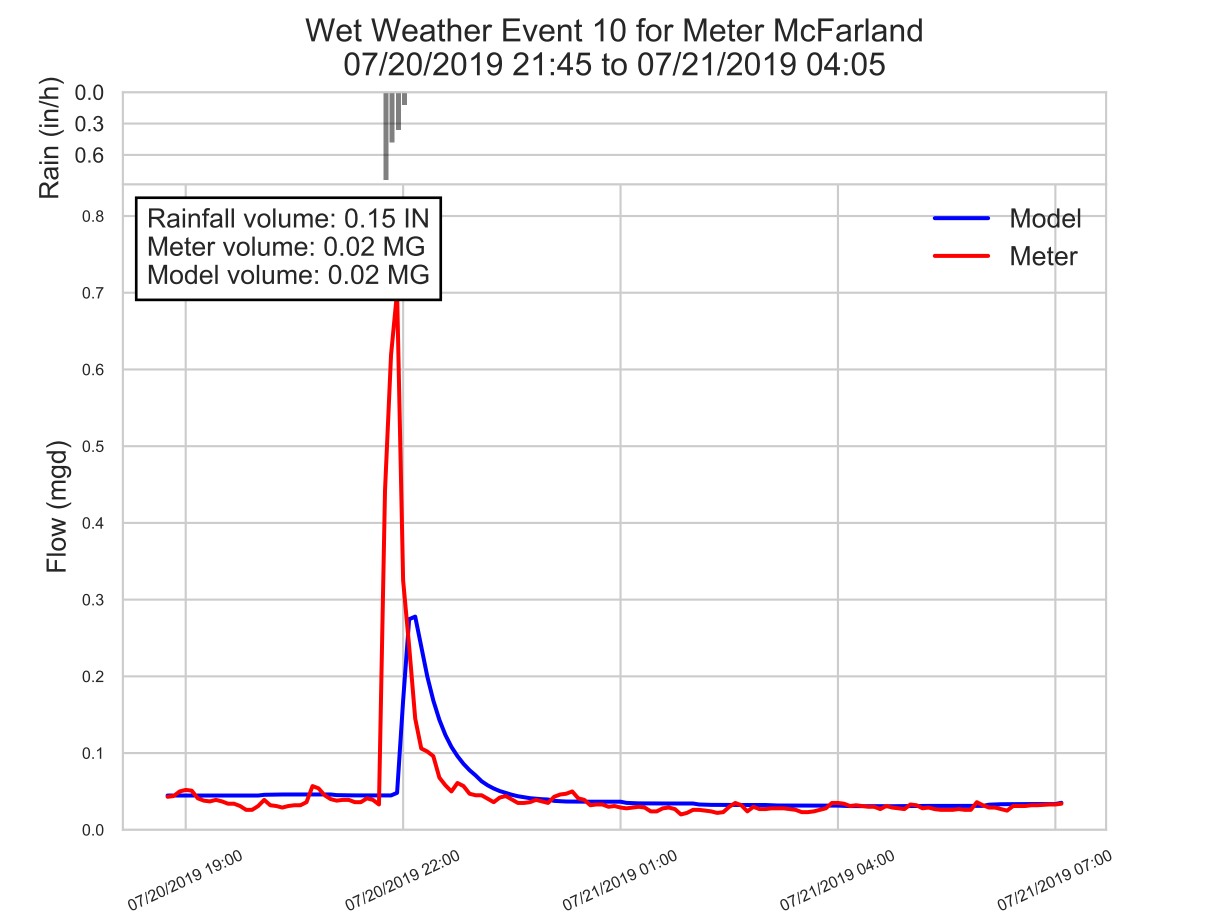
Wet Weather Event 7 for Meter McFarland
07/08/2019 08:24 to 07/08/2019 19:39
Rain (in/h)
0
1
2
Flow (mgd)
16
14
12
10
8
6
4
2
0
Rainfall volume: 1.63 IN
Meter volume: 0.43 MG
Model volume: 0.44 MG
Model
Meter
07/08/2019 06:00
07/08/2019 09:00
07/08/2019 12:00
07/08/2019 15:00
07/08/2019 18:00
07/08/2019 21:00



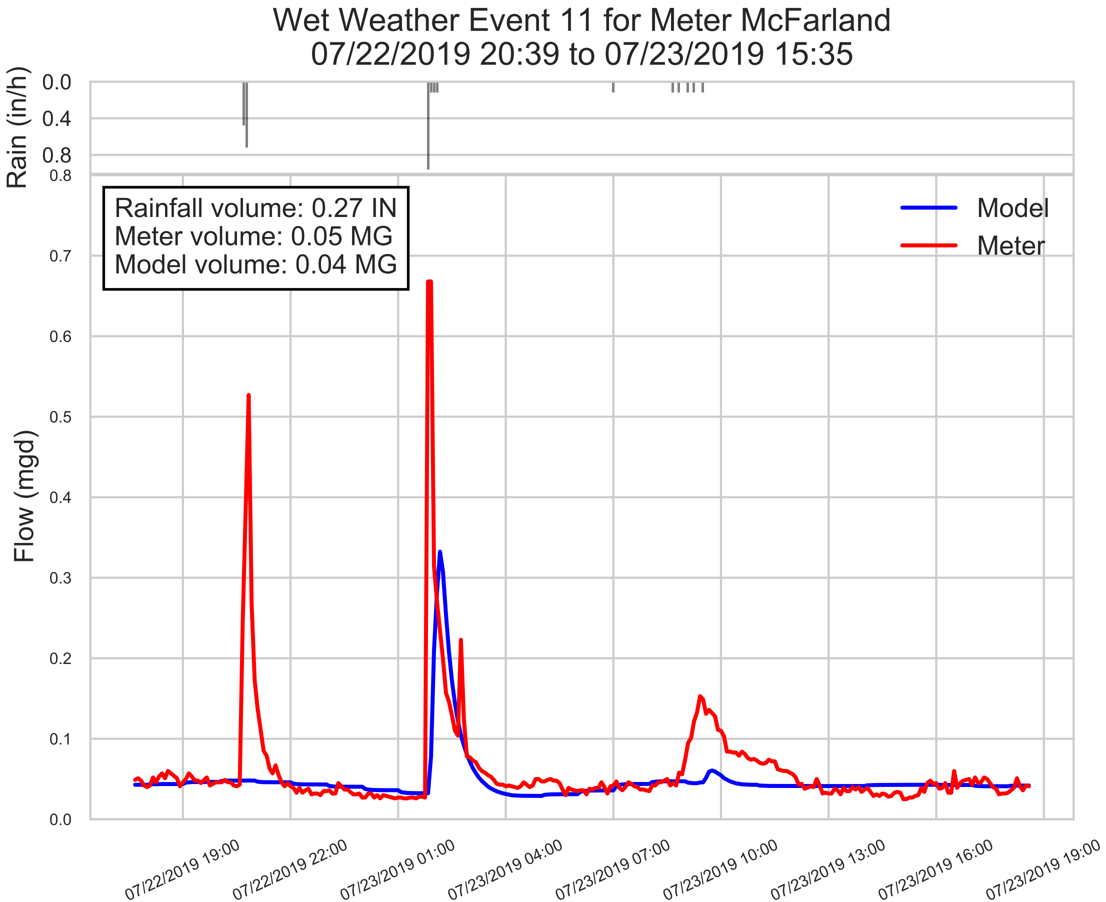
Wet Weather Event 8 for Meter McFarland
07/11/2019 15:54 to 07/12/2019 01:59
Rain (in/h)
0.0
1.5
3.0
Rainfall volume: 0.69 IN
Meter volume: 0.1 MG
Model volume: 0.14 MG
Model
Meter
Flow (mgd)
7
6
5
4
3
2
1
0
07/11/2019 15:00
07/11/2019 18:00
07/11/2019 21:00
07/12/2019 00:00
07/12/2019 03:00



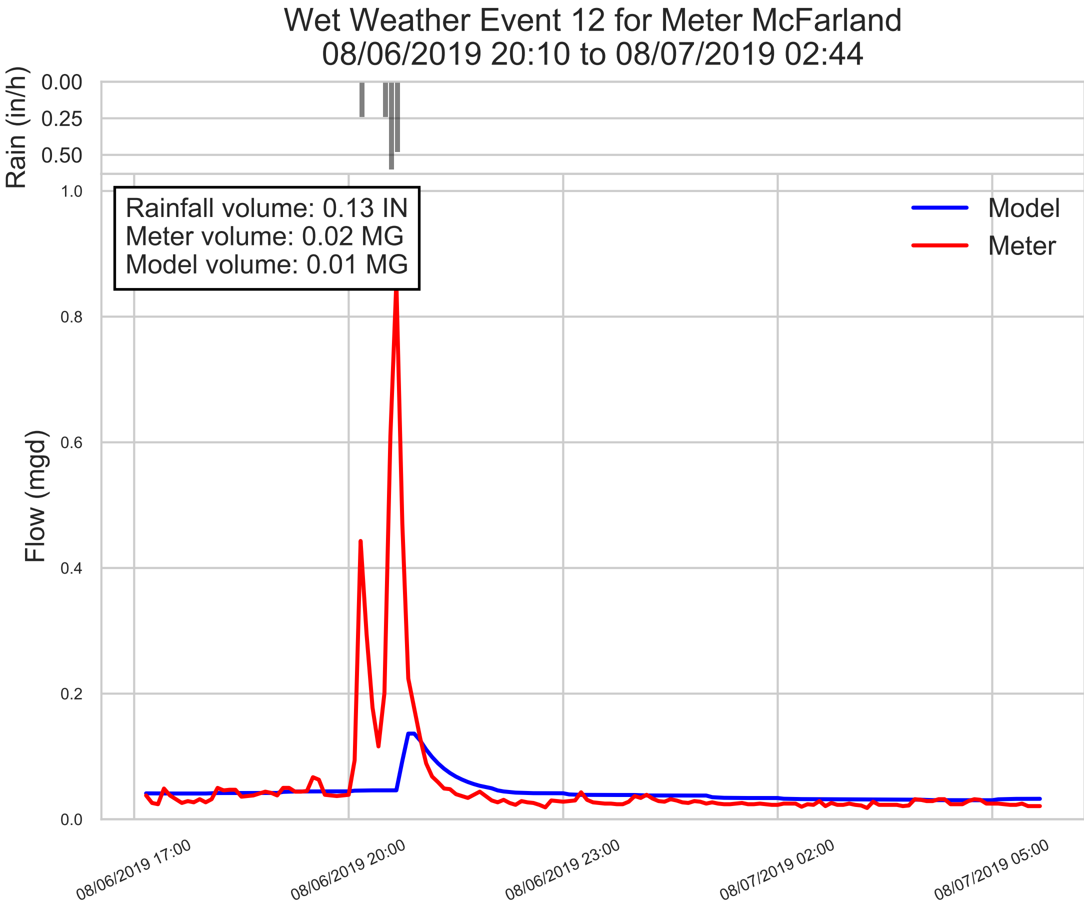
Wet Weather Event 9 for Meter McFarland
07/17/2019 17:44 to 07/18/2019 01:25
Rain (in/h)
0.00
0.25
0.50
Rainfall volume: 0.12 IN
Meter volume: 0.02 MG
Model volume: 0.01 MG
Model
Meter
Flow (mgd)
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
07/17/2019 17:00
07/17/2019 20:00
07/17/2019 23:00
07/18/2019 02:00
07/18/2019 05:00

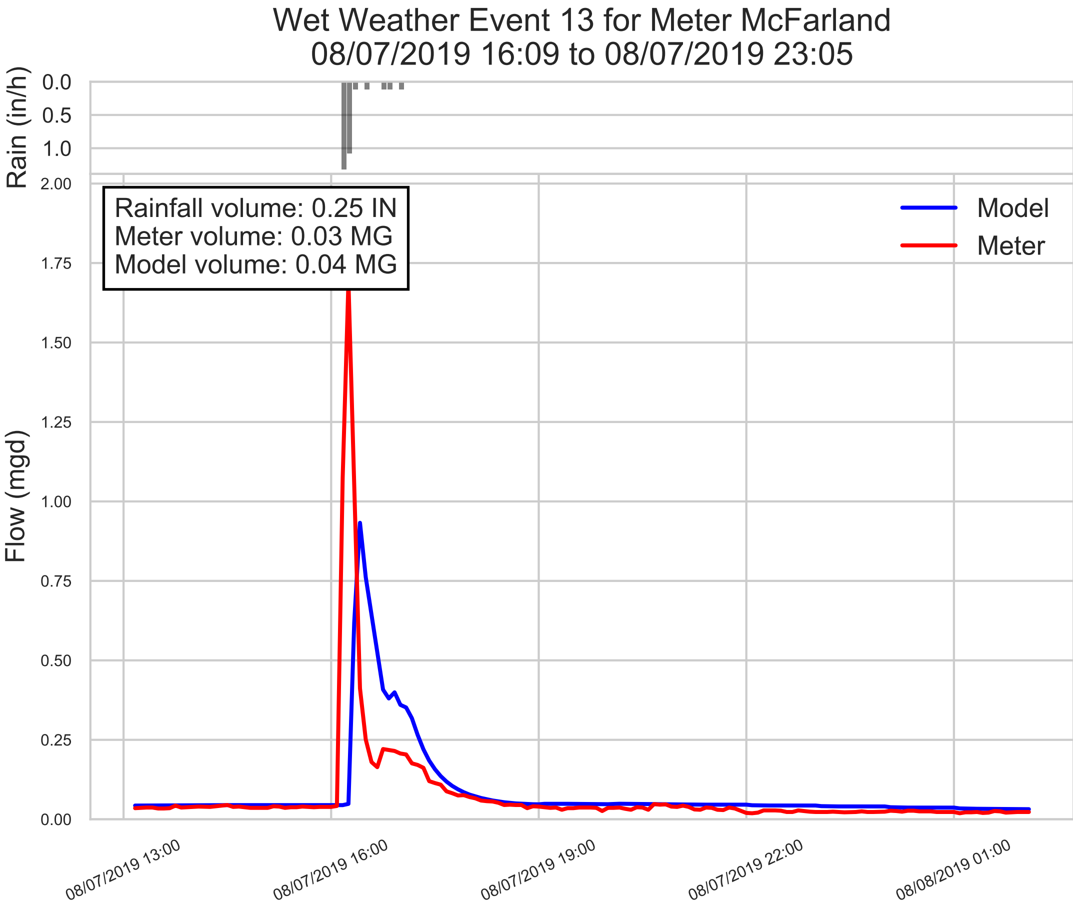


Wet Weather Event 10 for Meter McFarland
07/20/2019 21:45 to 07/21/2019 04:05
Rain (in/h)
0.0
0.3
0.6
Rainfall volume: 0.15 IN
Meter volume: 0.02 MG
Model volume: 0.02 MG
Model
Meter
Flow (mgd)
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
07/20/2019 19:00
07/20/2019 22:00
07/21/2019 01:00
07/21/2019 04:00
07/21/2019 07:00

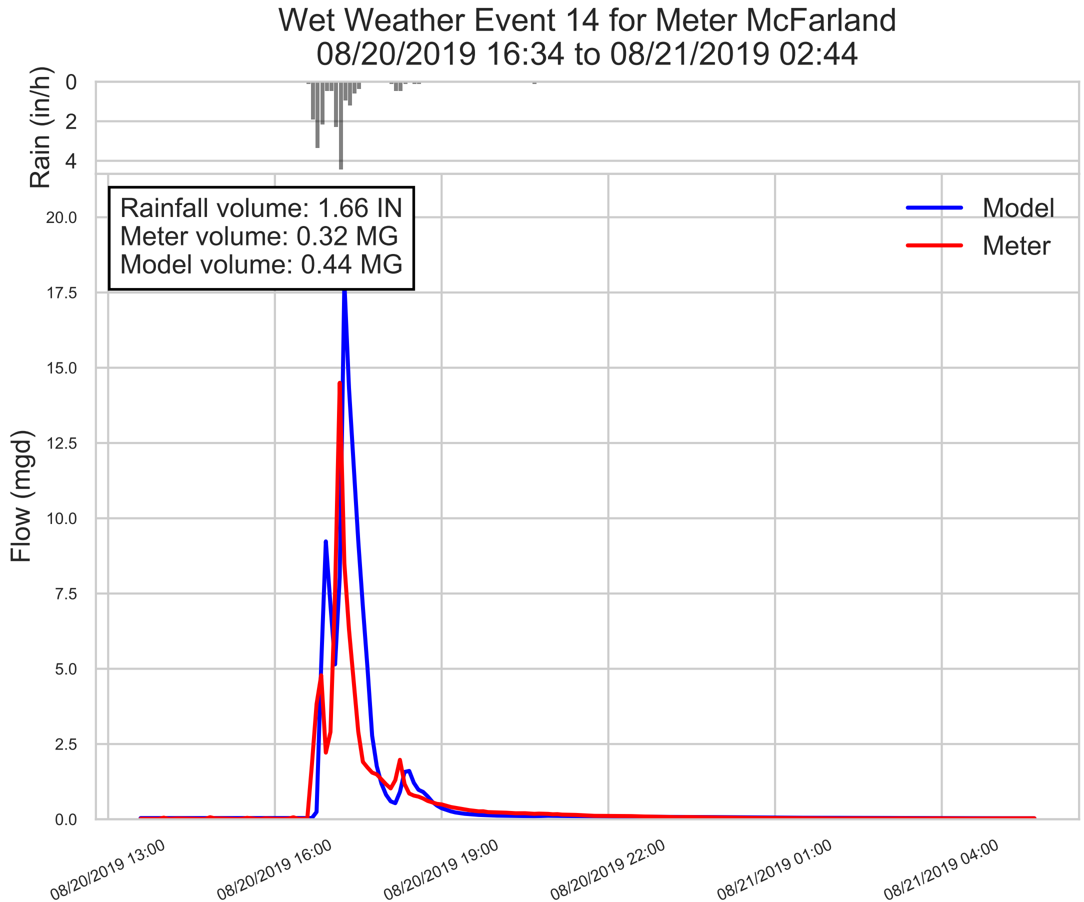


Wet Weather Event 11 for Meter McFarland
07/22/2019 20:39 to 07/23/2019 15:35
Rain (in/h)
0.0
0.4
0.8
Rainfall volume: 0.27 IN
Meter volume: 0.05 MG
Model volume: 0.04 MG
Model
Meter
Flow (mgd)
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
07/22/2019 19:00
07/22/2019 22:00
07/23/2019 01:00
07/23/2019 04:00
07/23/2019 07:00
07/23/2019 10:00
07/23/2019 13:00
07/23/2019 16:00
07/23/2019 19:00

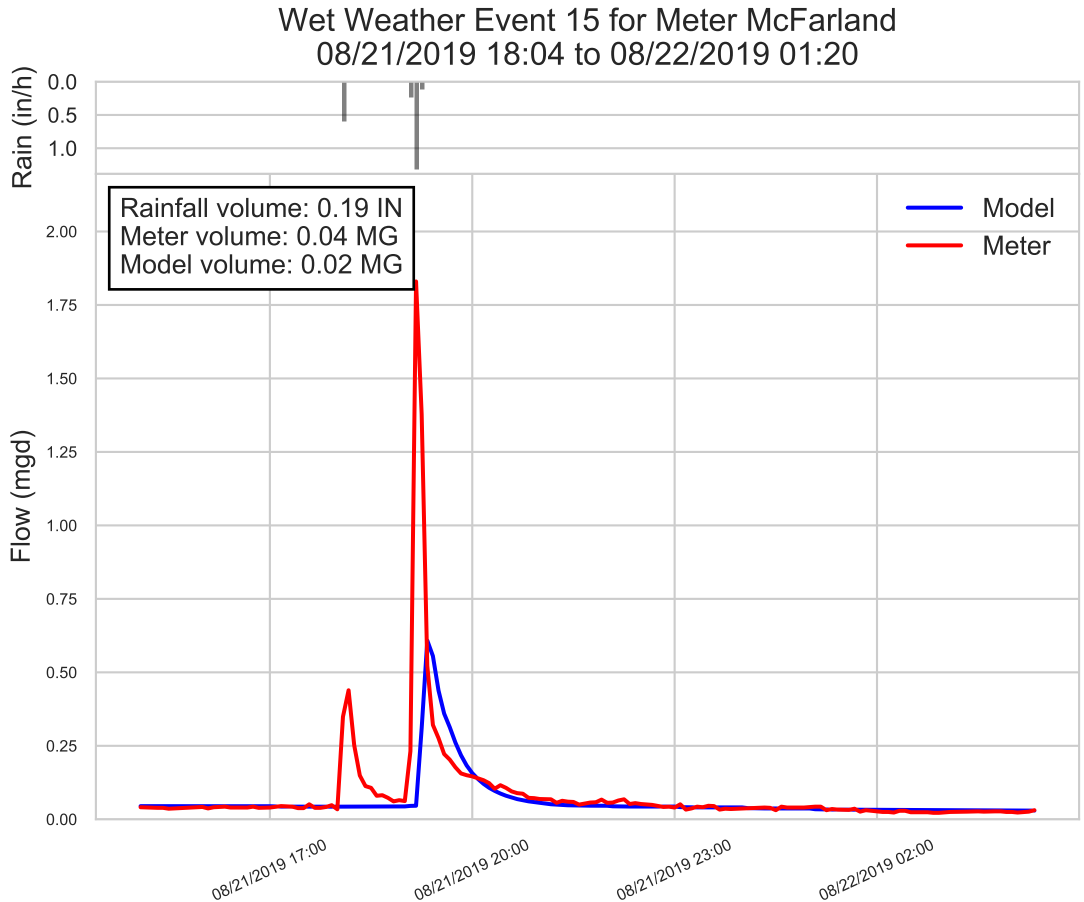

Wet Weather Event 12 for Meter McFarland
08/06/2019 20:10 to 08/07/2019 02:44
Rain (in/h)
0.00
0.25
0.50
Rainfall volume: 0.13 IN
Meter volume: 0.02 MG
Model volume: 0.01 MG
Model
Meter
Flow (mgd)
1.0
0.8
0.6
0.4
0.2
0.0
08/06/2019 17:00
08/06/2019 20:00
08/06/2019 23:00
08/07/2019 02:00
08/07/2019 05:00



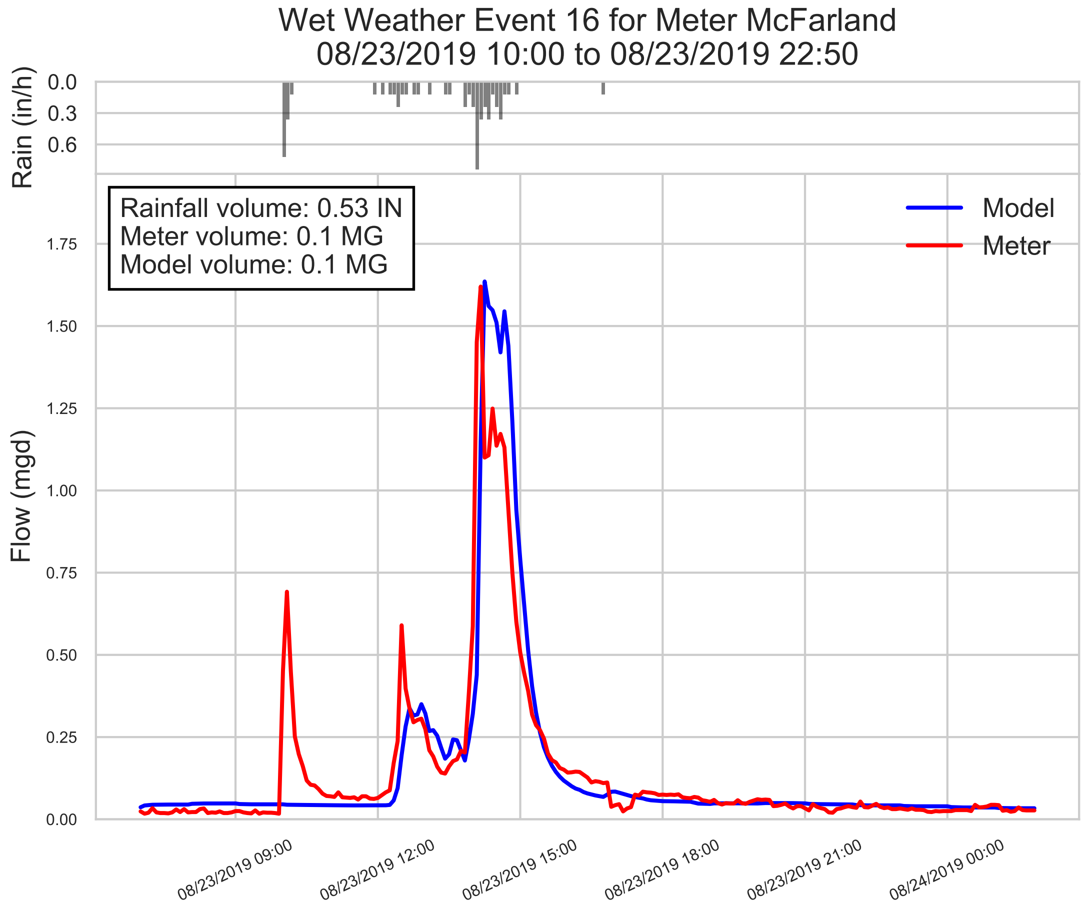
Wet Weather Event 13 for Meter McFarland
08/07/2019 16:09 to 08/07/2019 23:05
Rain (in/h)
0.0
0.5
1.0
2.00
1.75
1.50
1.25
1.00
0.75
0.50
0.25
0.00
Flow (mgd)
Rainfall volume: 0.25 IN
Meter volume: 0.03 MG
Model volume: 0.04 MG
Model
Meter
08/07/2019 13:00
08/07/2019 16:00
08/07/2019 19:00
08/07/2019 22:00
08/08/2019 01:00



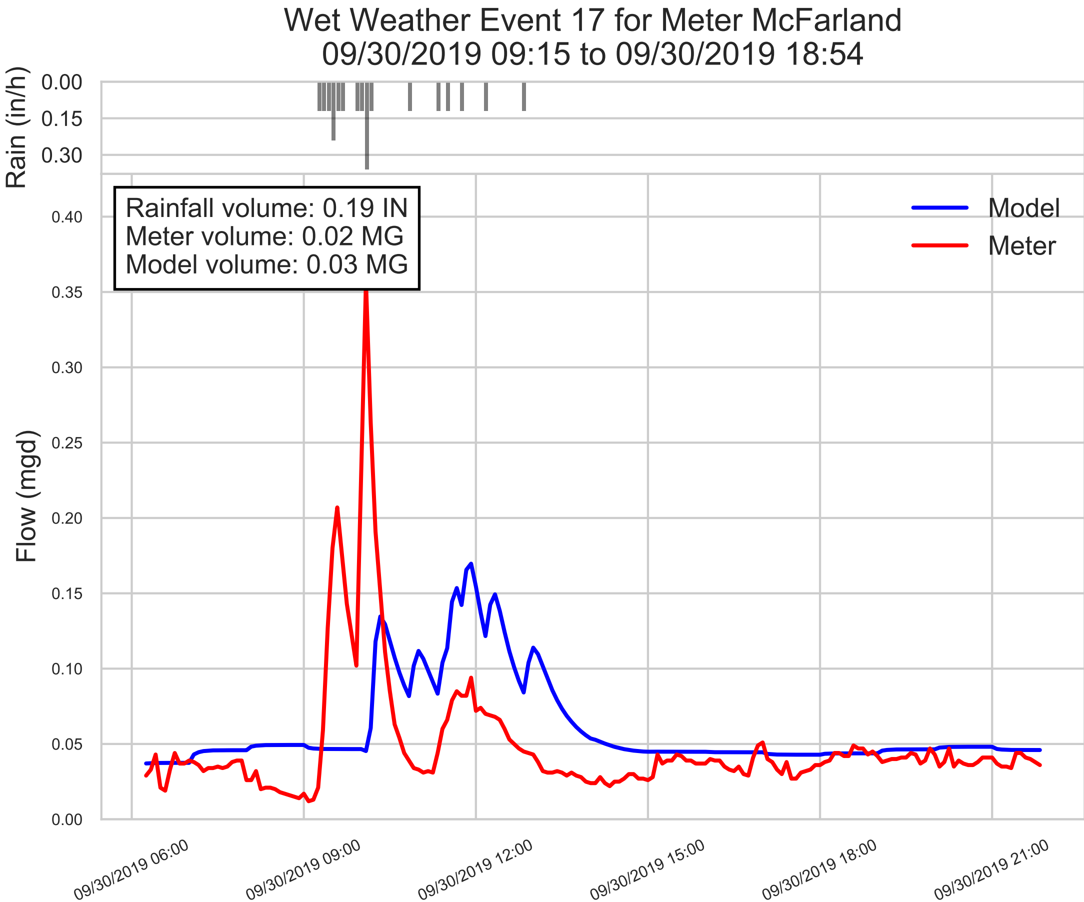
Wet Weather Event 14 for Meter McFarland
08/20/2019 16:34 to 08/21/2019 02:44
Rain (in/h)
0
2
4
Flow (mgd)
0.0
2.5
5.0
7.5
10.0
12.5
15.0
17.5
20.0
Rainfall volume: 1.66 IN
Meter volume: 0.32 MG
Model volume: 0.44 MG
Model
Meter
08/20/2019 13:00
08/20/2019 16:00
08/20/2019 19:00
08/20/2019 22:00
08/21/2019 01:00
08/21/2019 04:00



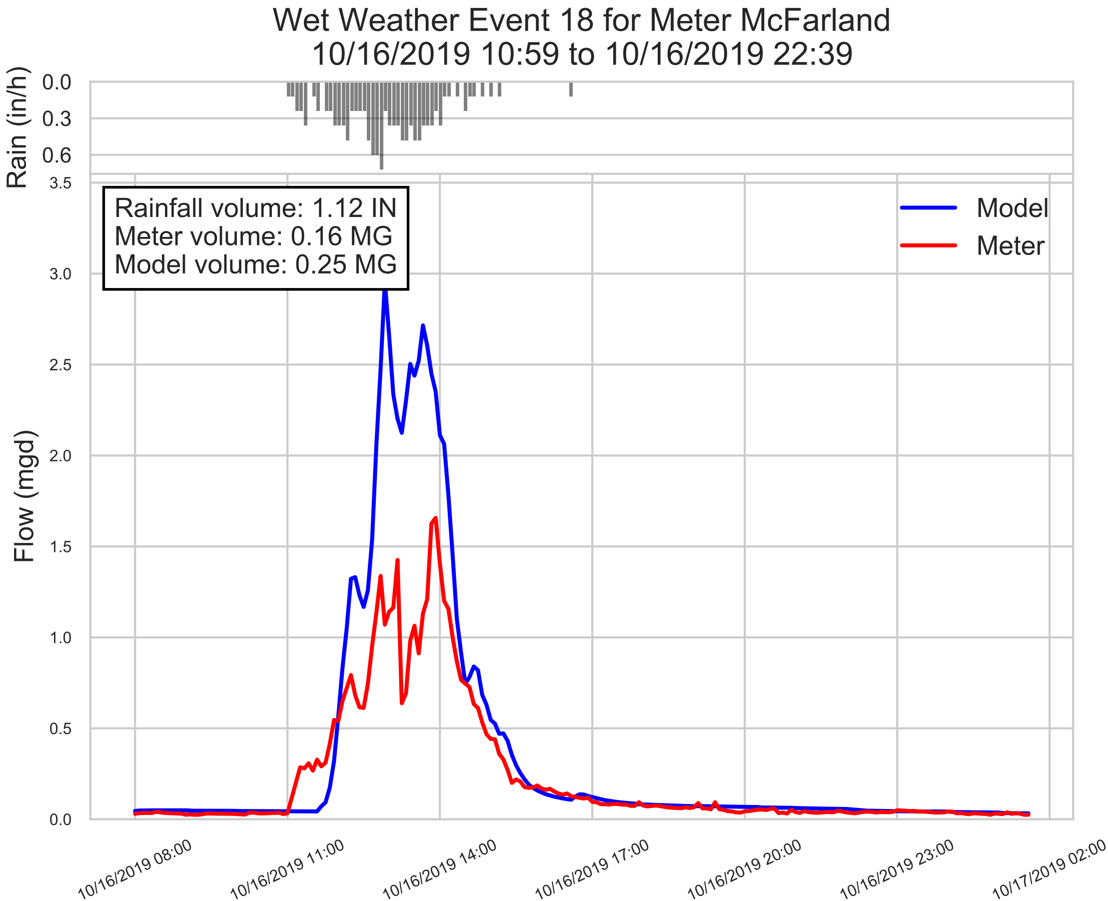
Wet Weather Event 15 for Meter McFarland
08/21/2019 18:04 to 08/22/2019 01:20
Rain (in/h)
0.0
0.5
1.0
Rainfall volume: 0.19 IN
Meter volume: 0.04 MG
Model volume: 0.02 MG
Model
Meter
Flow (mgd)
2.00
1.75
1.50
1.25
1.00
0.75
0.50
0.25
0.00
08/21/2019 17:00
08/21/2019 20:00
08/21/2019 23:00
08/22/2019 02:00



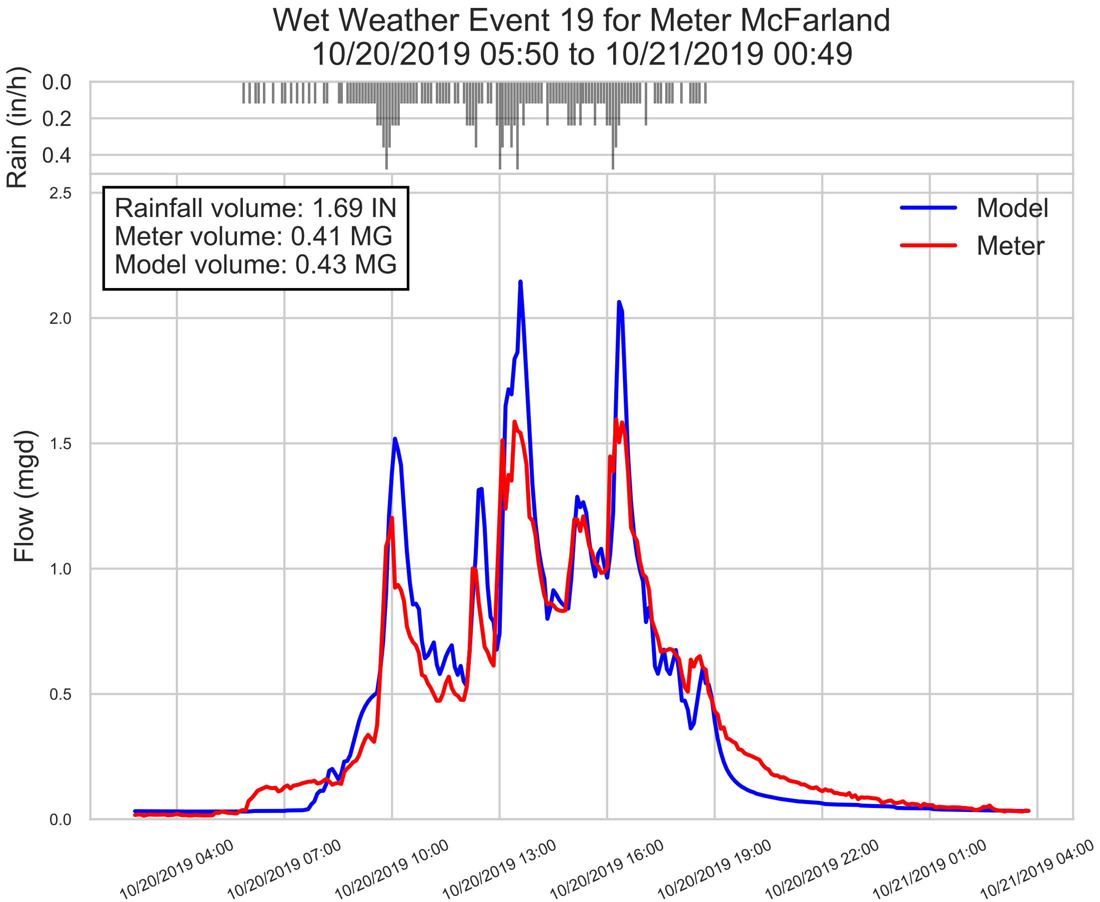
Wet Weather Event 16 for Meter McFarland
08/23/2019 10:00 to 08/23/2019 22:50
Rain (in/h)
0.0
0.3
0.6
Rainfall volume: 0.53 IN
Meter volume: 0.1 MG
Model volume: 0.1 MG
Model
Meter
Flow (mgd)
1.75
1.50
1.25
1.00
0.75
0.50
0.25
0.00
08/23/2019 09:00
08/23/2019 12:00
08/23/2019 15:00
08/23/2019 18:00
08/23/2019 21:00
08/24/2019 00:00

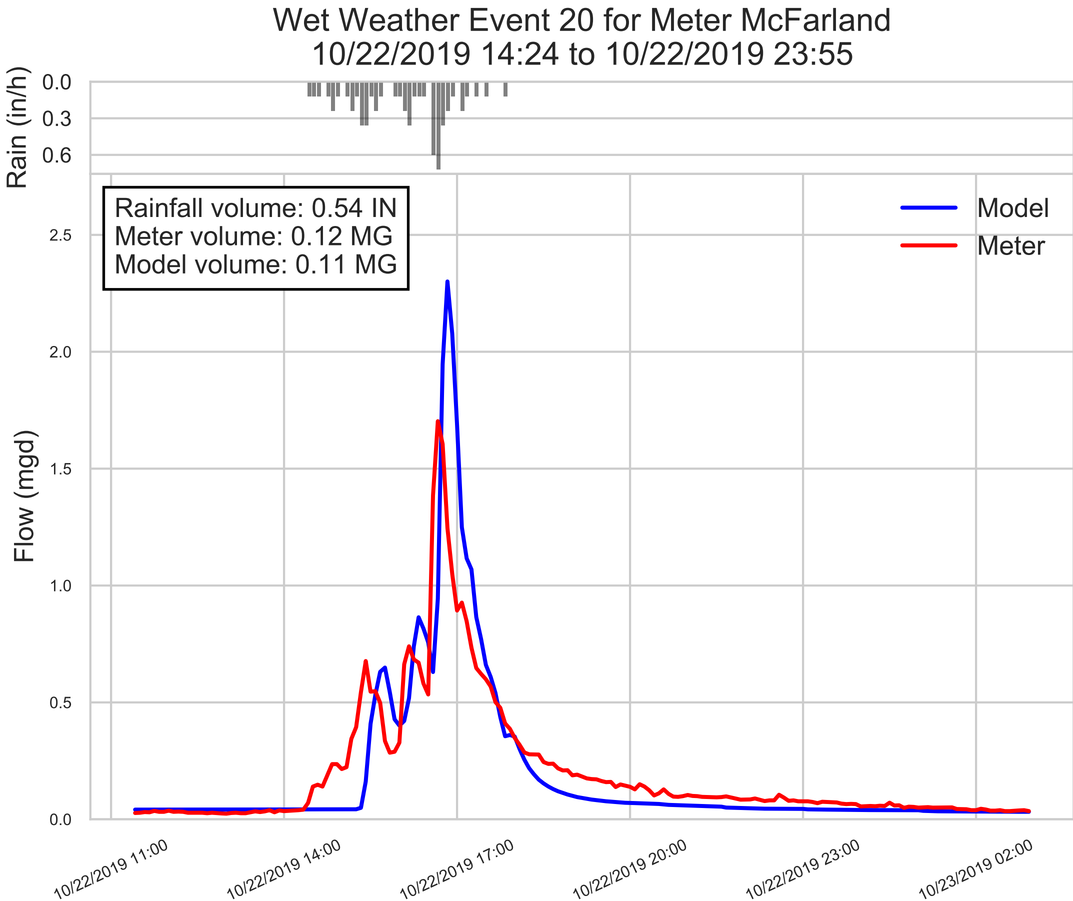


Wet Weather Event 17 for Meter McFarland
09/30/2019 09:15 to 09/30/2019 18:54
Rain (in/h)
0.00
0.15
0.30
Rainfall volume: 0.19 IN
Meter volume: 0.02 MG
Model volume: 0.03 MG
Model
Meter
Flow (mgd)
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
09/30/2019 06:00
09/30/2019 09:00
09/30/2019 12:00
09/30/2019 15:00
09/30/2019 18:00
09/30/2019 21:00

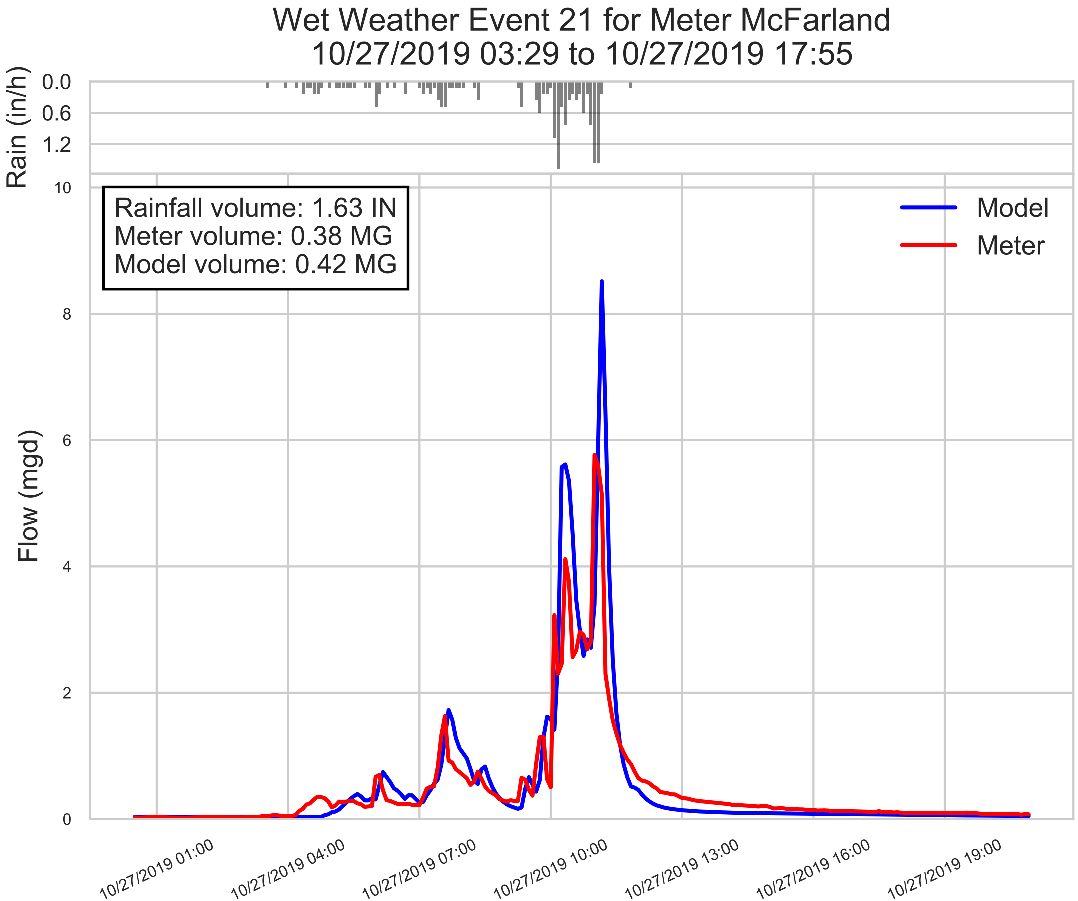


Wet Weather Event 18 for Meter McFarland
10/16/2019 10:59 to 10/16/2019 22:39
Rain (in/h)
0.0
0.3
0.6
Flow (mgd)
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
Rainfall volume: 1.12 IN
Meter volume: 0.16 MG
Model volume: 0.25 MG
Model
Meter
10/16/2019 08:00
10/16/2019 11:00
10/16/2019 14:00
10/16/2019 17:00
10/16/2019 20:00
10/16/2019 23:00
10/17/2019 02:00

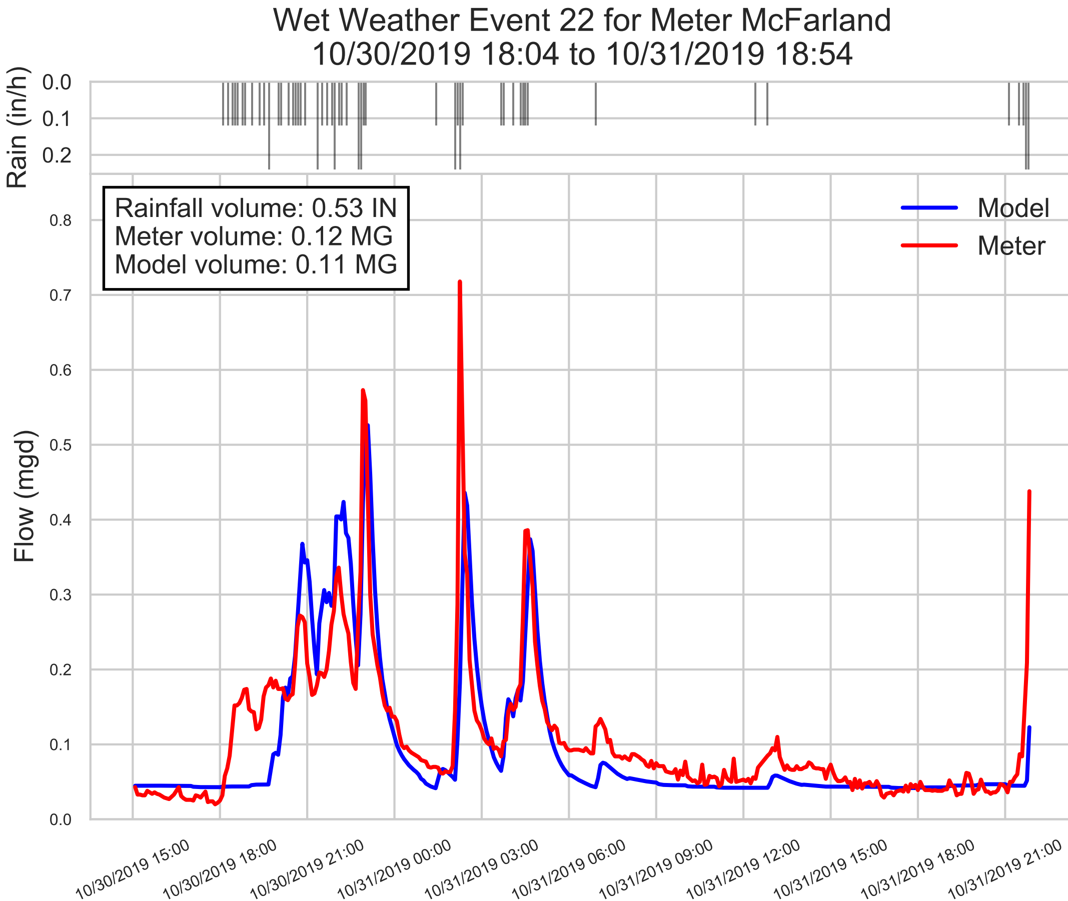

Wet Weather Event 19 for Meter McFarland
10/20/2019 05:50 to 10/21/2019 00:49
Rain (in/h)
0.0
0.2
0.4
Rainfall volume: 1.69 IN
Meter volume: 0.41 MG
Model volume: 0.43 MG
Model
Meter
Flow (mgd)
2.5
2.0
1.5
1.0
0.5
0.0
10/20/2019 04:00
10/20/2019 07:00
10/20/2019 10:00
10/20/2019 13:00
10/20/2019 16:00
10/20/2019 19:00
10/20/2019 22:00
10/21/2019 01:00
10/21/2019 04:00



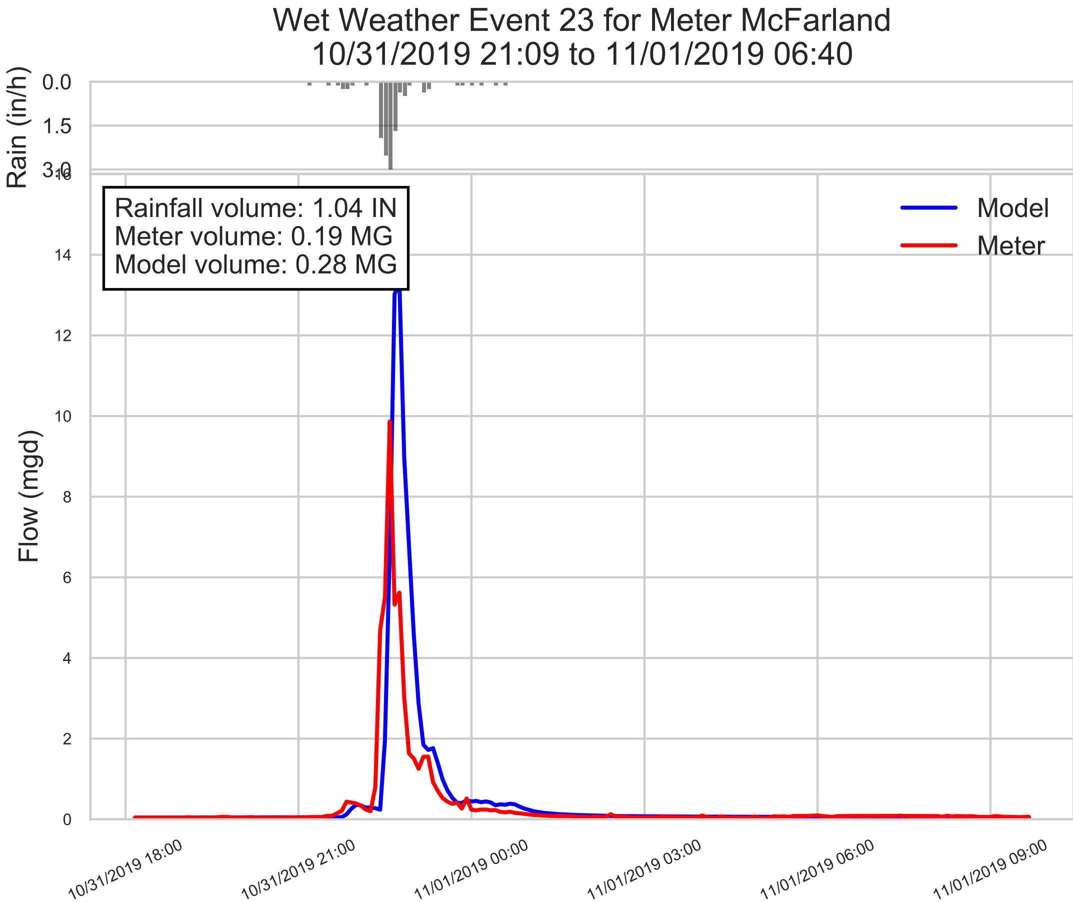
Wet Weather Event 20 for Meter McFarland
10/22/2019 14:24 to 10/22/2019 23:55
Rain (in/h)
0.0
0.3
0.6
Rainfall volume: 0.54 IN
Meter volume: 0.12 MG
Model volume: 0.11 MG
Model
Meter
Flow (mgd)
2.5
2.0
1.5
1.0
0.5
0.0
10/22/2019 11:00
10/22/2019 14:00
10/22/2019 17:00
10/22/2019 20:00
10/22/2019 23:00
10/23/2019 02:00

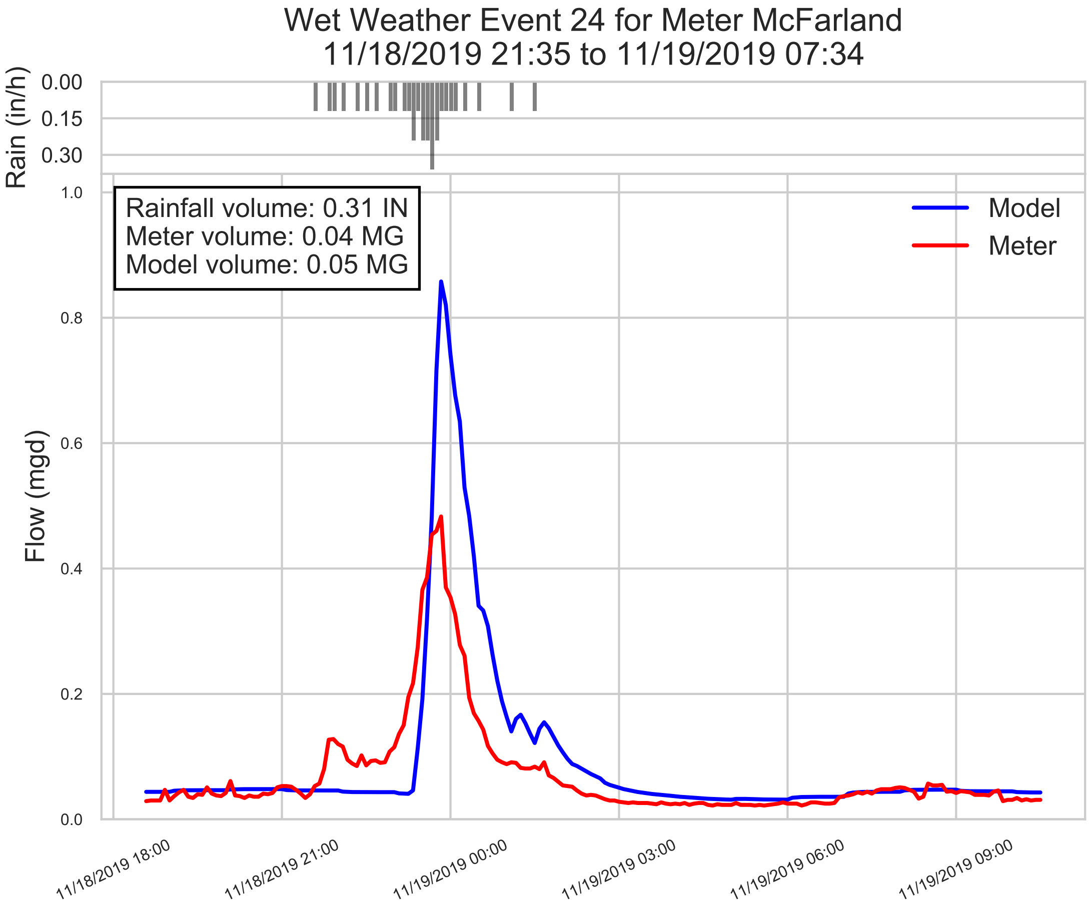


Wet Weather Event 21 for Meter McFarland
10/27/2019 03:29 to 10/27/2019 17:55
Rain (in/h)
0.0
0.6
1.2
Rainfall volume: 1.63 IN
Meter volume: 0.38 MG
Model volume: 0.42 MG
Model
Meter
Flow (mgd)
10
8
6
4
2
0
10/27/2019 01:00
10/27/2019 04:00
10/27/2019 07:00
10/27/2019 10:00
10/27/2019 13:00
10/27/2019 16:00
10/27/2019 19:00

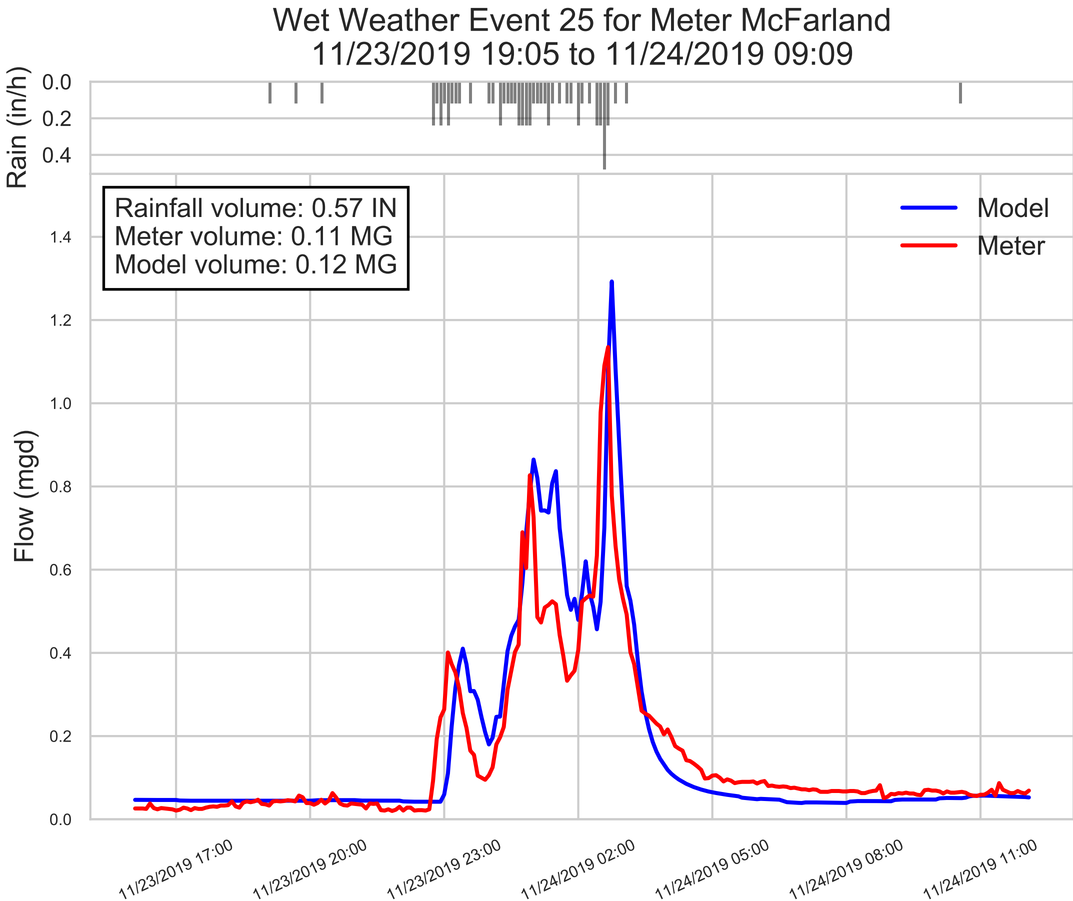


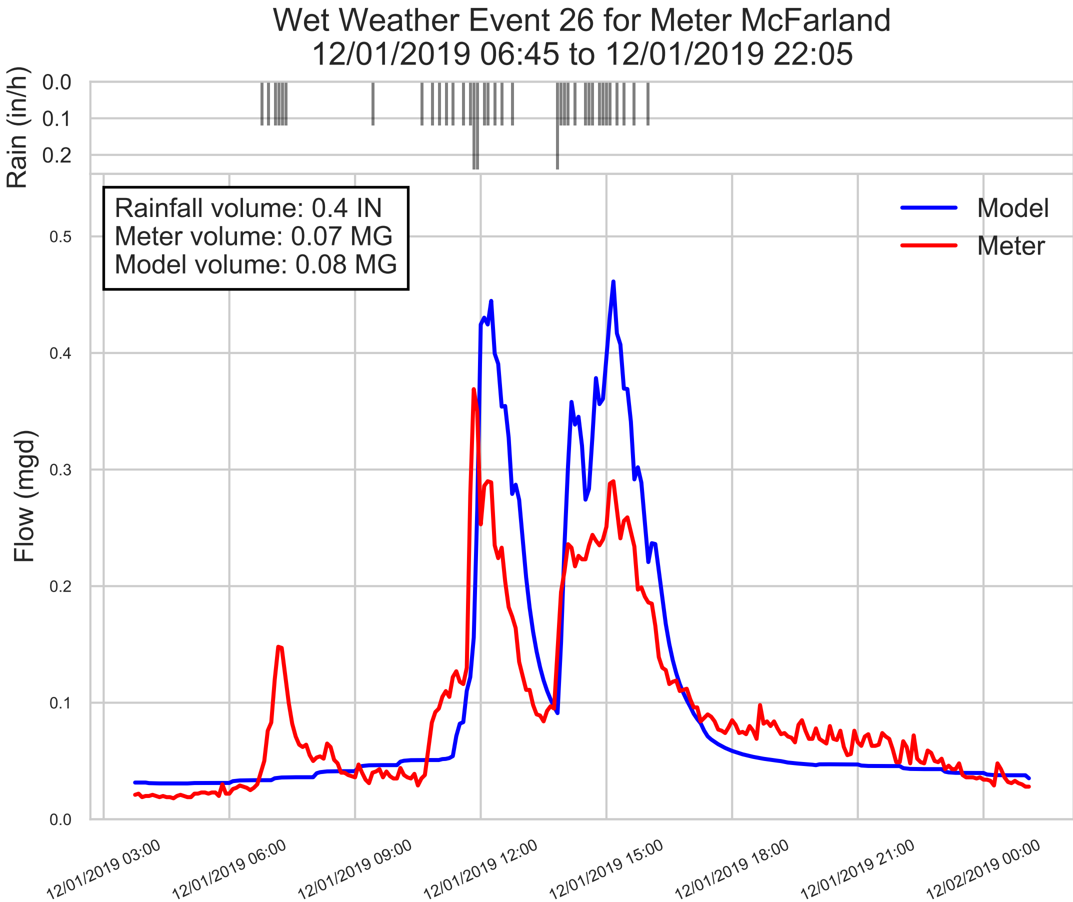
Wet Weather Event 22 for Meter McFarland
10/30/2019 18:04 to 10/31/2019 18:54
Rain (in/h)
0.0
0.1
0.2
Rainfall volume: 0.53 IN
Meter volume: 0.12 MG
Model volume: 0.11 MG
Model
Meter
Flow (mgd)
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
10/30/2019 15:00
10/30/2019 18:00
10/30/2019 21:00
10/31/2019 00:00
10/31/2019 03:00
10/31/2019 06:00
10/31/2019 09:00
10/31/2019 12:00
10/31/2019 15:00
10/31/2019 18:00
10/31/2019 21:00


Wet Weather Event 23 for Meter McFarland
10/31/2019 21:09 to 11/01/2019 06:40
Rain (in/h)
0.0
1.5
3.0
Rainfall volume: 1.04 IN
Meter volume: 0.19 MG
Model volume: 0.28 MG
Model
Meter
Flow (mgd)
16
14
12
10
8
6
4
2
0
10/31/2019 18:00
10/31/2019 21:00
11/01/2019 00:00
11/01/2019 03:00
11/01/2019 06:00
11/01/2019 09:00

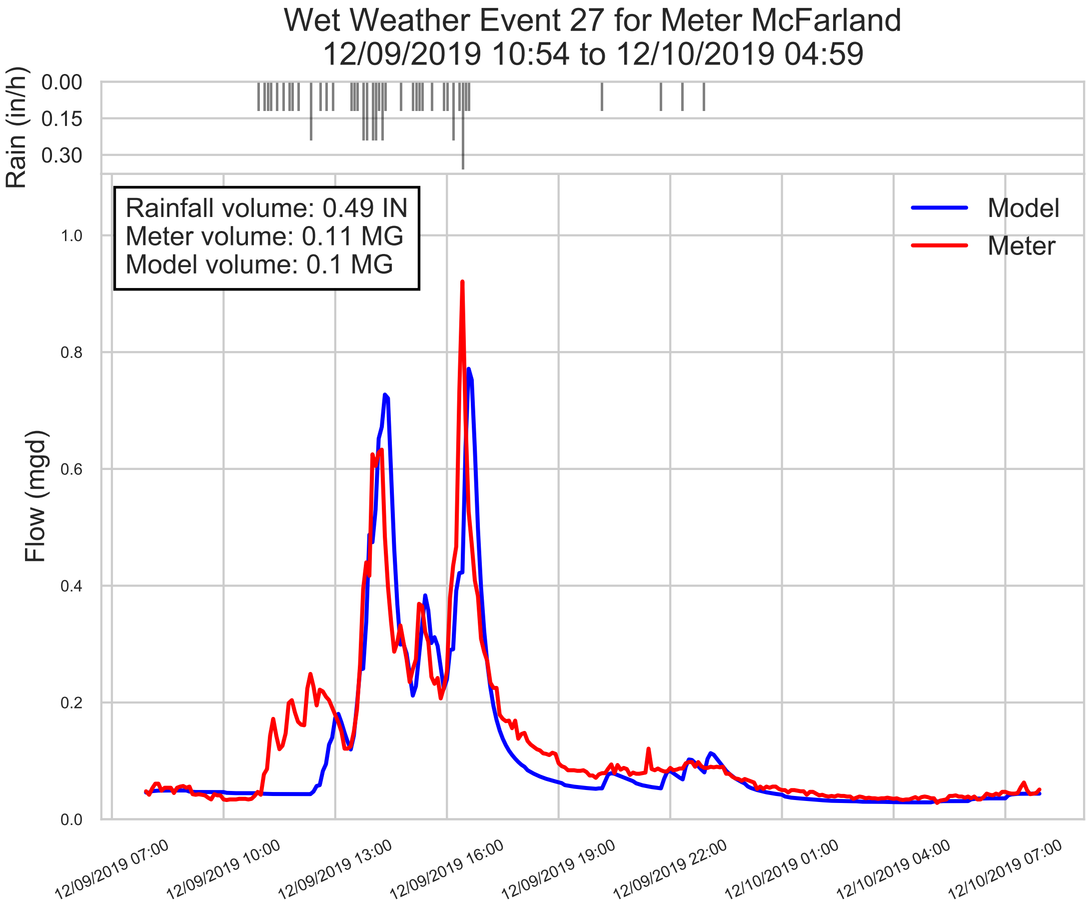


Wet Weather Event 24 for Meter McFarland
11/18/2019 21:35 to 11/19/2019 07:34
Rain (in/h)
0.00
0.15
0.30
Flow (mgd)
1.0
0.8
0.6
0.4
0.2
0.0
Rainfall volume: 0.31 IN
Meter volume: 0.04 MG
Model volume: 0.05 MG
Model
Meter
11/18/2019 18:00
11/18/2019 21:00
11/19/2019 00:00
11/19/2019 03:00
11/19/2019 06:00
11/19/2019 09:00


Wet Weather Event 25 for Meter McFarland
11/23/2019 19:05 to 11/24/2019 09:09
Rain (in/h)
0.0
0.2
0.4
Rainfall volume: 0.57 IN
Meter volume: 0.11 MG
Model volume: 0.12 MG
Model
Meter
Flow (mgd)
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
11/23/2019 17:00
11/23/2019 20:00
11/23/2019 23:00
11/24/2019 02:00
11/24/2019 05:00
11/24/2019 08:00
11/24/2019 11:00

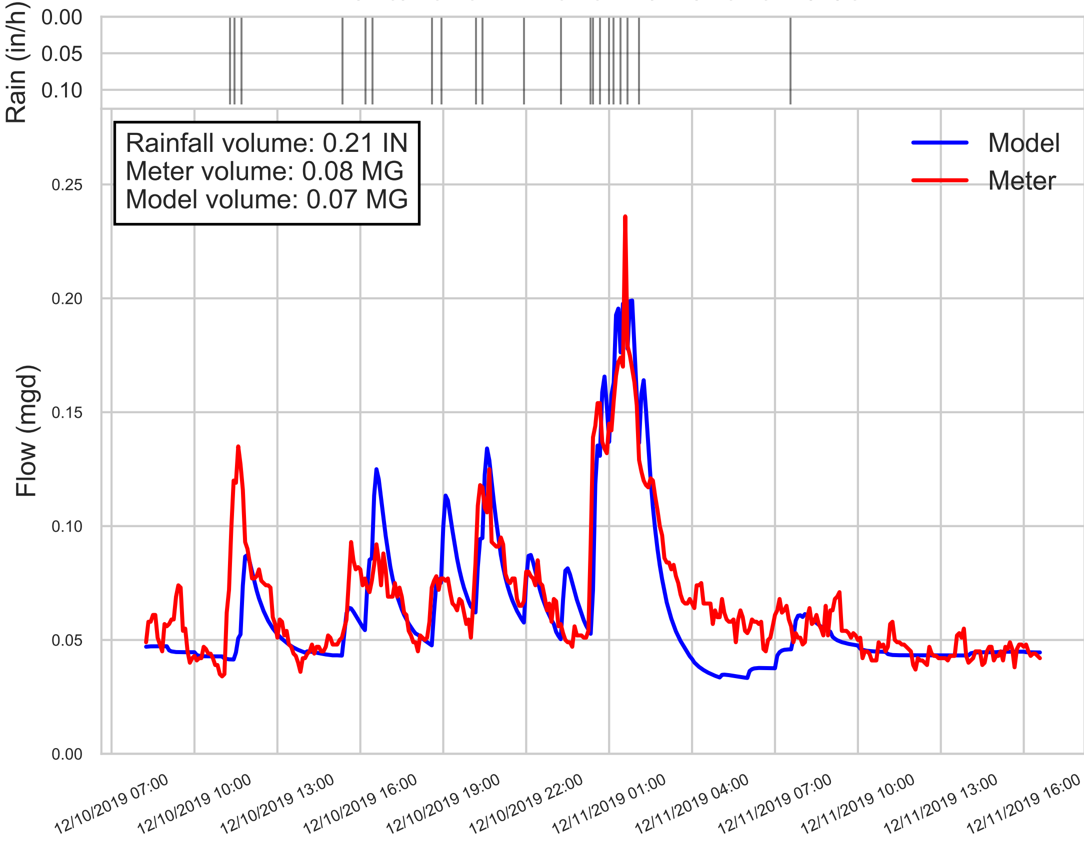


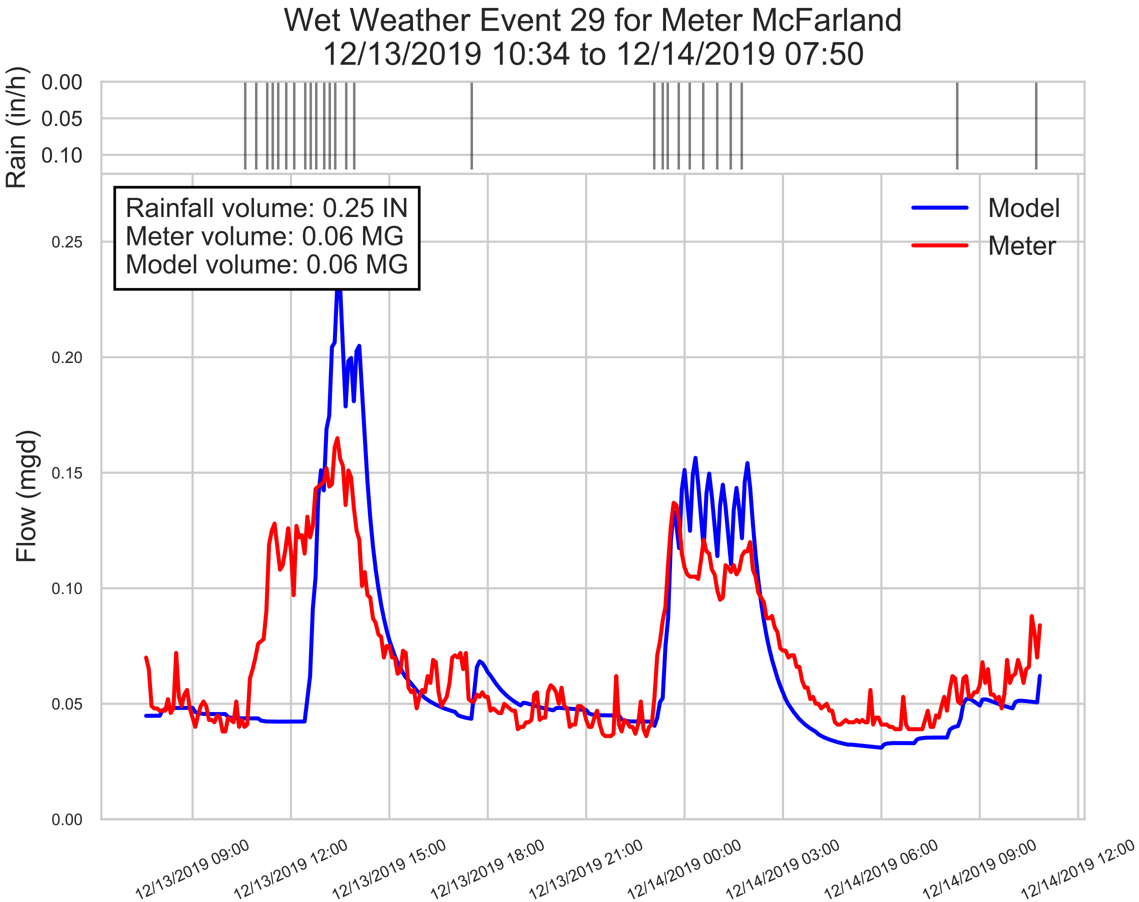
Wet Weather Event 26 for Meter McFarland
12/01/2019 06:45 to 12/01/2019 22:05
Rain (in/h)
0.0
0.1
0.2
Flow (mgd)
0.0
0.1
0.2
0.3
0.4
0.5
Rainfall volume: 0.4 IN
Meter volume: 0.07 MG
Model volume: 0.08 MG
Model
Meter
12/01/2019 03:00
12/01/2019 06:00
12/01/2019 09:00
12/01/2019 12:00
12/01/2019 15:00
12/01/2019 18:00
12/01/2019 21:00
12/02/2019 00:00

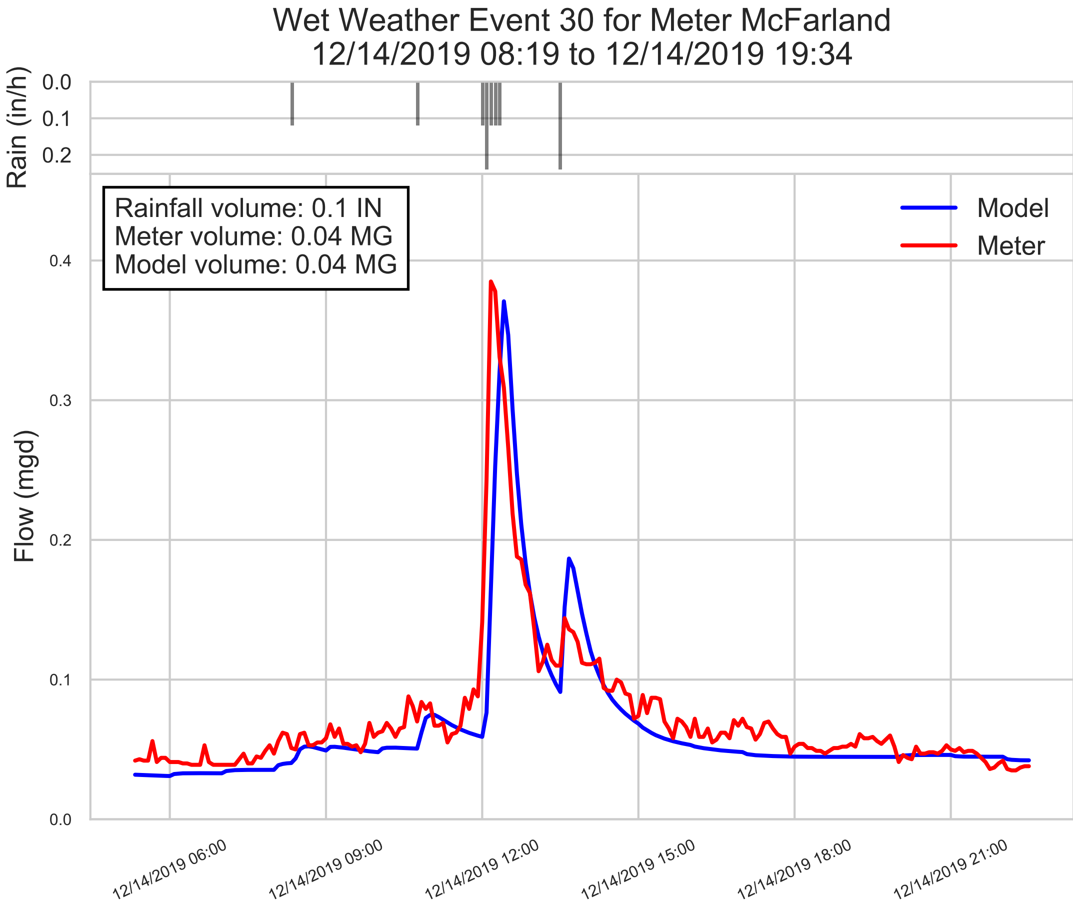


Wet Weather Event 27 for Meter McFarland
12/09/2019 10:54 to 12/10/2019 04:59
Rain (in/h)
0.00
0.15
0.30
Rainfall volume: 0.49 IN
Meter volume: 0.11 MG
Model volume: 0.1 MG
Model
Meter
Flow (mgd)
1.0
0.8
0.6
0.4
0.2
0.0
12/09/2019 07:00
12/09/2019 10:00
12/09/2019 13:00
12/09/2019 16:00
12/09/2019 19:00
12/09/2019 22:00
12/10/2019 01:00
12/10/2019 04:00
12/10/2019 07:00

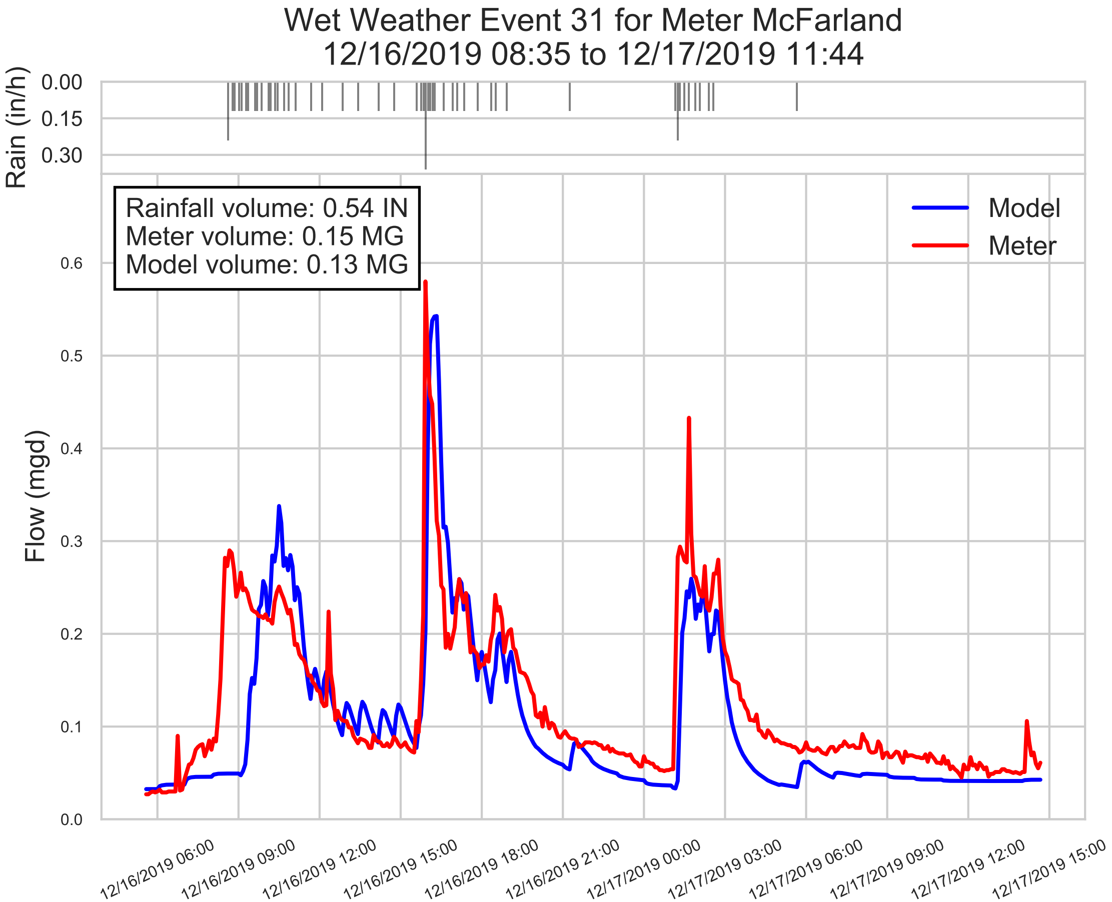
Wet Weather Event 28 for Meter McFarland
12/10/2019 11:15 to 12/11/2019 13:39

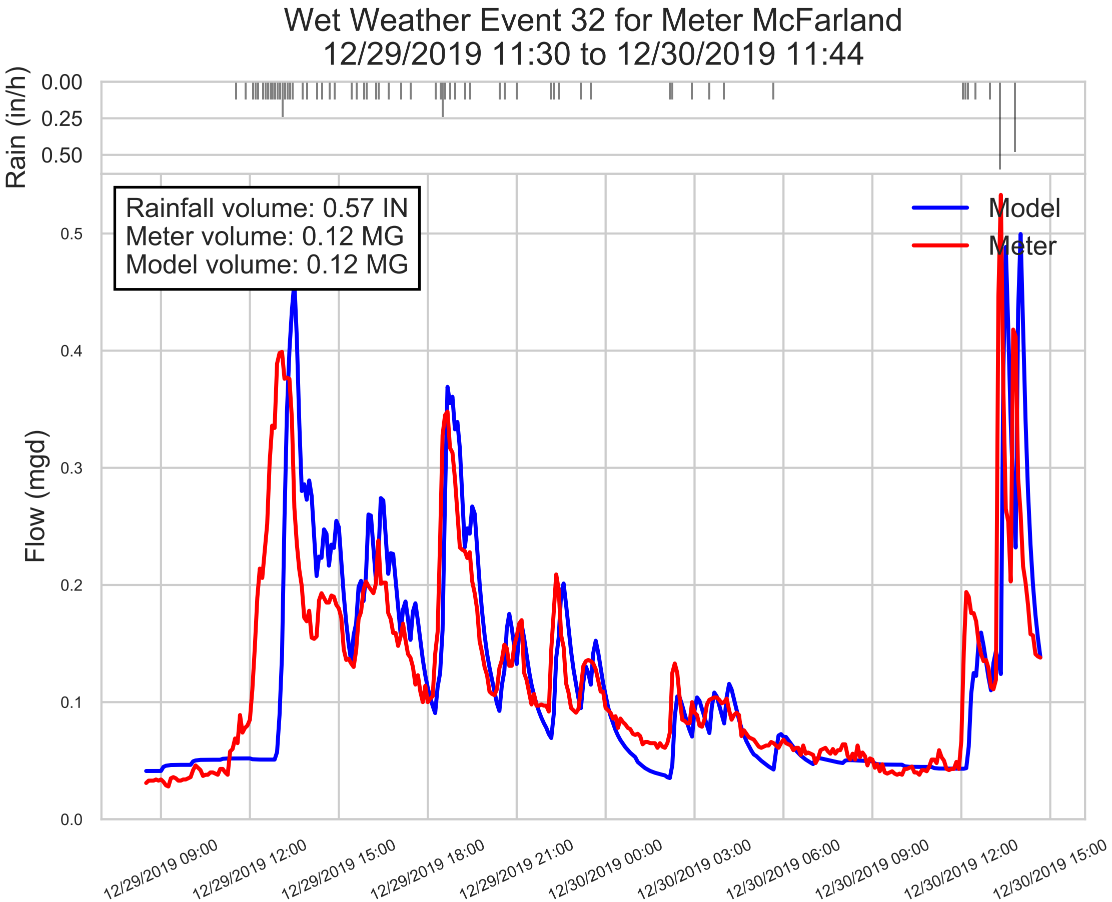



Wet Weather Event 29 for Meter McFarland
12/13/2019 10:34 to 12/14/2019 07:50
Rain (in/h)
0.00
0.05
0.10
Rainfall volume: 0.25 IN
Meter volume: 0.06 MG
Model volume: 0.06 MG
Model
Meter
Flow (mgd)
0.25
0.20
0.15
0.10
0.05
0.00
12/13/2019 09:00
12/13/2019 12:00
12/13/2019 15:00
12/13/2019 18:00
12/13/2019 21:00
12/14/2019 00:00
12/14/2019 03:00
12/14/2019 06:00
12/14/2019 09:00
12/14/2019 12:00

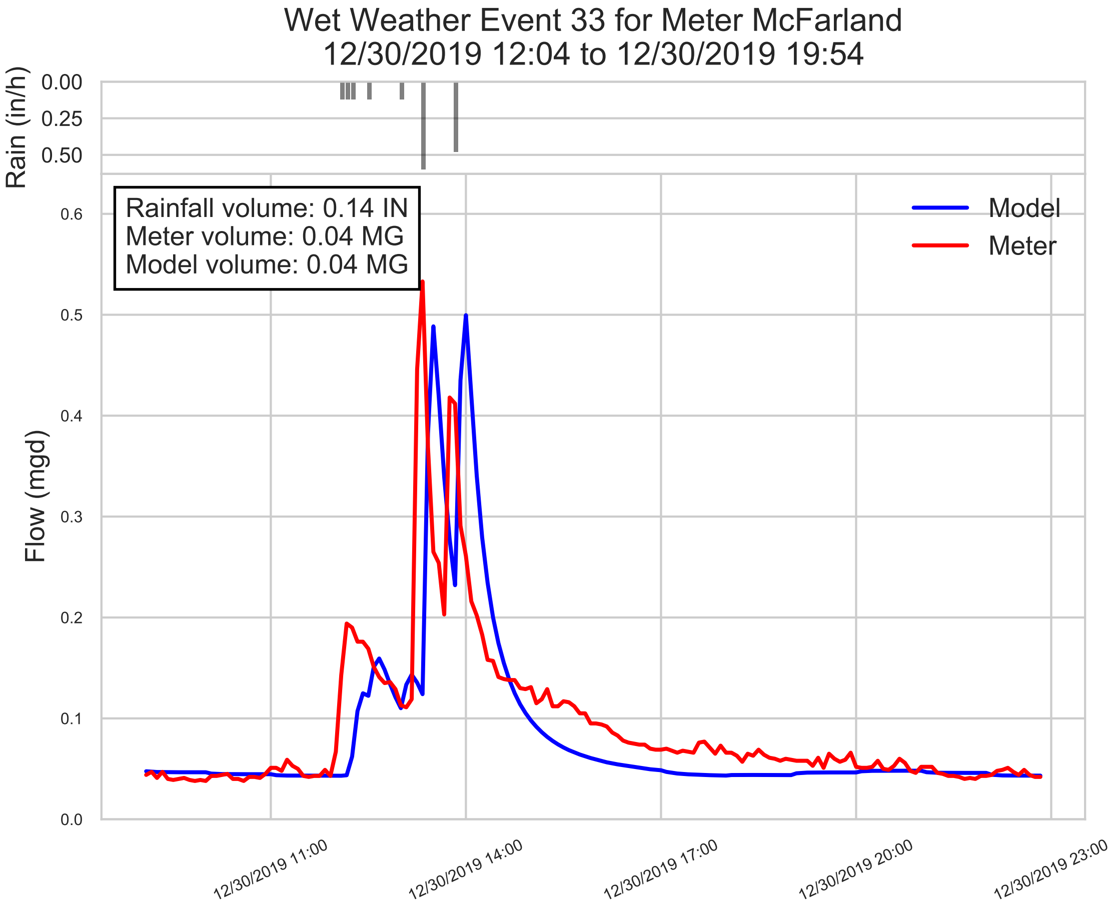


Wet Weather Event 30 for Meter McFarland
12/14/2019 08:19 to 12/14/2019 19:34
Rain (in/h)
0.0
0.1
0.2
Rainfall volume: 0.1 IN
Meter volume: 0.04 MG
Model volume: 0.04 MG
Model
Meter
Flow (mgd)
0.4
0.3
0.2
0.1
0.0
12/14/2019 06:00
12/14/2019 09:00
12/14/2019 12:00
12/14/2019 15:00
12/14/2019 18:00
12/14/2019 21:00


Wet Weather Event 31 for Meter McFarland
12/16/2019 08:35 to 12/17/2019 11:44
Rain (in/h)
0.00
0.15
0.30
Rainfall volume: 0.54 IN
Meter volume: 0.15 MG
Model volume: 0.13 MG
Model
Meter
Flow (mgd)
0.0
0.1
0.2
0.3
0.4
0.5
0.6
12/16/2019 06:00
12/16/2019 09:00
12/16/2019 12:00
12/16/2019 15:00
12/16/2019 18:00
12/16/2019 21:00
12/17/2019 00:00
12/17/2019 03:00
12/17/2019 06:00
12/17/2019 09:00
12/17/2019 12:00
12/17/2019 15:00

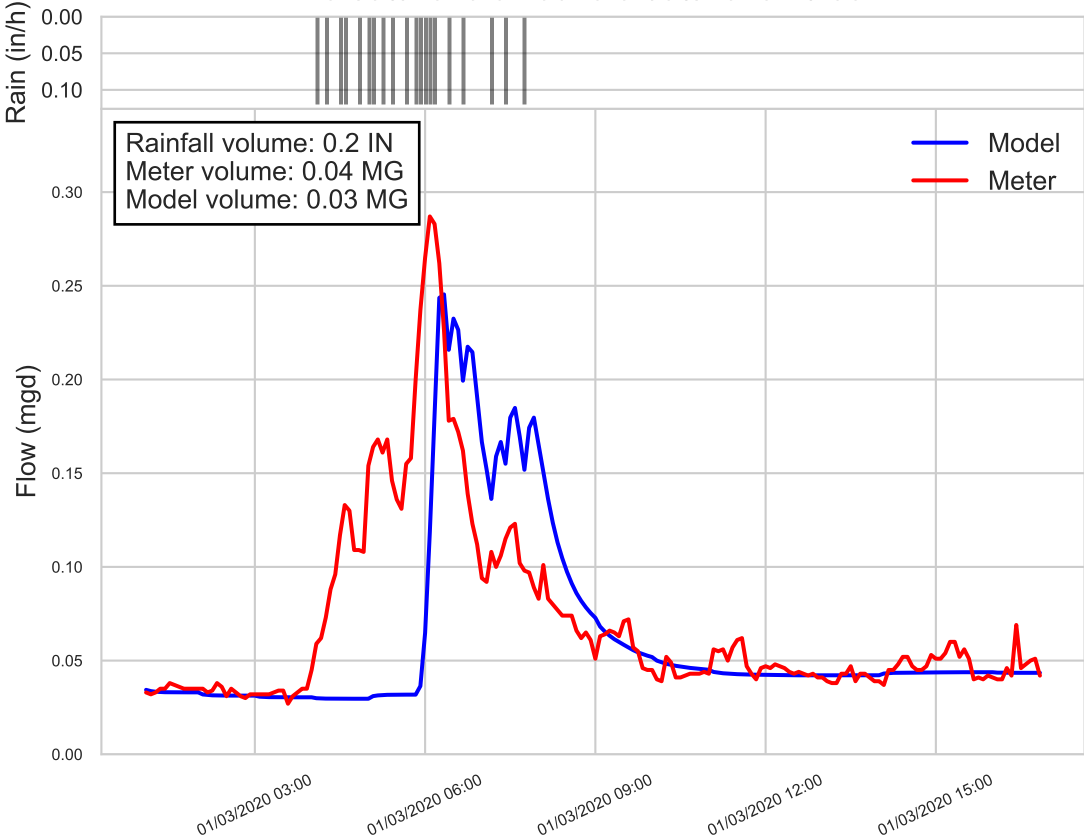


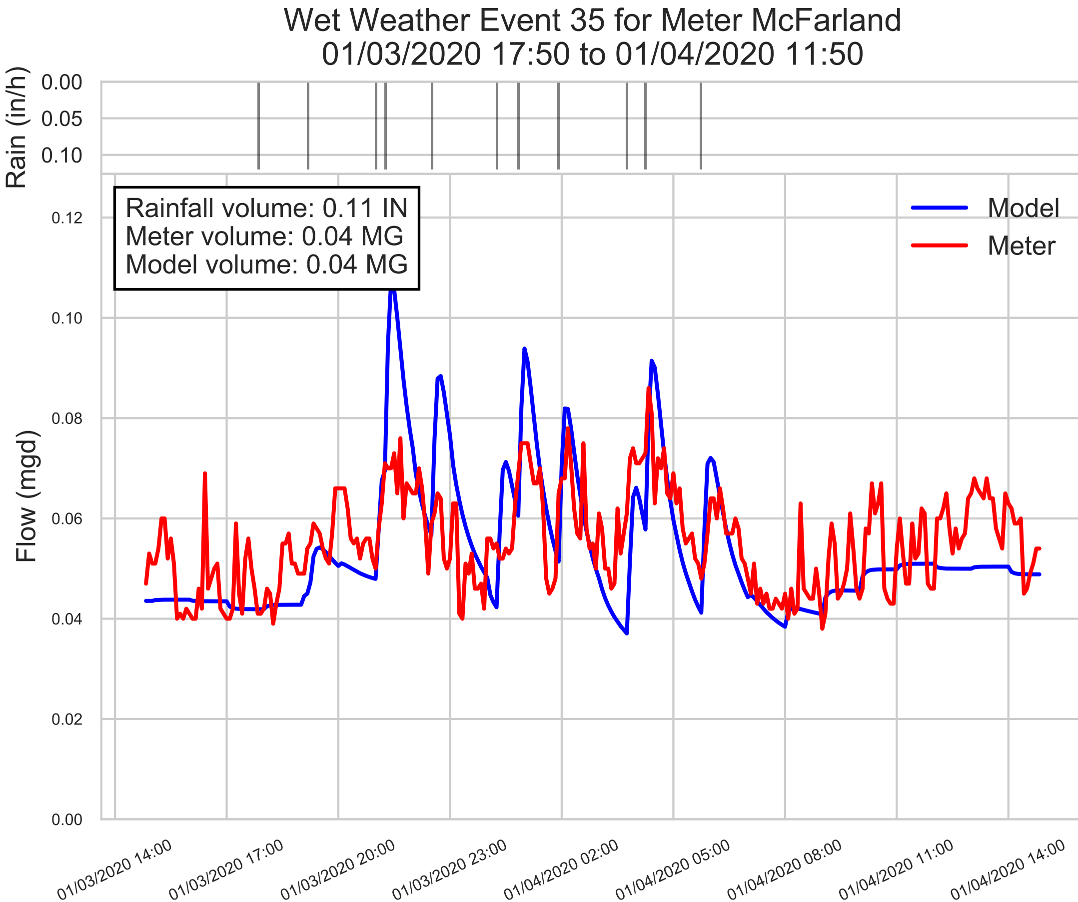
Wet Weather Event 32 for Meter McFarland
12/29/2019 11:30 to 12/30/2019 11:44
Rain (in/h)
0.00
0.25
0.50
Rainfall volume: 0.57 IN
Meter volume: 0.12 MG
Model volume: 0.12 MG
Model
Meter
Flow (mgd)
0.5
0.4
0.3
0.2
0.1
0.0
12/29/2019 09:00
12/29/2019 12:00
12/29/2019 15:00
12/29/2019 18:00
12/29/2019 21:00
12/30/2019 00:00
12/30/2019 03:00
12/30/2019 06:00
12/30/2019 09:00
12/30/2019 12:00
12/30/2019 15:00



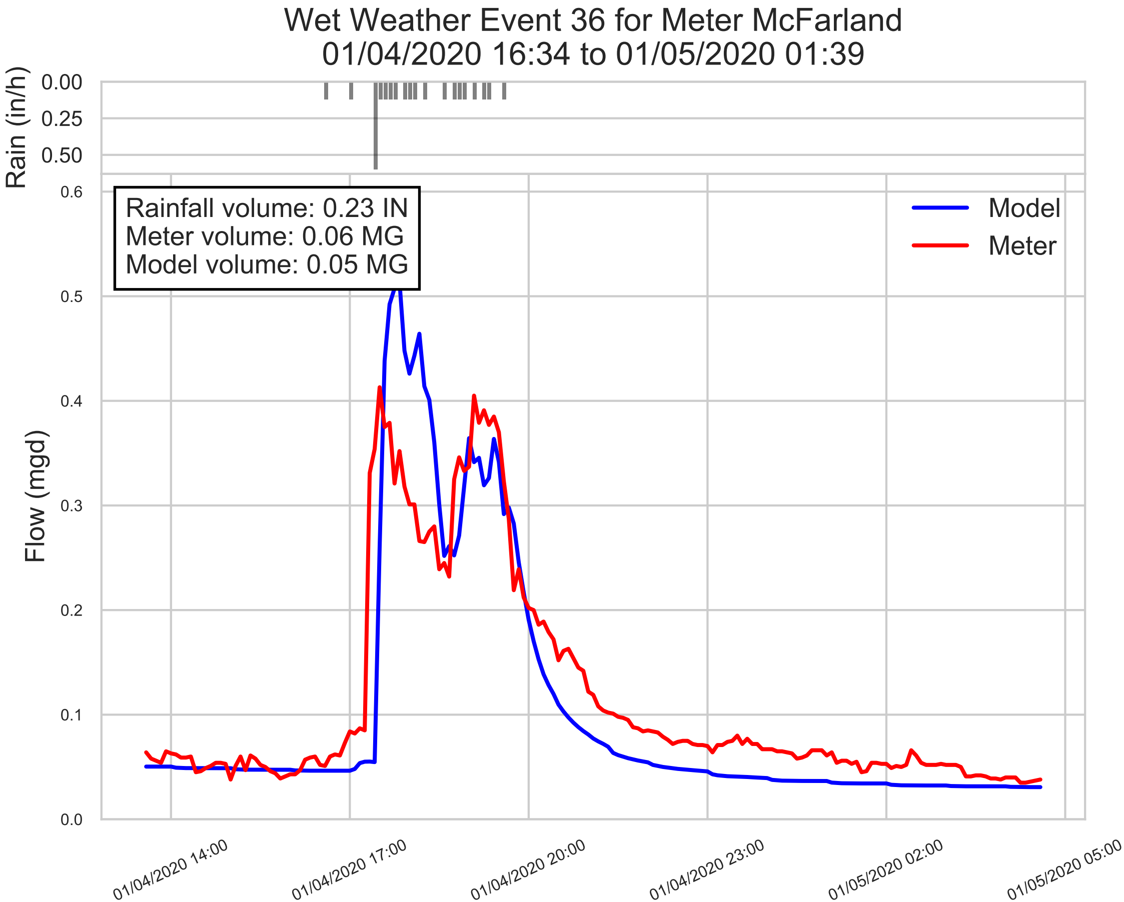
Wet Weather Event 33 for Meter McFarland
12/30/2019 12:04 to 12/30/2019 19:54
Rain (in/h)
0.00
0.25
0.50
Rainfall volume: 0.14 IN
Meter volume: 0.04 MG
Model volume: 0.04 MG
Model
Meter
Flow (mgd)
0.6
0.5
0.4
0.3
0.2
0.1
0.0
12/30/2019 11:00
12/30/2019 14:00
12/30/2019 17:00
12/30/2019 20:00
12/30/2019 23:00

Wet Weather Event 34 for Meter McFarland
01/03/2020 04:05 to 01/03/2020 13:50

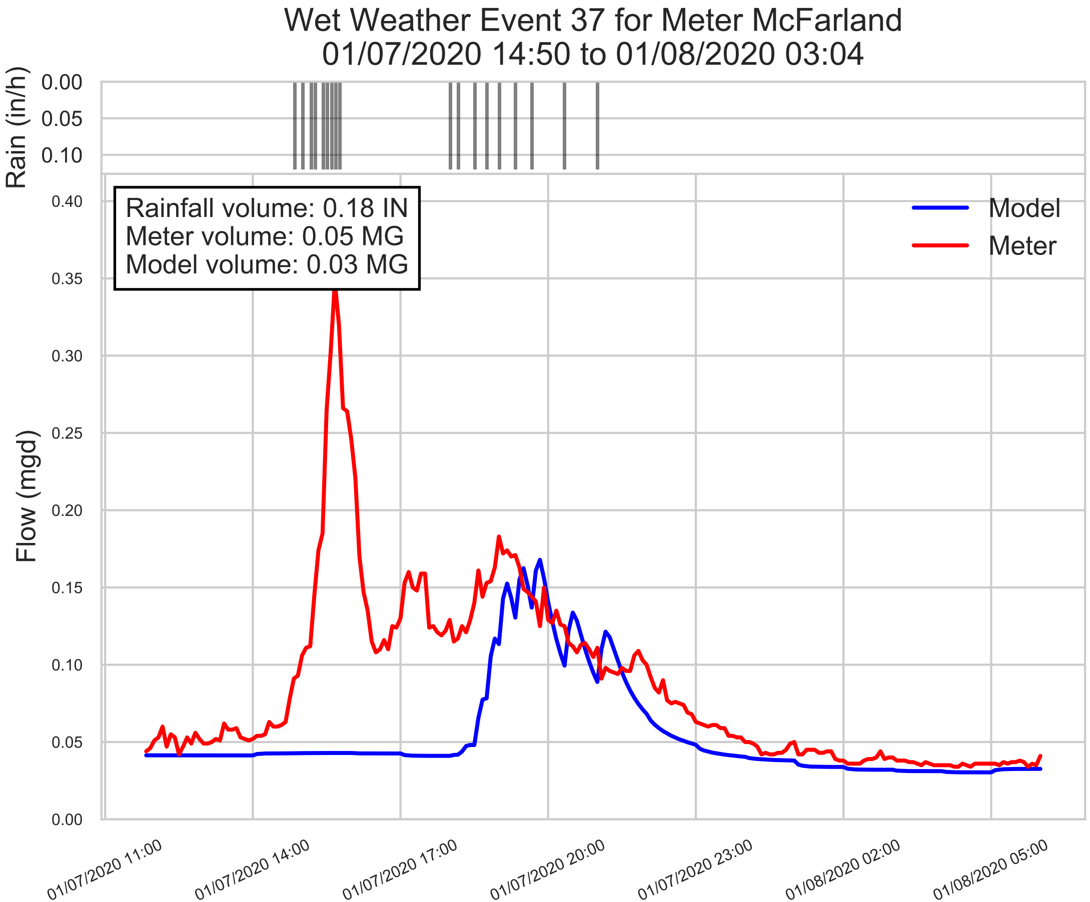




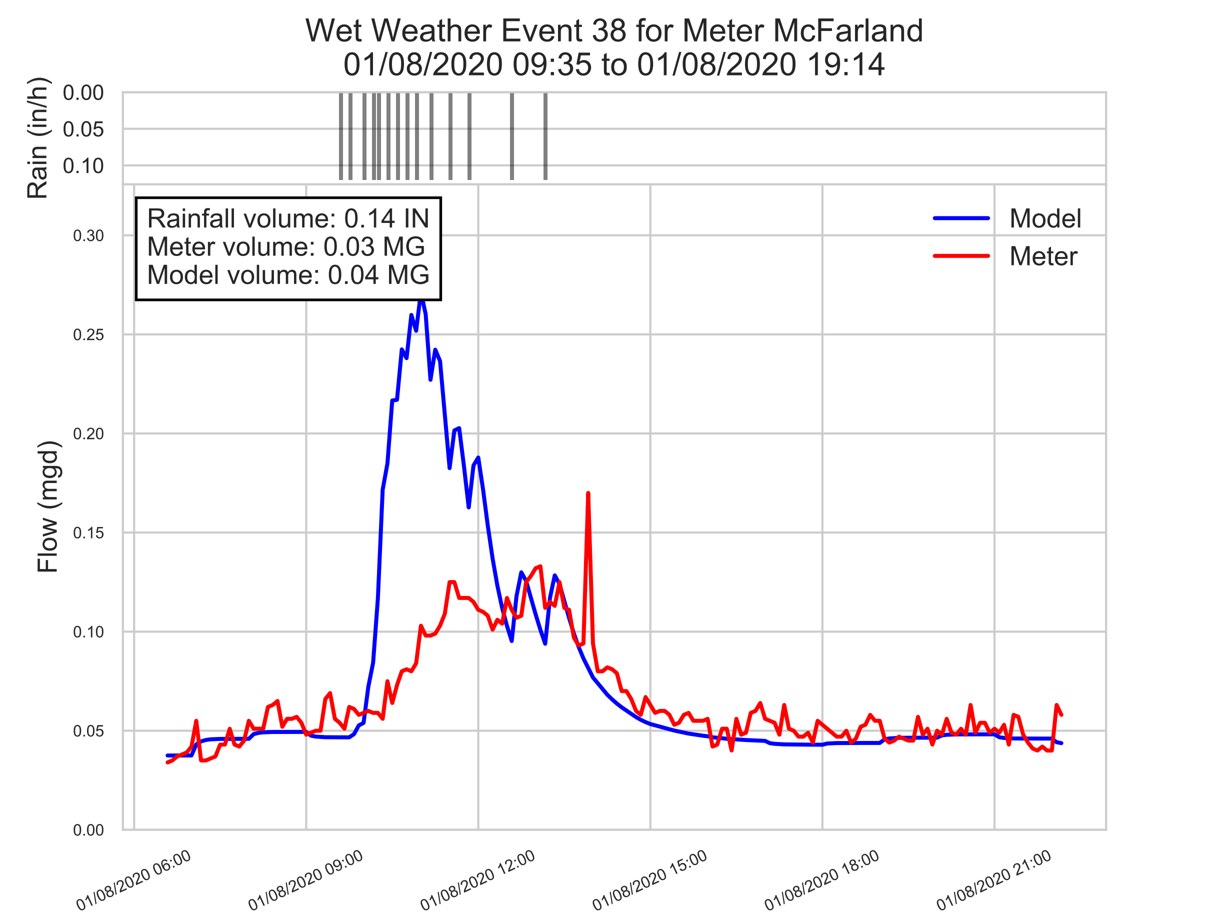
Wet Weather Event 35 for Meter McFarland
01/03/2020 17:50 to 01/04/2020 11:50
Rain (in/h)
0.00
0.05
0.10
Rainfall volume: 0.11 IN
Meter volume: 0.04 MG
Model volume: 0.04 MG
Model
Meter
Flow (mgd)
0.12
0.10
0.08
0.06
0.04
0.02
0.00
01/03/2020 14:00
01/03/2020 17:00
01/03/2020 20:00
01/03/2020 23:00
01/04/2020 02:00
01/04/2020 05:00
01/04/2020 08:00
01/04/2020 11:00
01/04/2020 14:00

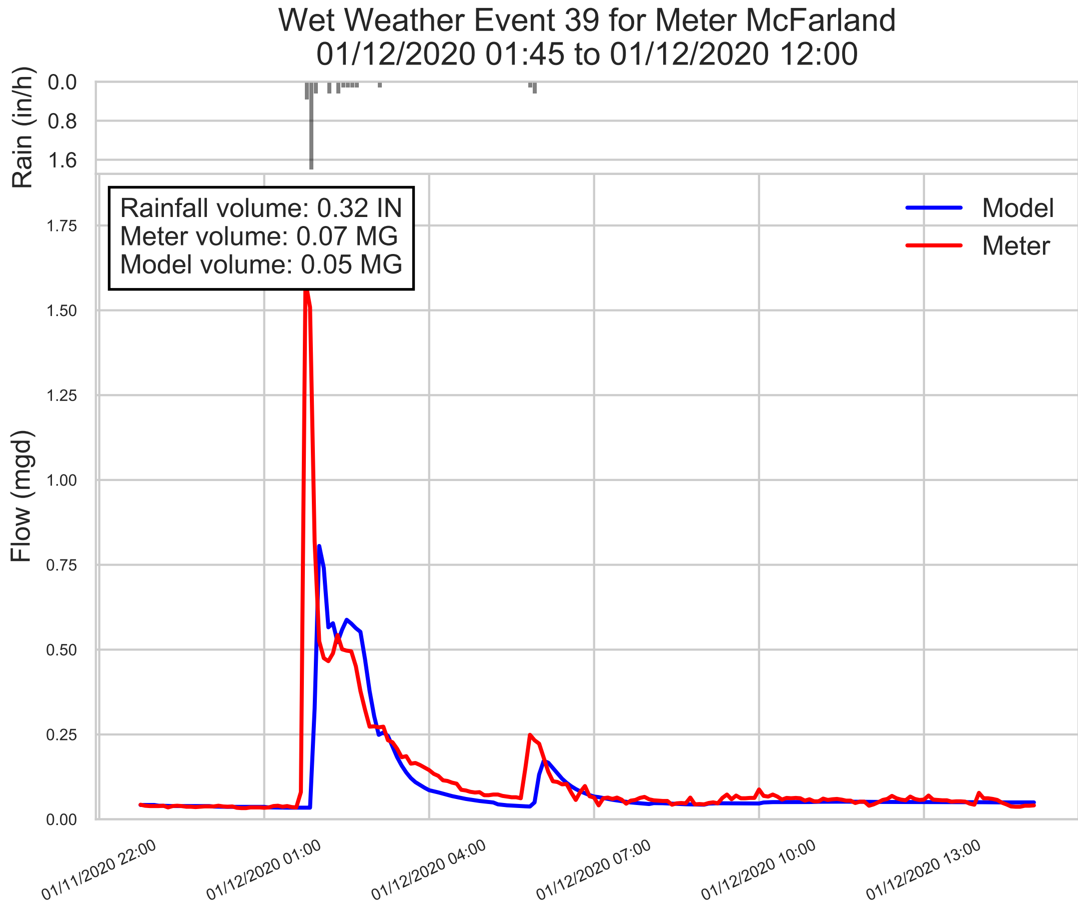


Wet Weather Event 36 for Meter McFarland
01/04/2020 16:34 to 01/05/2020 01:39
Rain (in/h)
0.00
0.25
0.50
Rainfall volume: 0.23 IN
Meter volume: 0.06 MG
Model volume: 0.05 MG
Model
Meter
Flow (mgd)
0.0
0.1
0.2
0.3
0.4
0.5
0.6
01/04/2020 14:00
01/04/2020 17:00
01/04/2020 20:00
01/04/2020 23:00
01/05/2020 02:00
01/05/2020 05:00

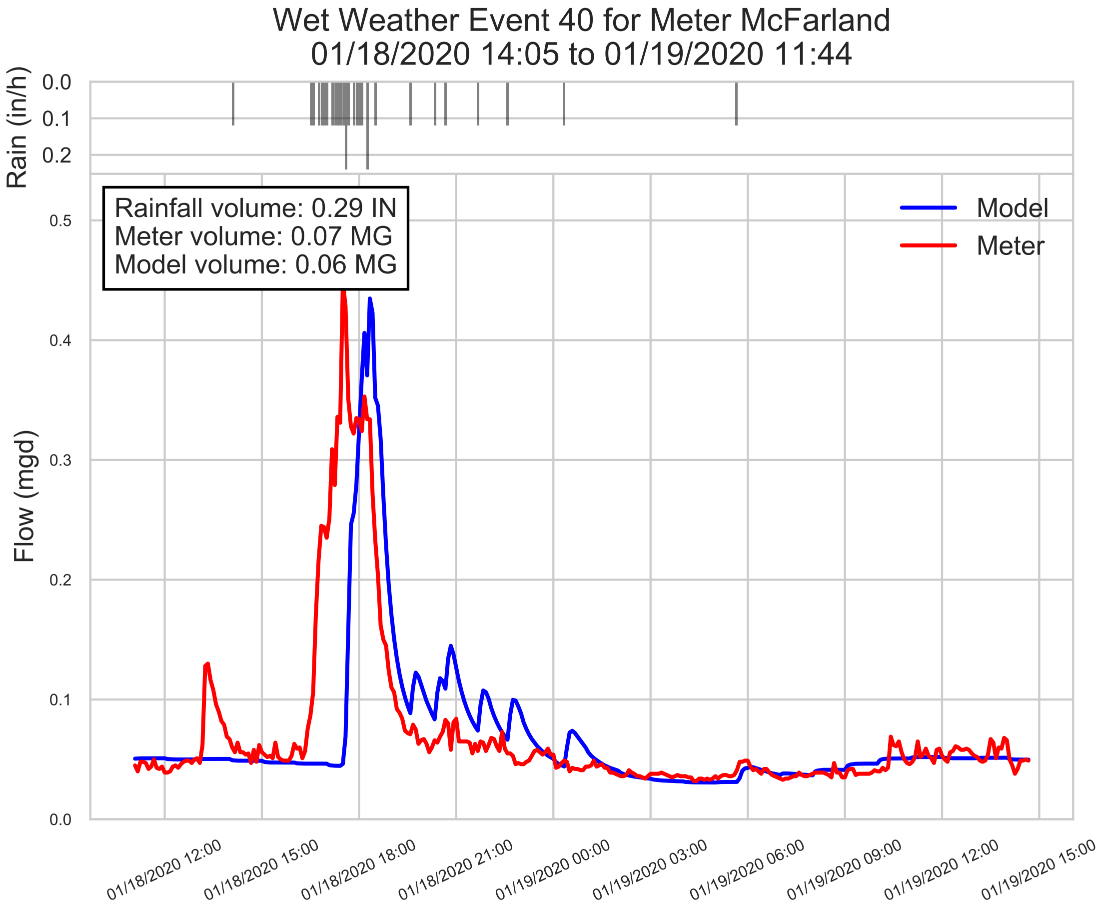


Wet Weather Event 37 for Meter McFarland
01/07/2020 14:50 to 01/08/2020 03:04
Rain (in/h)
0.00
0.05
0.10
Rainfall volume: 0.18 IN
Meter volume: 0.05 MG
Model volume: 0.03 MG
Model
Meter
Flow (mgd)
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
01/07/2020 11:00
01/07/2020 14:00
01/07/2020 17:00
01/07/2020 20:00
01/07/2020 23:00
01/08/2020 02:00
01/08/2020 05:00

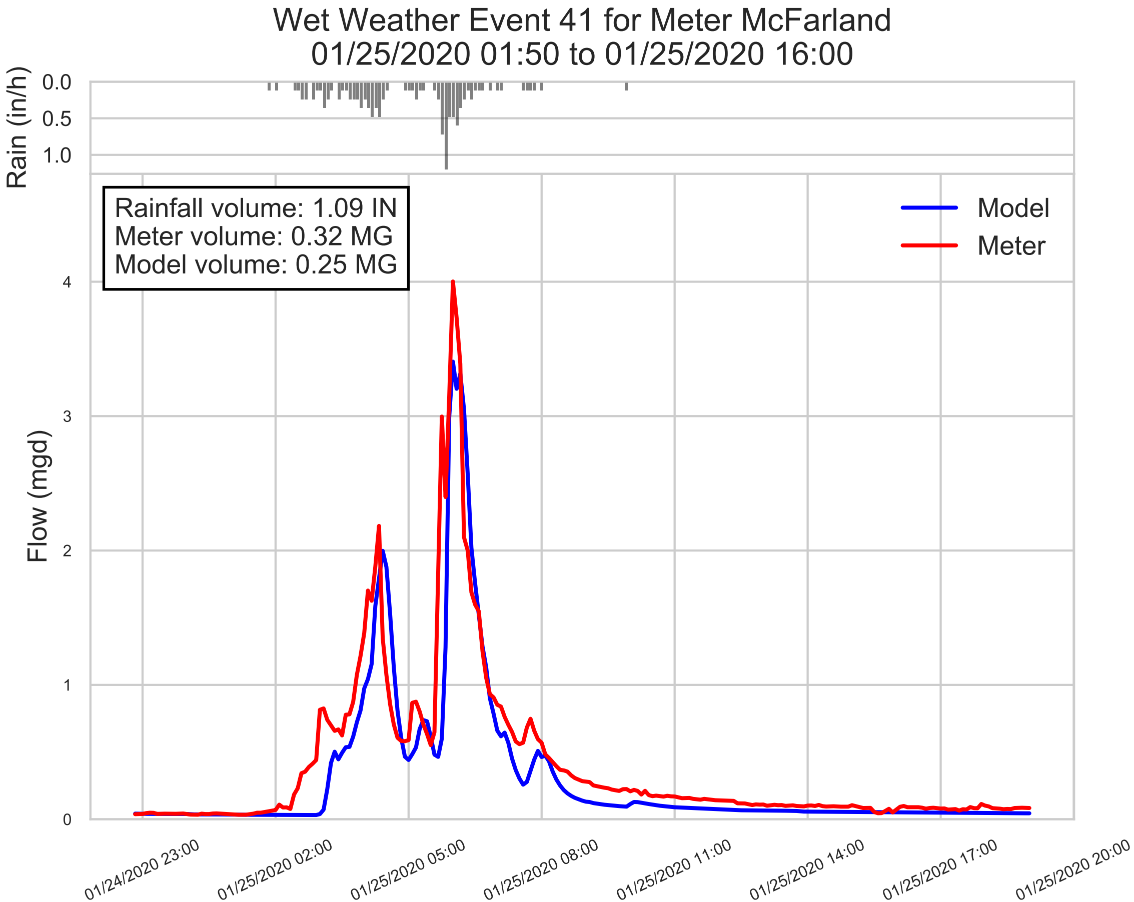

Wet Weather Event 38 for Meter McFarland
01/08/2020 09:35 to 01/08/2020 19:14
Rain (in/h)
0.00
0.05
0.10
Rainfall volume: 0.14 IN
Meter volume: 0.03 MG
Model volume: 0.04 MG
Model
Meter
Flow (mgd)
0.30
0.25
0.20
0.15
0.10
0.05
0.00
01/08/2020 06:00
01/08/2020 09:00
01/08/2020 12:00
01/08/2020 15:00
01/08/2020 18:00
01/08/2020 21:00



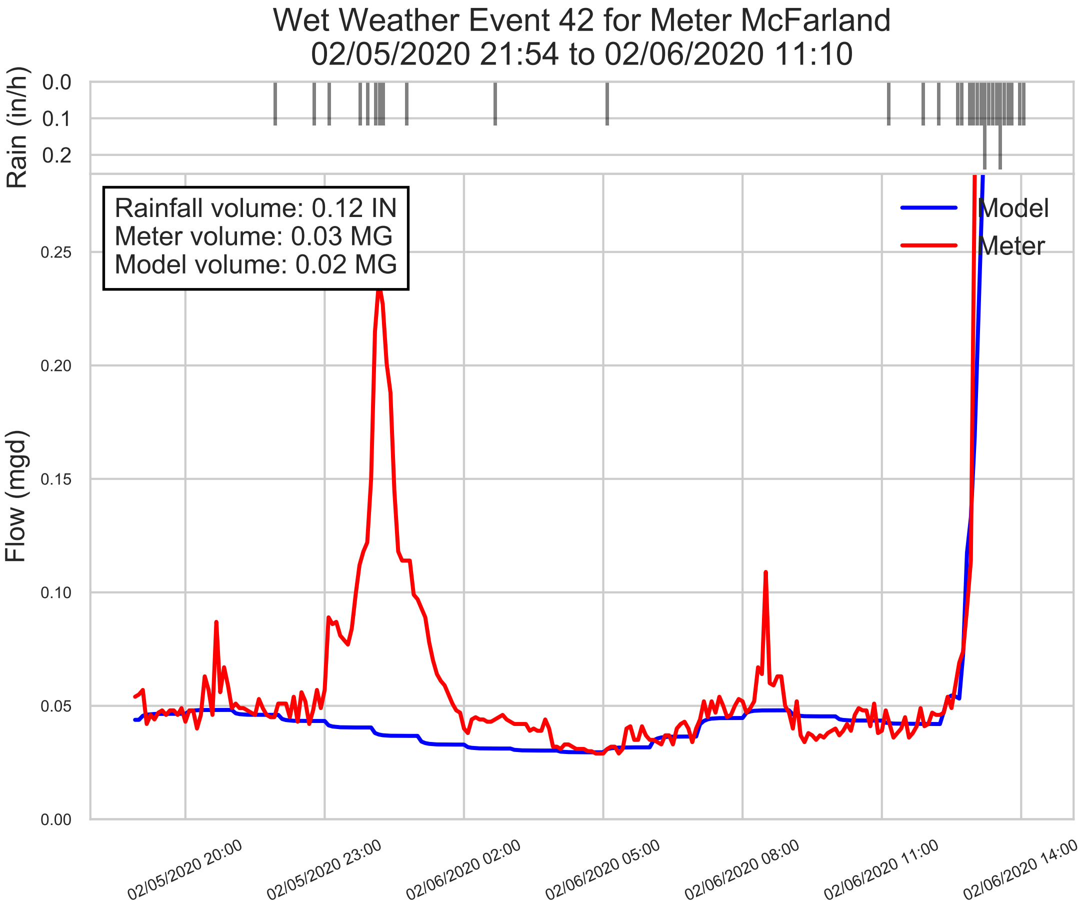
Wet Weather Event 39 for Meter McFarland
01/12/2020 01:45 to 01/12/2020 12:00
Rain (in/h)
0.0
0.8
1.6
Rainfall volume: 0.32 IN
Meter volume: 0.07 MG
Model volume: 0.05 MG
Model
Meter
Flow (mgd)
1.75
1.50
1.25
1.00
0.75
0.50
0.25
0.00
01/11/2020 22:00
01/12/2020 01:00
01/12/2020 04:00
01/12/2020 07:00
01/12/2020 10:00
01/12/2020 13:00

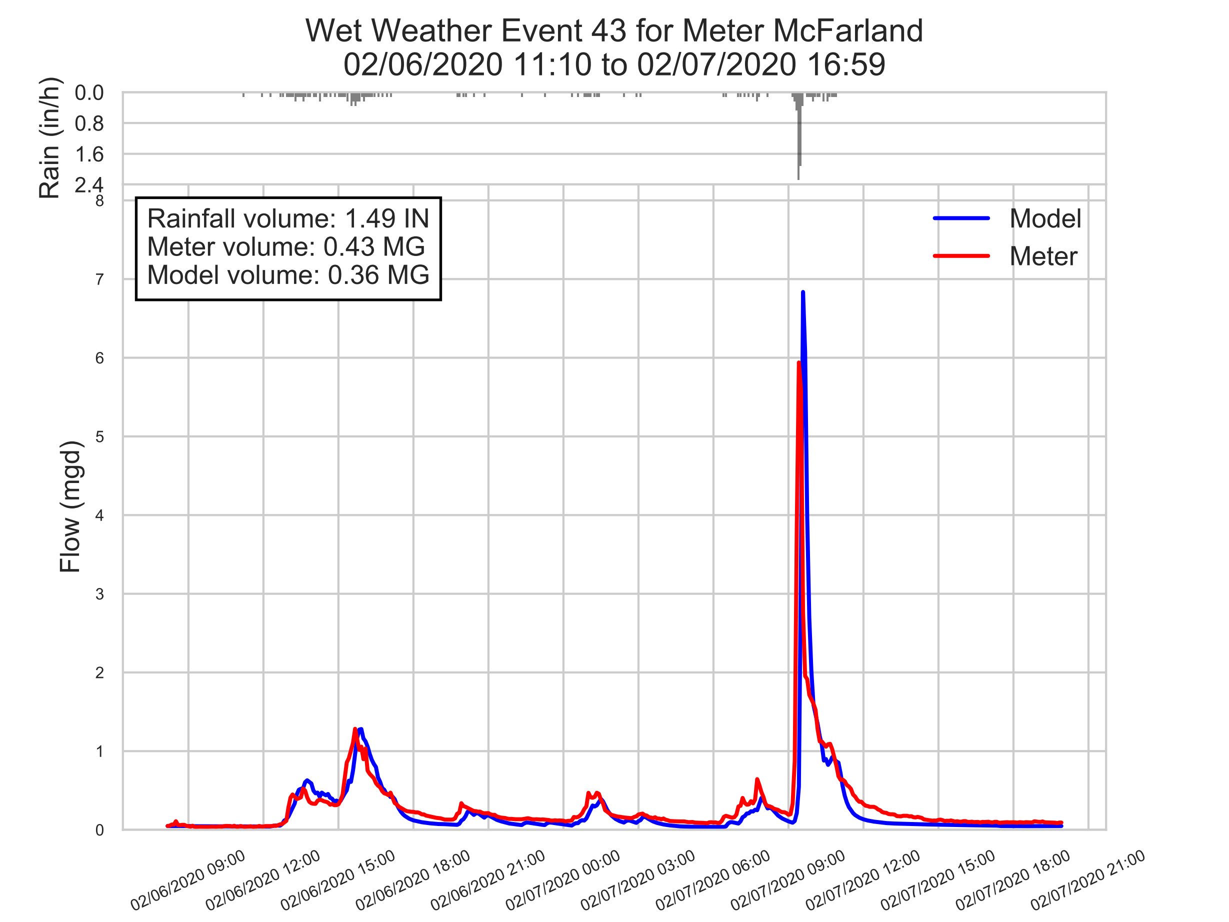


Wet Weather Event 40 for Meter McFarland
01/18/2020 14:05 to 01/19/2020 11:44
Rain (in/h)
0.0
0.1
0.2
Rainfall volume: 0.29 IN
Meter volume: 0.07 MG
Model volume: 0.06 MG
Model
Meter
Flow (mgd)
0.5
0.4
0.3
0.2
0.1
0.0
01/18/2020 12:00
01/18/2020 15:00
01/18/2020 18:00
01/18/2020 21:00
01/19/2020 00:00
01/19/2020 03:00
01/19/2020 06:00
01/19/2020 09:00
01/19/2020 12:00
01/19/2020 15:00

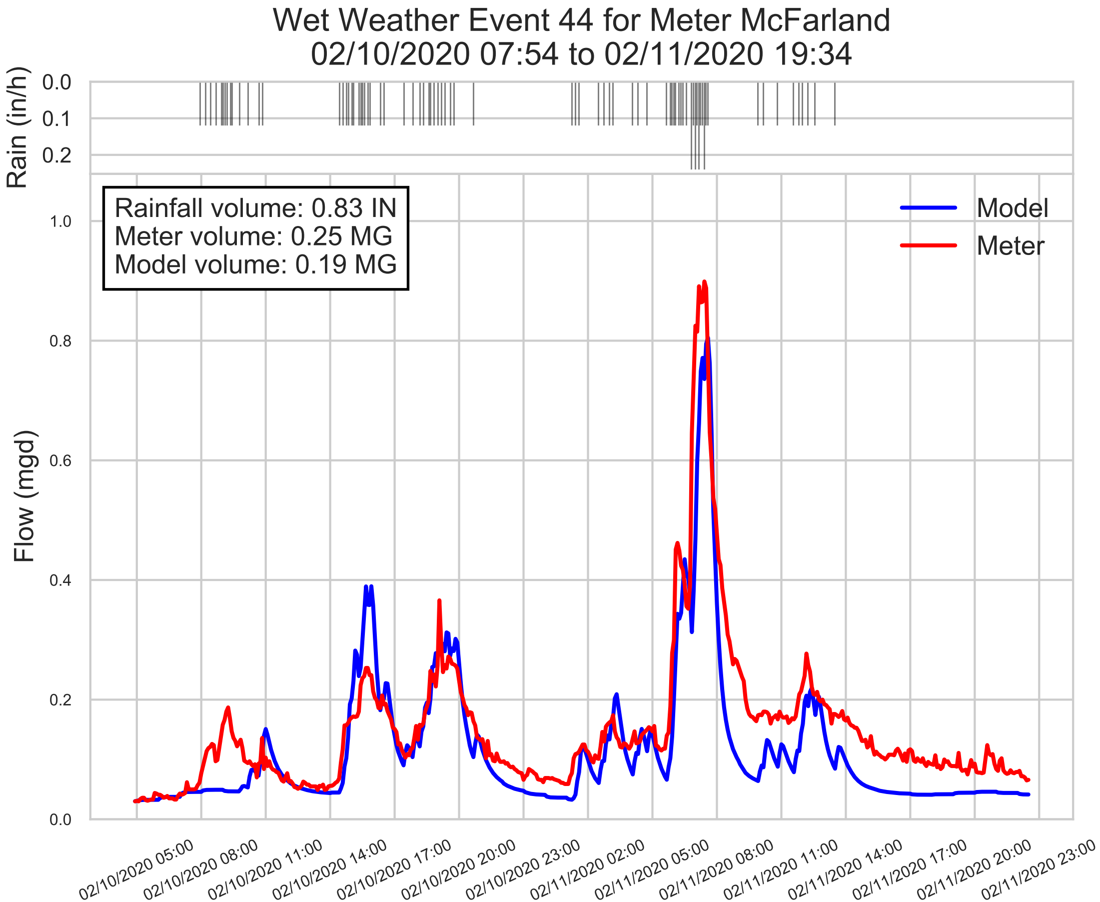


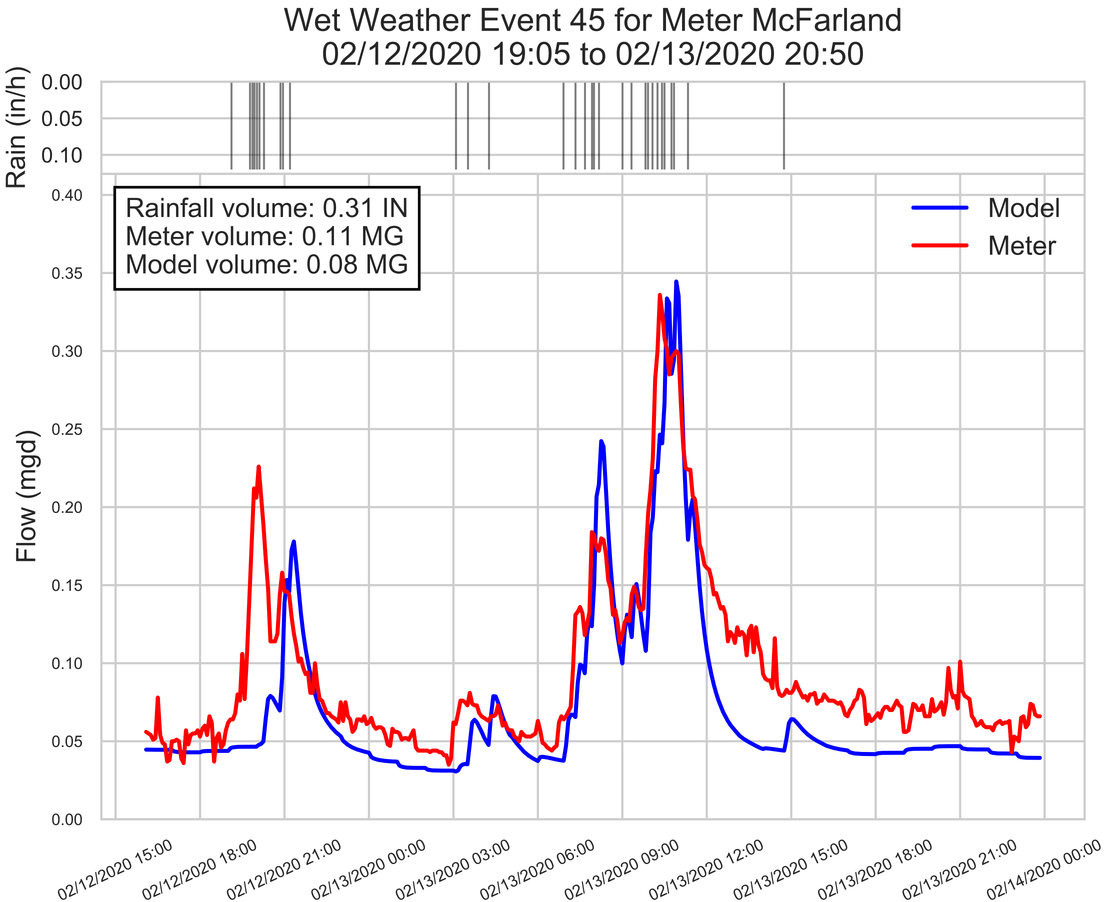
Wet Weather Event 41 for Meter McFarland
01/25/2020 01:50 to 01/25/2020 16:00
Rain (in/h)
0.0
0.5
1.0
Rainfall volume: 1.09 IN
Meter volume: 0.32 MG
Model volume: 0.25 MG
Model
Meter
Flow (mgd)
0
1
2
3
4
01/24/2020 23:00
01/25/2020 02:00
01/25/2020 05:00
01/25/2020 08:00
01/25/2020 11:00
01/25/2020 14:00
01/25/2020 17:00
01/25/2020 20:00


Wet Weather Event 42 for Meter McFarland
02/05/2020 21:54 to 02/06/2020 11:10
Rain (in/h)
0.0
0.1
0.2
Rainfall volume: 0.12 IN
Meter volume: 0.03 MG
Model volume: 0.02 MG
Model
Meter
Flow (mgd)
0.25
0.20
0.15
0.10
0.05
0.00
02/05/2020 20:00
02/05/2020 23:00
02/06/2020 02:00
02/06/2020 05:00
02/06/2020 08:00
02/06/2020 11:00
02/06/2020 14:00

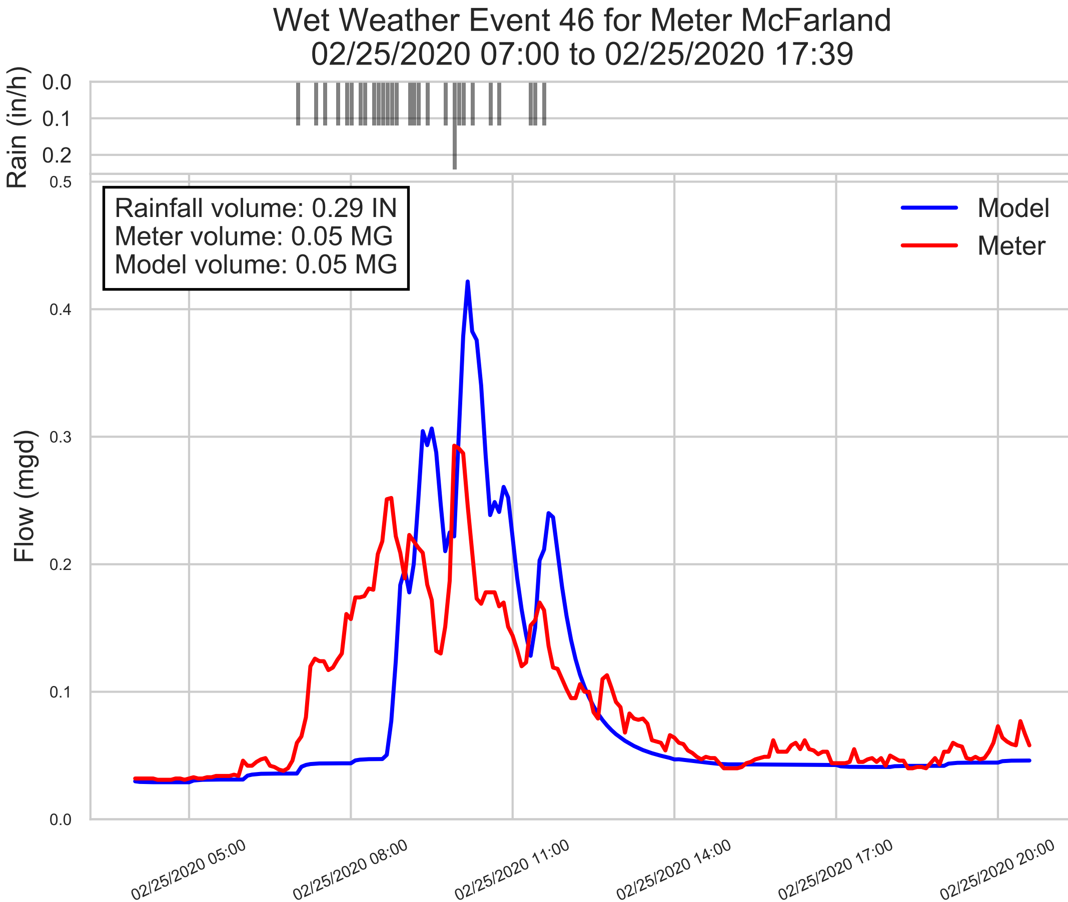


Wet Weather Event 43 for Meter McFarland
02/06/2020 11:10 to 02/07/2020 16:59
Rain (in/h)
0.0
0.8
1.6
2.4
Flow (mgd)
0
1
2
3
4
5
6
7
8
Rainfall volume: 1.49 IN
Meter volume: 0.43 MG
Model volume: 0.36 MG
Model
Meter
02/06/2020 09:00
02/06/2020 12:00
02/06/2020 15:00
02/06/2020 18:00
02/06/2020 21:00
02/07/2020 00:00
02/07/2020 03:00
02/07/2020 06:00
02/07/2020 09:00
02/07/2020 12:00
02/07/2020 15:00
02/07/2020 18:00
02/07/2020 21:00

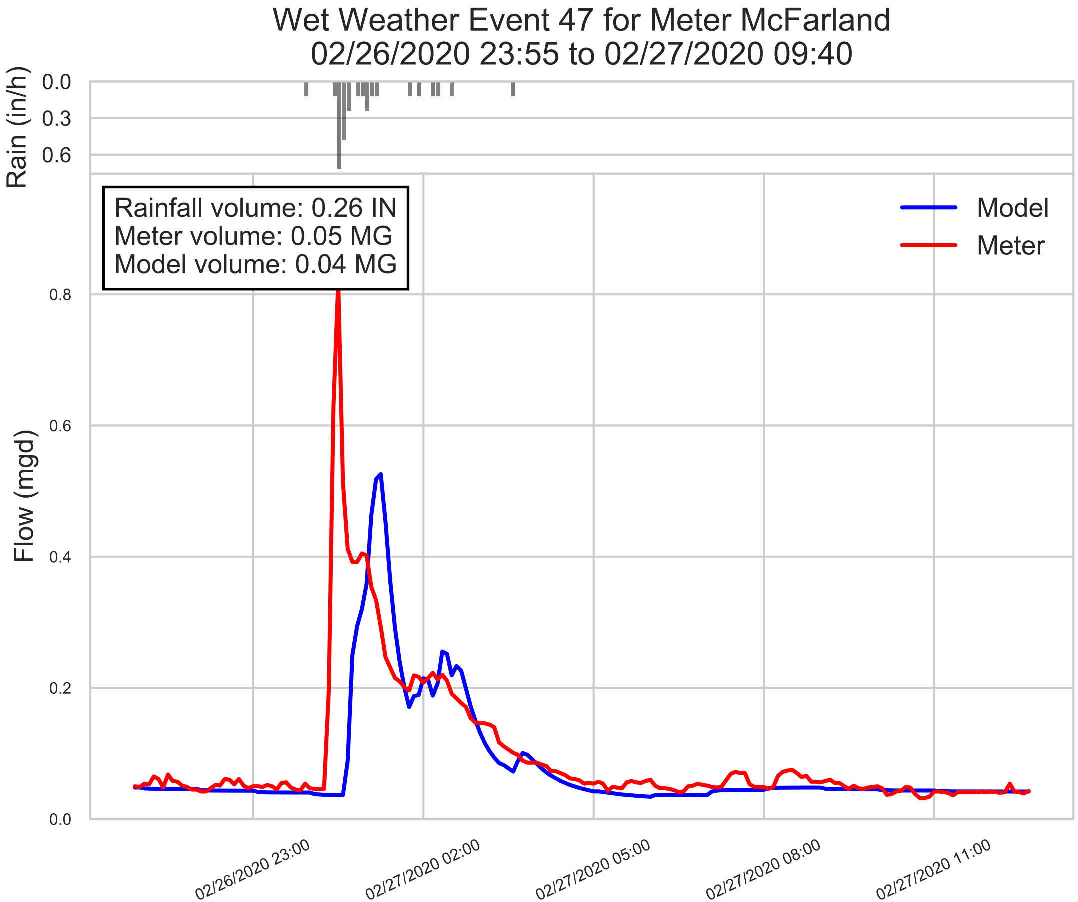

Wet Weather Event 44 for Meter McFarland
02/10/2020 07:54 to 02/11/2020 19:34
Rain (in/h)
0.0
0.1
0.2
Rainfall volume: 0.83 IN
Meter volume: 0.25 MG
Model volume: 0.19 MG
Model
Meter
Flow (mgd)
1.0
0.8
0.6
0.4
0.2
0.0
02/10/2020 05:00
02/10/2020 08:00
02/10/2020 11:00
02/10/2020 14:00
02/10/2020 17:00
02/10/2020 20:00
02/10/2020 23:00
02/11/2020 02:00
02/11/2020 05:00
02/11/2020 08:00
02/11/2020 11:00
02/11/2020 14:00
02/11/2020 17:00
02/11/2020 20:00
02/11/2020 23:00

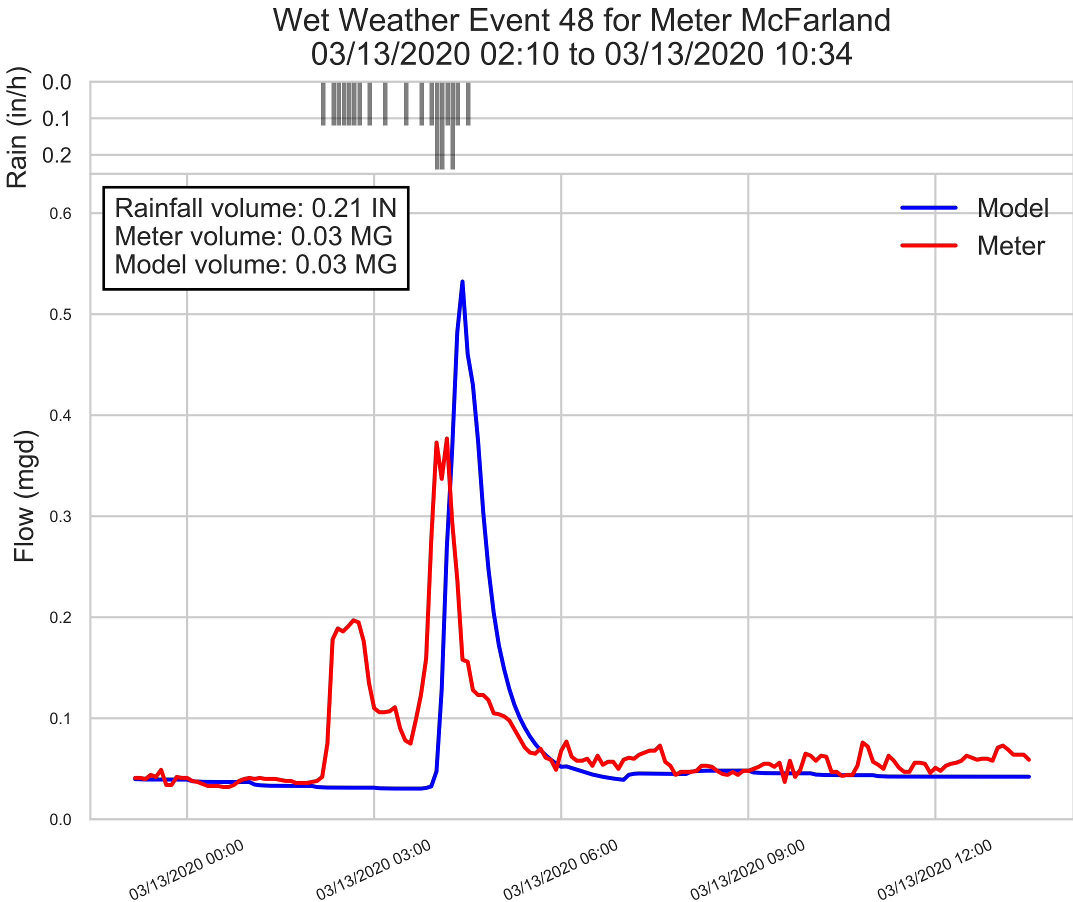


Wet Weather Event 45 for Meter McFarland
02/12/2020 19:05 to 02/13/2020 20:50
Rain (in/h)
0.00
0.05
0.10
Rainfall volume: 0.31 IN
Meter volume: 0.11 MG
Model volume: 0.08 MG
Model
Meter
Flow (mgd)
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
02/12/2020 15:00
02/12/2020 18:00
02/12/2020 21:00
02/13/2020 00:00
02/13/2020 03:00
02/13/2020 06:00
02/13/2020 09:00
02/13/2020 12:00
02/13/2020 15:00
02/13/2020 18:00
02/13/2020 21:00
02/14/2020 00:00

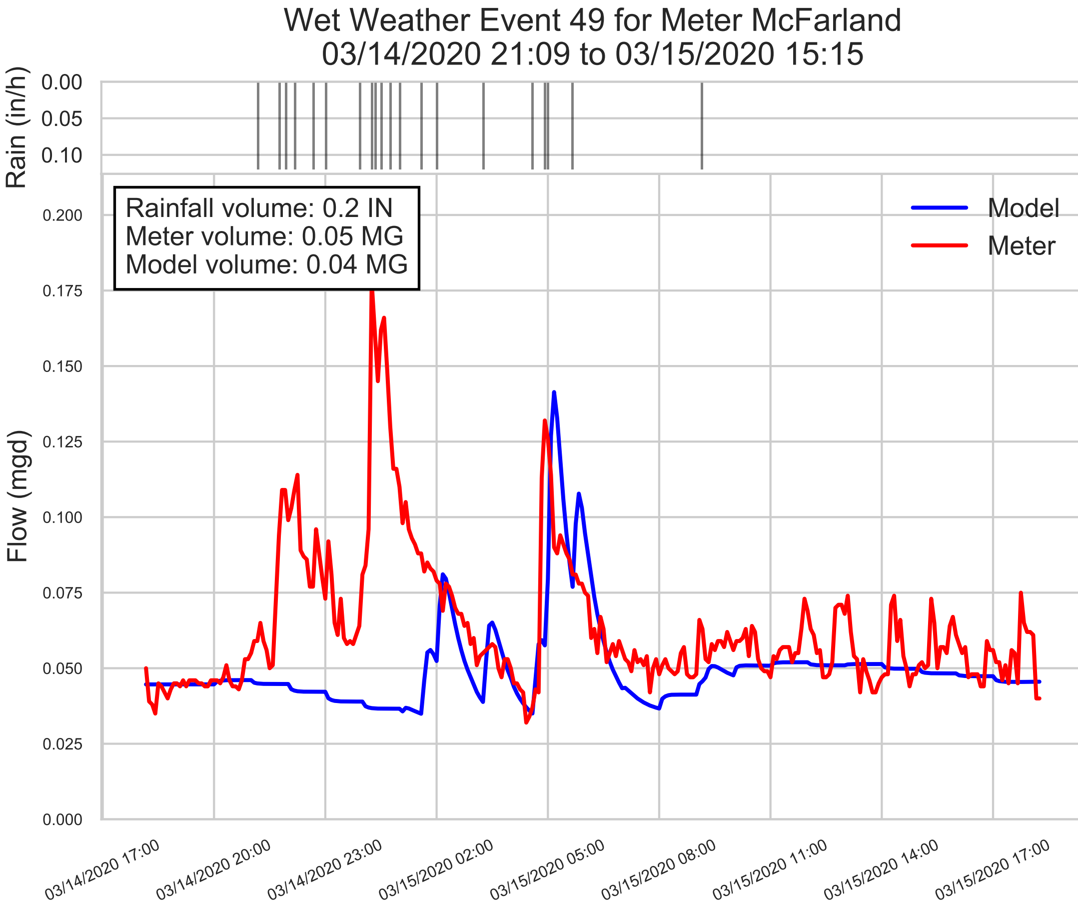


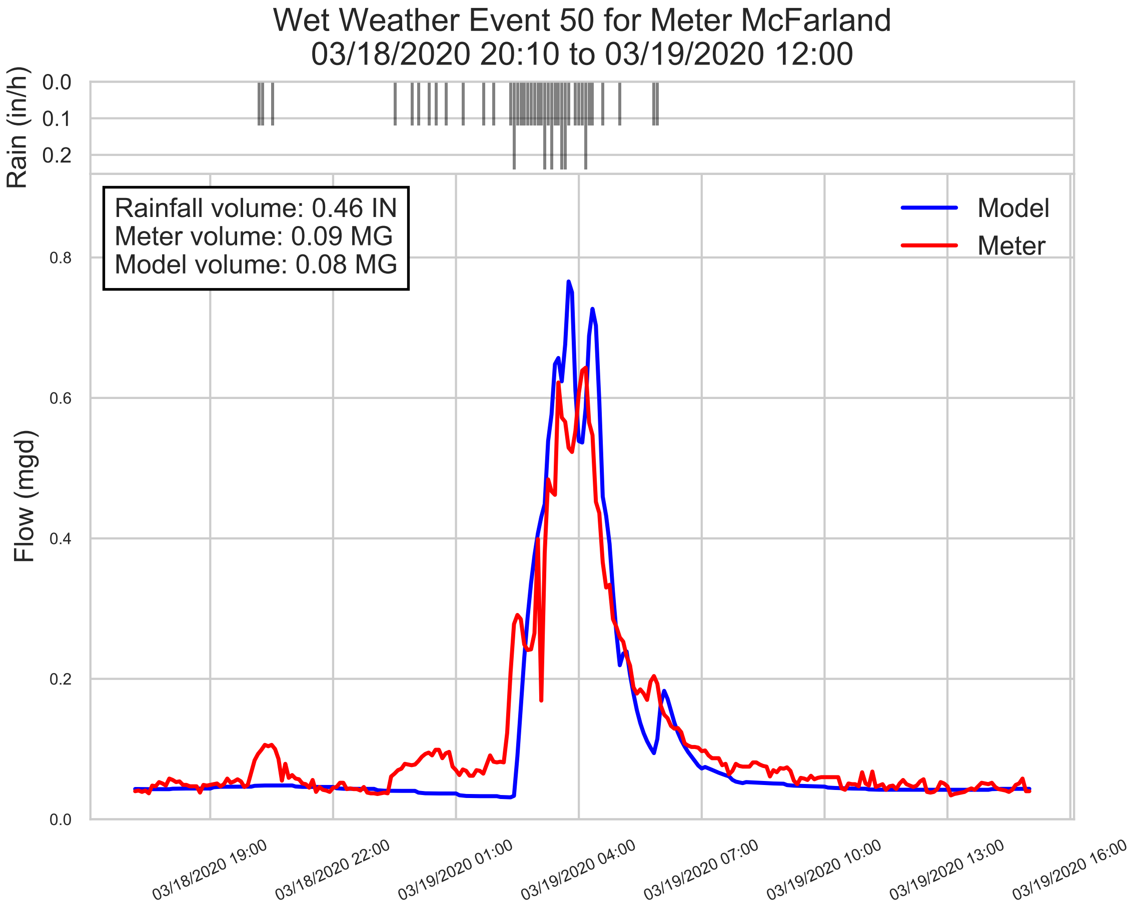
Wet Weather Event 46 for Meter McFarland
02/25/2020 07:00 to 02/25/2020 17:39
Rain (in/h)
0.0
0.1
0.2
Flow (mgd)
0.5
0.4
0.3
0.2
0.1
0.0
Rainfall volume: 0.29 IN
Meter volume: 0.05 MG
Model volume: 0.05 MG
Model
Meter
02/25/2020 05:00
02/25/2020 08:00
02/25/2020 11:00
02/25/2020 14:00
02/25/2020 17:00
02/25/2020 20:00

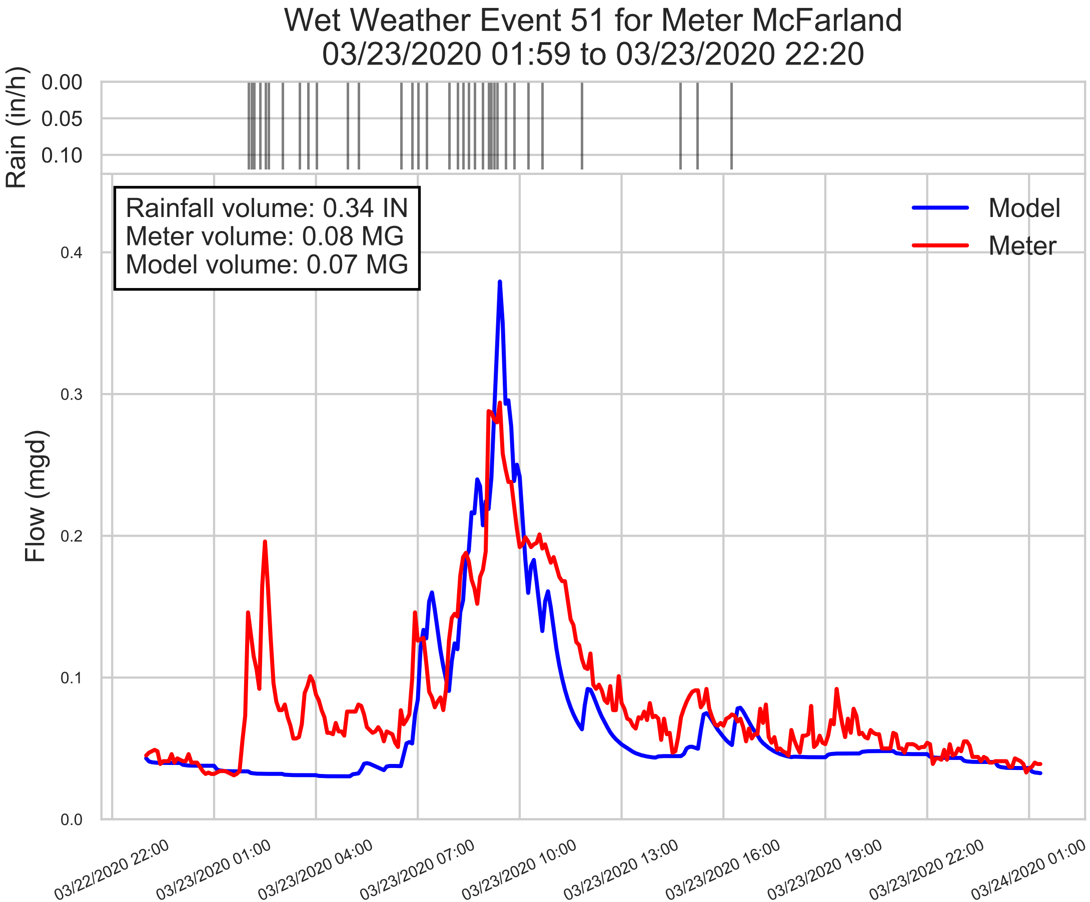

Wet Weather Event 47 for Meter McFarland
02/26/2020 23:55 to 02/27/2020 09:40
Rain (in/h)
0.0
0.3
0.6
Rainfall volume: 0.26 IN
Meter volume: 0.05 MG
Model volume: 0.04 MG
Model
Meter
Flow (mgd)
0.8
0.6
0.4
0.2
0.0
02/26/2020 23:00
02/27/2020 02:00
02/27/2020 05:00
02/27/2020 08:00
02/27/2020 11:00



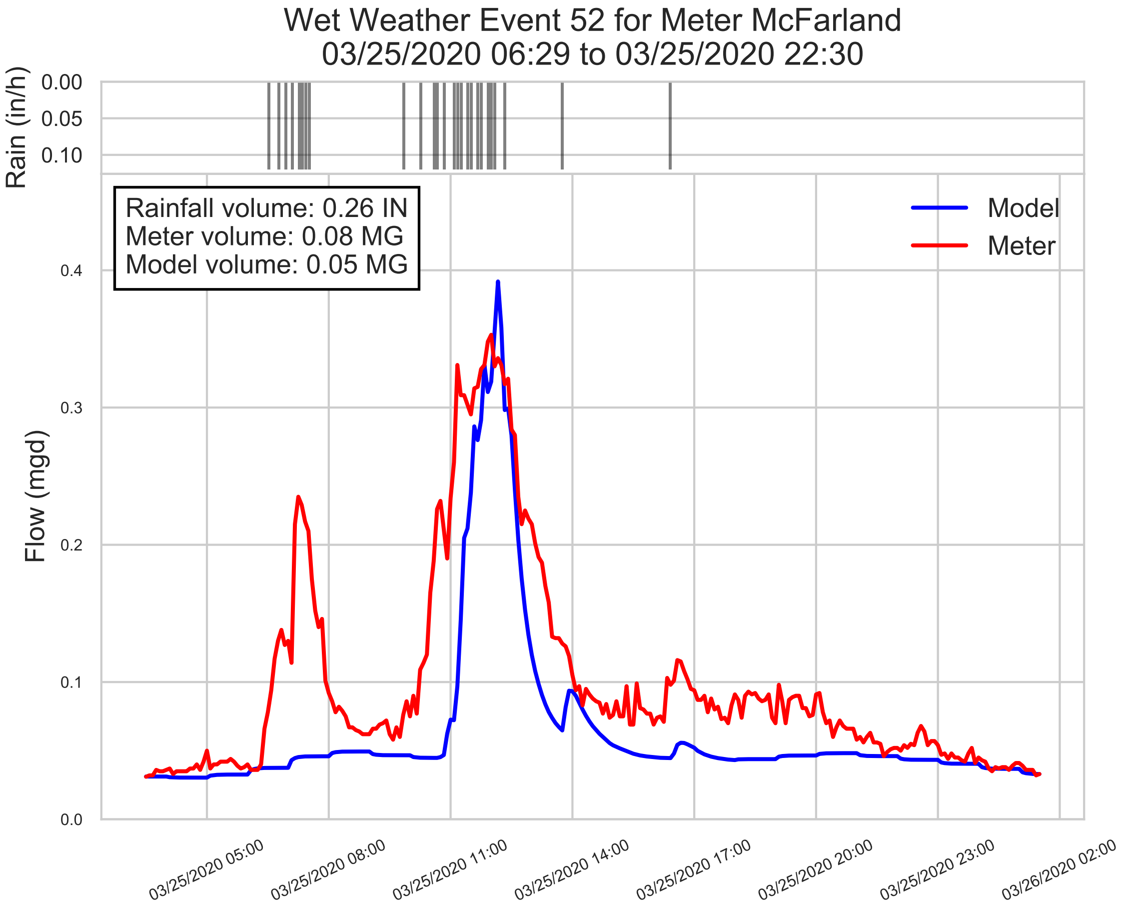
Wet Weather Event 48 for Meter McFarland
03/13/2020 02:10 to 03/13/2020 10:34
Rain (in/h)
0.0
0.1
0.2
Rainfall volume: 0.21 IN
Meter volume: 0.03 MG
Model volume: 0.03 MG
Model
Meter
Flow (mgd)
0.6
0.5
0.4
0.3
0.2
0.1
0.0
03/13/2020 00:00
03/13/2020 03:00
03/13/2020 06:00
03/13/2020 09:00
03/13/2020 12:00


Wet Weather Event 49 for Meter McFarland
03/14/2020 21:09 to 03/15/2020 15:15
Rain (in/h)
0.00
0.05
0.10
Rainfall volume: 0.2 IN
Meter volume: 0.05 MG
Model volume: 0.04 MG
Model
Meter
Flow (mgd)
0.200
0.175
0.150
0.125
0.100
0.075
0.050
0.025
0.000
03/14/2020 17:00
03/14/2020 20:00
03/14/2020 23:00
03/15/2020 02:00
03/15/2020 05:00
03/15/2020 08:00
03/15/2020 11:00
03/15/2020 14:00
03/15/2020 17:00

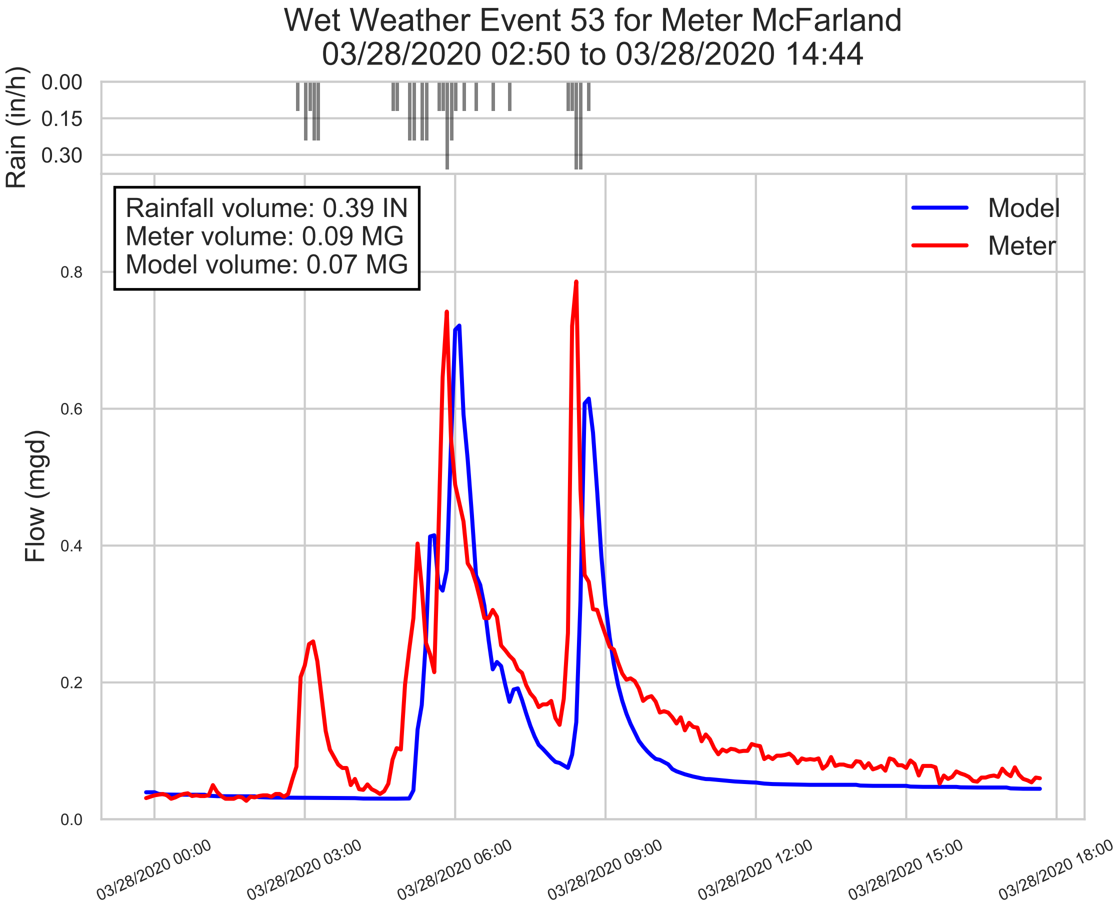

Wet Weather Event 50 for Meter McFarland
03/18/2020 20:10 to 03/19/2020 12:00
Rain (in/h)
0.0
0.1
0.2
Rainfall volume: 0.46 IN
Meter volume: 0.09 MG
Model volume: 0.08 MG
Model
Meter
Flow (mgd)
0.8
0.6
0.4
0.2
0.0
03/18/2020 19:00
03/18/2020 22:00
03/19/2020 01:00
03/19/2020 04:00
03/19/2020 07:00
03/19/2020 10:00
03/19/2020 13:00
03/19/2020 16:00

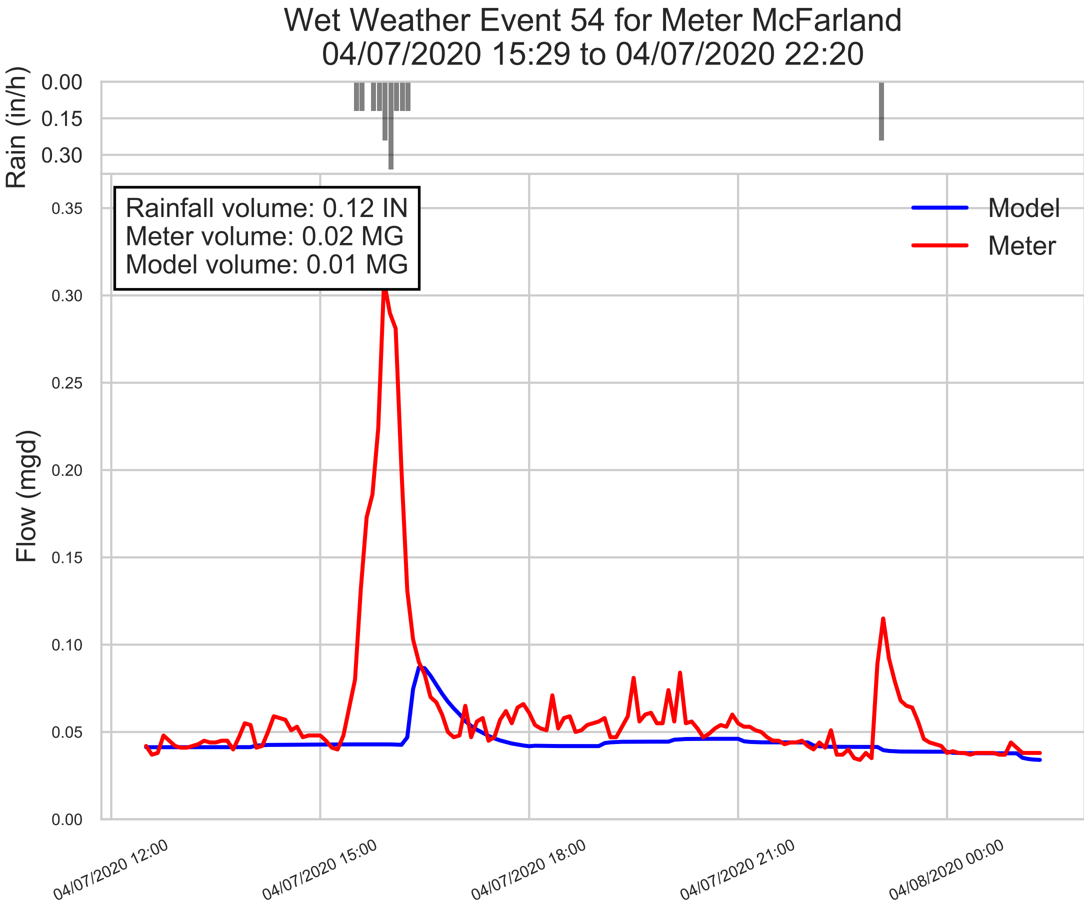


Wet Weather Event 51 for Meter McFarland
03/23/2020 01:59 to 03/23/2020 22:20
Rain (in/h)
0.00
0.05
0.10
Rainfall volume: 0.34 IN
Meter volume: 0.08 MG
Model volume: 0.07 MG
Model
Meter
Flow (mgd)
0.4
0.3
0.2
0.1
0.0
03/22/2020 22:00
03/23/2020 01:00
03/23/2020 04:00
03/23/2020 07:00
03/23/2020 10:00
03/23/2020 13:00
03/23/2020 16:00
03/23/2020 19:00
03/23/2020 22:00
03/24/2020 01:00

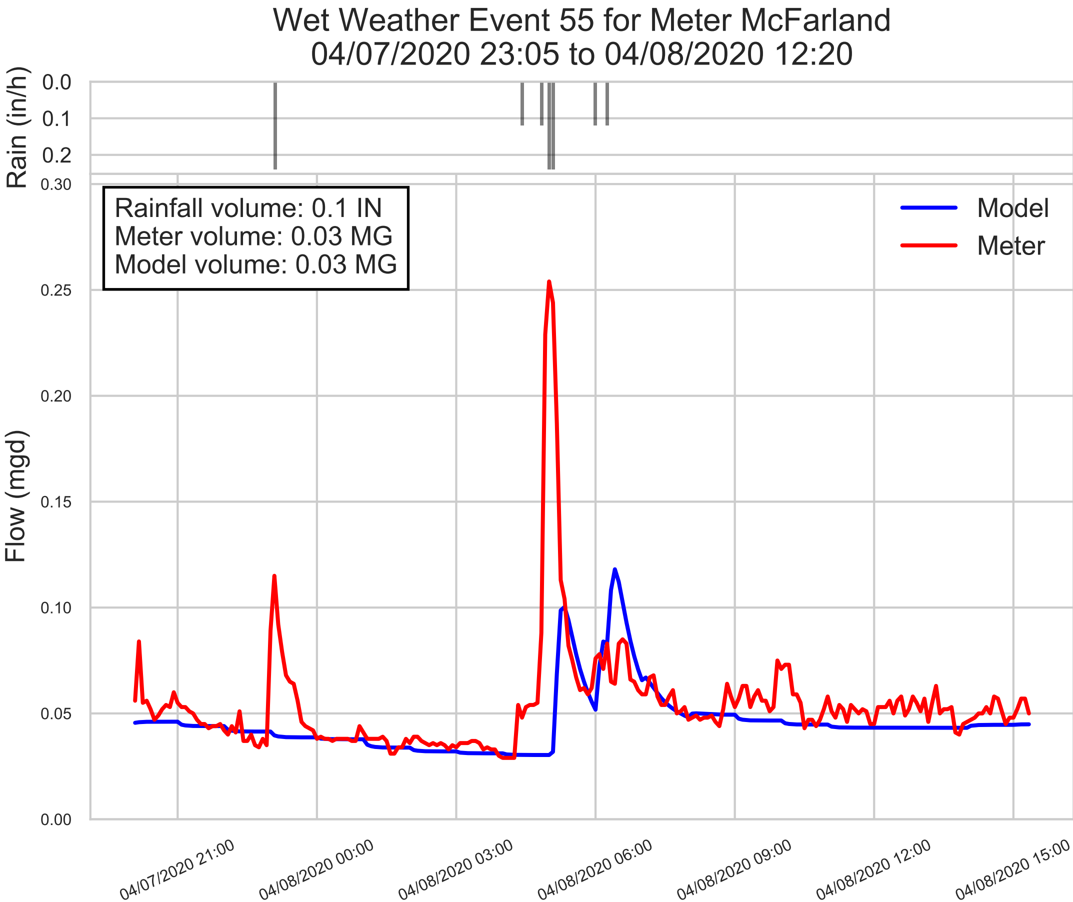


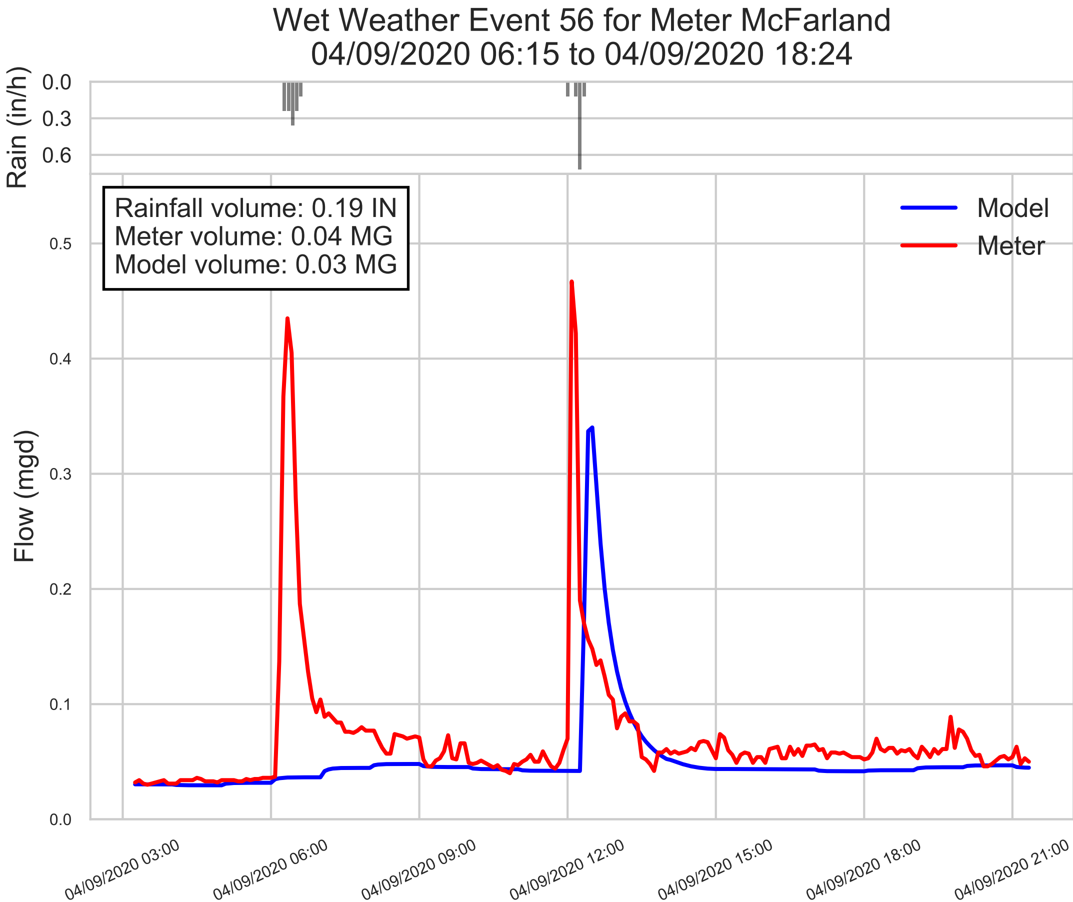
Wet Weather Event 52 for Meter McFarland
03/25/2020 06:29 to 03/25/2020 22:30
Rain (in/h)
0.00
0.05
0.10
Rainfall volume: 0.26 IN
Meter volume: 0.08 MG
Model volume: 0.05 MG
Model
Meter
Flow (mgd)
0.0
0.1
0.2
0.3
0.4
03/25/2020 05:00
03/25/2020 08:00
03/25/2020 11:00
03/25/2020 14:00
03/25/2020 17:00
03/25/2020 20:00
03/25/2020 23:00
03/26/2020 02:00

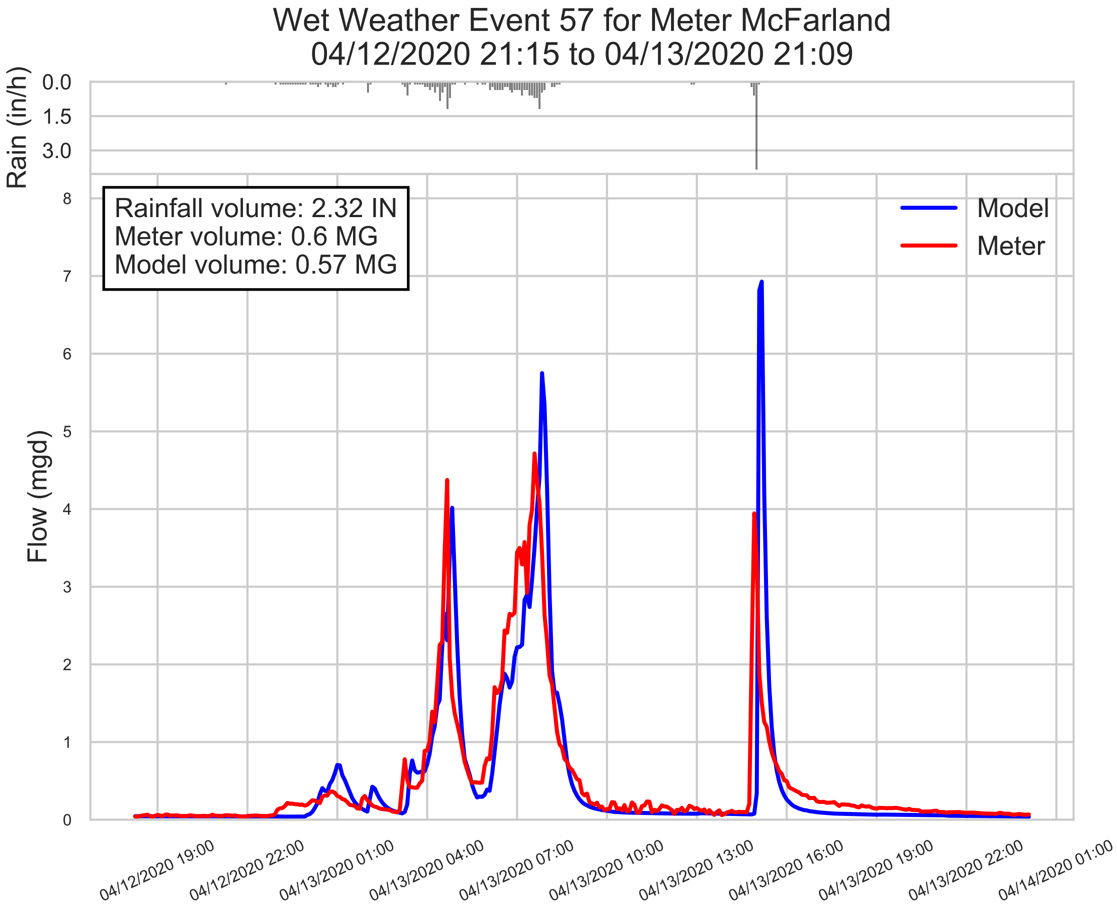

Wet Weather Event 53 for Meter McFarland
03/28/2020 02:50 to 03/28/2020 14:44
Rain (in/h)
0.00
0.15
0.30
Rainfall volume: 0.39 IN
Meter volume: 0.09 MG
Model volume: 0.07 MG
Model
Meter
Flow (mgd)
0.0
0.2
0.4
0.6
0.8
03/28/2020 00:00
03/28/2020 03:00
03/28/2020 06:00
03/28/2020 09:00
03/28/2020 12:00
03/28/2020 15:00
03/28/2020 18:00



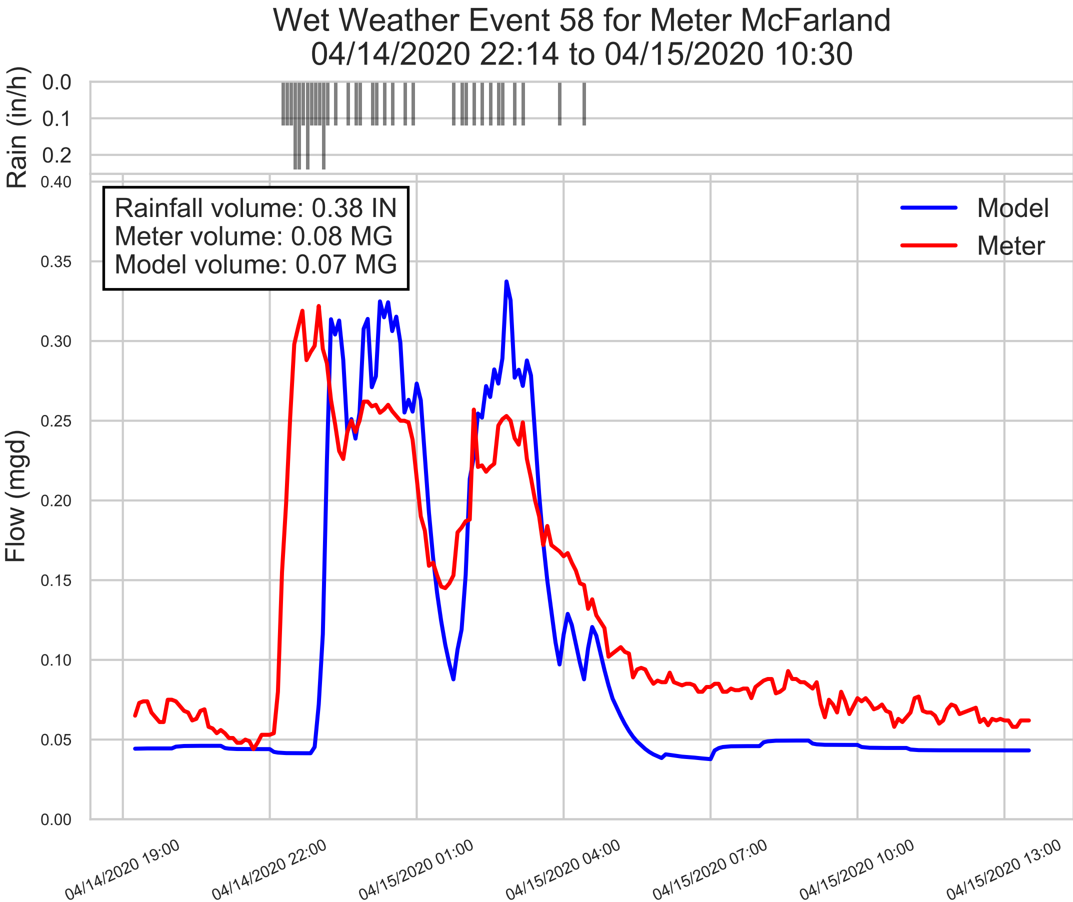
Wet Weather Event 54 for Meter McFarland
04/07/2020 15:29 to 04/07/2020 22:20
Rain (in/h)
0.00
0.15
0.30
Rainfall volume: 0.12 IN
Meter volume: 0.02 MG
Model volume: 0.01 MG
Model
Meter
Flow (mgd)
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
04/07/2020 12:00
04/07/2020 15:00
04/07/2020 18:00
04/07/2020 21:00
04/08/2020 00:00


Wet Weather Event 55 for Meter McFarland
04/07/2020 23:05 to 04/08/2020 12:20
Rain (in/h)
0.0
0.1
0.2
0.30
0.25
0.20
0.15
0.10
0.05
0.00
Flow (mgd)
Rainfall volume: 0.1 IN
Meter volume: 0.03 MG
Model volume: 0.03 MG
Model
Meter
04/07/2020 21:00
04/08/2020 00:00
04/08/2020 03:00
04/08/2020 06:00
04/08/2020 09:00
04/08/2020 12:00
04/08/2020 15:00

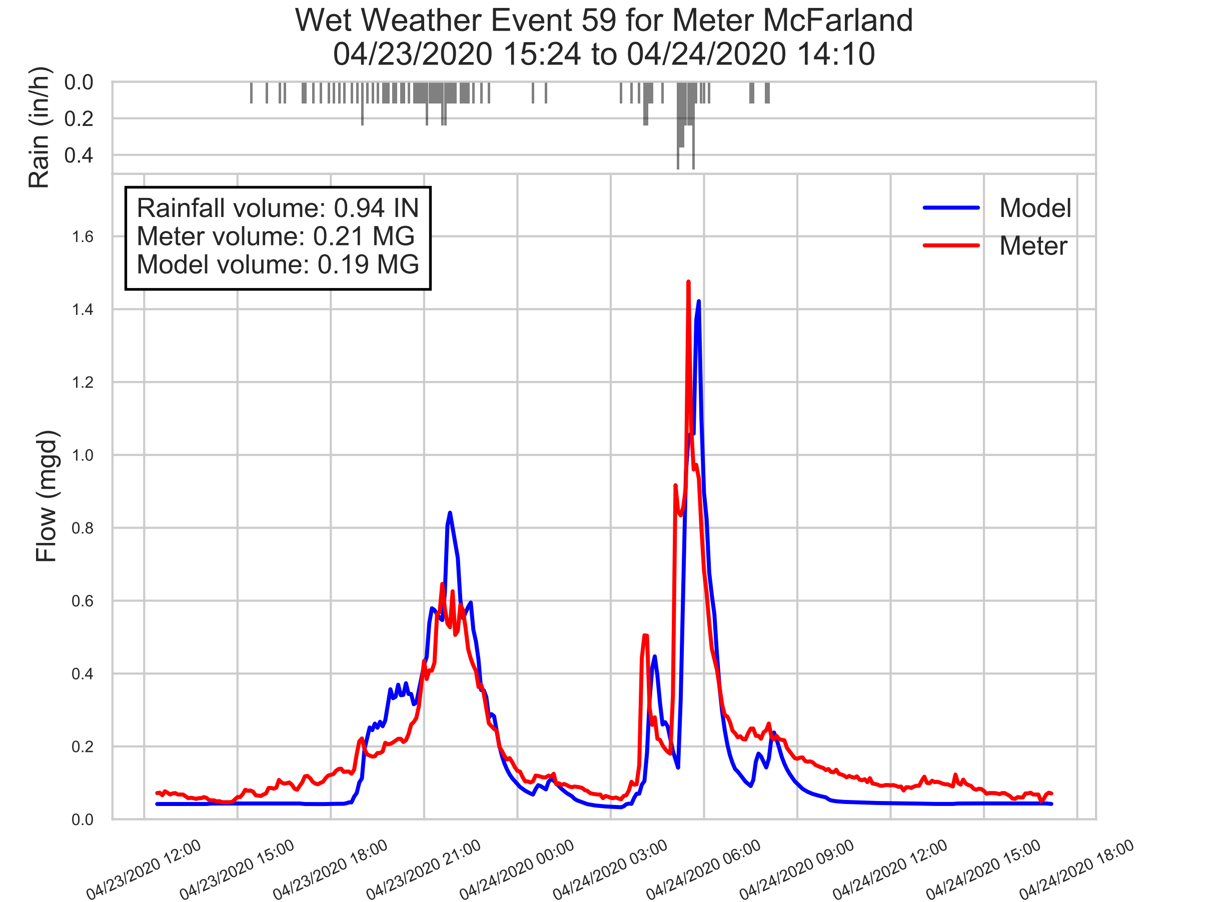

Wet Weather Event 56 for Meter McFarland
04/09/2020 06:15 to 04/09/2020 18:24
Rain (in/h)
0.0
0.3
0.6
Rainfall volume: 0.19 IN
Meter volume: 0.04 MG
Model volume: 0.03 MG
Model
Meter
Flow (mgd)
0.5
0.4
0.3
0.2
0.1
0.0
04/09/2020 03:00
04/09/2020 06:00
04/09/2020 09:00
04/09/2020 12:00
04/09/2020 15:00
04/09/2020 18:00
04/09/2020 21:00

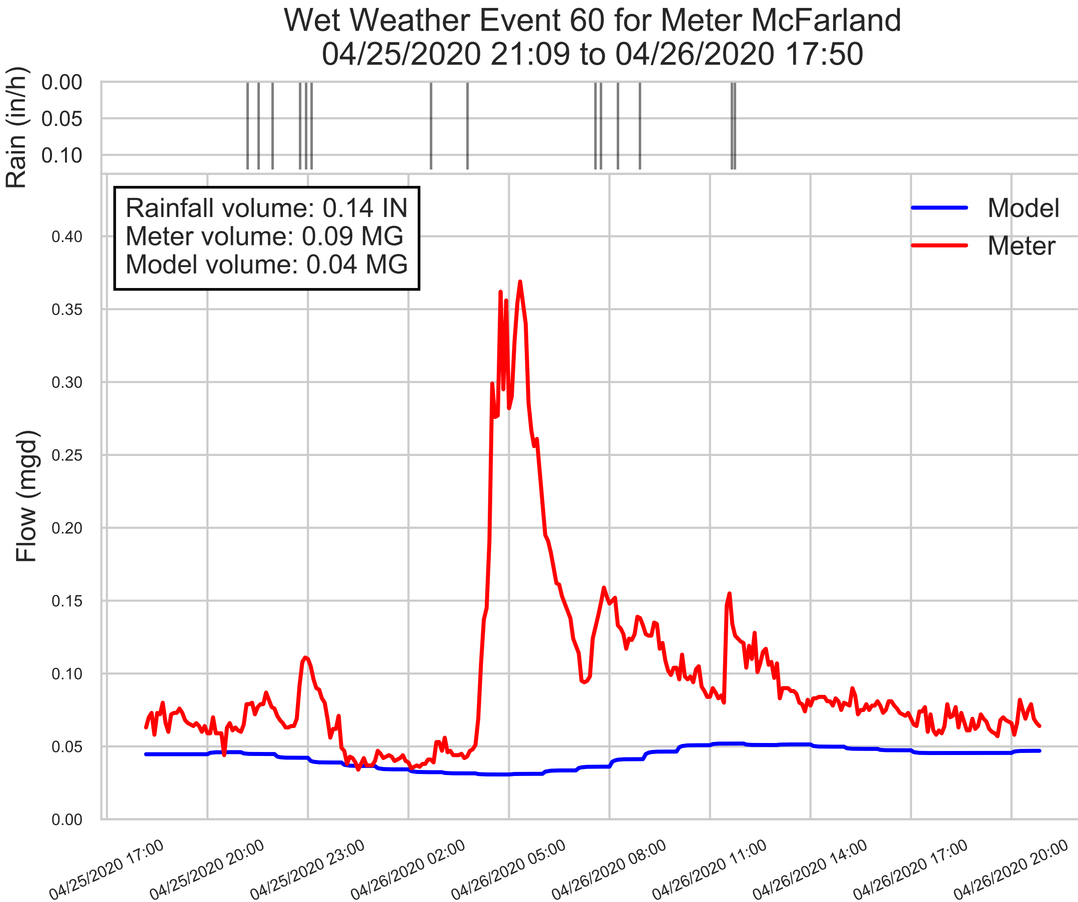


Wet Weather Event 57 for Meter McFarland
04/12/2020 21:15 to 04/13/2020 21:09
Rain (in/h)
0.0
1.5
3.0
Rainfall volume: 2.32 IN
Meter volume: 0.6 MG
Model volume: 0.57 MG
Model
Meter
Flow (mgd)
8
7
6
5
4
3
2
1
0
04/12/2020 19:00
04/12/2020 22:00
04/13/2020 01:00
04/13/2020 04:00
04/13/2020 07:00
04/13/2020 10:00
04/13/2020 13:00
04/13/2020 16:00
04/13/2020 19:00
04/13/2020 22:00
04/14/2020 01:00

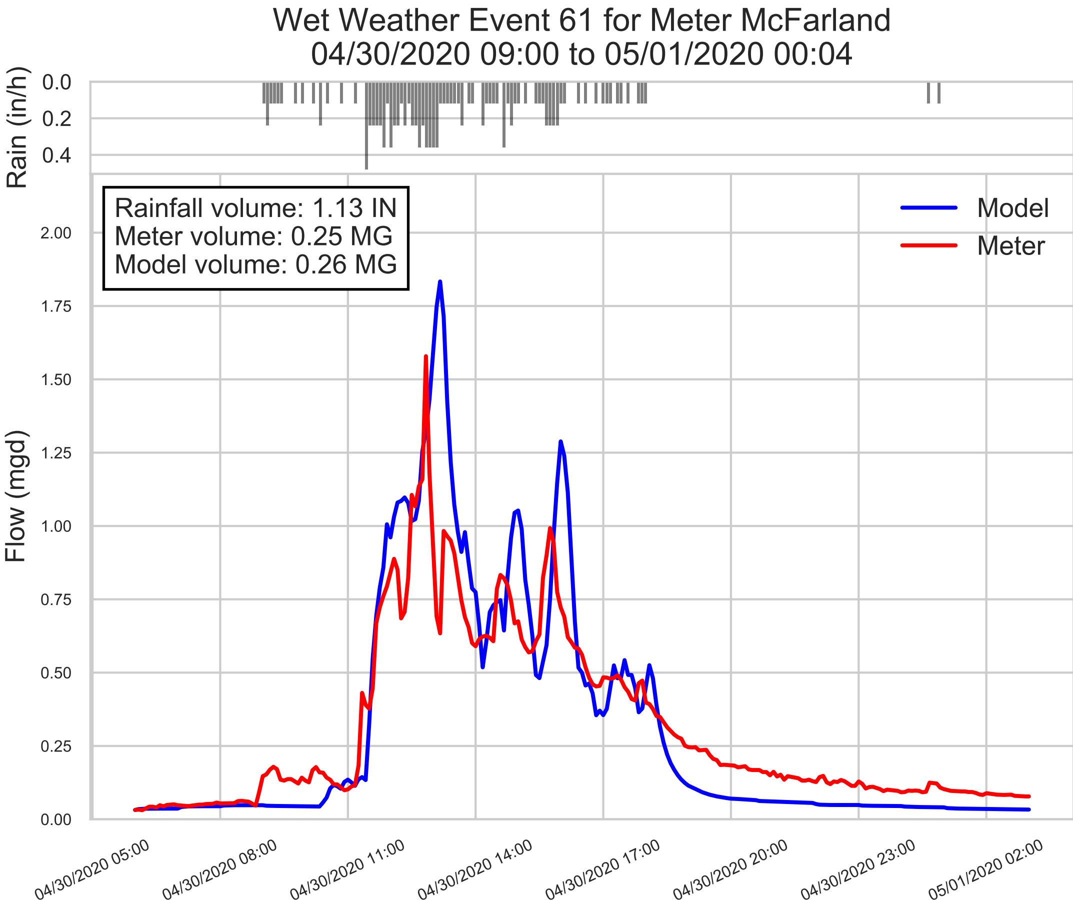


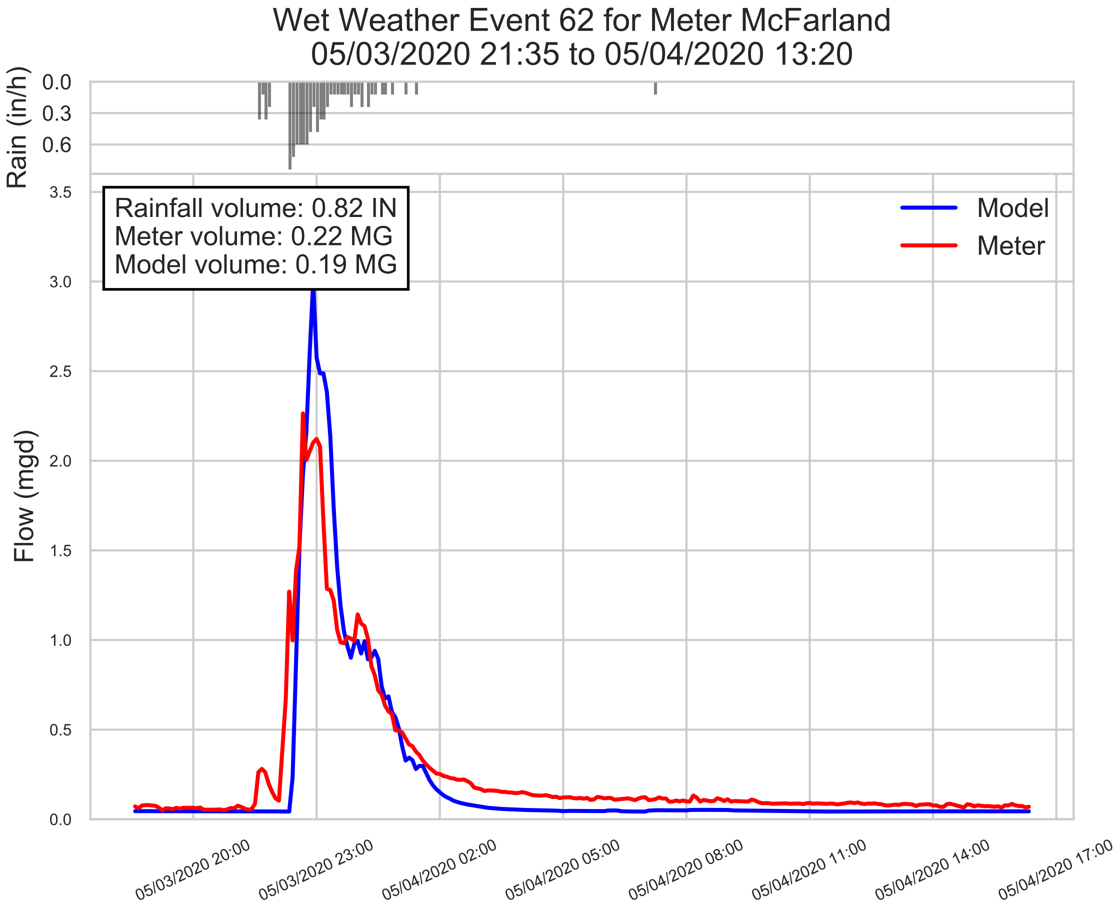
Wet Weather Event 58 for Meter McFarland
04/14/2020 22:14 to 04/15/2020 10:30
Rain (in/h)
0.0
0.1
0.2
Flow (mgd)
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
Rainfall volume: 0.38 IN
Meter volume: 0.08 MG
Model volume: 0.07 MG
Model
Meter
04/14/2020 19:00
04/14/2020 22:00
04/15/2020 01:00
04/15/2020 04:00
04/15/2020 07:00
04/15/2020 10:00
04/15/2020 13:00


Wet Weather Event 59 for Meter McFarland
04/23/2020 15:24 to 04/24/2020 14:10
Rain (in/h)
0.0
0.2
0.4
Rainfall volume: 0.94 IN
Meter volume: 0.21 MG
Model volume: 0.19 MG
Model
Meter
Flow (mgd)
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
04/23/2020 12:00
04/23/2020 15:00
04/23/2020 18:00
04/23/2020 21:00
04/24/2020 00:00
04/24/2020 03:00
04/24/2020 06:00
04/24/2020 09:00
04/24/2020 12:00
04/24/2020 15:00
04/24/2020 18:00

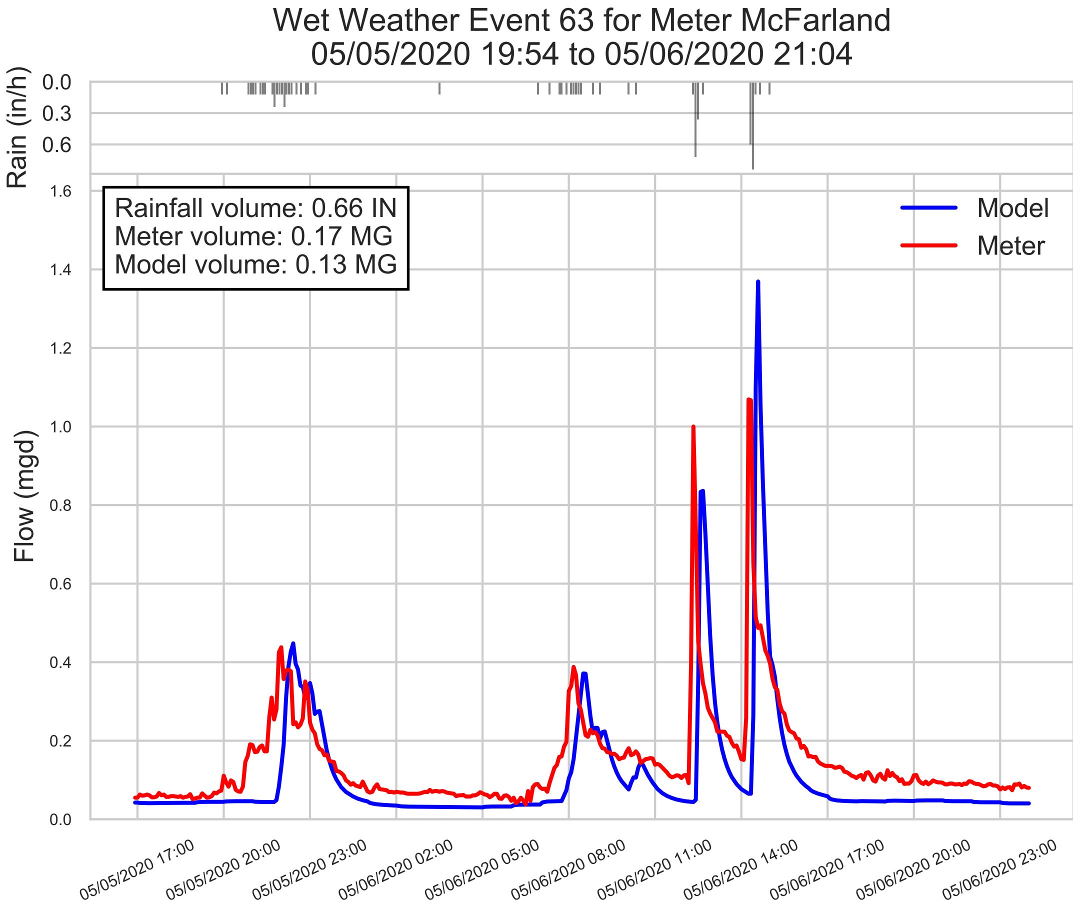


Wet Weather Event 60 for Meter McFarland
04/25/2020 21:09 to 04/26/2020 17:50
Rain (in/h)
0.00
0.05
0.10
Rainfall volume: 0.14 IN
Meter volume: 0.09 MG
Model volume: 0.04 MG
Model
Meter
Flow (mgd)
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
04/25/2020 17:00
04/25/2020 20:00
04/25/2020 23:00
04/26/2020 02:00
04/26/2020 05:00
04/26/2020 08:00
04/26/2020 11:00
04/26/2020 14:00
04/26/2020 17:00
04/26/2020 20:00

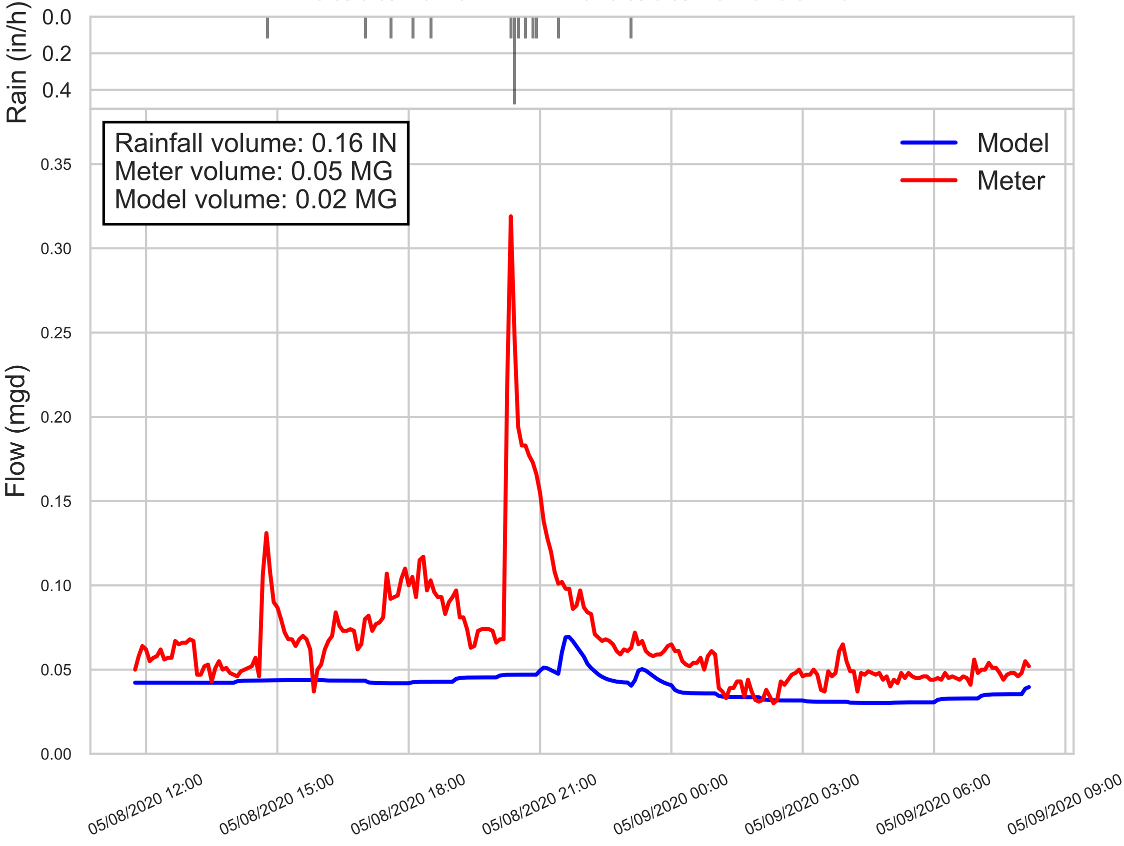

Wet Weather Event 61 for Meter McFarland
04/30/2020 09:00 to 05/01/2020 00:04
Rain (in/h)
0.0
0.2
0.4
Rainfall volume: 1.13 IN
Meter volume: 0.25 MG
Model volume: 0.26 MG
Model
Meter
Flow (mgd)
2.00
1.75
1.50
1.25
1.00
0.75
0.50
0.25
0.00
04/30/2020 05:00
04/30/2020 08:00
04/30/2020 11:00
04/30/2020 14:00
04/30/2020 17:00
04/30/2020 20:00
04/30/2020 23:00
05/01/2020 02:00

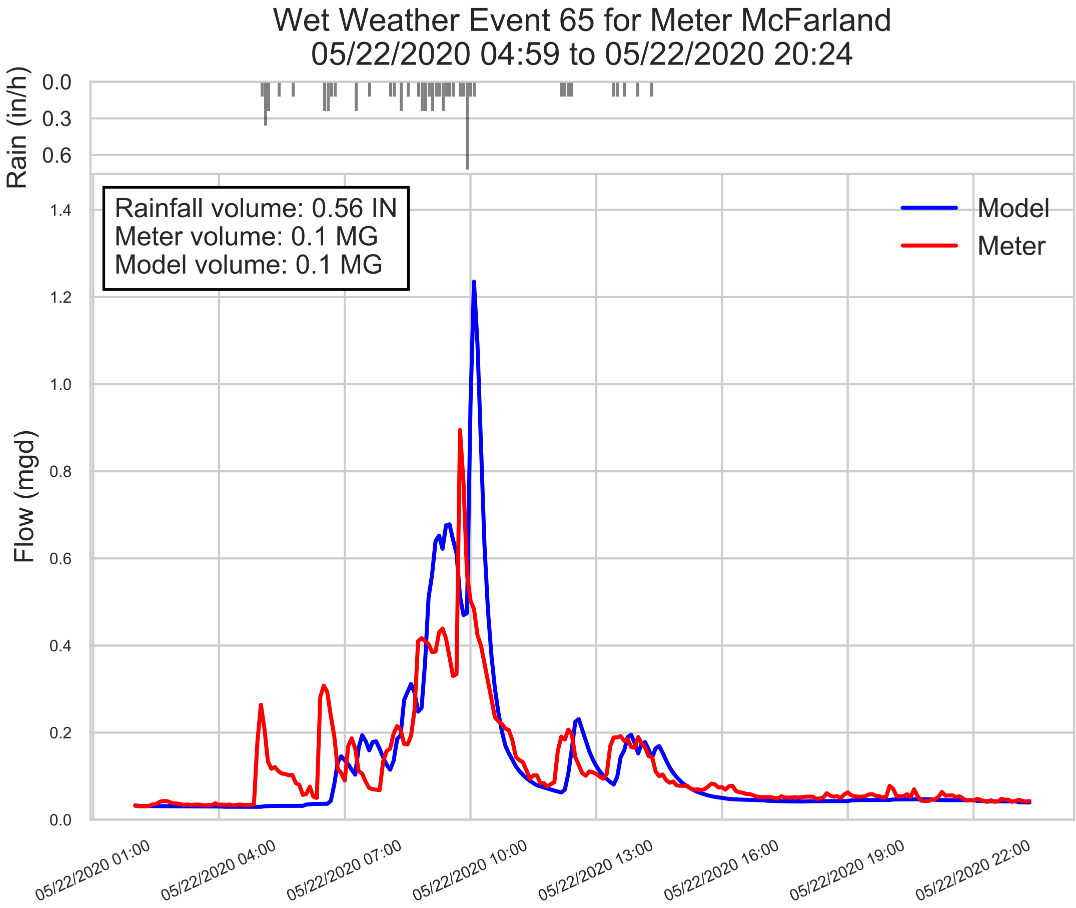


Wet Weather Event 62 for Meter McFarland
05/03/2020 21:35 to 05/04/2020 13:20
Rain (in/h)
0.0
0.3
0.6
Rainfall volume: 0.82 IN
Meter volume: 0.22 MG
Model volume: 0.19 MG
Model
Meter
Flow (mgd)
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
05/03/2020 20:00
05/03/2020 23:00
05/04/2020 02:00
05/04/2020 05:00
05/04/2020 08:00
05/04/2020 11:00
05/04/2020 14:00
05/04/2020 17:00

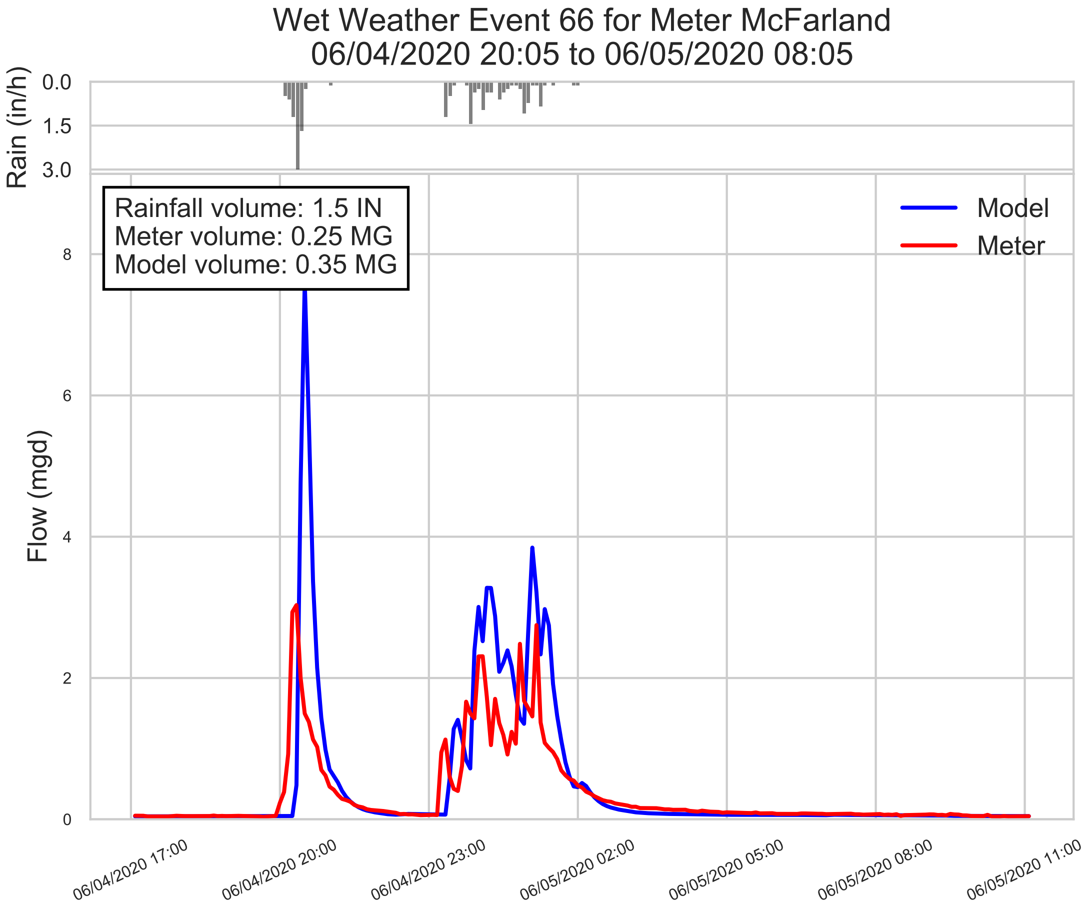

Wet Weather Event 63 for Meter McFarland
05/05/2020 19:54 to 05/06/2020 21:04
Rain (in/h)
0.0
0.3
0.6
Rainfall volume: 0.66 IN
Meter volume: 0.17 MG
Model volume: 0.13 MG
Model
Meter
Flow (mgd)
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
05/05/2020 17:00
05/05/2020 20:00
05/05/2020 23:00
05/06/2020 02:00
05/06/2020 05:00
05/06/2020 08:00
05/06/2020 11:00
05/06/2020 14:00
05/06/2020 17:00
05/06/2020 20:00
05/06/2020 23:00

Wet Weather Event 64 for Meter McFarland
05/08/2020 14:44 to 05/09/2020 05:10

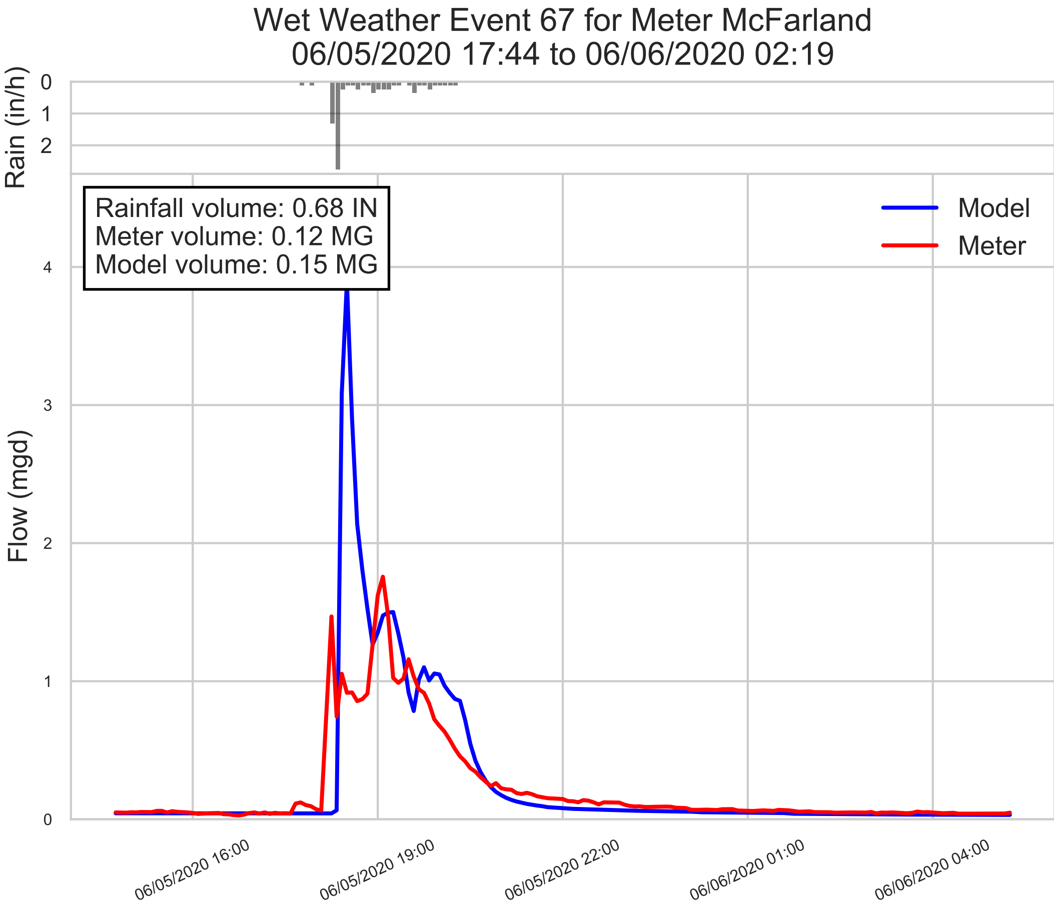




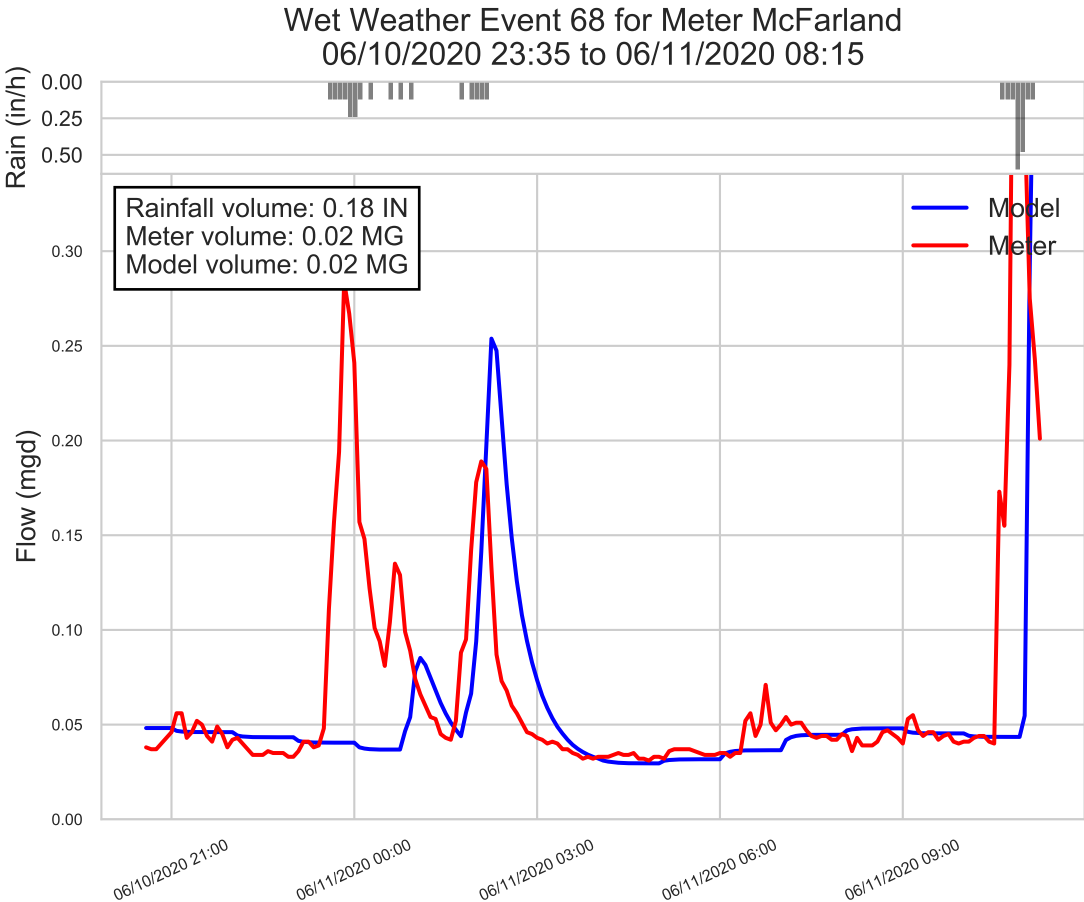
Wet Weather Event 65 for Meter McFarland
05/22/2020 04:59 to 05/22/2020 20:24
Rain (in/h)
0.0
0.3
0.6
Rainfall volume: 0.56 IN
Meter volume: 0.1 MG
Model volume: 0.1 MG
Model
Meter
Flow (mgd)
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
05/22/2020 01:00
05/22/2020 04:00
05/22/2020 07:00
05/22/2020 10:00
05/22/2020 13:00
05/22/2020 16:00
05/22/2020 19:00
05/22/2020 22:00



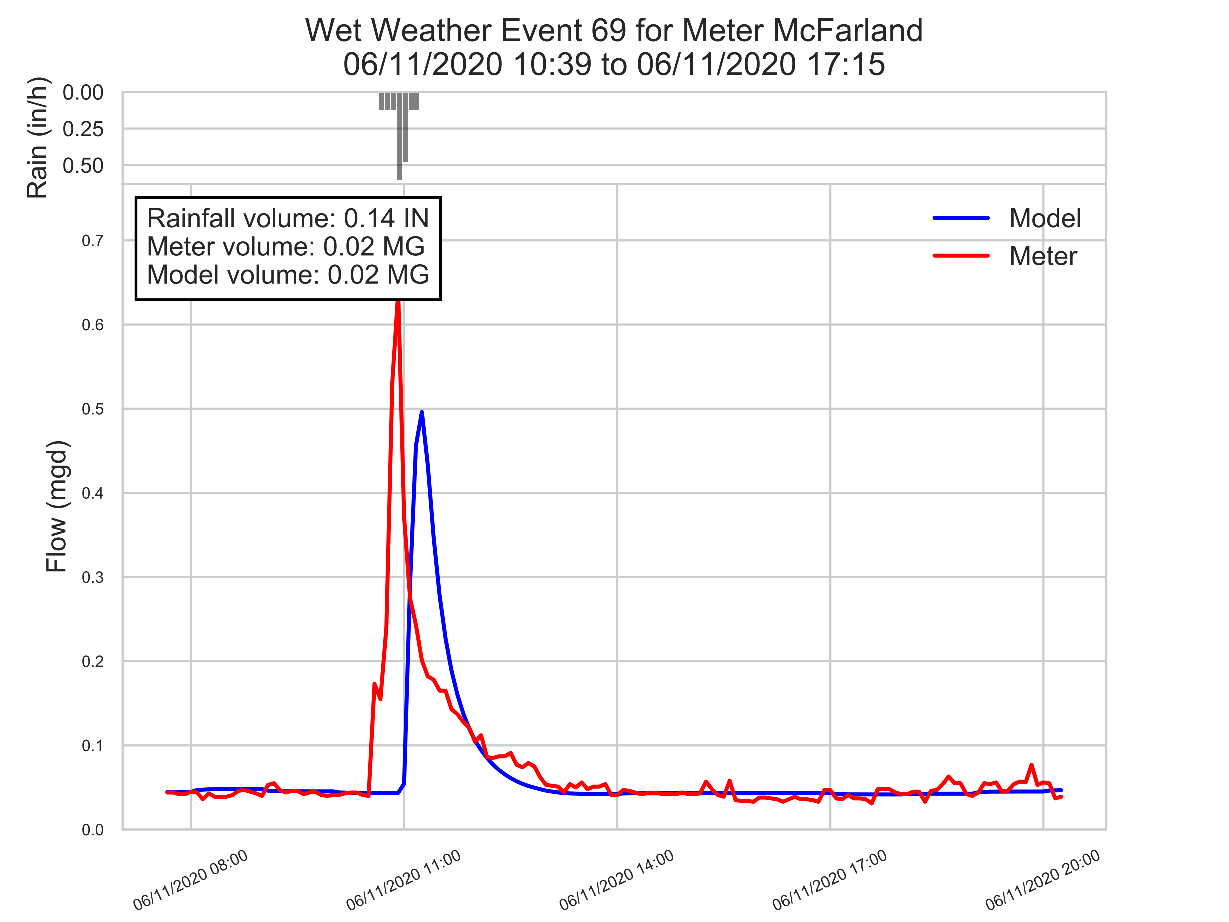
Wet Weather Event 66 for Meter McFarland
06/04/2020 20:05 to 06/05/2020 08:05
Rain (in/h)
0.0
1.5
3.0
Rainfall volume: 1.5 IN
Meter volume: 0.25 MG
Model volume: 0.35 MG
Model
Meter
Flow (mgd)
0
2
4
6
8
06/04/2020 17:00
06/04/2020 20:00
06/04/2020 23:00
06/05/2020 02:00
06/05/2020 05:00
06/05/2020 08:00
06/05/2020 11:00



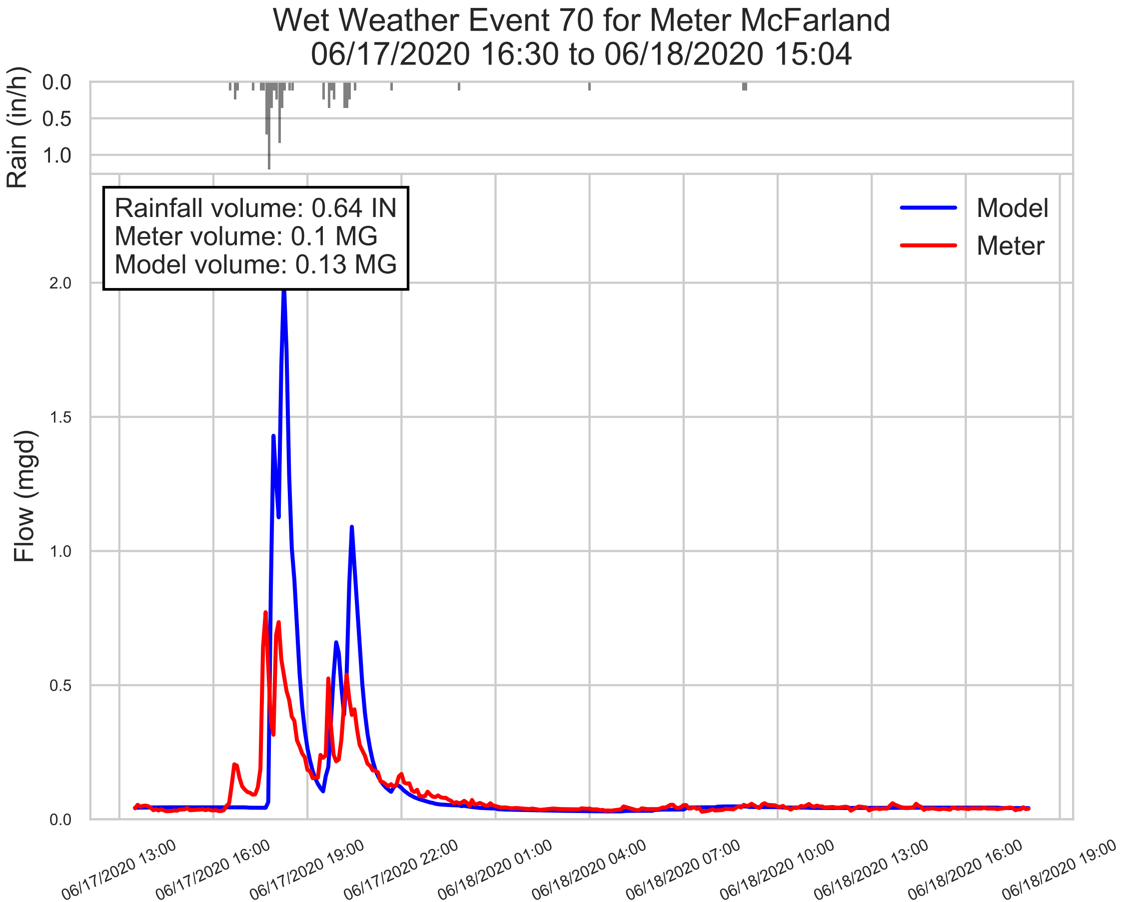
Wet Weather Event 67 for Meter McFarland
06/05/2020 17:44 to 06/06/2020 02:19
Rain (in/h)
0
1
2
Rainfall volume: 0.68 IN
Meter volume: 0.12 MG
Model volume: 0.15 MG
Model
Meter
Flow (mgd)
4
3
2
1
0
06/05/2020 16:00
06/05/2020 19:00
06/05/2020 22:00
06/06/2020 01:00
06/06/2020 04:00

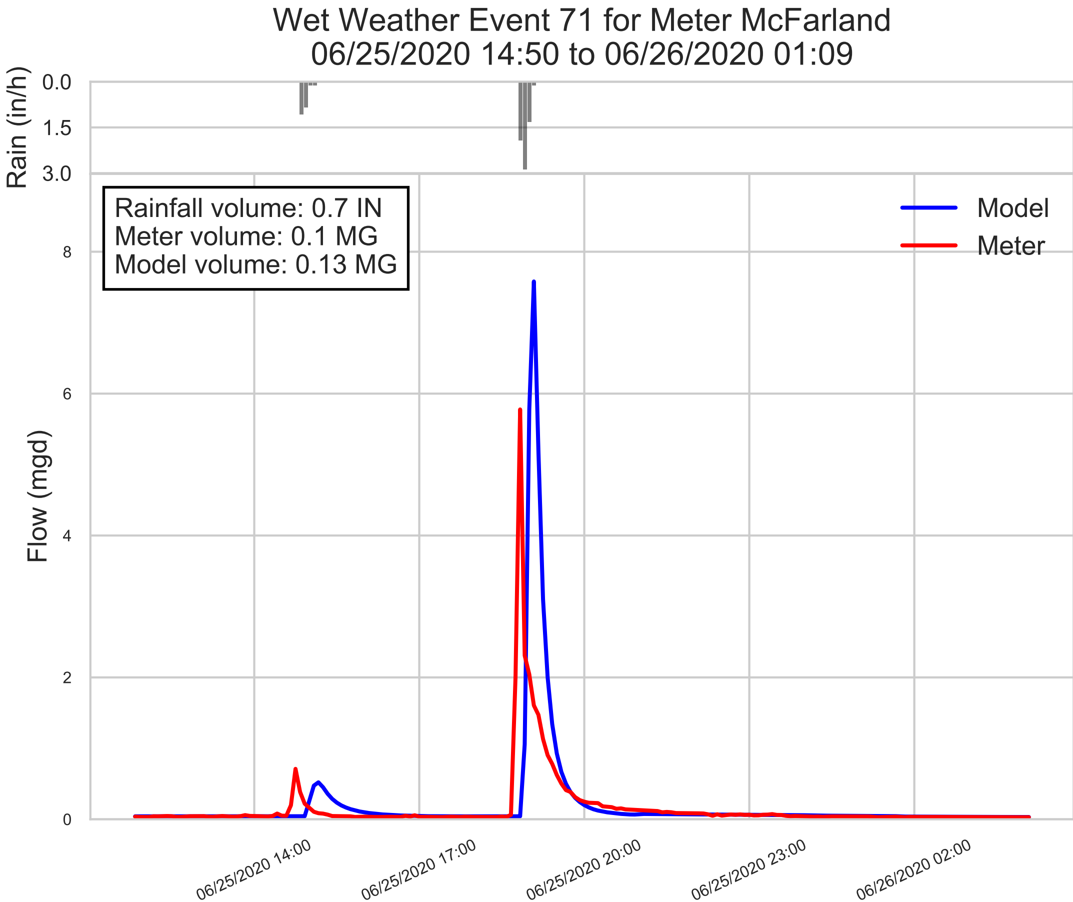


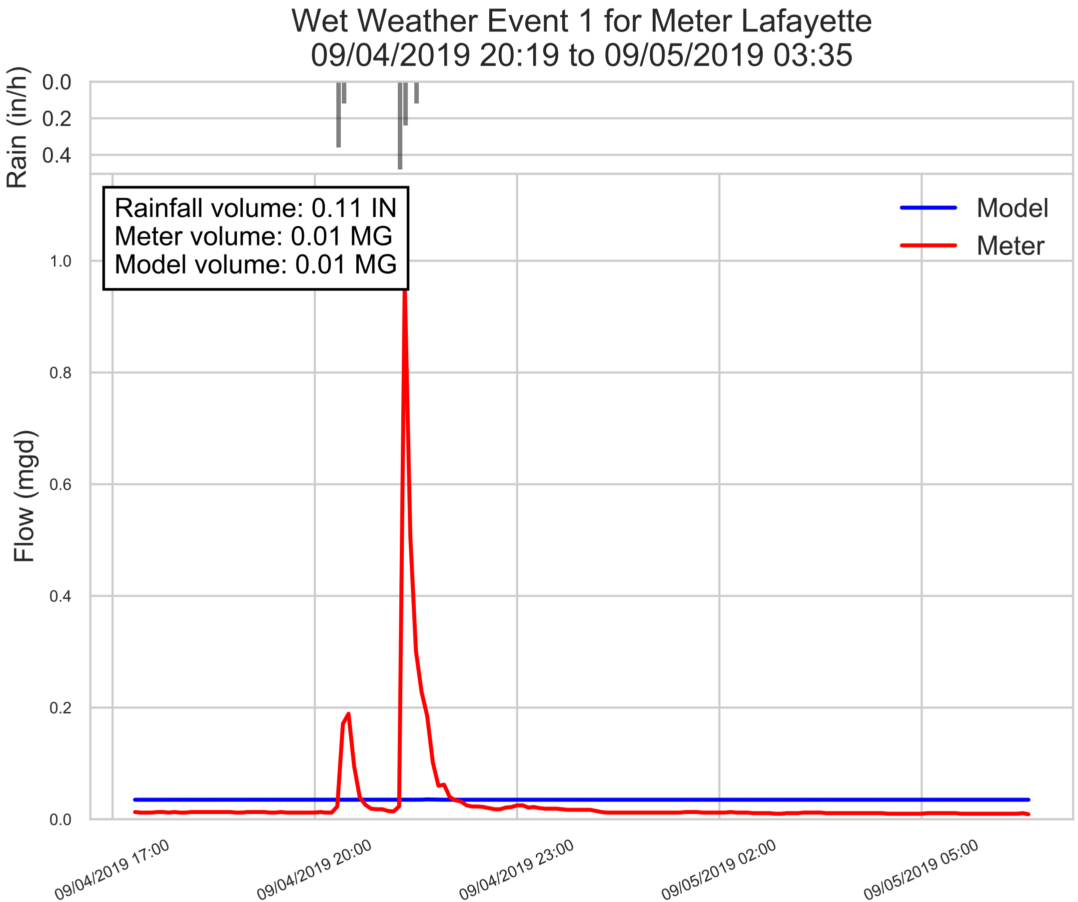
Wet Weather Event 68 for Meter McFarland
06/10/2020 23:35 to 06/11/2020 08:15
Rain (in/h)
0.00
0.25
0.50
Rainfall volume: 0.18 IN
Meter volume: 0.02 MG
Model volume: 0.02 MG
Model
Meter
Flow (mgd)
0.30
0.25
0.20
0.15
0.10
0.05
0.00
06/10/2020 21:00
06/11/2020 00:00
06/11/2020 03:00
06/11/2020 06:00
06/11/2020 09:00



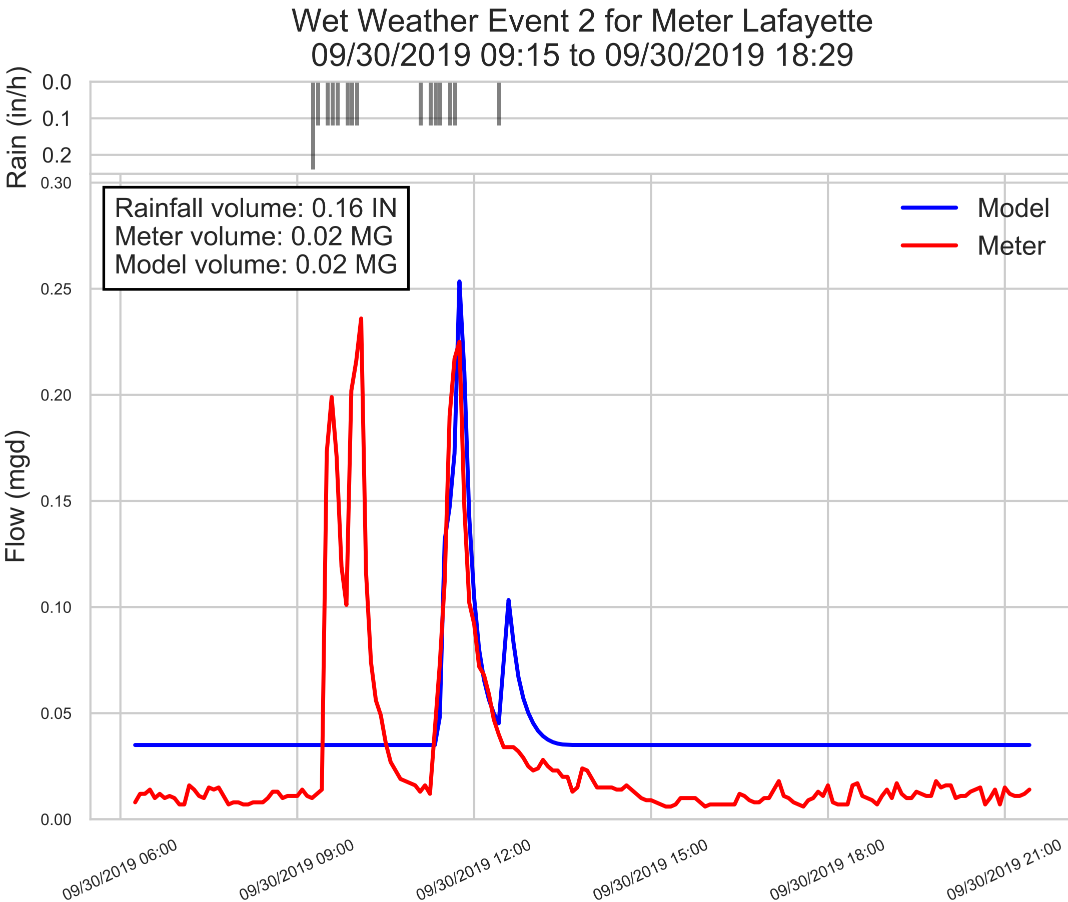
Wet Weather Event 69 for Meter McFarland
06/11/2020 10:39 to 06/11/2020 17:15
Rain (in/h)
0.00
0.25
0.50
Rainfall volume: 0.14 IN
Meter volume: 0.02 MG
Model volume: 0.02 MG
Model
Meter
Flow (mgd)
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
06/11/2020 08:00
06/11/2020 11:00
06/11/2020 14:00
06/11/2020 17:00
06/11/2020 20:00


Wet Weather Event 70 for Meter McFarland
06/17/2020 16:30 to 06/18/2020 15:04
Rain (in/h)
0.0
0.5
1.0
Rainfall volume: 0.64 IN
Meter volume: 0.1 MG
Model volume: 0.13 MG
Model
Meter
Flow (mgd)
2.0
1.5
1.0
0.5
0.0
06/17/2020 13:00
06/17/2020 16:00
06/17/2020 19:00
06/17/2020 22:00
06/18/2020 01:00
06/18/2020 04:00
06/18/2020 07:00
06/18/2020 10:00
06/18/2020 13:00
06/18/2020 16:00
06/18/2020 19:00

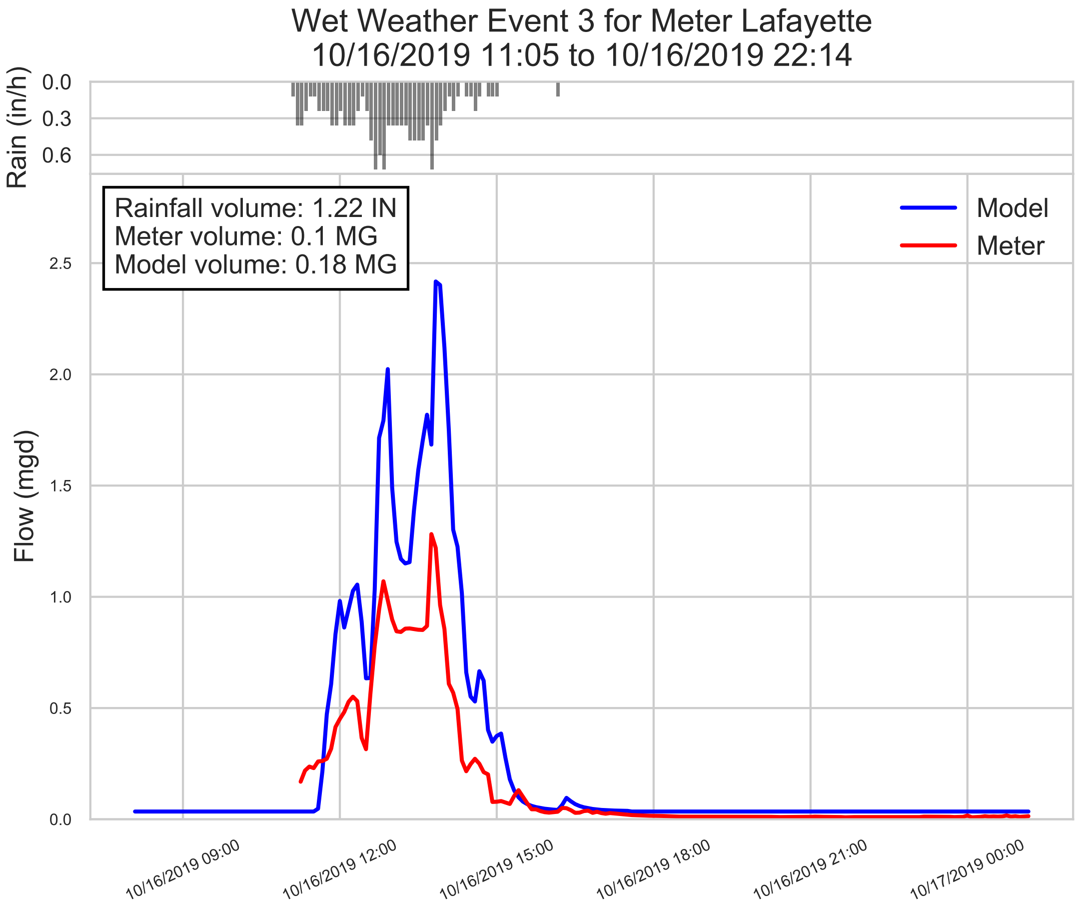

Wet Weather Event 71 for Meter McFarland
06/25/2020 14:50 to 06/26/2020 01:09
Rain (in/h)
0.0
1.5
3.0
Rainfall volume: 0.7 IN
Meter volume: 0.1 MG
Model volume: 0.13 MG
Model
Meter
Flow (mgd)
8
6
4
2
0
06/25/2020 14:00
06/25/2020 17:00
06/25/2020 20:00
06/25/2020 23:00
06/26/2020 02:00



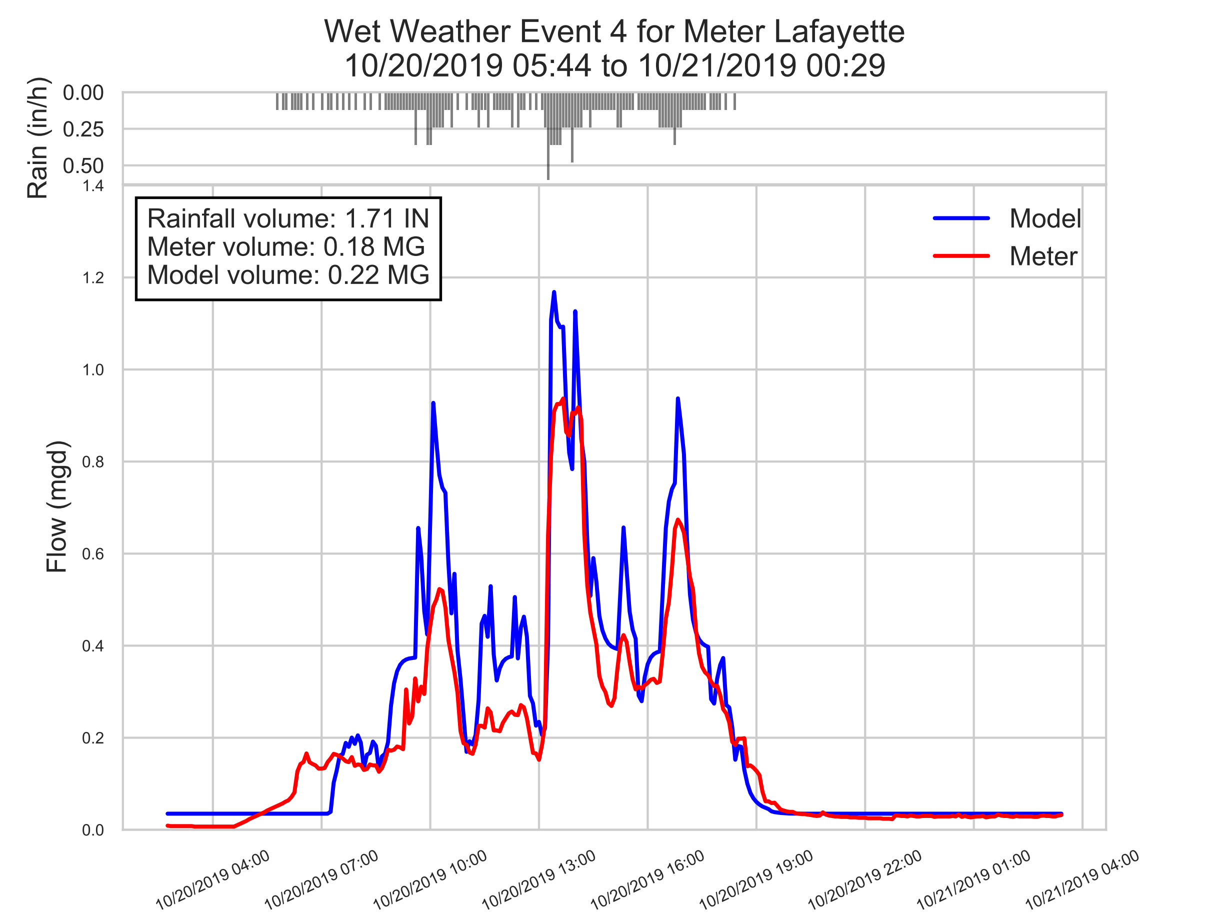
Wet Weather Event 1 for Meter Lafayette
09/04/2019 20:19 to 09/05/2019 03:35
Rain (in/h)
0.0
0.2
0.4
Rainfall volume: 0.11 IN
Meter volume: 0.01 MG
Model volume: 0.01 MG
Model
Meter
Flow (mgd)
1.0
0.8
0.6
0.4
0.2
0.0
09/04/2019 17:00
09/04/2019 20:00
09/04/2019 23:00
09/05/2019 02:00
09/05/2019 05:00



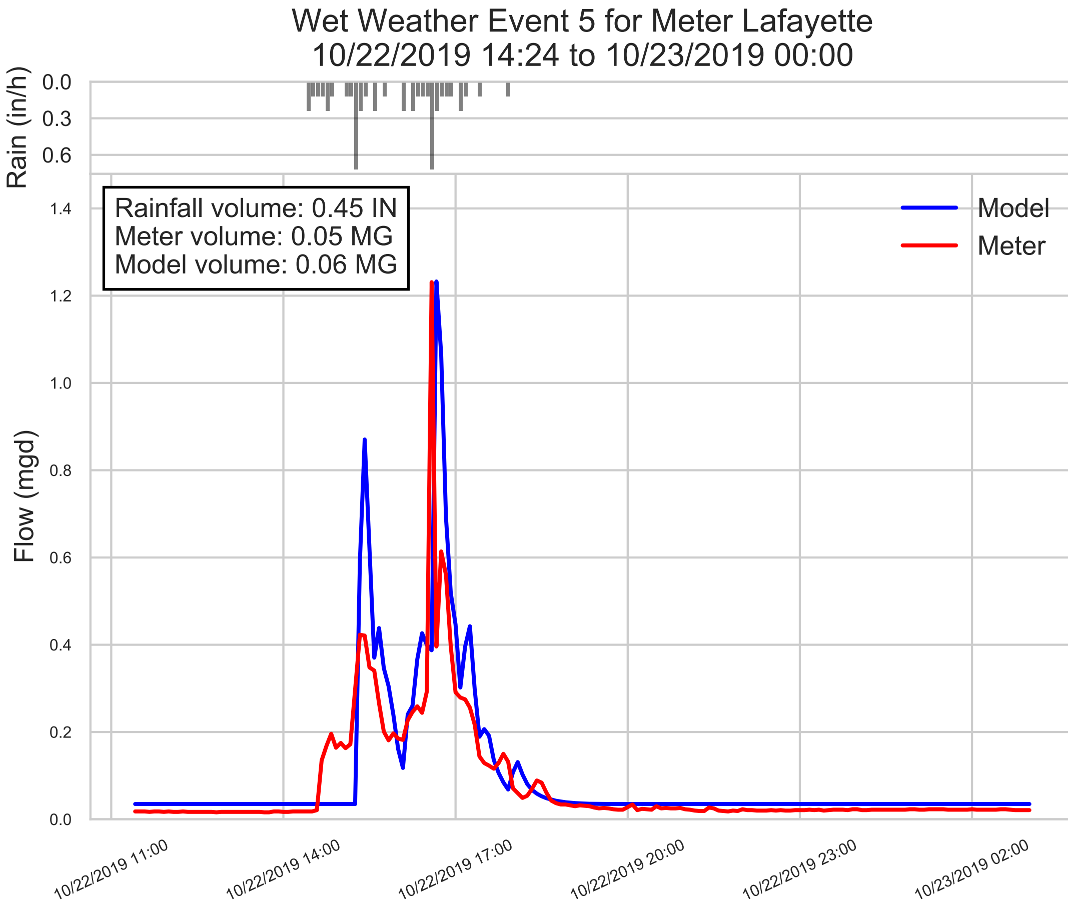
Wet Weather Event 2 for Meter Lafayette
09/30/2019 09:15 to 09/30/2019 18:29
Rain (in/h)
0.0
0.1
0.2
Flow (mgd)
0.30
0.25
0.20
0.15
0.10
0.05
0.00
Rainfall volume: 0.16 IN
Meter volume: 0.02 MG
Model volume: 0.02 MG
Model
Meter
09/30/2019 06:00
09/30/2019 09:00
09/30/2019 12:00
09/30/2019 15:00
09/30/2019 18:00
09/30/2019 21:00



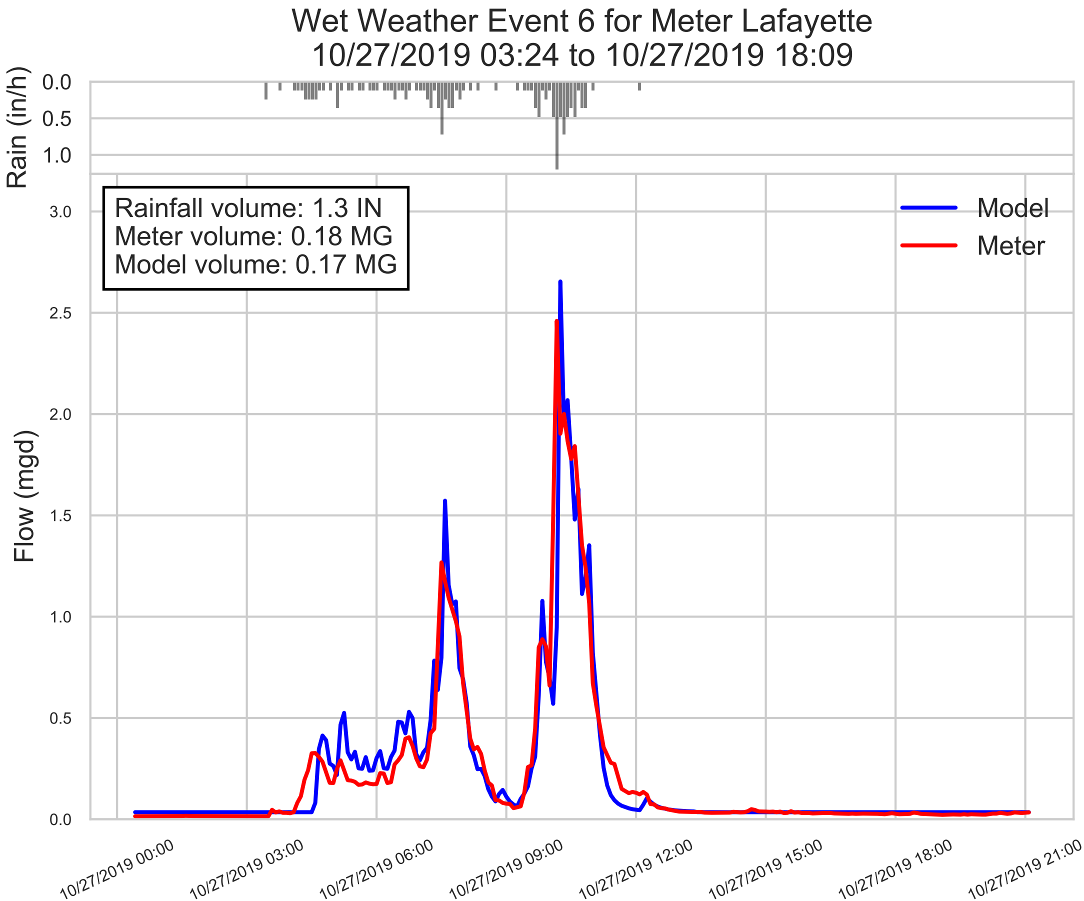
Wet Weather Event 3 for Meter Lafayette
10/16/2019 11:05 to 10/16/2019 22:14
Rain (in/h)
0.0
0.3
0.6
Rainfall volume: 1.22 IN
Meter volume: 0.1 MG
Model volume: 0.18 MG
Model
Meter
Flow (mgd)
2.5
2.0
1.5
1.0
0.5
0.0
10/16/2019 09:00
10/16/2019 12:00
10/16/2019 15:00
10/16/2019 18:00
10/16/2019 21:00
10/17/2019 00:00

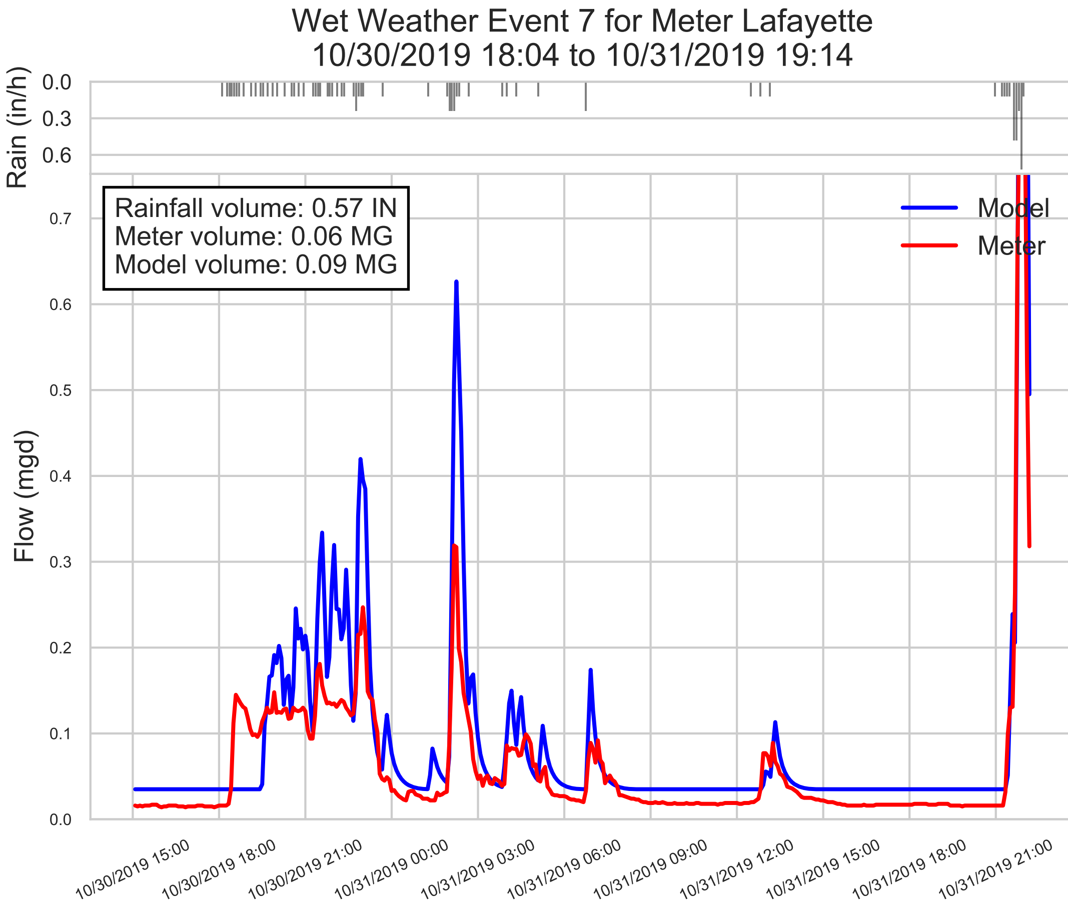


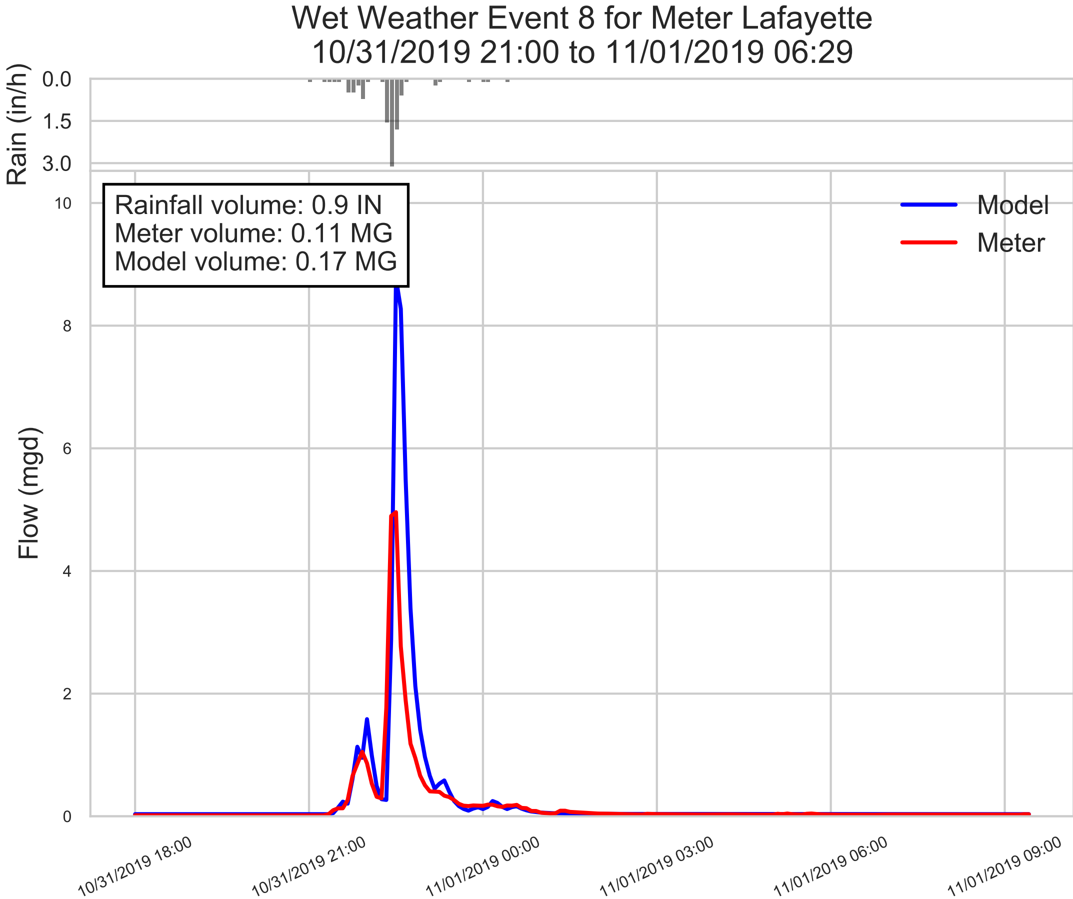
Wet Weather Event 4 for Meter Lafayette
10/20/2019 05:44 to 10/21/2019 00:29
Rain (in/h)
0.00
0.25
0.50
Flow (mgd)
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
Rainfall volume: 1.71 IN
Meter volume: 0.18 MG
Model volume: 0.22 MG
Model
Meter
10/20/2019 04:00
10/20/2019 07:00
10/20/2019 10:00
10/20/2019 13:00
10/20/2019 16:00
10/20/2019 19:00
10/20/2019 22:00
10/21/2019 01:00
10/21/2019 04:00



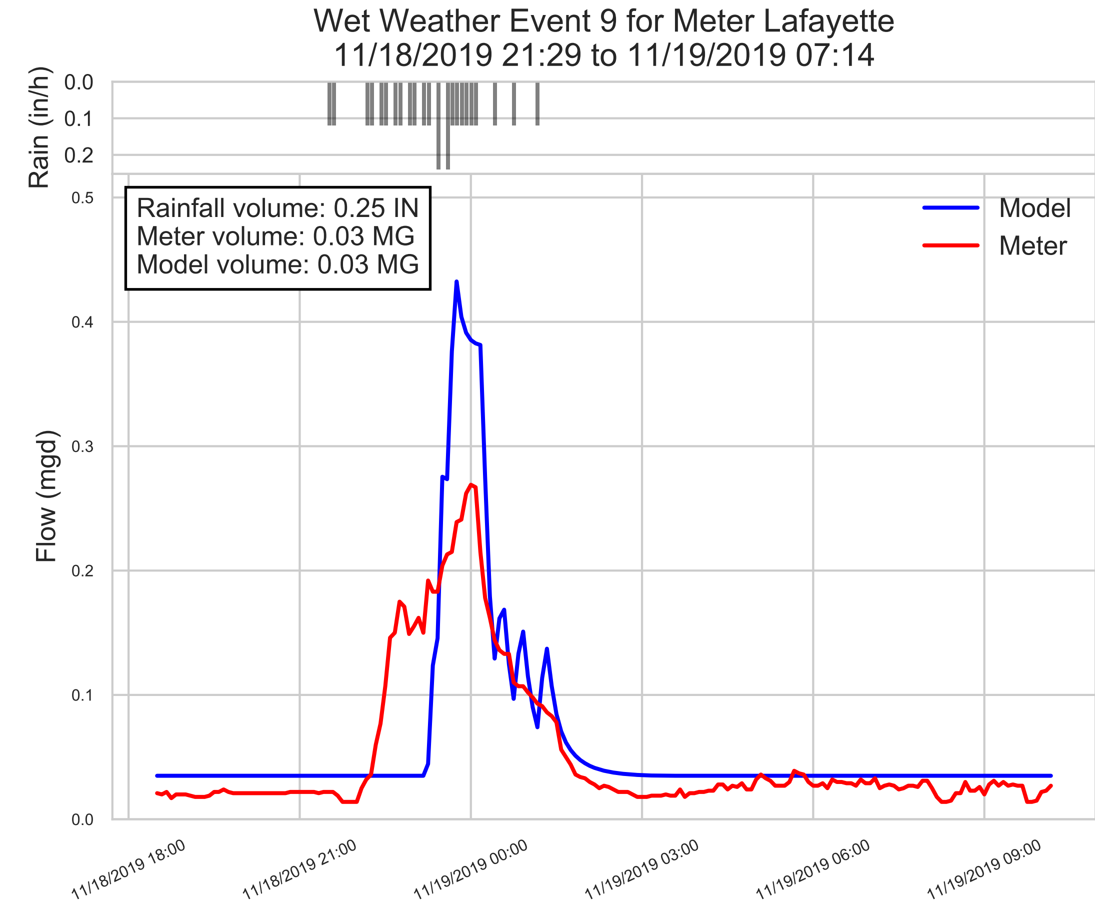
Wet Weather Event 5 for Meter Lafayette
10/22/2019 14:24 to 10/23/2019 00:00
Rain (in/h)
0.0
0.3
0.6
Rainfall volume: 0.45 IN
Meter volume: 0.05 MG
Model volume: 0.06 MG
Model
Meter
Flow (mgd)
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
10/22/2019 11:00
10/22/2019 14:00
10/22/2019 17:00
10/22/2019 20:00
10/22/2019 23:00
10/23/2019 02:00

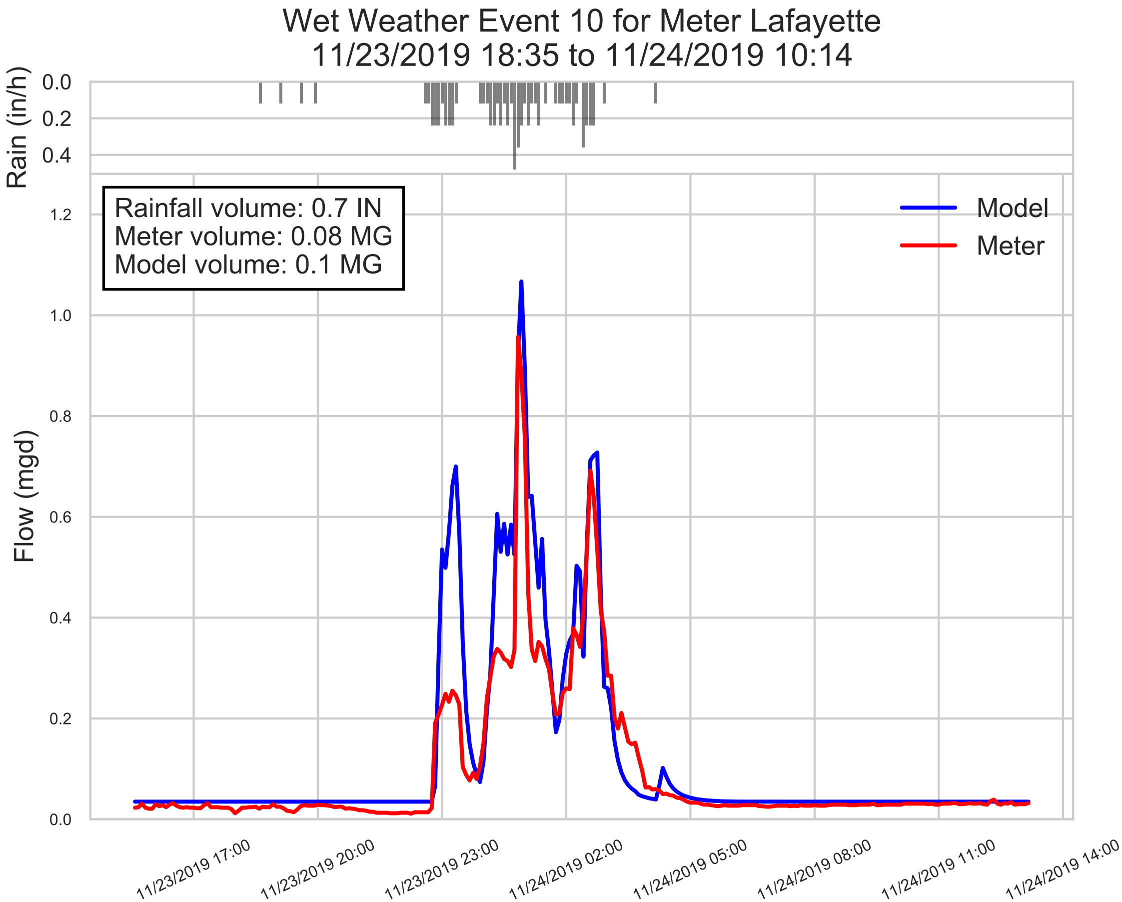

Wet Weather Event 6 for Meter Lafayette
10/27/2019 03:24 to 10/27/2019 18:09
Rain (in/h)
0.0
0.5
1.0
Rainfall volume: 1.3 IN
Meter volume: 0.18 MG
Model volume: 0.17 MG
Model
Meter
Flow (mgd)
3.0
2.5
2.0
1.5
1.0
0.5
0.0
10/27/2019 00:00
10/27/2019 03:00
10/27/2019 06:00
10/27/2019 09:00
10/27/2019 12:00
10/27/2019 15:00
10/27/2019 18:00
10/27/2019 21:00

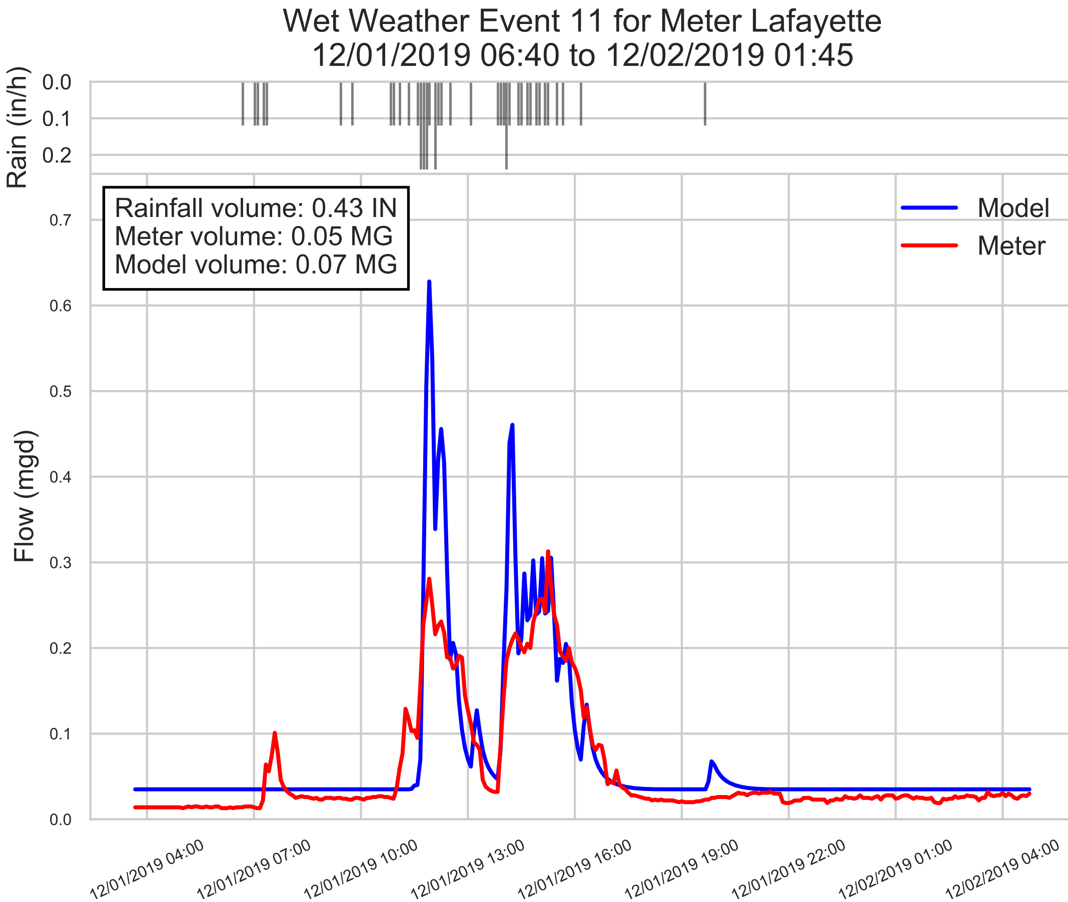

Wet Weather Event 7 for Meter Lafayette
10/30/2019 18:04 to 10/31/2019 19:14
Rain (in/h)
0.0
0.3
0.6
Rainfall volume: 0.57 IN
Meter volume: 0.06 MG
Model volume: 0.09 MG
Model
Meter
Flow (mgd)
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
10/30/2019 15:00
10/30/2019 18:00
10/30/2019 21:00
10/31/2019 00:00
10/31/2019 03:00
10/31/2019 06:00
10/31/2019 09:00
10/31/2019 12:00
10/31/2019 15:00
10/31/2019 18:00
10/31/2019 21:00

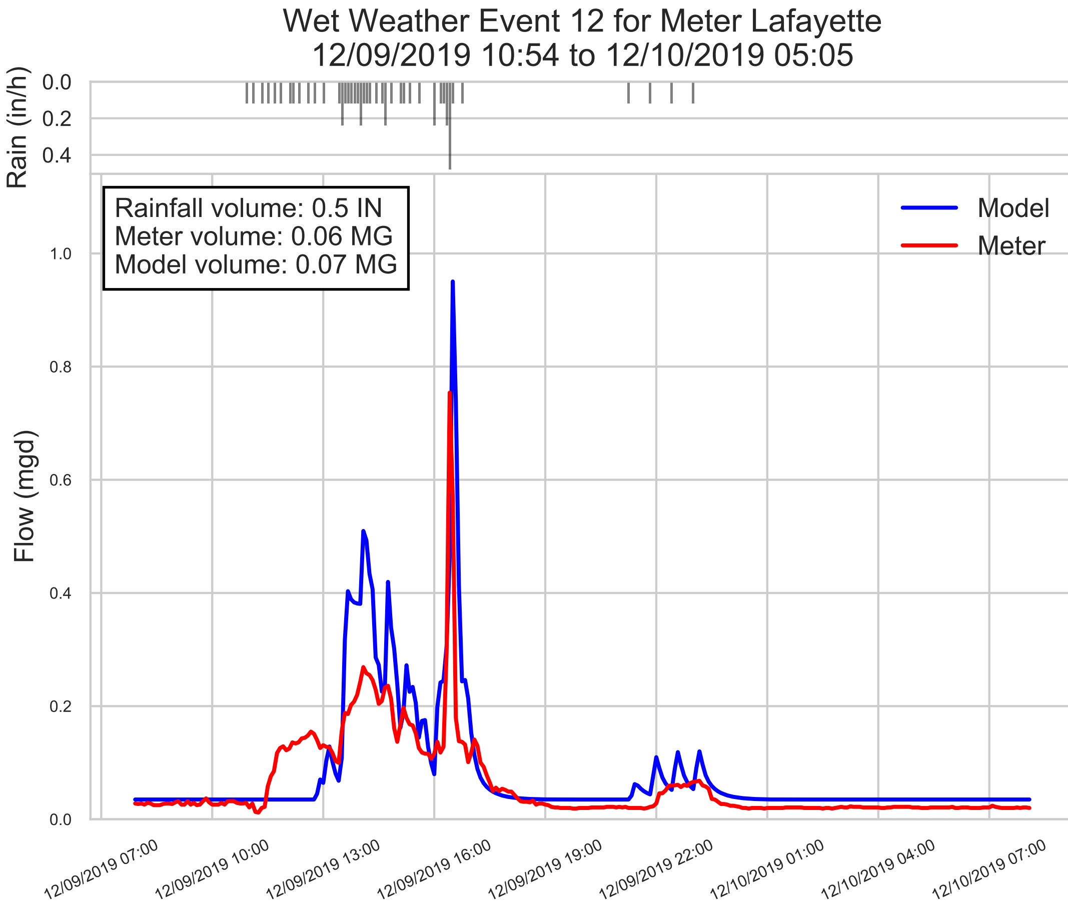


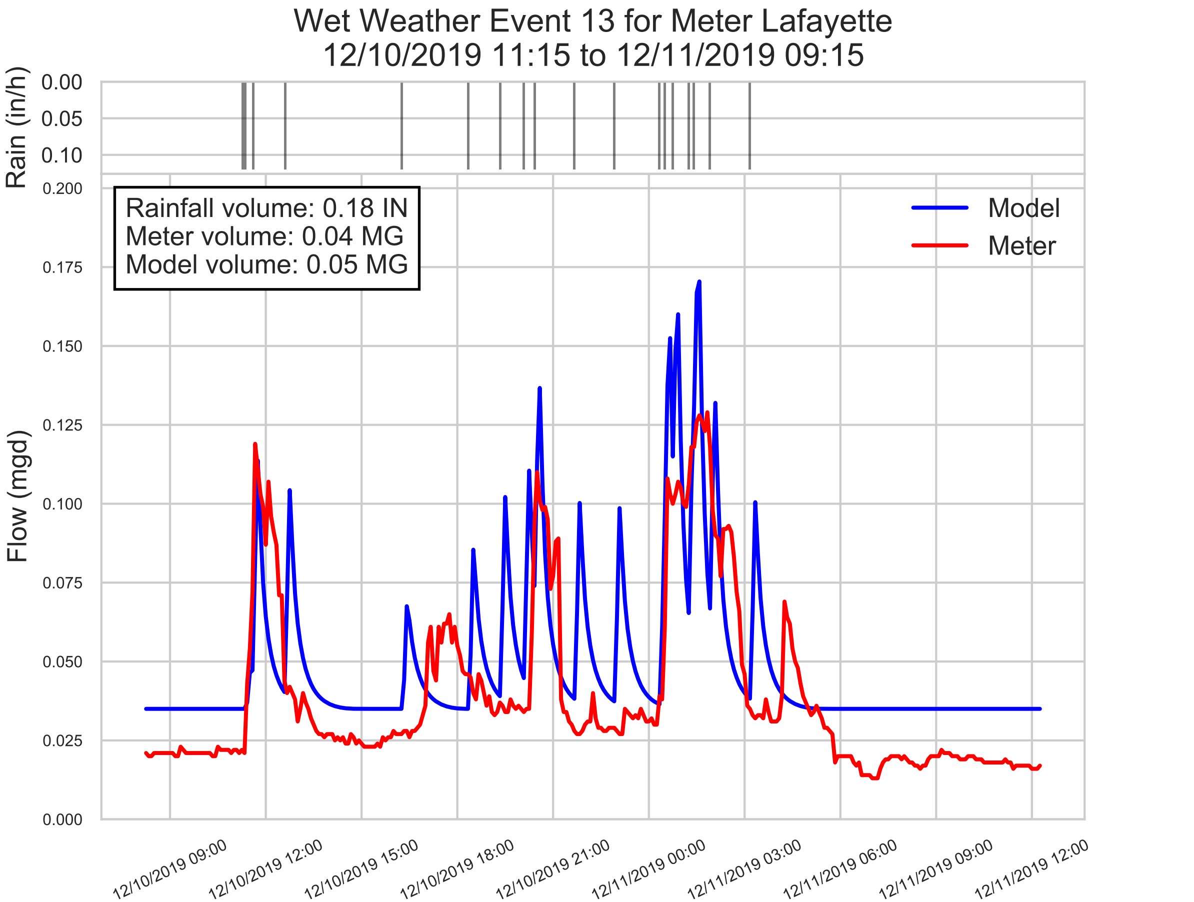
Wet Weather Event 8 for Meter Lafayette
10/31/2019 21:00 to 11/01/2019 06:29
Rain (in/h)
0.0
1.5
3.0
Rainfall volume: 0.9 IN
Meter volume: 0.11 MG
Model volume: 0.17 MG
Model
Meter
Flow (mgd)
10
8
6
4
2
0
10/31/2019 18:00
10/31/2019 21:00
11/01/2019 00:00
11/01/2019 03:00
11/01/2019 06:00
11/01/2019 09:00


Wet Weather Event 9 for Meter Lafayette
11/18/2019 21:29 to 11/19/2019 07:14
Rain (in/h)
0.0
0.1
0.2
Rainfall volume: 0.25 IN
Meter volume: 0.03 MG
Model volume: 0.03 MG
Model
Meter
Flow (mgd)
0.5
0.4
0.3
0.2
0.1
0.0
11/18/2019 18:00
11/18/2019 21:00
11/19/2019 00:00
11/19/2019 03:00
11/19/2019 06:00
11/19/2019 09:00

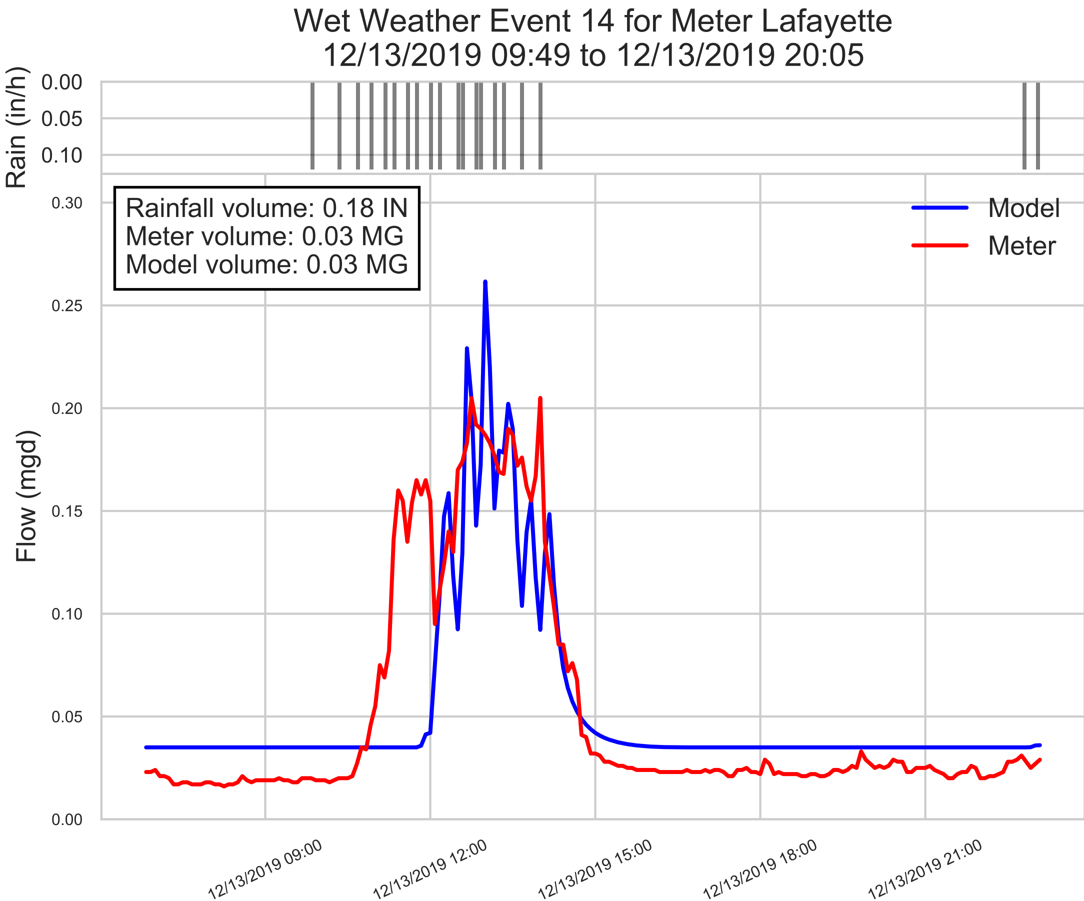

Wet Weather Event 10 for Meter Lafayette
11/23/2019 18:35 to 11/24/2019 10:14
Rain (in/h)
0.0
0.2
0.4
Rainfall volume: 0.7 IN
Meter volume: 0.08 MG
Model volume: 0.1 MG
Model
Meter
Flow (mgd)
1.2
1.0
0.8
0.6
0.4
0.2
0.0
11/23/2019 17:00
11/23/2019 20:00
11/23/2019 23:00
11/24/2019 02:00
11/24/2019 05:00
11/24/2019 08:00
11/24/2019 11:00
11/24/2019 14:00


Wet Weather Event 11 for Meter Lafayette
12/01/2019 06:40 to 12/02/2019 01:45
Rain (in/h)
0.0
0.1
0.2
Rainfall volume: 0.43 IN
Meter volume: 0.05 MG
Model volume: 0.07 MG
Model
Meter
Flow (mgd)
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
12/01/2019 04:00
12/01/2019 07:00
12/01/2019 10:00
12/01/2019 13:00
12/01/2019 16:00
12/01/2019 19:00
12/01/2019 22:00
12/02/2019 01:00
12/02/2019 04:00

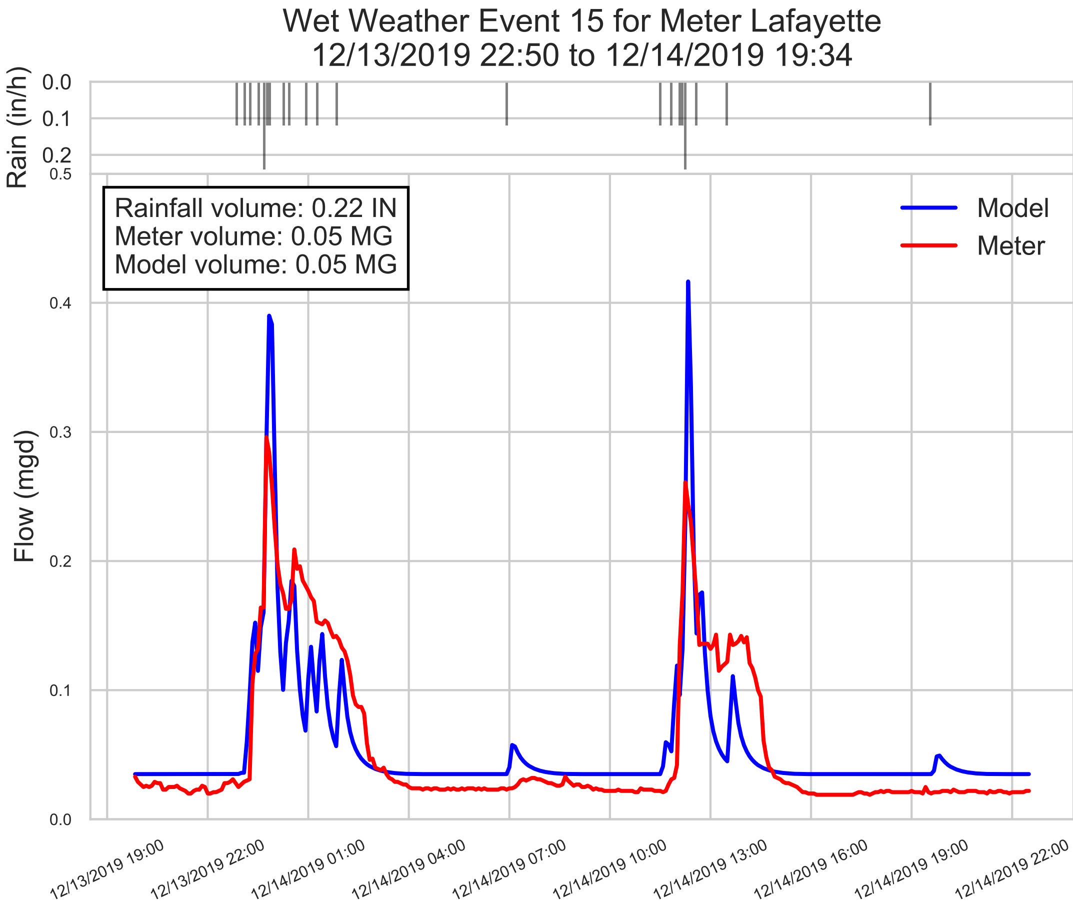

Wet Weather Event 12 for Meter Lafayette
12/09/2019 10:54 to 12/10/2019 05:05
Rain (in/h)
0.0
0.2
0.4
Rainfall volume: 0.5 IN
Meter volume: 0.06 MG
Model volume: 0.07 MG
Model
Meter
Flow (mgd)
1.0
0.8
0.6
0.4
0.2
0.0
12/09/2019 07:00
12/09/2019 10:00
12/09/2019 13:00
12/09/2019 16:00
12/09/2019 19:00
12/09/2019 22:00
12/10/2019 01:00
12/10/2019 04:00
12/10/2019 07:00

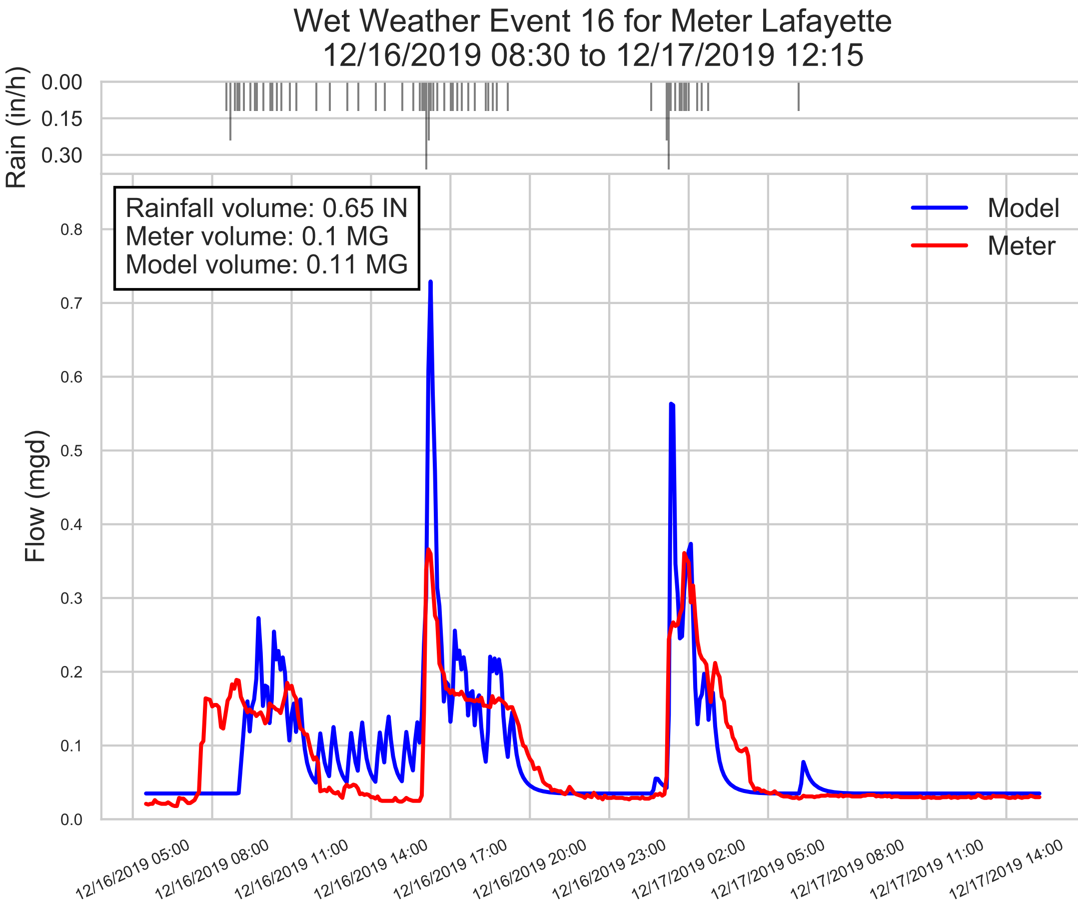


Wet Weather Event 13 for Meter Lafayette
12/10/2019 11:15 to 12/11/2019 09:15
Rain (in/h)
0.00
0.05
0.10
Flow (mgd)
0.200
0.175
0.150
0.125
0.100
0.075
0.050
0.025
0.000
Rainfall volume: 0.18 IN
Meter volume: 0.04 MG
Model volume: 0.05 MG
Model
Meter
12/10/2019 09:00
12/10/2019 12:00
12/10/2019 15:00
12/10/2019 18:00
12/10/2019 21:00
12/11/2019 00:00
12/11/2019 03:00
12/11/2019 06:00
12/11/2019 09:00
12/11/2019 12:00

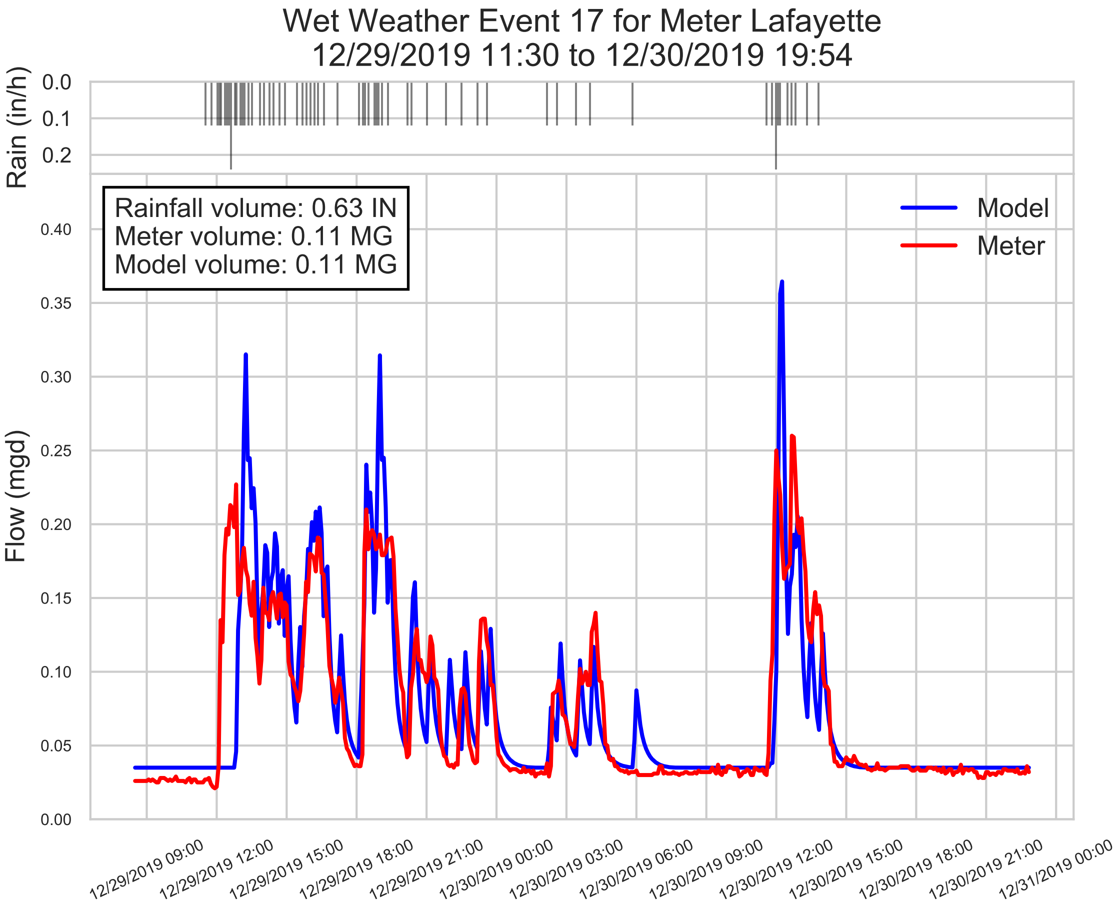


Wet Weather Event 14 for Meter Lafayette
12/13/2019 09:49 to 12/13/2019 20:05
Rain (in/h)
0.00
0.05
0.10
Rainfall volume: 0.18 IN
Meter volume: 0.03 MG
Model volume: 0.03 MG
Model
Meter
Flow (mgd)
0.30
0.25
0.20
0.15
0.10
0.05
0.00
12/13/2019 09:00
12/13/2019 12:00
12/13/2019 15:00
12/13/2019 18:00
12/13/2019 21:00

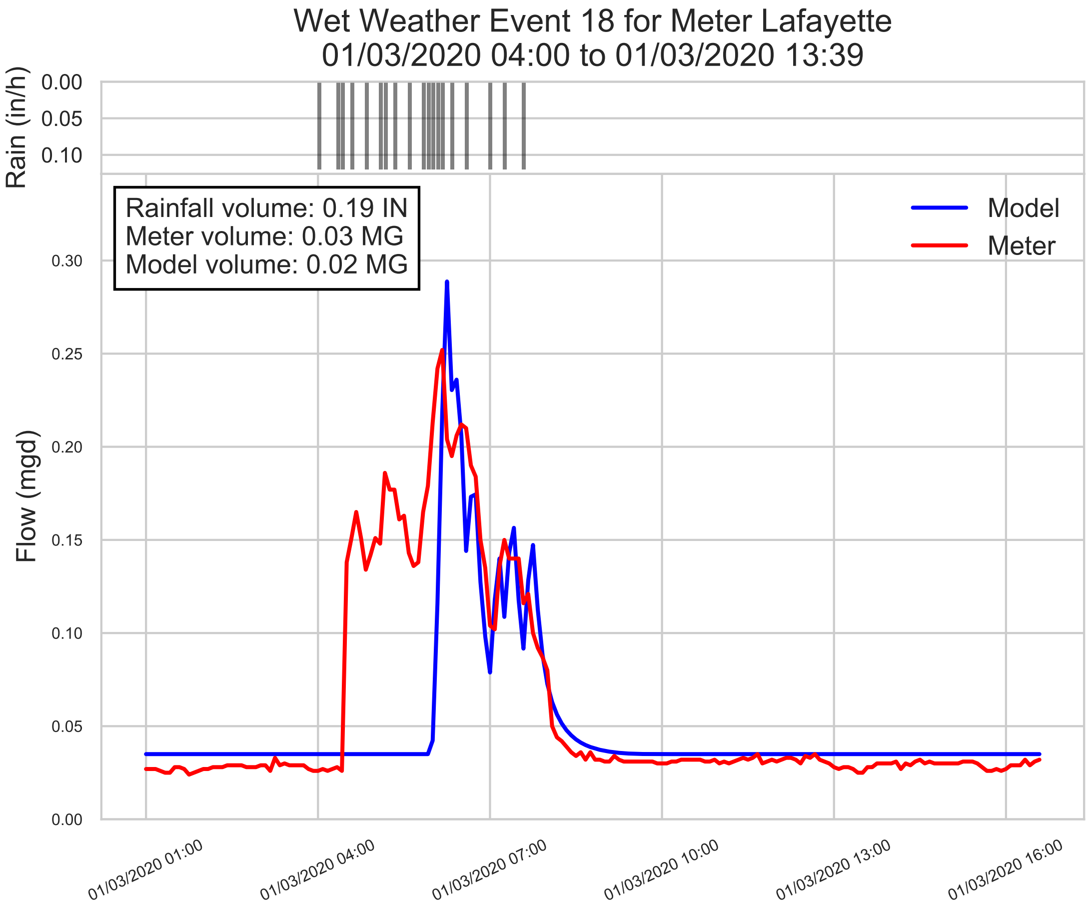

Wet Weather Event 15 for Meter Lafayette
12/13/2019 22:50 to 12/14/2019 19:34
Rain (in/h)
0.0
0.1
0.2
0.5
Rainfall volume: 0.22 IN
Meter volume: 0.05 MG
Model volume: 0.05 MG
Model
Meter
Flow (mgd)
0.4
0.3
0.2
0.1
0.0
12/13/2019 19:00
12/13/2019 22:00
12/14/2019 01:00
12/14/2019 04:00
12/14/2019 07:00
12/14/2019 10:00
12/14/2019 13:00
12/14/2019 16:00
12/14/2019 19:00
12/14/2019 22:00



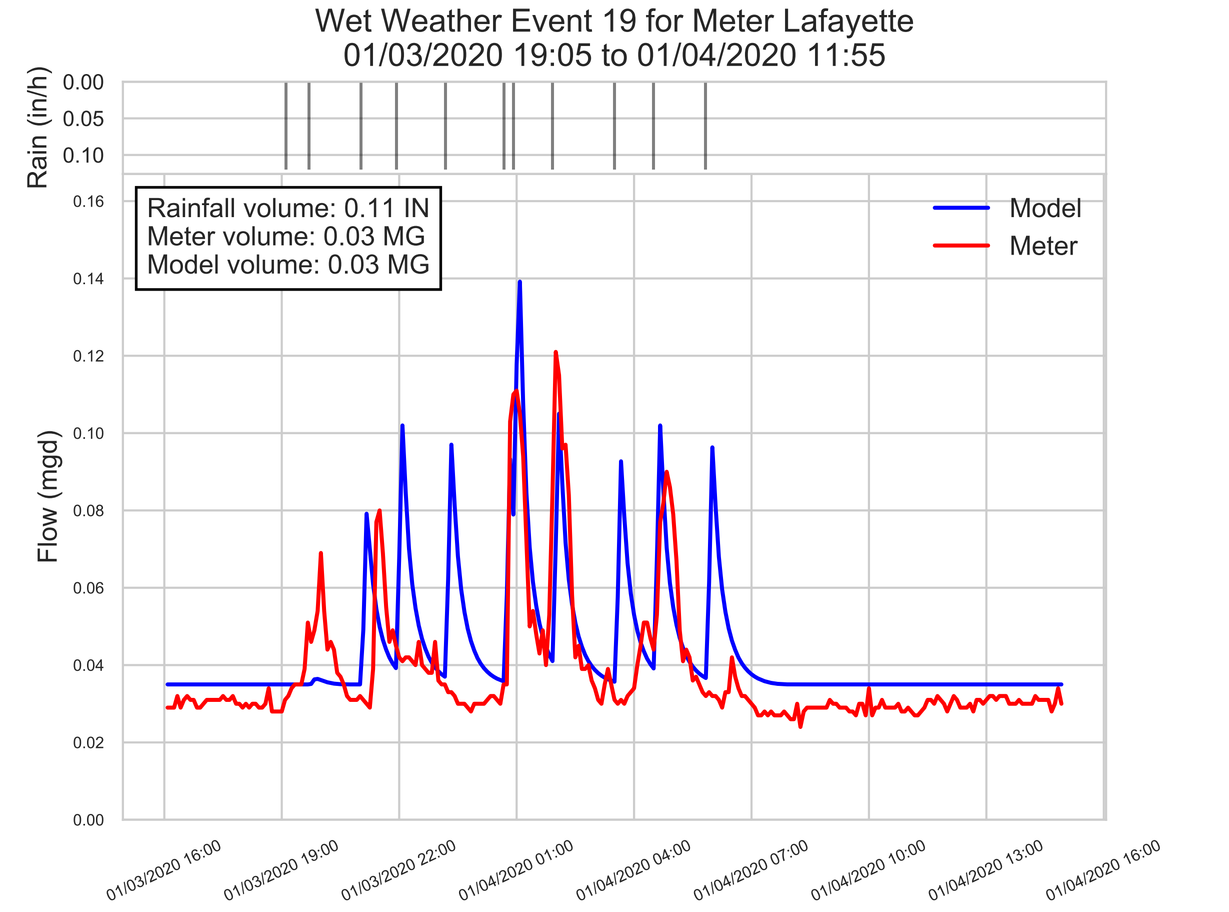
Wet Weather Event 16 for Meter Lafayette
12/16/2019 08:30 to 12/17/2019 12:15
Rain (in/h)
0.00
0.15
0.30
Rainfall volume: 0.65 IN
Meter volume: 0.1 MG
Model volume: 0.11 MG
Model
Meter
Flow (mgd)
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
12/16/2019 05:00
12/16/2019 08:00
12/16/2019 11:00
12/16/2019 14:00
12/16/2019 17:00
12/16/2019 20:00
12/16/2019 23:00
12/17/2019 02:00
12/17/2019 05:00
12/17/2019 08:00
12/17/2019 11:00
12/17/2019 14:00



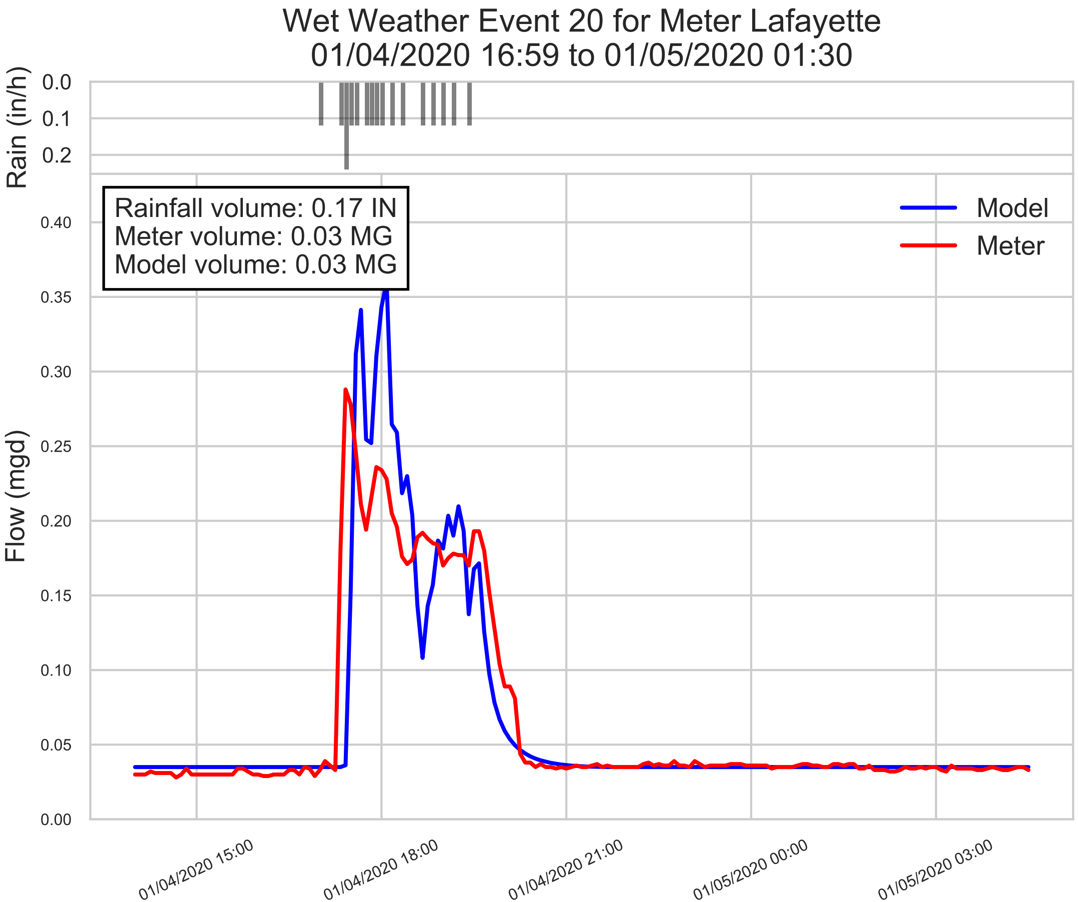
Wet Weather Event 17 for Meter Lafayette
12/29/2019 11:30 to 12/30/2019 19:54
Rain (in/h)
0.0
0.1
0.2
Rainfall volume: 0.63 IN
Meter volume: 0.11 MG
Model volume: 0.11 MG
Model
Meter
Flow (mgd)
0.00
0.05
0.10
0.15
0.20
0.25
0.30
0.35
0.40
12/29/2019 09:00
12/29/2019 12:00
12/29/2019 15:00
12/29/2019 18:00
12/29/2019 21:00
12/30/2019 00:00
12/30/2019 03:00
12/30/2019 06:00
12/30/2019 09:00
12/30/2019 12:00
12/30/2019 15:00
12/30/2019 18:00
12/30/2019 21:00
12/31/2019 00:00



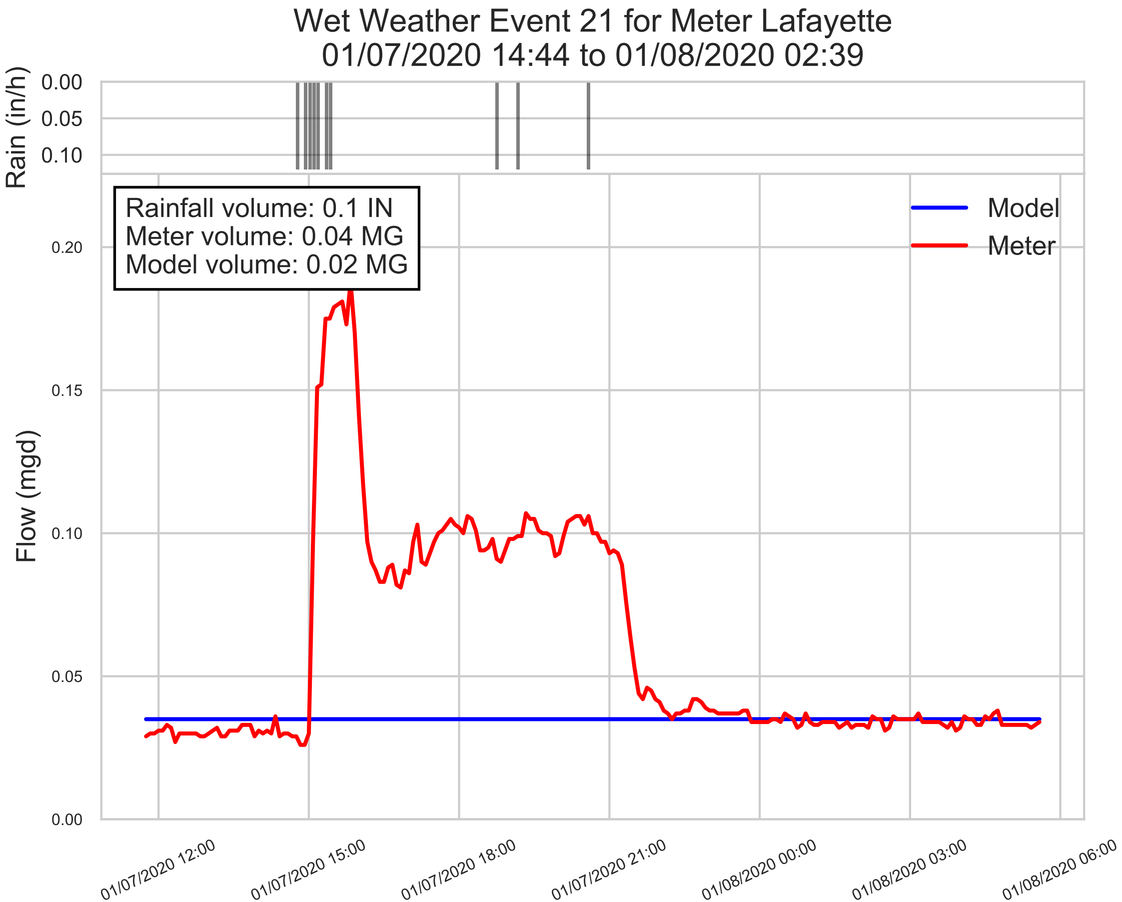
Wet Weather Event 18 for Meter Lafayette
01/03/2020 04:00 to 01/03/2020 13:39
Rain (in/h)
0.00
0.05
0.10
Rainfall volume: 0.19 IN
Meter volume: 0.03 MG
Model volume: 0.02 MG
Model
Meter
Flow (mgd)
0.30
0.25
0.20
0.15
0.10
0.05
0.00
01/03/2020 01:00
01/03/2020 04:00
01/03/2020 07:00
01/03/2020 10:00
01/03/2020 13:00
01/03/2020 16:00

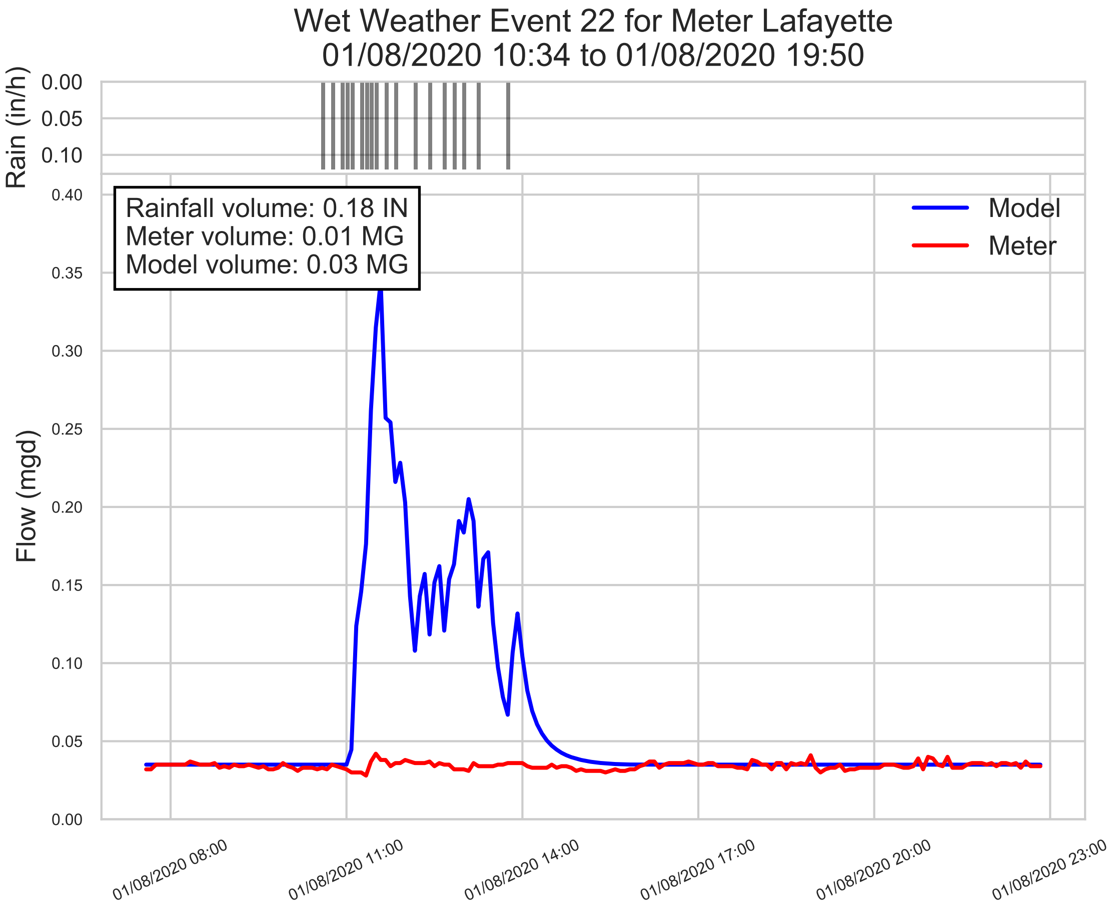


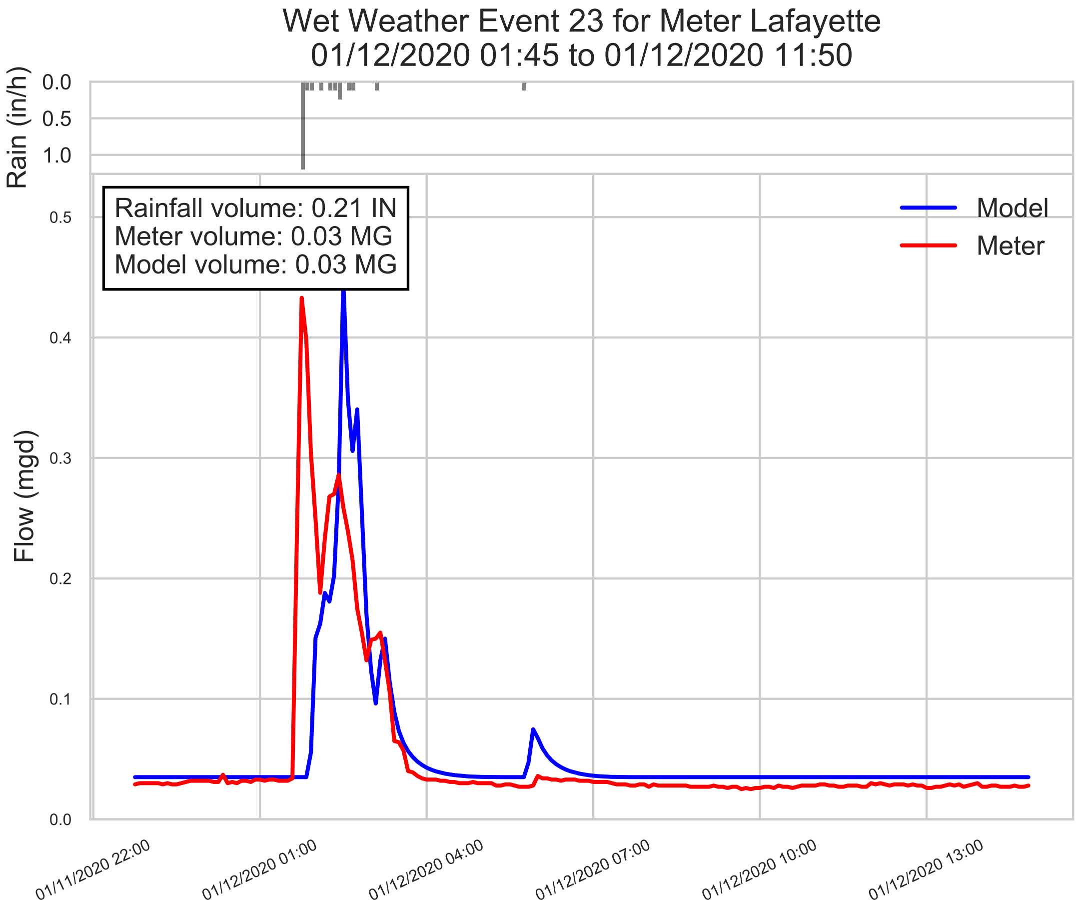
Wet Weather Event 19 for Meter Lafayette
01/03/2020 19:05 to 01/04/2020 11:55
Rain (in/h)
0.00
0.05
0.10
Rainfall volume: 0.11 IN
Meter volume: 0.03 MG
Model volume: 0.03 MG
Model
Meter
Flow (mgd)
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
01/03/2020 16:00
01/03/2020 19:00
01/03/2020 22:00
01/04/2020 01:00
01/04/2020 04:00
01/04/2020 07:00
01/04/2020 10:00
01/04/2020 13:00
01/04/2020 16:00

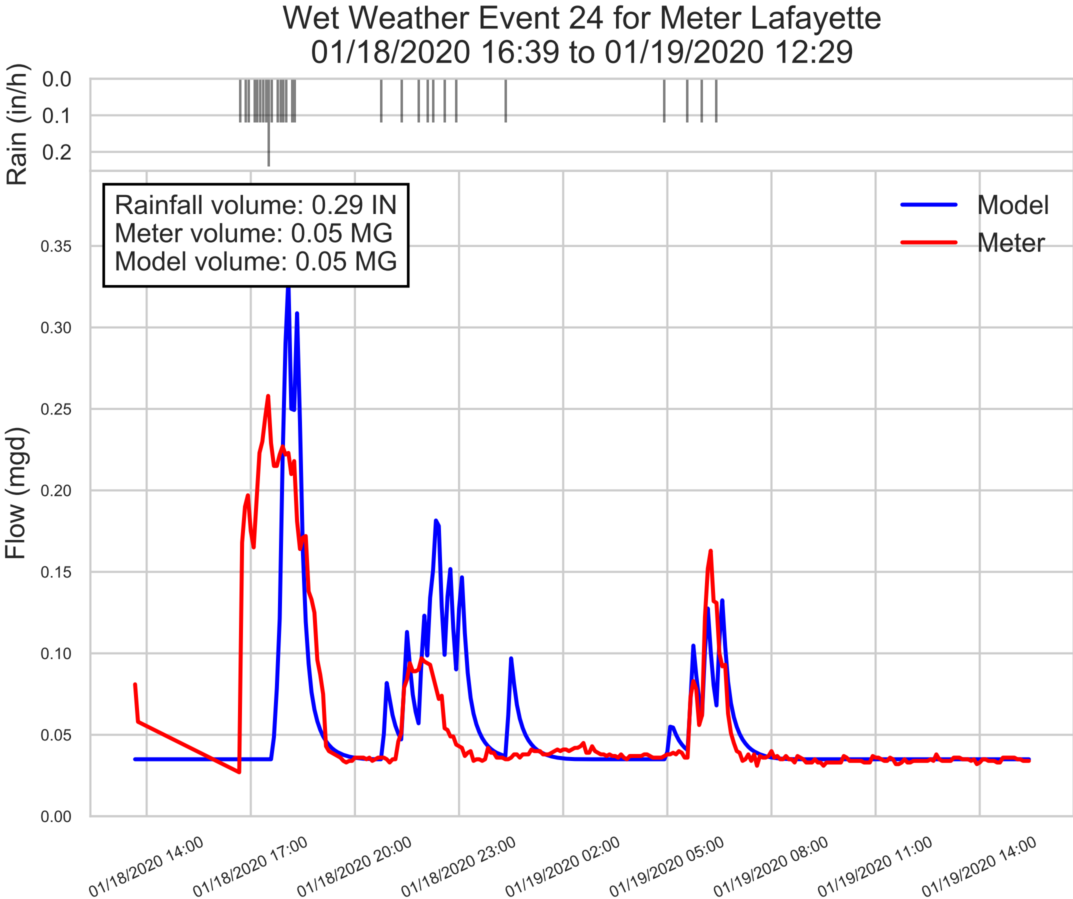


Wet Weather Event 20 for Meter Lafayette
01/04/2020 16:59 to 01/05/2020 01:30
Rain (in/h)
0.0
0.1
0.2
Rainfall volume: 0.17 IN
Meter volume: 0.03 MG
Model volume: 0.03 MG
Model
Meter
Flow (mgd)
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
01/04/2020 15:00
01/04/2020 18:00
01/04/2020 21:00
01/05/2020 00:00
01/05/2020 03:00

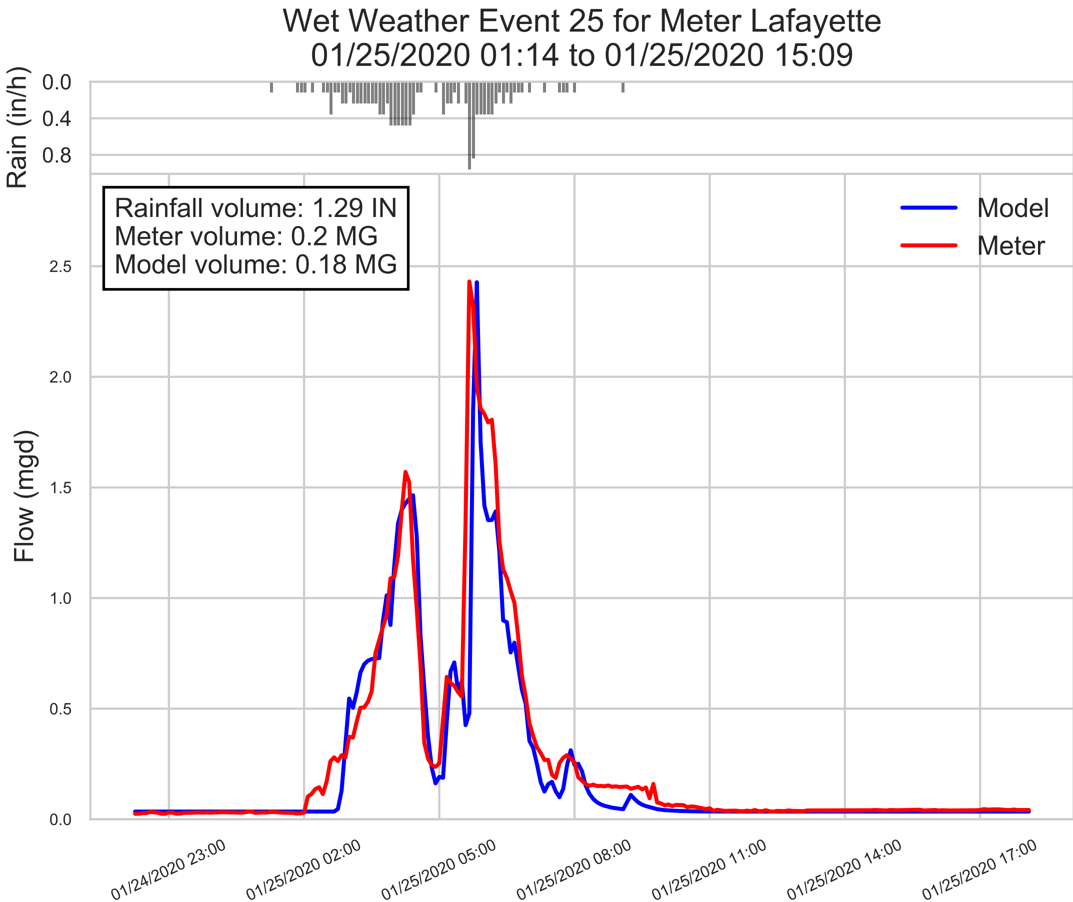

Wet Weather Event 21 for Meter Lafayette
01/07/2020 14:44 to 01/08/2020 02:39
Rain (in/h)
0.00
0.05
0.10
Rainfall volume: 0.1 IN
Meter volume: 0.04 MG
Model volume: 0.02 MG
Model
Meter
Flow (mgd)
0.20
0.15
0.10
0.05
0.00
01/07/2020 12:00
01/07/2020 15:00
01/07/2020 18:00
01/07/2020 21:00
01/08/2020 00:00
01/08/2020 03:00
01/08/2020 06:00


Wet Weather Event 22 for Meter Lafayette
01/08/2020 10:34 to 01/08/2020 19:50
Rain (in/h)
0.00
0.05
0.10
Flow (mgd)
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
Rainfall volume: 0.18 IN
Meter volume: 0.01 MG
Model volume: 0.03 MG
Model
Meter
01/08/2020 08:00
01/08/2020 11:00
01/08/2020 14:00
01/08/2020 17:00
01/08/2020 20:00
01/08/2020 23:00

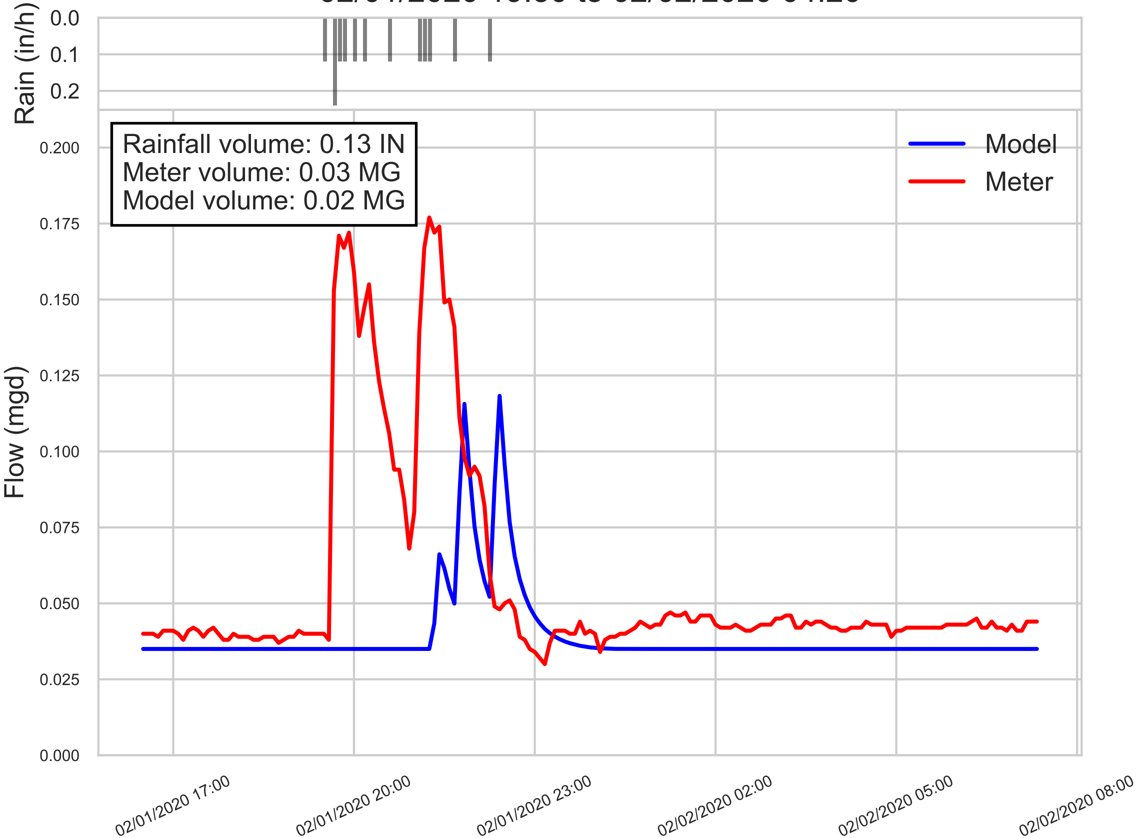

Wet Weather Event 23 for Meter Lafayette
01/12/2020 01:45 to 01/12/2020 11:50
Rain (in/h)
0.0
0.5
1.0
Rainfall volume: 0.21 IN
Meter volume: 0.03 MG
Model volume: 0.03 MG
Model
Meter
Flow (mgd)
0.5
0.4
0.3
0.2
0.1
0.0
01/11/2020 22:00
01/12/2020 01:00
01/12/2020 04:00
01/12/2020 07:00
01/12/2020 10:00
01/12/2020 13:00

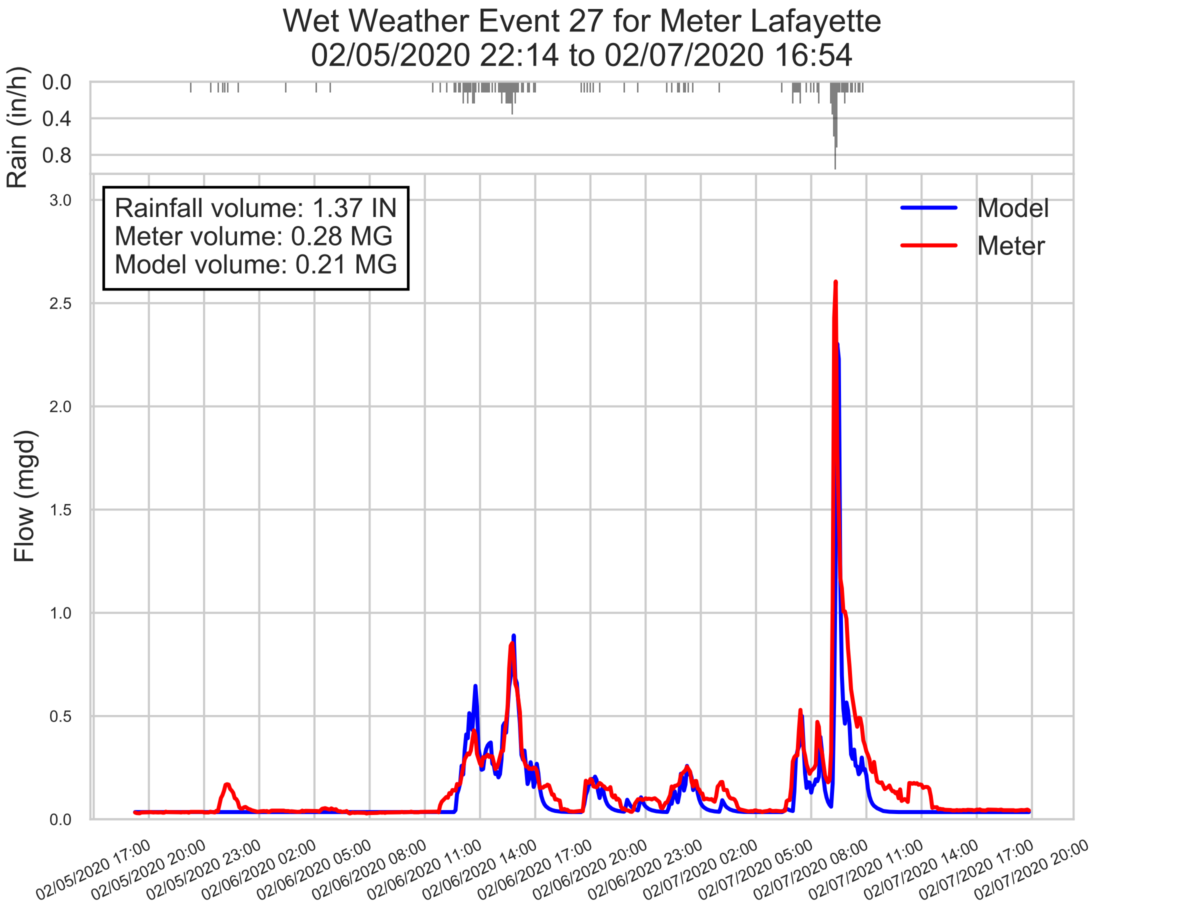


Wet Weather Event 24 for Meter Lafayette
01/18/2020 16:39 to 01/19/2020 12:29
Rain (in/h)
0.0
0.1
0.2
Rainfall volume: 0.29 IN
Meter volume: 0.05 MG
Model volume: 0.05 MG
Model
Meter
Flow (mgd)
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
01/18/2020 14:00
01/18/2020 17:00
01/18/2020 20:00
01/18/2020 23:00
01/19/2020 02:00
01/19/2020 05:00
01/19/2020 08:00
01/19/2020 11:00
01/19/2020 14:00

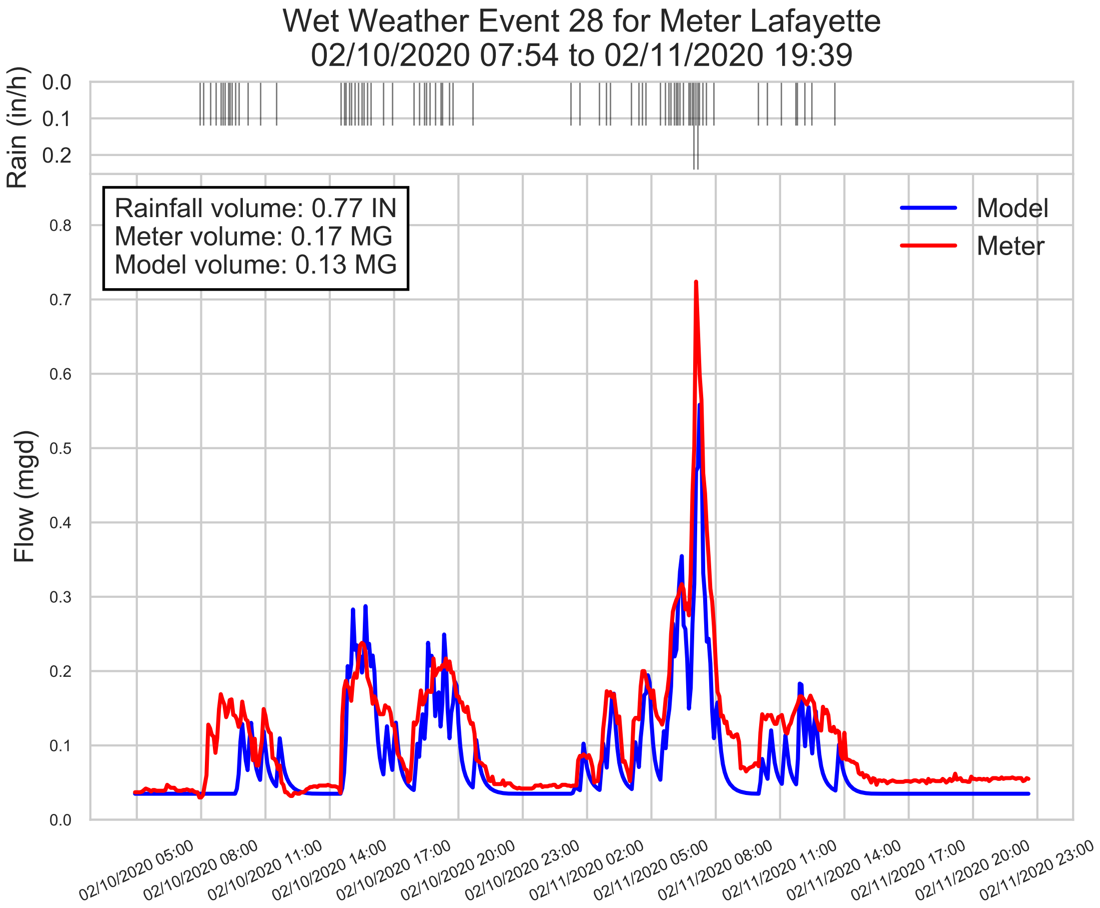

Wet Weather Event 25 for Meter Lafayette
01/25/2020 01:14 to 01/25/2020 15:09
Rain (in/h)
0.0
0.4
0.8
Rainfall volume: 1.29 IN
Meter volume: 0.2 MG
Model volume: 0.18 MG
Model
Meter
Flow (mgd)
2.5
2.0
1.5
1.0
0.5
0.0
01/24/2020 23:00
01/25/2020 02:00
01/25/2020 05:00
01/25/2020 08:00
01/25/2020 11:00
01/25/2020 14:00
01/25/2020 17:00

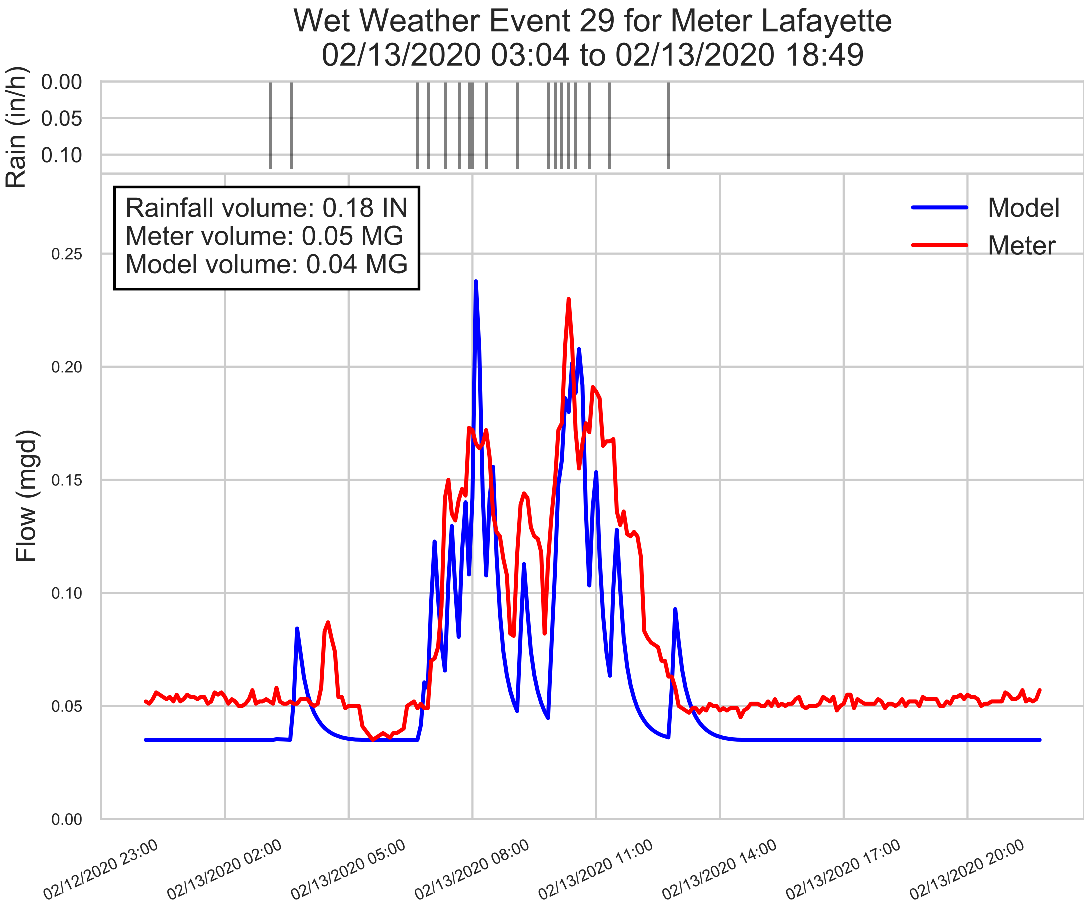
Wet Weather Event 26 for Meter Lafayette
02/01/2020 19:30 to 02/02/2020 04:20



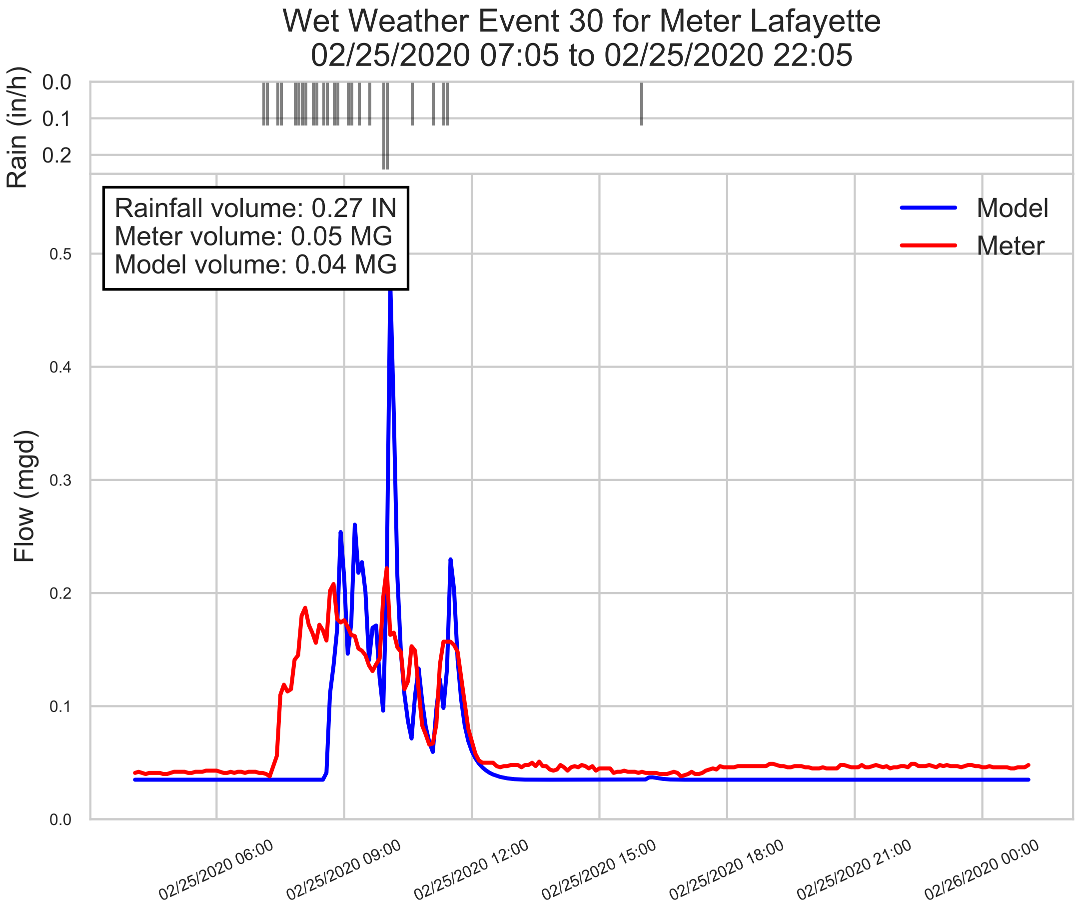


Wet Weather Event 27 for Meter Lafayette
02/05/2020 22:14 to 02/07/2020 16:54
Rain (in/h)
0.0
0.4
0.8
Rainfall volume: 1.37 IN
Meter volume: 0.28 MG
Model volume: 0.21 MG
Model
Meter
Flow (mgd)
3.0
2.5
2.0
1.5
1.0
0.5
0.0
02/05/2020 17:00
02/05/2020 20:00
02/05/2020 23:00
02/06/2020 02:00
02/06/2020 05:00
02/06/2020 08:00
02/06/2020 11:00
02/06/2020 14:00
02/06/2020 17:00
02/06/2020 20:00
02/06/2020 23:00
02/07/2020 02:00
02/07/2020 05:00
02/07/2020 08:00
02/07/2020 11:00
02/07/2020 14:00
02/07/2020 17:00
02/07/2020 20:00

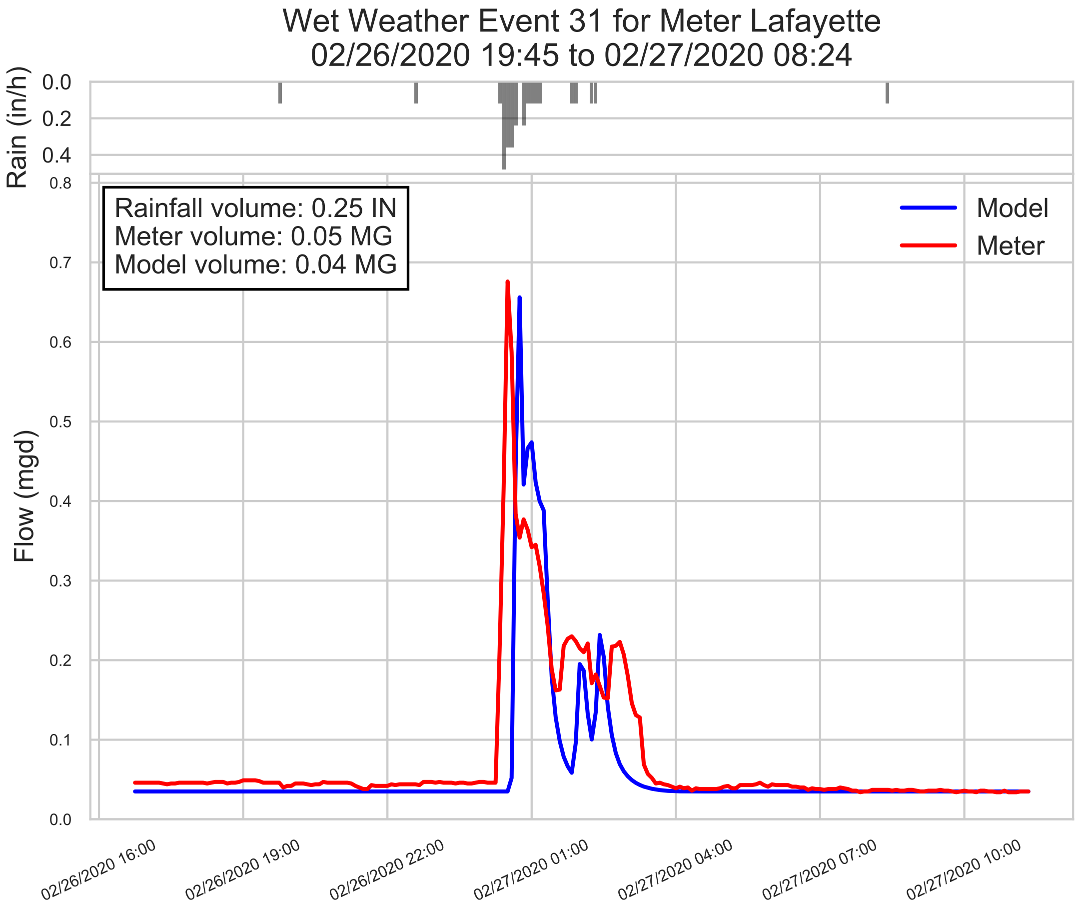

Wet Weather Event 28 for Meter Lafayette
02/10/2020 07:54 to 02/11/2020 19:39
Rain (in/h)
0.0
0.1
0.2
Rainfall volume: 0.77 IN
Meter volume: 0.17 MG
Model volume: 0.13 MG
Model
Meter
Flow (mgd)
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
02/10/2020 05:00
02/10/2020 08:00
02/10/2020 11:00
02/10/2020 14:00
02/10/2020 17:00
02/10/2020 20:00
02/10/2020 23:00
02/11/2020 02:00
02/11/2020 05:00
02/11/2020 08:00
02/11/2020 11:00
02/11/2020 14:00
02/11/2020 17:00
02/11/2020 20:00
02/11/2020 23:00

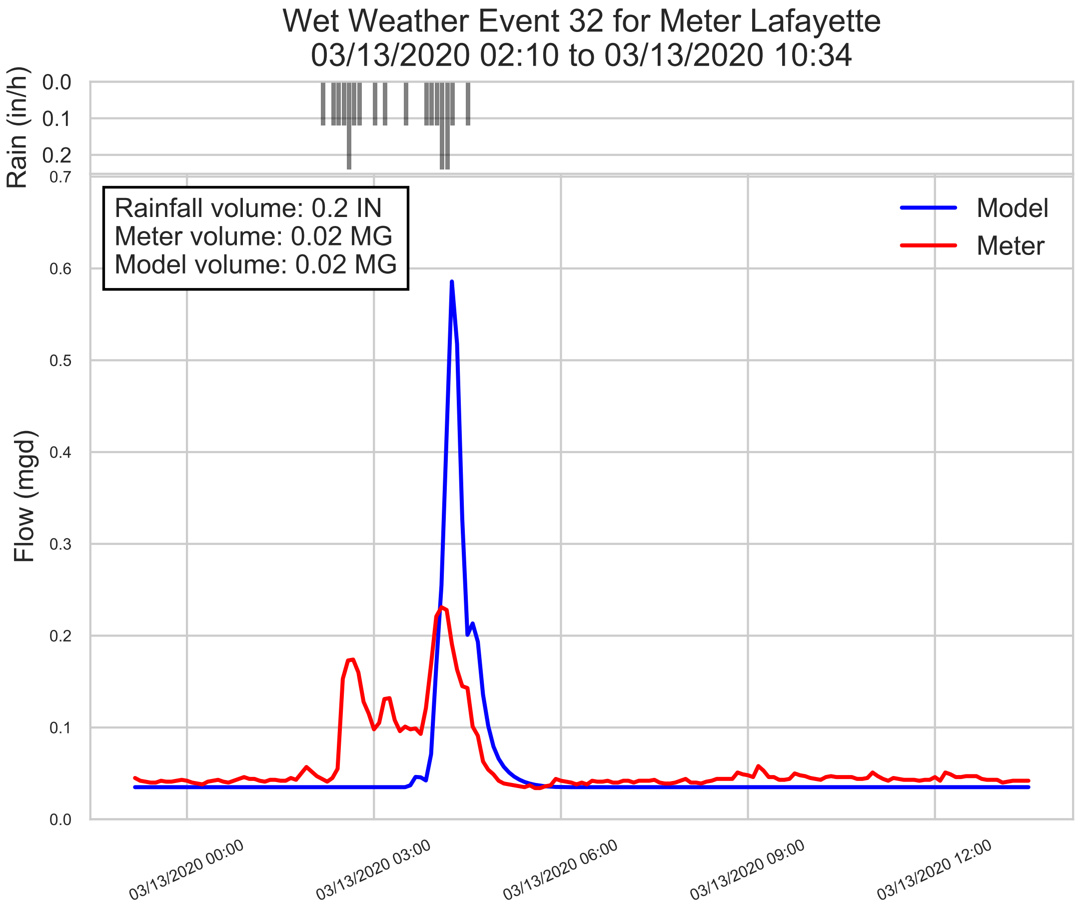


Wet Weather Event 29 for Meter Lafayette
02/13/2020 03:04 to 02/13/2020 18:49
Rain (in/h)
0.00
0.05
0.10
Rainfall volume: 0.18 IN
Meter volume: 0.05 MG
Model volume: 0.04 MG
Model
Meter
Flow (mgd)
0.25
0.20
0.15
0.10
0.05
0.00
02/12/2020 23:00
02/13/2020 02:00
02/13/2020 05:00
02/13/2020 08:00
02/13/2020 11:00
02/13/2020 14:00
02/13/2020 17:00
02/13/2020 20:00

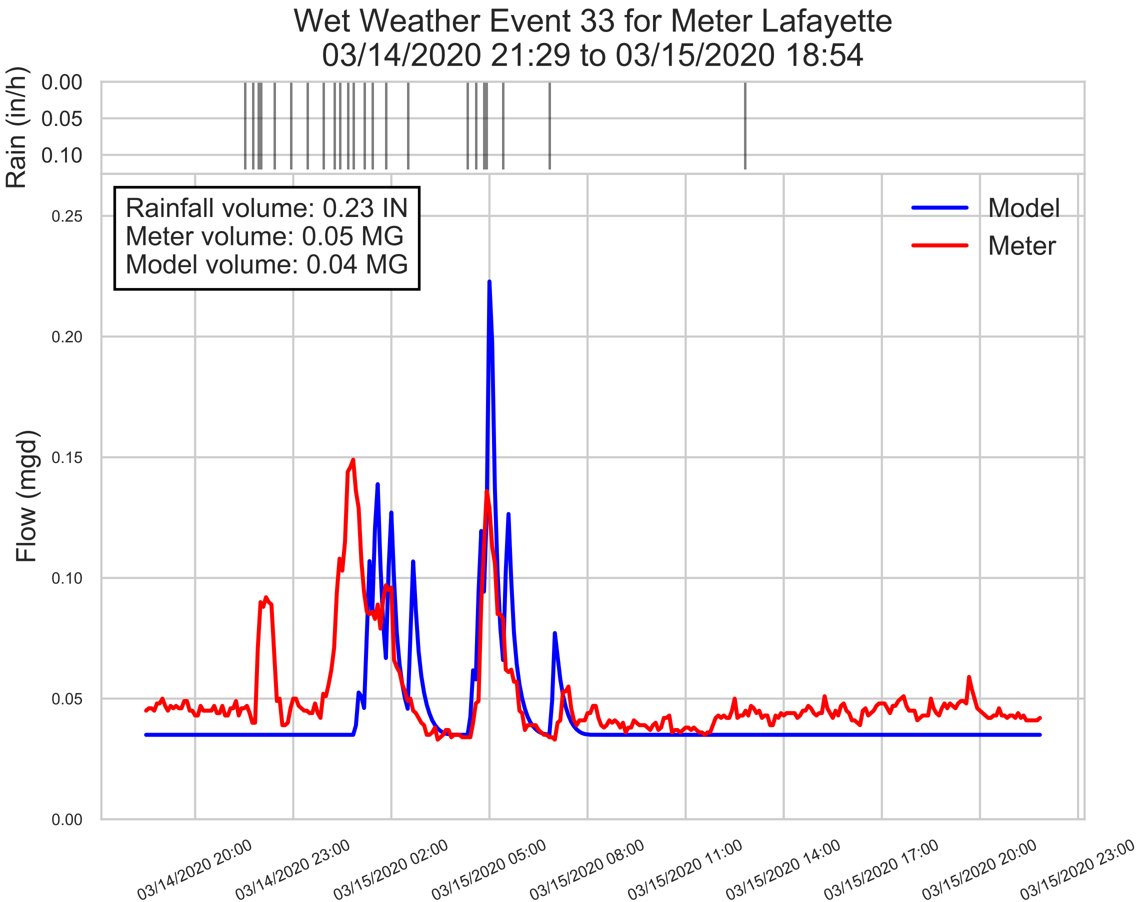


Wet Weather Event 30 for Meter Lafayette
02/25/2020 07:05 to 02/25/2020 22:05
Rain (in/h)
0.0
0.1
0.2
Rainfall volume: 0.27 IN
Meter volume: 0.05 MG
Model volume: 0.04 MG
Model
Meter
Flow (mgd)
0.5
0.4
0.3
0.2
0.1
0.0
02/25/2020 06:00
02/25/2020 09:00
02/25/2020 12:00
02/25/2020 15:00
02/25/2020 18:00
02/25/2020 21:00
02/26/2020 00:00

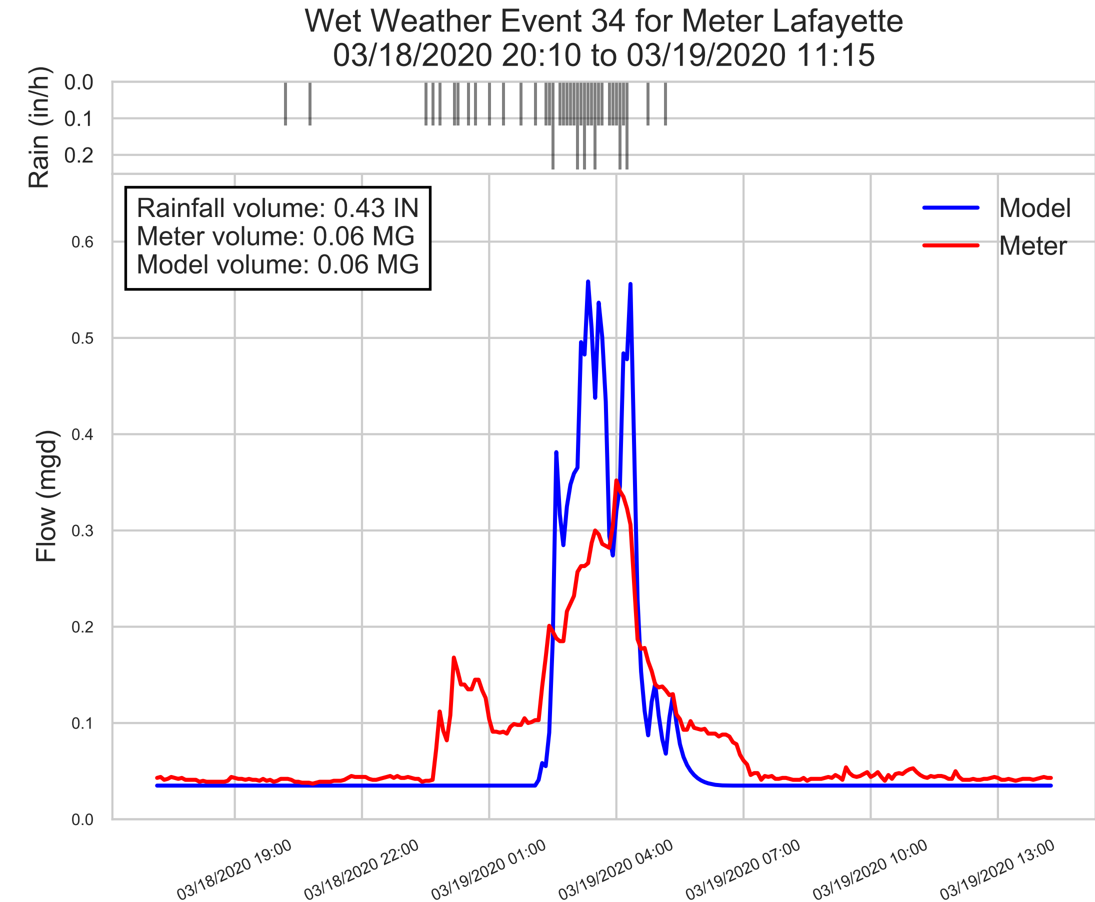

Wet Weather Event 31 for Meter Lafayette
02/26/2020 19:45 to 02/27/2020 08:24
Rain (in/h)
0.0
0.2
0.4
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
Flow (mgd)
Rainfall volume: 0.25 IN
Meter volume: 0.05 MG
Model volume: 0.04 MG
Model
Meter
02/26/2020 16:00
02/26/2020 19:00
02/26/2020 22:00
02/27/2020 01:00
02/27/2020 04:00
02/27/2020 07:00
02/27/2020 10:00



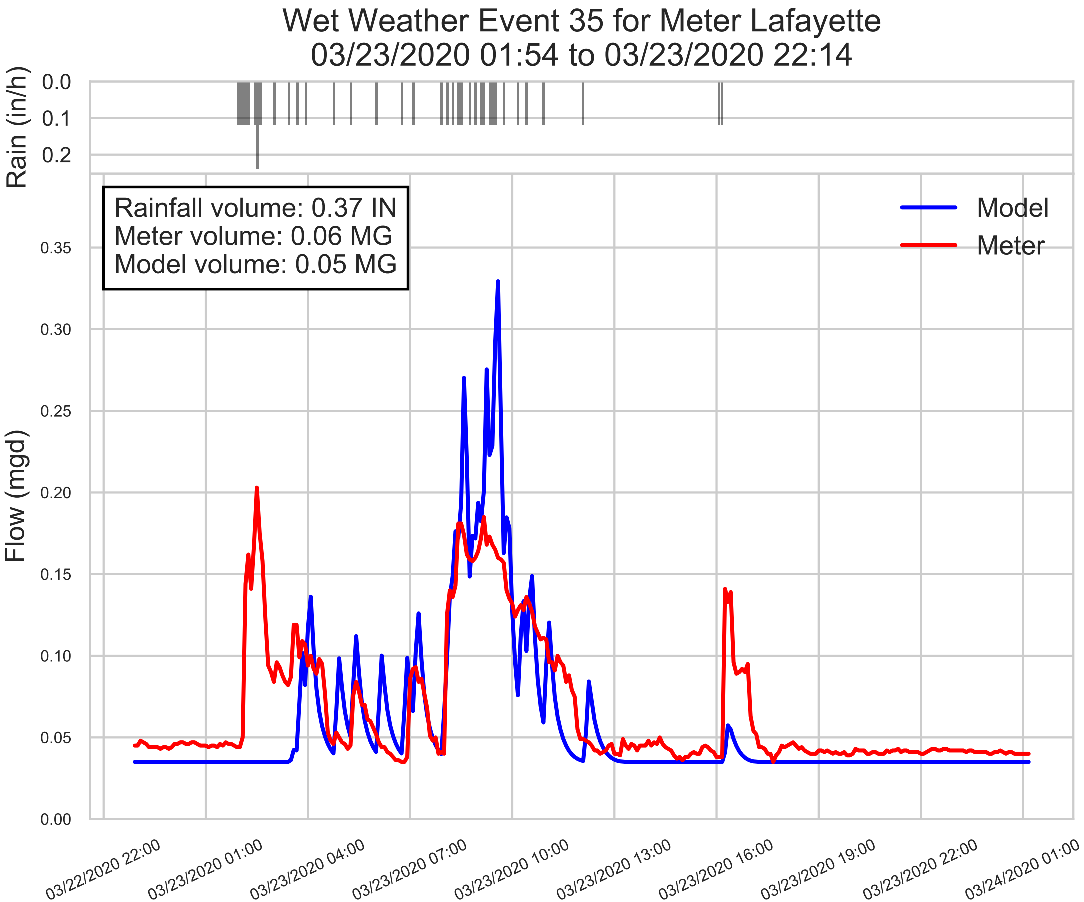
Wet Weather Event 32 for Meter Lafayette
03/13/2020 02:10 to 03/13/2020 10:34
Rain (in/h)
0.0
0.1
0.2
Flow (mgd)
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
Rainfall volume: 0.2 IN
Meter volume: 0.02 MG
Model volume: 0.02 MG
Model
Meter
03/13/2020 00:00
03/13/2020 03:00
03/13/2020 06:00
03/13/2020 09:00
03/13/2020 12:00



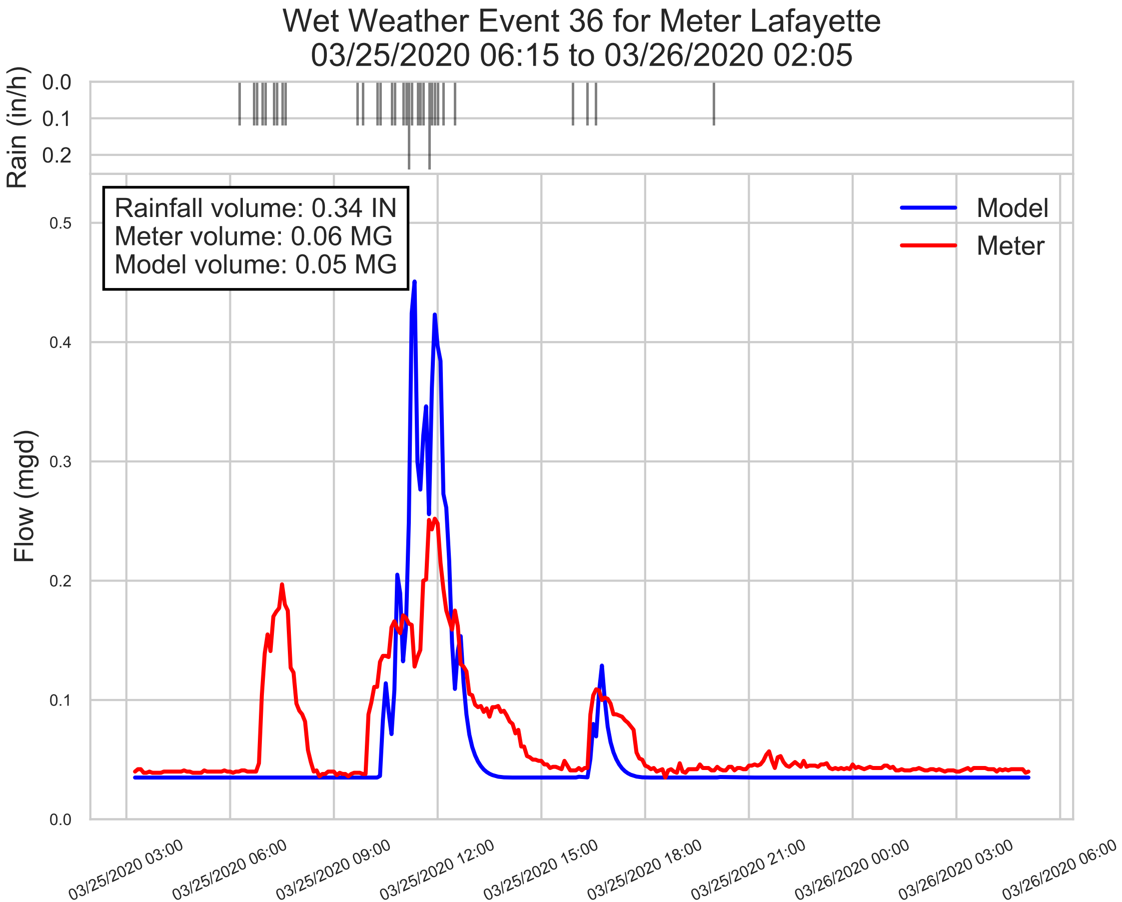
Wet Weather Event 33 for Meter Lafayette
03/14/2020 21:29 to 03/15/2020 18:54
Rain (in/h)
0.00
0.05
0.10
Rainfall volume: 0.23 IN
Meter volume: 0.05 MG
Model volume: 0.04 MG
Model
Meter
Flow (mgd)
0.25
0.20
0.15
0.10
0.05
0.00
03/14/2020 20:00
03/14/2020 23:00
03/15/2020 02:00
03/15/2020 05:00
03/15/2020 08:00
03/15/2020 11:00
03/15/2020 14:00
03/15/2020 17:00
03/15/2020 20:00
03/15/2020 23:00



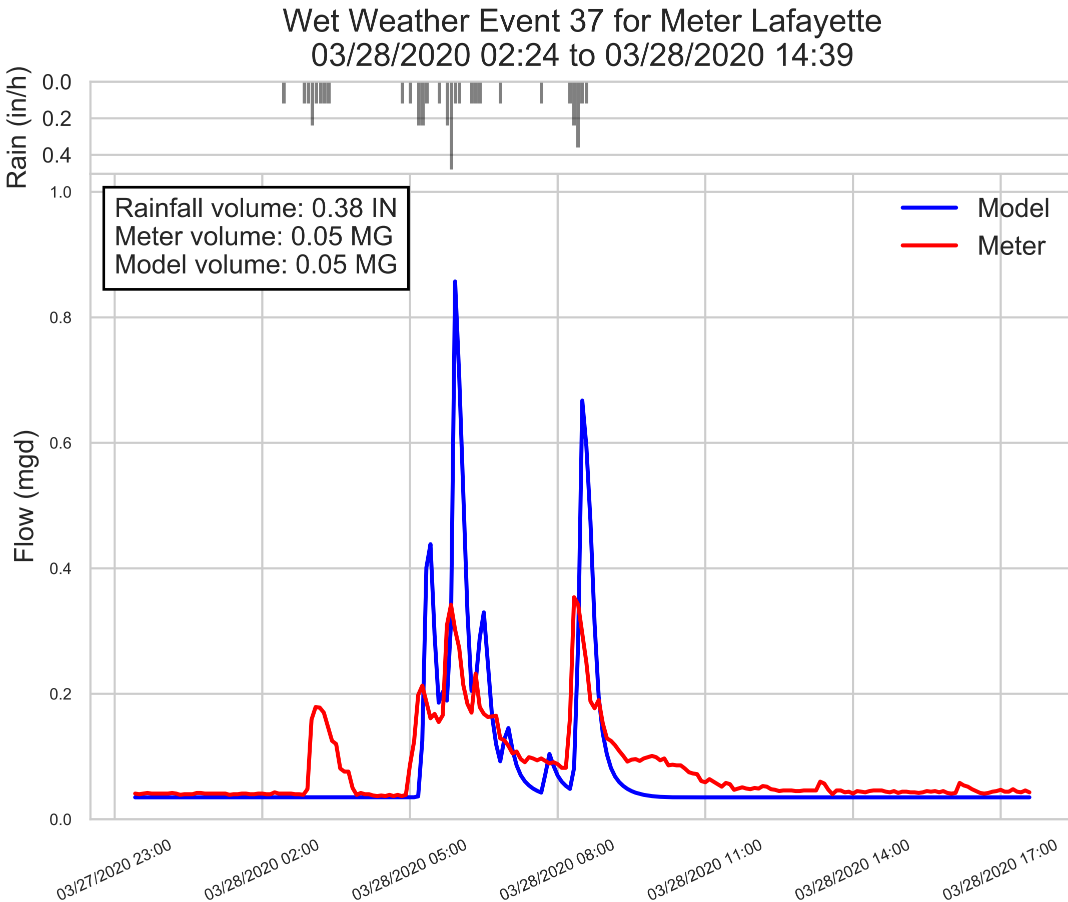
Wet Weather Event 34 for Meter Lafayette
03/18/2020 20:10 to 03/19/2020 11:15
Rain (in/h)
0.0
0.1
0.2
Rainfall volume: 0.43 IN
Meter volume: 0.06 MG
Model volume: 0.06 MG
Model
Meter
Flow (mgd)
0.6
0.5
0.4
0.3
0.2
0.1
0.0
03/18/2020 19:00
03/18/2020 22:00
03/19/2020 01:00
03/19/2020 04:00
03/19/2020 07:00
03/19/2020 10:00
03/19/2020 13:00



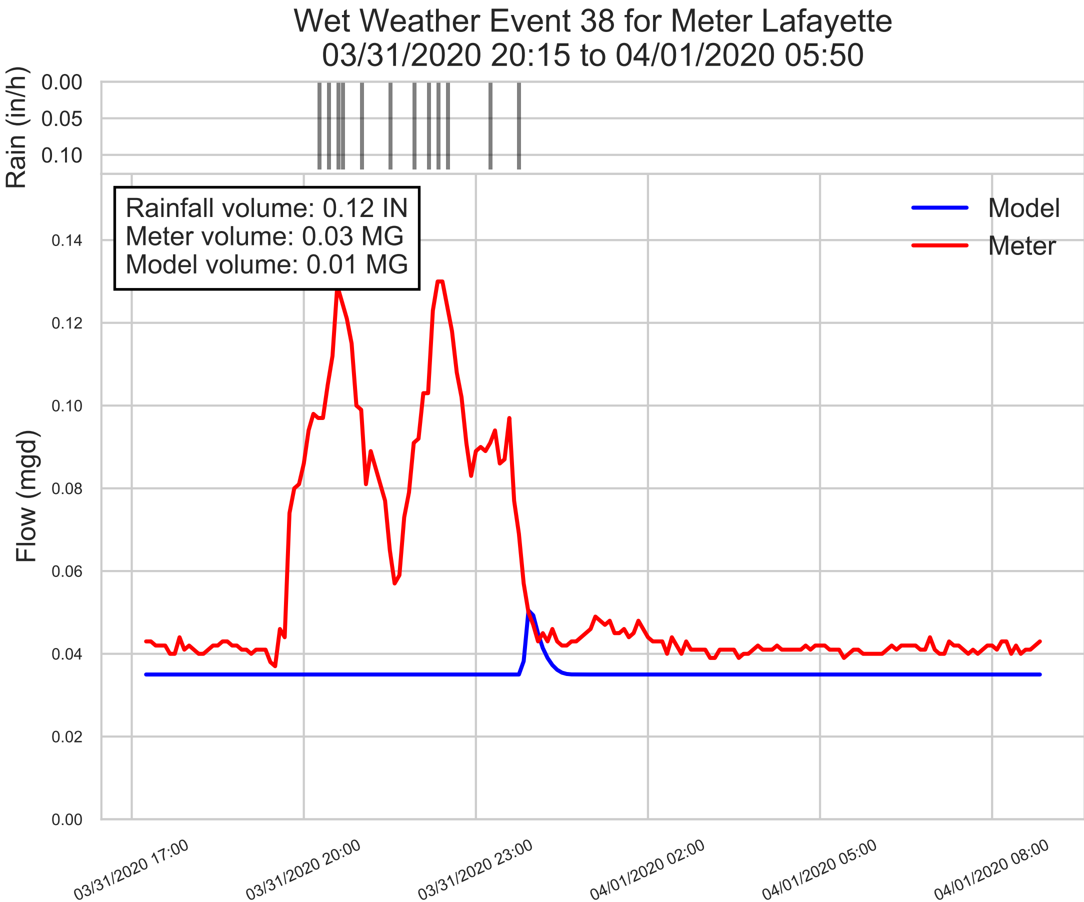
Wet Weather Event 35 for Meter Lafayette
03/23/2020 01:54 to 03/23/2020 22:14
Rain (in/h)
0.0
0.1
0.2
Rainfall volume: 0.37 IN
Meter volume: 0.06 MG
Model volume: 0.05 MG
Model
Meter
Flow (mgd)
0.00
0.05
0.10
0.15
0.20
0.25
0.30
0.35
03/22/2020 22:00
03/23/2020 01:00
03/23/2020 04:00
03/23/2020 07:00
03/23/2020 10:00
03/23/2020 13:00
03/23/2020 16:00
03/23/2020 19:00
03/23/2020 22:00
03/24/2020 01:00



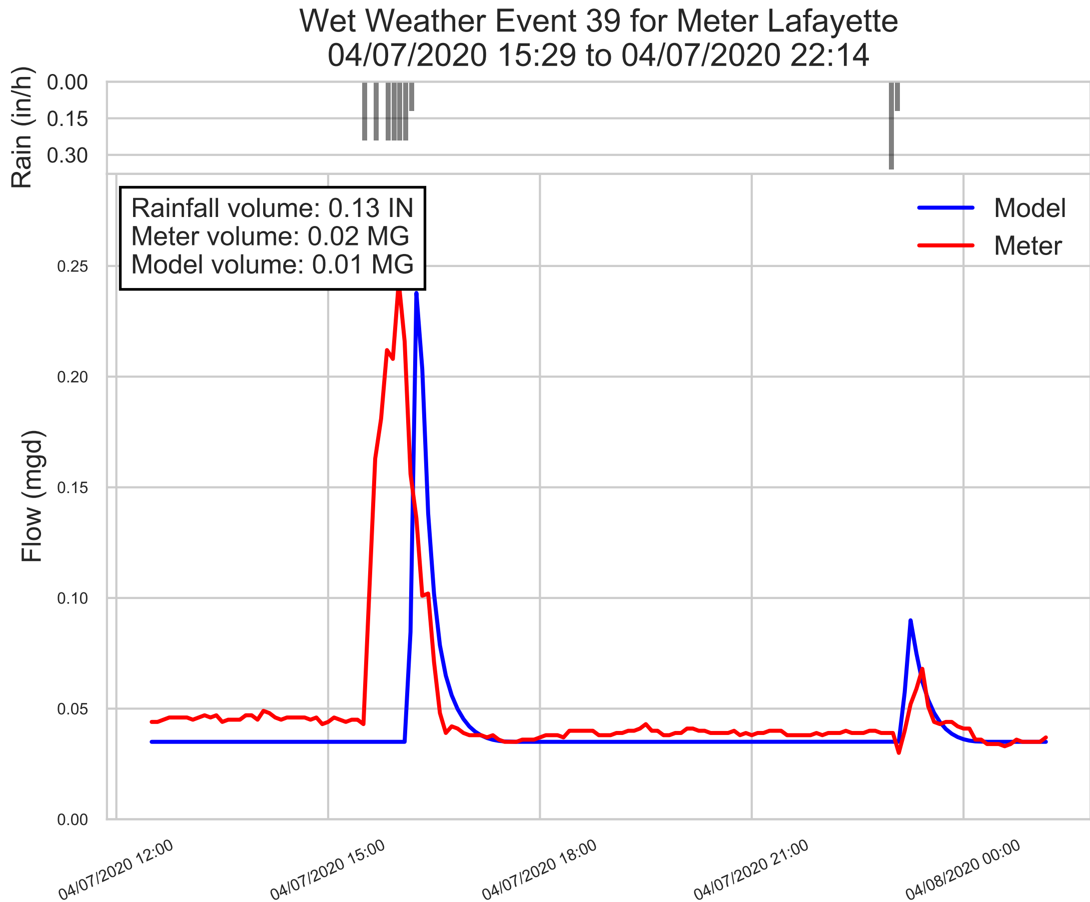
Wet Weather Event 36 for Meter Lafayette
03/25/2020 06:15 to 03/26/2020 02:05
Rain (in/h)
0.0
0.1
0.2
Rainfall volume: 0.34 IN
Meter volume: 0.06 MG
Model volume: 0.05 MG
Model
Meter
Flow (mgd)
0.5
0.4
0.3
0.2
0.1
0.0
03/25/2020 03:00
03/25/2020 06:00
03/25/2020 09:00
03/25/2020 12:00
03/25/2020 15:00
03/25/2020 18:00
03/25/2020 21:00
03/26/2020 00:00
03/26/2020 03:00
03/26/2020 06:00



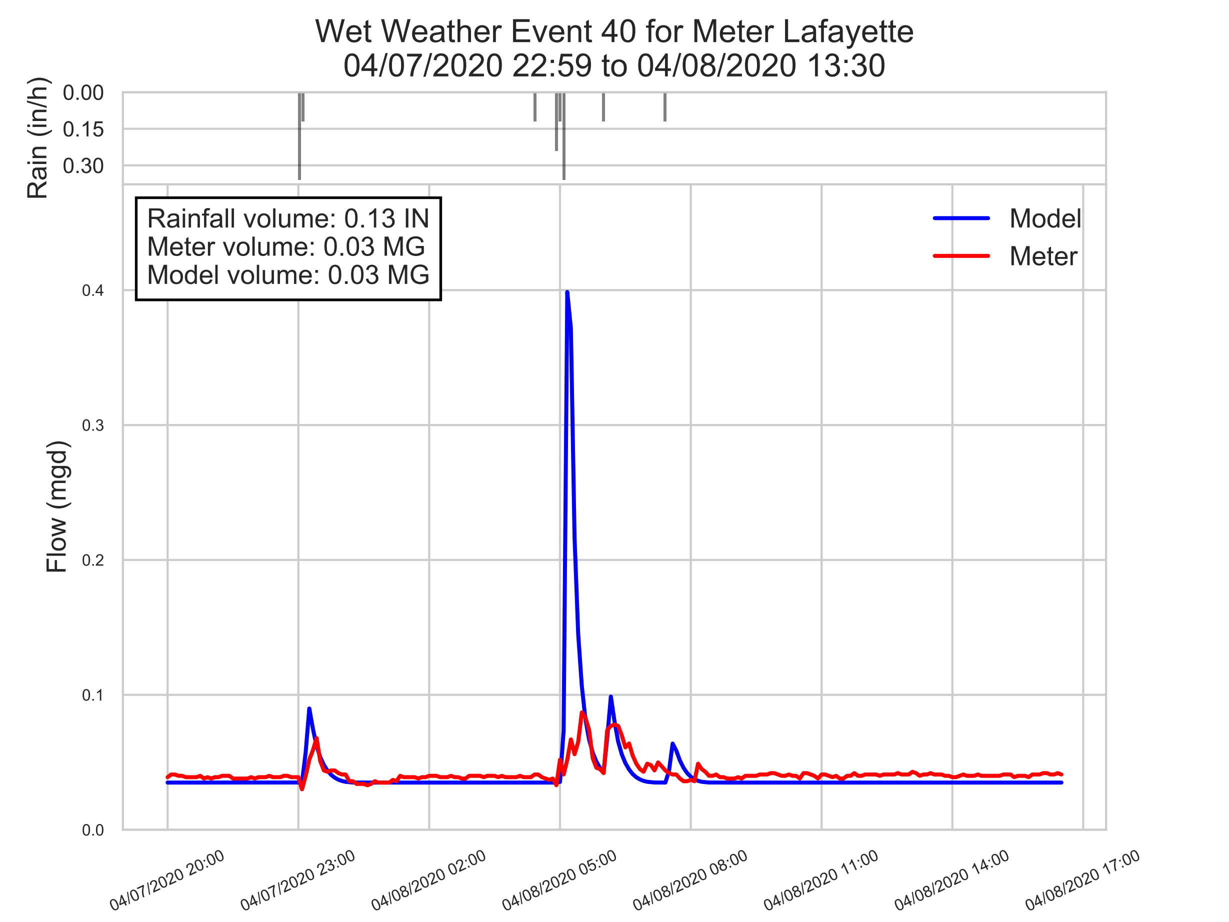
Wet Weather Event 37 for Meter Lafayette
03/28/2020 02:24 to 03/28/2020 14:39
Rain (in/h)
0.0
0.2
0.4
Flow (mgd)
1.0
0.8
0.6
0.4
0.2
0.0
Rainfall volume: 0.38 IN
Meter volume: 0.05 MG
Model volume: 0.05 MG
Model
Meter
03/27/2020 23:00
03/28/2020 02:00
03/28/2020 05:00
03/28/2020 08:00
03/28/2020 11:00
03/28/2020 14:00
03/28/2020 17:00



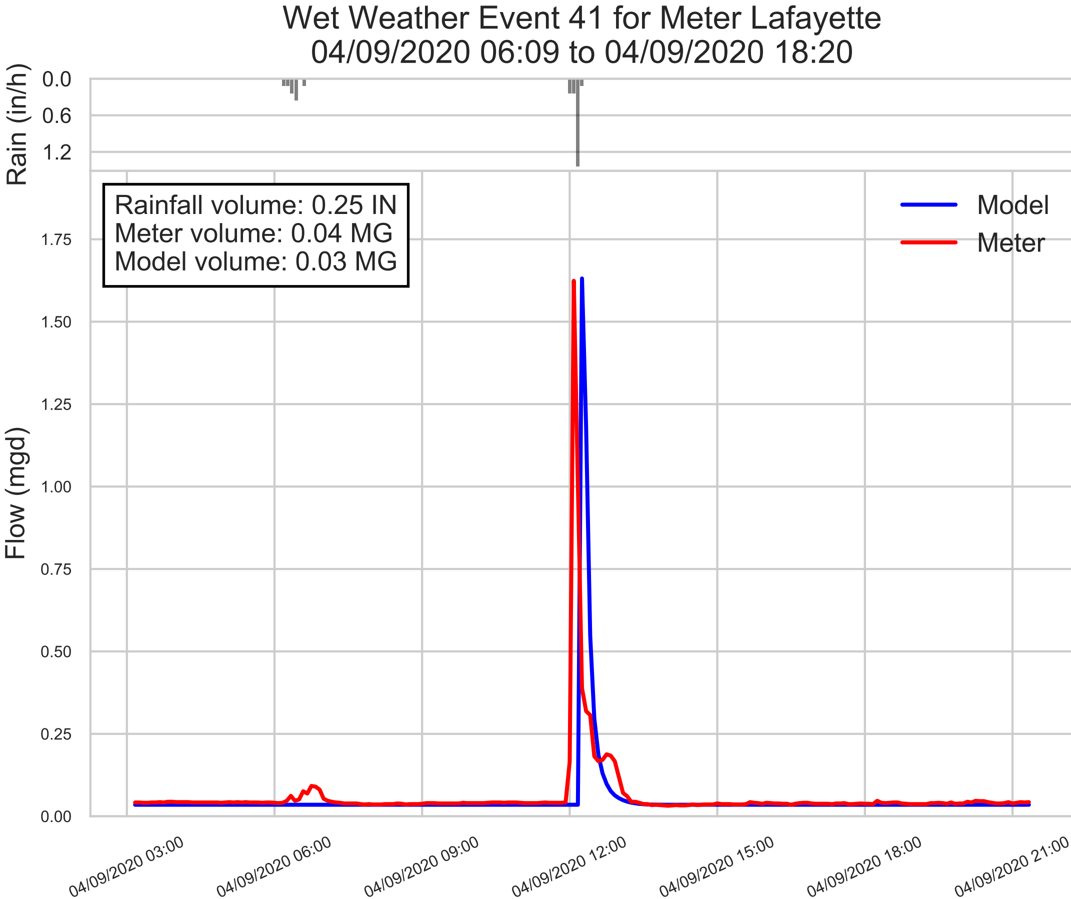
Wet Weather Event 38 for Meter Lafayette
03/31/2020 20:15 to 04/01/2020 05:50
Rain (in/h)
0.00
0.05
0.10
Rainfall volume: 0.12 IN
Meter volume: 0.03 MG
Model volume: 0.01 MG
Model
Meter
Flow (mgd)
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
03/31/2020 17:00
03/31/2020 20:00
03/31/2020 23:00
04/01/2020 02:00
04/01/2020 05:00
04/01/2020 08:00



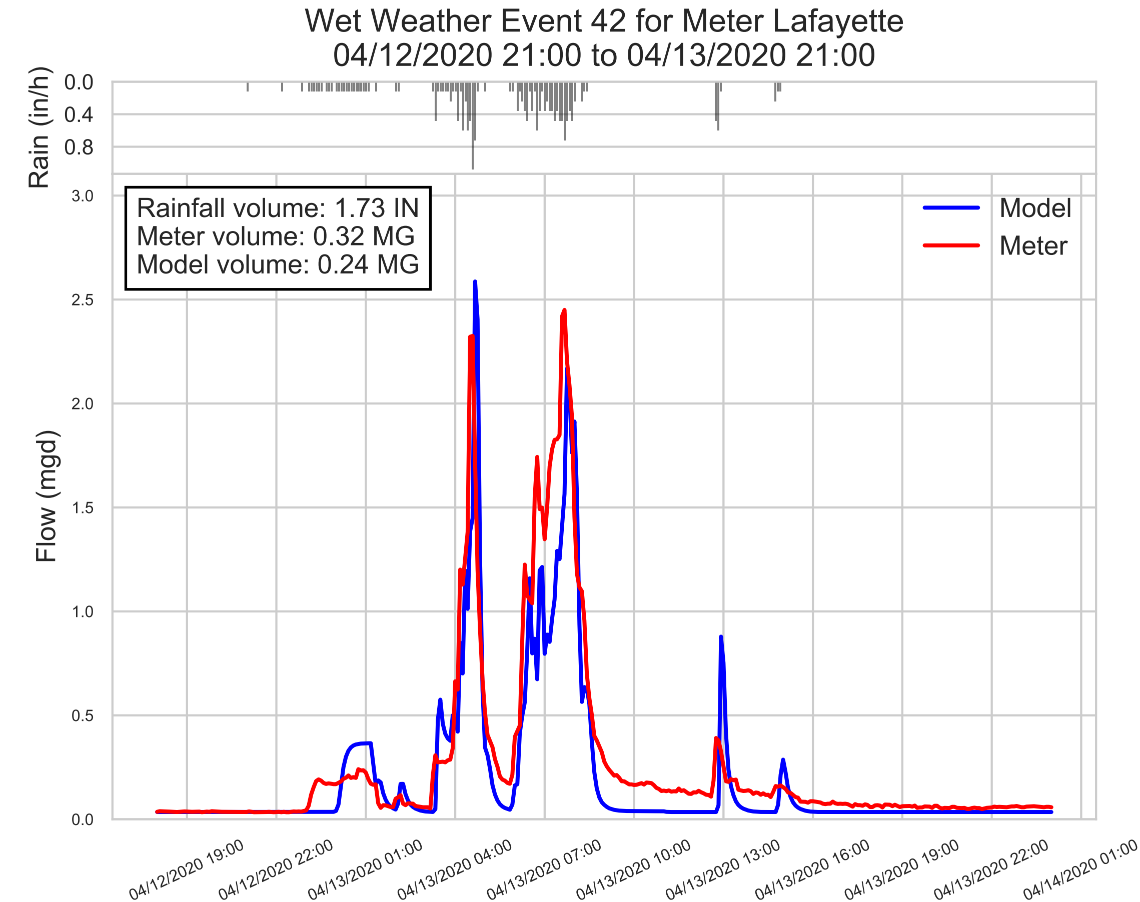
Wet Weather Event 39 for Meter Lafayette
04/07/2020 15:29 to 04/07/2020 22:14
Rain (in/h)
0.00
0.15
0.30
Rainfall volume: 0.13 IN
Meter volume: 0.02 MG
Model volume: 0.01 MG
Model
Meter
Flow (mgd)
0.25
0.20
0.15
0.10
0.05
0.00
04/07/2020 12:00
04/07/2020 15:00
04/07/2020 18:00
04/07/2020 21:00
04/08/2020 00:00



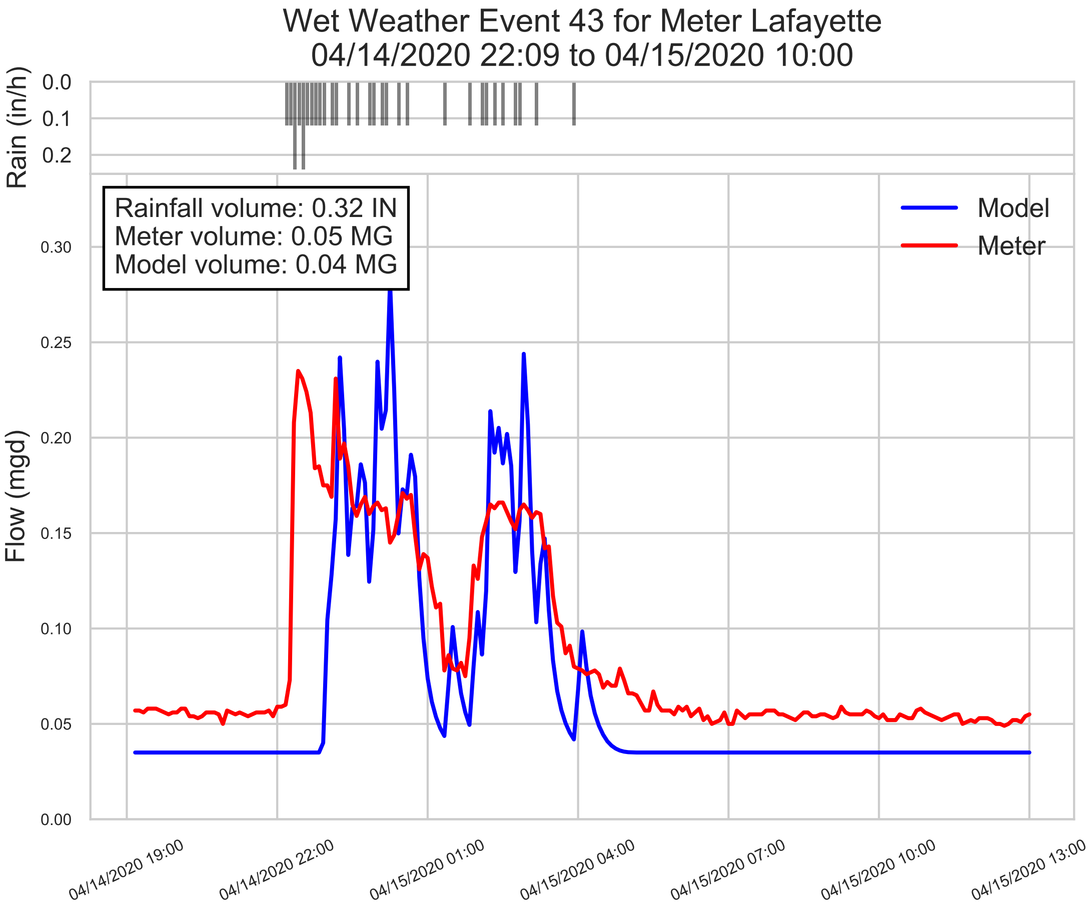
Wet Weather Event 40 for Meter Lafayette
04/07/2020 22:59 to 04/08/2020 13:30
Rain (in/h)
0.00
0.15
0.30
Rainfall volume: 0.13 IN
Meter volume: 0.03 MG
Model volume: 0.03 MG
Model
Meter
Flow (mgd)
0.0
0.1
0.2
0.3
0.4
04/07/2020 20:00
04/07/2020 23:00
04/08/2020 02:00
04/08/2020 05:00
04/08/2020 08:00
04/08/2020 11:00
04/08/2020 14:00
04/08/2020 17:00



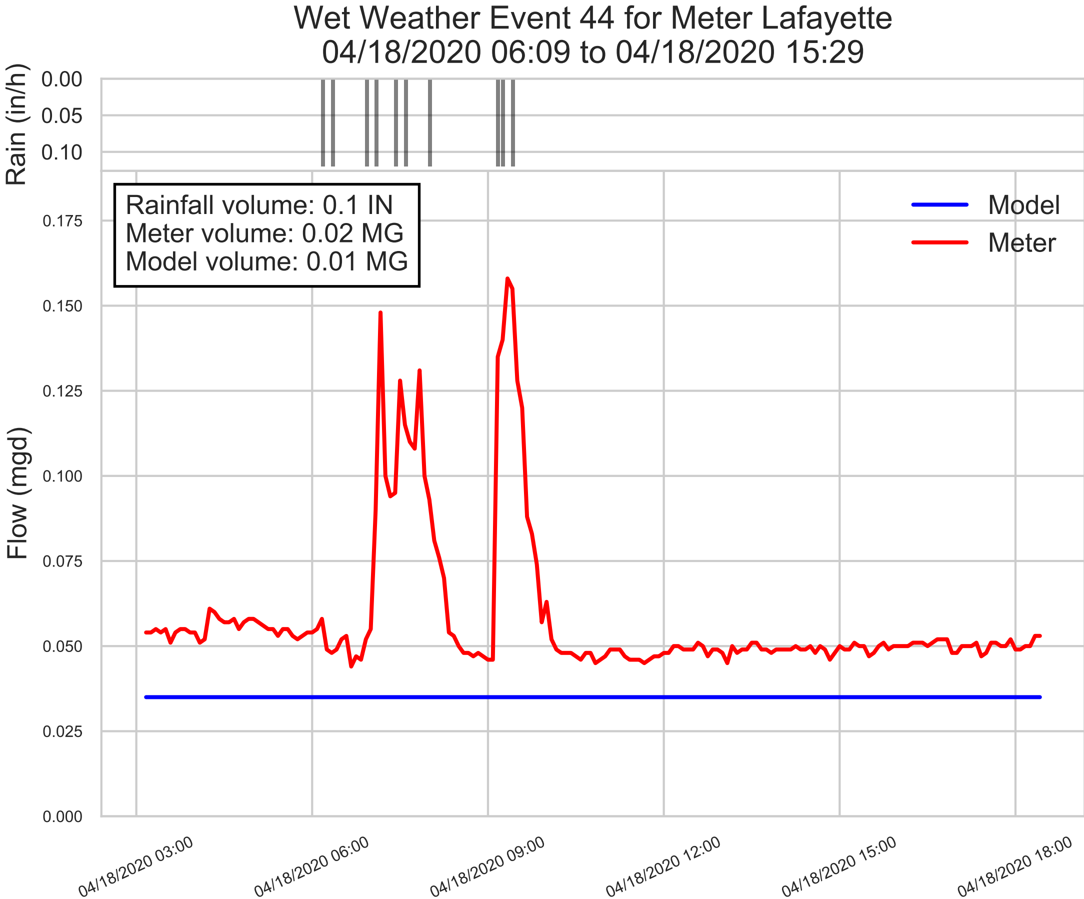
Wet Weather Event 41 for Meter Lafayette
04/09/2020 06:09 to 04/09/2020 18:20
Rain (in/h)
0.0
0.6
1.2
Rainfall volume: 0.25 IN
Meter volume: 0.04 MG
Model volume: 0.03 MG
Model
Meter
Flow (mgd)
1.75
1.50
1.25
1.00
0.75
0.50
0.25
0.00
04/09/2020 03:00
04/09/2020 06:00
04/09/2020 09:00
04/09/2020 12:00
04/09/2020 15:00
04/09/2020 18:00
04/09/2020 21:00



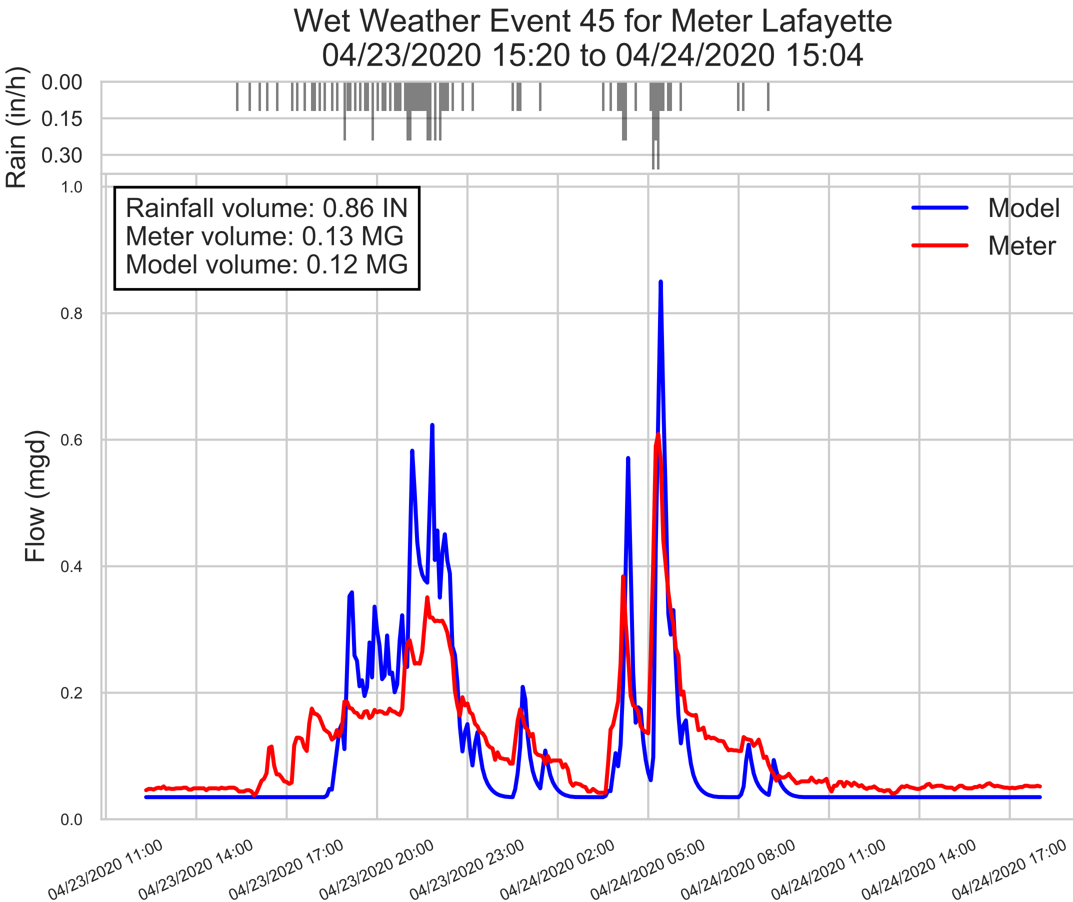
Wet Weather Event 42 for Meter Lafayette
04/12/2020 21:00 to 04/13/2020 21:00
Rain (in/h)
0.0
0.4
0.8
Rainfall volume: 1.73 IN
Meter volume: 0.32 MG
Model volume: 0.24 MG
Model
Meter
Flow (mgd)
3.0
2.5
2.0
1.5
1.0
0.5
0.0
04/12/2020 19:00
04/12/2020 22:00
04/13/2020 01:00
04/13/2020 04:00
04/13/2020 07:00
04/13/2020 10:00
04/13/2020 13:00
04/13/2020 16:00
04/13/2020 19:00
04/13/2020 22:00
04/14/2020 01:00



Wet Weather Event 43 for Meter Lafayette
04/14/2020 22:09 to 04/15/2020 10:00
Rain (in/h)
0.0
0.1
0.2
Rainfall volume: 0.32 IN
Meter volume: 0.05 MG
Model volume: 0.04 MG
Model
Meter
Flow (mgd)
0.30
0.25
0.20
0.15
0.10
0.05
0.00
04/14/2020 19:00
04/14/2020 22:00
04/15/2020 01:00
04/15/2020 04:00
04/15/2020 07:00
04/15/2020 10:00
04/15/2020 13:00

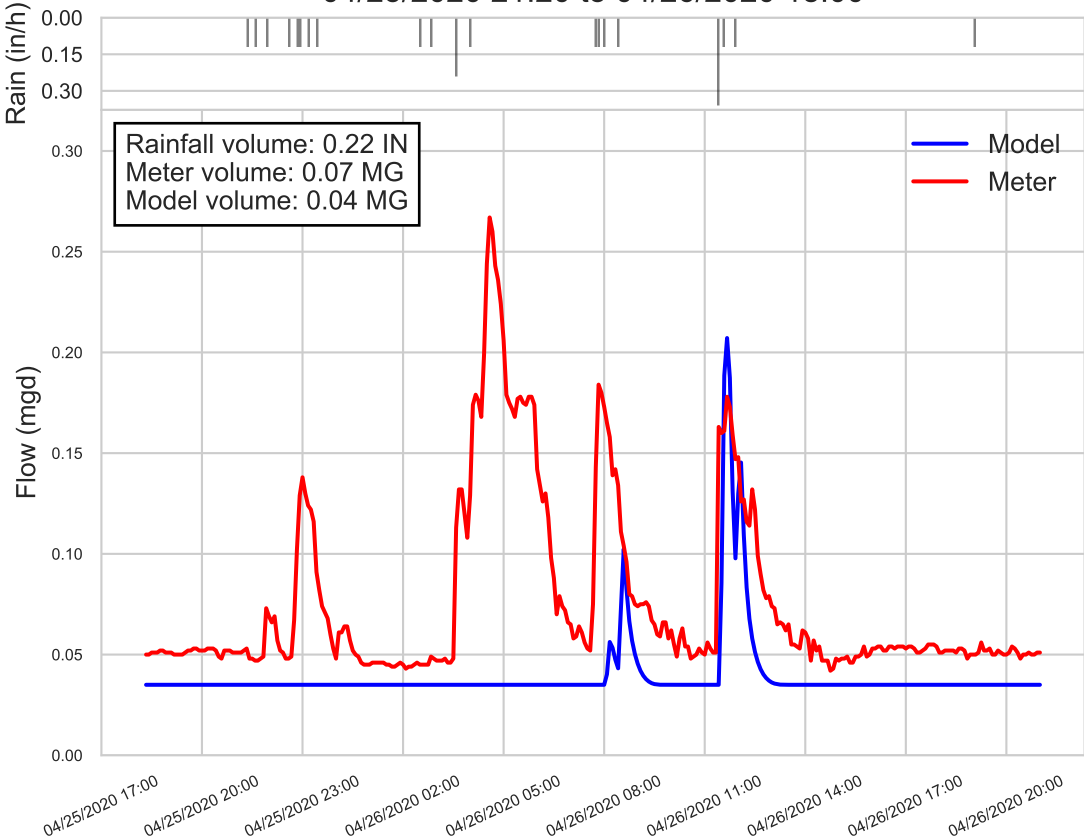


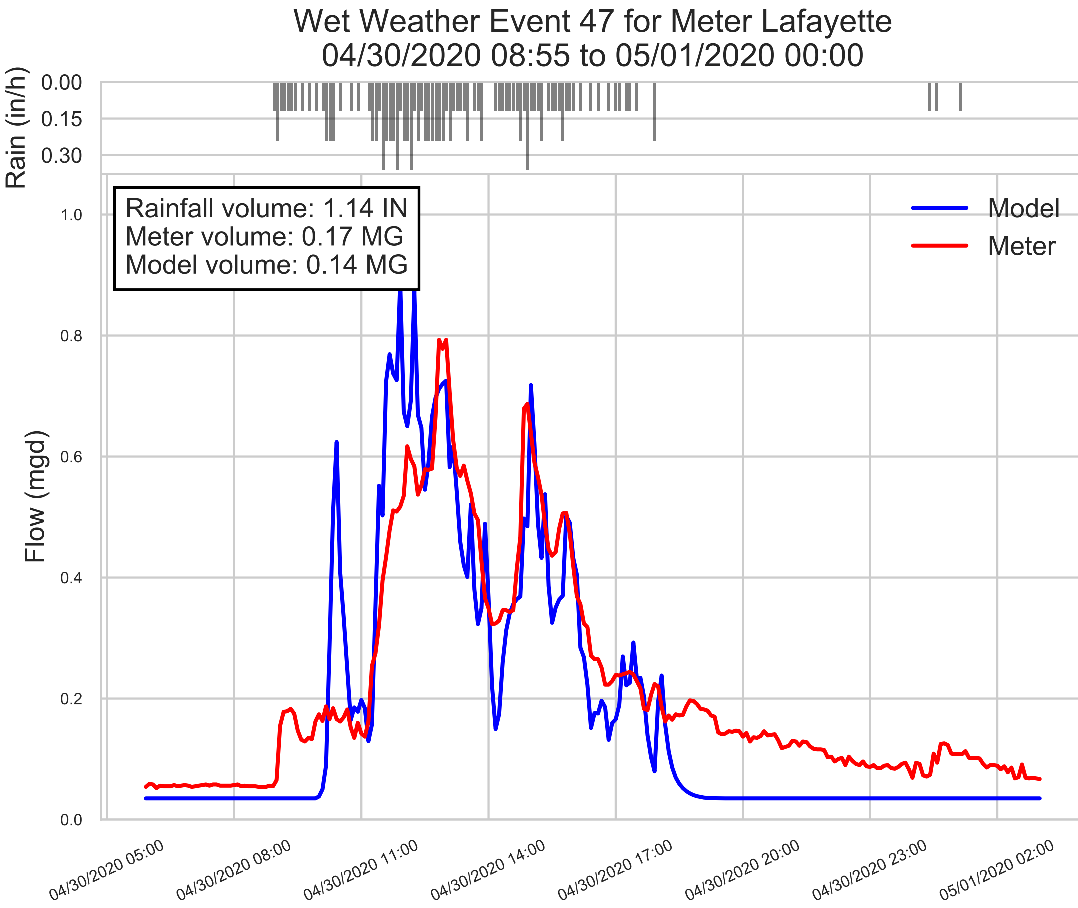
Wet Weather Event 44 for Meter Lafayette
04/18/2020 06:09 to 04/18/2020 15:29
Rain (in/h)
0.00
0.05
0.10
Rainfall volume: 0.1 IN
Meter volume: 0.02 MG
Model volume: 0.01 MG
Model
Meter
Flow (mgd)
0.175
0.150
0.125
0.100
0.075
0.050
0.025
0.000
04/18/2020 03:00
04/18/2020 06:00
04/18/2020 09:00
04/18/2020 12:00
04/18/2020 15:00
04/18/2020 18:00



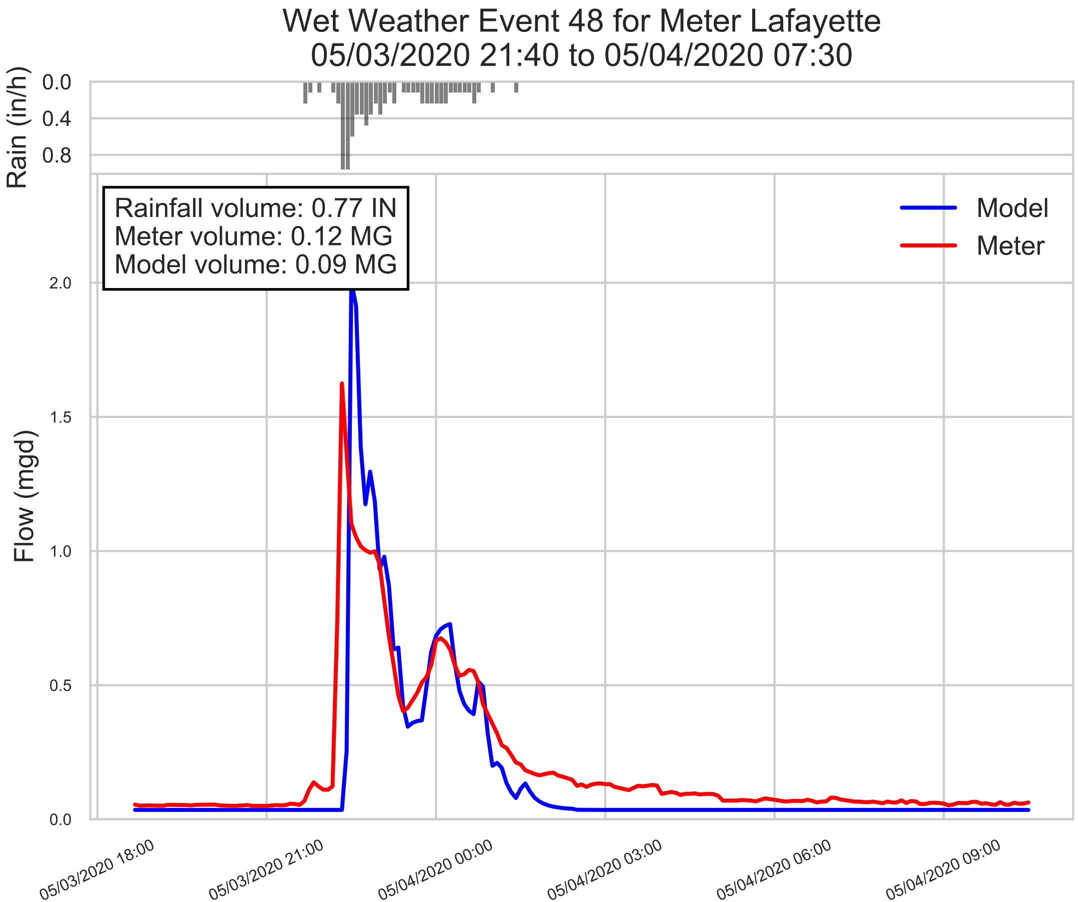
Wet Weather Event 45 for Meter Lafayette
04/23/2020 15:20 to 04/24/2020 15:04
Rain (in/h)
0.00
0.15
0.30
Flow (mgd)
1.0
0.8
0.6
0.4
0.2
0.0
Rainfall volume: 0.86 IN
Meter volume: 0.13 MG
Model volume: 0.12 MG
Model
Meter
04/23/2020 11:00
04/23/2020 14:00
04/23/2020 17:00
04/23/2020 20:00
04/23/2020 23:00
04/24/2020 02:00
04/24/2020 05:00
04/24/2020 08:00
04/24/2020 11:00
04/24/2020 14:00
04/24/2020 17:00

Wet Weather Event 46 for Meter Lafayette
04/25/2020 21:20 to 04/26/2020 18:00

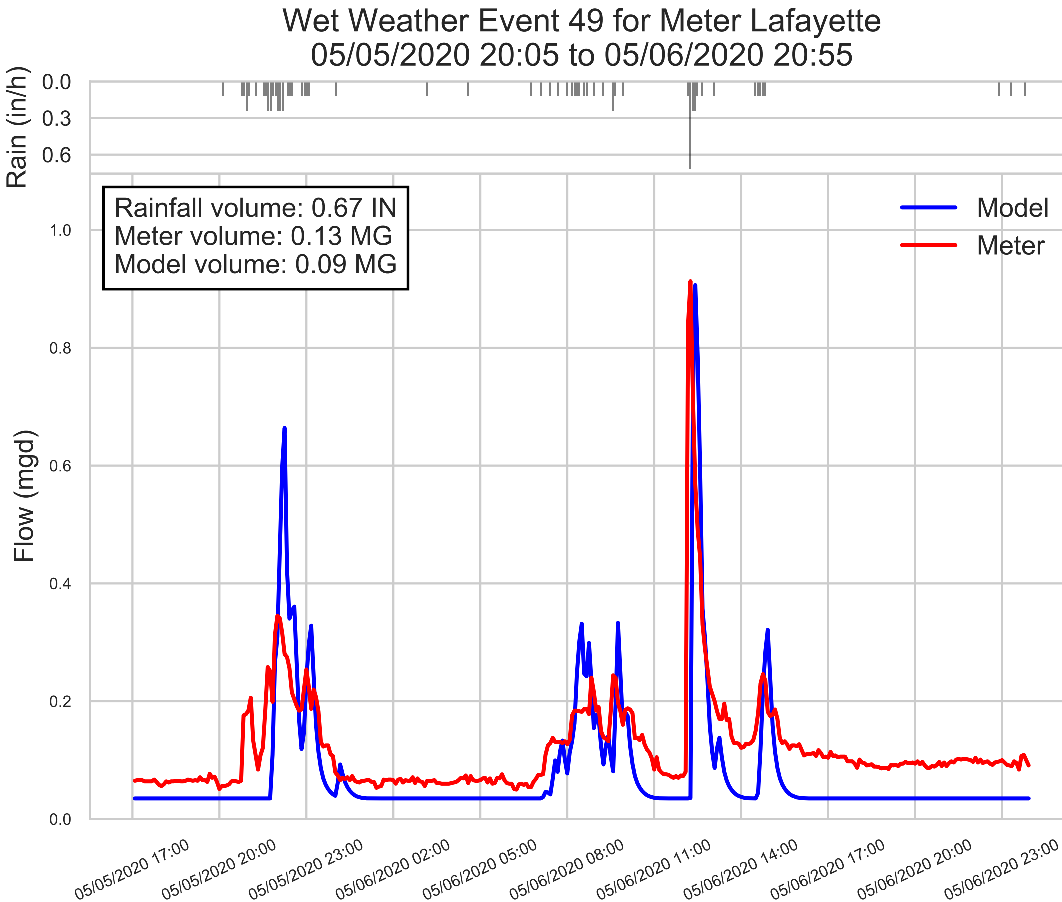




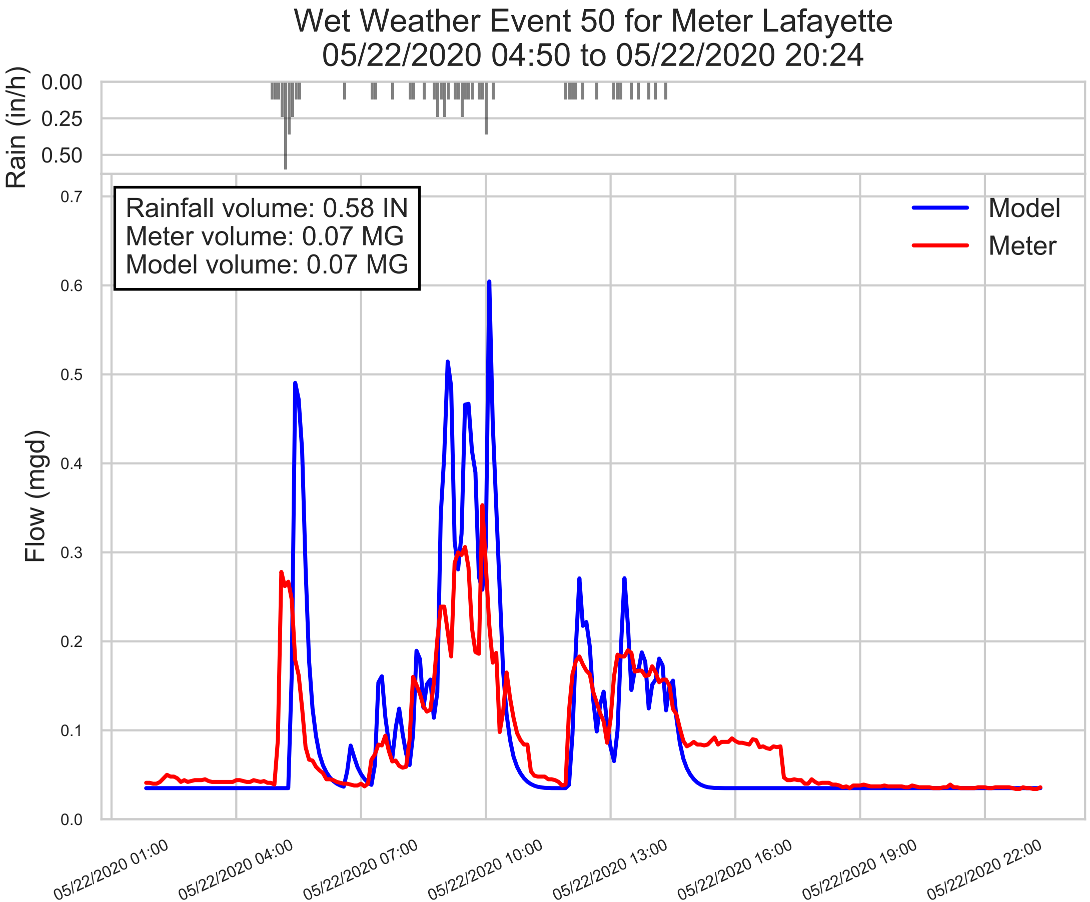
Wet Weather Event 47 for Meter Lafayette
04/30/2020 08:55 to 05/01/2020 00:00
Rain (in/h)
0.00
0.15
0.30
Rainfall volume: 1.14 IN
Meter volume: 0.17 MG
Model volume: 0.14 MG
Model
Meter
Flow (mgd)
1.0
0.8
0.6
0.4
0.2
0.0
04/30/2020 05:00
04/30/2020 08:00
04/30/2020 11:00
04/30/2020 14:00
04/30/2020 17:00
04/30/2020 20:00
04/30/2020 23:00
05/01/2020 02:00



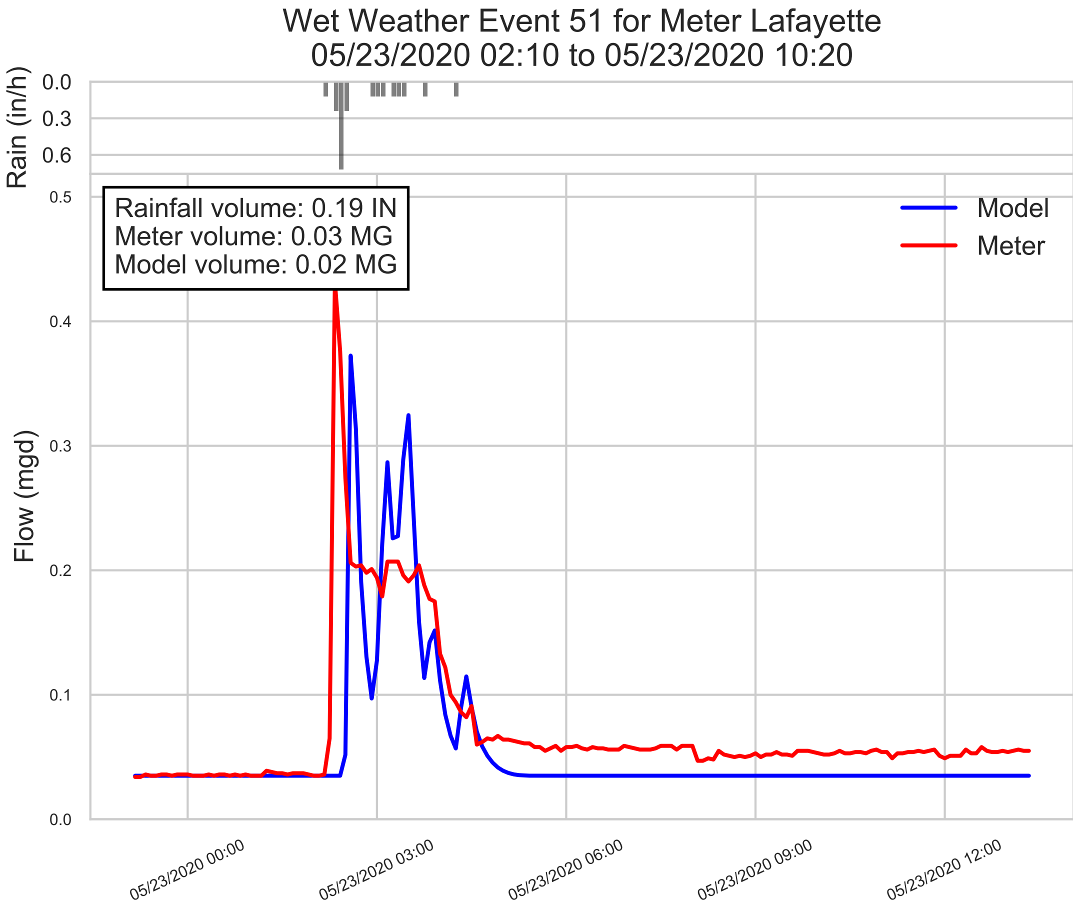
Wet Weather Event 48 for Meter Lafayette
05/03/2020 21:40 to 05/04/2020 07:30
Rain (in/h)
0.0
0.4
0.8
Rainfall volume: 0.77 IN
Meter volume: 0.12 MG
Model volume: 0.09 MG
Model
Meter
Flow (mgd)
2.0
1.5
1.0
0.5
0.0
05/03/2020 18:00
05/03/2020 21:00
05/04/2020 00:00
05/04/2020 03:00
05/04/2020 06:00
05/04/2020 09:00



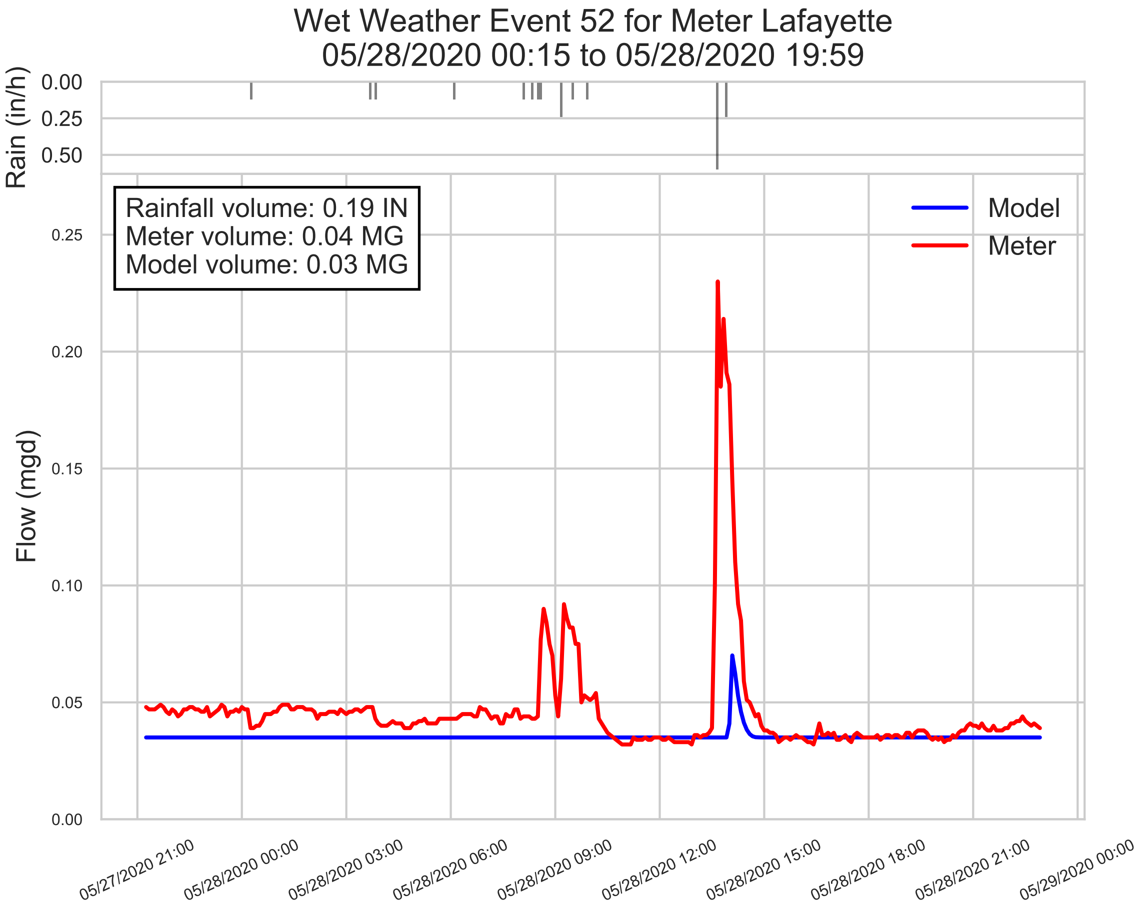
Wet Weather Event 49 for Meter Lafayette
05/05/2020 20:05 to 05/06/2020 20:55
Rain (in/h)
0.0
0.3
0.6
Rainfall volume: 0.67 IN
Meter volume: 0.13 MG
Model volume: 0.09 MG
Model
Meter
Flow (mgd)
1.0
0.8
0.6
0.4
0.2
0.0
05/05/2020 17:00
05/05/2020 20:00
05/05/2020 23:00
05/06/2020 02:00
05/06/2020 05:00
05/06/2020 08:00
05/06/2020 11:00
05/06/2020 14:00
05/06/2020 17:00
05/06/2020 20:00
05/06/2020 23:00



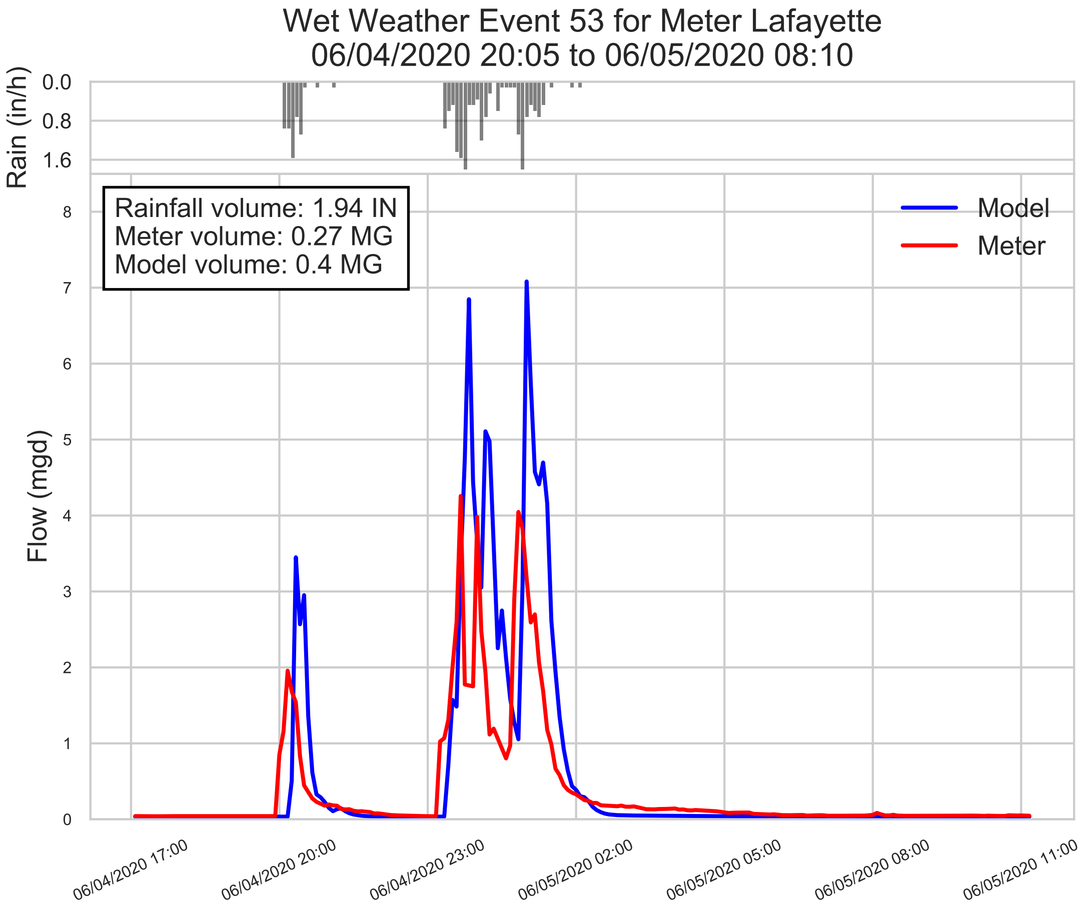
Wet Weather Event 50 for Meter Lafayette
05/22/2020 04:50 to 05/22/2020 20:24
Rain (in/h)
0.00
0.25
0.50
Rainfall volume: 0.58 IN
Meter volume: 0.07 MG
Model volume: 0.07 MG
Model
Meter
Flow (mgd)
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
05/22/2020 01:00
05/22/2020 04:00
05/22/2020 07:00
05/22/2020 10:00
05/22/2020 13:00
05/22/2020 16:00
05/22/2020 19:00
05/22/2020 22:00



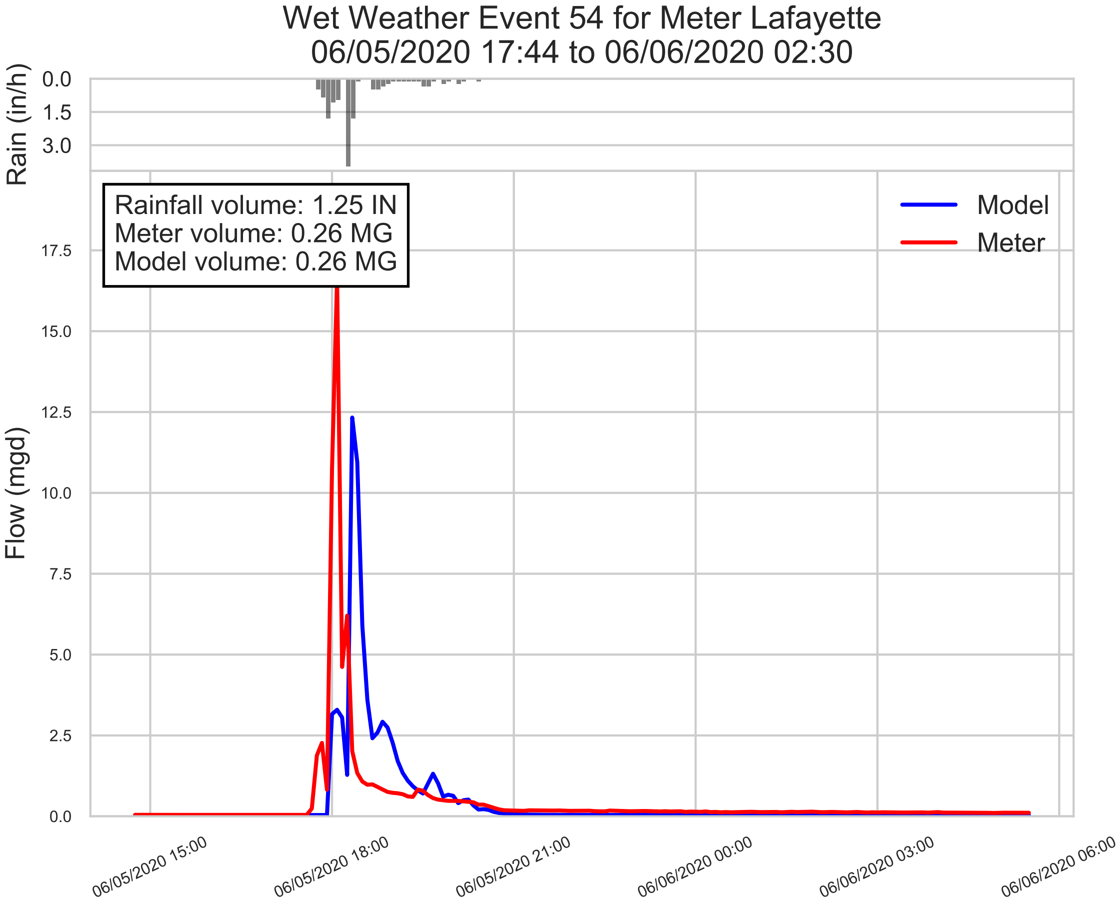
Wet Weather Event 51 for Meter Lafayette
05/23/2020 02:10 to 05/23/2020 10:20
Rain (in/h)
0.0
0.3
0.6
Rainfall volume: 0.19 IN
Meter volume: 0.03 MG
Model volume: 0.02 MG
Model
Meter
Flow (mgd)
0.5
0.4
0.3
0.2
0.1
0.0
05/23/2020 00:00
05/23/2020 03:00
05/23/2020 06:00
05/23/2020 09:00
05/23/2020 12:00

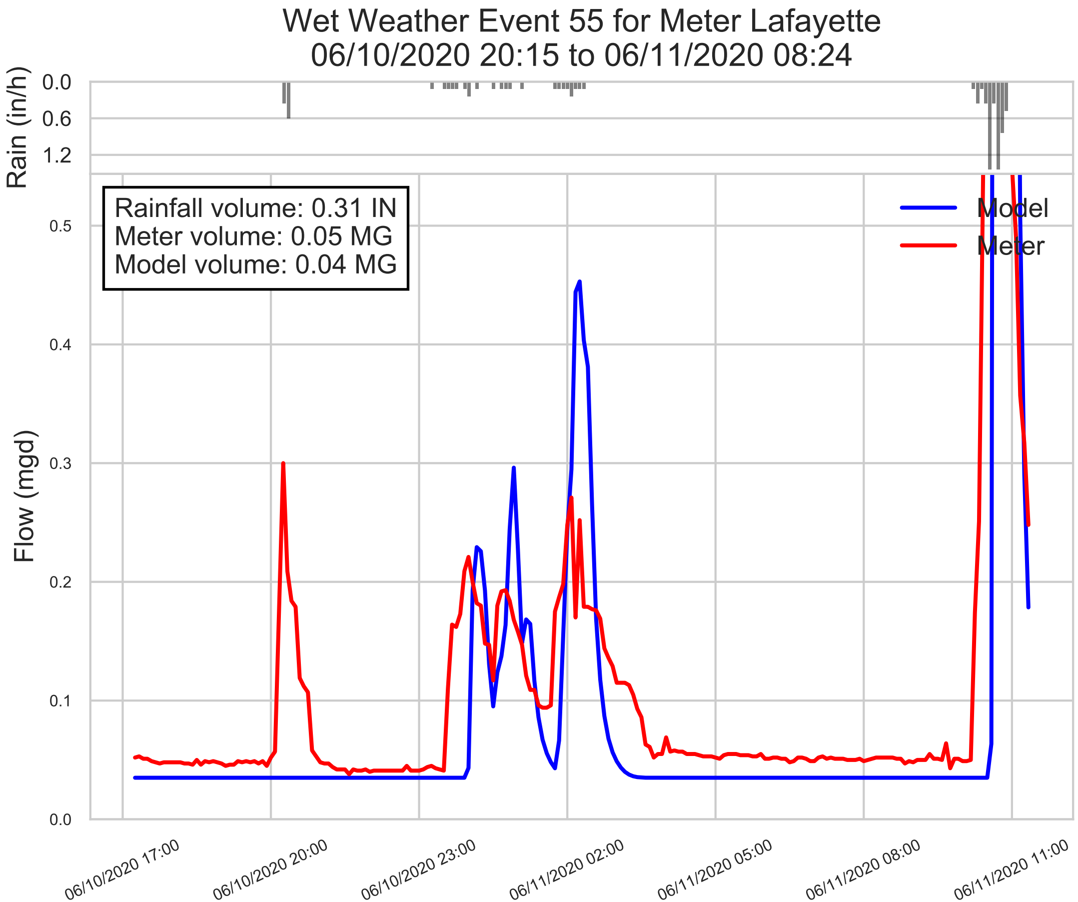


Wet Weather Event 52 for Meter Lafayette
05/28/2020 00:15 to 05/28/2020 19:59
Rain (in/h)
0.00
0.25
0.50
Rainfall volume: 0.19 IN
Meter volume: 0.04 MG
Model volume: 0.03 MG
Model
Meter
Flow (mgd)
0.25
0.20
0.15
0.10
0.05
0.00
05/27/2020 21:00
05/28/2020 00:00
05/28/2020 03:00
05/28/2020 06:00
05/28/2020 09:00
05/28/2020 12:00
05/28/2020 15:00
05/28/2020 18:00
05/28/2020 21:00
05/29/2020 00:00

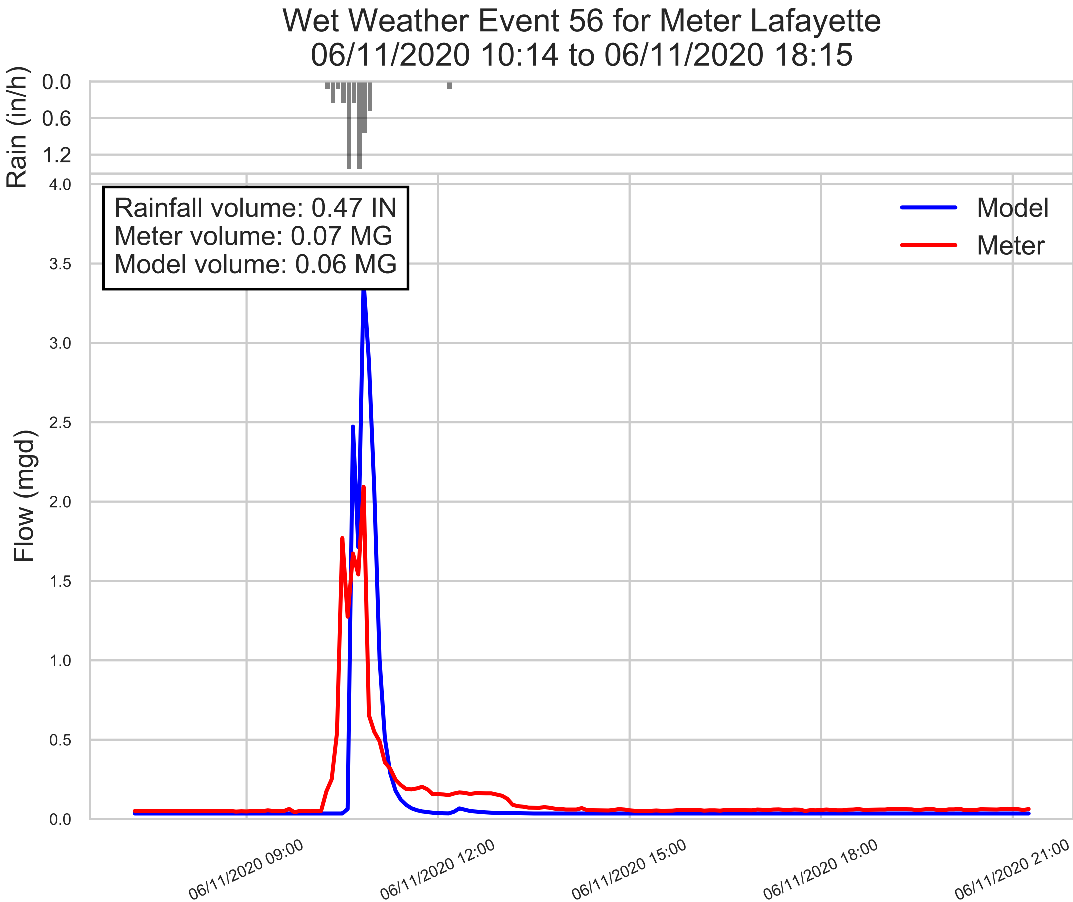


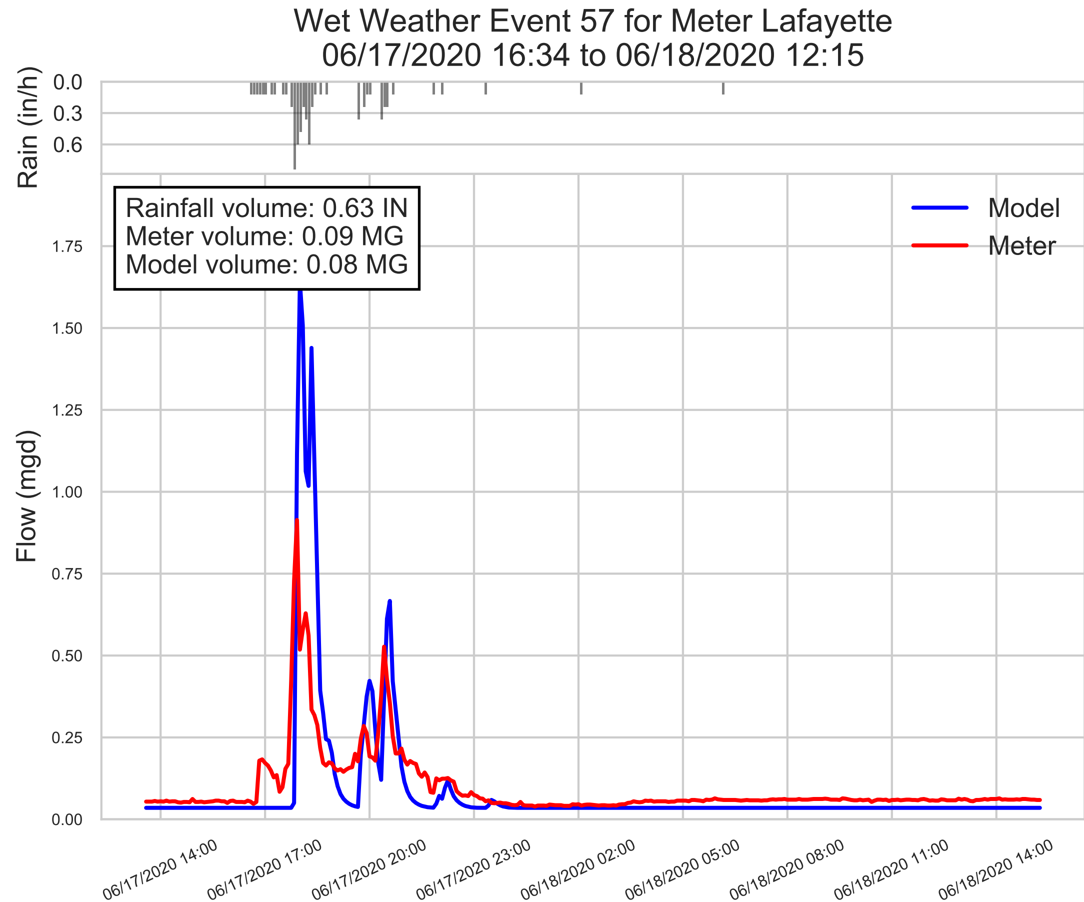
Wet Weather Event 53 for Meter Lafayette
06/04/2020 20:05 to 06/05/2020 08:10
Rain (in/h)
0.0
0.8
1.6
Rainfall volume: 1.94 IN
Meter volume: 0.27 MG
Model volume: 0.4 MG
Model
Meter
Flow (mgd)
0
1
2
3
4
5
6
7
8
06/04/2020 17:00
06/04/2020 20:00
06/04/2020 23:00
06/05/2020 02:00
06/05/2020 05:00
06/05/2020 08:00
06/05/2020 11:00


Wet Weather Event 54 for Meter Lafayette
06/05/2020 17:44 to 06/06/2020 02:30
Rain (in/h)
0.0
1.5
3.0
Rainfall volume: 1.25 IN
Meter volume: 0.26 MG
Model volume: 0.26 MG
Model
Meter
Flow (mgd)
17.5
15.0
12.5
10.0
7.5
5.0
2.5
0.0
06/05/2020 15:00
06/05/2020 18:00
06/05/2020 21:00
06/06/2020 00:00
06/06/2020 03:00
06/06/2020 06:00

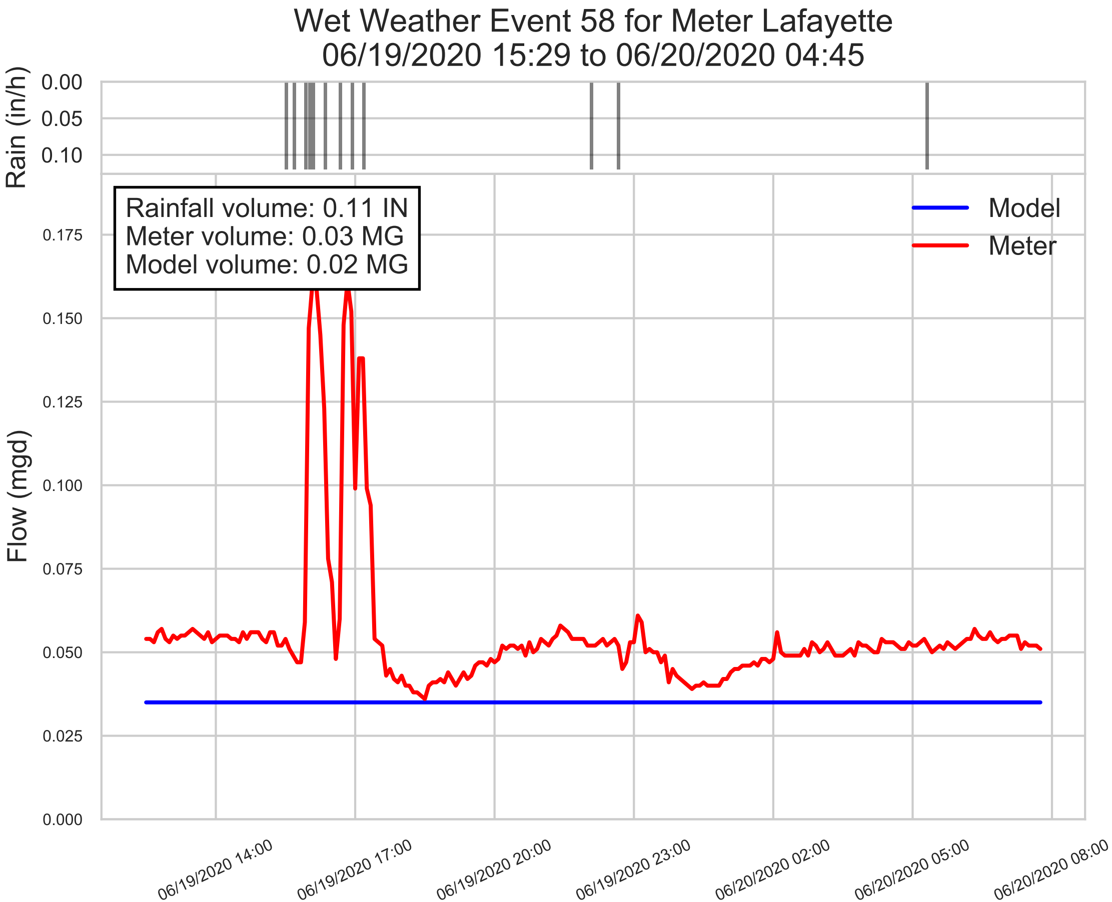


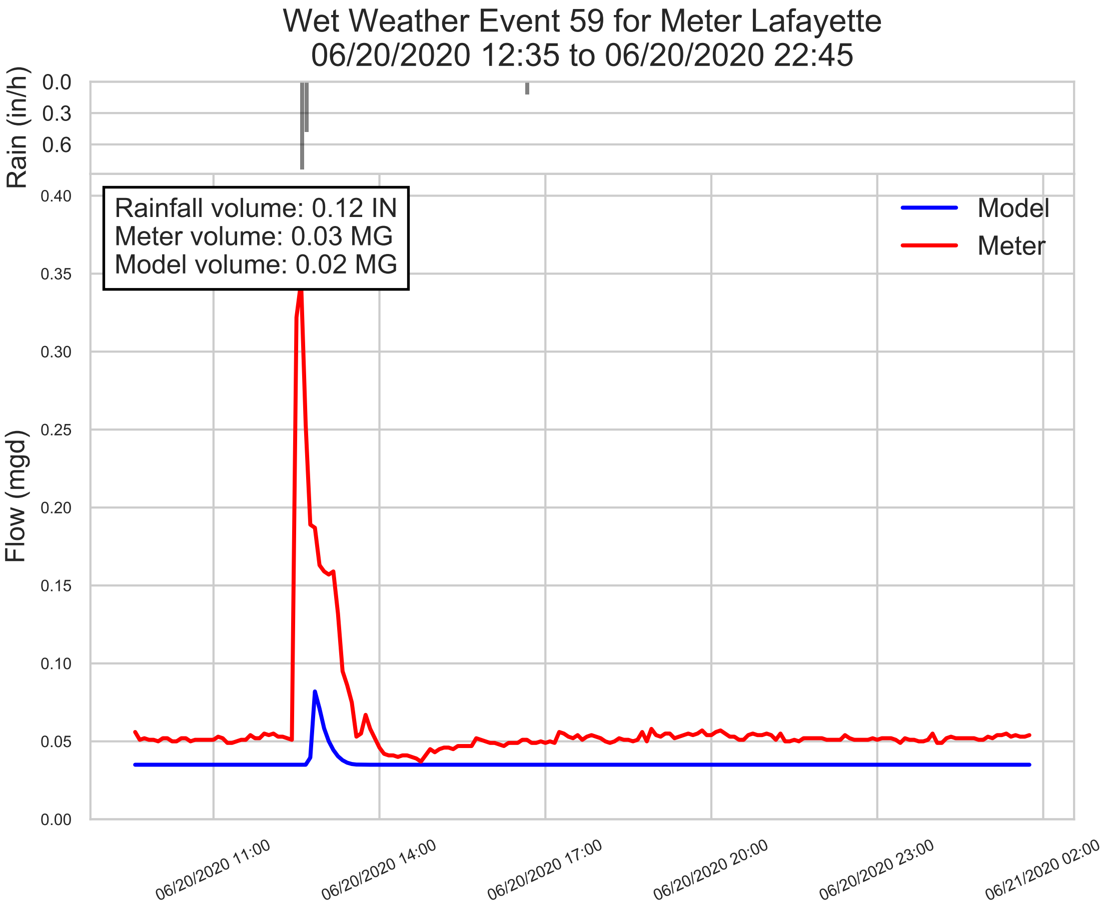
Wet Weather Event 55 for Meter Lafayette
06/10/2020 20:15 to 06/11/2020 08:24
Rain (in/h)
0.0
0.6
1.2
Rainfall volume: 0.31 IN
Meter volume: 0.05 MG
Model volume: 0.04 MG
Model
Meter
Flow (mgd)
0.5
0.4
0.3
0.2
0.1
0.0
06/10/2020 17:00
06/10/2020 20:00
06/10/2020 23:00
06/11/2020 02:00
06/11/2020 05:00
06/11/2020 08:00
06/11/2020 11:00


Wet Weather Event 56 for Meter Lafayette
06/11/2020 10:14 to 06/11/2020 18:15
Rain (in/h)
0.0
0.6
1.2
Rainfall volume: 0.47 IN
Meter volume: 0.07 MG
Model volume: 0.06 MG
Model
Meter
Flow (mgd)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
06/11/2020 09:00
06/11/2020 12:00
06/11/2020 15:00
06/11/2020 18:00
06/11/2020 21:00



Wet Weather Event 57 for Meter Lafayette
06/17/2020 16:34 to 06/18/2020 12:15
Rain (in/h)
0.0
0.3
0.6
Rainfall volume: 0.63 IN
Meter volume: 0.09 MG
Model volume: 0.08 MG
Model
Meter
Flow (mgd)
1.75
1.50
1.25
1.00
0.75
0.50
0.25
0.00
06/17/2020 14:00
06/17/2020 17:00
06/17/2020 20:00
06/17/2020 23:00
06/18/2020 02:00
06/18/2020 05:00
06/18/2020 08:00
06/18/2020 11:00
06/18/2020 14:00


Wet Weather Event 58 for Meter Lafayette
06/19/2020 15:29 to 06/20/2020 04:45
Rain (in/h)
0.00
0.05
0.10
Rainfall volume: 0.11 IN
Meter volume: 0.03 MG
Model volume: 0.02 MG
Model
Meter
Flow (mgd)
0.175
0.150
0.125
0.100
0.075
0.050
0.025
0.000
06/19/2020 14:00
06/19/2020 17:00
06/19/2020 20:00
06/19/2020 23:00
06/20/2020 02:00
06/20/2020 05:00
06/20/2020 08:00



Wet Weather Event 59 for Meter Lafayette
06/20/2020 12:35 to 06/20/2020 22:45
Rain (in/h)
0.0
0.3
0.6
Rainfall volume: 0.12 IN
Meter volume: 0.03 MG
Model volume: 0.02 MG
Model
Meter
Flow (mgd)
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
06/20/2020 11:00
06/20/2020 14:00
06/20/2020 17:00
06/20/2020 20:00
06/20/2020 23:00
06/21/2020 02:00

Wet Weather Event 60 for Meter Lafayette
06/27/2020 16:50 to 06/27/2020 23:19