INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
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Eric J. Holcomb
Governor

Brian C. Rockensuess
Commissioner

February 20, 2024

VIA ELECTRONIC MAIL

The Honorable Chris Jensen, Mayor
City of Noblesville
16 South 10th Street
Noblesville, Indiana 46060

Dear Mayor Jensen:

Re: Combined Sewer Overflow Program
Long Term Control Plan
Level of Control Review
City of Noblesville
NPDES Permit No. IN0020168
State Judicial Agreement No. 29D01-0709-MI-1056
Hamilton County

The City of Noblesville has completed all projects included in their approved Combined Sewer Overflow (CSO) Long Term Control Plan (LTCP) implementation schedule. The City also completed Post Construction Monitoring (PCM) and submitted a report dated February 2, 2024. Based on the findings in the report and discussions with Noblesville staff and their consultant, the Indiana Department of Environmental Management (IDEM) Office of Water Quality (OWQ) conducted a review of data included on CSO Monthly Report of Operation (MRO) forms to determine whether CSO discharges comply with the approved CSO LTCP level of control, which is to capture and provide full treatment to all flows at the Wastewater Treatment Plant (WWTP) from rain events up to and including the 10-year, 1-hour storm. The City of Noblesville has eight CSOs remaining in their collection system. The timeframe included in our review was from August 2022 through December 2023. The following findings were noted:

- Per the City's PCM report, the model indicated a potential for overflows at CSO 004 during rain events less than the 10-year, 1-hour storm. The City/consultant confirmed the model's findings based on data reported on the City's CSO MRO forms.

- During IDEM's CSO level of control review, CSO MRO forms indicated untreated CSO discharges occurred from CSO 004 only. Within the review period, there were six CSO discharge events from CSO 004. IDEM has determined CSO 004 discharges occurred below the approved CSO level of control.

Based on the information provided in the City of Noblesville's PCM report and data evaluated by IDEM, the agency has determined that the City's implemented CSO LTCP did not result in compliance with the approved CSO level of control associated with the LTCP. This letter is intended to notify the City of this inadequacy, which then activates the CSO Compliance Plan (CP) provision in Paragraph 10 of State Judicial Agreement No. 29D01-0709-MI-1056. The CSO CP must be submitted for IDEM review and approval within ninety (90) days from the date of this letter.

Please note that CSO level of control reviews by IDEM will be ongoing, and future compliance determinations will be conducted based on future data.

Please contact Kara Wendholt at 317-233-5961 or by email at kwendhol@idem.in.gov if you have questions regarding this letter. Thank you for your attention to this matter.

Sincerely,

Leigh Voss

Leigh Voss, Chief
Municipal NPDES Permits Section
Office of Water Quality

cc: Jonathan Mirgeaux, Utilities Director
Karrie Hutson, Assistant Director
Gene Stafford, Certified Operator
Lance Langer, CHA Consulting
Sierra Alberts, IDEM Office of Legal Counsel Attorney
Kim Rohr, IDEM Wastewater Inspections Section Chief

LONG-TERM CONTROL PLAN POST-CONSTRUCTION ANALYSIS

City of Noblesville
197 Washington Street,
Noblesville, Indiana

Project Site #
CHA Project Number: 070610.000

February 2, 2024

Prepared for:
City of Noblesville
197 Washington St
Noblesville, Indiana

Prepared by:
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1.0 BACKGROUND

As a part of the Combined Sewer Overflow (CSO) Long-Term Control Plan (LTCP), published June 2007; updated August 2008, the City of Noblesville (City), NPDES Permit #: IN0020168, has completed several phases of improvements. These improvements were made to help meet level of service requirements in compliance with the Agreed Judgment between the Indiana Department of Environmental Management (IDEM) and the City, approved September 13, 2007. The Agreed Judgment has been included in **Appendix A**. The purpose of this CSO Post-Construction Analysis is to document the update, calibration, and validation of the newly developed Infoworks ICM model and review the model to ensure that the level of service from recent improvements is met. The overall goal and geographical approach of LTCP improvements is to limit, transport, store, or treat the combined sewage generated during wet weather events and reduce number of CSOs. The following is a summary of the LTCP initiatives and phases accomplished thus far:

Phase I – WWTP Headworks Improvements: (Project duration 2006-2007 – Investment $10.73M)

Phase I involved the expansion of the preliminary treatment peak capacity from 15 million gallons per day (MGD) to 30 MGD, construction of a total of 1.0 million gallons (MG) of wet weather storage/equalization capacity and upsizing the combined sewer interceptors entering the plant through pipe bursting. The upsized interceptor sewers will allow for an increased wet weather flow rate to the Noblesville wastewater treatment plant (WWTP) and the 1.0 MG of flow storage/equalization capacity combined with the existing 0.45 MG of storage/equalization capacity will allow the facility to store and ultimately treat a greater volume of combined sewage during storm events. With these improvements, the plant has the capability to capture additional wet weather flow from the combined system and address future growth in the sanitary service area.

Phase II – WWTP Primary Treatment Improvements: (2007-2010 – Investment $22.79M)

The Phase II expansion has increased the primary treatment, secondary treatment, and disinfection capacity so that the WWTP can treat an average flow of 10 MGD and a peak hourly flow of 20 MGD. Upon completion of Phase II, half of the flow equalization tanks constructed in Phase I have been converted to primary clarifiers, thereby reducing the flow equalization tank volume by 0.5 MG (the WWTP will still have a total of 0.95 MG of flow equalization capacity). A UV disinfection facility was installed to replace gaseous chlorination as the disinfection process.

Phase III –Division 1 – East Region Relief Sewer: (2010-2011 – Investment $8.0M)

The Phase III of the City's LTCP improvements included capturing and conveying combined sewage into a new relief sewer system and installing adjacent stormwater systems. Three

stormwater systems ran parallel to the relief sewer with pipes ranging from 12 to 72 inches in diameter, new inlets, and best management practices (BMPs) for stormwater quality were added. Two stormwater systems discharge into the outfall sewers downstream of their associated diversion structure. One system was directed to the White River via a new cast-in-place headwall with a river flap gate and energy dissipation at the 72 inch discharge. The relief sewer is 36 to 72 inches in diameter, carrying 68 MGD. An alignment was selected along Maple Avenue to avoid impacting State Road 38.

Phase III – Division 2 – Central Region Storage: (2012-2017 – Investment $12.55M)

Conveyance of the captured CSO was installed to flow from outfalls 003 and 006 to a centralized storage unit with a river front alignment. The central conveyance was designed to consolidate CSO outfalls 003 and 006, resulting in the closure of CSO 006. New infrastructure includes sewers ranging in size from 36 to 60 inches in diameter and can convey a total flow of approximately 68 MGD.

Phase III – Division 3- Central Region Conveyance: (2014-2016 – Investment $4.6M)

As part of the city's CSO LTCP, the Central Region Conveyance relief sewer was installed to convey CSO flows from downtown to the city's CSO storage tank at the WWTP. Flows are conveyed through 2,900 feet of 60 inch piping along the White River from downtown Noblesville to the WWTP site.

Phase IV – North Region Sewer Separation: (2018-2022 – Investment $3.17M)

The north area was separated prior to the initiation of the LTCP with a portion of the original combined sewer area remaining. This phase included the completion of the sewer separation project.

Phase V – South Region Conveyance: (2021-2022 – Investment $3.9M)

Phase V of the City's LTCP project involved construction of a relief sewer for combined sewage, installation of a diversion structure, construction of the CSO 002 outfall sewer (now referred to as CSO 011), Sewer separation in a flood-prone area near the 10th street improvements, and an extension of storm sewer from Maple Ave to Conner Street.

The total cost for Phases 1-5 is $68.5 M over the course of the LTCP. **Table 1** summarizes the total investment made by the City on the LTCP improvements.

Table 1 – Cost Summary for the LTCP Improvements

LTCP Phase	Planning & Design	Construction, Inspection & Administration	Construction	Total
Phase 1 - Div 1	$881,206	$1,159,900	$6,521,220	$8,562,326
Phase 1 - Div 2	-	$83,100	$2,094,705	$2,177,805
Phase 2 - Div 1	$803,794	$1,740,000	$18,172,751	$20,716,545
Phase 2 - Div 2	$663,286	$1,417,970	-	$2,081,256
LTCP Document	$210,000	-	-	$210,000
LTCP Implementation	$840,400	-	-	$840,400
Phase 3 - Div 1	$515,300	$1,067,280	$6,422,892	$8,005,472
Phase 3 - Div 2	$32,000	$690,044	$11,827,268	$12,549,312
Phase 3 - Div 3	$146,960	$1,064,754	$3,379,568	$4,591,282
Phase 4	$247,235	$526,606	$2,392,566	$3,166,407
Phase 5	$410,470	$411,137	$3,080,012	$3,901,619
Post-Construction Monitoring	$183,000	-	$1,534,502	$1,717,502
Total	**$4,933,651**	**$8,160,791**	**$55,425,484**	**$68,519,926**

To support the effectiveness of the recently completed LTCP improvements, CHA updated and analyzed the City's hydraulic model. This was done using Innovyze/Autodesk's Infoworks ICM to reflect recent construction of the combined sewer system and calibrating the model against field data to assess LTCP improvements and review if the level of service from LTCP modifications is sufficient. To complete these tasks, the model was calibrated for both dry weather and wet weather events, validated against separate wet weather events, and then reviewed against the results of a theoretical 10-year 1-hour storm event to determine whether the level of service is met throughout the system. The system was then analyzed for deficiencies. This Report presents an overview of these processes and their results.

2.0 METHODOLOGY

To support the objective of post-construction monitoring analysis, the following methodologies were applied.

Pre-Construction Model Review:

- Review the pre-construction model provided to determine the state of the system prior to LTCP improvements
- Determine where deficiencies existed prior to construction to confirm that level of service is met in the updated and calibrated model

Model Development:

- Use a combination of LTCP As-builts and updated City GIS data to establish and build a physical pipe network
- For this project, gravity sewer was not included in the model
- Using elevation data along with storm/combined sewer GIS data, sub-catchments were developed for each respective CSO basin
- With flow data from the WWTP headworks, develop an hourly diurnal for the average dry weather day
    - The average dry weather day was determined in the range of August 2022 to September 2023
    - A minimum of two (2) antecedent dry days were required for consideration to ensure no storm water was still present in the system
- Based on the average daily dry weather flows, determine the baseline wastewater generation for the system
- Distribute the wastewater generation based on known generation from Sly Run and Stoney Creek
    - Split up the remaining generation based on an estimated number of parcels in each section of the system
    - Wastewater generation was applied to the furthest upstream node for each section to emulate the worst-case conditions
- Calibrate the updated model using the average dry weather flows at each CSO and the WWTP headworks
    - Diurnals were created from the average hourly flow from the WWTP diurnal.
    - These were calculated using the average flow at each hour of the day across a year of data to determine the “typical” dry weather day
    - Calibration criteria of 20% or 0.01 MG or 1 inch, or 0.1 MGD for dry weather
- Determine wet weather calibration events
    - Use data from ADS Prism after March 16th, 2022, to calibrate to post-construction performance
    - Select two (2) days for calibration ranging in storm size from 3-month to 2-year
    - Select two (2) days for validation ranging in storm size from 3-month to 2-year
- Calibrate the model using selected rain events
    - Calibration criteria of 20% or 0.5 MG or 6 inches, or 1 MGD
- Validate the calibrated model against the other two (2) rain events

<u>Level of Service Review:</u>

- Run the calibrated and validated model against a synthetic 10-year, 1-hour Huff storm per IDEM CSO Policy as directed by 327 IAC 15- 13 (Rule 13)
- Evaluate the results of the model for system performance
    - Check for overflows at any CSOs
    - Check for flooding or significant surcharging throughout the system
    - Determine if the newly constructed central storage is adequate
- Determine where level of service is not met in the system

3.0 MODEL DEVELOPMENT

The development of the model consisted of several steps: data collection, review of the pre-construction model, model update, calibration, and validation.

3.1 Data Collection

Prior to development of the model several primary data sources were identified:

1) GIS and Combined Sewer Overflow Operational Plan (CSOOP) information
2) Flow monitoring and (ADS) Rain gauge precipitation data via ADS Prism
3) Record drawings from each phase of the LTCP improvements
4) WWTP Headworks flow data provided by the City
5) CSO Daily Monitoring Reports (DMRs)
6) WWTP Monthly Reports of Operation (MROs)

Table 2 presents a summary of model parameters and associated data sources. Most hydraulic and hydrologic parameters in the Infoworks model were derived from the city's GIS, which was received on March 15, 2023.

Table 2 – Parameter Source Summary

Parameter/elements Source Summary		
Parameter Type	**SWMM Parameter**	**Source**
Hydraulic	Pipe Length	GIS, SWMM Model, as-builts
	Pipe Size	
	Manhole Inverts	
	Manhole Depth	
	Weir Height	
	Weir Length	
	WWTP Capacity	2023 CA
	WWTP Operation	
Hydrologic	Basin Acreage	ArcGIS Pro, Hamilton County Topo Data, SWMM Model
	Basin Slope	
	Basin Width	
	DCIA (% Imp)	
	Depression Storage	
	Soil Infiltration	USDA Soil Survey

3.2 Review of Pre-Construction Model

Before updating the model, EPA SWMM 5.0 copies of the pre-construction model from 2007 and a partially updated but not calibrated model from 2021 were transmitted to CHA. The pre-construction model was used to determine the level of service prior to LTCP improvements while the partially updated model was used as a basis to perform the model update. Due to a lack of available flow monitoring data and limited information when the pre-construction model was developed, the sanitary system was set forth in minimal detail. Sly Run, Stony Creek, and the Northwest Interceptor are represented through simplified means and do not reflect the actual infrastructure in those areas. **Figures 1** and **2** present the extents of the Noblesville pre-construction SWMM model and the partially updated SWMM model respectively.

The review of the pre-construction model reinforced the need for the LTCP improvements and the reasoning behind this construction. There were several primary goals for the LTCP improvements denoted by deficiencies within the level of service of the pre-construction model. These goals include the addition of central storage to handle large storm events, diversion of CSO 007 and 008 flows to a new sewer main along Maple Ave that leads to the new central storage to prevent overflows, the closure of CSO 006 and diversion of those flows to CSO 003A, partial storm sewer separation in the southern region and construction of a new diversion structure (CSO 011) to replace CSO 002, the connection of the southern region to the new central storage to prevent overflows at CSO 011, among other various general system-wide improvements.

To evaluate the post-construction system, it was determined that the model should be converted to a more modern and robust software system to get a more accurate analysis and prepare the model for expansion in the future. An evaluation was completed on various combined sewer modeling software, and it was recommended that the City of Noblesville move forward with Infoworks ICM. This was due to its wide range of functionalities, especially when it comes to more complex systems as the model will be expanded in the future to include the entirety of the combined sewer system. The full software analysis details can be found in **Appendix B**. CHA converted the hydraulic model from EPA SWMM to Infoworks ICM to be used as a baseline of the City's system for the update.

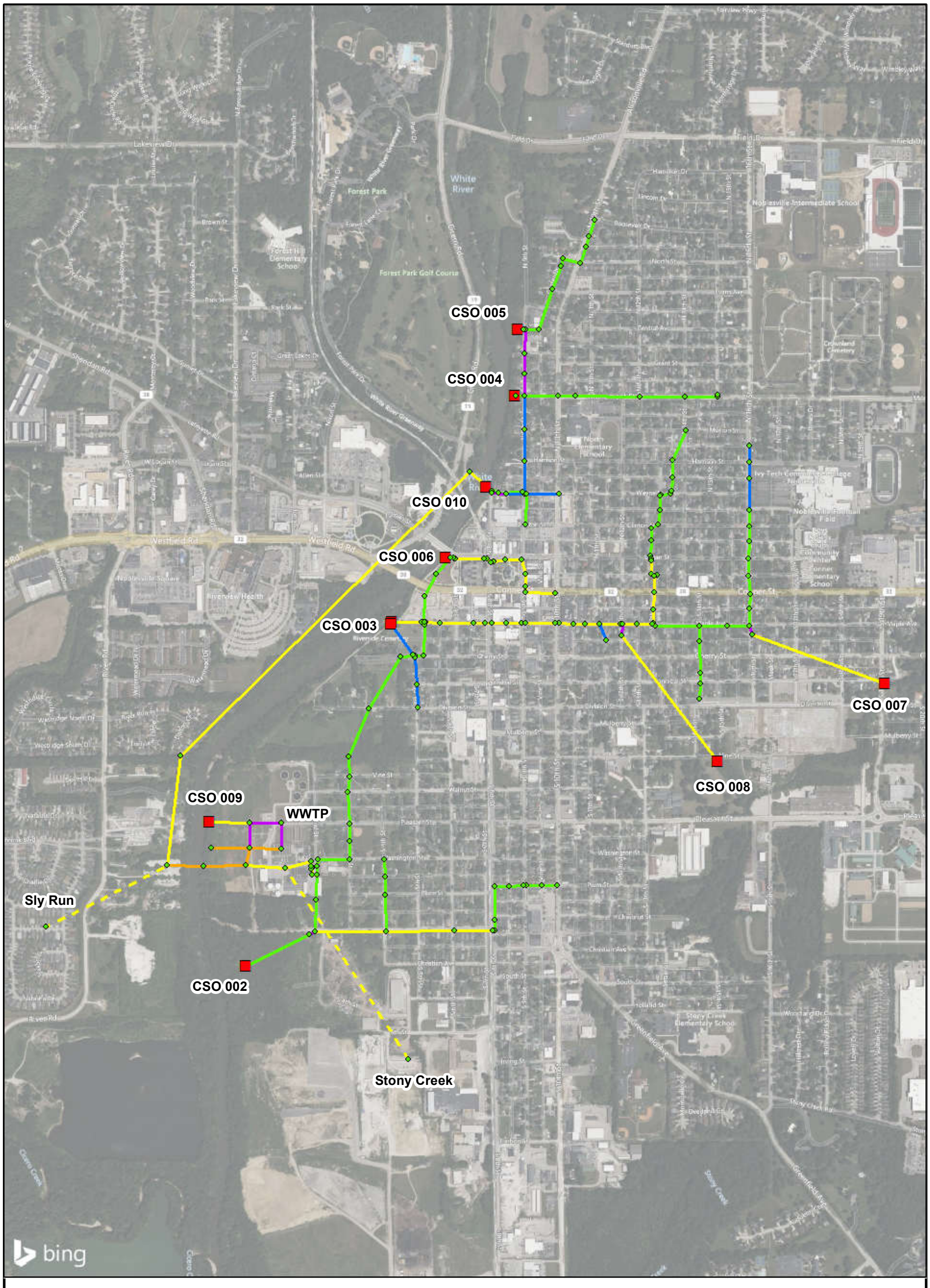
3.3 Model Update

Prior to the review of the model, it is important that the infrastructure is up-to-date and accurate. A model update was performed using the previous EPA SWMM model, GIS data provided by the City, and as-builts from each construction phase of the LTCP.

The primary focus for these updates includes the addition of new portions of the system in the northern region, invert elevation adjustments as needed based on the latest GIS data and as-built information, diversion structure updates, and updates to the central storage at the WWTP. During

this process, the sub-catchment areas for routing rainfall were updated using a mixture of elevation data and the locations of combined and storm sewer that flow to the WWTP.

A system overview from the updated model is shown in **Figure 3a** and includes the updated sub-catchment areas with their associated CSO outfall. **Figure 3b** includes a system overview with associated pipe diameters.



N
W E
S

0 625 1,250 2,500
Feet

LEGEND

- Manholes
- CSO Outfalls

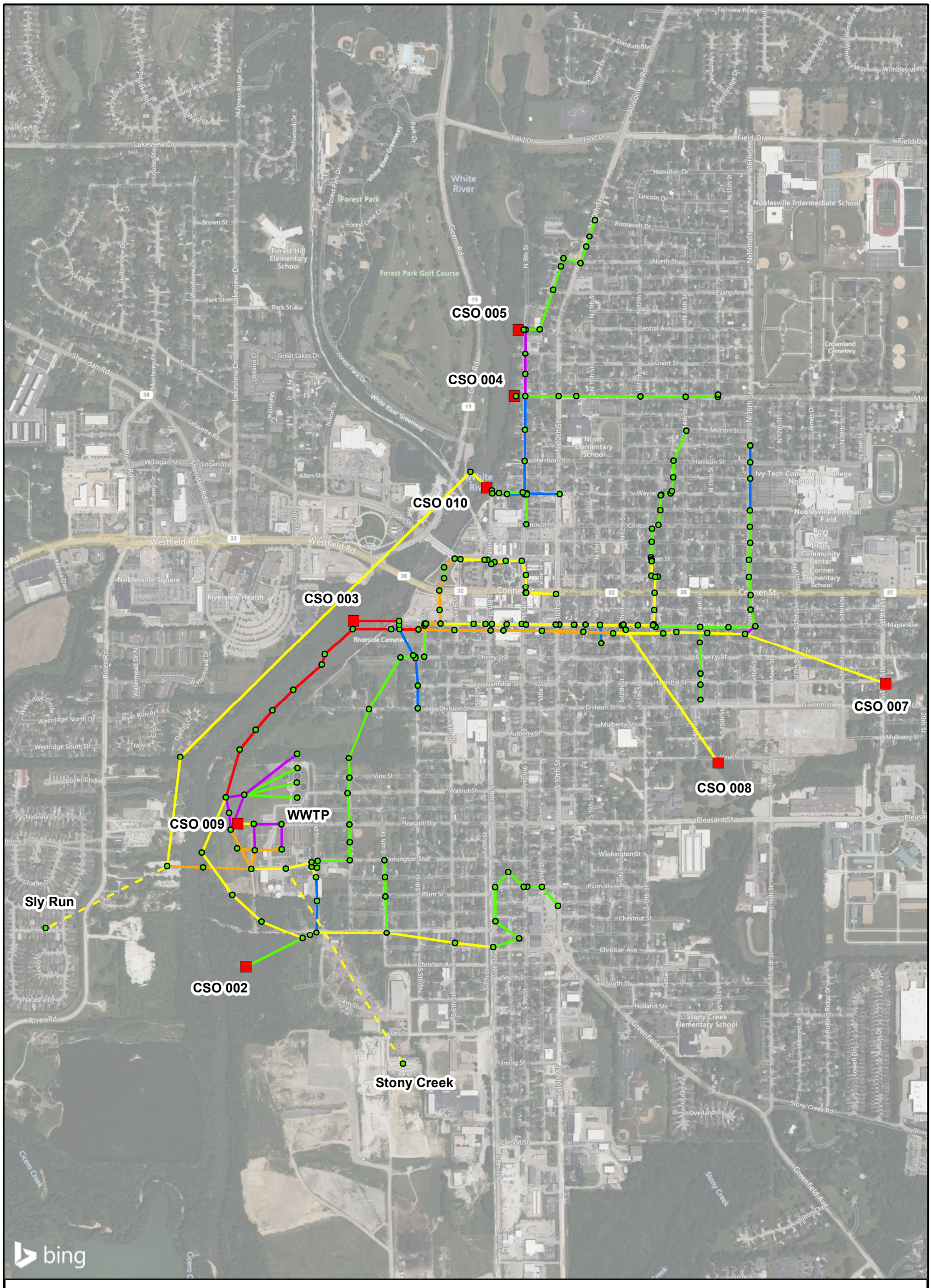
Diameter

- <12 inch
- 12-16 inch
- 16-24 inch
- 24-36 inch
- 36-48 inch
- >48 inch
- Sewer Pipe Representation

CITY OF NOBLESVILLE
LONG-TERM CONTROL PLAN POST-CONSTRUCTION MODELING
PRE-CONSTRUCTION MODEL OVERVIEW

FIGURE 1

V:\Projects\ANY\K6\070610.000\06_Project_Data\GIS\MXDs\Figure 1 - Pre-Construction Model.mxd



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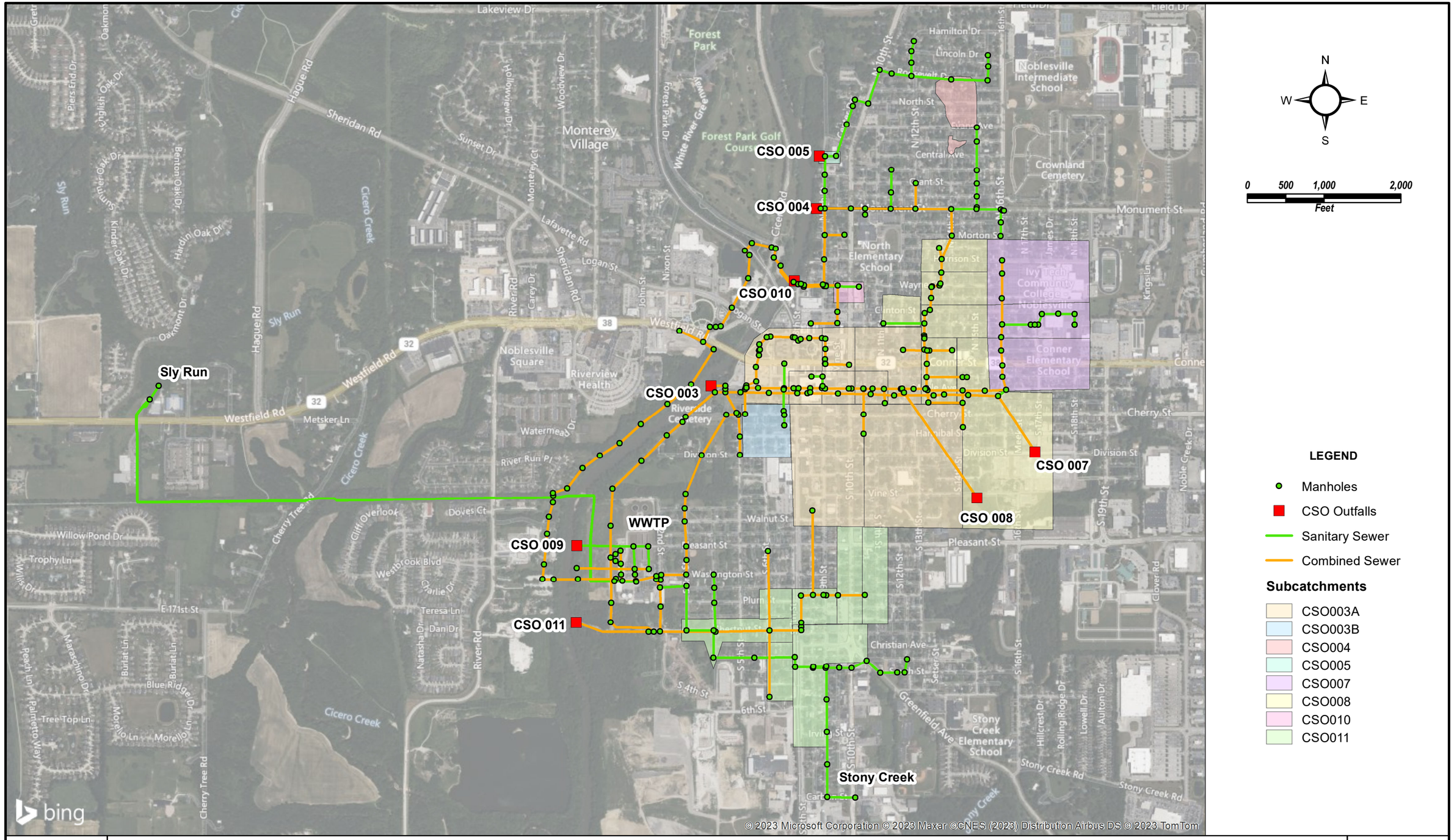
CITY OF NOBLESVILLE
LONG-TERM CONTROL PLAN POST-CONSTRUCTION MODELING
PRE-UPDATE MODEL OVERVIEW

FIGURE 2

V:\Projects\ANY\K6\070610.000\06_Project_Data\GIS\MXDs\Figure 2 - Pre-Update Model.mxd

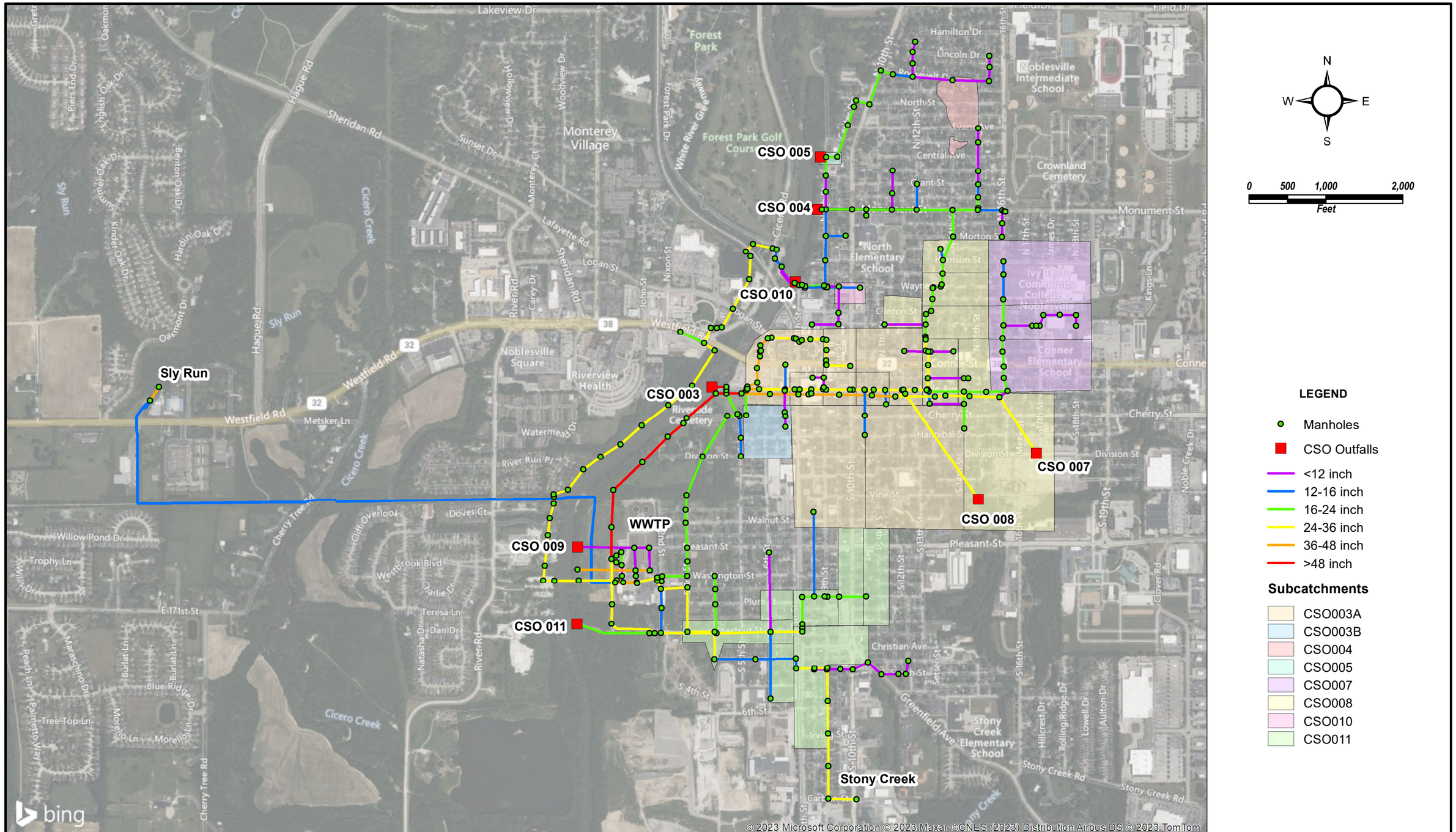


CITY OF NOBLESVILLE
LONG-TERM CONTROL PLAN POST-CONSTRUCTION MODELING

POST-CONSTRUCTION MODEL OVERVIEW

FIGURE 3a

V:\Projects\ANY\K6\070610.000\06_Project_Data\GIS\MXDs\Figure 3a - Post-Construction_Model_Overview.mxd



CITY OF NOBLESVILLE
LONG-TERM CONTROL PLAN POST-CONSTRUCTION MODELING

POST-CONSTRUCTION MODEL OVERVIEW DIAMETER DISTRIBUTION

FIGURE 3b

V:\Projects\ANY\K6\070610.000\06_Project_Data\GIS\MXDs\Figure 3b - Post-Construction_Model_Overview_Diameters.mxd

4.0 CALIBRATION AND VALIDATION

4.1 Calibration Criteria

When evaluating the updated hydraulic model, accuracy of modeling results is important in determining the efficacy of current system operations and proposed improvements. To ensure that the model is accurate, it undergoes a calibration and validation process where modeling parameters such as impervious area and pipe roughness are modified to align model results with field results. This process, while able to model field conditions well, has nuances that occur in the field. To this end, a list of criteria must be developed that allows room for error. If the modeling results are within these criteria, the model can then be deemed calibrated. **Table 3** details the criteria used for the dry weather and wet weather calibration of this hydraulic model.

Table 3 – Calibration Criteria

Scenario	Peak Depth	Peak Flow	Volume
Dry Weather	1 inch or 20%	0.1 MGD or 20%	0.01 MG or 20%
Wet Weather	6 inches or 20%	1 MGD or 20%	0.5 MG or 20%

4.2 Dry Weather Calibration

Following the model update, the model must be calibrated before being used in analyses to ensure the accuracy of the model results for both dry weather events (wastewater only) and wet weather events (storm events). The model needs to first be calibrated during dry conditions to ensure that there is a solid baseline for the system operations prior to the storm events.

The dry weather data was compiled based on the average flows and depths at the headworks as well as each individual CSO from January 1st, 2023, to May 31st, 2023. The average flow at the headworks of the WWTP and each individual CSO is presented in **Table 4**.

Table 4 – Average Daily Flow, Dry Weather

Location	Average Daily Flow (MGD)
Headworks	8.233
CSO 003A	0.192
CSO 003B	0.053
CSO 004	0.057
CSO 005	0.029
CSO 007	0.020
CSO 008	0.152
CSO 009	0.000
CSO 010	0.005
CSO 011	0.007

Figures 4A, 4B, and **4C** present the overall calibration scatter plot for peak depth, peak flow, and total event volume respectively. Individual calibration charts are presented in **Appendix C**. As shown in the figures, the dry weather calibration is adequate, with the model results within the previously mentioned criteria of the reliable flow monitoring data.

Figure 4A – Dry Weather Peak Depth Summary

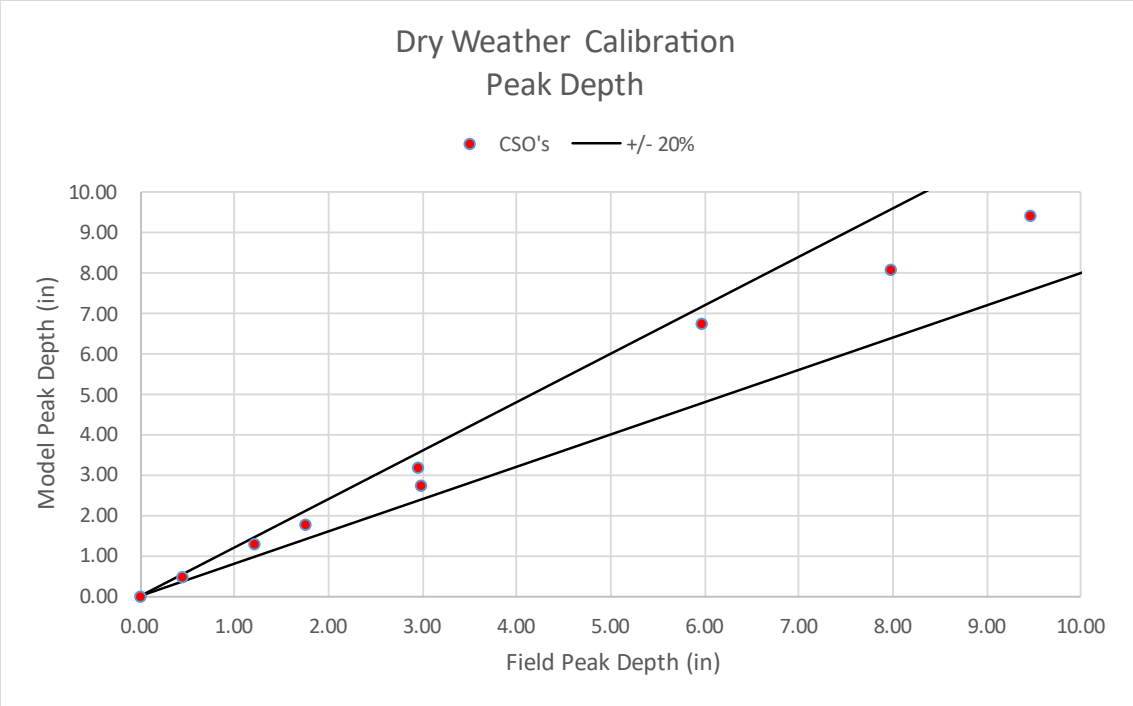


Figure 4B – Dry Weather Peak Flow Summary

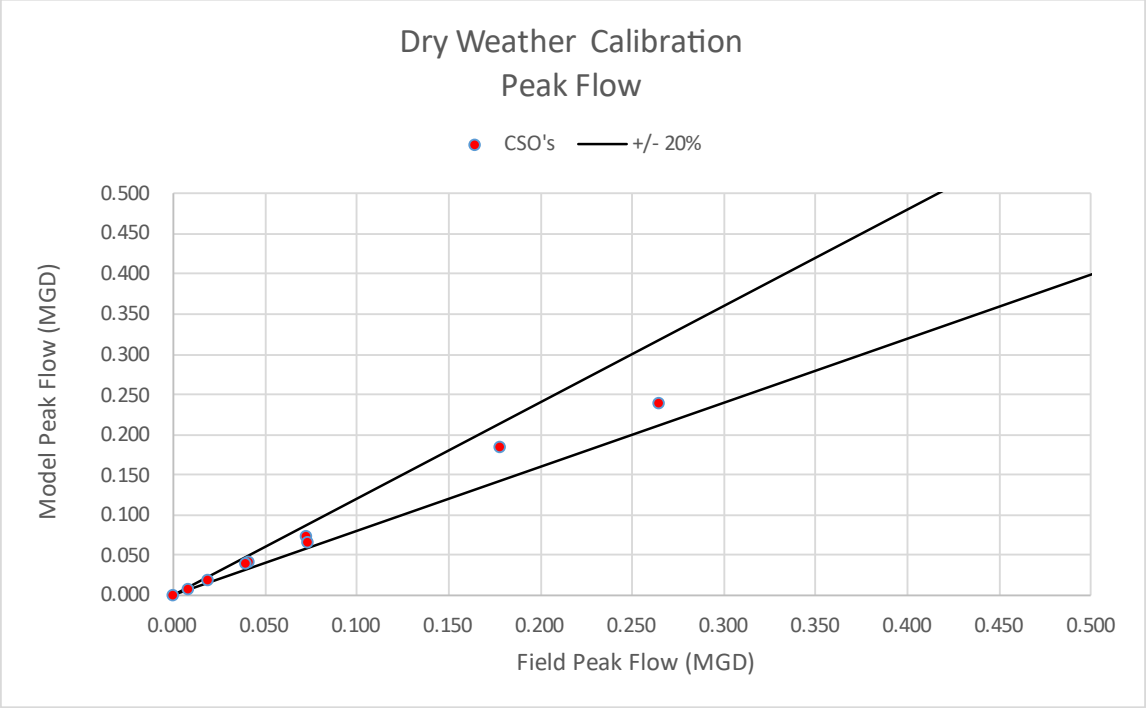
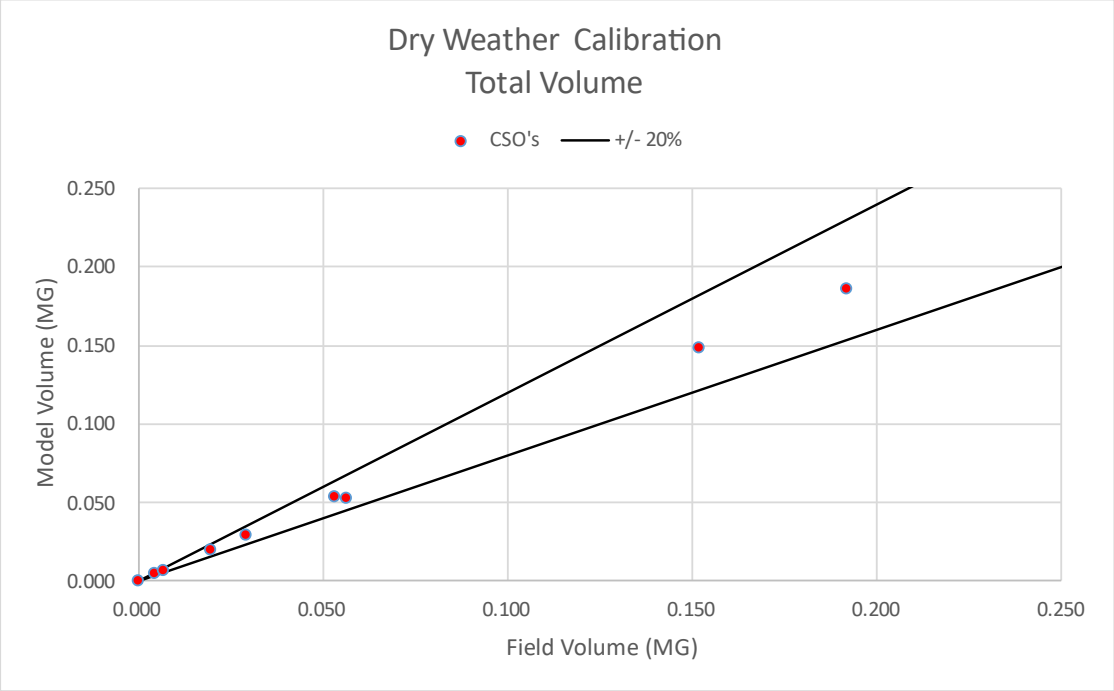


Figure 4C – Dry Weather Total Volume Summary



4.3 Wet Weather Calibration and Validation

Following the dry weather calibration, rain events are modeled to ensure accuracy during storm events. For model calibration with wet weather events, typically, flow depth is deemed to be the most accurate parameter since velocity measurements used in determining flows (and therefore volumes) are more volatile with the time increments that measurements are taken. Overflow data is the least accurate parameter as the measurements are discontinuous. The calibration is considered effective if there is an acceptable range for flow depth and peak flow in the upstream or capture pipe. For this system, the flow monitors reside in the upstream pipe for all CSOs, other than CSO 004 and CSO 008 where it resides in the capture pipe of the regulator structure.

The wet weather events were determined using rainfall data from the rain gauge located at the WWTP. Two major system changes occurred that were used as cutoffs for determining possible rain events. The first event was the completion of the LTCP construction in July 2022 and the second being a large root/obstruction removal in a pipe upstream of CSO 004 on March 16th, 2023. Ideally the rain events would be after the root removal with a classification of at least a 3-month storm based on intensity and duration. When possible, it is also important to select events with at least two antecedent dry days, days since the last rainfall, to ensure there is no remnants of stormwater in the system that will affect the modeling results. Lastly, while helpful but not necessary, having a large rain event with another rain event following it, a two-day storm, aids in determining if the model accurately represents back-to-back storms and not just individual events. A breakdown of the results of this analysis and selection process is shown in **Table 5** below.

Table 5 – Wet Weather Calibration Days – Pre/Post Obstruction Removal (+/- March 16th)

Date	WW Flow (MGD)	Total Precipitation (in)	Duration (hrs)	Classification	Antecedent Dry Days
7/17/2022	10.66	0.46	3.00	< 2-month	0
		0.47	1.50	< 2-month	
		1.5	3.50	9-month	
7/27/2022	9.18	0.95	1.00	6-month	0
		0.16	15 min	< 2-month	
8/9/2022[2]	**8.42**	**0.8**	**1.00**	**4-month**	**0**
		0.23	1.00	< 2-month	
8/29/2022	7.35	0.25	30 min	< 2-month	7
		0.15	30 min	< 2-month	
		0.85	1.50	3-month	
9/10/2022[1]	**9.67**	**1.9**	**3.00**	**2-year**	**4**
9/11/2022[1]	**12.73**	**1.67**	**4.50**	**1-year**	**0**
10/25/2022	7.17	0.63	3.00	< 2-month	6
11/27/2022	7.41	0.63	2.00	< 2-month	0
		0.14	1.50	< 2-month	
12/14/2022	7.62	0.19	2.00	< 2-month	3
		0.18	2.00	< 2-month	
		0.29	4.00	< 2-month	
12/30/2022	10.56	0.15	1.00	< 2-month	6
		0.74	8.00	< 2-month	
1/3/2023	7.11	0.58	6.00	< 2-month	1
1/12/2023	7.79	0.37	3.00	< 2-month	5
		0.24	4.00	< 2-month	
1/18/2023	7.76	0.65	6.00	< 2-month	1
1/25/2023	7.18	0.73	12.00	< 2-month	1
2/9/2023	8.27	0.62	4.00	< 2-month	0
2/22/2023	7.2	0.47	2.50	< 2-month	5
3/3/2023	*15.46*	*1.87*	*12.00*	*9-month*	*6*
3/24/2023	10.73	0.42	3.00	< 2-month	0
		0.26	2.50	< 2-month	
3/31/2023	10.8	0.22	4.00	< 2-month	3
		0.1	15 min	< 2-month	
		0.32	1.00	< 2-month	
4/5/2023	9.97	0.66	3.00	< 2-month	3
4/28/2023	8.34	0.54	6.00	< 2-month	5
5/7/2023	8.06	0.42	3.00	< 2-month	5
5/19/2023	9.87	0.49	2.00	< 2-month	2
6/11/2023		0.54	8.00	< 2-month	21
6/26/2023		0.45	30 min	< 2-month	0
7/1/2023	7.4	0.14	1.50	< 2-month	0
		0.37	1.00	< 2-month	
7/8/2023[2]	**8.6**	**0.99**	**2.50**	**3-month**	**2**
8/9/2023[1]	**9.15**	**1.54**	**5.00**	**9-month**	**1**

[1] Calibration Event

[2] Validation Event

From **Table 5** we can see that the selected rain events for calibration are 08/09/2023, a 9-month storm, and a back-to-back storm event from 09/10/2022-09/11/2022, a 2-year and 1-year storm respectively. The validation events selected were 08/09/2022, a 4-month storm, and 07/08/2023, a 3-month storm. The other storm events with a sufficient intensity and duration were 07/17/2022, a 9-month event, 07/27/2022, a 6-month event, and 03/03/2023, a 9-month event, but were not selected due to high WWTP flows that may indicate abnormal conditions.

As an overview of the calibration and validation process, the results at each CSO were averaged across all four events to give an overall idea of the accuracy of the calibration and validation process. This helps to show where the calibration results lie on average since certain events may results in slightly larger skews one way or another or may include the presence of outliers. The summary of these results is presented in **Figures 5A, 5B,** and **5C** below for peak depth, peak flow, and total volume.

Figure 5A – Wet Weather Average Peak Depth Summary

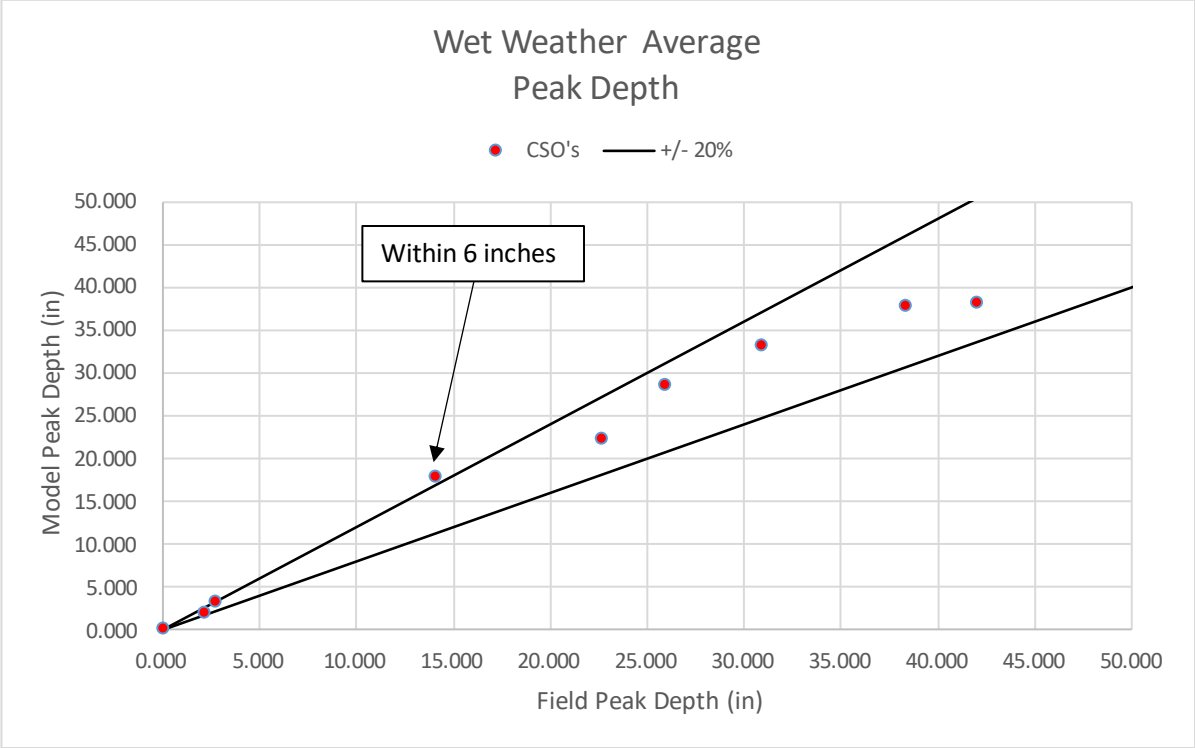


Figure 5B – Wet Weather Average Peak Flow Summary

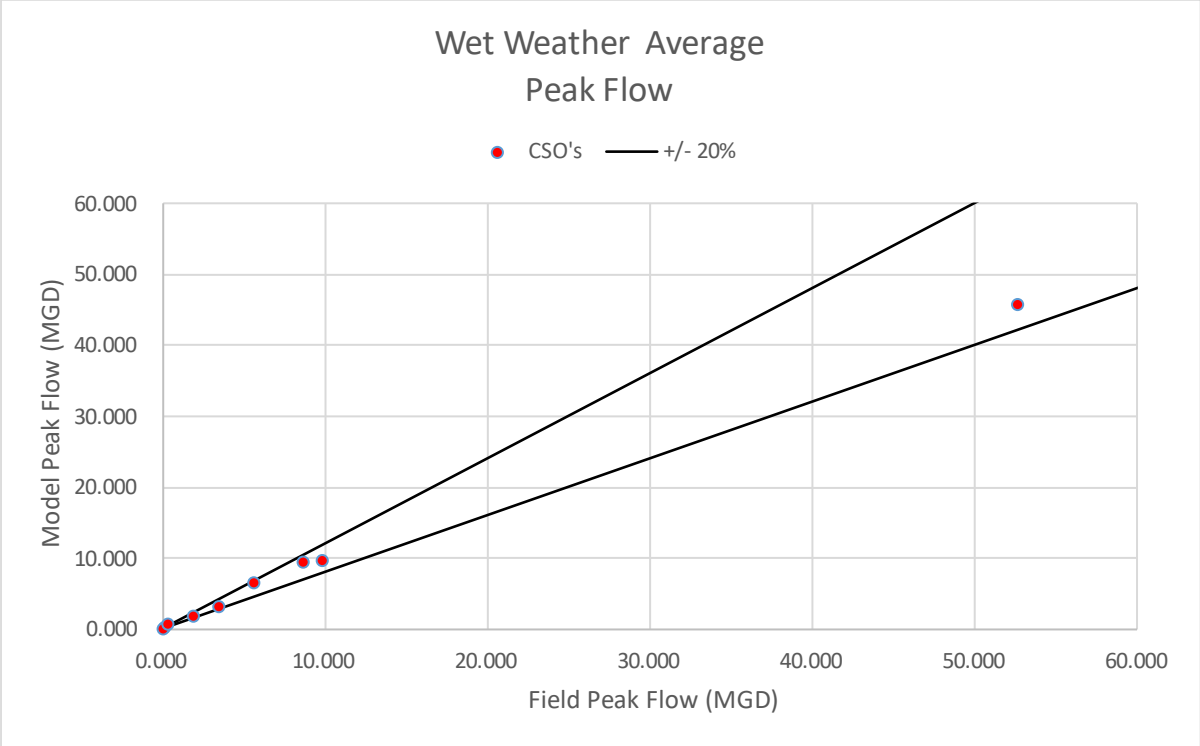
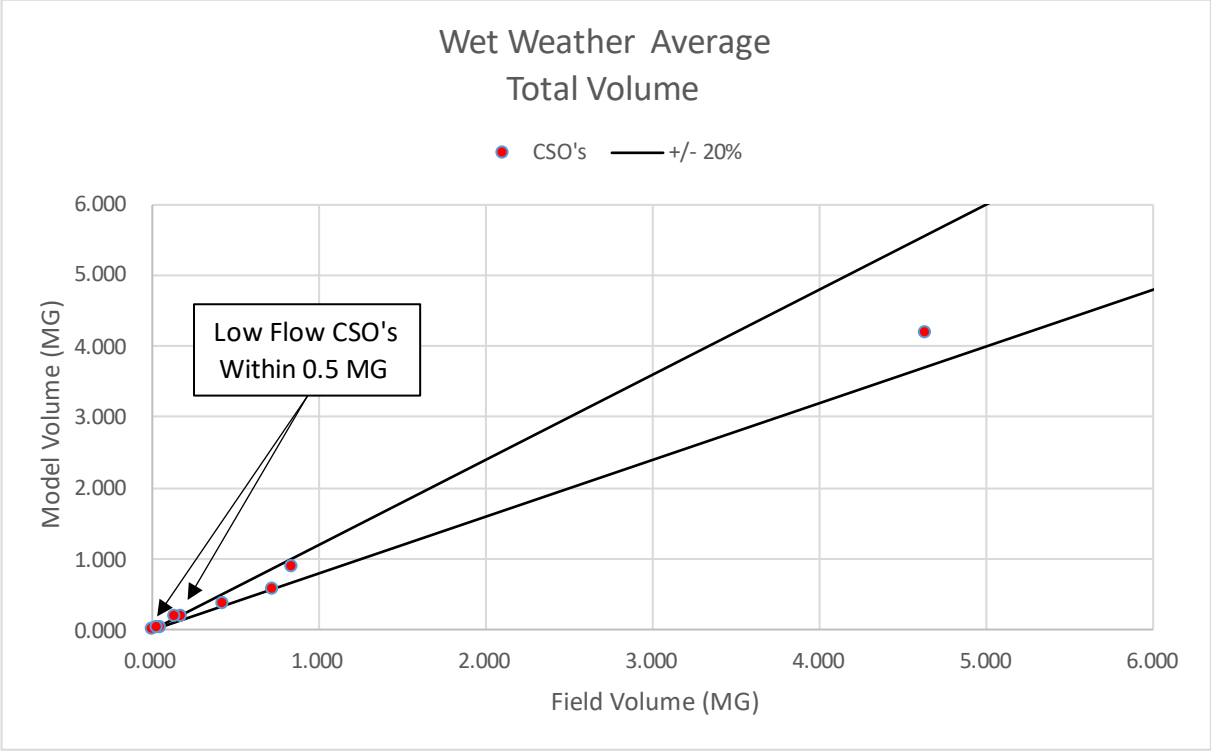


Figure 5C – Wet Weather Average Total Volume Summary



4.4 Wet Weather Calibration

As mentioned, two events were selected for model calibration based on the criteria presented in the previous section: August 9th, 2023, and September 10th, 2022.

The August 9th, 2023, event was a 9-month storm with an approximate duration of 5 hours anteceded by approximately 1 day of dry weather. After initial sub-catchment areas and percent imperviousness were developed, the calibration of this event was completed by making successive adjustments to model parameters such as the total imperviousness of each sub-catchment area, infiltration rates, area roughness, pipe roughness and storage depths for pervious and impervious surfaces. **Figures 6A, 6B,** and **6C** present the overall calibration scatter plot for peak depth, peak flow, and total event volume respectively for the August 9th, 2023, calibration event. In **Figure 6C** there was an uncertainty in monitoring data at CSO 003A where the peak depths and flows were abnormally going up and down consistently over a short period of time and the other CSOs did not have the same pattern and were within the criteria for calibration and validation. It is recommended to check the recording device for any issues and determine if re-calibration is necessary and to investigate the weir wall and screen within the diversion structure for any potential issues. **Appendix D** contains individual calibration charts for the August 9, 2023, event.

Figure 6A – Wet Weather Calibration Day 1 Peak Depth Summary

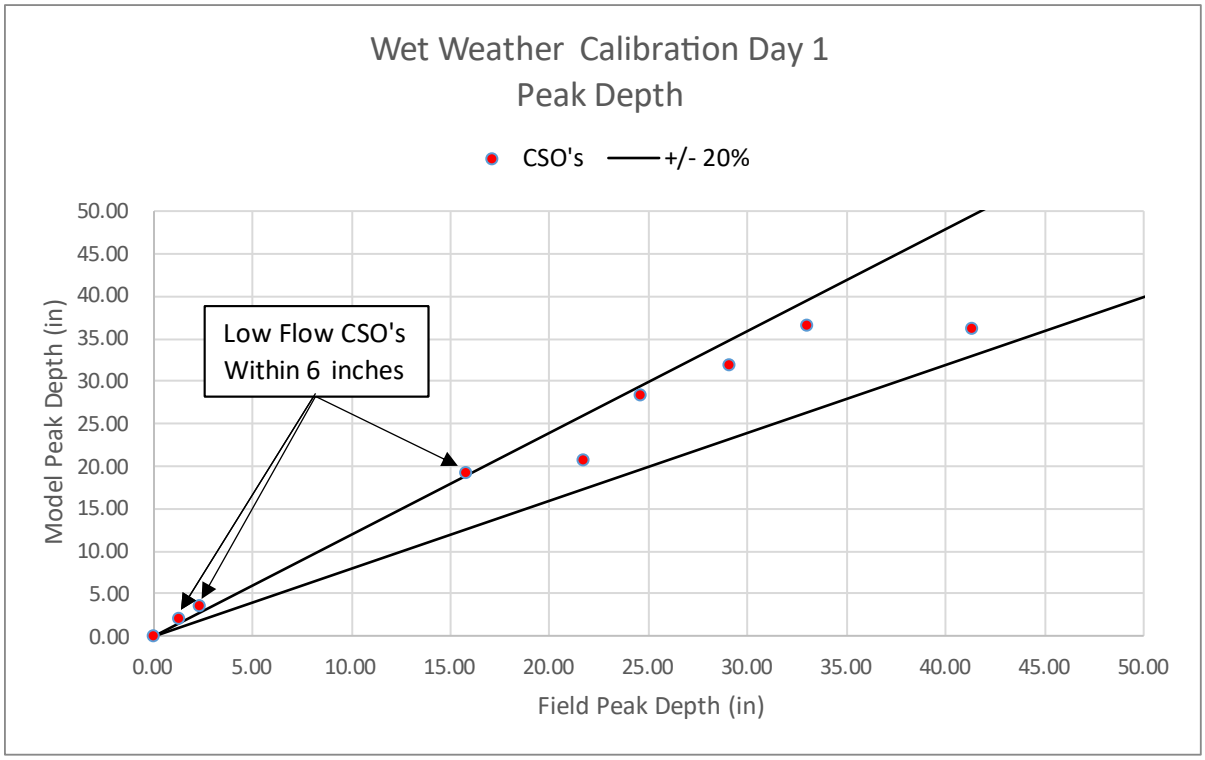


Figure 6B – Wet Weather Calibration Day 1 Peak Flow Summary

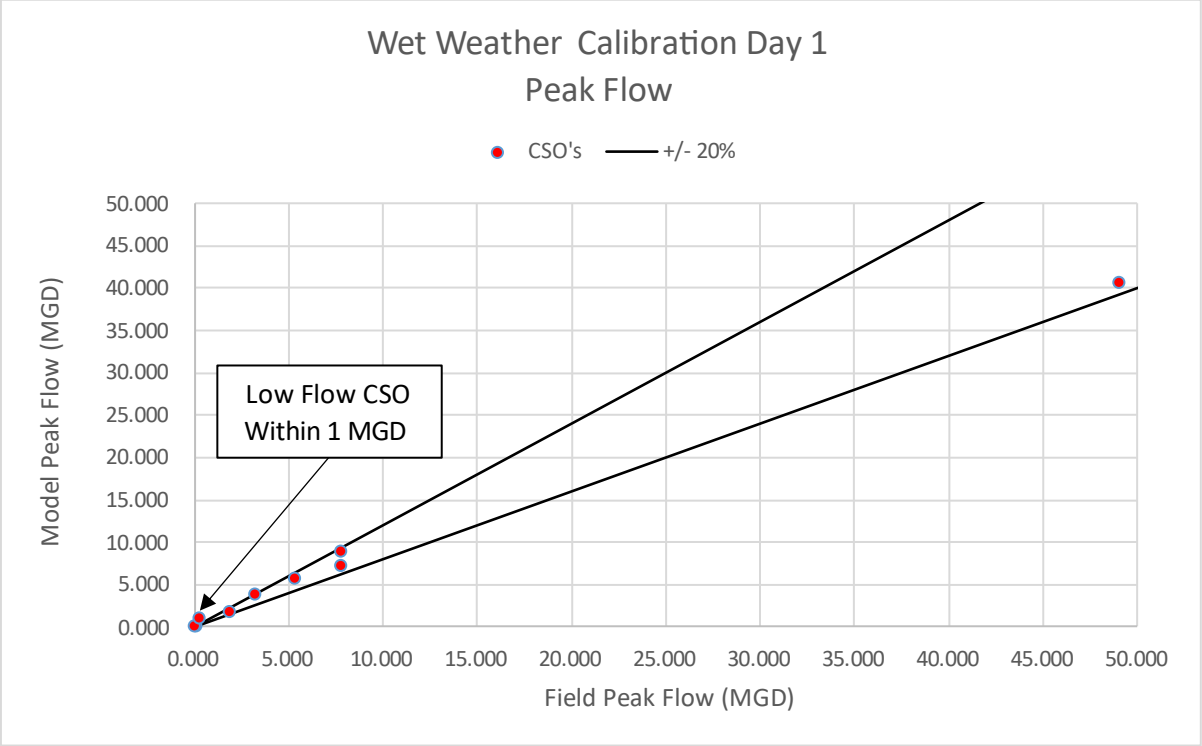
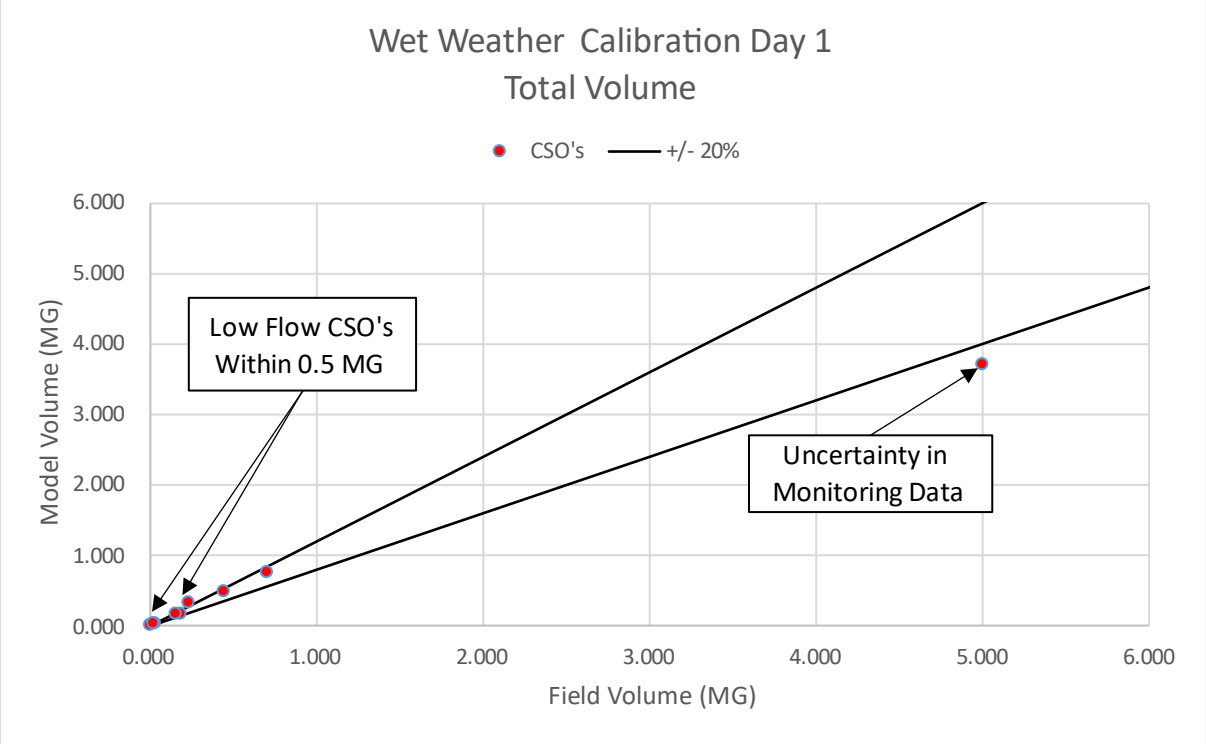


Figure 6C – Wet Weather Calibration Day 1 Total Volume Summary



The September 10th, 2022, event was a 2-year storm with an approximate duration of 3 hours anteceded by approximately 4 days of dry weather. Additional adjustments were made to the aforementioned modeling parameters as needed, and both calibration days were re-run until satisfactory results were achieved. **Figures 7A, 7B,** and **7C** present the overall calibration scatter plot for peak depth, peak flow, and total event volume respectively for the August 9th, 2023, calibration event. In **Figure 7A** the peak depth of CSO 003B was modeled to be high. When reviewing the field data, negative values were found for depth during all peak depth times for the model. It is recommended to verify the accuracy of the recording devices and re-calibrate. **Appendix D** contains individual calibration charts for the September 10th, 2022, event.

Figure 7A – Wet Weather Calibration Day 2 Peak Depth Summary

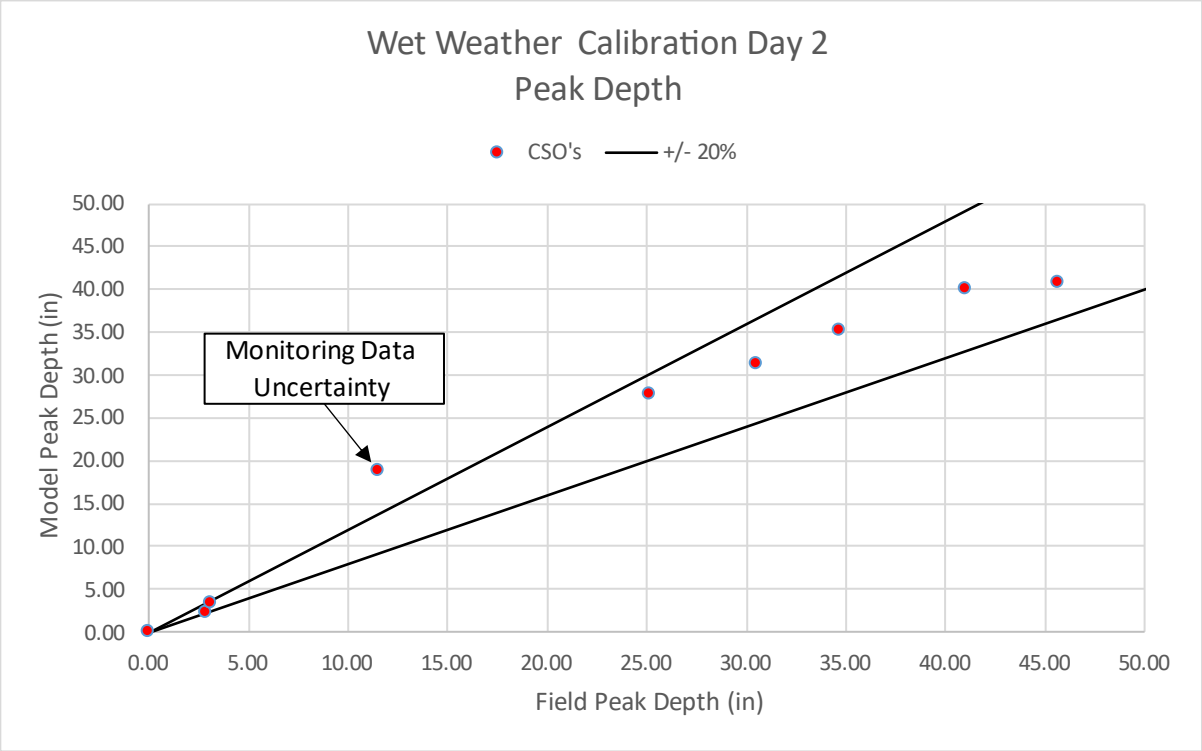


Figure 7B – Wet Weather Calibration Day 2 Peak Flow Summary

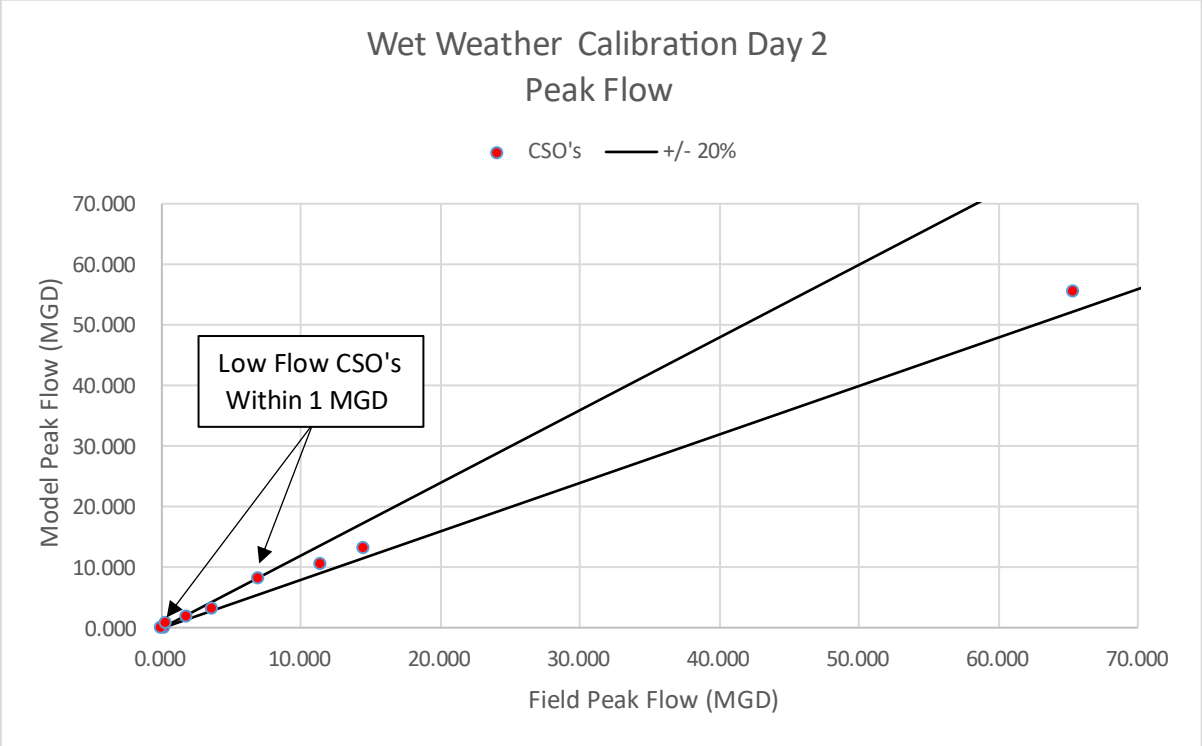
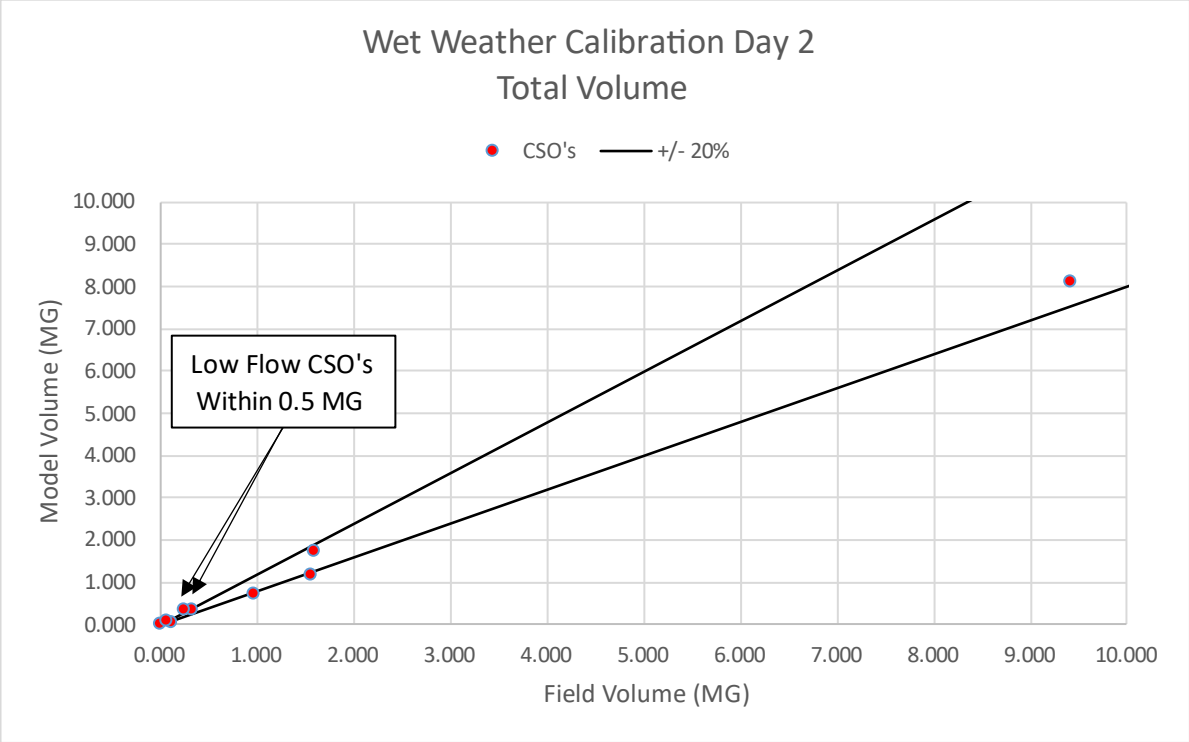


Figure 7C– Wet Weather Calibration Day 2 Total Volume Summary



For both events, the wet weather calibration is adequate, with the model results within 20%, or 6 inches, or 1.0 MGD, or 0.5 MG of the reliable flow monitoring data. Out of the two events, the second calibration day, 09/10/23-9/11/2023, had a more accurate response across the board. The first calibration day had a low CSO 003A volume which was an outlier for the overall calibration of the model and likely due to an abnormality in the field data. The second calibration day did have a peak depth outside of the criteria at CSO 003B, but this was likely due to an error in the recording device. On average the depths at CSO 003B are within criteria and was determined to be adequate for this calibration. To further determine the accuracy of the model after calibration, the additional two wet weather events were analyzed for validation purposes.

4.5 Wet Weather Validation

Two events were selected for model validation: August 9th, 2022 (Day 1), and July 8th, 2023 (Day 2). The events were selected based on the size and duration of the storm using the rain gauge data provided by the City. To determine validation storms, it is ideal to have a range of storm intensities to ensure accuracy for both small and large storms as a result of the previous wet weather calibration.

For validation events, no adjustments were made to the model parameters. **Figures 8A, 8B,** and **8C** present the overall calibration scatter plots for peak depth, peak flow, and total event volume for August 9th, 2022. **Figures 9A, 9B,** and **9C** present the plots for July 8th, 2023. For **Figure 8A** there was a high peak depth for CSO 007. This was due to an issue with the monitoring device not recording depth properly and reading “0” as a baseline. The calibration and validation days after August 9th, 2022, were recording depths properly so no action is recommended due to this issue. In **Figure 8B** there were high peak flows at both CSO 007 and CSO 008. Upon reviewing the field data, it was found that flow spikes were not recorded during the peak of the storm. This is likely due to the rainfall at the rain gauge location compared to CSO 007 and CSO 008 showing a higher intensity than occurred near those CSOs. It is recommended to install additional rain gauges throughout the system to get a better distribution of rainfall at each CSO and to capture any variance based on area. On average, CSO 007 and CSO 008 peak flows fell within criteria and are deemed adequate for these calibration purposes. **Appendix E** contains individual validation charts for the validation events.

Figure 8A – Wet Weather Validation Day 1 Peak Depth Summary

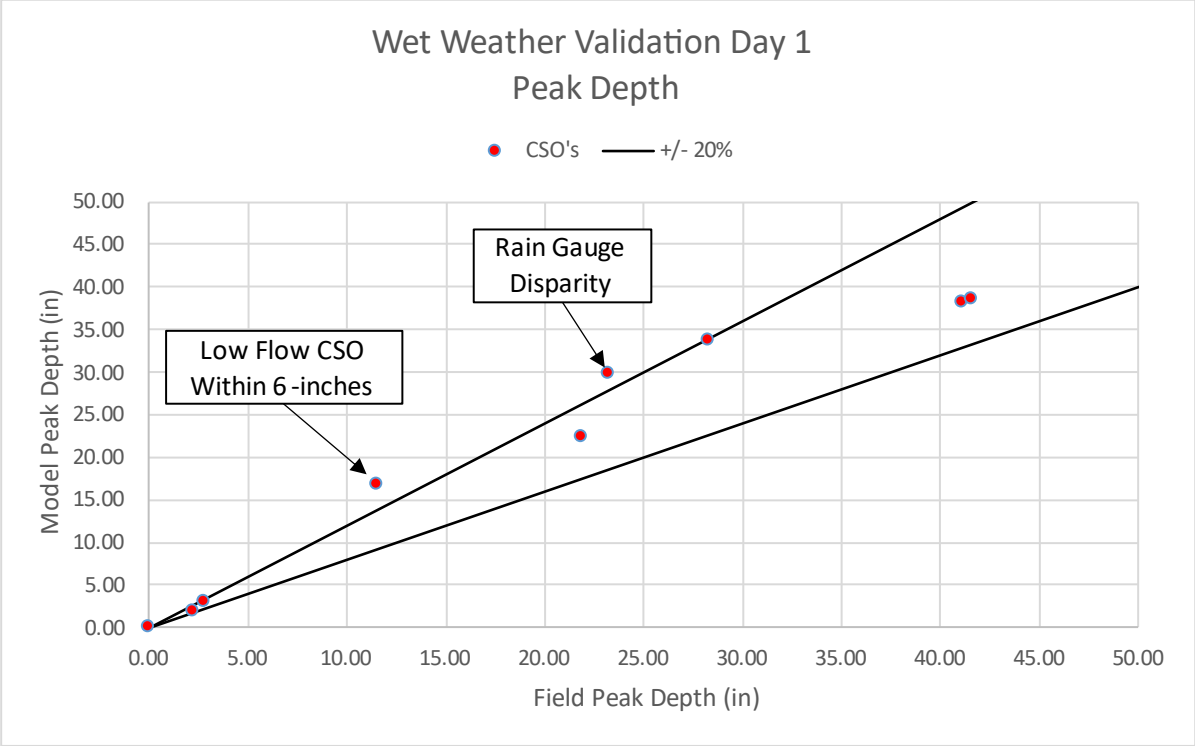


Figure 8B – Wet Weather Validation Day 1 Peak Flow Summary

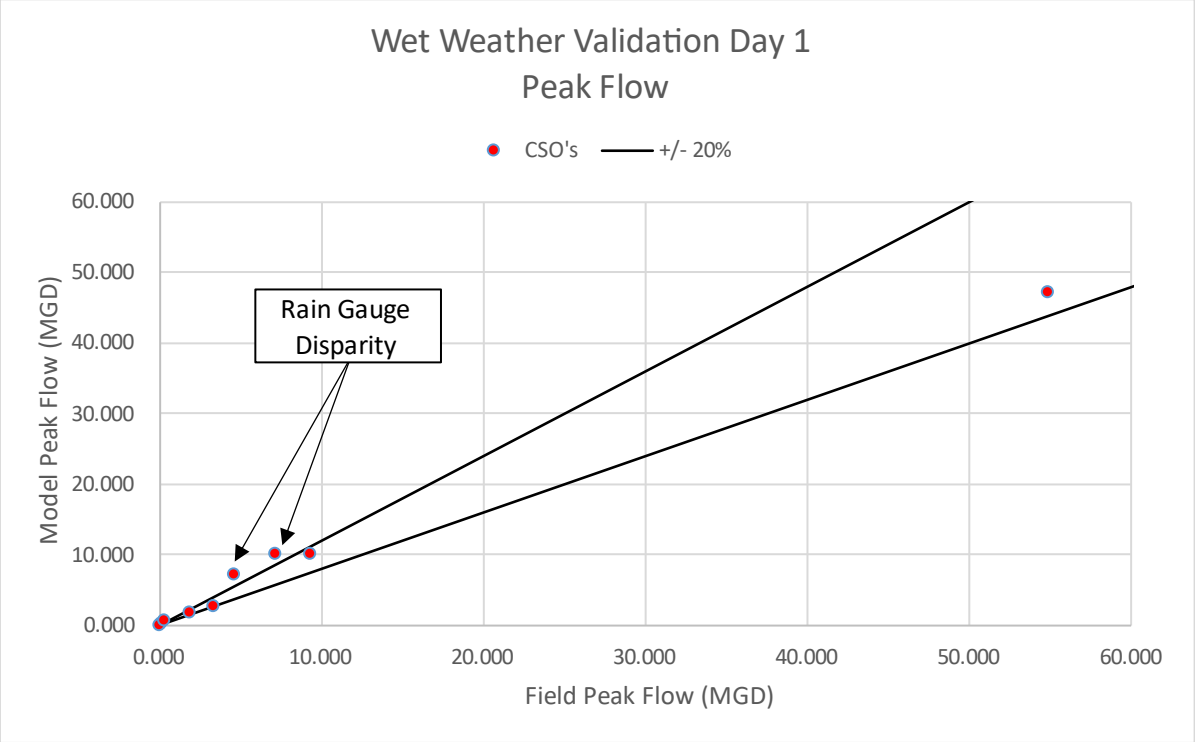


Figure 8C – Wet Weather Validation Day 1 Total Volume Summary

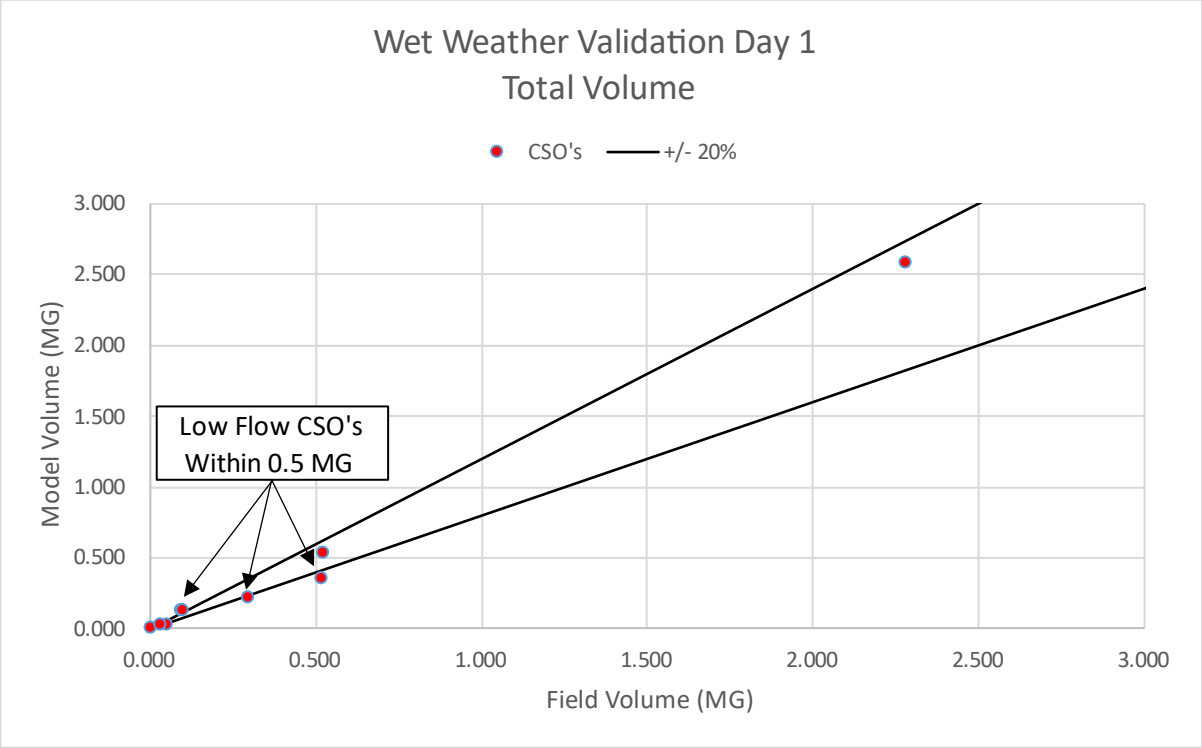


Figure 9A – Wet Weather Validation Day 2 Peak Depth Summary

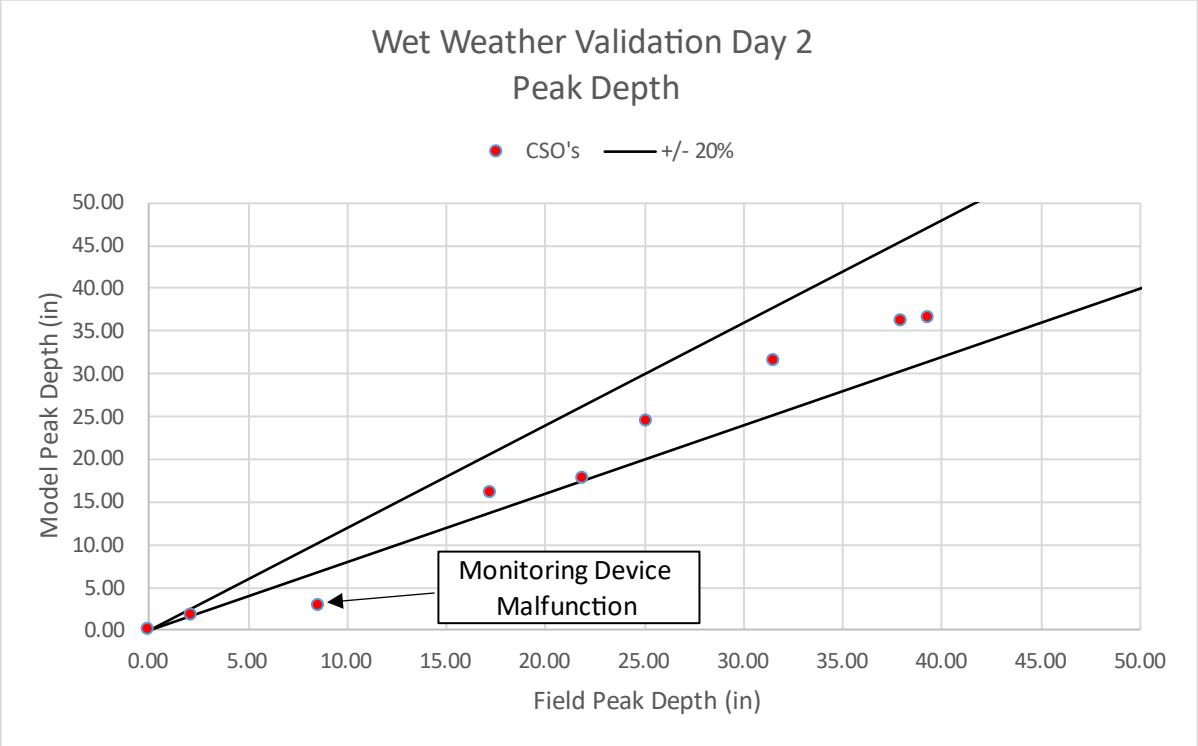


Figure 9B – Wet Weather Validation Day 2 Peak Flow Summary

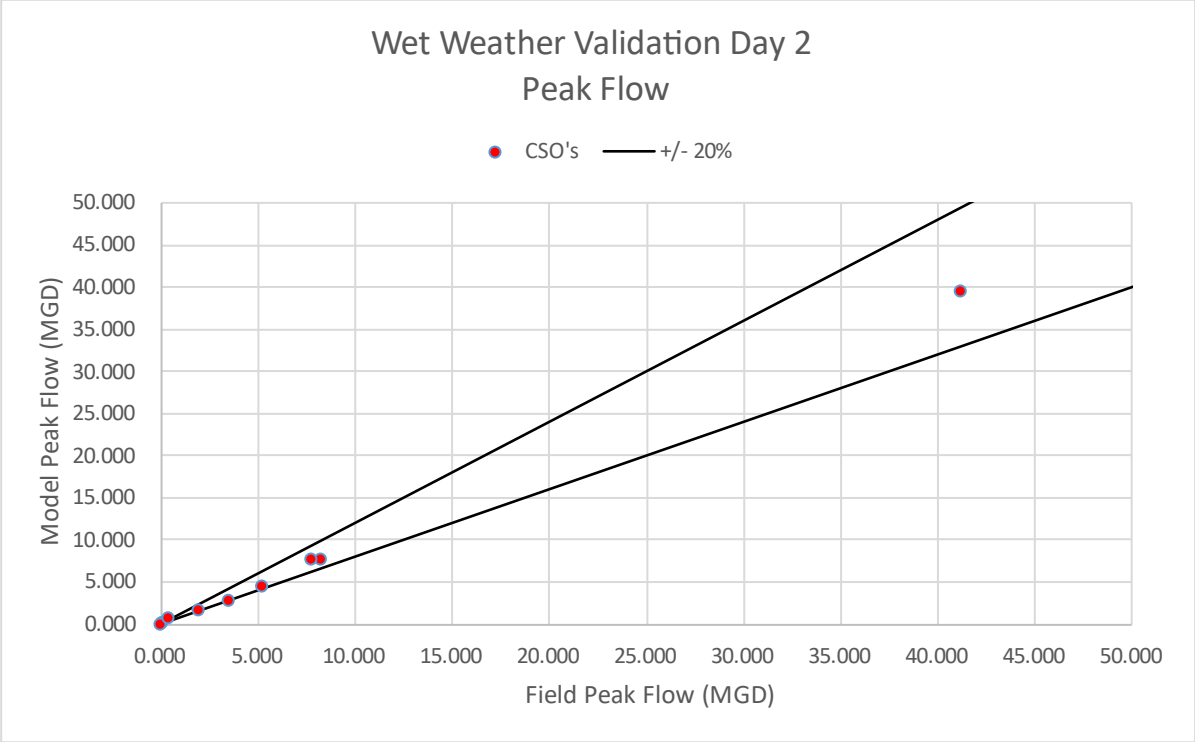
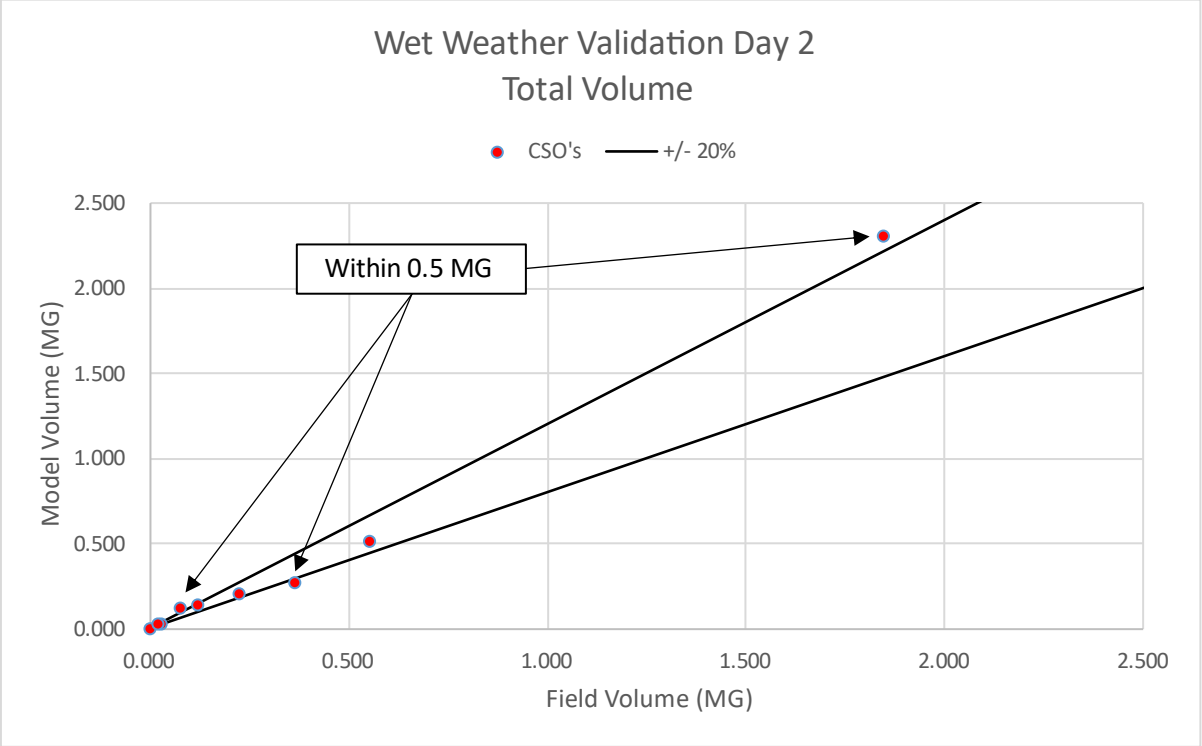


Figure 9C – Wet Weather Validation Day 2 Total Volume Summary



As seen in the previous figures and individual graphs of **Appendix E**, the validation of the model calibration was sufficient. Validation day 2 was accurate for all CSOs in both peak depth and peak flow, as well as overall flow paths. There were several outliers in validation day 1 but had several data errors/discrepancies such as at CSO 007 where depth was reading at “0” for nearly the entire day. Other locations that were just outside of the criteria ranges appear to have experienced lower rainfall intensities than were recorded by the rain gauge, but overall were deemed as sufficient due to the overall average of values across all calibration and validation runs being within criteria for all data points: peak depth, peak flow, and total volume. Based on the results of all four wet weather runs the model can be deemed calibrated and adequate for reviewing the level of service of the system and analyzing potential recommendations for addressing any deficiencies.

5.0 LEVEL OF SERVICE REVIEW

When reviewing the level of service of the system, a 10-year, 1-hour design storm, based on the Huff distribution, was used to determine if there were any deficiencies in the current system. When analyzing the results of this model run, there are two key components to determine if there are deficiencies in the system: whether any of the CSOs are overflowing into the river or if there is any flooding in the system, whether that is at manholes or the storage at the WWTP.

5.1 CSO Overflows

During a 10-year, 1-hour storm event, there should not be any overflow going to the CSO outfalls. After analyzing the design storm in the updated and calibrated model, it was determined there was an overflow at CSO 004 where overflows have been reported in the past. The total overflow at this CSO was approximately 0.17 MG for this 10-year storm event. The target level of service for the system would result in no overflows for the 10-year, 1-hour Huff design storm.

No other CSOs were found to overflow in the model during the 10-year, 1-hour design storm.

A comparison between the pre-construction and post-construction overflow volumes was completed for the 10-year, 1-hour storm event to determine the improvement in the system’s level of service following the LTCP improvements. **Table 6** summarizes these volumes below.

Table 6 – Pre-Construction vs Post-Construction Overflow Comparison; 10-year, 1-hour Storm

Location	Pre-Construction Overflow (MG)[1]	Post-Construction Overflow (MG)
CSO 002[4]	0.54	-
CSO 003A[2]	1.07	0.00
CSO 003B[2]	0.16	0.00
CSO 003[2]	-	0.00
CSO 004	0.59	0.17
CSO 005	0.35	0.00
CSO 006[3]	0.80	-
CSO 007	0.46	0.00
CSO 008	0.40	0.00
CSO 009	0.00	0.00
CSO 010	0.07	0.00
CSO 011[4]	-	0.00
Total	**4.44**	**0.17**

[1] Pre-construction overflows were taken from the SWMM model results in the 2007 "Noblesville SWMM Calibration Memorandum" by RW Armstrong

[2] Post-construction, CSO 003A and CSO 003B combine at diversion structure E-1 which sends flow either to the new central storage or to CSO 003

[3] Post-construction, CSO 006 was closed, and flows were routed to the CSO 003A diversion structure

[4] Following construction CSO 002 was moved and renamed to CSO 011

As seen in **Table 6**, the overflows that were occurring at nearly every CSO in the system pre-construction have been eliminated with the recent construction projects. The only overflow remaining in the system based on the 10-year, 1-hour design storm is at CSO 004 as mentioned above. A comparison of the average annual CSO statistics from pre-construction versus post-construction recorded overflows within the system is provided below in **Table 7**.

Table 7 – Pre-Construction vs Post-Construction Overflow Comparison; Average Annual CSO Statistics

Location	Pre-Construction Overflow (MG)[1]	Post-Construction Overflow (MG) [2]
CSO 002[5]	1.30	-
CSO 003A[3]	6.30	0.00
CSO 003B[3]	0.20	0.00
CSO 003[3]	-	0.00
CSO 004	0.30	0.025
CSO 005	0.10	0.00
CSO 006[4]	1.30	-
CSO 007	0.60	0.00
CSO 008	0.80	0.00
CSO 009	0.60	0.00
CSO 010	0.10	0.00
CSO 011[5]	-	0.00
Total	**11.1**	**0.025**

[1] Pre-construction overflows were taken from Table 2-2 of the LTCP

[2] Post-construction overflows are the average annual overflow from January 2022 through August 2023 – adjustments were made to account for 2023 being a partial year of data

[3] Post-construction, CSO 003A and CSO 003B combine at diversion structure E-1 which sends flow either to the new central storage or to CSO 003

[4] Post-construction, CSO 006 was closed, and flows were routed to the CSO 003A diversion structure

[5] Following construction CSO 002 was moved and renamed to CSO 011

As seen in **Table 7**, the average annual pre-construction overflow volume was 11.1 MG which has since been reduced to 0.025 MG following the LTCP improvements. This has resulted in a 99.77% reduction in overflows in the system.

5.2 Central Storage

As a part of the LTCP improvements two storage basins, a 1-year, 1 hour basin and a 10-year, 1 hour basin, were constructed with storage capacities of 1.20 MG and 1.02 MG. These were analyzed as a part of the level of service review to determine if the capacities are adequate for storage during a 10-year, 1-hour storm with current system operations. When modeled, the storage capacity of both the 1-year, 1-hour basin and the 10-year, 1-hour basin reached around 85%.

The recently constructed storage basins have been confirmed to be adequate storage for a 10-year, 1-hour storm event.

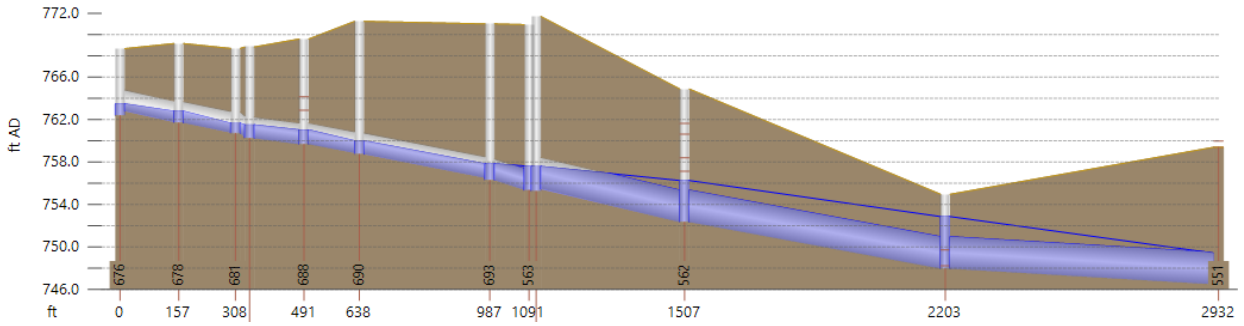
5.3 System Surcharging and Flooding

One of the primary concerns with large storm events in a combined sanitary and storm sewer system is system surcharging or flooding. Surcharging is when the flow is greater than the downstream pipe capacity and the water level rises into the manhole structure. This is a precursor for flooding which occurs when the sewer backs up, rises in the manhole and then floods out into either the street or into buildings. During the 10-year, 1-hour design storm event, pipe profiles were taken during the peak of the flow to determine if any surcharging or flooding occurred.

Overall, the system did not have any significant amount of surcharging except at areas where flooding occurred. In general, combined sewer systems are more likely to experience surcharging during larger storms but, if the water level stays more than 8 feet from the rim of the manhole it is not considered to be a significant issue to address. There was minor surcharging at the CSO 004 diversion structure due to throttling the flow out the overflow pipe from the in-pipe weir, but the surcharging was still 8 feet from ground level. Other minor surcharges exist within the system, but none reach critical levels and do not have any deficiencies that need to be addressed.

The southern region along Chestnut Street, leading up to CSO 011, was the only region of the system that resulted in minor flooding at one manhole based on the modeling results. Storm sewer separation has been done at this location during Phase V of the LTCP improvements which reduced the overall volume of stormwater entering the system. The total overflow volume was approximately 100 gal and occurred over less than a 1 minute. The manhole that the flooding occurred at was model ID, 544. The City has not observed any flooding at this manhole, which is near the treatment plant and likely to be noticed in the event of an overflow. The results of the model have not been verified by field reports, so it is likely a conservative estimate. The City intends to install a bolted manhole lid in an abundance of caution. The pipe profile for the flooded area is shown in **Figure 10**. Due to the short duration of the flood, the model reporting timestep of 15-minute intervals was insufficient to capture the time of the flooding, so levels are shown just after flooding occurs.

Figure 10 – Chestnut Street Pipe Profile; 10-year, 1-hour Storm



Other than the one manhole in the southern region, no other flooding was found in the model during the 10-year storm. Pipe profiles for the rest of the system are included in **Appendix F**.

6.0 CONCLUSION

Following the LTCP construction phases, the model of the City's combined sanitary and storm sewer system was updated to determine the efficacy of the system-wide improvements. CHA utilized the previous EPA SWMM model as a baseline and updated it based on the latest GIS data from the City as well as the as-builts from each of the construction phases. The model was then calibrated using dry weather events followed by wet weather events to ensure accuracy of the model with both sanitary flows as well as during storm events. The model was then validated against further wet weather events to verify that the calibration was done accurately and completely. During the calibration and validation process some of recording devices were found to potentially have errors. It is recommended to investigate the recording devices at both CSO 003A (**Figure 6C**) and CSO 003B (**Figure 7A**) and recalibrate as necessary. The condition of the weir wall and screen at CSO 003A should be evaluated to check if the field collected flow data is accurate. The installation of additional rain gauges throughout the system would provide a more accurate distribution at each CSO and avoid variance based on location. Using the updated and calibrated model, an analysis of the existing level of service of the system was conducted to determine if any deficiencies exist.

During the level of service review, the new central storage at the WWTP was reviewed to determine if the total storage is sufficient to endure a 10-year, 1-hour storm. The analysis of the model confirmed the performance of the 1-year, 1-hour and 10-year, 1-hour storage basins to be adequate with current system operations, reaching approximately 85% capacity during the 10-year, 1-hour design storm.

Other than the storage analysis, the level of service review found two areas in the system with potential for overflows. The model indicates there is potential for overflows at CSO 004 during events less than the 10-year, 1-hour storm. This is confirmed by reports in the City's MROs. The other location the model indicated potential for overflows is a manhole in the southern region. The City has not observed issues at this manhole near the plant but intends to install a sealed manhole lid out of an abundance of caution.

Following the analysis, a comparison was done on the average annual CSO overflows between the overflows reported in the LTCP (pre-construction) and the newly calibrated and validated model (post-construction). This comparison was used to quantify the success of the LTCP improvements and the effects it had on the system. The Post-Construction model resulted in the elimination of overflows at all CSOs except for CSO 004, where the overflow was significantly

reduced. Overall, the LTCP improvements was a $68.5 M investment that resulted in a 99.77% reduction in overflows within the system.

APPENDIX A

Agreed Judgment

STATE OF INDIANA	)	IN THE HAMILTON SUPERIOR COURT
	) SS:	
COUNTY OF HAMILTON	)	CAUSE NO.

COMMISSIONER, INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT,	)
Plaintiff,	)
v.	)
CITY OF NOBLESVILLE,	)
Defendant.	)

AGREED JUDGMENT

WHEREAS, concurrent with the filing of this Agreed Judgment, Plaintiff, the Commissioner of the Indiana Department of Environmental Management ("IDEM") has filed a complaint (the "Complaint") in this civil action against the Defendant, the City of Noblesville (the "City"), in connection with the City's operation of its municipal wastewater and sewer system. The Complaint alleges that the City is in noncompliance with Title 13 of the Indiana Code, Title 327 of the Indiana Administrative Code Articles 2 and 5, and its National Pollutant Discharge Elimination System permit, including Attachment A (hereinafter referred to as the "NPDES Permit") issued by IDEM pursuant to the Clean Water Act ("CWA"). IDEM seeks injunctive relief for the noncompliance.

WHEREAS, the City denies any liability to IDEM arising out of the transactions or occurrences alleged in the Complaint.

WHEREAS, the City, owns and operates a wastewater collection system comprised of combined and sanitary sewers, which includes nine (9) combined sewer overflow ("CSO") outfalls, and the Class IV, 5.0 MGD activated sludge wastewater treatment plant ("WWTP") located at 197 West Washington Street, Noblesville, IN, Hamilton County.

WHEREAS, the City is authorized by NPDES Permit No. IN0020168, to discharge wastewater to the West Fork of the White River and Wilson's Ditch, in accordance with effluent limitations, monitoring requirements, and other conditions contained in the NPDES Permit.

WHEREAS, the NPDES Permit expires on March 31, 2011 and is renewable and/or issued in five (5) year increments while the estimated timeline for implementation of the Long Term Control Plan ("LTCP") is fifteen (15) years.

WHEREAS, the NPDES Permit identifies nine (9) CSO outfalls in the City's sewage collection system, identified as Outfall Nos. 002, 003, 004, 005, 006, 007, 008, 009 and 010.

WHEREAS, IDEM records for the last three (3) years indicate that the City has reported discharges from CSO Outfalls listed in the NPDES Permit. Such discharges were not provided with treatment, and therefore allegedly violated or threatened to violate the narrative effluent limitations contained in the NPDES Permit.

WHEREAS, Pursuant to the NPDES Permit, the City was required to submit to IDEM, a CSO Long-Term Control Plan ("LTCP"), which LTCP contains, among other elements, the following:

a. a description of the control/treatment measures that will be implemented by the City in order to ensure that discharges from its CSO outfalls comply with the water quality based and technology based requirements of the CWA and State law, along with a schedule, that includes specific milestone dates, for implementation of the control/treatment measures; and

b. a description of the post-construction compliance monitoring program that will be implemented by the City in order to determine whether the control/treatment measures, upon implementation, are adequate to ensure compliance with the water quality-based and technology

-based requirements of the CWA and State law, along with a schedule, that includes specific milestone dates for implementation of the post-construction compliance monitoring program.

WHEREAS, pursuant to Federal policy, including but not limited to the "Combined Sewer Overflow (CSO) Control Policy" 59 FR 18688, the "National Combined Sewer Overflow Strategy" 54 F.R. 37370 and other related CSO guidance issued by U.S. EPA ("Federal Policy"), the City and IDEM are compelled to resolve the matters contained herein.

WHEREAS, the City has made progress toward returning to compliance with Title 13 of the Indiana Code, Title 327 of the Indiana Administrative Code Articles 2 and 5, NPDES Permit, and the CWA, through projects that are discussed in detail below in the Background section of this Agreed Judgment.

WHEREAS, the City has submitted to IDEM, for approval, a LTCP that contains the elements specified in Attachment 1 to this Agreed Judgment. The LTCP contains a control approach that will be implemented over a 15 year period in five (5) LTCP phases. The five (5) LTCP phases are, generally, described as: 1, the WWTP headworks expansion/interceptor upgrade with WWTP flow equalization; 2, WWTP expansion; 3, Central and East conveyance, Central storage facility and high rate treatment at the WWTP; 4, North basin sewer separations; and 5, South conveyance sewer. Full implementation of the LTCP is expected to provide full treatment of the 1 year/1hour design storm as well as primary treatment and disinfection up to and including the 10 year/1hour design storm. Flows beyond the 10 year/1hour design storm will be treated to the extent possible by facilities designed for lesser flows. The schedule is attached to this Agreed Judgment, designated as Attachment 1. Bruno Pigott, Assistant Commissioner IDEM Office of Water Quality, sent a letter to Mayor John Ditslear, City of Noblesville dated June 26, 2007 approving the LTCP.

WHEREAS, the Parties agree and the Court, by entering this Agreed Judgment, finds, that settlement of these matters, without protracted litigation, is fair, reasonable, and in the public interest.

NOW THEREFORE, before the taking of any testimony, without any admission by the City of any facts beyond those that the Parties have explicitly agreed to in this Agreed Judgment, and with the consent of the Parties, it is hereby ORDERED:

BACKGROUND

The City of Noblesville is located along the White River in Hamilton County. The City's sewer system currently contains approximately 200 miles of sewers and serves an area of approximately 16,000 acres. The combined sewer system covers approximately 380 acres (about 2% of the total service area) and contains approximately 13 miles of combined sewers. The City has a total of nine (9) CSO outfalls including the WWTP's CSO-related bypass. Seven of the nine outfalls discharge wet-weather CSO to the White River and CSOs 007 and 008 discharge to Wilson's Ditch.

The WWTP was originally constructed in 1948 and it was expanded and upgraded in 1969, 1973, and 1993. The 1973 expansion enabled the WWTP to treat an average flow of 2.4 million gallons per day ("MGD") and a peak hourly flow of 4.6 MGD. In 1991, the City began constructing an $18 million WWTP expansion that would result in a design average flow rate of 5.0 MGD, a 10.0 MGD peak hourly hydraulic capacity, a 0.655 million gallon ("MG") high flow storage capacity, and a 15.0 MGD pumping capacity. In 2005, the City began implementing its LTCP through planning, design, and construction of three key projects focused on maximizing flow to the WWTP and providing full treatment of those wet-weather flows. The first project was completed in 2006 and it expanded the interceptor sewer leading from the WWTP to the

CSO 003(A) diversion structure through pipe bursting to increase conveyance of wet-weather flow to the WWTP. The second project will be completed in 2007 and it includes increasing the WWTP's pumping and grit handling capacity to 30.0 MGD, and adding 1.0 MG of high flow storage capacity. The third project is currently in the final stages of design. This project is an expansion that will increase the design average flow rate to 10.0 MGD with a 20.0 MGD peak hourly hydraulic capacity. Construction of this expansion is expected to be completed in 2010. These three projects cost approximately $29.5 million to design and construct.

The City has begun implementation of projects contained in its LTCP. This implementation includes the phase I expansion, phase II design and bid, and preliminary design for projects A to C as contained in the LTCP.

JURISDICTION AND VENUE

1. This Court has jurisdiction over the subject matter of this action pursuant to Ind. Code §§ 13-30-4-1 and 13-14-2-6. The Complaint states claims upon which relief can be granted under Title 327 of the Indiana Administrative Code, Articles 2 and 5. Venue is proper in this Court as the City of Noblesville is located in Hamilton County.

APPLICABILITY

2. The provisions of this Agreed Judgment shall apply to and be binding upon the State of Indiana, and the City and its officers, directors, agents, employees, successors, contractors and assigns and any person having notice of this Agreed Judgment who is, or will be acting on behalf of or in concert or participation with the City. The City shall provide a copy of this Agreed Judgment to any successor in interest at least thirty (30) days prior to transfer of that interest, and simultaneously shall verify in writing to IDEM that such notice has been given. Any sale or transfer of the City's interests in its wastewater treatment facilities shall not in any

manner relieve the City of its responsibilities for meeting the terms and conditions of this Agreed Judgment. In any action to enforce this Agreed Judgment, the City shall not raise as a defense the failure by any of its officers, directors, agents, employees, successors, assigns or contractors to take actions necessary to comply with the Agreed Judgment.

OBJECTIVE

3. All plans, measures, reports, construction, maintenance, operational requirements and other obligations in this Agreed Judgment or resulting from the activities required by this Agreed Judgment shall have the objective of allowing the City to achieve and maintain full compliance with the CWA, federal and state laws and regulations, and the terms and conditions of the City's NPDES permit.

COMPLIANCE AND LONG TERM CONTROL PLAN IMPLEMENTATION

4. The City shall comply with 327 IAC 5-2-8(1), 327 IAC 2-1-6(a)(1), IC 13-18-4-5, IC 13-30-2-1, all parts of the NPDES Permit.

5. Beginning on the Effective Date of this Agreed Judgment, and continuing during implementation of the LTCP pursuant to this Agreed Judgment, the City shall, at all times, operate its sewage collection system and wastewater treatment system as efficiently and effectively as practicable.

6. The City shall implement the LTCP in accordance with the schedule set forth in Attachment 1.[1]

7. The City may seek to amend or revise the approved LTCP in accordance with applicable laws, rules, policy and this Agreed Judgment. Upon the City's receipt of IDEM's

[1] The LTCP schedule requires coordination of phase 2/project C with the planned Connor Street expansion by the Indiana Department of Transportation. To the extent that phase 2/project C is delayed by the Indiana Department of Transportation's Conner Street expansion then the schedule will be adjusted accordingly.

approval of any amendment or revision to the LTCP, or upon resolution of any disputes pursuant to this Agreed Judgment, Dispute Resolution, concerning a proposed revision to the LTCP, the revised LTCP (including any additional post-construction monitoring and modeling) shall supersede the schedule contained in Attachment 1, any previously approved LTCP or revised LTCP, or any previously-approved extension of deadlines, and the City shall implement the revised LTCP (including any additional post-construction monitoring and modeling) in accordance with the schedule in the approved revised LTCP.

IDEM APPROVAL OF SUBMISSIONS

8. The City shall notify IDEM, in writing, within thirty (30) days of completion of each action or milestone contained in the Schedule in Attachment 1 and any task or plan approved by IDEM pursuant to this Agreed Judgment. The notification shall include a description of the action completed and the date it was completed, and a progress report that contains a summary of the activities undertaken to complete the task. The City shall adequately address any IDEM comments regarding the report, within the timeframe required by IDEM.

9. Within sixty (60) days after completion of each of the five (5) LTCP phases of the approved LTCP, the City shall submit to IDEM, for review and approval, a report that contains a summary of the data gathered as a result achievement of the completion of the LTCP, including post-construction compliance monitoring and an evaluation of the success of the phase in meeting the goals of the LTCP. The City shall adequately address any IDEM comments regarding the report, within the timeframe required by IDEM.

10. The City shall conduct post construction monitoring as required in the LTCP and the NPDES Permit. In the event that data resulting from CSO post-construction monitoring or other information indicates that the LTCP is not adequate to provide full treatment of the 1

year/1 hour design storm as well as primary treatment and disinfection up to and including the 10 year/1hour design storm, and treatment and disinfection of combined sewage flows generated during storms in excess of the 10 year/1hour storm to the extent possible with facilities designed for lesser flows, the City shall, within ninety (90) days of becoming aware of such inadequacy, develop and submit to IDEM, for approval, a CSO Compliance Plan ("CSO CP") that identifies (a) the additional measures that may be implemented by the City; and (b) the post-construction compliance monitoring program that will be implemented by the City in order to determine whether the additional measures, upon implementation, are adequate, along with a schedule, that includes specific milestone dates.

11. The CSO CP is subject to IDEM approval. Following receipt of the CSO CP, IDEM may, in writing (a) approve all of or any portion of the CSO CP; (b) approve all or a portion of the CSO CP upon specified conditions; (c) disapprove of all or any portion of the CSO CP, notifying the City of deficiencies in the CP and granting the City additional time within which to correct the deficiencies; (d) modify the submission to correct deficiencies; or (e) reject all or any portion of the CP. The Parties will make a good faith effort to negotiate the CSO CP; or, invoke the Dispute Resolution clause contained herein if such good faith effort fails.

12. The City, upon receipt of written notification from IDEM of approval of the CSO CP, shall immediately implement the approved CSO CP and adhere to the schedules contained therein. The approved CSO CP shall be incorporated into this Agreed Judgment and shall be deemed an enforceable part thereof.

13. The provisions of Order Paragraphs 10, 11, and 12 shall continue to apply until post-construction monitoring indicates to IDEM that the terms of the LTCP have been fulfilled.

FUNDING

14. The City may seek Federal and State grant funding assistance. However, compliance with the terms of this Agreed Judgment is not conditioned on the receipt of Federal or State funds. In addition, failure to comply is not excused by the lack of Federal or State funds, or by the processing of any applications for the same.

COMMUNICATIONS

15. All submittals required by this Order, unless notified otherwise in writing, shall be sent to:

Cyndi Wagner, Chief, Wet Weather Section
Indiana Department of Environmental Management
Office of Water Quality – Mail Code 65-42
100 North Senate Avenue
Indianapolis, IN 46204-2251

And

Utility Director
City of Noblesville
16 South 10th Street
Noblesville, Indiana 46060

STIPULATED PENALTIES

16. In the event the terms and conditions of the following Judgment paragraphs are violated, the IDEM may assess and the City shall pay a stipulated penalty in the following amount:

Order Paragraph Number	***Violation***	Penalty Amount
6	Failure to implement the LTCP and adhere to the milestone dates set forth in the schedule in Attachment 1.	$500 per each week or part thereof late[2]

[2] Stipulated penalties will be calculated per week or part thereof, which means if the item referenced is late one (1) to seven (7) days it is one (1) week, eight (8) to fourteen (14) days is two (2) weeks, fifteen (15) to twenty-one (21) days is three (3) weeks, etc.

8	Failure to notify IDEM, in writing, within 30 days of completion of each action contained in the LTCP and any plan approved by IDEM pursuant to this Agreed Judgment.	$250 per each week or part thereof late
8	Failure to timely submit report.	$500 per each week or part thereof late
8	Failure to timely address any IDEM comments within the timeframe set by IDEM.	$500 per each week or part thereof late
10	Failure to timely submit a complete and sufficient CSO CP.	$500 per each week or part thereof late
11	Failure to timely revise and resubmit the CSO CP in accordance with written notice by IDEM.	$500 per each week or part thereof late
12	Failure to comply with any milestone date contained in the schedule set forth in the approved CSO CP.	$500 per each week or part thereof late

17. Stipulated penalties shall be due and payable within thirty (30) days after the City receives written notice that the IDEM has determined a stipulated penalty is due. Assessment and payment of stipulated penalties shall not preclude the IDEM from seeking any additional relief against the City for violation of the Agreed Judgment. In lieu of any of the stipulated penalties given above, the IDEM may seek any other remedies or sanctions available by virtue of the City's violation of this Agreed Judgment, or Indiana law, including but not limited to civil penalties pursuant to IC 13-30-4.

18. Stipulated penalties are payable by check to the Environmental Management Special Fund. Checks shall include the Case Number of this action and shall be mailed to:

Indiana Department of Environmental Management
Cashiers Office – Mail Code 50-10C
100 N. Senate Avenue
Indianapolis., IN 46204-2251

19. In the event that any stipulated amount assessed pursuant to Paragraph Nos. 16 and 17 is not paid within thirty (30) days of notice that it is due, the City shall pay interest on the

unpaid balance at the rate established by IC 24-4.6-1-101. The interest shall continue to accrue until the stipulated penalty is paid in full.

FORCE MAJEURE

20. If any event occurs that causes or may cause the City to violate any provision or requirement of this Agreed Judgment, the City shall notify IDEM in writing within fourteen (14) days from the date the City first knew, or in the exercise of reasonable diligence should have known, that compliance with the Agreed Judgment would be prevented or delayed. The notice shall reference this Section of the Agreed Judgment and shall describe in detail the anticipated length of time the violation may persist, the precise cause or causes of the violation, the measures taken or to be taken by the City to prevent or minimize the violation and the timetable by which those measures will be implemented. The City shall adopt all reasonable measures to avoid or minimize any such violation. The City shall make all reasonable efforts to identify events that cause or may cause a violation of this Agreed Judgment. Failure by the City to comply with the notice requirements of this Paragraph shall constitute a waiver of the City's rights to obtain an extension of time or other relief under this Section based on such incident.

21. If IDEM agrees that the violation has been or will be caused by circumstances beyond the control of the City or any entity controlled by it, including its consultants and contractors, and that the City could not have prevented such violation, the time for performance of the requirement in question shall be extended for a period not to exceed the actual delay resulting from such circumstance, and stipulated penalties shall not be due for such delay or non-compliance. In the event IDEM does not agree that the violation was caused by circumstances beyond the control of the City and notifies the City of such determination, the City may invoke the dispute resolution provisions in this Agreed Judgment.

22. If the City invokes dispute resolution and IDEM or the Court determines that the violation was caused by circumstances beyond the control of the City or any entity controlled by it, and that the City could not have prevented such violation, the City shall be excused as to that violation, but only for the period of time the violation continues due to such circumstances.

23. The City shall bear the burden of proving that any delay or violation has been or will be caused by circumstances beyond its control, and that the City could not have prevented such violation, as set forth above. The City shall also bear the burden of establishing the duration and extent of any delay or violation attributable to such circumstances, that such duration or extent is or was warranted under the circumstances and that, as a result of the delay, a particular extension period is appropriate. An extension of one compliance date based on a particular circumstance beyond the City's control may require the City to extend any subsequent compliance date or dates. Such an extension of a compliance date(s) shall be determined by the Parties on an incident by incident basis.

24. Changed financial circumstances, unanticipated, increased costs or expenses associated with implementation of this Agreed Judgment shall not serve as a basis for excusing violations or granting extensions of time under this Agreed Judgment, except as expressly provided in Force Majeure.

25. Failure to apply for a required permit or approval or to provide in a timely manner all information required to obtain a permit or approval that is necessary to meet the requirements of this Agreed Judgment shall not, in any event, serve as a basis for excusing violations of or granting extensions of time under this Agreed Judgment. However, a permitting authority's failure to act in a timely manner on an approvable permit application may serve as a basis for an extension under the force majeure provisions of this Agreed Judgment.

26. The City shall make a showing of proof regarding the cause of each delayed incremental step or other requirement for which an extension is sought. The City may petition for the extension of more than one compliance date in a single request.

DISPUTE RESOLUTION

27. This Court shall retain jurisdiction of this matter for the purposes of implementing and enforcing the terms and conditions of this Agreed Judgment and for the purpose of adjudicating all disputes among the Parties that may arise under the provisions of this Agreed Judgment. Any dispute that arises with respect to the meaning, application, implementation, interpretation, amendment or modification of this Agreed Judgment, or with respect to the City's compliance herewith (including the adequacy of the City's performance of the control measures and adequacy of the submittals required by this Agreed Judgment) or any delay hereunder, the resolution of which is not otherwise expressly provided for in this Agreed Judgment, shall in the first instance be the subject of informal negotiations. If any Party believes it has a dispute with any other Party, it shall notify all the other Parties in writing, including notice to the Indiana Attorney General, setting forth the matter(s) in dispute, and the Parties will proceed initially to resolve the matter in dispute by informal means. Such period of informal negotiations shall not exceed thirty (30) days from the date the notice was sent, unless the Parties agree otherwise.

28. If the informal negotiations are unsuccessful, the position of the IDEM shall control unless, within twenty (20) days after the conclusion of the informal negotiation period, the City invokes the formal dispute resolution procedures of this Section by serving on IDEM a written statement of position on the matter in dispute, including any supporting factual data, analysis, opinion, or documentation.

29. Within thirty (30) days of receiving the City's statement of position under Paragraph 28, the IDEM will serve on the City its written statement of position, including any supporting factual data, analysis, opinion, or documentation.

30. An administrative record of the dispute shall be maintained by IDEM and shall contain all statements of position, including supporting documentation, submitted pursuant to Paragraphs 28 and 29.

31. IDEM's statement of position shall be binding upon the City unless the City files a petition with the Court describing the nature of the dispute and a proposal for its resolution. The City's petition must be filed no more than twenty (20) days after receipt of IDEM's statement of position. IDEM shall then have thirty (30) days to file a response setting forth their position and proposal for resolution. In any such dispute, the petitioner shall have the burden of proof, and the standard of review shall be that provided by applicable law.

32. Submission of any matter to the Court for resolution shall not extend any of the deadlines set forth in this Agreed Judgment, unless the Parties agree to such extension in writing or the Court allows the extension upon motion.

33. Stipulated penalties with respect to any disputed matter (and interest thereto) shall accrue in accordance with Paragraphs 16 and 17; however, payment of stipulated penalties, and any accrued interest, shall be stayed pending resolution of the dispute, as follows:

(a) If the dispute is resolved by informal agreement before appeal to this Court, accrued penalties (and interest), if any, determined to be owed shall be paid within sixty (60) days of the agreement or the receipt of IDEM's final position in writing.

(b) If the dispute is appealed to this Court and the IDEM prevails in whole or in part, the City shall pay all accrued penalties (and interest) determined to be owed within sixty (60) days of the Court's decision or order.

(c) In the event of an appeal, the City shall pay all accrued penalties (and interest) determined to be owed within sixty (60) days after a final decision no longer subject to judicial review has been rendered.

RIGHT OF ENTRY

34. IDEM, and its representatives, contractors, consultants, and attorneys shall have the right of entry into and upon the City's wastewater treatment facility and sewer system, at all reasonable times, upon proper presentation of credentials, for the purposes of:

(a) Monitoring the progress of activities required by this Agreed Judgment;

(b) Verifying any data or information required to be submitted pursuant to this Agreed Judgment;

(c) Obtaining samples and, upon request, splits of any samples taken the City or its consultants. Upon request, the City will be provided with splits of all samples taken by the IDEM; and

(d) Otherwise assessing the City's compliance with this Agreed Judgment, the City's Current Permits, the CWA or applicable State law.

This Section in no way limits or affects any right of entry and inspection held by IDEM pursuant to applicable Federal or State laws, regulations, or permits.

CERTIFICATION

35. Any report, plan, or other submission that the City is required by this Agreed Judgment to submit, including reports, plans or other submissions that the City is also required to

submit by its Current Permits, shall be signed by an official or authorized agent of the City and shall include the following certification:

I certify under penalty of law that the document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

36. The City shall not object to the admissibility into evidence of any report, plan, or other submission prepared in accordance with this Paragraph or the information contained in said reports in any proceeding initiated by any of the Parties to this Agreed Judgment to enforce this Agreed Judgment. Notwithstanding the above, the City may seek in accordance with applicable law to submit any contradictory or other evidence as to any matter affected by the evidence referred to in the preceding section in any proceeding to enforce this Agreed Judgment.

NOT A PERMIT/COMPLIANCE WITH OTHER STATUTES/REGULATIONS

37. This Agreed Judgment is not and shall not be construed as a permit, or a modification of any existing permit, issued pursuant to Section 402 of the CWA, 33 U.S.C. § 1342, or State law, nor shall it in any way relieve the City of its obligations to obtain permits for its wastewater treatment facilities, sewer system, or modifications thereto, and to comply with the requirements of any NPDES permit or with any other applicable Federal or State law or regulation, including the obligation to obtain facility construction permits pursuant to Title 327 of the Indiana Administrative Code, Article 3. Any new permit, or modification of existing permits, must be complied with in accordance with applicable Federal and State laws and regulations.

38. Nothing herein, including the incorporation of the CSO Control Measures specified in Attachment 1 into this Agreed Judgment, or IDEM's review or approval of any plans, reports, policies or procedures formulated pursuant to this Agreed Judgment (including any Revised CSO Control Measures Plan), shall be construed as relieving the City of the duty to comply with the CWA, the regulations promulgated there under, and all applicable permits issued there under, or as relieving the City of its duty to comply with applicable state law. To the extent there is a conflict between the LTCP and the Agreed Judgment, the LTCP controls.

EFFECT OF COMPLIANCE

39. IDEM does not, by its consent to the entry of this Agreed Judgment, warrant or aver in any manner that the City's complete compliance with this Agreed Judgment will result in compliance with the provisions of the CWA, 33 U.S.C. §§ 1251 et seq., applicable state law, or the City's NPDES permits.

EFFECT OF AGREED JUDGMENT AND NON-WAIVER PROVISIONS

40. Nothing contained in this Agreed Judgment shall be construed to prevent or limit IDEM's rights to obtain penalties or further or additional injunctive relief under State statutes or rules, including, but not limited to, criminal punishment under applicable State laws and rules respectively except as expressly specified herein.

41. This Agreed Judgment resolves the civil claims of IDEM for civil penalties and injunctive relief for the violations alleged and subject matter covered in the Complaint filed herein through the date of entry of this Agreed Judgment.

42. IDEM further reserves all rights against the City with respect to any violations by the City that occur after the date of lodging of this Agreed Judgment, and/or for any violations of

applicable state law not specifically alleged in the Complaint filed herein, whether they occurred before or after the date of lodging of this Agreed Judgment.

43. The Parties agree that the City is responsible for achieving and maintaining complete compliance with all State laws, rules, and permits, and that compliance with this Agreed Judgment shall be no defense to any actions commenced by IDEM pursuant to said laws, regulations, or permits, except as set forth herein.

44. This Agreed Judgment does not limit or affect the rights of the Parties as against any third parties that are not Parties to this Agreed Judgment. The Parties recognize that this Agreed Judgment resolves only matters between IDEM and the City and that its execution does not preclude the City from asserting any legal or factual position in any action brought against it by any person or entity not a Party to this Agreed Judgment.

45. IDEM reserves any and all legal and equitable remedies available to enforce the provisions of this Agreed Judgment.

46. This Agreed Judgment shall not limit any authority of IDEM under any applicable statute or regulation, including the authority to seek information from the City, to require monitoring, to conduct inspections, or to seek access to the property of the City; nor shall anything in this Agreed Judgment be construed to limit the authority of IDEM to undertake any action against any person, including the City, in response to conditions that may present an imminent and substantial endangerment to the environment or to the public health or welfare.

47. Obligations of the City under the provisions of this Agreed Judgment to perform duties scheduled to occur after the signing, but prior to the date of entry, shall be legally enforceable from the date this Agreed Judgment is signed by the City. Liability for stipulated penalties, if applicable, shall accrue for violation of such obligations and payment of such

stipulated penalties may be demanded by the IDEM as provided in this Agreed Judgment. The contempt authority of this Court shall also extend to violations of such obligations.

COSTS OF SUIT

48. Each Party shall bear its own costs and attorneys' fees with respect to matters related to this Agreed Judgment.

MODIFICATION

49. There shall be no material modification of this Agreed Judgment, Exhibits attached to this Agreed Judgment, or the submittals approved under this Agreed Judgment without written approval by the Parties and the Court. Any non-material modification of this Agreed Judgment, its Exhibits, or approved submittals shall be in writing and signed by the Parties. Any modifications to the attached Exhibits or subsequently approved submittals that are specifically allowed under the terms of those Exhibits or submittals may be made in accordance with the terms of those Exhibits or approved submittals. All modifications, whether material or non-material, shall be deemed an enforceable part of this Agreed Judgment.

CONTINUING JURISDICTION

50. The Court shall retain jurisdiction to enforce the terms and conditions and achieve the objectives of this Agreed Judgment and to resolve disputes arising hereunder as may be necessary or appropriate for the construction, modification, implementation or execution of this Agreed Judgment.

TERMINATION

51. Upon motion filed with the Court by IDEM or the City, the Court may terminate the terms of this Agreed Judgment after each of the following has occurred:

(a) The City has achieved compliance with all provisions contained in this Agreed Judgment, and subsequently has maintained satisfactory compliance with each and every provision for twelve consecutive months;

(b) The City has paid all penalties and other monetary obligations due hereunder and no penalties or other monetary obligations due hereunder are outstanding or owed to IDEM; and

(c) At least one hundred twenty (120) days prior to filing the motion, the City has certified to IDEM that it has complied with the terms of this Agreed Judgment and has provided sufficient documentation to IDEM to support its certification.

The Court, in terminating this Agreed Judgment shall issue an Order declaring that the Agreed Judgment, its terms and conditions, has been satisfied.

SIGNATORIES/SERVICE

52. The Indiana Deputy Attorney General signing this Agreed Judgment, on behalf of the State of Indiana and IDEM, and the undersigned representative of the City each certifies that he or she is authorized to enter into the terms and conditions of this Agreed Judgment and to execute and bind legally such Party to this document.

53. The Parties agree that The City need not file an answer to the Complaint in this action unless or until the Court expressly declines to enter this Agreed Judgment.

FINAL JUDGMENT

54. Upon approval and entry of this Agreed Judgment by the Court, this Agreed Judgment shall constitute the final judgment of the Court between IDEM and the City.

THE UNDERSIGNED PARTIES enter into this Agreed Judgment:

FOR THE STATE OF INDIANA
STEVE CARTER
Attorney General of Indiana

By:_____ DATED:_____

Sierra L. Cutts, Deputy Attorney General
Office of the Attorney General
Indiana Government Center South, 5th Floor
302 West Washington Street
Indianapolis, Indiana 46204

FOR IDEM

_____ DATED:_____

THOMAS W. EASTERLY, Commissioner
Indiana Department of Environmental Management
100 North Senate Avenue, IGCN 1301
Indianapolis, Indiana 46204

FOR THE CITY OF NOBLESVILLE

_____ DATED:_____

Mayor John Ditslear, City of Noblesville

_____ DATED:_____

Vicki J. Wright or Angela L. Hamm, Attorneys
Counsels for Noblesville
Krieg DeVault LLP
One Indiana Square, Suite 2800
Indianapolis, IN 46204-2079

The Court finds there is no just reason for delay and therefore approves and enters this Agreed Judgment as a final judgment.

SO ORDERED this _____ day of _____, 2007.

Judge, Hamiliton Circuit Court

Distribution:

Sierra L. Cutts, Indiana Attorney General's Office, 302 West Washington Street, IGCS, 5th Floor, Indianapolis, Indiana 46204

Vicki J. Wright & Angela L. Hamm, Krieg DeVault, One Indiana Square, Ste 2800, Indianapolis, Indiana 46204

IM-1085848_1.DOC

APPENDIX B

Software Recommendation Memo

City of Noblesville
Long-Term Control Plan Post-Construction Modeling

Software Recommendation

Revision Date: April 19, 2023

Introduction

The purpose of this memorandum is to review and analyze hydraulic modeling software to recommend the best software package for the City of Noblesville Sanitary Sewer District Long-Term Control Plan Post-Construction Modeling (LTCP PCM) project with anticipation of a model expansion to include the entirety of the system for the City's future use. The recommended software package should be cost effective and include a combination of robust data management capabilities and a user accessible graphic interface.

InfoSWMM

InfoSWMM is 1D/2D urban drainage modeling software capable of analyzing stormwater, Sanitary Sewer, and combined sewer networks for planning and management similar to PCSWMM that is owned by Innovyze, an Autodesk company. The capability that distinguishes InfoSWMM from the other products is that it can conduct extensive overflow, rainfall-derived infiltration, and inflow (RDII), green architecture, and groundwater filtration (GWI) analyses. It should be noted that InfoSWMM will be discontinued by Innovyze to be replaced solely by InfoWorks ICM by 2026.

The following is a detailed list of pros and cons for the InfoSWMM Software:

Pros

- Can import data from GIS, CAD
- Able to process data from HEC-Ras/ EPA SWWM
- Robust Facility manager and domain management allow for quick activation and inactivation of improvement options
- Data exchange features between excel and access
- Efficient Scenario management functionality
- Easy to understand Error Definition
- Clear presentation of results

Cons

- Profile viewer has limited flexibility
- Limited hydrologic calculation options.
- Unavailability of support by vendor
- To be discontinued in 2026

With the anticipation of model expansion for the City of Noblesville (City) and the discontinuation of InfoSWMM in 2026, it is recommended to not use InfoSWMM. This will prevent the need to go through more software training again for a different software.

InfoWorks ICM

InfoWorks ICM is an advanced, integrated catchment modeling software used for modeling complex hydraulic and hydrologic network elements quickly, accurately, and collaboratively for water and wastewater. Like InfoSWMM, it is owned by Innovyze, an Autodesk company. It contains comprehensive overflow, rainfall-derived infiltration, and inflow (RDII), Dry Weather Flow Allocator, Models Flow attenuation.

The following is a detailed list of pros and cons for InfoWorks ICM Software:

Pros

- Facility Manager
- Develop system master plans
- Assess the impact of inflow and infiltration on SSOs
- Establish SSO and CSO remediation programs
- Batch Simulation
- Scenario Manager with Parent-Child Inheritance Functionality
- Advanced Reporting (reserve capacity, freeboard, etc.)
- Data Flagging
- Unlimited undo and redo
- Accurate modeling for more complex sewer systems
- Can use remote machines to run simulations
- Easily import GIS, hydrology, and hydraulic model data from various sources
- A lot of available training classes

Cons

- Does not feature public domain nor facility manager options to run simulations.
- Complex software that requires more training to utilize
- Not as user-friendly as most other software packages

InfoWorks ICM is the most robust of the software packages that were analyzed as a part of this comparison and recommendation. It has the most features and potential for accurate development of more complex systems but, this all comes at the cost of a less user-friendly interface that requires more training to be utilized properly.

SewerGEMS

SewerGEMS is a fully-dynamic, multi-platform (MicroStation, ArcGIS, AutoCAD, and Stand-Alone) sanitary and combined sewer modeling solution. With SewerGEMS, you can analyze all sanitary and combined sewer system elements in one package and have the option of performing the analyses with the SWMM algorithm or Bentley's own implicit solution of the full Saint-Venant equations. Sewer GEMS is known for optimizing best management practices (BMP) and is owned by Bentley, which has excellent customer support services and availability.

The following is a detailed list of pros and cons for the SewerGEMS Software:

Pros

- Develop system master plans
- Assess the impact of inflow and infiltration on SSOs
- Develop SSO and CSO remediation programs
- Perform system evaluations associated with US, EPA, CMOM, and NPDES
- Optimize lift station and system storage capacities
- Implement real-time control strategies
- Model relief sewers, overflow diversions, and inverted siphons
- Accurately simulate operations with variable-speed pumping and logical controls
- Simulate out-of-service or proposed sewers within the same model
- Tabular reporting (FlexTables)
- Modify global options including unit settings, drawing layout and display settings, and element labeling.

Cons

- Limited presentation for time series or profiles of results
- No options to switch between different SWMM versions.
- The interchange between SewerGEMS and EPA SWMM is not seamless with many features not recognized by SewerGems, still need manual check

SewerGEMS is a user-friendly modeling software that still maintains an adequate level of design capabilities. While not as robust as InfoWorks ICM for more complex systems, it has a good balance between useability and complex hydraulic analysis but doesn't have the level of compatibility with EPA SWMM that the other software has.

PCSWMM

PCSWMM is an advanced stormwater, wastewater, watershed, and water distribution network. PCSWMM focuses on improving drainage and green infrastructure design, floodplain delineation, sewer overflow mitigation, water quality and integrated catchment analysis, and 1D-2D modeling. PCSWMM is optimized to handle large amounts of data while maintaining a user-friendly design.

The following is a detailed list of pros and cons for the PCSWMM Software:

Pros

- The interface provides for relatively straightforward input/output functionality including copy/paste into and out of the model tables
- Has import/export features with external data sources including Excel, ArcGIS shapefiles or geodatabases.
- PC-SWMM engine is by EPA and allows the option to toggle to select the software version.
- Pipe Profile Graphics
- Dynamic storm simulation
- Floodplain mapping and risk analysis
- Flood forecasting

- Can easily combine surface flows with underground flows
- Has stormwater management and sewer remediation capabilities

Cons

- Limited Support by CHI
- Error Definition can be difficult to understand
- Not as robust as the other softwares

Cost Comparison

The cost of each software package was obtained from the vendors' official websites and the packages were evaluated to acquire an understanding of their cost benefit. Based on the quotes received from their respective company websites for one or multiple seat licenses, the general pricing information for the software packages is as follows:

1. InfoSWMM (Innovyze/Autodesk) was the most expensive software in the study, priced at $22,000.00 per year for a single license of the Executive suite, with additional $5,250.00 annual maintenance and upgrading charges. InfoSWMM is beginning to be phased out and purchasing through the vendor's website is no longer possible. A request for a more accurate quote has been sent out to the Autodesk team.

2. InfoWorks ICM (Innovyze /AutoDesk) has two options for purchasing; subscription-based and token-based. The subscription-based option is a flat fee of $7,500 annually for the standard software. For users who do not use the software daily, the token-based system allows for a "pay when you use it" option where you use 31 tokens/day at a cost of $300/100 tokens. It should be noted that for the token-based system, whether you use the software for 20 minutes or 8 hours, both count as one day.

3. SewerGEMS (Bentley) has an annual subscription fee that is based on the maximum number of pipes allowable in a model. Prices range from $2,927 for 250 pipes to $14,644 for unlimited pipes. A table with all the options is presented below.

# of Pipes	Cost per Year
250	$2,927
1,000	$5,859
2,000	$7,615
5,000	$8,785
10,000	$11,713
Unlimited	$14,644

4. PCSWWM (CHI Software) has a range of prices depending on functionality. It is recommended to go for at least the "Professional 2D" package at $2,400 per user per year. If it is planned for three or more users to utilize the software, the Enterprise version is recommended with a base cost of $4,400 per year with an additional $600 per user, totaling at $6,200 per year for three users.

A summary of the software costs is presented in the table below:

Software	InfoSWWM	SewerGEMS	InfoWorks ICM	PCSWMM
Subscription	N/A	$2,927 - $14,233.00	$7,500	$2,400 - $6,200
Token Based	N/A	N/A	31 Tokens/day ($300/100 tokens)	N/A
Fixed	$45,000	N/A	N/A	N/A

Conclusion

Of the software packages analyzed, all of them meet the basic needs of the modeling task, except possibly InfoSWMM which has lost a lot of support, including ease of purchasing and the loss of access coming in 2026. PCSWMM and SewerGEMS could get the job done but, the best flexibility and detail of functions comes in InfoWorks ICM. While PCSWMM comes off as the most affordable option with a cost of $6,200 per year for three users. With the plan to expand the model to include the entirety of the system in the future, InfoWorks ICM is the best option due to its robust software package that allows for design of more complex systems as well as the new token-based payment system that allows for paying by the day.

Recommendation

After the review and analysis of these different software packages, it is recommended that the City of Noblesville move forward with **InfoWorks ICM** as the modeling software of choice due to its large range of functionalities, especially when it comes to more complex systems as the model is expanded in the future, and its flexibility in payment that allows users who utilize the model less frequently to pay on an as needed basis.

References

InfoSWMM

--Information: Introduction - InfoSWMM Help Documentation - Innovyze

--Pricing: No longer supported on the webpage.

InfoWorksICM

--Information: InfoWorks ICM - Sewer Edition | Innovyze® Store

-- Pricing: InfoWorks ICM | Get Prices & Buy InfoWorks ICM 2023 | Autodesk

SewerGEMS

--Information: OpenFlows SewerGEMS | Bentley Systems

-- Pricing: Buy OpenFlows SewerGEMS

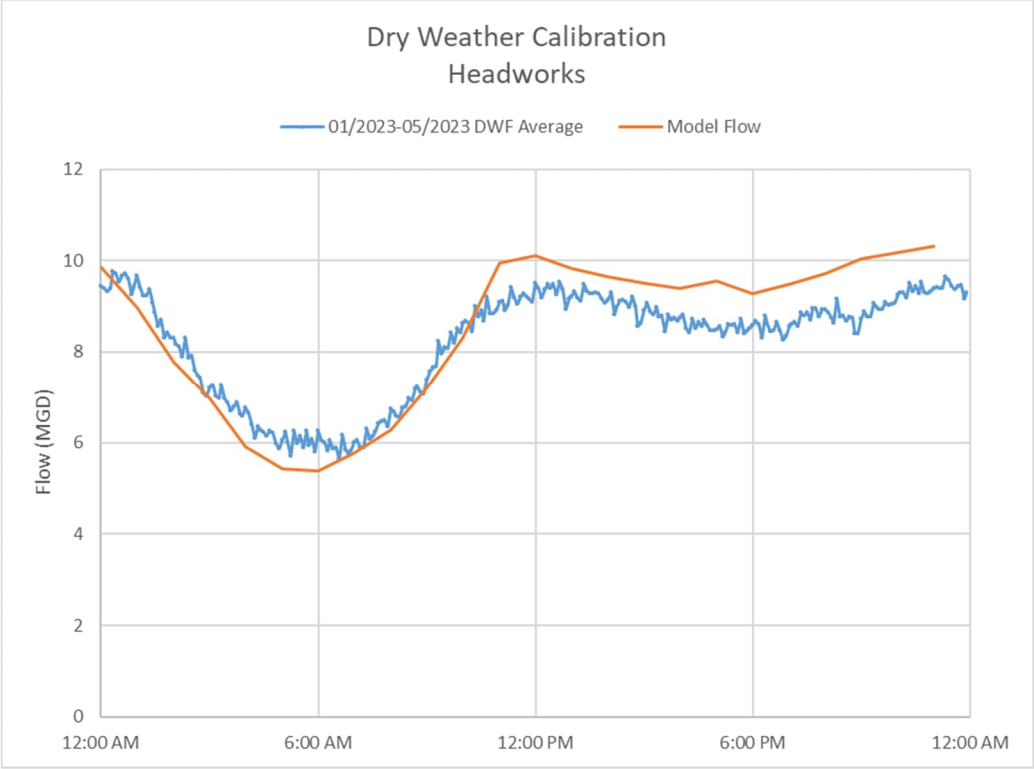
PC SWMM

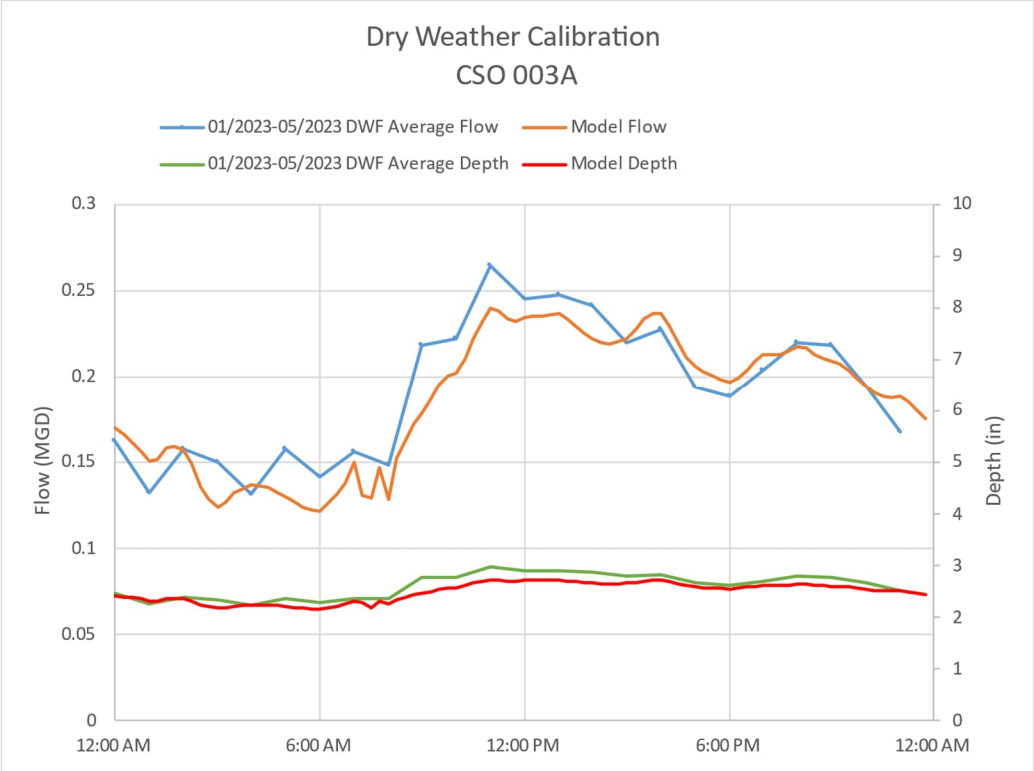
--Information: SWMM5 modeling with PCSWMM

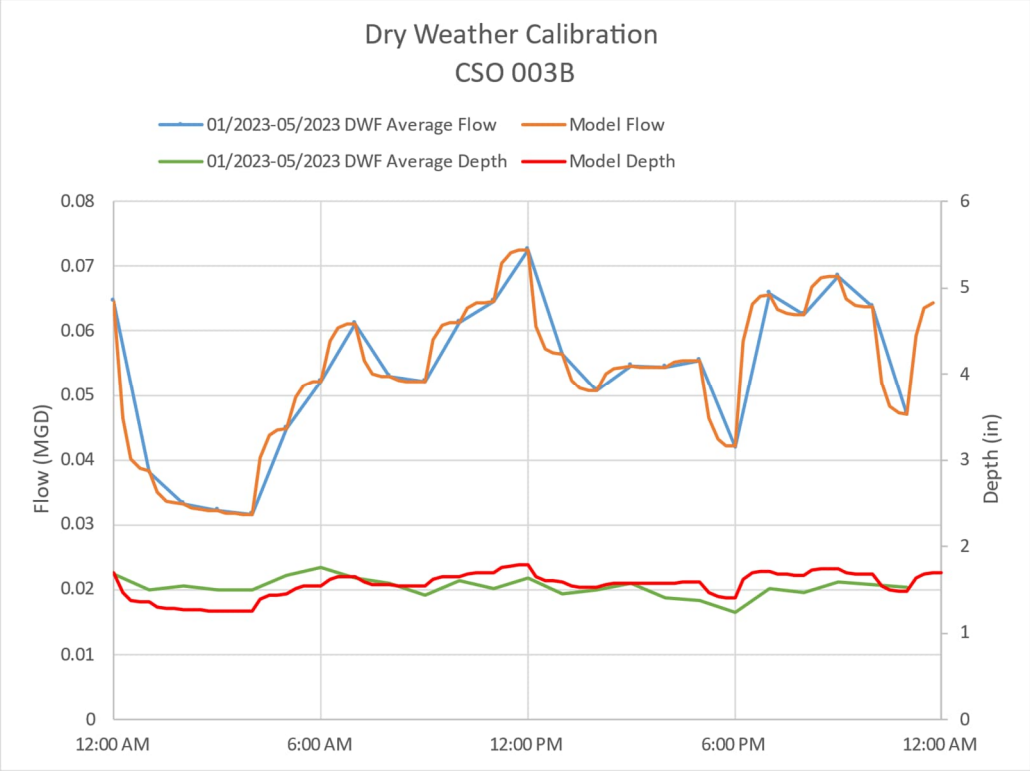
--Pricing: PCSWMM Pricing

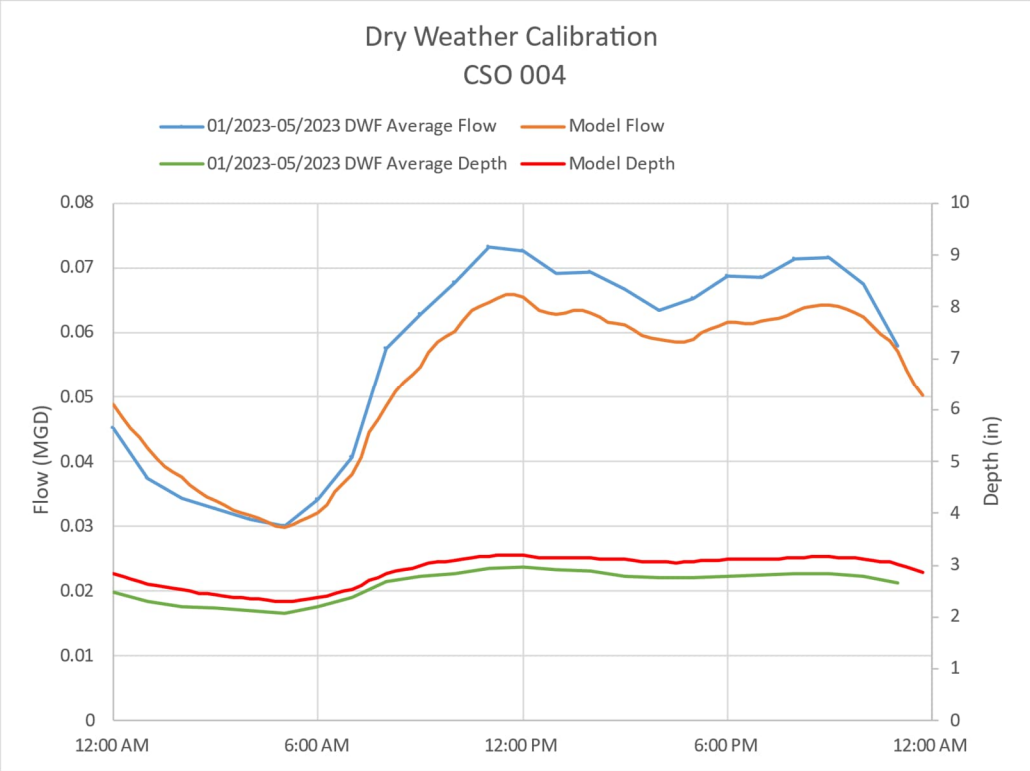
APPENDIX C

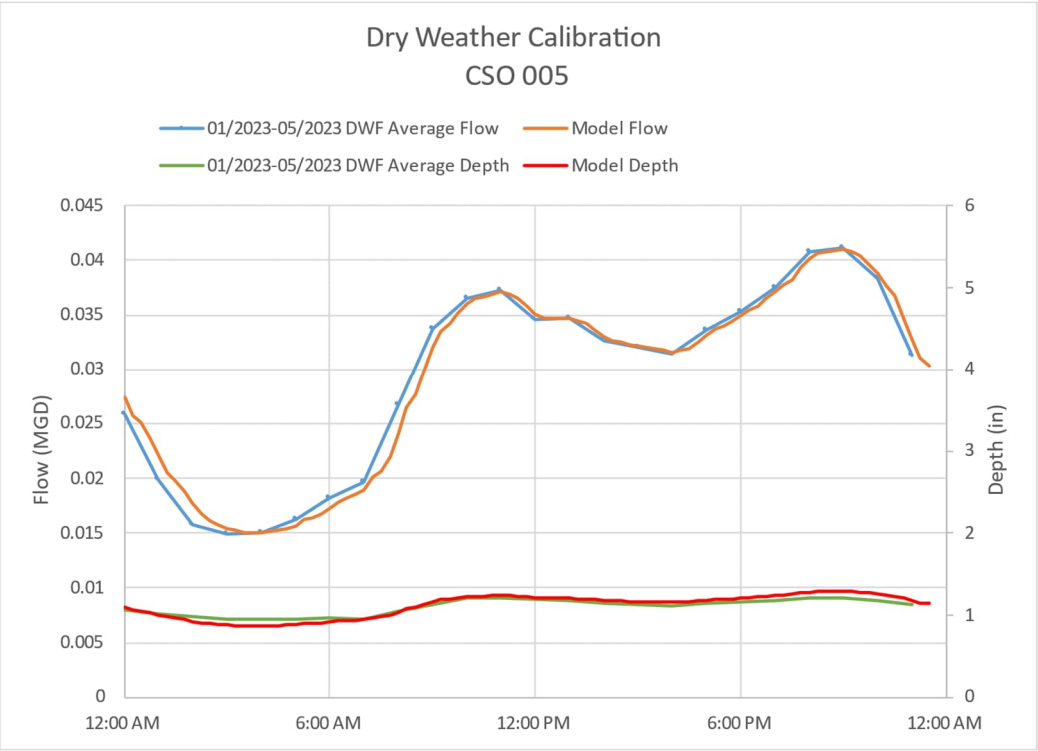
Dry Weather Calibration Charts

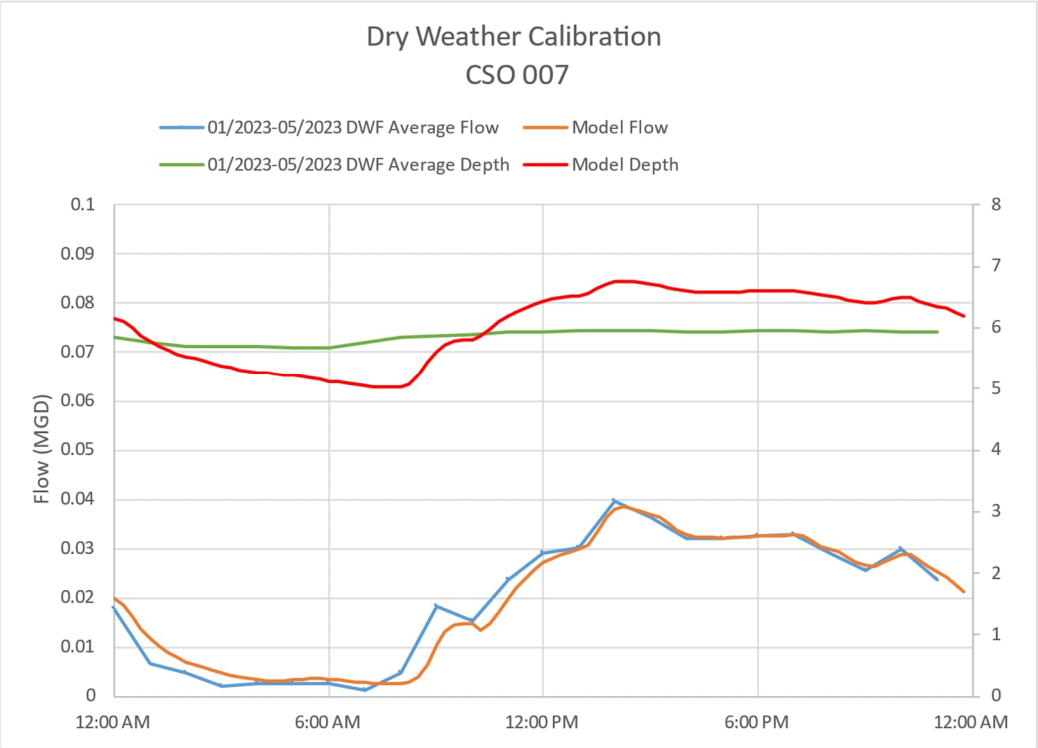

Dry Weather Calibration
Headworks
01/2023-05/2023 DWF Average
Model Flow
Flow (MGD)
12
10
8
6
4
2
0
12:00 AM
6:00 AM
12:00 PM
6:00 PM
12:00 AM

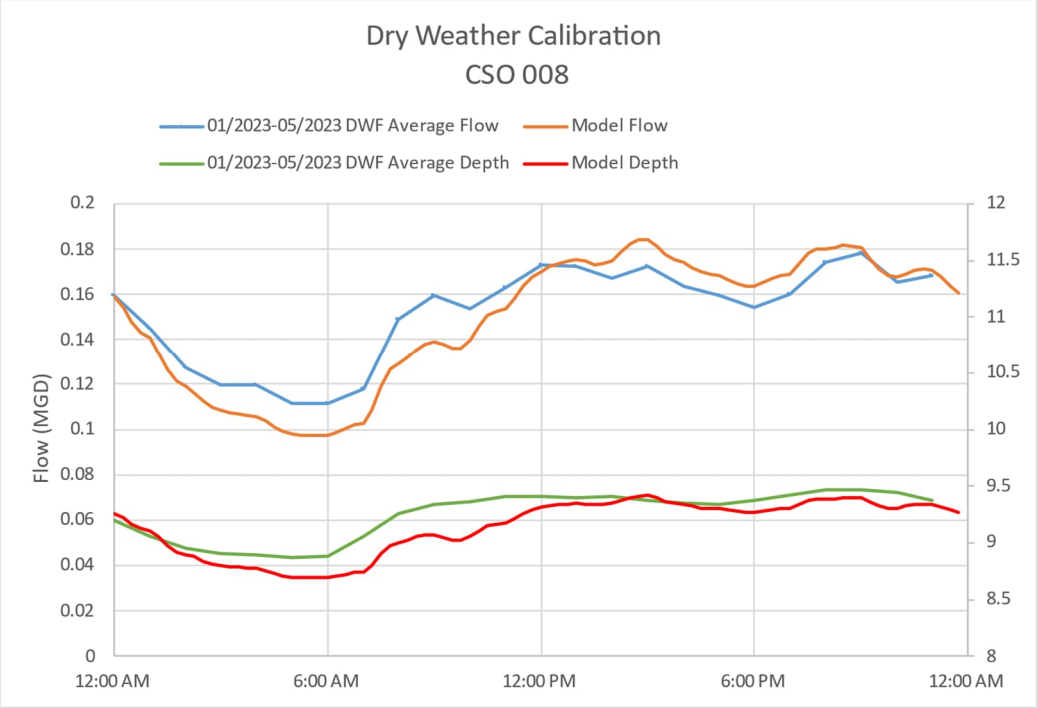

Dry Weather Calibration
CSO 003A
01/2023-05/2023 DWF Average Flow
Model Flow
01/2023-05/2023 DWF Average Depth
Model Depth
Flow (MGD)
0.3
0.25
0.2
0.15
0.1
0.05
0
Depth (in)
10
9
8
7
6
5
4
3
2
1
0
12:00 AM
6:00 AM
12:00 PM
6:00 PM
12:00 AM

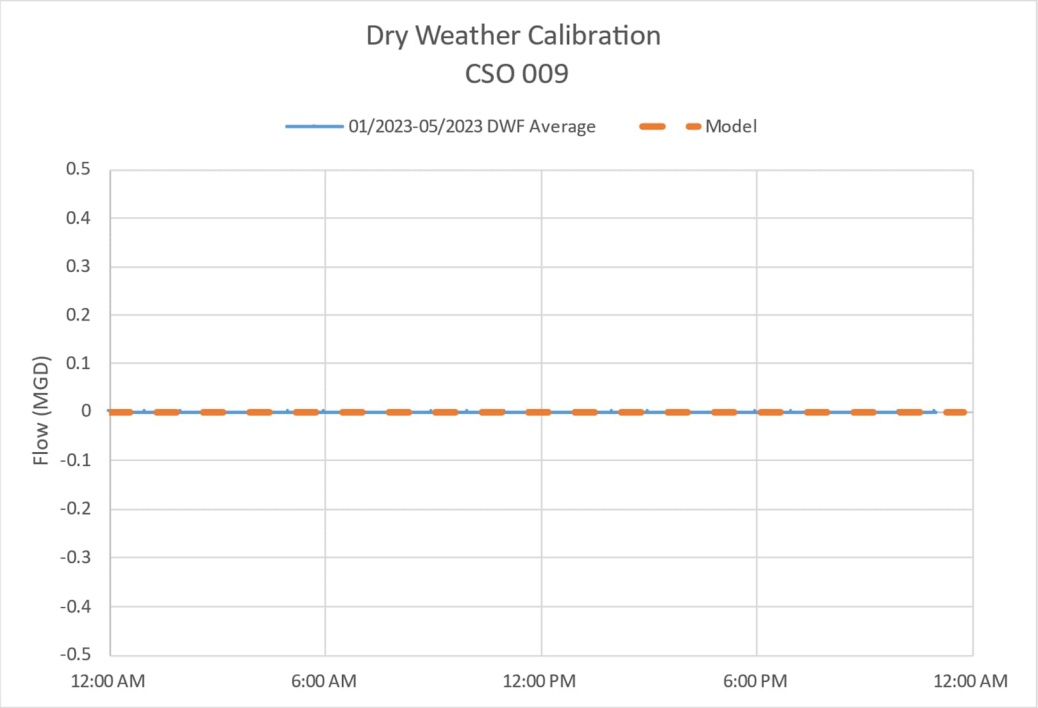

Dry Weather Calibration
CSO 003B
01/2023-05/2023 DWF Average Flow
Model Flow
01/2023-05/2023 DWF Average Depth
Model Depth
Flow (MGD)
Depth (in)
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
6
5
4
3
2
1
0
12:00 AM
6:00 AM
12:00 PM
6:00 PM
12:00 AM

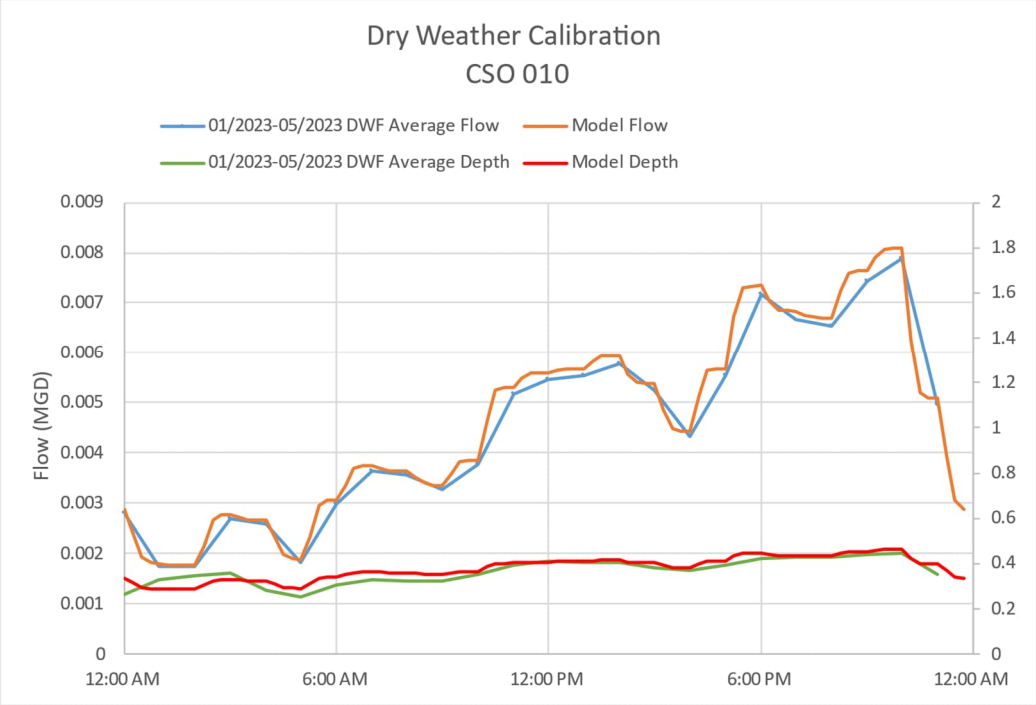

Dry Weather Calibration
CSO 004
01/2023-05/2023 DWF Average Flow
Model Flow
01/2023-05/2023 DWF Average Depth
Model Depth
Flow (MGD)
Depth (in)
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
10
9
8
7
6
5
4
3
2
1
0
12:00 AM
6:00 AM
12:00 PM
6:00 PM
12:00 AM

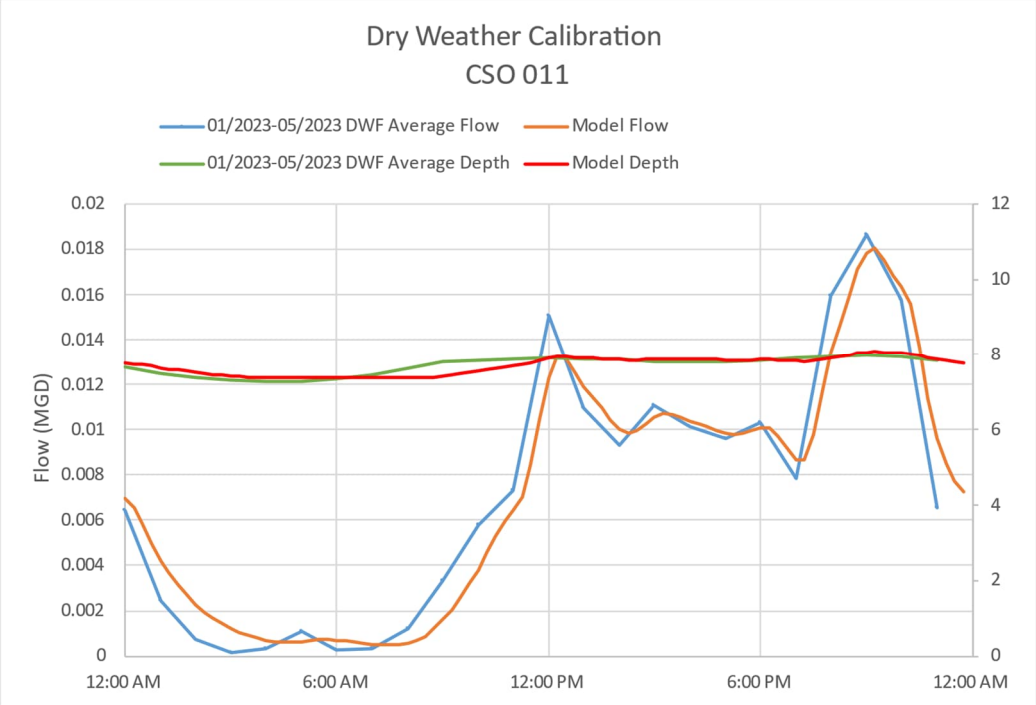

Dry Weather Calibration
CSO 005
01/2023-05/2023 DWF Average Flow
Model Flow
01/2023-05/2023 DWF Average Depth
Model Depth
Flow (MGD)
Depth (in)
0.045
0.04
0.035
0.03
0.025
0.02
0.015
0.01
0.005
0
6
5
4
3
2
1
0
12:00 AM
6:00 AM
12:00 PM
6:00 PM
12:00 AM


Dry Weather Calibration
CSO 007
01/2023-05/2023 DWF Average Flow
Model Flow
01/2023-05/2023 DWF Average Depth
Model Depth
Flow (MGD)
0.1
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
8
7
6
5
4
3
2
1
0
12:00 AM
6:00 AM
12:00 PM
6:00 PM
12:00 AM


Dry Weather Calibration
CSO 008
01/2023-05/2023 DWF Average Flow
Model Flow
01/2023-05/2023 DWF Average Depth
Model Depth
Flow (MGD)
0.2
0.18
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
12
11.5
11
10.5
10
9.5
9
8.5
8
12:00 AM
6:00 AM
12:00 PM
6:00 PM
12:00 AM


Dry Weather Calibration
CSO 009
01/2023-05/2023 DWF Average
Model
Flow (MGD)
0.5
0.4
0.3
0.2
0.1
0
-0.1
-0.2
-0.3
-0.4
-0.5
12:00 AM
6:00 AM
12:00 PM
6:00 PM
12:00 AM

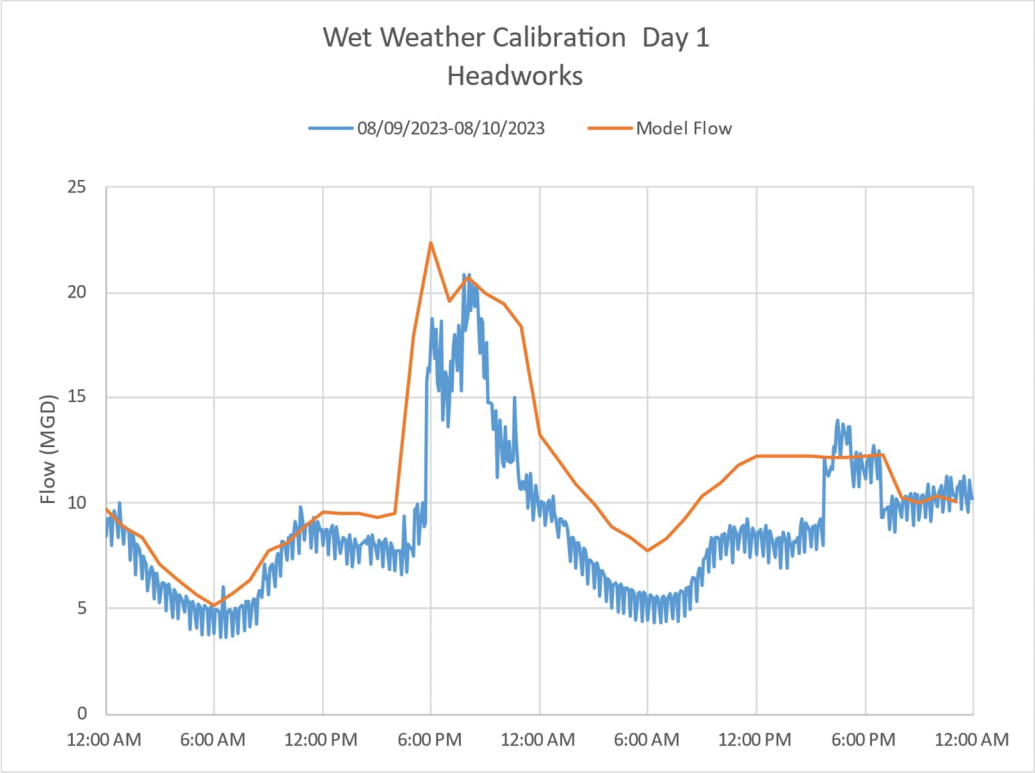

Dry Weather Calibration
CSO 010
01/2023-05/2023 DWF Average Flow
Model Flow
01/2023-05/2023 DWF Average Depth
Model Depth
Flow (MGD)
0.009
0.008
0.007
0.006
0.005
0.004
0.003
0.002
0.001
0
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
12:00 AM
6:00 AM
12:00 PM
6:00 PM
12:00 AM

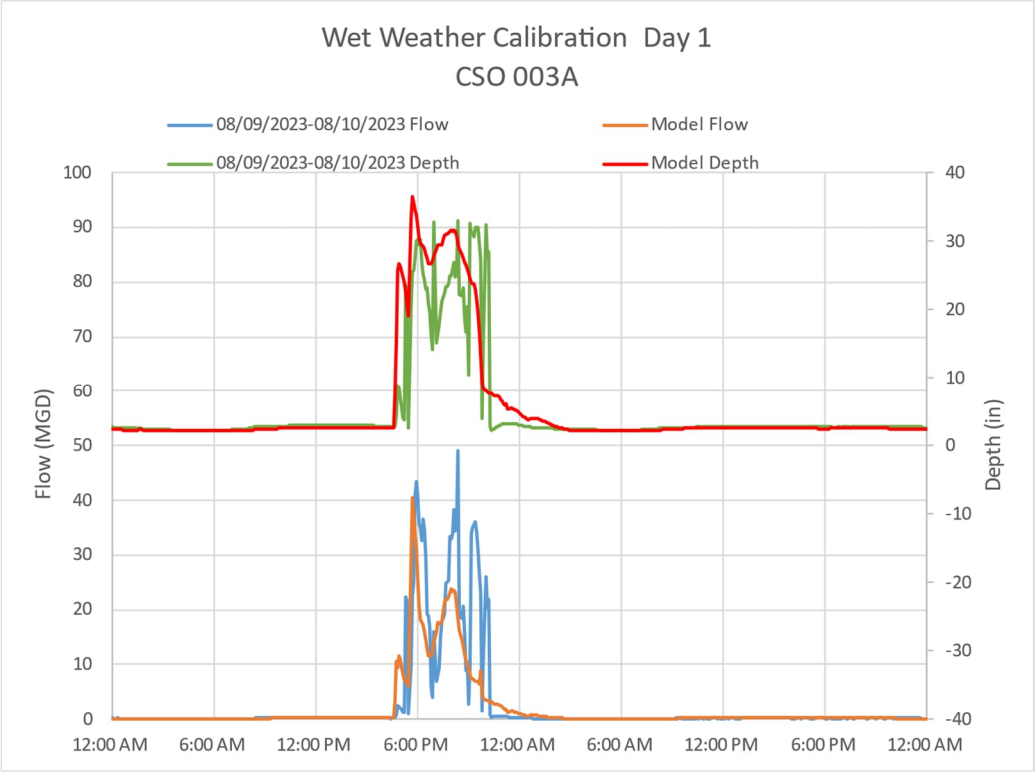

Dry Weather Calibration
CSO 011
01/2023-05/2023 DWF Average Flow
Model Flow
01/2023-05/2023 DWF Average Depth
Model Depth
Flow (MGD)
0.02
0.018
0.016
0.014
0.012
0.01
0.008
0.006
0.004
0.002
0
12
10
8
6
4
2
0
12:00 AM
6:00 AM
12:00 PM
6:00 PM
12:00 AM

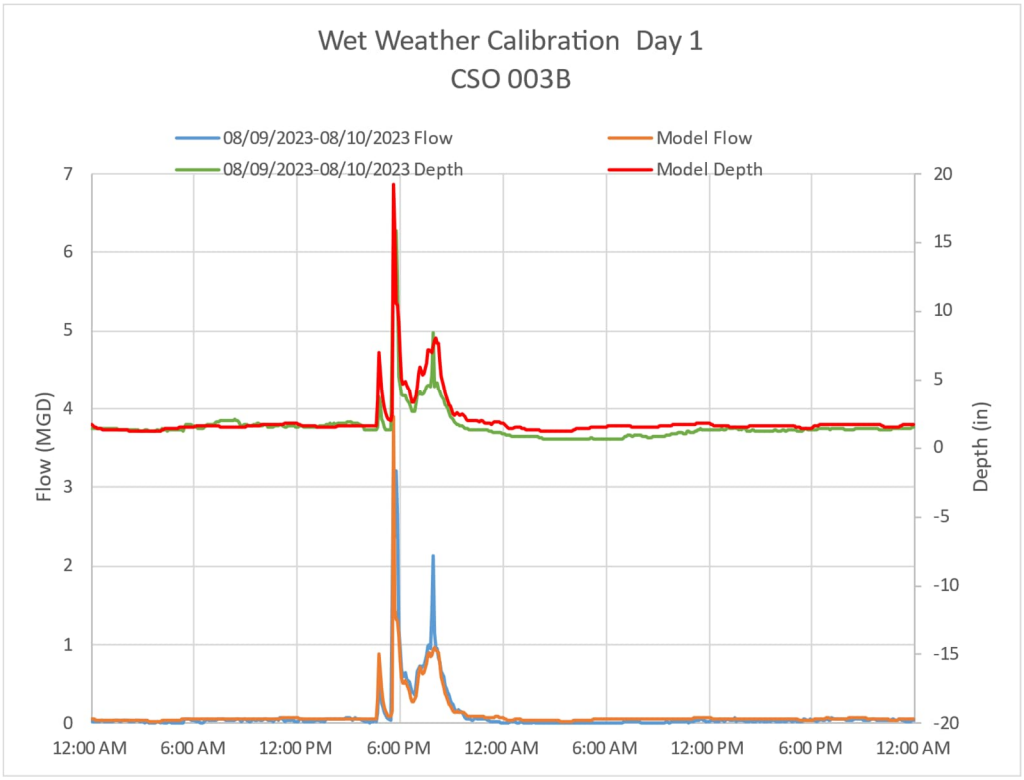
APPENDIX D

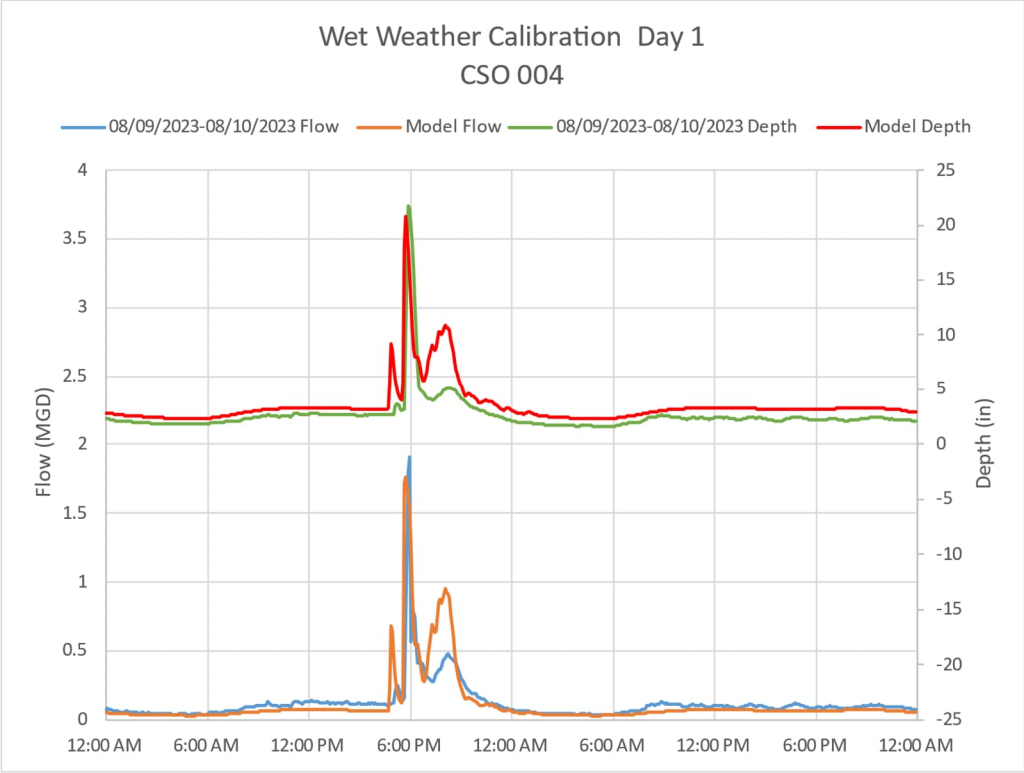
Wet Weather Calibration Charts

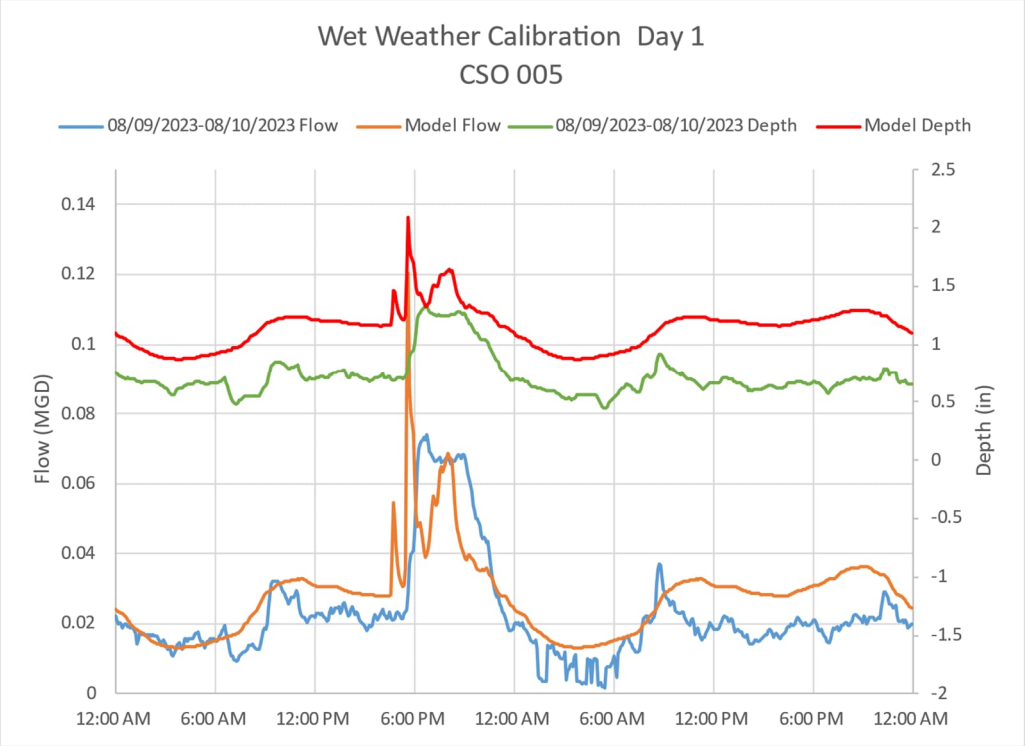
Calibration Day 1 – 08/09/2023

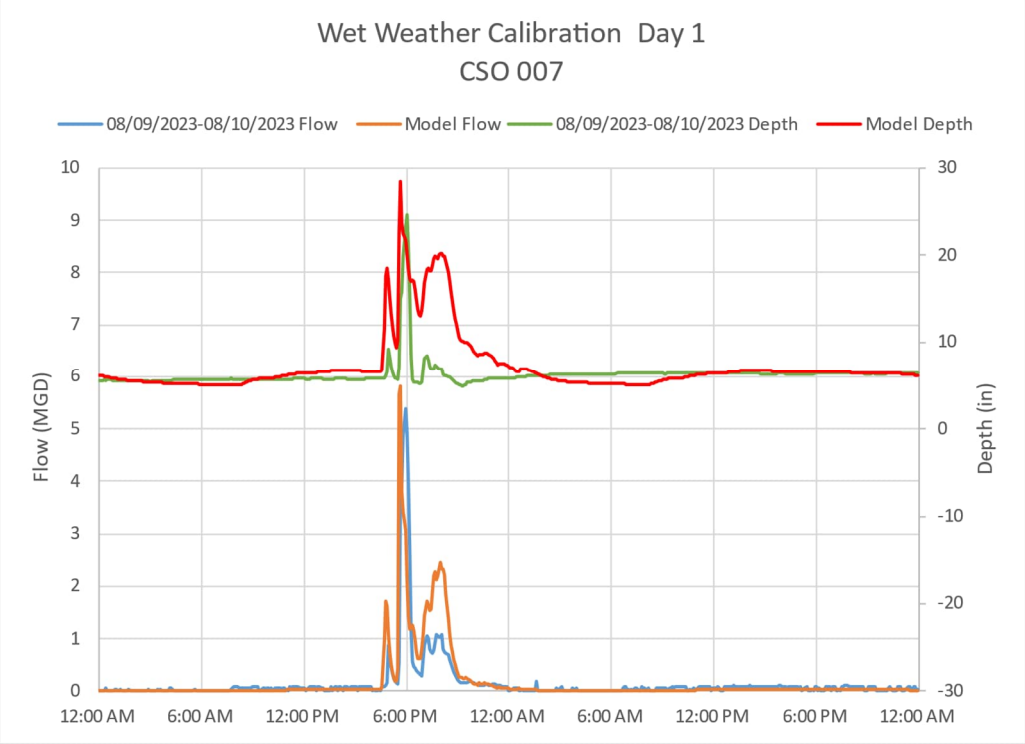


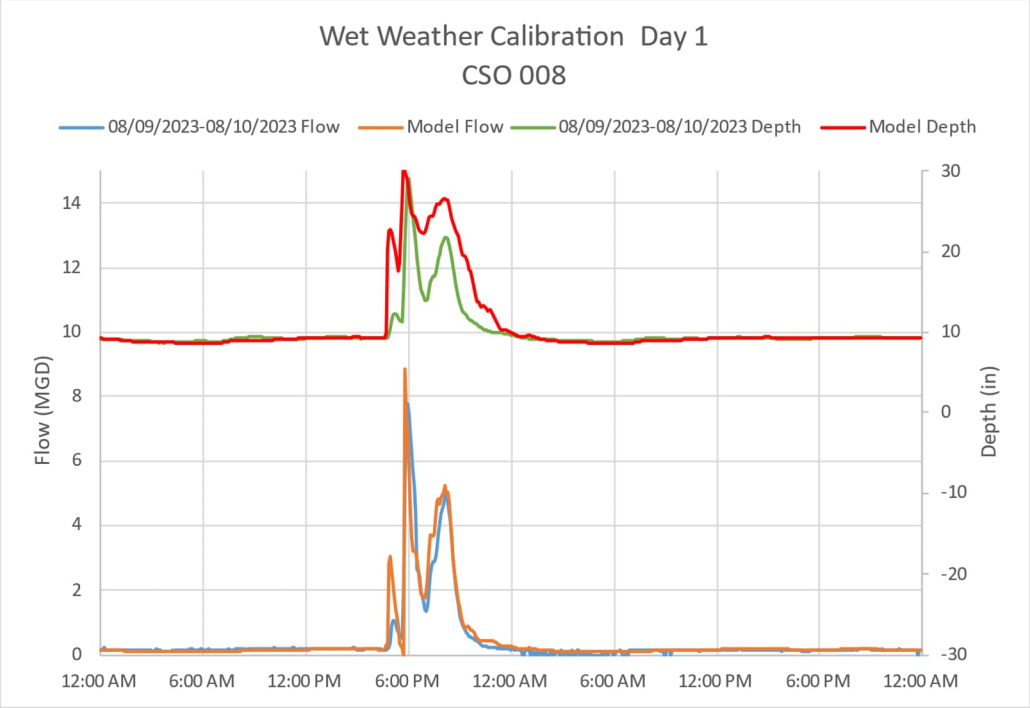


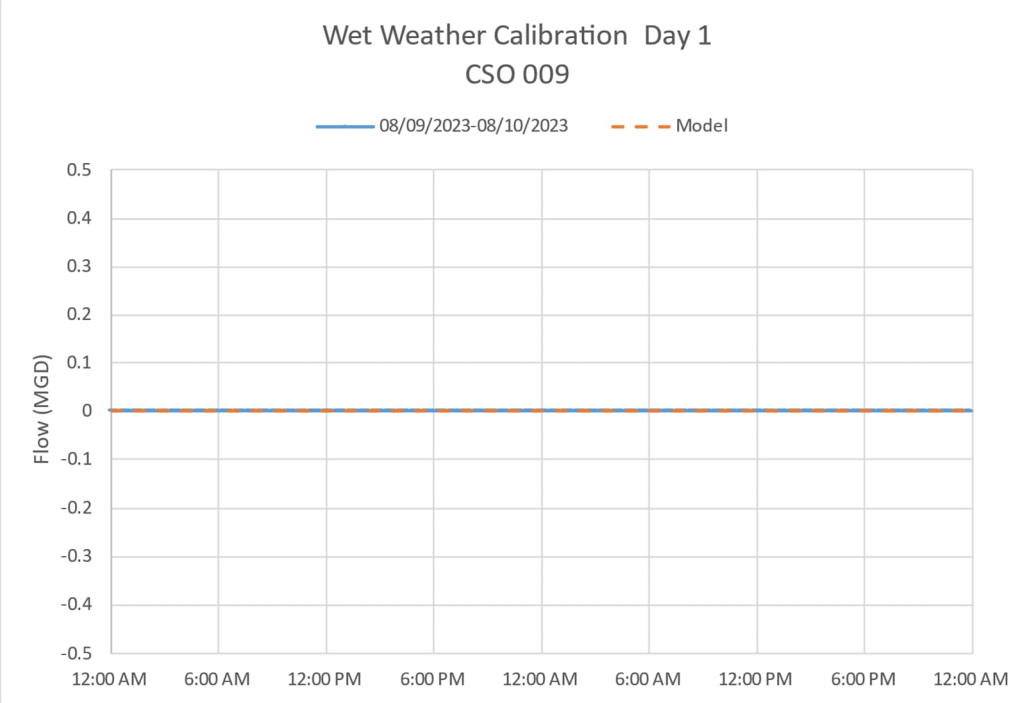

Wet Weather Calibration Day 1
CSO 003B
08/09/2023-08/10/2023 Flow
Model Flow
08/09/2023-08/10/2023 Depth
Model Depth
Flow (MGD)
Depth (in)
0
1
2
3
4
5
6
7
-20
-15
-10
-5
0
5
10
15
20
12:00 AM
6:00 AM
12:00 PM
6:00 PM
12:00 AM
6:00 AM
12:00 PM
6:00 PM
12:00 AM

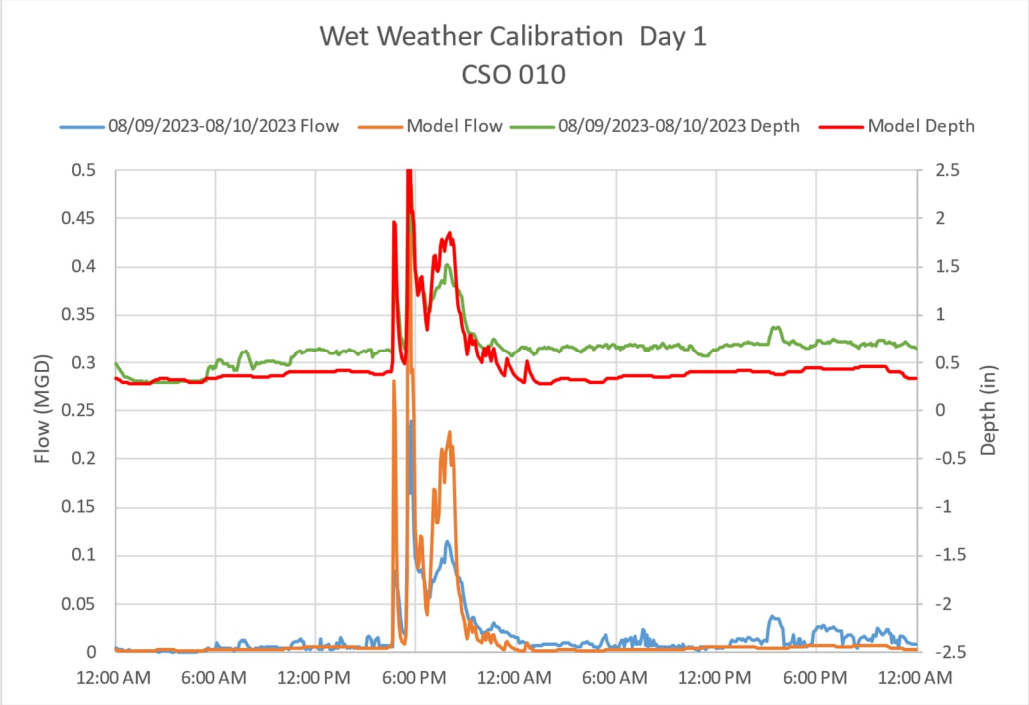

Wet Weather Calibration Day 1
CSO 004
08/09/2023-08/10/2023 Flow
Model Flow
08/09/2023-08/10/2023 Depth
Model Depth
Flow (MGD)
Depth (in)
0
0.5
1
1.5
2
2.5
3
3.5
4
-25
-20
-15
-10
-5
0
5
10
15
20
25
12:00 AM
6:00 AM
12:00 PM
6:00 PM
12:00 AM
6:00 AM
12:00 PM
6:00 PM
12:00 AM

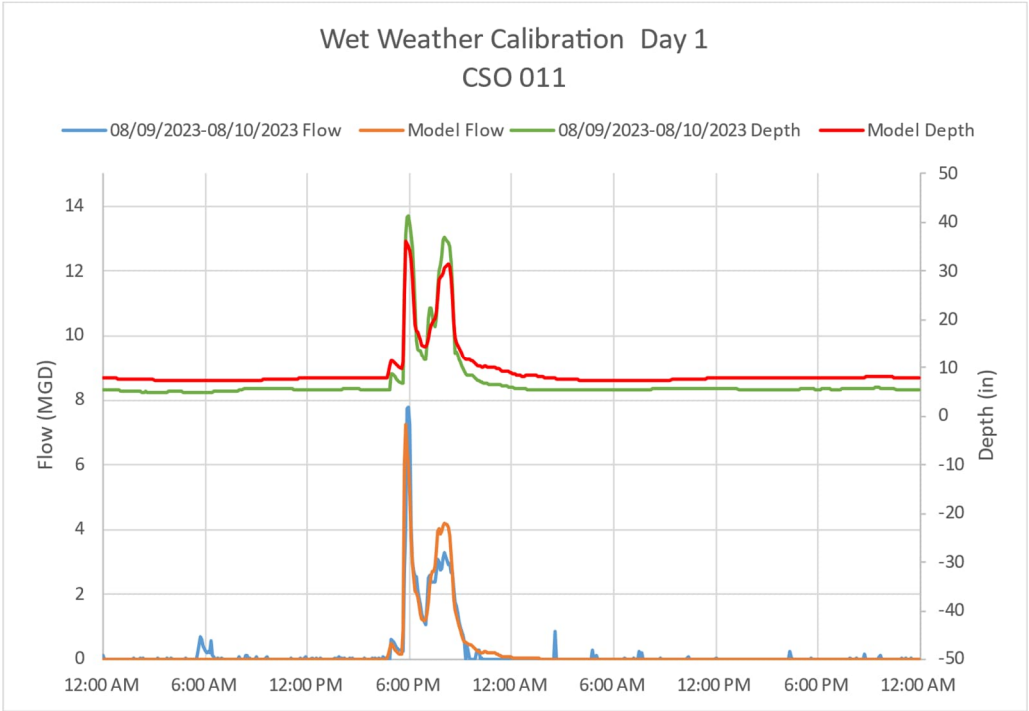

Wet Weather Calibration Day 1
CSO 005
08/09/2023-08/10/2023 Flow
Model Flow
08/09/2023-08/10/2023 Depth
Model Depth
Flow (MGD)
Depth (in)
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
2.5
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
12:00 AM
6:00 AM
12:00 PM
6:00 PM
12:00 AM
6:00 AM
12:00 PM
6:00 PM
12:00 AM


Wet Weather Calibration Day 1
CSO 007
08/09/2023-08/10/2023 Flow
Model Flow
08/09/2023-08/10/2023 Depth
Model Depth
Flow (MGD)
Depth (in)
10
9
8
7
6
5
4
3
2
1
0
30
20
10
0
-10
-20
-30
12:00 AM
6:00 AM
12:00 PM
6:00 PM
12:00 AM
6:00 AM
12:00 PM
6:00 PM
12:00 AM

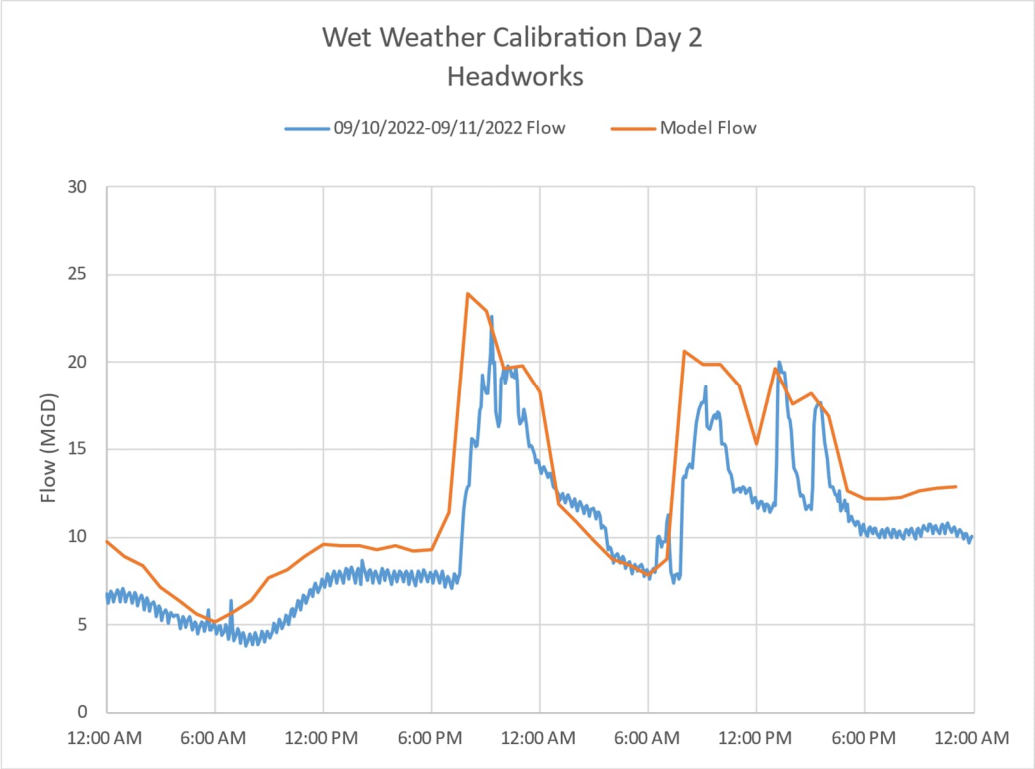

Wet Weather Calibration Day 1
CSO 008
08/09/2023-08/10/2023 Flow
Model Flow
08/09/2023-08/10/2023 Depth
Model Depth
Flow (MGD)
Depth (in)
0
2
4
6
8
10
12
14
30
20
10
0
-10
-20
-30
12:00 AM
6:00 AM
12:00 PM
6:00 PM
12:00 AM
6:00 AM
12:00 PM
6:00 PM
12:00 AM

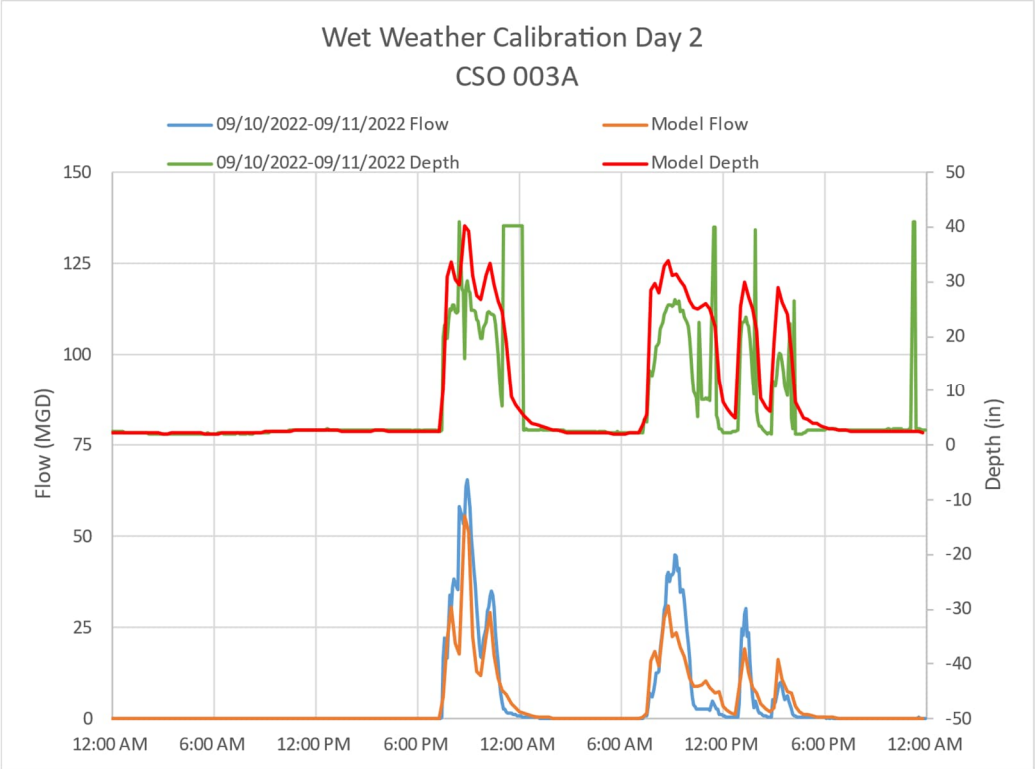

Wet Weather Calibration Day 1
CSO 009
08/09/2023-08/10/2023
Model
Flow (MGD)
0.5
0.4
0.3
0.2
0.1
0
-0.1
-0.2
-0.3
-0.4
-0.5
12:00 AM
6:00 AM
12:00 PM
6:00 PM
12:00 AM
6:00 AM
12:00 PM
6:00 PM
12:00 AM

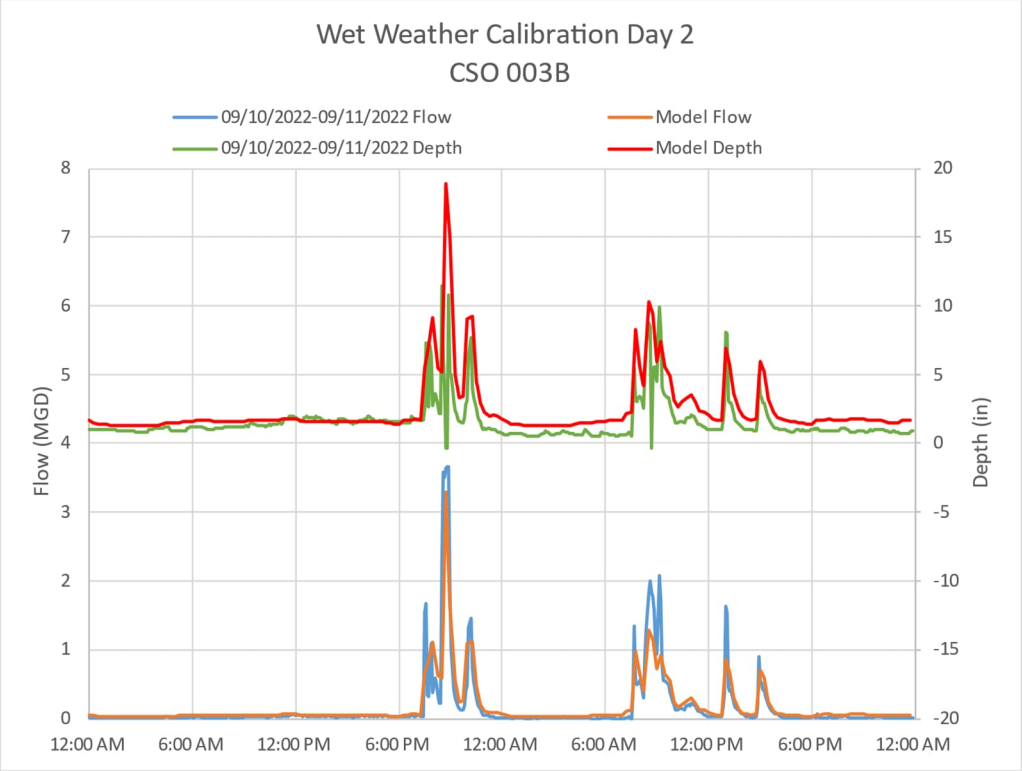

Wet Weather Calibration Day 1
CSO 010
08/09/2023-08/10/2023 Flow
Model Flow
08/09/2023-08/10/2023 Depth
Model Depth
Flow (MGD)
Depth (in)
0.5
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
2.5
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
-2.5
12:00 AM
6:00 AM
12:00 PM
6:00 PM
12:00 AM
6:00 AM
12:00 PM
6:00 PM
12:00 AM

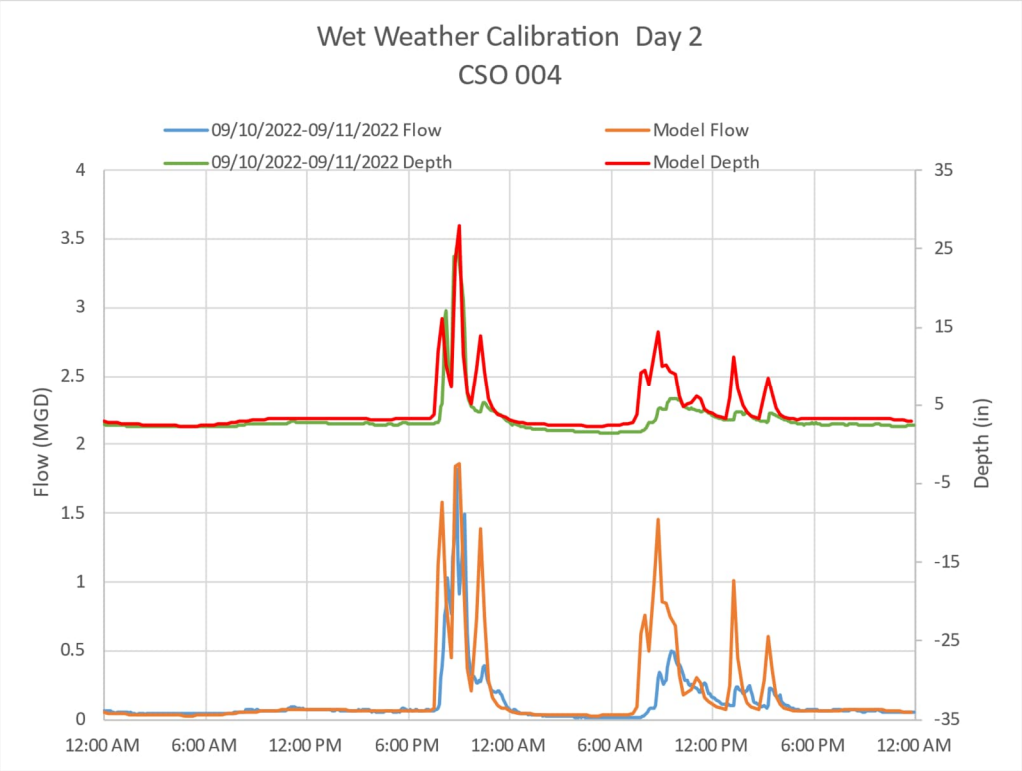

Wet Weather Calibration Day 1
CSO 011
08/09/2023-08/10/2023 Flow
Model Flow
08/09/2023-08/10/2023 Depth
Model Depth
Flow (MGD)
Depth (in)
14
12
10
8
6
4
2
0
50
40
30
20
10
0
-10
-20
-30
-40
-50
12:00 AM
6:00 AM
12:00 PM
6:00 PM
12:00 AM
6:00 AM
12:00 PM
6:00 PM
12:00 AM

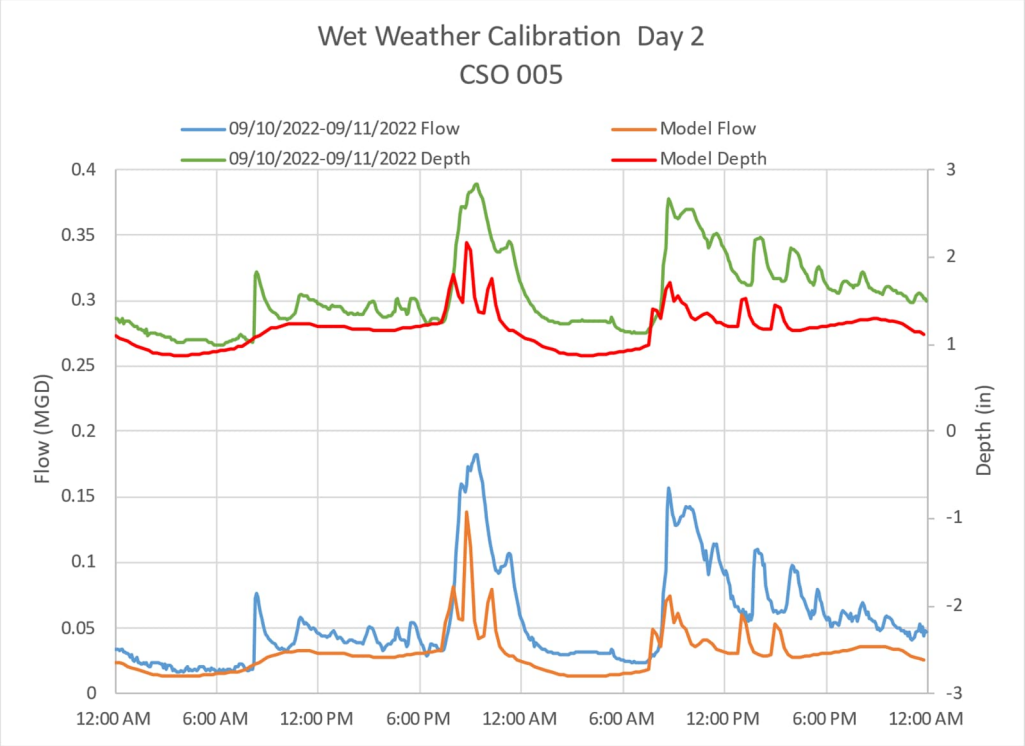
Calibration Day 2 – 09/10-11/2022

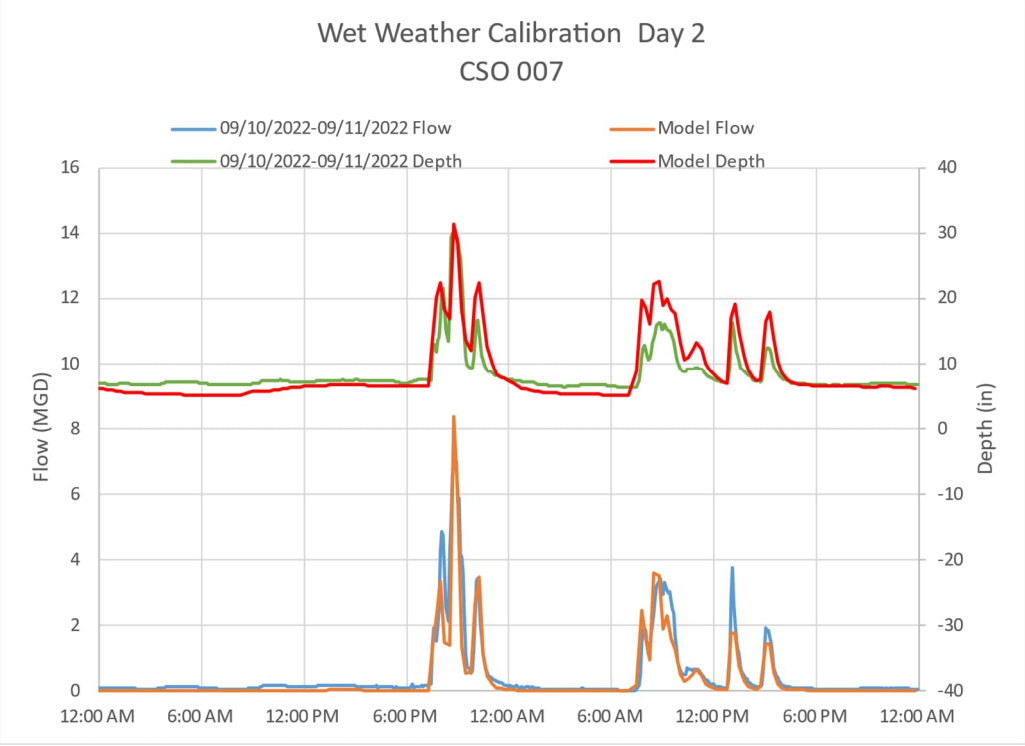


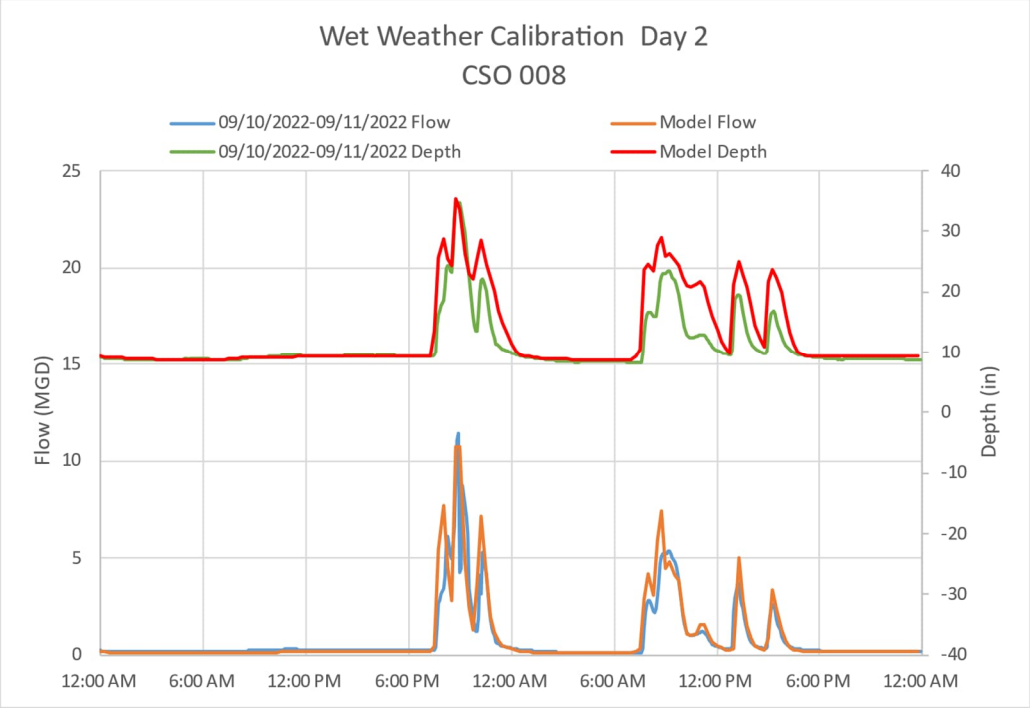


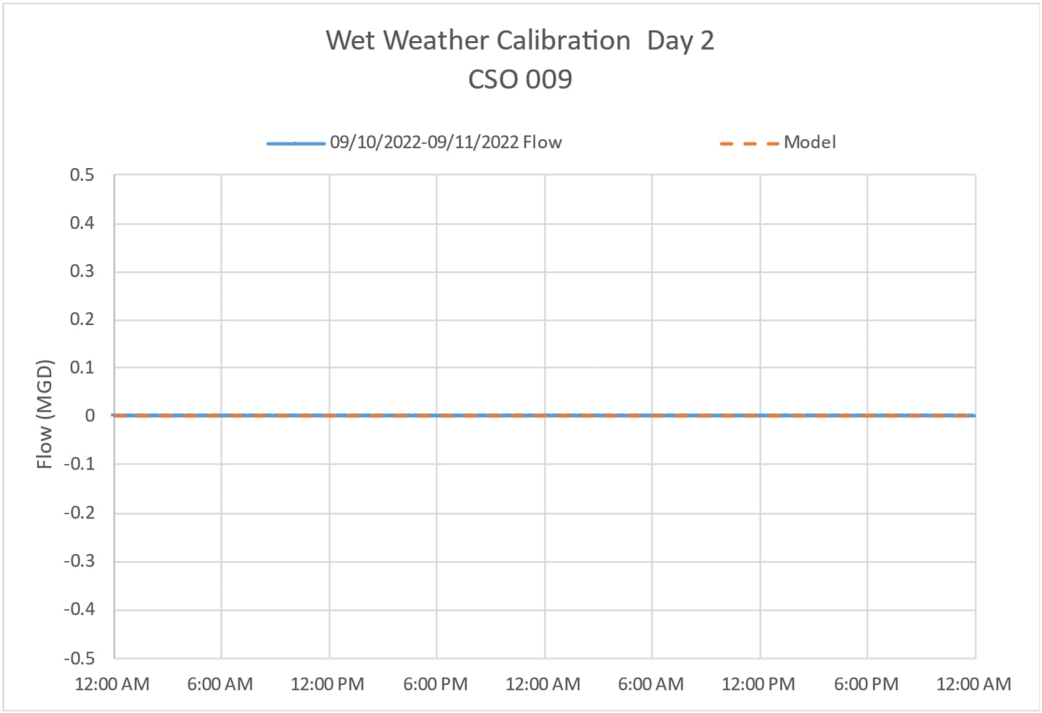

Wet Weather Calibration Day 2
CSO 003B
09/10/2022-09/11/2022 Flow
Model Flow
09/10/2022-09/11/2022 Depth
Model Depth
Flow (MGD)
Depth (in)
8
7
6
5
4
3
2
1
0
20
15
10
5
0
-5
-10
-15
-20
12:00 AM
6:00 AM
12:00 PM
6:00 PM
12:00 AM
6:00 AM
12:00 PM
6:00 PM
12:00 AM

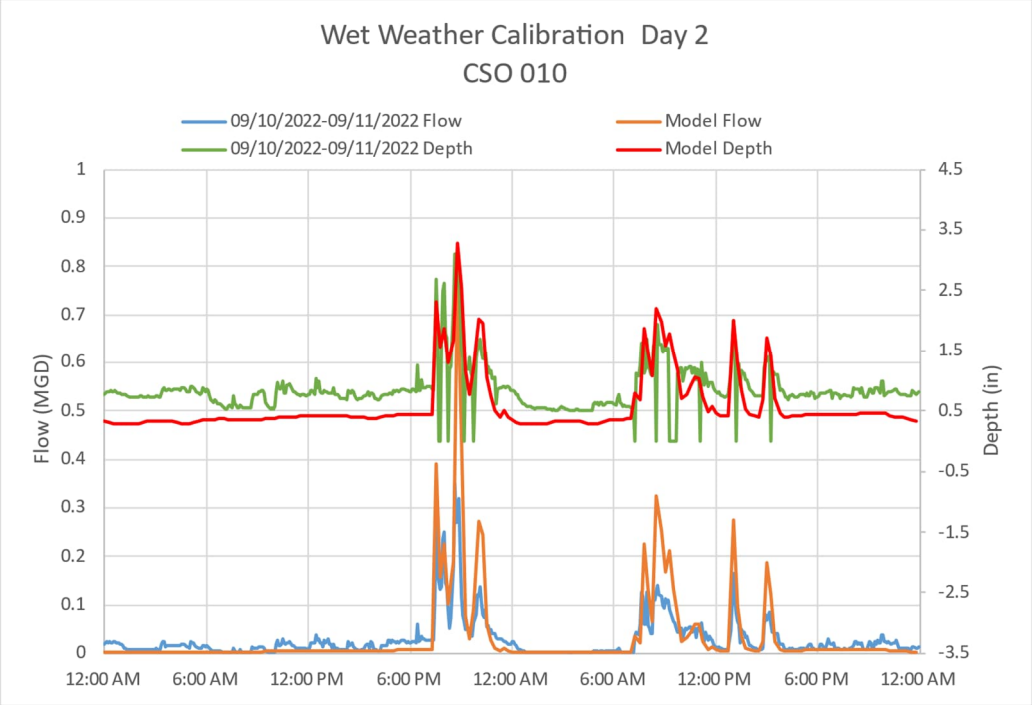

Wet Weather Calibration Day 2
CSO 004
09/10/2022-09/11/2022 Flow
Model Flow
09/10/2022-09/11/2022 Depth
Model Depth
Flow (MGD)
Depth (in)
4
3.5
3
2.5
2
1.5
1
0.5
0
35
25
15
5
-5
-15
-25
-35
12:00 AM
6:00 AM
12:00 PM
6:00 PM
12:00 AM
6:00 AM
12:00 PM
6:00 PM
12:00 AM

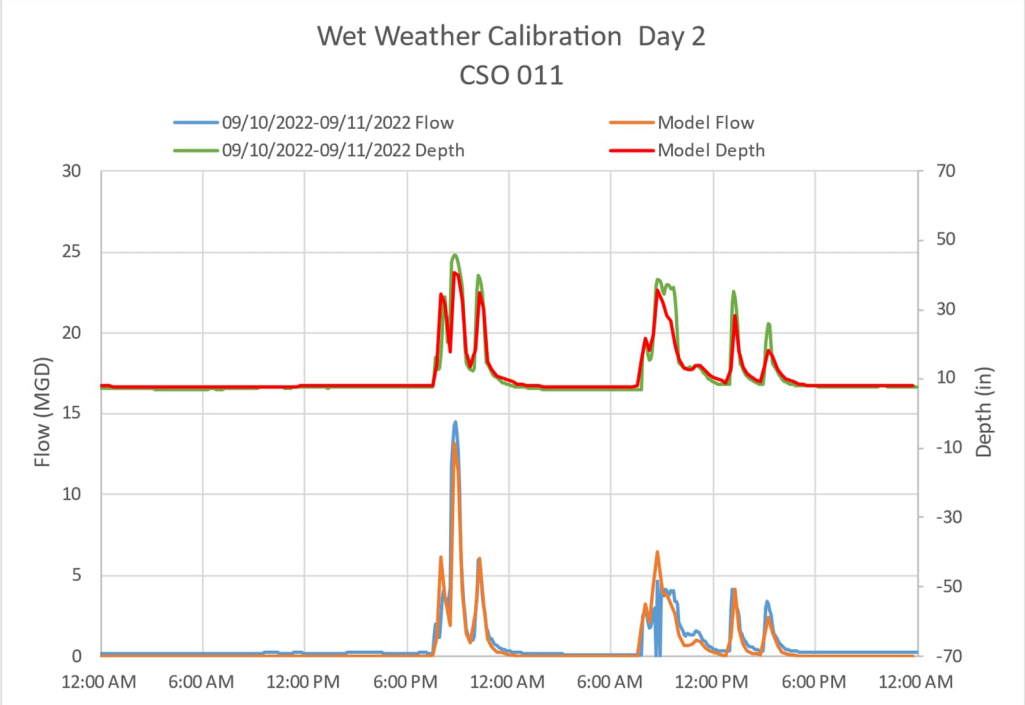

Wet Weather Calibration Day 2
CSO 005
09/10/2022-09/11/2022 Flow
Model Flow
09/10/2022-09/11/2022 Depth
Model Depth
Flow (MGD)
Depth (in)
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
3
2
1
0
-1
-2
-3
12:00 AM
6:00 AM
12:00 PM
6:00 PM
12:00 AM
6:00 AM
12:00 PM
6:00 PM
12:00 AM


Wet Weather Calibration Day 2
CSO 007
09/10/2022-09/11/2022 Flow
Model Flow
09/10/2022-09/11/2022 Depth
Model Depth
Flow (MGD)
Depth (in)
16
14
12
10
8
6
4
2
0
40
30
20
10
0
-10
-20
-30
-40
12:00 AM
6:00 AM
12:00 PM
6:00 PM
12:00 AM
6:00 AM
12:00 PM
6:00 PM
12:00 AM


Wet Weather Calibration Day 2
CSO 008
09/10/2022-09/11/2022 Flow
Model Flow
09/10/2022-09/11/2022 Depth
Model Depth
Flow (MGD)
Depth (in)
25
20
15
10
5
0
40
30
20
10
0
-10
-20
-30
-40
12:00 AM
6:00 AM
12:00 PM
6:00 PM
12:00 AM
6:00 AM
12:00 PM
6:00 PM
12:00 AM


Wet Weather Calibration Day 2
CSO 009
09/10/2022-09/11/2022 Flow
Model
Flow (MGD)
0.5
0.4
0.3
0.2
0.1
0
-0.1
-0.2
-0.3
-0.4
-0.5
12:00 AM
6:00 AM
12:00 PM
6:00 PM
12:00 AM
6:00 AM
12:00 PM
6:00 PM
12:00 AM

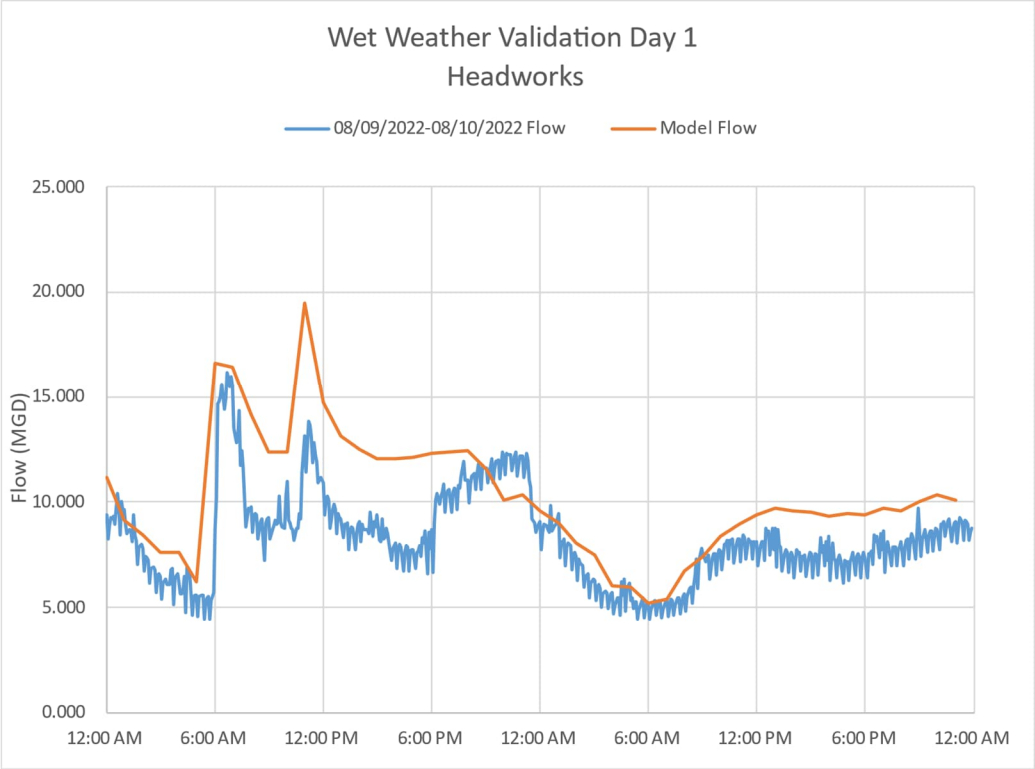

Wet Weather Calibration Day 2
CSO 010
09/10/2022-09/11/2022 Flow
09/10/2022-09/11/2022 Depth
Model Flow
Model Depth
Flow (MGD)
Depth (in)
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
4.5
3.5
2.5
1.5
0.5
-0.5
-1.5
-2.5
-3.5
12:00 AM
6:00 AM
12:00 PM
6:00 PM
12:00 AM
6:00 AM
12:00 PM
6:00 PM
12:00 AM

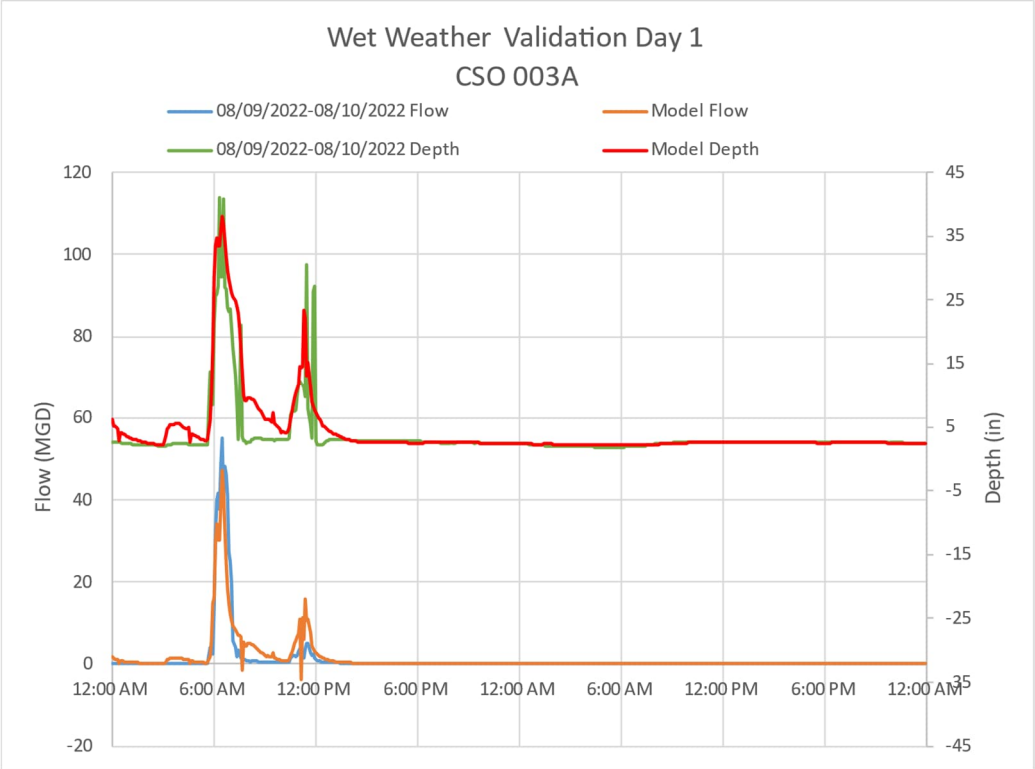

Wet Weather Calibration Day 2
CSO 011
09/10/2022-09/11/2022 Flow
09/10/2022-09/11/2022 Depth
Model Flow
Model Depth
Flow (MGD)
Depth (in)
30
25
20
15
10
5
0
70
50
30
10
-10
-30
-50
-70
12:00 AM
6:00 AM
12:00 PM
6:00 PM
12:00 AM
6:00 AM
12:00 PM
6:00 PM
12:00 AM

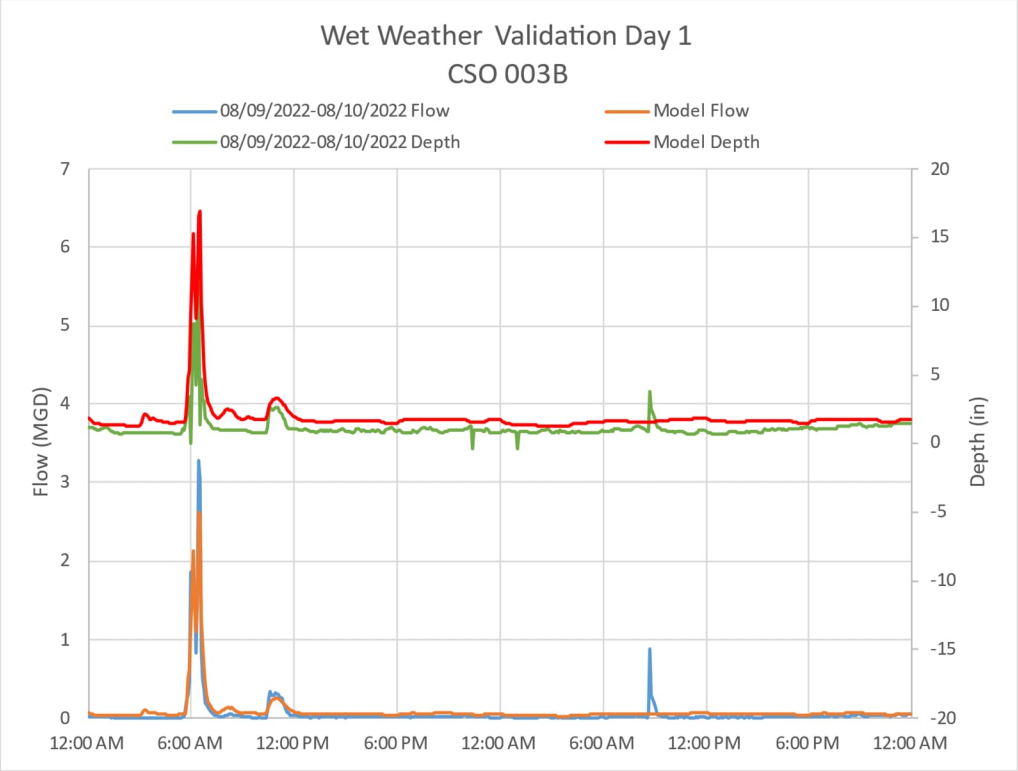
APPENDIX E

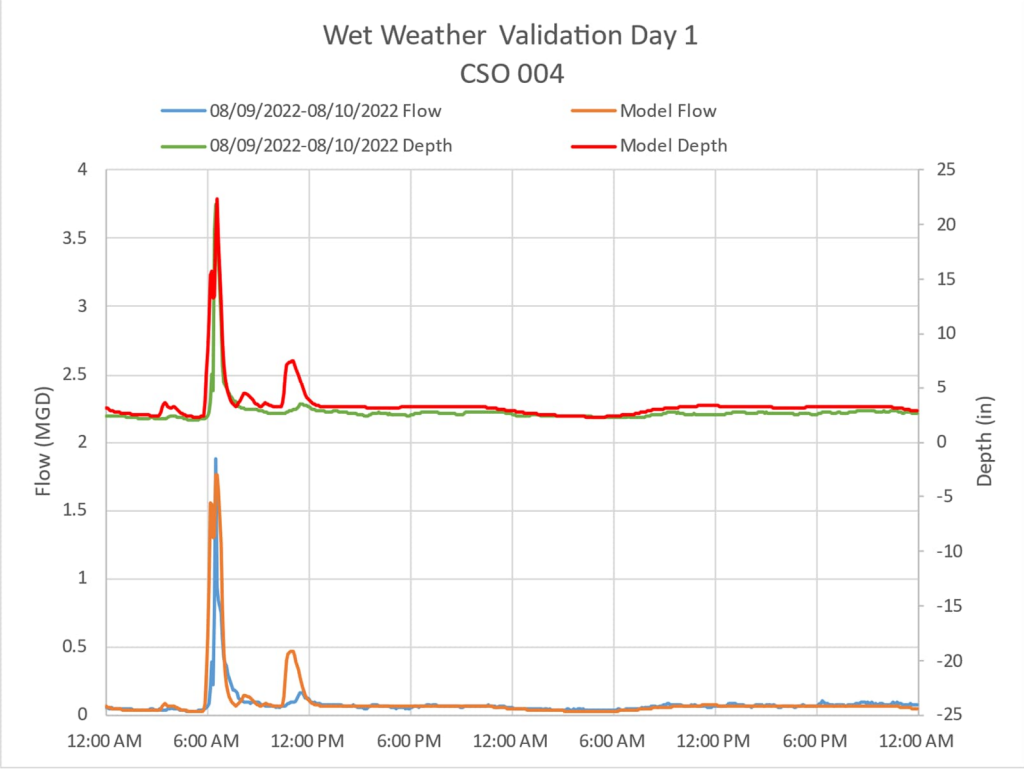
Wet Weather Validation Charts

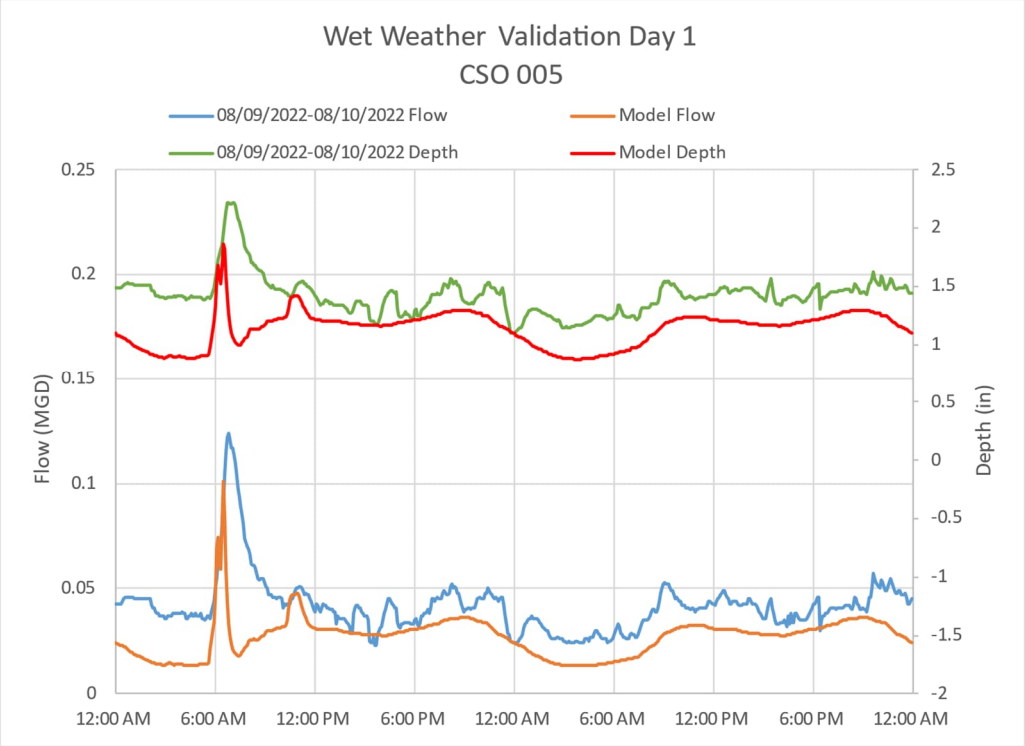
Validation Day 1 – 08/09/2022

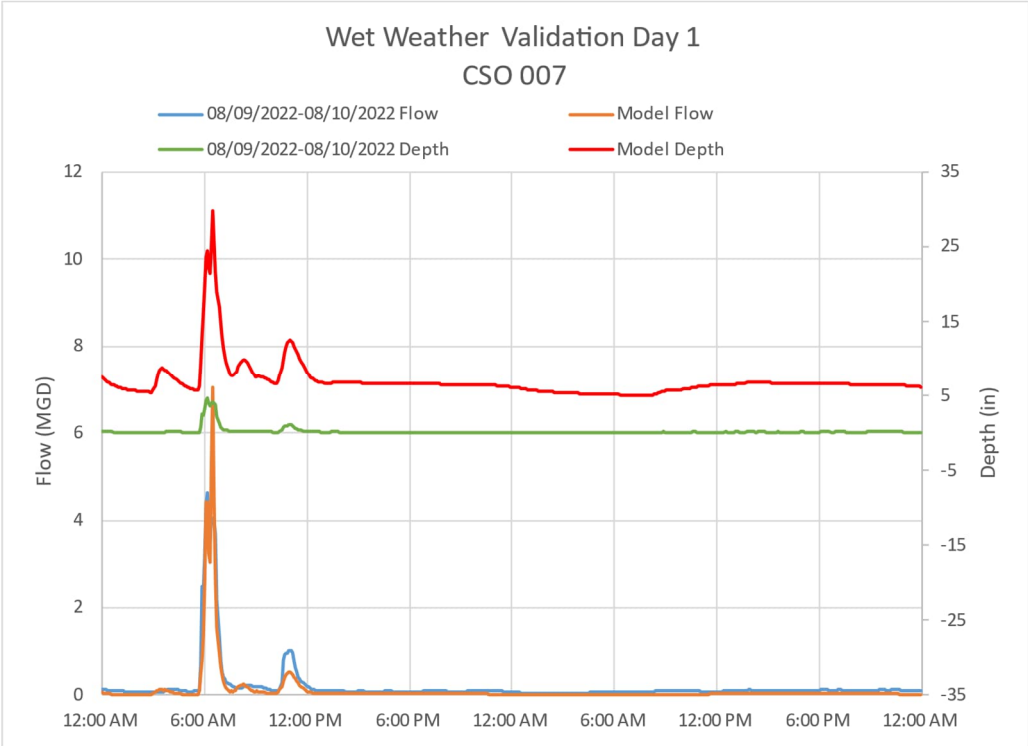


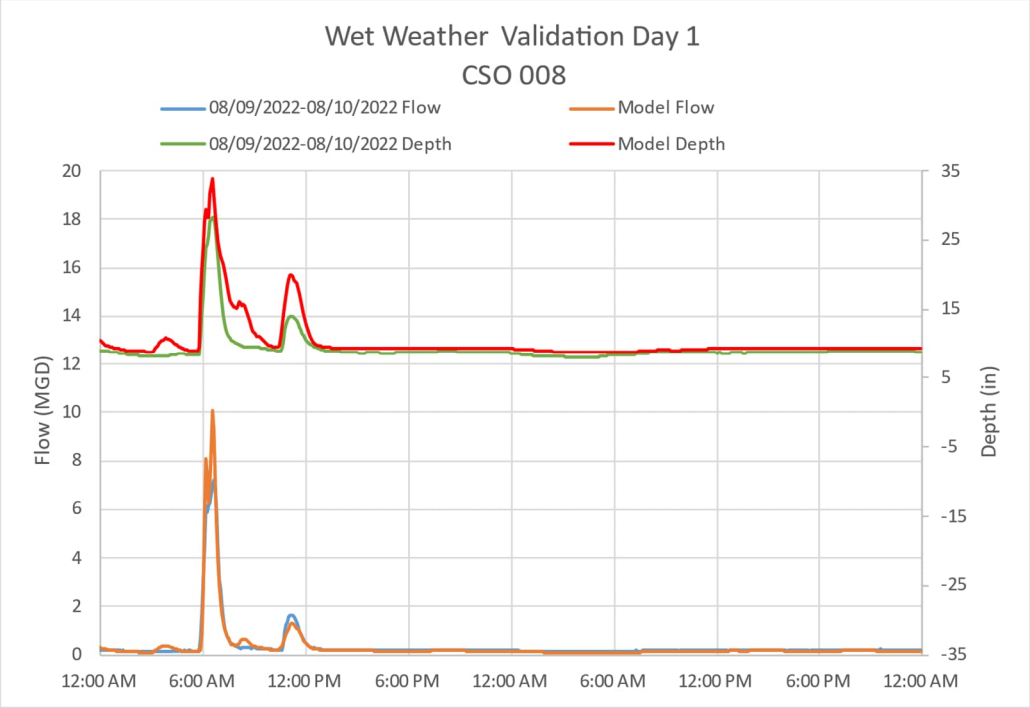


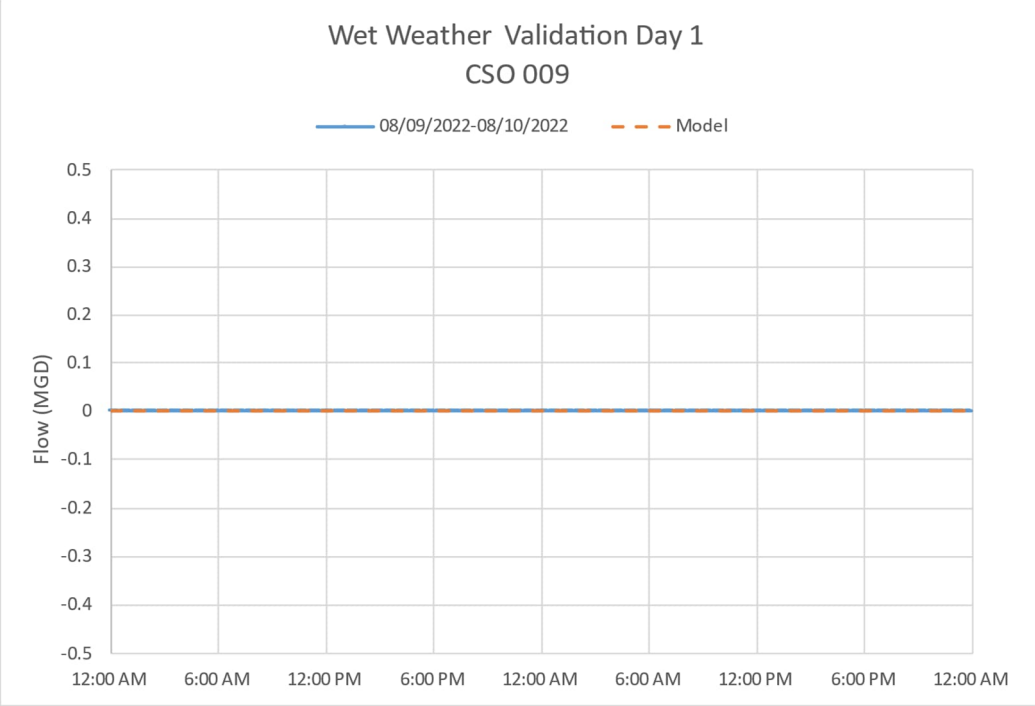

Wet Weather Validation Day 1
CSO 003B
08/09/2022-08/10/2022 Flow
Model Flow
08/09/2022-08/10/2022 Depth
Model Depth
Flow (MGD)
Depth (in)
0
1
2
3
4
5
6
7
-20
-15
-10
-5
0
5
10
15
20
12:00 AM
6:00 AM
12:00 PM
6:00 PM
12:00 AM
6:00 AM
12:00 PM
6:00 PM
12:00 AM

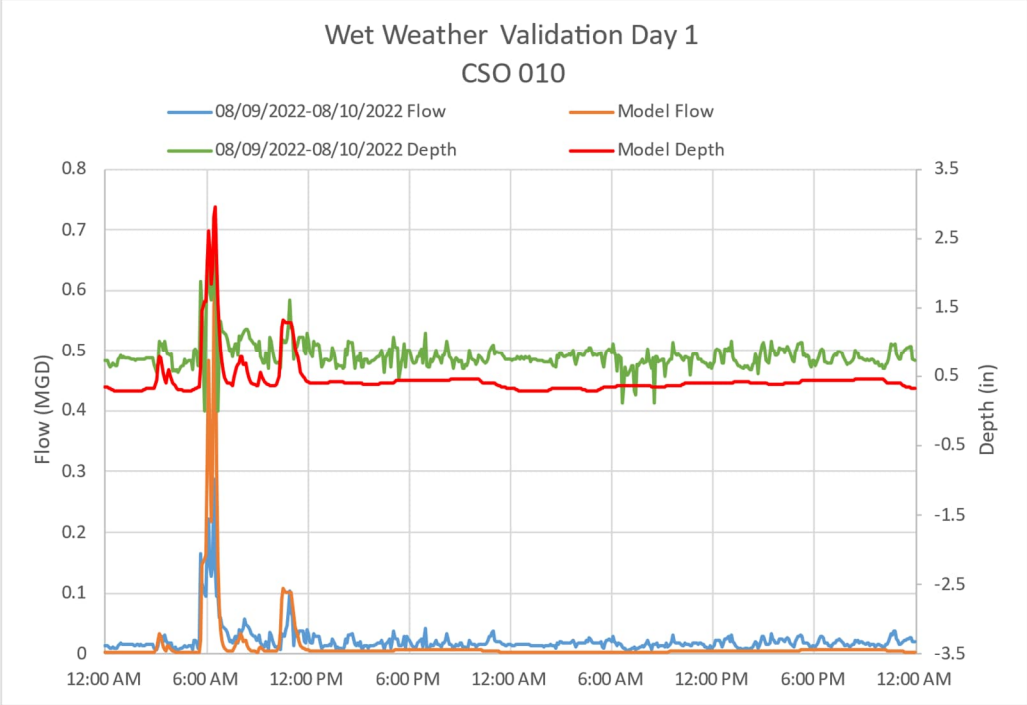

Wet Weather Validation Day 1
CSO 004
08/09/2022-08/10/2022 Flow
Model Flow
08/09/2022-08/10/2022 Depth
Model Depth
Flow (MGD)
Depth (in)
0
0.5
1
1.5
2
2.5
3
3.5
4
-25
-20
-15
-10
-5
0
5
10
15
20
25
12:00 AM
6:00 AM
12:00 PM
6:00 PM
12:00 AM
6:00 AM
12:00 PM
6:00 PM
12:00 AM

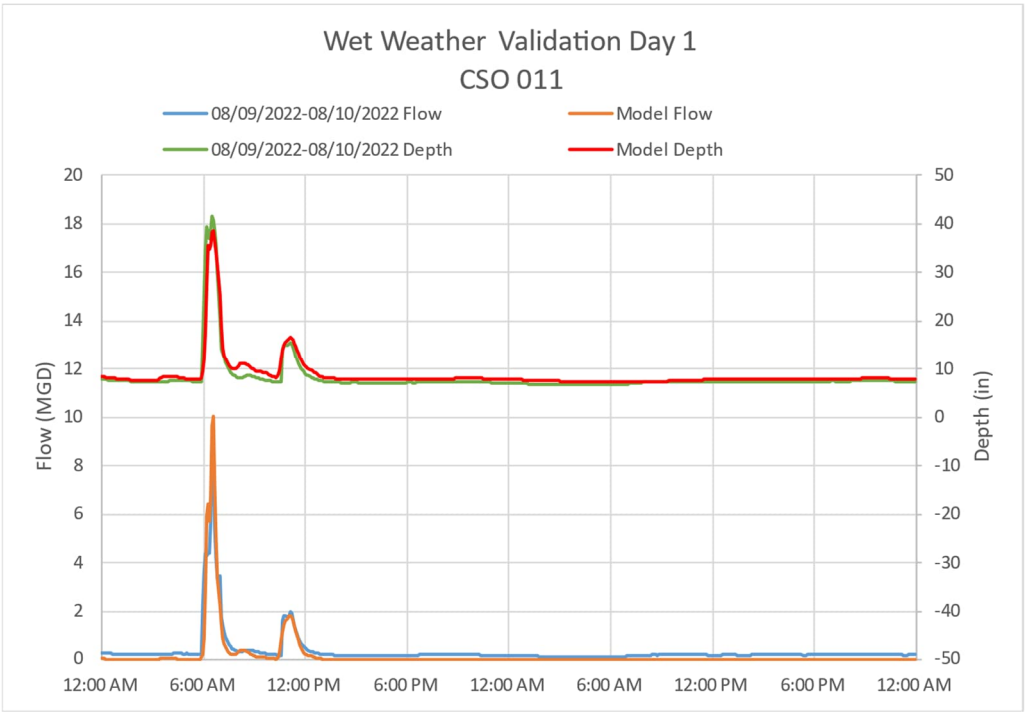

Wet Weather Validation Day 1
CSO 005
08/09/2022-08/10/2022 Flow
Model Flow
08/09/2022-08/10/2022 Depth
Model Depth
Flow (MGD)
Depth (in)
0.25
0.2
0.15
0.1
0.05
0
2.5
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
12:00 AM
6:00 AM
12:00 PM
6:00 PM
12:00 AM
6:00 AM
12:00 PM
6:00 PM
12:00 AM


Wet Weather Validation Day 1
CSO 007
08/09/2022-08/10/2022 Flow
Model Flow
08/09/2022-08/10/2022 Depth
Model Depth
Flow (MGD)
Depth (in)
12
10
8
6
4
2
0
35
25
15
5
-5
-15
-25
-35
12:00 AM
6:00 AM
12:00 PM
6:00 PM
12:00 AM
6:00 AM
12:00 PM
6:00 PM
12:00 AM

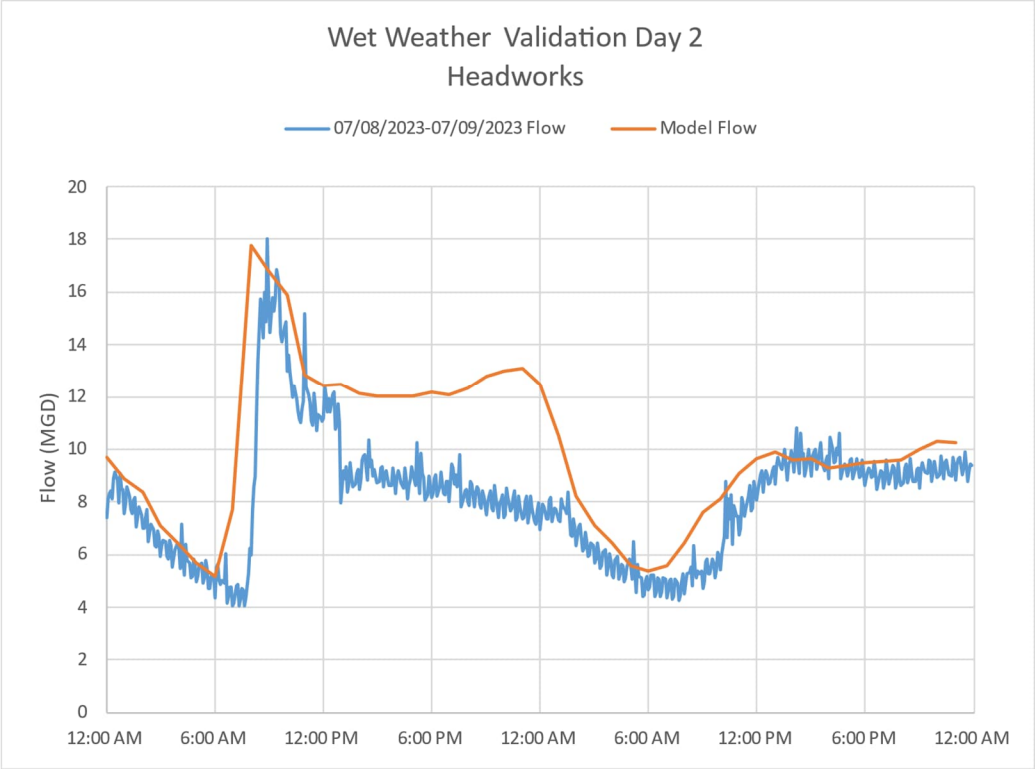

Wet Weather Validation Day 1
CSO 008
08/09/2022-08/10/2022 Flow
Model Flow
08/09/2022-08/10/2022 Depth
Model Depth
Flow (MGD)
Depth (in)
20
18
16
14
12
10
8
6
4
2
0
35
25
15
5
-5
-15
-25
-35
12:00 AM
6:00 AM
12:00 PM
6:00 PM
12:00 AM
6:00 AM
12:00 PM
6:00 PM
12:00 AM

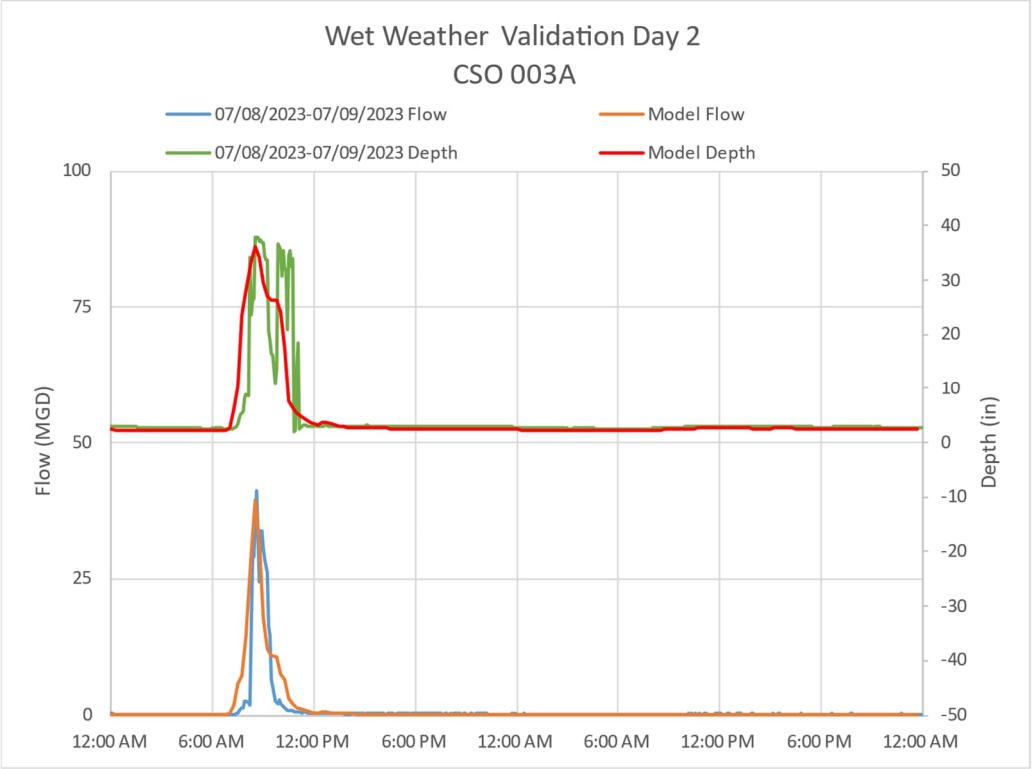

Wet Weather Validation Day 1
CSO 009
08/09/2022-08/10/2022
Model
Flow (MGD)
0.5
0.4
0.3
0.2
0.1
0
-0.1
-0.2
-0.3
-0.4
-0.5
12:00 AM
6:00 AM
12:00 PM
6:00 PM
12:00 AM
6:00 AM
12:00 PM
6:00 PM
12:00 AM

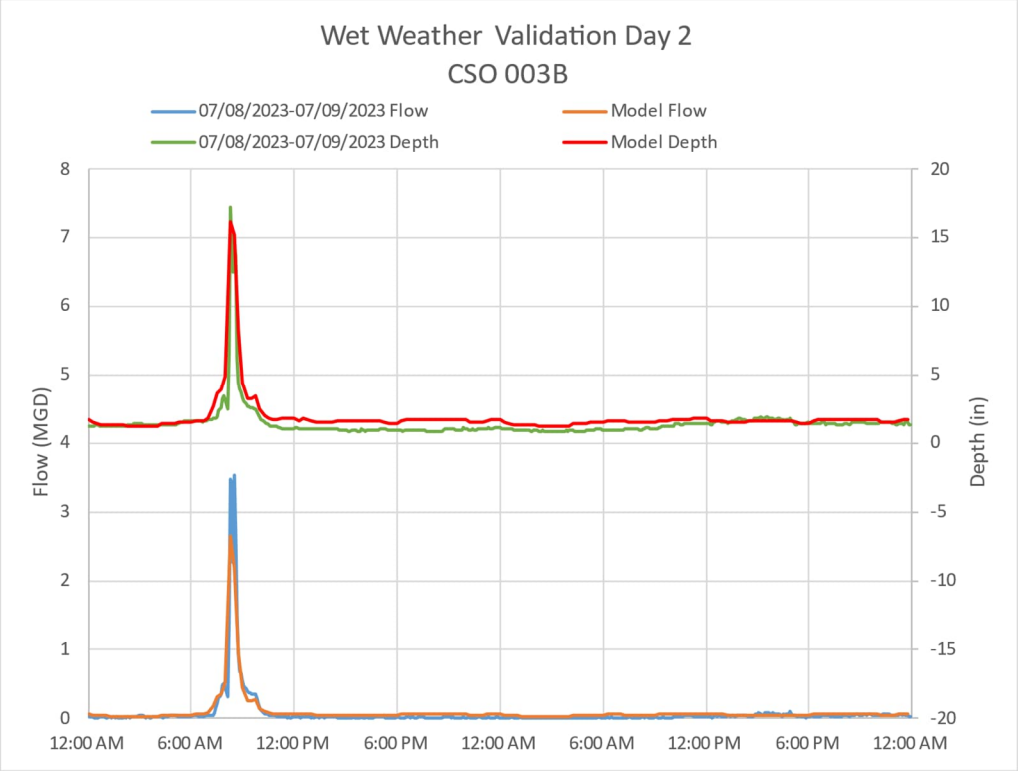

Wet Weather Validation Day 1
CSO 010
08/09/2022-08/10/2022 Flow
Model Flow
08/09/2022-08/10/2022 Depth
Model Depth
Flow (MGD)
Depth (in)
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
3.5
2.5
1.5
0.5
-0.5
-1.5
-2.5
-3.5
12:00 AM
6:00 AM
12:00 PM
6:00 PM
12:00 AM
6:00 AM
12:00 PM
6:00 PM
12:00 AM

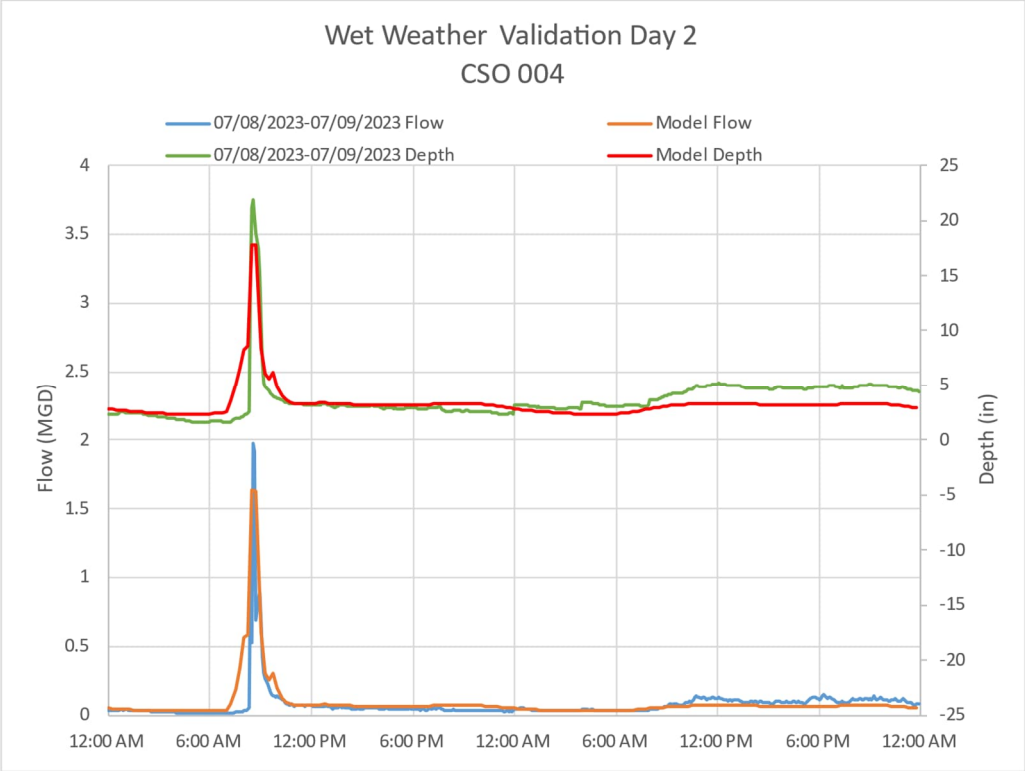

Wet Weather Validation Day 1
CSO 011
08/09/2022-08/10/2022 Flow
Model Flow
08/09/2022-08/10/2022 Depth
Model Depth
Flow (MGD)
Depth (in)
20
18
16
14
12
10
8
6
4
2
0
50
40
30
20
10
0
-10
-20
-30
-40
-50
12:00 AM
6:00 AM
12:00 PM
6:00 PM
12:00 AM
6:00 AM
12:00 PM
6:00 PM
12:00 AM

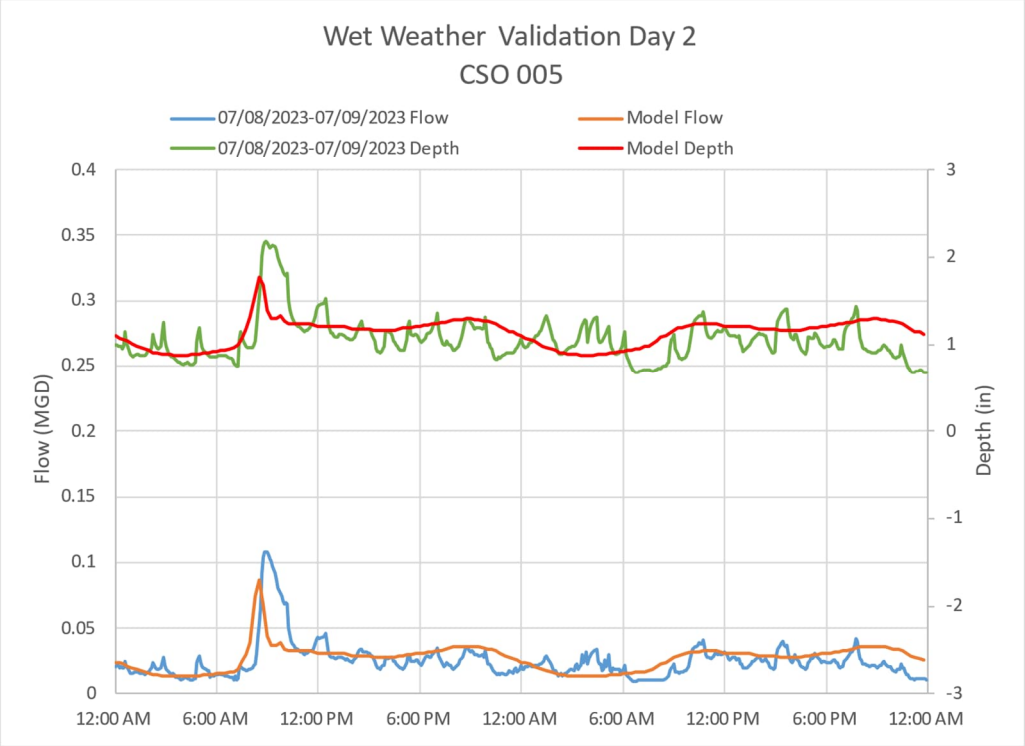
Validation Day 2 – 07/08/2023

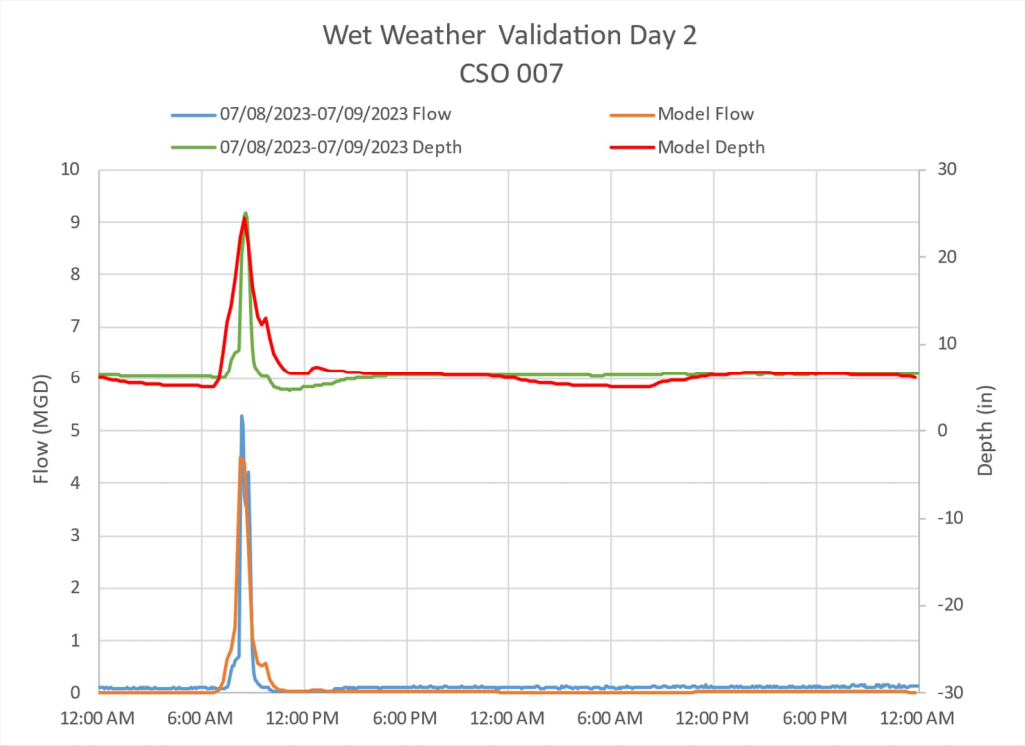


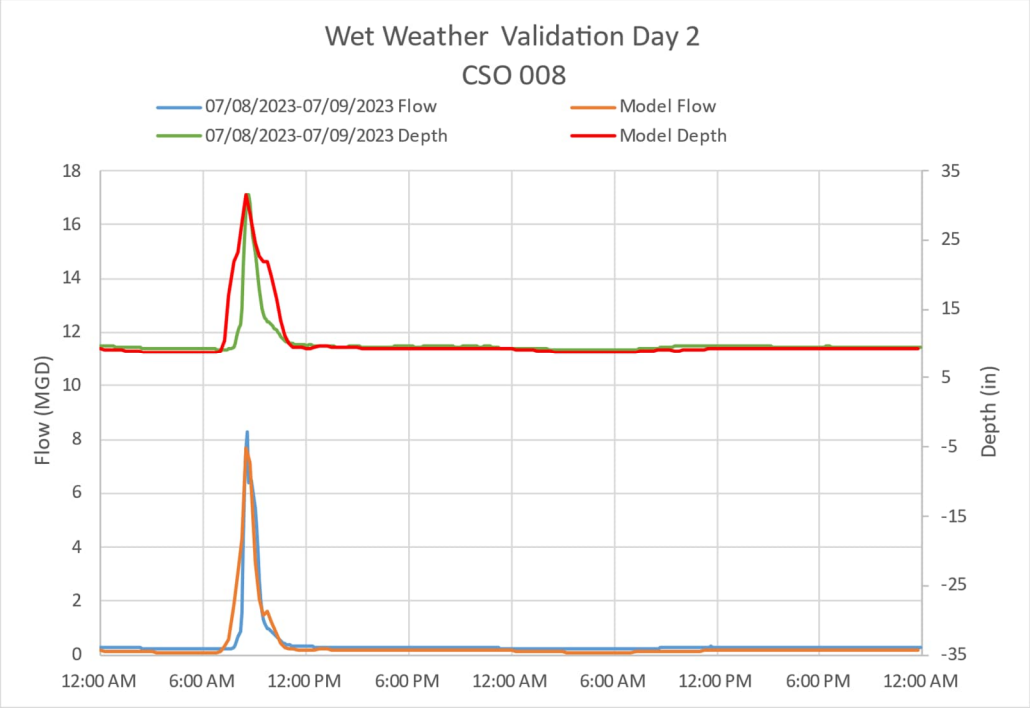


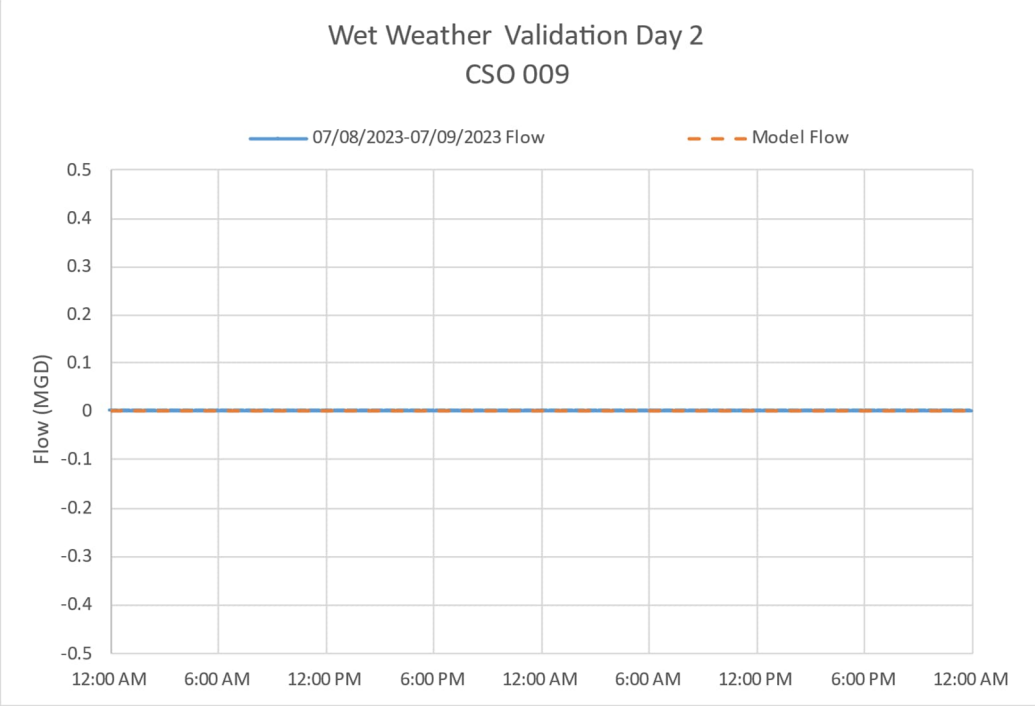

Wet Weather Validation Day 2
CSO 003B
07/08/2023-07/09/2023 Flow
Model Flow
07/08/2023-07/09/2023 Depth
Model Depth
Flow (MGD)
Depth (in)
8
7
6
5
4
3
2
1
0
20
15
10
5
0
-5
-10
-15
-20
12:00 AM
6:00 AM
12:00 PM
6:00 PM
12:00 AM
6:00 AM
12:00 PM
6:00 PM
12:00 AM

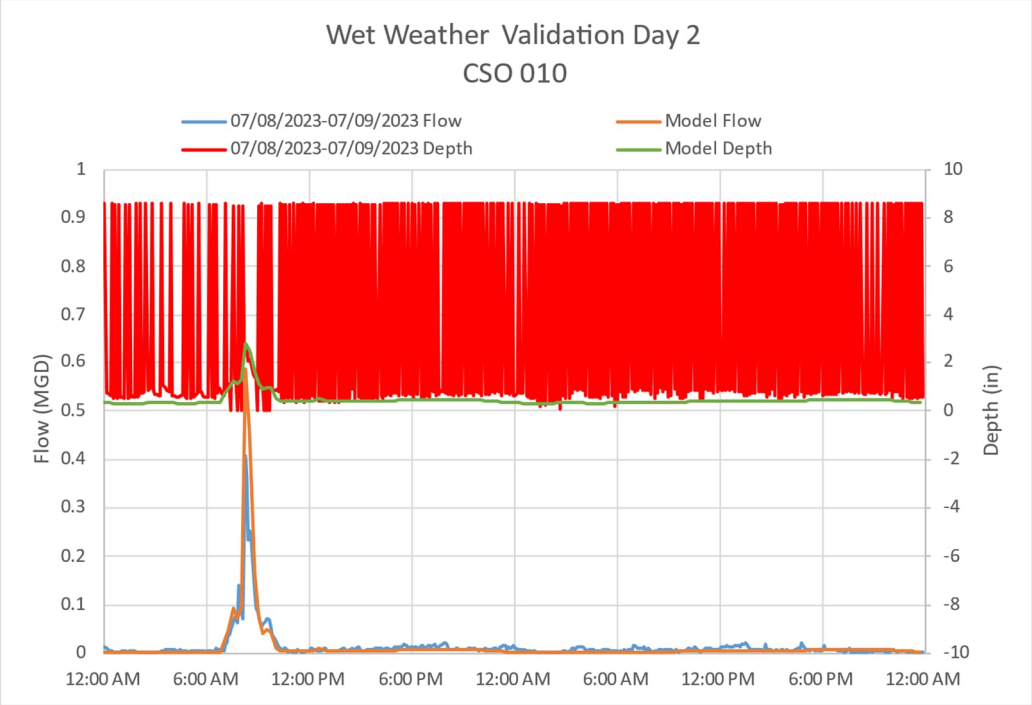

Wet Weather Validation Day 2
CSO 004
07/08/2023-07/09/2023 Flow
Model Flow
07/08/2023-07/09/2023 Depth
Model Depth
Flow (MGD)
Depth (in)
4
3.5
3
2.5
2
1.5
1
0.5
0
25
20
15
10
5
0
-5
-10
-15
-20
-25
12:00 AM
6:00 AM
12:00 PM
6:00 PM
12:00 AM
6:00 AM
12:00 PM
6:00 PM
12:00 AM

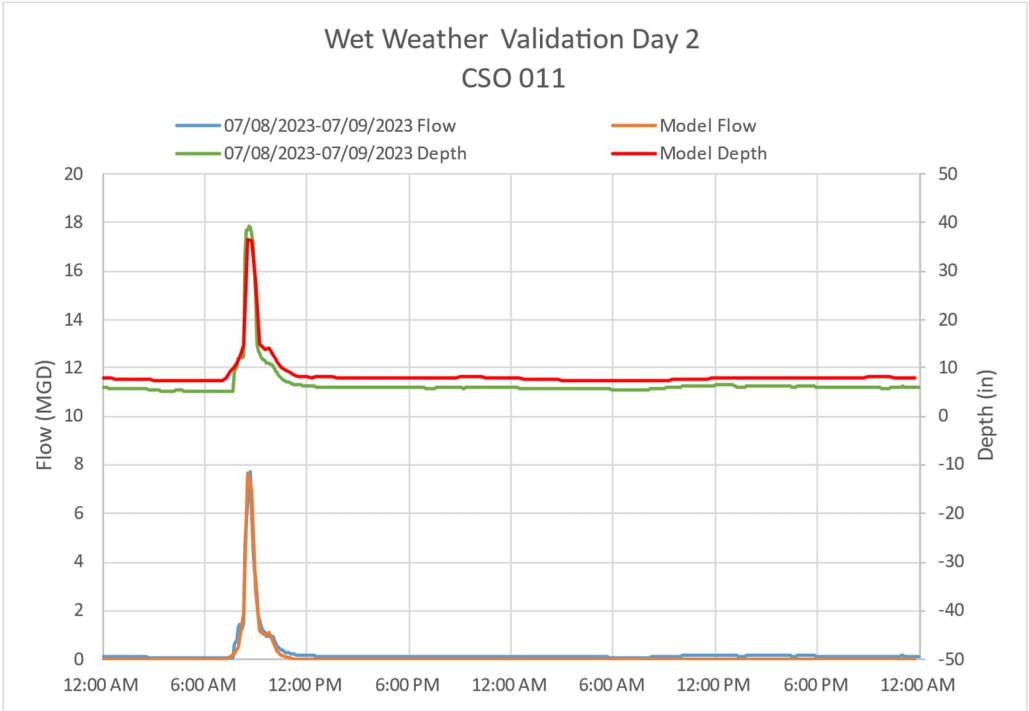

Wet Weather Validation Day 2
CSO 005
07/08/2023-07/09/2023 Flow
Model Flow
07/08/2023-07/09/2023 Depth
Model Depth
Flow (MGD)
Depth (in)
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
3
2
1
0
-1
-2
-3
12:00 AM
6:00 AM
12:00 PM
6:00 PM
12:00 AM
6:00 AM
12:00 PM
6:00 PM
12:00 AM


Wet Weather Validation Day 2
CSO 007
07/08/2023-07/09/2023 Flow
Model Flow
07/08/2023-07/09/2023 Depth
Model Depth
Flow (MGD)
Depth (in)
10
9
8
7
6
5
4
3
2
1
0
30
20
10
0
-10
-20
-30
12:00 AM
6:00 AM
12:00 PM
6:00 PM
12:00 AM
6:00 AM
12:00 PM
6:00 PM
12:00 AM


Wet Weather Validation Day 2
CSO 008
07/08/2023-07/09/2023 Flow
Model Flow
07/08/2023-07/09/2023 Depth
Model Depth
Flow (MGD)
Depth (in)
18
16
14
12
10
8
6
4
2
0
35
25
15
5
-5
-15
-25
-35
12:00 AM
6:00 AM
12:00 PM
6:00 PM
12:00 AM
6:00 AM
12:00 PM
6:00 PM
12:00 AM


Wet Weather Validation Day 2
CSO 009
07/08/2023-07/09/2023 Flow
Model Flow
Flow (MGD)
0.5
0.4
0.3
0.2
0.1
0
-0.1
-0.2
-0.3
-0.4
-0.5
12:00 AM
6:00 AM
12:00 PM
6:00 PM
12:00 AM
6:00 AM
12:00 PM
6:00 PM
12:00 AM

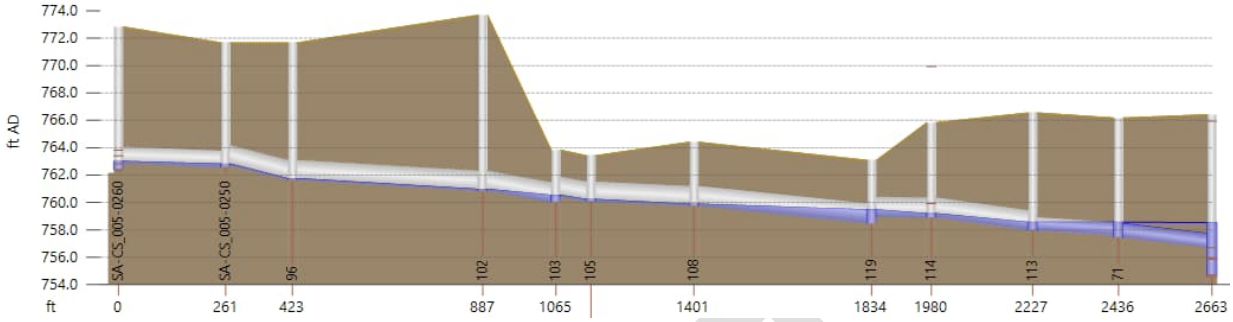

Wet Weather Validation Day 2
CSO 010
07/08/2023-07/09/2023 Flow
07/08/2023-07/09/2023 Depth
Model Flow
Model Depth
Flow (MGD)
Depth (in)
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
10
8
6
4
2
0
-2
-4
-6
-8
-10
12:00 AM
6:00 AM
12:00 PM
6:00 PM
12:00 AM
6:00 AM
12:00 PM
6:00 PM
12:00 AM


Wet Weather Validation Day 2
CSO 011
07/08/2023-07/09/2023 Flow
07/08/2023-07/09/2023 Depth
Model Flow
Model Depth
Flow (MGD)
Depth (in)
20
18
16
14
12
10
8
6
4
2
0
50
40
30
20
10
0
-10
-20
-30
-40
-50
12:00 AM
6:00 AM
12:00 PM
6:00 PM
12:00 AM
6:00 AM
12:00 PM
6:00 PM
12:00 AM

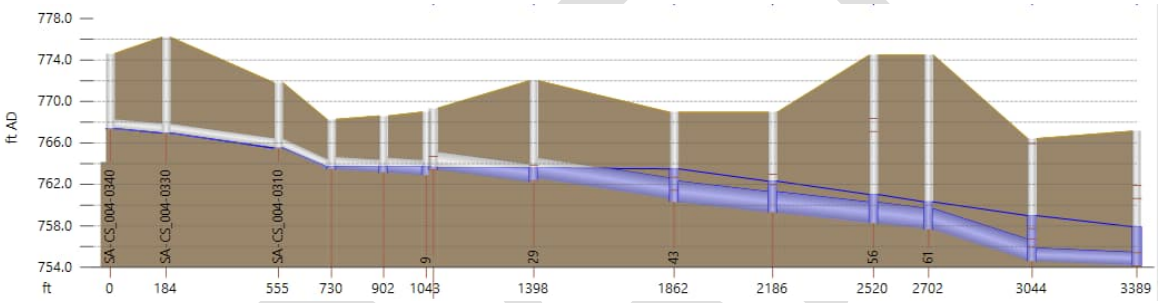
APPENDIX F

Hydraulic Pipe Profiles

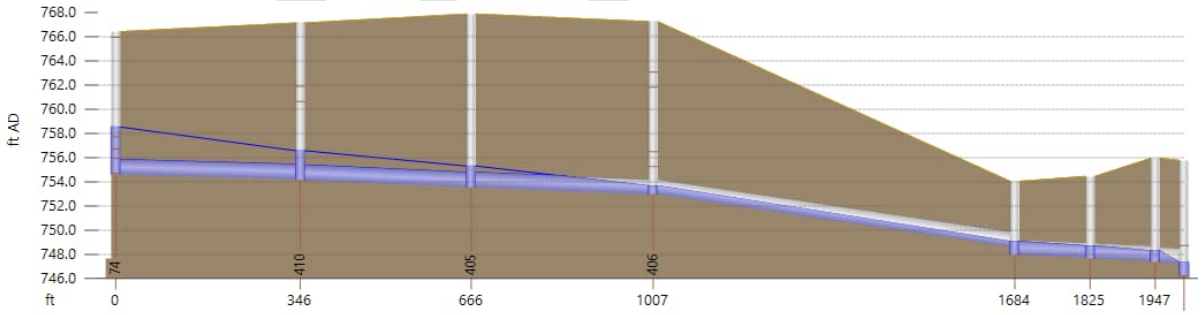
N 9th Street – Upstream of CSO 005 Diversion Structure to CSO 004 Diversion Structure



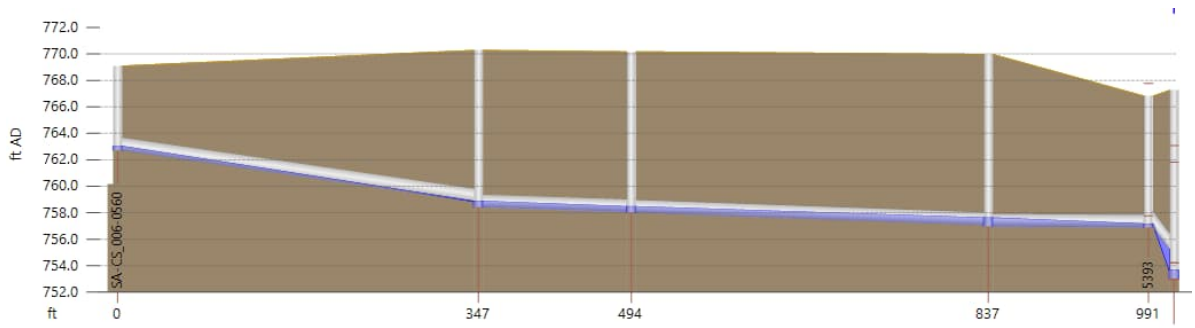
Monument Street – N 15th Street to CSO 004 Diversion Structure



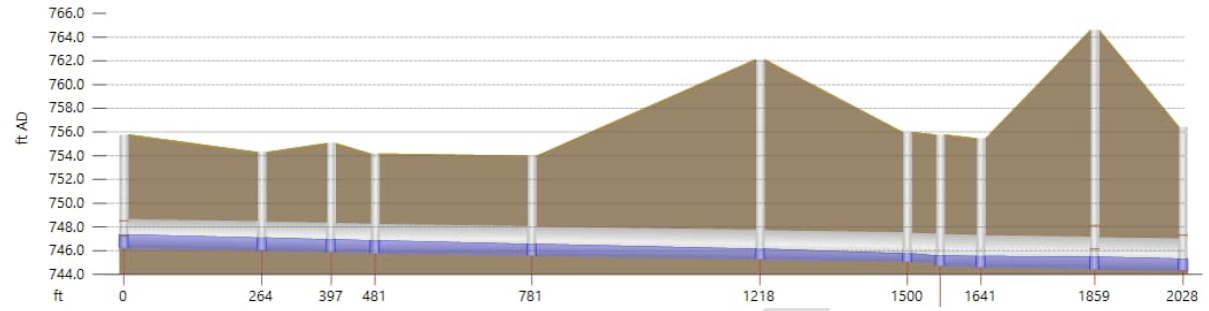
CSO 004 to NW Interceptor



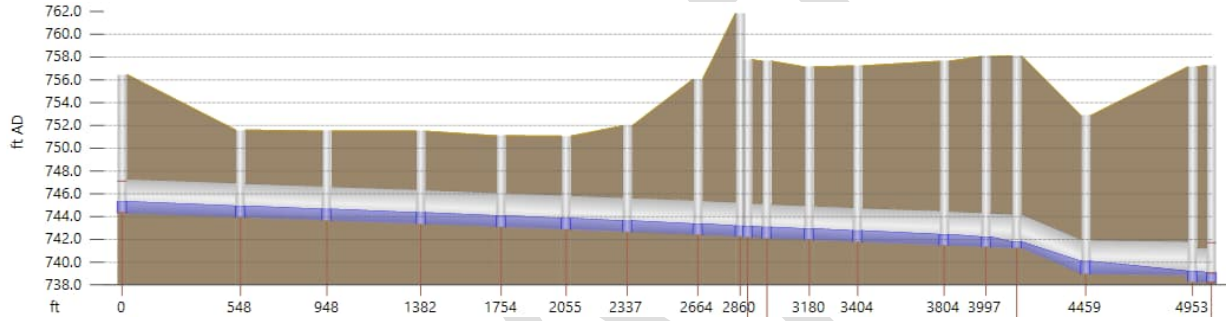
Upstream of CSO 010 to CSO 010 Structure



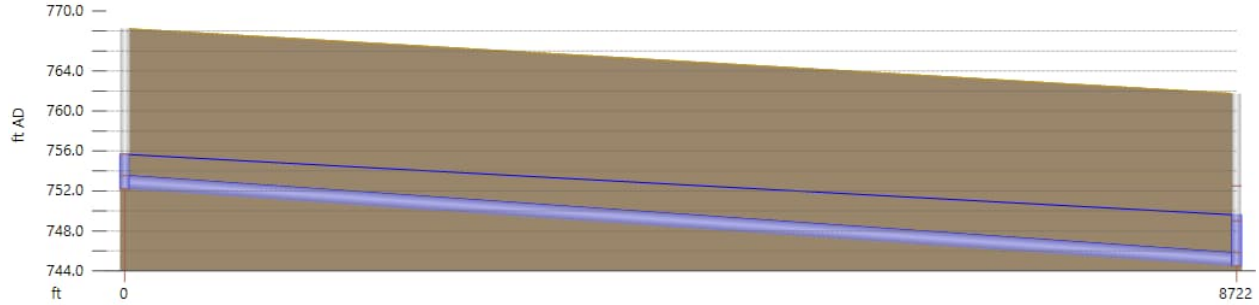
NW Interceptor – CSO 010 Siphon to Westfield Road



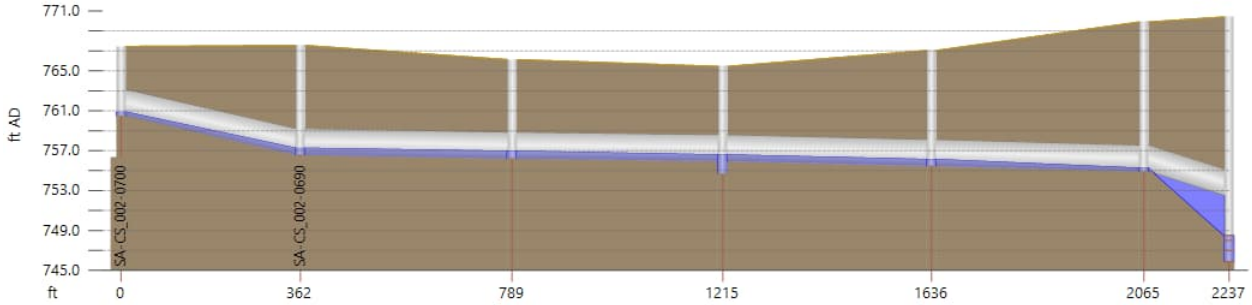
NW Interceptor – Westfield Road to WWTP



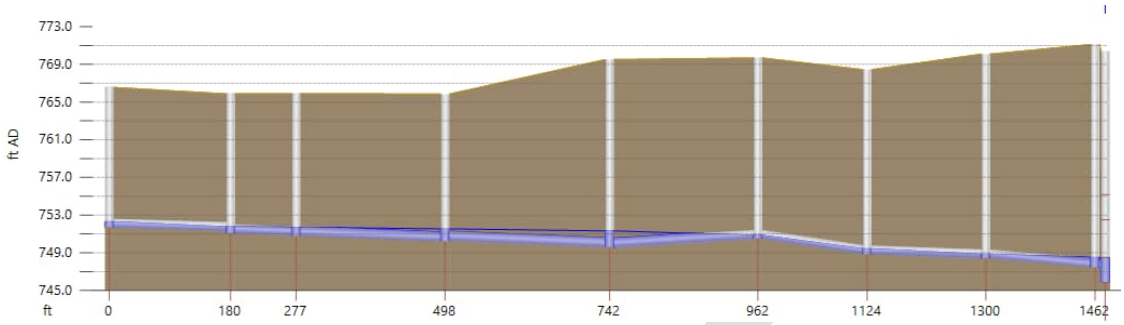
Sly Run Force Main



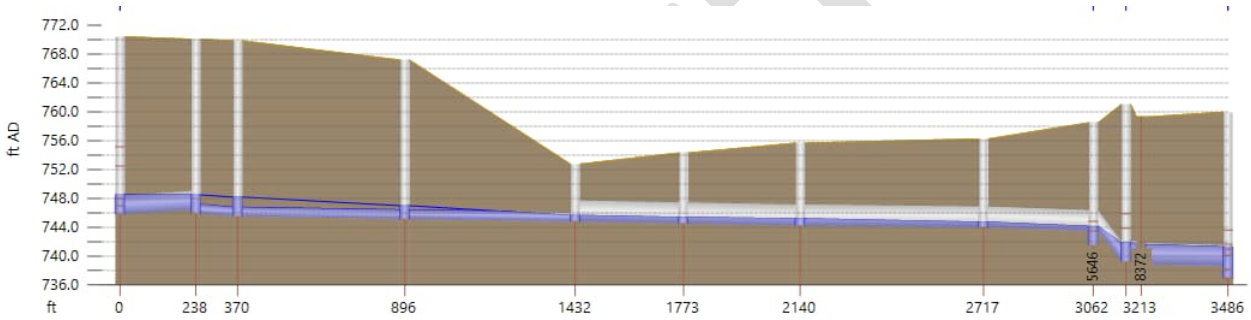
Southern Region – Stoney Creek to 8th Street



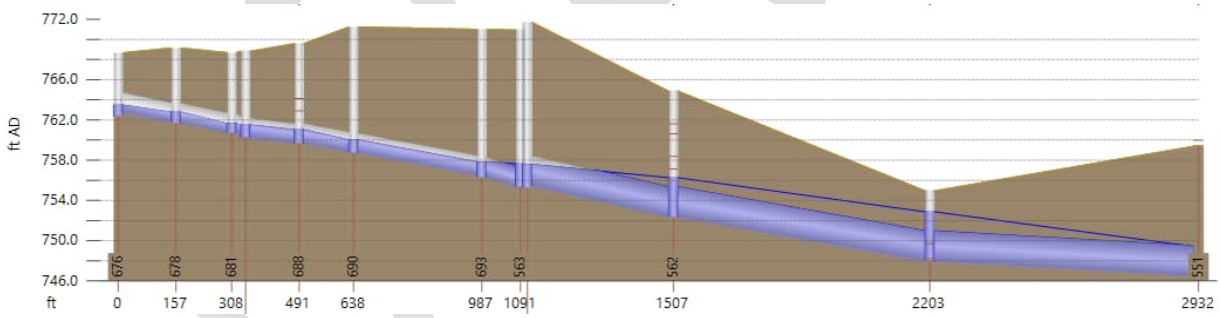
Southern Region – South Street to 8th Street



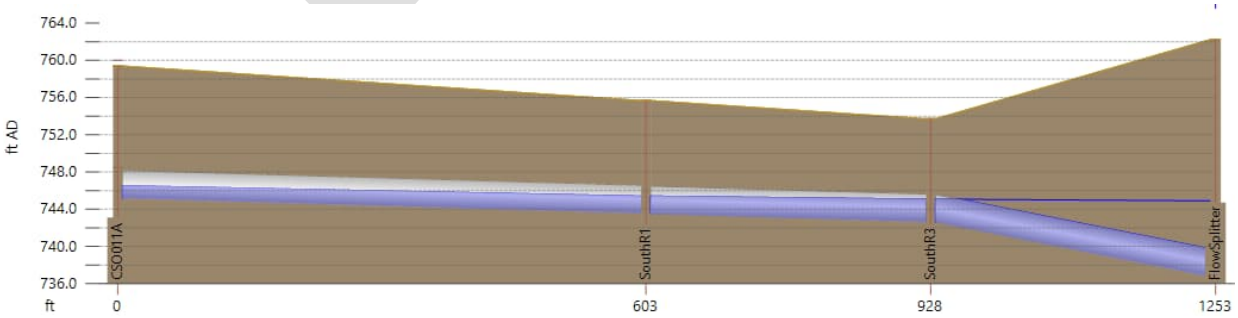
Southern Region – 8th Street to WWTP



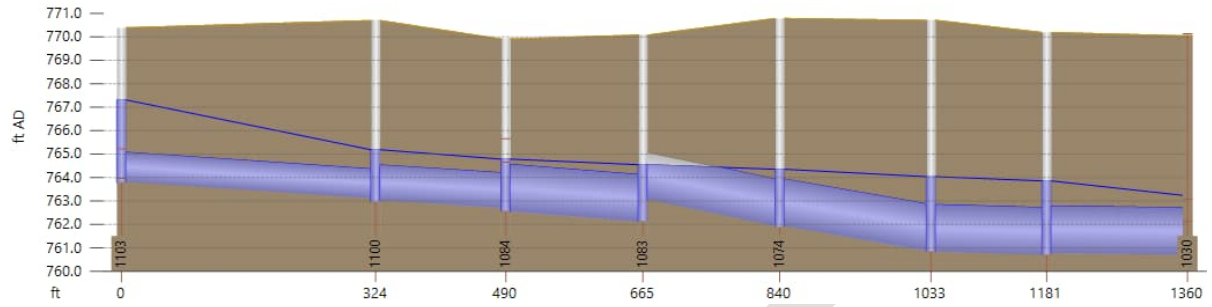
Southern Region – Plum Street to CSO 011



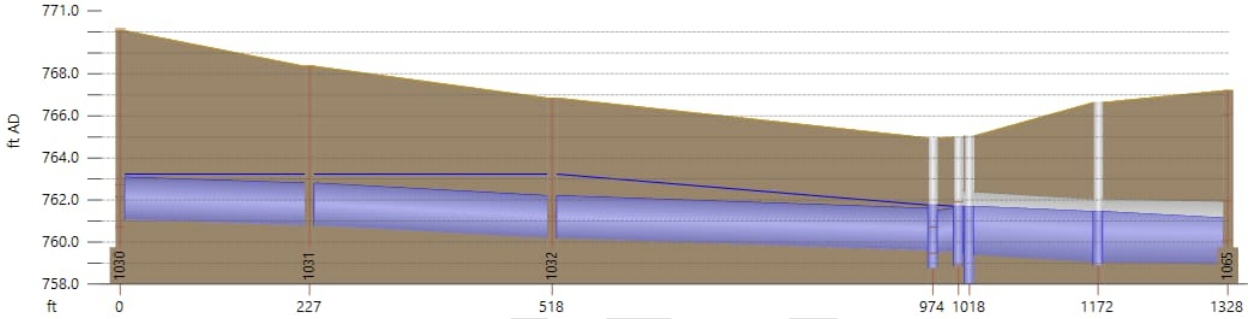
Southern Region – CSO 011 to Influent Structure



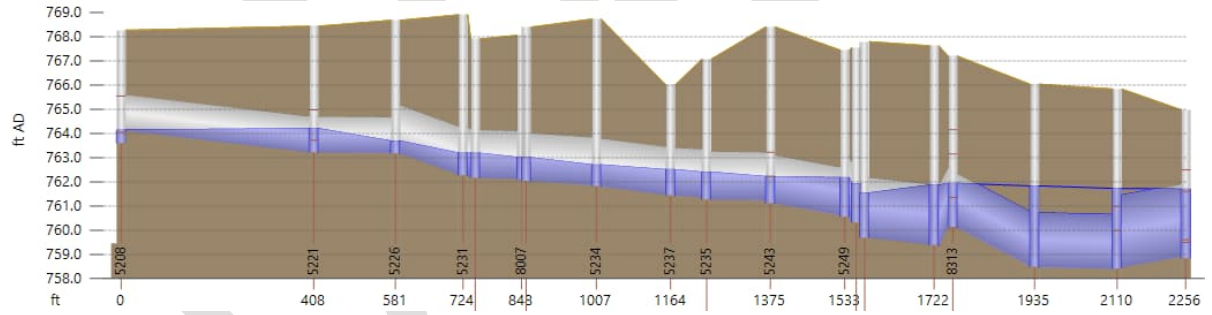
N 16th Street – Harrison Street to Conner Street



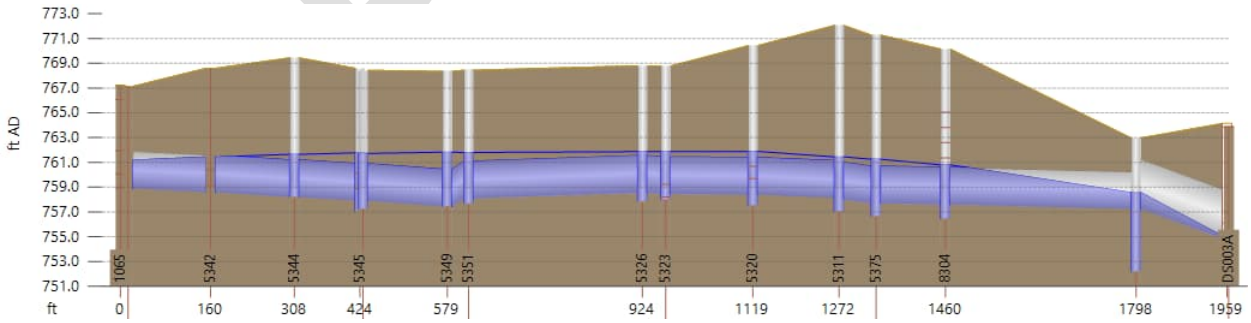
Conner Street - CSO 007 to CSO 008



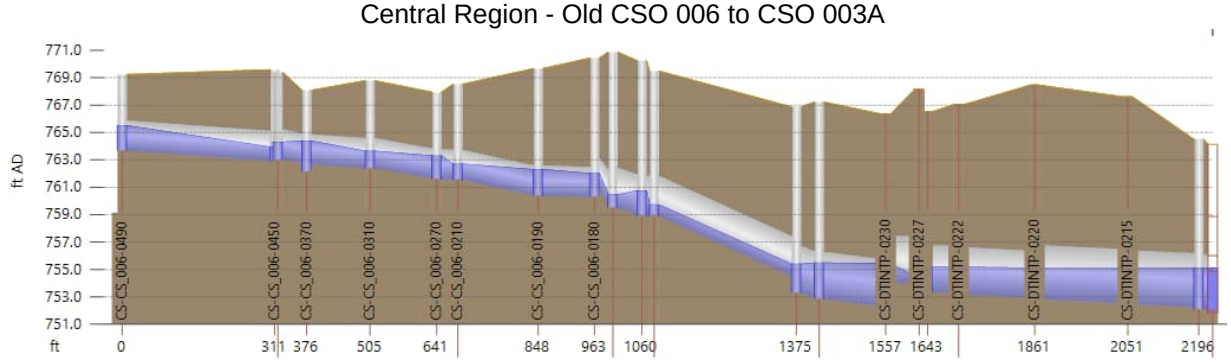
N 14th Street – Harrison Street to Conner Street



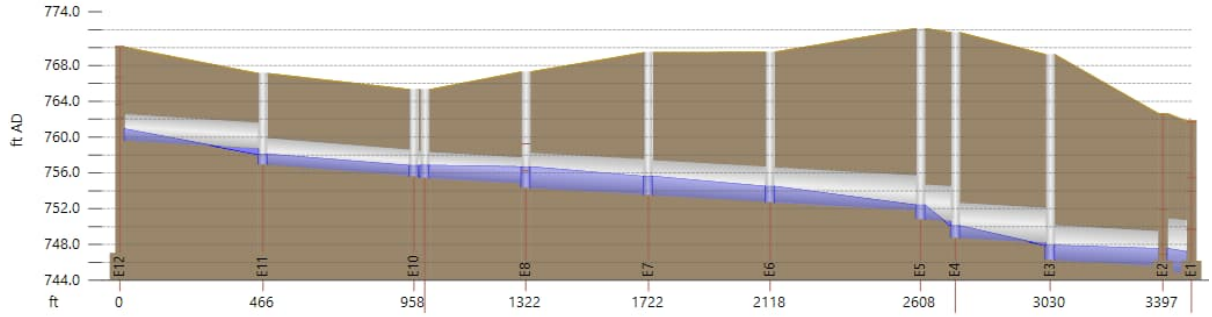
Conner Street - CSO 008 to CSO 003A



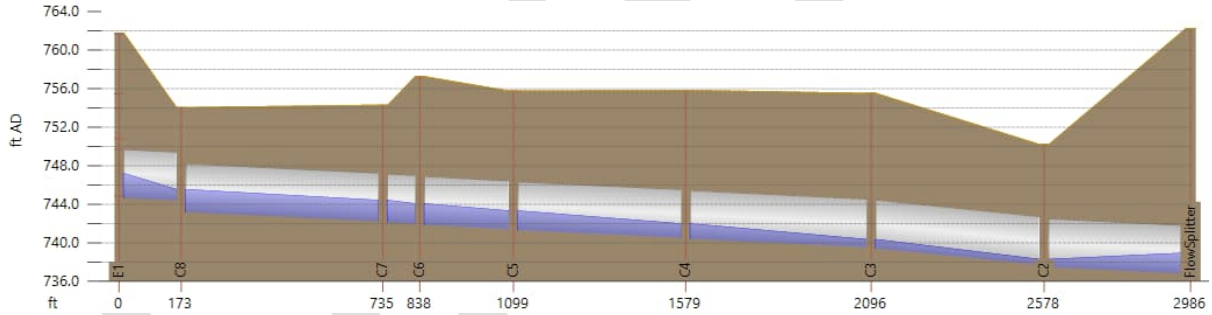
Central Region - Old CSO 006 to CSO 003A



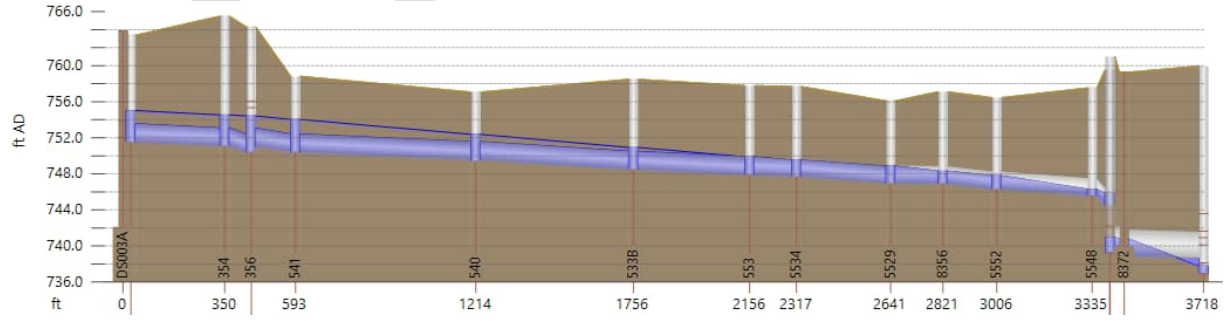
Maple Street – E1 to E11



Central Conveyance – E1 to Influent Structure



Central Region – CSO 003A to WWTP



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THE CITY OF
NOBLESVILLE
EST. 1823

December 20, 2023

Kara Wendholt
Senior Environmental Manager
Indiana Department of Environmental Management
100 N Senate Avenue IGCN 1255
Marion County, Indianapolis, IN 46204

Re: Noblesville CSO LTCP
Post-Construction Monitoring
Report Submittal
NPDES # IN0020168

Dear Ms. Wendholt:

I am writing to inform you that the City of Noblesville has completed all the construction projects and Post-Construction Monitoring (PCM) detailed in its Combined Sewer Overflow (CSO) Long-Term Control Plan (LTCP) (published June 2007; updated August 2008) in compliance with the Agreed Judgment between IDEM and the City (approved September 13, 2007).

As part of the LTCP PCM effort, the City in collaboration with its LTCP consultant, CHA Consulting, evaluated the impacts of the LTCP projects. The PCM effort included updating the combined sewer model. This effort included adding facilities that were newly constructed since the model was originally created, then performing a calibration and validation of the updated model. The PCM analysis and modeling is to confirm the overall achievements of the existing combined sewer system and treatment plants including the CSO LTCP facilities.

The LTCP resulted in the closure of CSO 006 and a 99.8% reduction in annual CSO volume when comparing the pre-LTCP average year (from the NetSTORM simulation using 1950-2005 precipitation data) to the actual volume (annualized overflow volume recorded between January 2022 and August 2023). This improvement was achieved at an overall cost of $68.5 million.

Please let me know if IDEM has any questions or concerns or would like additional details.

Sincerely,

Jonathan Mirgeaux, PE
Director, Noblesville Utilities

Community:	Noblesville (IN0020168)	**Outfalls:**	8 CSO outfalls	**Notes:**
Reviewer:	Kara Wendholt	**1 yr / 15 min storm:**	N/A	* Noblesville PCM Report indicates CSO 004 discharges belwo the 10-year, 1-hour design storm LOC
Date Reviewed:	1/23/2024	**10 yr / 15 min storm:**	1.15"/15 min	* During this LOC review period, CSO 004 was the only outfall to have untreated discharges. Several of these discharges could not be granted enforcement discretion.
LTCP Fully Implemented Date:	7/19/2022	**10 yr / 24 hr storm:**	4.25"/24 hr	
Review Timeframe:	August 2022 - December 2023	**Design Peak Hourly Flow:**	20 MGD	
Number of Months:	17	**Design Average Flow:**	10 MGD	
Level of Control:	Storage for full treatment			

Month/Year	CSO Events	WWTF Events	Dates (Outfall)	Rainfall Intensity	Antecedent Moisture	Plant Maximization	Additional comments	Enforcement Discretion
August-22	2	N/A	8/9 - CSO 004 8/20- CSO 004	8/9 - 0.78"/15 min; 1.13"/3 hr 8/20 - 0.41"/15 min; .42"/.5 hr	8/9 - slight 8/20 - no	8/9 - no 8/20 - yes		8/9 - No 8/20 - No
September-22	1		9/10 - CSO 004	0.93"/15 min; 1.9"/3 hr	no	yes		No
October-22	0							
November-22	0							
December-22	0							
January-23	0							
February-23	0							
March-23	0							
April-23	0							
May-23	0							
June-23	0							
July-23	2		7/5 - CSO 004 7/8 - CSO 004	7/5 - 0.52"/15 min; 0.52"/.75 hr 7/8 - 0.72"/15 min; 0.99"/2.5 hr	7/5 - very slight 7/8 - yes	7/5 - yes 7/8 - yes		7/5 - No 7/8 - Questionable
August-23	1		8/9 - CSO 004	0.58"/15 min; 1.54"/4 hrs	yes	yes		Questionable
September-23	0							
October-23	0							
November-23	0							
December-23	0							