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June 15, 2021 Project Number: P1581-17

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Attention: **Kevin Murphy, P.Eng.**

Subject: **7000 Campeau Drive Subdivision - Preliminary Stormwater Management Plan**

Introduction

The proposed residential development at 7000 Campeau Drive in Kanata, Ontario, consists of four individual parcels equating to approximately 70.9 ha. These lands are a part of the Kanata Golf and Country Club and are currently zoned as Parks and Open Space (O1A). The proposed development will consist of single detached homes, front drive towns, back-to-back towns, stacked towns and medium-density blocks. The proposed development will be serviced by Four (4) dry SWM ponds, and One (1) underground storage unit. The stormwater management facilities have been strategically located at low points within the proposed development, where each facility can outlet to the existing trunk storm sewer that runs along Knudson Drive and Weslock Way. The site will also implement Etobicoke Exfiltration Systems (EES) to provide water quality control to the site and offset any deficits to groundwater contributions due to the increase in impervious areas. Figure 1 provides an overview of the proposed development area relative to existing infrastructure along with the respective locations of the proposed SWM facilities. This memo intends to assess and ensure that the preliminary design of the proposed development meets several fundamental stormwater management requirements.

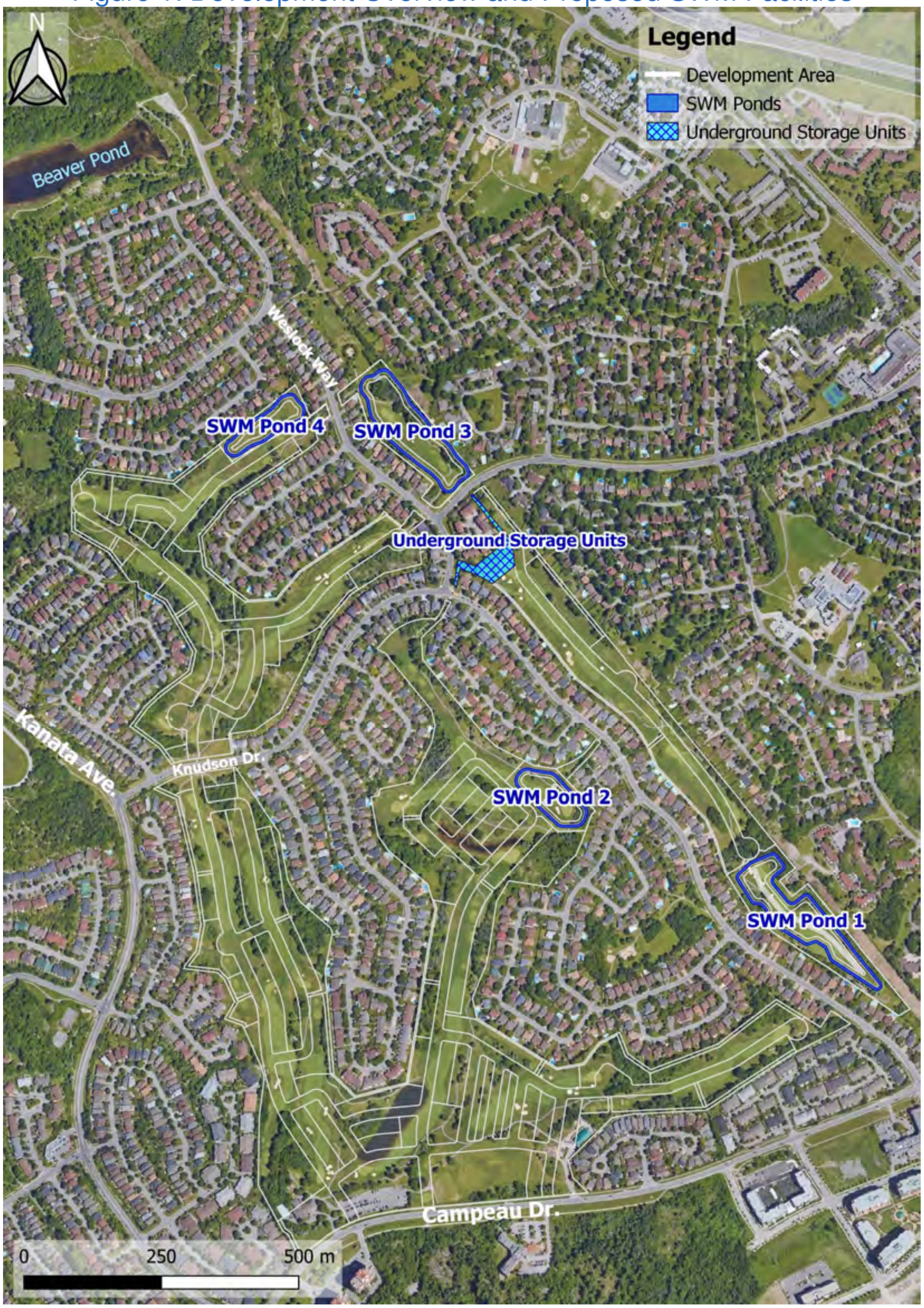
As such, this memo will document and assess:

(i) The adequacy of the proposed minor system to convey the 2- and 100-year storm flows from within the development to the stormwater management (SWM) facilities.
(ii) The capacity of the proposed major system to safely convey the excess 100-year flows to the SWM facilities.
(iii) The operation of the proposed SWM facilities based on quality and quantity control requirements.
(iv) The hydraulic impacts of the proposed subdivision and SWM facilities on the upstream and downstream existing infrastructure.
(v) The peak flows into the Beaver Pond Facility for pre- and post-development conditions.
(vi) The emergency overflow from the proposed development under the 100 Year + 20% stress test.

All analyses documented in this memo were completed using the PCSWMM hydrologic and hydraulic modelling software package. The City of Ottawa provided JFSA with an existing condition PCSWMM model of the study area, which this study has built upon. The following discusses in detail the pre- and post-development PCSWMM modelling components and the findings of this preliminary analysis.

Note that this analysis has been completed to specifically assess the hydrologic and hydraulic operations of the proposed site and impacts on neighbouring properties (local changes to rear yard drainage and storm sewer connections), this model is not intended to be used to assess the entire subwatershed. For the analysis of developments impacts on the greater subwatershed refer to JFSA June 2021 Report titled ." Downstream of 7000 Campeau Drive – Hydrologic Assessment"

Figure 1: Development Overview and Proposed SWM Facilities



Existing Conditions Model

Model Overview

To assess the stormwater operations of the proposed development the City of Ottawa provided JFSA with a detailed PCSWMM (hydrologic & hydraulic) model of the existing major and minor stormwater system that discharges to the Beaver Pond. This model is highly detailed and was developed using the vast amounts of GIS data available to the City (natural topography, minor system pipe network, catch basin locations etc.).The City model consists of two individual models, the Kinematic Wave model and the Dynamic Wave model. The Kinematic Wave model is used to simulate the subcatchment runoff, the major system flow paths and the total flow into the minor system. Note that the representation of the major system flow paths in the Kinematic Wave model is simplistic and does not fully consider the existing grading and topography of the land. The major system in this model simply allows for any excess flow that can not enter a catchbasin to flow to the next nearest catchbasin. The flows diverted to the minor system network simulated by the Kinematic model are then extracted into an Interface File (text file). The Interface File contains approximately 734 individual hydrographs at all inflow locations into the minor system. This interface file is then read into the Dynamic Wave model to simulate the operations of the minor system.

Modifications and Corrections

A few minor errors/issues were noted in the City models as provided. This included minor system pipe inverts that were incorrect (STM12459 & STM11997) which were corrected to reflect as-built values collected by DSEL from the City of Ottawa. One minor system node (MHSTM12321) had an invert elevation of 0 m, which resulted in inflows to pond at this node until the water surface reached the elevation of the outlet pipe invert (98.43 m). A detailed review of the external drainage areas to the Beaver Pond was completed by DSEL, based on City of Ottawa 1K mapping data, which found that there were several locations along the drainage boundary that would drain to external subcatchments and not to the Beaver Pond. This generally included developed lands that had minor system infrastructure that would direct flow to neighbouring watercourses. Some 1.445 ha of land was added to the model’s total drainage area and 1.975 ha removed from the model’s total drainage area, resulting in a net 0.53 ha (0.2% of the total model drainage area) reduction in the total modelled drainage area. Images of the identified issues addressed above have been documented in Attachment A. Within the City’s dynamic model it was identified that there were several locations where flooding was occurring (volume being lost from the model). These locations were reviewed and modified (to allow ponding) to ensure the full runoff volume was contained within the model.

Field Verification

The City model was reviewed against the data obtained from the flow monitoring program completed by JFSA from June 2019 to October 2019 within the Campeau Drive and Weslock Way minor systems. Full details of this monitoring program have been provided in JFSA’s July 2020 report titled “Kanata Golf & Country Club - 2019 Monitoring & Hydrologic Model Calibration Report”. Refer to Attachment A for plots comparing the simulated and observed flows for all “Significant Events[1]” recorded during the 2019 monitoring period at Campeau Drive and Weslock Way.

[1] A “Significant Event” is defined as a rainfall event with a total rainfall volume greater than 5 mm which was followed by at least 12 hours without any additional rainfall.

From visual inspection of the results, it appears that the City's model does a good job of replicating the overall response and shape of the hydrograph at both locations. Numerically reviewing the two datasets it was found that on average the City model appears to overestimate the peak flows into the minor system by 6% and 30% at Weslock Way and Campeau Drive, respectively. Although the model does not appear to have a significant bias to overestimating peak flows for all simulated events with a minimum peak flow ratio of 0.45 and 0.51 at Weslock and Campeau, respectively. Based on the field data from 2019, it was found that the City model overestimated the total runoff volume into the minor system at both locations for that year, with the simulated total volumes being 48% and 29% larger than the observed volumes at Weslock Way and Campeau Drive, respectively.

Looking at the full hydrographs, the model appears to have a reasonable coefficient of determination (R^2) of 0.56 and 0.60 at Weslock Way and Campeau Drive, respectively, and with a Nash-Sutcliffe model efficiency coefficients of 0.26 and 0.08, respectively. Note that the closer the coefficient of determination (R^2) and Nash-Sutcliffe model efficiency coefficient are to 1.0, the better the statistical fit. Full statistical summaries have been provided in Tables 1 & 2 below. Note that no events greater than the 2-year event were observed during this monitoring period.

Table 1: Weslock Way 2019 Monitoring Summary – Field observations vs City Model

Parameter	Value
Total Rainfall Volume (mm)	264.04
Minimum Peak Flow Ratio (Sim/Meas)	0.45
Average Peak Flow Ratio (Sim/Meas)	1.06
Maximum Peak Flow Ratio (Sim/Meas)	1.51
Measured Volume (m^3)	46696
Simulated Volume (m^3)	69148
Volume Difference (m^3)	22452
Volume Ratio (Sim/Meas)	1.48
R^2	0.56
Nash-Sutcliffe	0.26

Table 2: Campeau Drive 2019 Monitoring Summary – Field observations vs City Model

Parameter	Value
Total Rainfall Volume (mm)	239.43
Minimum Peak Flow Ratio (Sim/Meas)	0.51
Average Peak Flow Ratio (Sim/Meas)	1.30
Maximum Peak Flow Ratio (Sim/Meas)	1.94
Measured Volume (m^3)	11714
Simulated Volume (m^3)	15100
Volume Difference (m^3)	3386
Volume Ratio (Sim/Meas)	1.29
R^2	0.60
Nash-Sutcliffe	0.08

Based on the above findings, it is concluded that the City's model is not a perfect reflection of the existing stormwater operations of the area, as it generally (but not always) tends to slightly overestimate both the peak flows and total runoff volume into the system. Although this model has been considered a reasonable representation for the purposes of this study, as it generally tends to produce a conservative estimate of peak flows and total volume into the existing minor system, based on the field data currently available. As such, this model has been used to establish the existing hydraulic and hydrologic conditions of the study area.

Downstream Boundary Condition and Hot Start File

The City model, as provided, assumed a free outlet at the Beaver Pond. To ensure that the analysis completed in this study is conservative the downstream boundary of the model was fixed to the 100-year peak water level in the Beaver Pond of 92.55 m, based on AECOM's, May 2011 report "*Shirley's Brook & Watt's Creek Phase 1 - Stormwater Management Study*". The new downstream boundary created a backwater that propagates up the existing storm sewer system. To ensure this boundary was stable, a hot start file was generated to allow the backwatered storm sewer to stabilize before a simulated event. After making the above refinements the model was simulated using the 5-year 3-hour Chicago storm, 100-year 24-hour SCS storm and 100-year +20% 24-hour SCS storm. The results of this analysis would function as the existing conditions targets for the proposed development.

Proposed Conditions Model

Model Overview

Like the existing conditions modelling, the proposed condition analysis consisted of two models, the Kinematic Wave model and the Dynamic Wave model. For the proposed conditions, the Kinematic Wave model was adjusted to contain only the existing external lands to the development site, and the area that makes up the proposed development lands was removed, as it would be simulated in the Dynamic Wave model. The following sections document the development of the proposed conditions model and the results of this analysis.

Subcatchments

To ensure that there was no overlap or gaps in subcatchments between the two models, the Kinematic Wave model subcatchment boundaries had to be slightly adjusted to ensure that they would match up with the proposed development boundaries in the Dynamic Wave model. This required either slightly clipping or slightly extending the existing subcatchment boundaries in the Kinematic Wave model, this was primarily completed along the rear yards of the existing residential developments. After ensuring that there were no intersections of subcatchment boundaries between the two models, the drainage areas of the Kinematic Wave model were updated based on their new drainage area. If a subcatchment area changed by more than 10% that subcatchment Width / Flow Length parameter was also recalculated. The remaining subcatchment parameters in the Kinematic Wave model remained unaltered. Figures B1 & B2 in Attachment B provide an overview of the subcatchment areas simulated in the Kinematic and Dynamic models.

The drainage areas within the proposed development were provided by DSEL. As the development is only at the preliminary design stage, the majority of the subcatchments have been assumed to be 64% impervious (Runoff Coefficient = 0.65). Default Manning's values of 0.013, 0.25, have been applied for impervious and pervious surfaces, respectively. City default Horton's infiltration values of 76.2 mm/hr, 13.2 mm/hr, 4.14 1/hr & a 7 Day drying time have also been applied to the model. Subcatchment slopes within the development have been assigned based on the slopes specified within preliminary grading plans. Note that these above parameters also conform to the parameters used in the City's Kinematic Wave model.

Etobicoke Exfiltration Systems (EES)

It is proposed that within the development Etobicoke Exfiltration Systems (EES) will be implemented to provide quality control for the site while also offsetting any groundwater recharge deficits caused by the increase in impervious areas. As specified in John Tran & James Li's "Planning and Design Manual of the Etobicoke Exfiltration System for Stormwater Management", for the EES units to achieve 80% TSS removal, the systems should be designed to treat the 95th percentile rainfall event. Based on the statistical analysis of historical rainfall data recorded at the Ottawa Airport, completed by J.L Richards as a part of the Barrhaven South Master Servicing Study, the 95th percentile rainfall event in Ottawa equates to the 22 mm event.

At this stage of the exact details of each of these EES is not know, but it is known that for the development to achieve 80% TSS removal, these systems will need to be implemented throughout the entirety of the site and designed to capture and infiltrate the 22 mm event. To account for the benefit of these systems within the modelling without replicate the exact design details (which are still unknown), the depression storage for both the impervious and pervious surfaces have been set to 22 mm for all subcatchments within the development, to reflect the runoff reduction from the site that will be caused by the implementation of the EES.

Nodes, Links & Interfacing Files

The entire existing minor system included in the City's PCSWMM model was imported into the development Dynamic Wave model, along with all the "Mid-Point" nodes and associated links. These "Mid-Point" nodes were imported into the Dynamic model to ensure that the flows external to the development simulated in the Kinematic Wave model are appropriately passed and represented in the Dynamic Wave model. In locations where there is an existing major system spill to the golf course, additional nodes were added to the Kinematic Wave model from the Dynamic Wave model. The inclusion of these nodes allows for the external flows onto the golf course simulated by the Kinematic Wave model to be passed to the correct location within the Dynamic Wave model, these include external major system flows into the development.

Development Major system

Preliminary grading of the proposed major system has been included in the model, with generic road cross-section transects reflective of the proposed Right of Way (ROW) at each respective location. Roads with preliminary centreline grades less than 0.65% will be designed with a 'saw tooth' or 'sagged' road profile. The runoff from the development will be conveyed to catchbasins located at low points on the street. Flows above the minor system capture rate will temporarily be stored within the surface storage present within these sags and released slowly to the storm sewers. If the low point storage is surpassed, the flow will be conveyed overland to the next downstream road segment. Note that as the development is only at the preliminary design stage, the exact details of the saw toothing are not known, although it is safe to assume that any road segments with a high point to highpoint slopes of < 0.3% will be able to accommodate such road saw toothing. As such storage nodes have been applied to the model to approximately account for the storage volume provided by these sags. The depth/storage relationships were developed based on a typical 100 m length of road segments. These storage curves were applied to locations within the model's major system that are reflective of slopes of 0.1% - 0.3%. For each location, the depth/storage curve of the 100 m length was adjusted to reflect the actual length of the road segment within the model. For example, for a 40 m long sag section the 100m depth/storage curve values would be multiplied by a factor of 0.40. Note that individual storage curves were derived for 100 m lengths with high point to high point slopes of 0.1%, 0.2% & 0.3 %. The invert elevation of these locations was reduced by 15 cm to approximately account for the depression within these sags.

Note that this is only a conceptual representation of the road sags, and the future inclusion of the detailed road saw toothing will provide greater storage within the development major system than what has been simulated in this model. Refer to Figure B3 in Attachment B for an overview of the major system flow routes within the proposed development. Refer to Figure B5 in Attachment B for a figure of the conceptual proposed road sags grading and the associated depth/storage area curves applied in the model.

As per City standards, for the 100-year storm, the maximum total depth of water (static + dynamic) on all roads shall not exceed 35 cm at the gutter and the product of the maximum flow depths on streets and maximum flow velocity must be less than 0.60 m^2/s on all roads. Table C-1 in Attachment C provides a summary of the maximum major system flow depths and velocity and provides the flow depth velocity product for the 100-year SCS 24 hour and Chicago 3-hour storm. From this preliminary analysis, it was found that the flow depth velocity product is less than 0.60 m^2/s. Table C-2 in Attachment C provides a summary of the maximum major system ponding depths within the development for the 100-year SCS 24 hour and Chicago 3-hour storm. From this preliminary analysis, it was found that the major system ponding depths were either equal to or less than 0.35 m at all locations.

Rear Yard Ditches

The model has been updated to contain conceptual grading of the proposed rear yard ditches that will be implemented to capture runoff from the proposed development as well as runoff from the existing units that have rear yard discharge to the existing golf course. Connections from the rear yards to the proposed storm sewer network have also been included in this modelling Table C3 in Attachment C, provides an overview of the maximum rear yard ponding depths for 100-year SCS 24 hour and Chicago 3-hour storm. From this preliminary analysis, it was found that the major system ponding depths were either equal to or less than 0.35 m at all locations.

Development Minor System

Per the City of Ottawa standards, the minor system has been designed to accommodate, at a minimum, the 2-year post-development flows from within the site. The minor system surrounding the existing development was designed with a 5-year level of service, and as such, any external lands that will discharge to the development's minor system have been sized to ensure that the 5-year level of service will be maintained. Refer to the following section "External Minor system" regarding the checks completed to ensure the same level of service will be provided. The minor system within the development was preliminarily sized based on Rational Method calculations, refer to the Rational Method design sheets provided by DSEL in Attachment B for full details. The pipe sizes determined from the Rational Method calculations were included in the Dynamic Wave model. A Manning's roughness of 0.013 was applied to all proposed pipes within the development and minor system loss coefficients applied to all pipes based on each pipe's respective orientation, refer to Attachment B for the respective minor system loss coefficients applied in this model.

A minor system hydraulic grade line (HGL) analysis was completed for the proposed development based on the 100-year 3-hour Chicago and 100-year 24-hour SCS design storms. From this analysis it was found that the maximum pipe velocities are no greater than 6.0 m/s for all proposed pipes, in locations where the proposed simulated pipe velocities are less than 0.8 m/s, these pipes can be easily downsized at detailed design. Table C4 in Attachment C provided the maximum HGL with the minor system for these design storms. To ensure that the proposed development will provide adequate freeboard to the proposed USF it has been assumed that a minimum freeboard of 1.8 m from the top of the Maintenance Hole is provided for the 100-year events. These results show that on average the maximum depth within the proposed storm sewer is 2.594 m below the top of the maintenance hole.

There are some locations where the 100-year hydraulic grade line is less than 1.8 m below the proposed ground elevation, these locations are either located within the SWM pond block, do not have storm sewer connections to buildings, or the buildings that connect to these locations will be on sump pumps; therefore the high 100-year hydraulic grade line at these locations will not have any negative impacts. Notes identifying these locations have been provided in Table C4. As mentioned above, due to grading constraints within the development sump pumps will be required to service several homes. Further details of these exact locations will be provided at the detailed design stage.

Major/Minor System Connections

Within the development, flows have been passed from the major system to the minor system using outlet links. These outlets have been included in the model to function as an approximate representation of the flow capture provided by the proposed catch basins within the development. Depth/Flow curves for each outlet were generated based on the 2-year peak flow from the proposed development and 5-year peak flow from the existing external rear yards that will discharge to the proposed storm sewer at each respective location. The flow for each of these curves was increased by 14% at a depth of 0.3 m to account for additional inflows due to the increased head applied to standard inlet control devices and catch basins during the 100-year storm. The site has been designed to ensure that no major system flow spills back onto the existing development, for the 100-Year event.

SWM Ponds

The preliminary SWM pond sizes have been based on the "Preliminary Stormwater Management Plan" analysis completed by JFSA in July 2020 and have been updated to reflect dry ponds (the previous submission assumed wet ponds) and also considers the benefits of the proposed EES systems. The total drainage area to each of the SWM Ponds is approximately 57.44 ha, 26.66 ha, 48.37 ha and 12.73 ha for SWM Ponds 1, 2, 3, & 4, respectively. Figure B6 in Attachment B provides an overview of the drainage areas to each of the SWM facilities. As the site will provide quality control via EES, the SWM ponds within the development solely provided erosion and quantity control. Table B1 – B4 outlines the pond stage/storage/outflow for each SWM facility.

The SWM ponds have been represented in the model using storage nodes, which use a depth/area relationship to represent the pond footprint and storage volume provided. Tables 3 - 6 summarize the peak water levels, inflow, outflow and storage volume used in each of the ponds for the 5-year 3-hour Chicago storm, 100-year 3-hour Chicago storm, 100-year 24-hour SCS and 100-year 24-hour SCS +20%.

Table 3: SWM Pond 1 Summary
Drainage Area: 57.44 ha

Event	Max WSE (m)	Max Inflow (m^3/s)	Max Outflow (m^3/s)	Max Storage Volume (m^3)
5 Year Chicago 3Hr	95.333	3.699	0.050	7,895
100 Year Chicago 3hr	96.328	7.570	0.102	18,650
100 Year SCS 24hr	96.692	7.800	0.116	23,180
100 Year SCS 24hr +20%	97.079	8.661	0.222	28,420

Table 4: SWM Pond 2 Summary
Drainage Area 26.66 ha

Event	Max WSE (m)	Max Inflow (m^3/s)	Max Outflow (m^3/s)	Max Storage Volume (m^3)
5 Year Chicago 3Hr	95.978	1.681	0.073	3,613
100 Year Chicago 3hr	97.028	4.543	0.149	9,366
100 Year SCS 24hr	97.200	4.996	0.158	10,410
100 Year SCS 24hr +20%	97.497	6.448	0.981	12,270

Table 5: SWM Pond 3 Summary
Drainage Area: 48.37 ha

Event	Max WSE (m)	Max Inflow (m^3/s)	Max Outflow (m^3/s)	Max Storage Volume (m^3)
5 Year Chicago 3Hr	94.623	3.408	0.160	6,799
100 Year Chicago 3hr	95.479	7.423	0.318	17,540
100 Year SCS 24hr	95.698	7.730	0.347	20,560
100 Year SCS 24hr +20%	96.084	9.221	0.834	26,190

Table 6: SWM Pond 4 Summary
Drainage Area: 12.73 ha

Event	Max WSE (m)	Max Inflow (m^3/s)	Max Outflow (m^3/s)	Max Storage Volume (m^3)
5 Year Chicago 3Hr	95.361	0.979	0.026	1,880
100 Year Chicago 3hr	96.212	2.965	0.041	5,166
100 Year SCS 24hr	96.393	3.043	0.043	5,988
100 Year SCS 24hr +20%	96.771	4.137	0.102	7,877

Underground Storage Units

9.31 ha of proposed development lands downstream of Pond 1, will have an underground storage unit in place to attenuate runoff from these lands into the existing trunk sewer. The underground storage units will be located in the Open Space block located in the northern extent of the development near the intersection of Weslock Way and Catherwood Court. Based on this preliminary analysis the underground storage units will need to provide approximately 1000 m³ of storage volume and will need to be equipped with a 650 mm orifice plate outlet to attenuate the runoff from the site into the existing trunk sewer. Note that due to grading constraints the residential units within this section of the proposed storm sewer system will need to be equipt with sump pumps, and as such the upstream HGL increases created by this storage unit attenuating flow during large events should not negatively affect the operations of these residential units. Tables 7 summarize the peak water levels, inflow, outflow and storage volume used in each of the ponds for the 5-year 3-hour Chicago storm, 100-year 3-hour Chicago storm, 100-year 24-hour SCS and 100-year 24-hour SCS +20%.

Table 7: Underground Storage Unit Summary

Event	Max WSE (m)	Max Inflow (m^3/s)	Max Outflow (m^3/s)	Max Storage Volume (m^3)
5 Year Chicago 3Hr	93.044	0.531	0.270	420
100 Year Chicago 3hr	94.087	1.322	1.122	1,000
100 Year SCS 24hr	94.113	1.183	1.183	1,000
100 Year SCS 24hr +20%	94.139	1.254	1.254	1,000

Stress Test -Emergency Overflow

As a part of this analysis, a design storm stress test has been completed, based on a 20% increase in the intensity of the 100-year 24-hour SCS design storm. Each of the proposed SWM ponds will have emergency flow routes implemented to deal with such an event. Under this stress test, Pond 1 will discharge a peak flow of 0.093 m^3/s (947 m^3) to the proposed road within the development downstream of the pond. Pond 2 will discharge a maximum flow of 0.810 m^3/s (3,210 m^3) to an emergency overflow drop structure that will connect to the existing trunk sewer on Weslock Way. Pond 3 will discharge 0.441 m^3/s (2,200 m^3) to a ditch in Weslock Park, and Pond 4 will spill 0.054 m^3/s (331 m^3) to the road within the development, which will ultimately discharge to the ditch in Weslock Park, after crossing a localized low point on Weslock Way. The above is a preliminary assessment of the emergency overflow measures. A comprehensive assessment of each of these measures will be completed at the detailed design stage.

External Minor System

There are currently eleven (11) locations where the minor system of the existing developed lands can freely discharge to the golf course. Under post-development conditions, these inflows to the site will be picked up by the proposed development's minor system and directed to the respective SWM ponds. The minor system within the development has been sized to ensure that there will be no increases in the existing storm sewer HGL once it is connected to the proposed development's minor system. Table C5 in Attachment C provides a complete summary of the existing and proposed peak HGLs at the outlets of the existing storm sewers. From this analysis, it is seen that there will be no increases in the existing HGL storm sewers due to the connection of these outlets to the proposed development minor system for the various design storms. Note that both MHST11678 & MHST01107 see a slight increase (maximum 5 cm) in HGL for the various design storms, these increases are due to the slight difference created in making the existing development drainage areas abut with the proposed development drainage boundaries in the proposed condition modelling and are simply a modelling artifact and not a true HGL increase. Note that at these locations, even with these increases, the existing storm sewer is not surcharged and should have no negative impacts on existing infrastructure upstream, as there is sufficient freeboard.

Local Downstream Impacts

The peak inflows to the Beaver Pond on the Knudson Drive / Weslock Way trunk sewer have been extracted based on existing and proposed conditions detailed modelling. Table 7 below provides a full summary of the existing and proposed peak flows and total volumes to the Beaver Pond from the Knudson Drive / Weslock Way trunk sewer.

Table 8: Peak flow and total volume into the Beaver Pond from Knudson Drive / Weslock Way trunk storm sewer

Event	Existing Conditions		Proposed Conditions		Difference	
	Peak Flow (m^3/s) [1]	Total Volume (m^3) [2]	Peak Flow (m^3/s) [3]	Total Volume (m^3) [4]	Peak Flow (m^3/s) [3]-[1]	Total Volume (m^3) [4]-[2]
5 Year Chicago 3Hr	5.727	24,930	5.165	29,200	-0.562	4,270
100 Year Chicago 3hr	9.218	64,440	8.464	78,870	-0.754	14,430
100 Year SCS 24hr	9.413	80,420	9.290	106,600	-0.123	26,180
100 Year SCS 24hr +20%	10.030	128,400	10.420	131,600	0.390	3,200

From this analysis it was found that peak flows to the Beaver Pond for the simulated design storms are less than pre-development conditions due to the proposed SWM ponds, except for the stress test (100 Year SCS 24Hr +20%). As expected, the total runoff volume to the Beaver Pond has increased under the proposed conditions. The impacts of these volumetric increases due to the development have been assessed in a separate memo by JFSA "Downstream of 7000 Campeau Drive – Hydrologic Assessment" June 2021, which reviews and quantifies the downstream impacts of the development on the greater Watts Creek watershed.

Table C6 in Attachment C provides a comparison of the existing and proposed HGL in the existing Knudson Drive / Weslock Way trunk sewer at the various SWMF outlet locations. From these results, it is seen that the proposed development either matches or reduces the existing peak HGL in this system up to and including the 100-year event. Under the stress test, it was found that there would be a maximum increase in HGL of this trunk sewer of 10 cm. Although it is important to consider that this increase in HGL will not increase the risk of existing basement flooding, as under this scenario there is still a 4.37 m freeboard from the top of the Maintenance Hole at this location, which is more than enough to ensure that the existing houses that discharge to this system still have a free outlet.

Conclusion

The detailed PCSWMM models provided by the City for the lands draining to the Beaver Pond were updated to correct a few minor issues and compared with field measured flows from 2019. This investigation showed that this model provided a reasonably good correlation with the field observed data, and accordingly this model was used to establish the existing hydraulic and hydrologic conditions of the study area. This model was then updated to reflect the proposed development at 7000 Campeau Drive. Full details of this update have been outlined in this memo. From this analysis, it was found that:

- The proposed minor system within the development is adequately sized to safely convey the 5- and 100-year storm flows to the proposed SWM facilities.
- The proposed major system within the development is adequately sized to safely convey the excess 100-year flows to the proposed SWM facilities.
- The operation of the proposed SWM facilities has been shown to meet quantity control requirements, with quality control requirements assessed at detailed design through the implementation of Etobicoke Exfiltration Systems.
- The proposed development will not result in any HGL increases on the existing stormwater infrastructure upstream or downstream of the proposed development for events up to and including the 100-year event.
- The proposed development peak flows into the Beaver Pond from the Knudson Drive / Weslock Way trunk sewer, are either equal to or less than existing peak flows.
- The peak HGL in the existing Knudson Drive/ Westlock Way will not be increased due to the proposed development for events up to and including the 100-year event.

Yours truly,
J.F Sabourin and Associates Inc.

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Figures:

Tables:

Attachments:

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Attachment A

Existing Conditions Model Overview

Legend

- Area Added
- Area Removed
- City Model Subcatchments

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DSEL
david schaeffer engineering ltd

SCALE : 1:2500

0 50 100 150 m

PROJECT :

7000 Campeau Drive

TITLE :

Figure A1:
Subcatchment Area Adjustments

PROJECT	1581-17
DRAWN:	JB
DATE:	May 2020

Legend

- Area Added
- Area Removed
- City Model Subcatchments

J.F. Sabourin and Associates Inc.
WATER RESOURCES AND ENVIRONMENTAL CONSULTANTS
52 Springbrook Drive
Ottawa, ON, K2S 1B9
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DSEL
david schaeffer engineering ltd

SCALE : 1:2500

0 50 100 150 m

PROJECT :
7000 Campeau Drive

TITLE :
Figure A2:
Subcatchment Area Adjustments

PROJECT	1581-17
DRAWN:	JB
DATE:	May 2020

Legend

- Area Added
- Area Removed
- City Model Subcatchments

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DSEL
david schaeffer engineering ltd

SCALE : 1:2500

0 50 100 150 m

PROJECT :

7000 Campeau Drive

TITLE :

Figure A3:
Subcatchment Area Adjustments

PROJECT	1581-17
DRAWN:	JB
DATE:	May 2020

Figure A4: MHSTM12321 – Node invert set to 0m

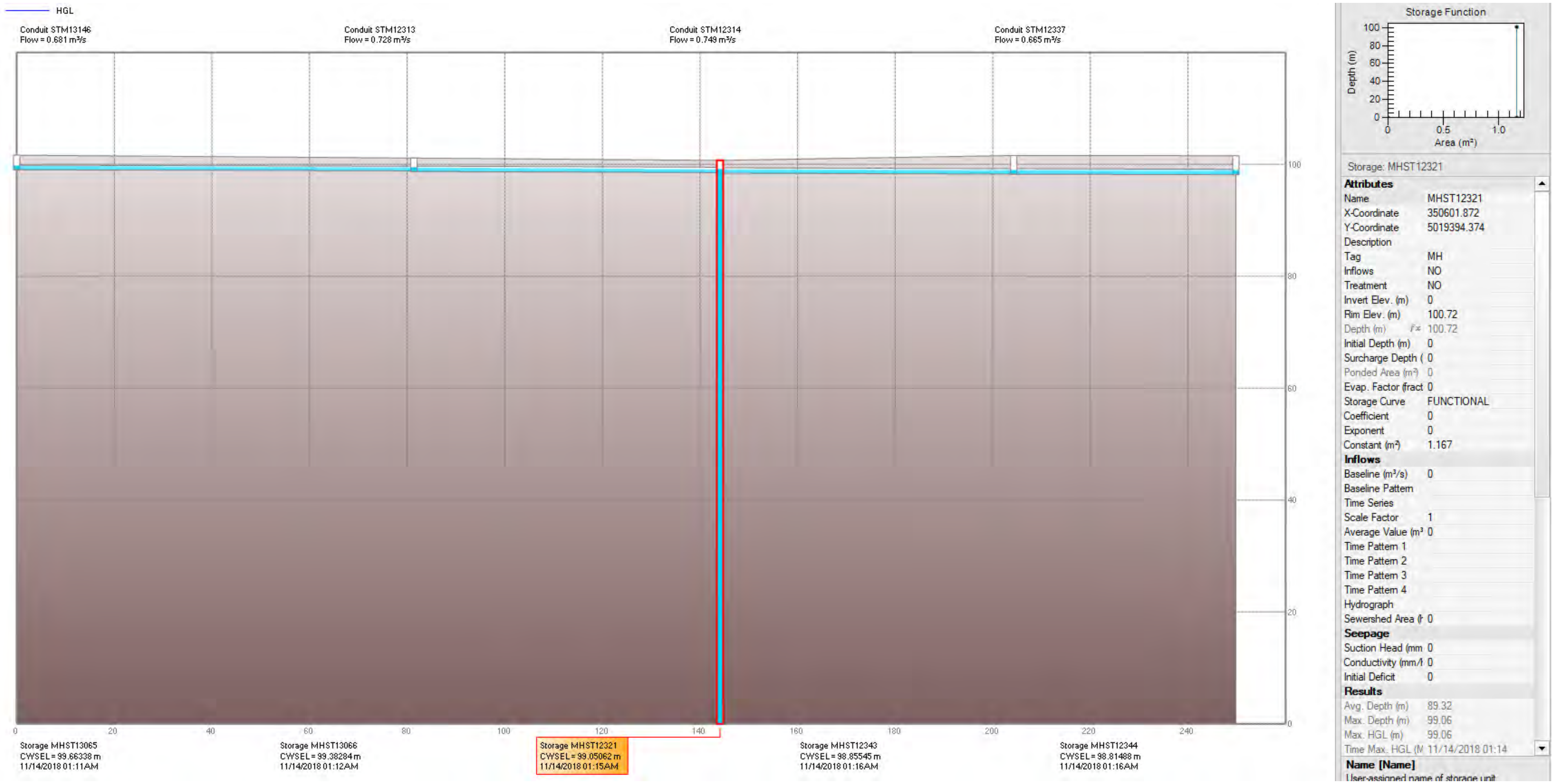


Figure A5: STM12459 – Link inlet and outlet elevations do not match neighbouring pipes

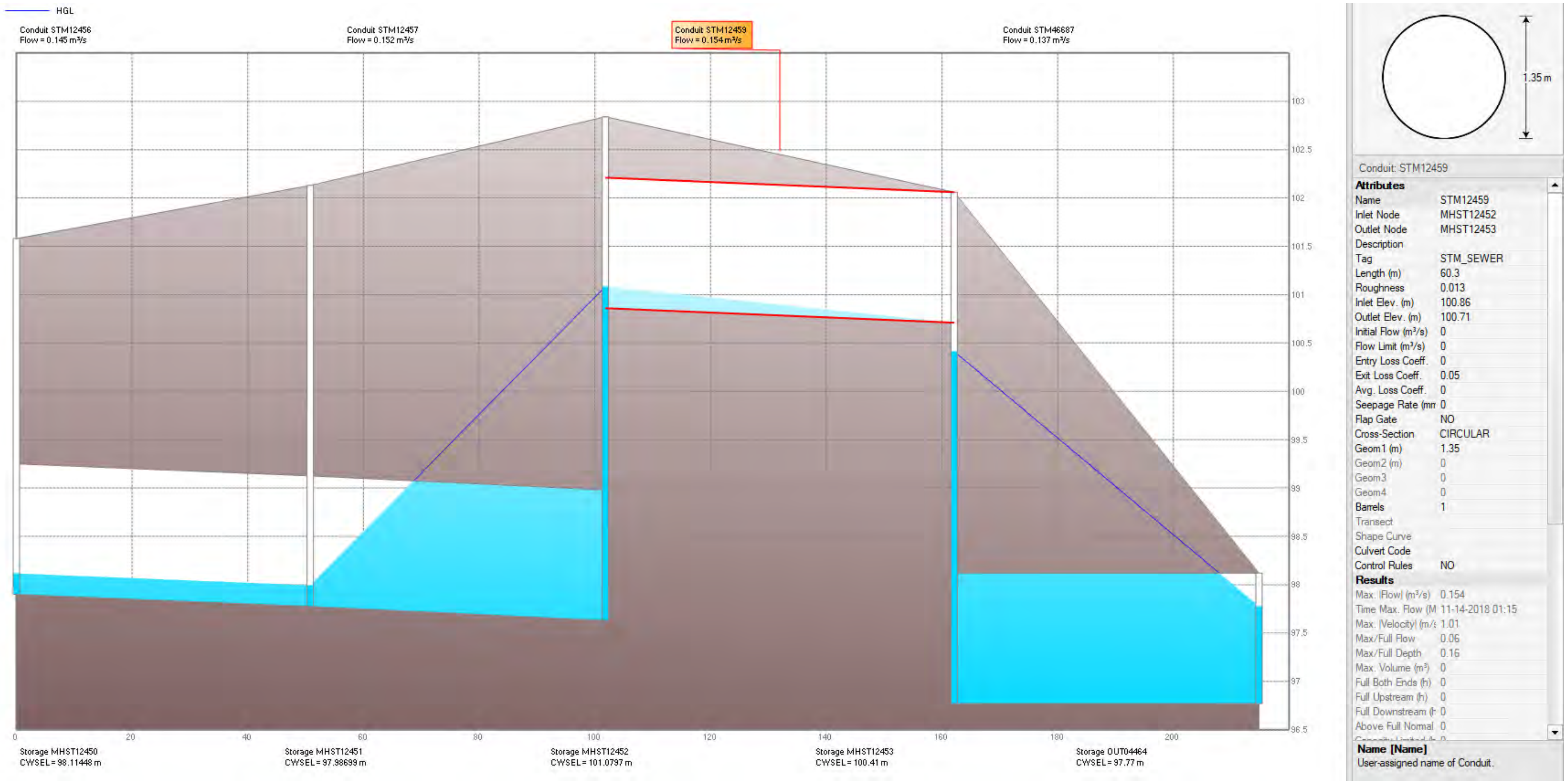
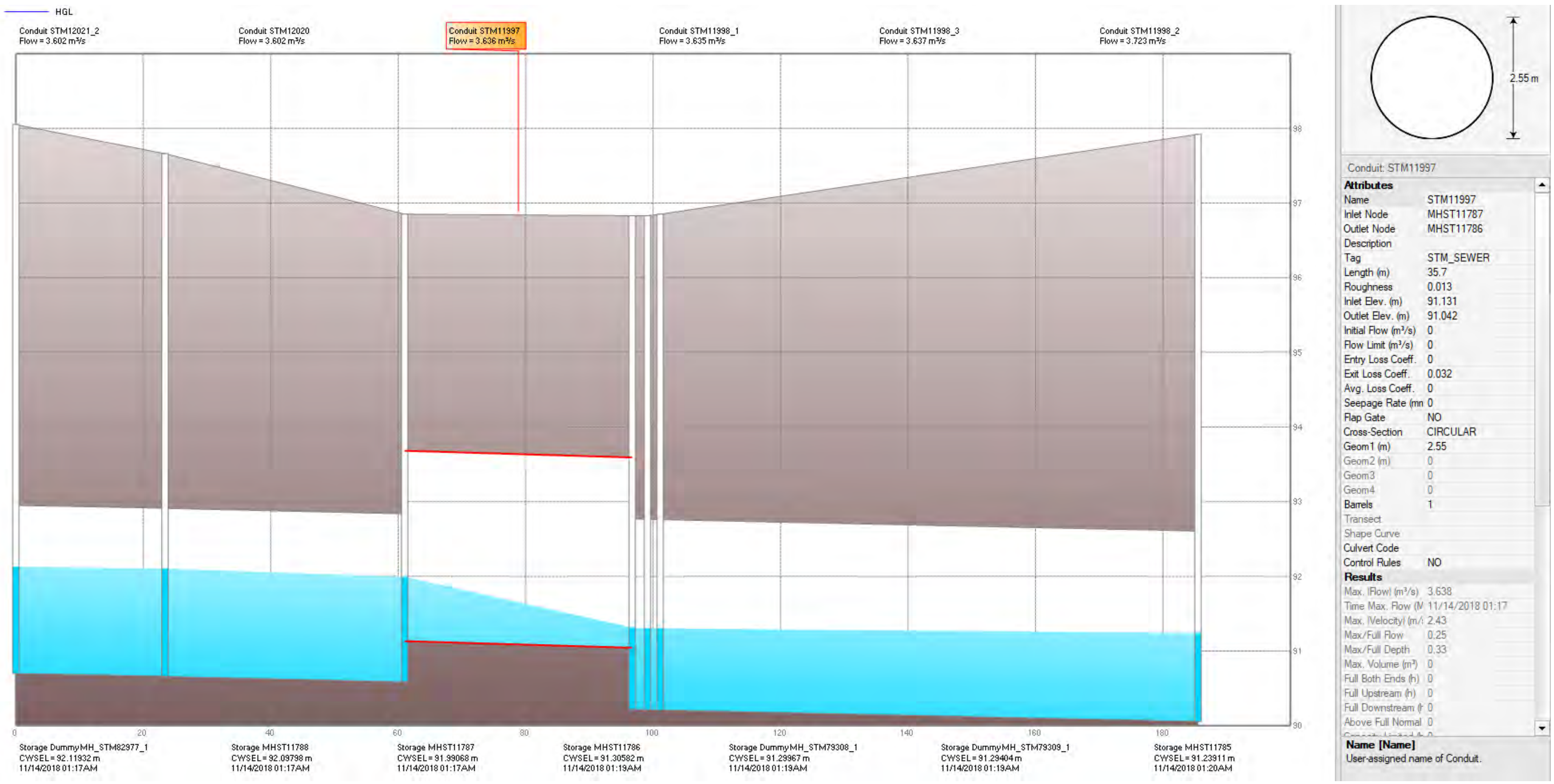
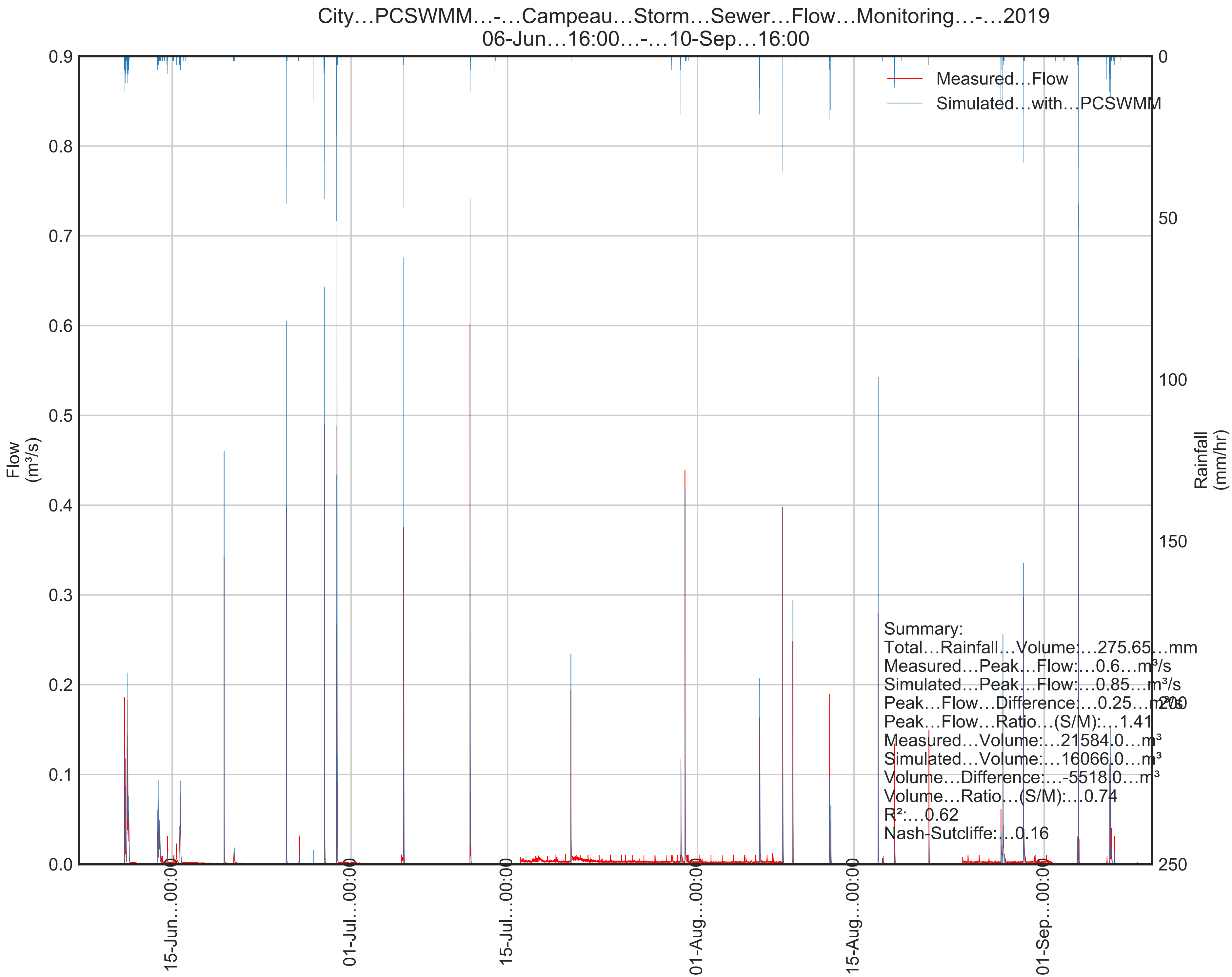
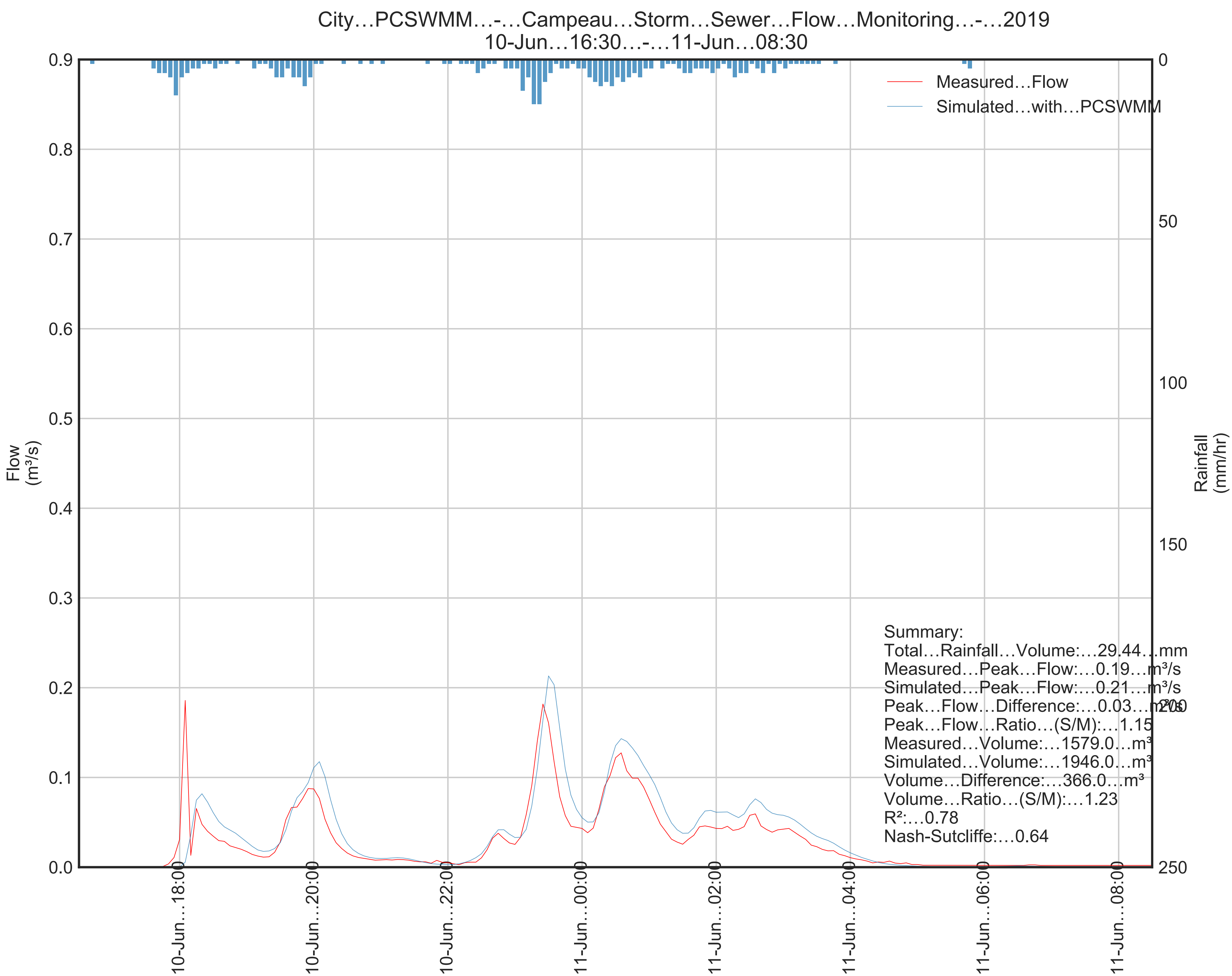


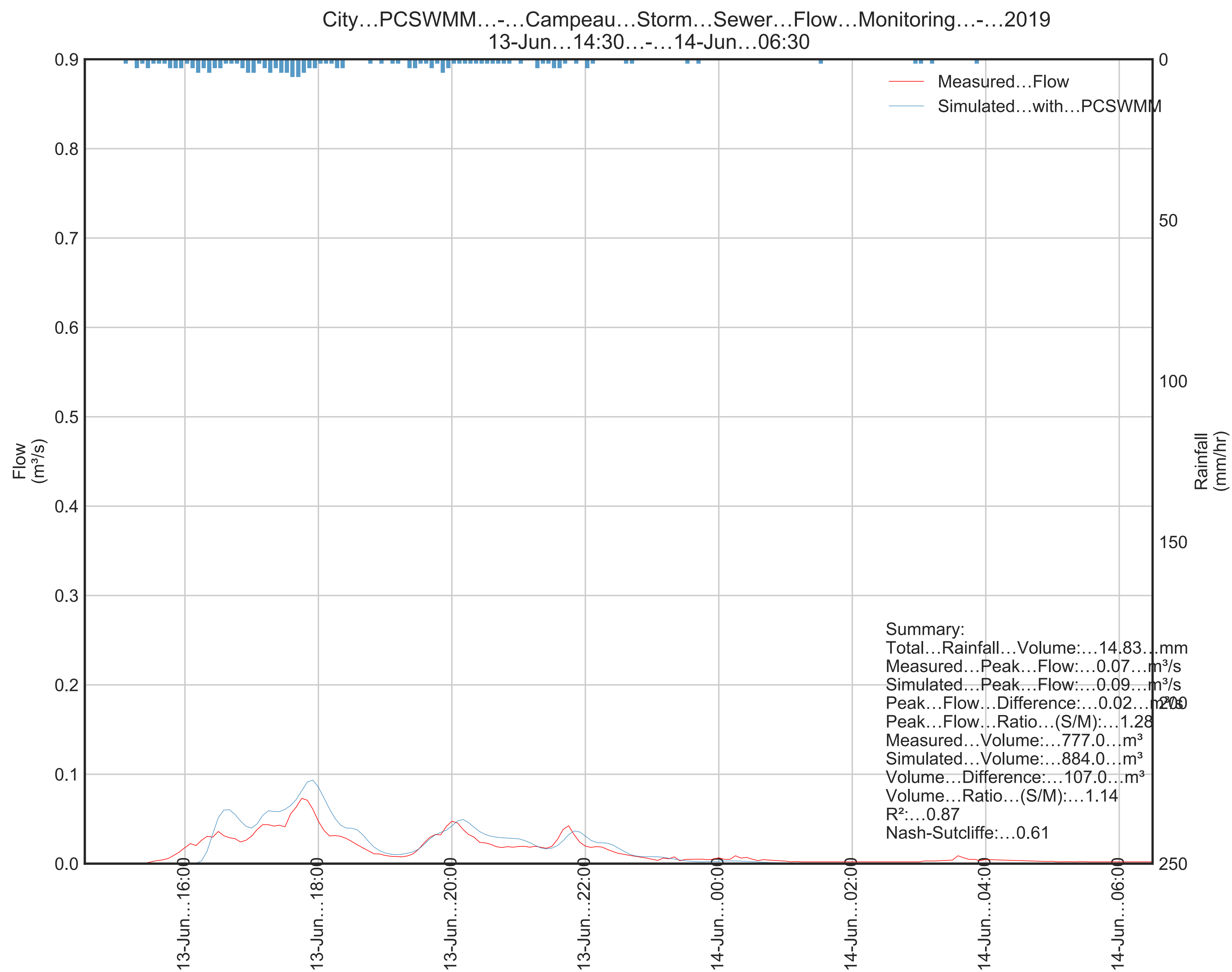
Figure A6: STM11997 – Link inlet and outlet elevations do not match neighbouring pipes

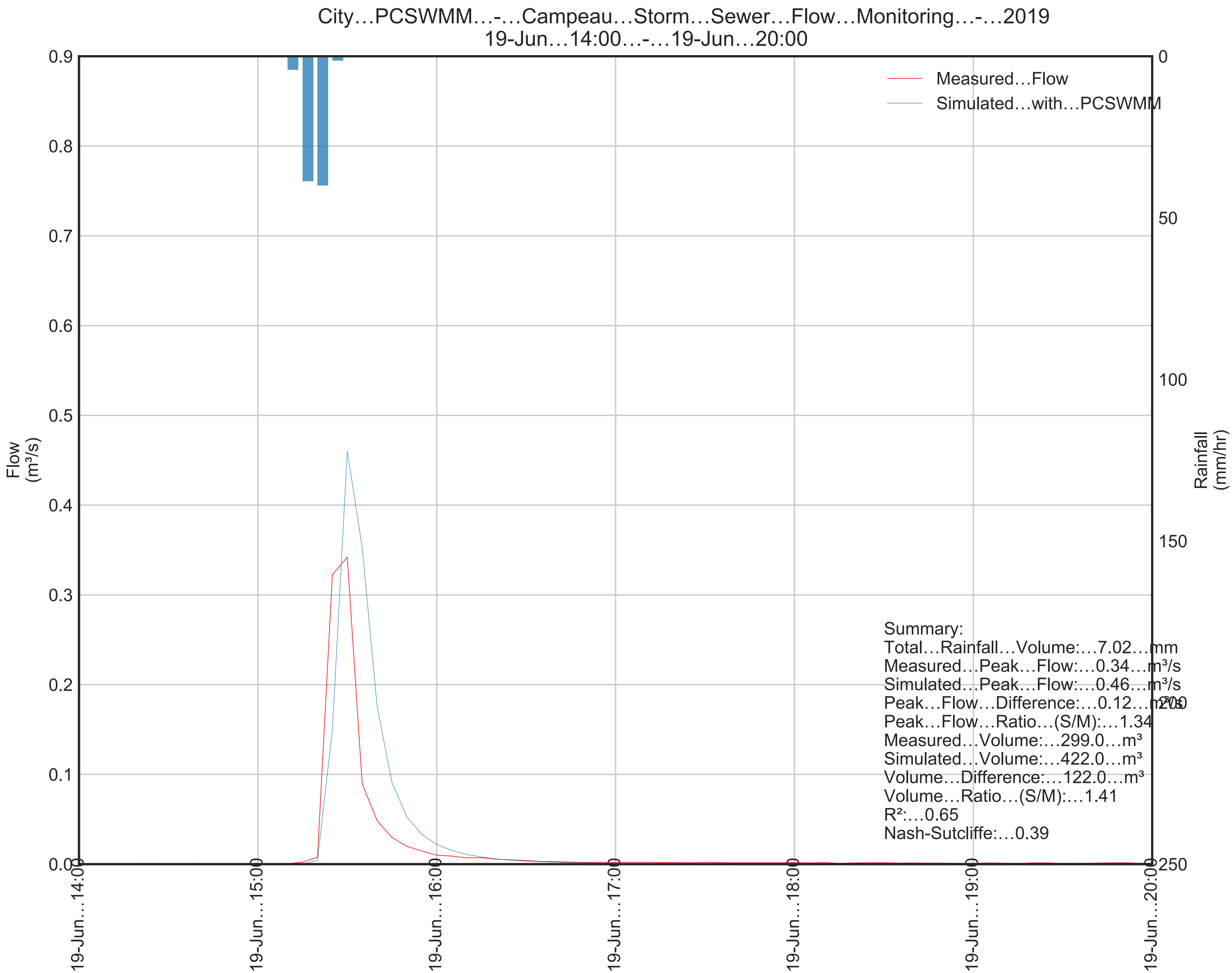


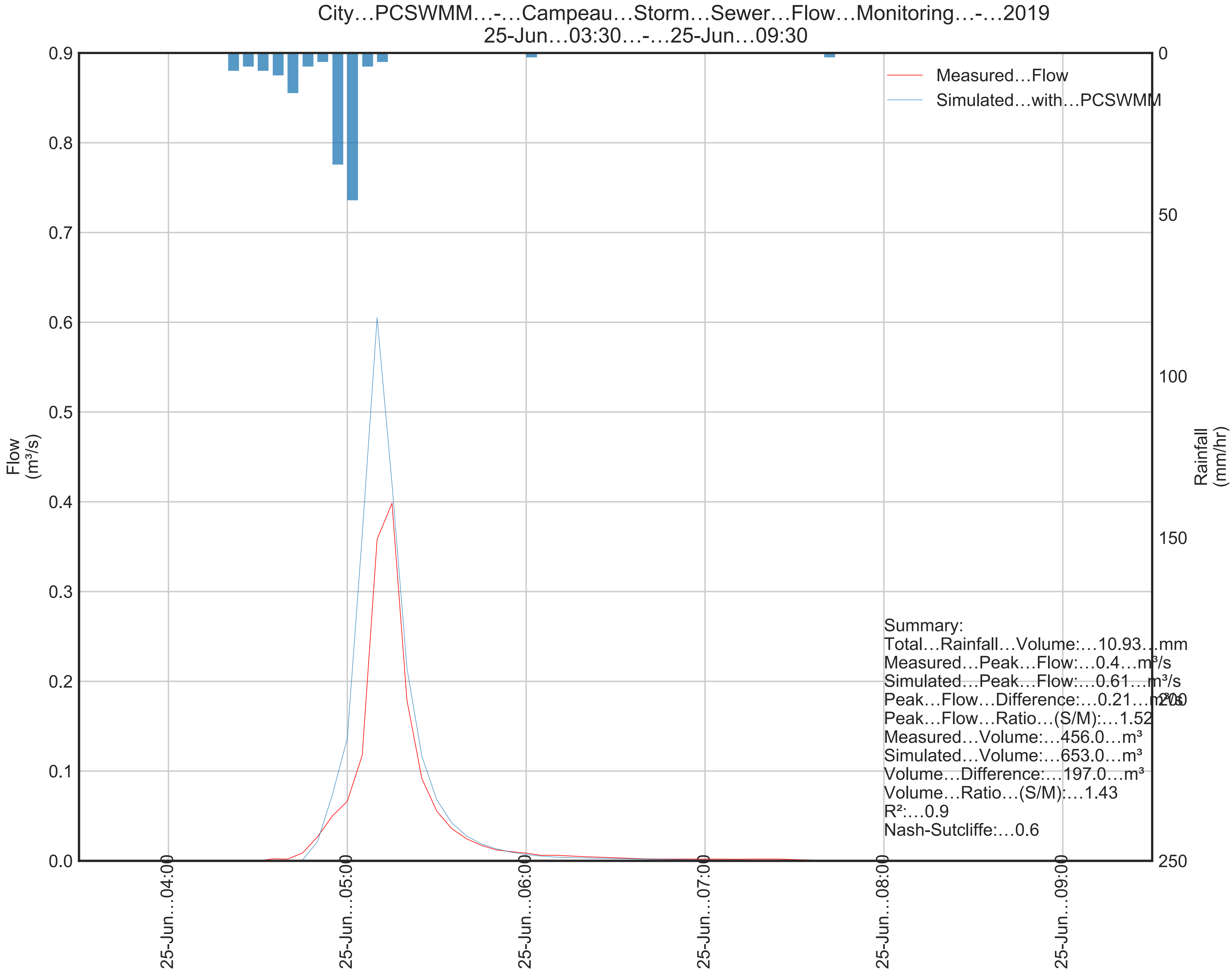


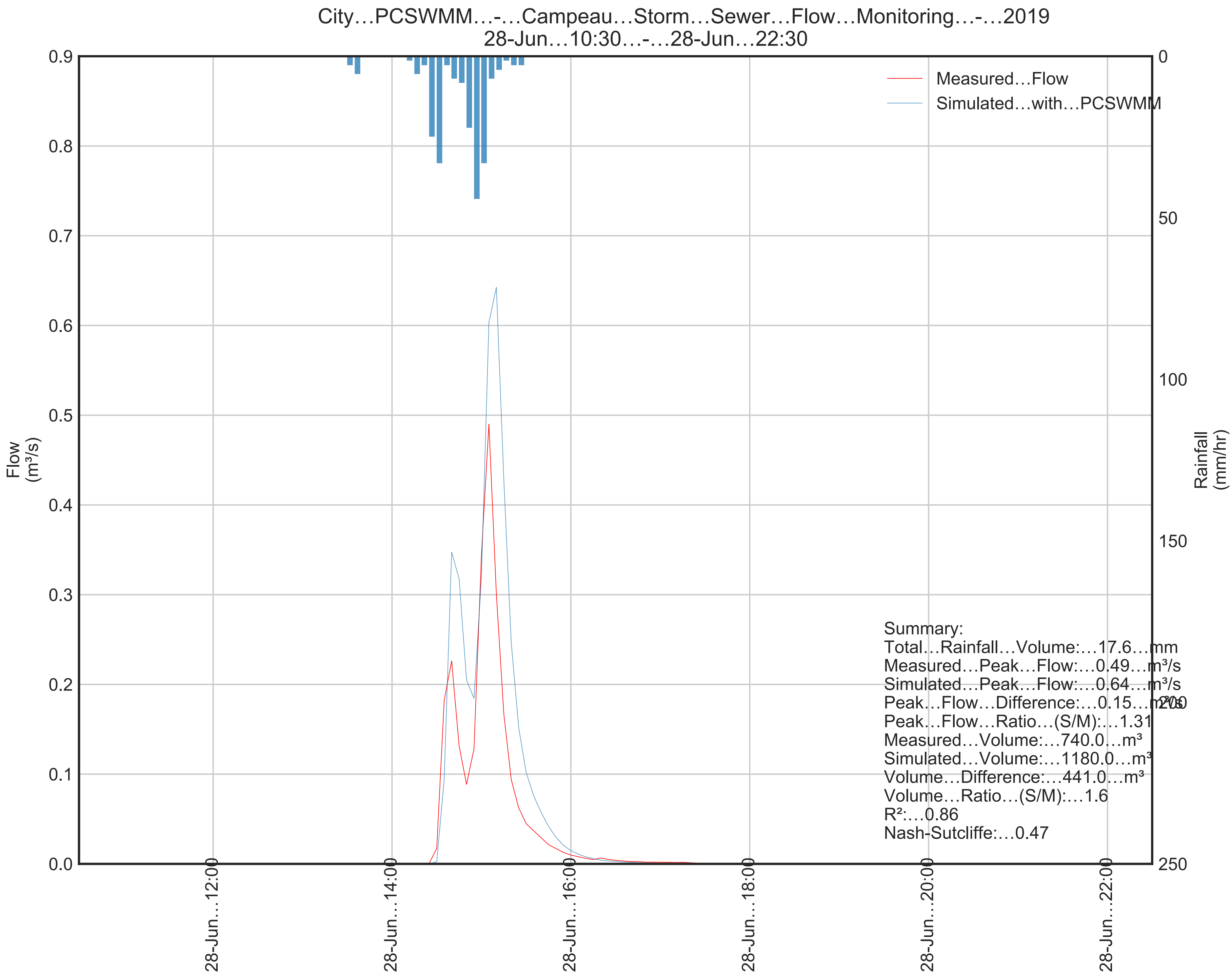
City…PCSWMM…-…Campeau…Storm…Sewer…Flow…Monitoring…-…2019
06-Jun…16:00…-…10-Sep…16:00
Flow (m³/s)
Rainfall (mm/hr)
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
0
50
100
150
200
250
Measured…Flow
Simulated…with…PCSWMM
Summary:
Total…Rainfall…Volume:…275.65…mm
Measured…Peak…Flow:…0.6…m³/s
Simulated…Peak…Flow:…0.85…m³/s
Peak…Flow…Difference:…0.25…m³/s
Peak…Flow…Ratio…(S/M):…1.41
Measured…Volume:…21584.0…m³
Simulated…Volume:…16066.0…m³
Volume…Difference:…-5518.0…m³
Volume…Ratio…(S/M):…0.74
R²:…0.62
Nash-Sutcliffe:…0.16
15-Jun…00:00
01-Jul…00:00
15-Jul…00:00
01-Aug…00:00
15-Aug…00:00
01-Sep…00:00


City PCSWMM - Campeau Storm Sewer Flow Monitoring - 2019
10-Jun 16:30 - 11-Jun 08:30
Flow (m³/s)
Rainfall (mm/hr)
Measured Flow
Simulated with PCSWMM
Summary:
Total Rainfall Volume: 29.44 mm
Measured Peak Flow: 0.19 m³/s
Simulated Peak Flow: 0.21 m³/s
Peak Flow Difference: 0.03 m³/s
Peak Flow Ratio (S/M): 1.15
Measured Volume: 1579.0 m³
Simulated Volume: 1946.0 m³
Volume Difference: 366.0 m³
Volume Ratio (S/M): 1.23
R²: 0.78
Nash-Sutcliffe: 0.64
10-Jun 18:00
10-Jun 20:00
10-Jun 22:00
11-Jun 00:00
11-Jun 02:00
11-Jun 04:00
11-Jun 06:00
11-Jun 08:00

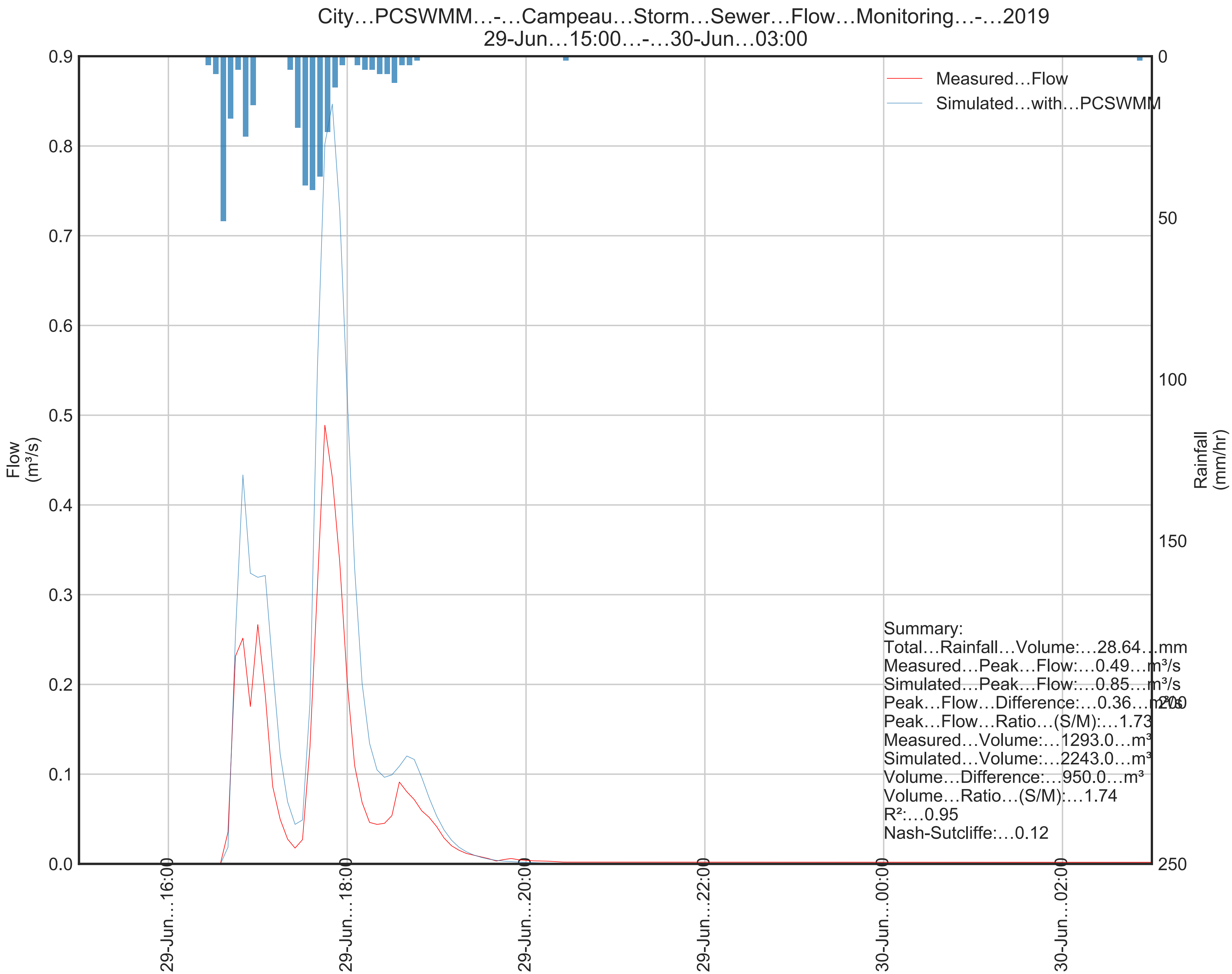

City PCSWMM - Campeau Storm Sewer Flow Monitoring - 2019
13-Jun 14:30 - 14-Jun 06:30
Measured Flow
Simulated with PCSWMM
Flow (m³/s)
Rainfall (mm/hr)
Summary:
Total Rainfall Volume: 14.83 mm
Measured Peak Flow: 0.07 m³/s
Simulated Peak Flow: 0.09 m³/s
Peak Flow Difference: 0.02 m³/s
Peak Flow Ratio (S/M): 1.28
Measured Volume: 777.0 m³
Simulated Volume: 884.0 m³
Volume Difference: 107.0 m³
Volume Ratio (S/M): 1.14
R²: 0.87
Nash-Sutcliffe: 0.61
13-Jun 16:00
13-Jun 18:00
13-Jun 20:00
13-Jun 22:00
14-Jun 00:00
14-Jun 02:00
14-Jun 04:00
14-Jun 06:00


City…PCSWMM…-…Campeau…Storm…Sewer…Flow…Monitoring…-…2019
19-Jun…14:00…-…19-Jun…20:00
Measured…Flow
Simulated…with…PCSWMM
Flow
(m³/s)
Rainfall
(mm/hr)
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
0
50
100
150
200
250
19-Jun…14:00
19-Jun…15:00
19-Jun…16:00
19-Jun…17:00
19-Jun…18:00
19-Jun…19:00
19-Jun…20:00
Summary:
Total…Rainfall…Volume:…7.02…mm
Measured…Peak…Flow:…0.34…m³/s
Simulated…Peak…Flow:…0.46…m³/s
Peak…Flow…Difference:…0.12…m³/s
Peak…Flow…Ratio…(S/M):…1.34
Measured…Volume:…299.0…m³
Simulated…Volume:…422.0…m³
Volume…Difference:…122.0…m³
Volume…Ratio…(S/M):…1.41
R²:…0.65
Nash-Sutcliffe:…0.39

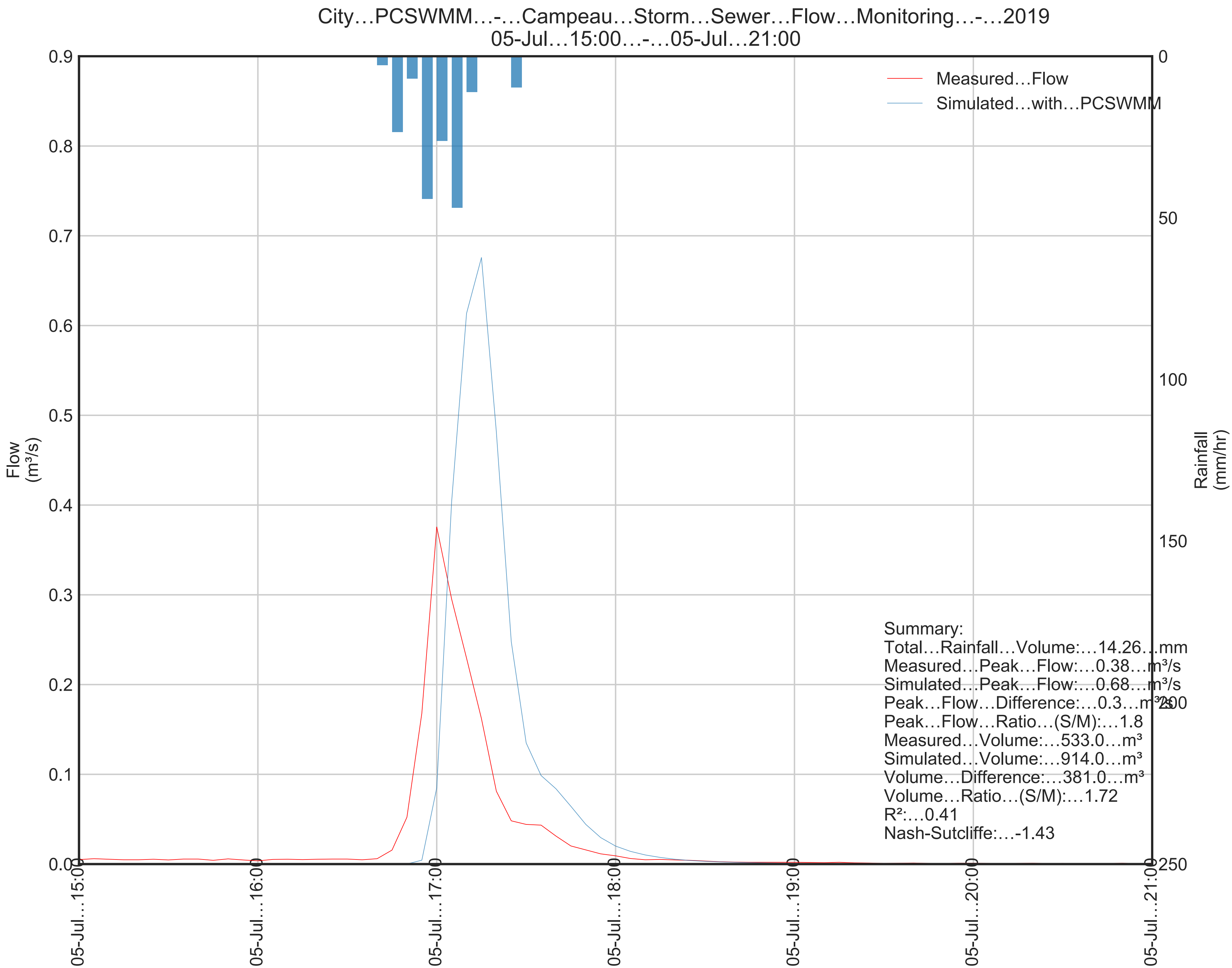

City PCSWMM - Campeau Storm Sewer Flow Monitoring - 2019
25-Jun 03:30 - 25-Jun 09:30
Flow (m³/s)
Rainfall (mm/hr)
Measured Flow
Simulated with PCSWMM
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
0
50
100
150
200
250
25-Jun 04:00
25-Jun 05:00
25-Jun 06:00
25-Jun 07:00
25-Jun 08:00
25-Jun 09:00
Summary:
Total Rainfall Volume: 10.93 mm
Measured Peak Flow: 0.4 m³/s
Simulated Peak Flow: 0.61 m³/s
Peak Flow Difference: 0.21 m³/s
Peak Flow Ratio (S/M): 1.52
Measured Volume: 456.0 m³
Simulated Volume: 653.0 m³
Volume Difference: 197.0 m³
Volume Ratio (S/M): 1.43
R²: 0.9
Nash-Sutcliffe: 0.6



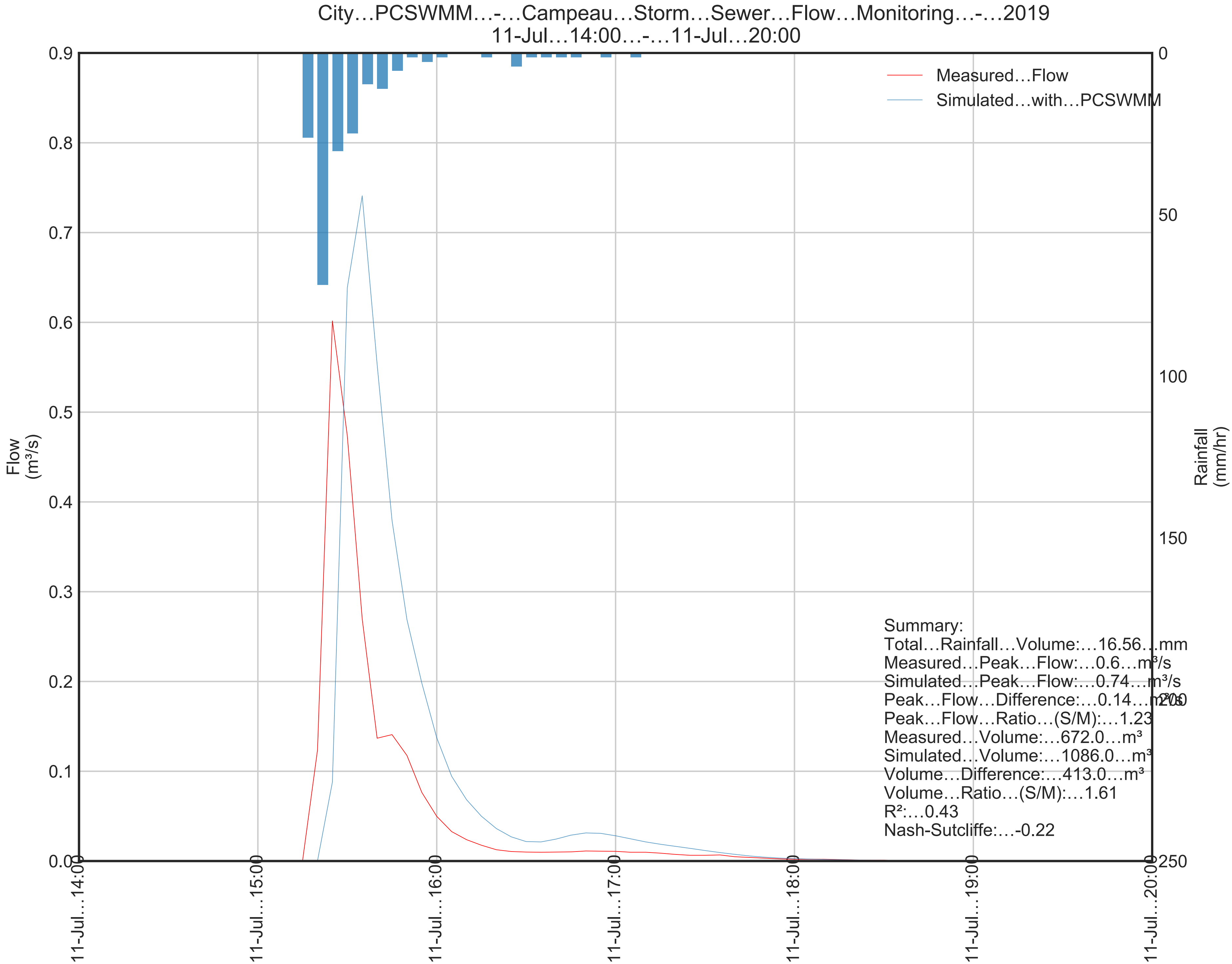
City…PCSWMM…-…Campeau…Storm…Sewer…Flow…Monitoring…-…2019
28-Jun…10:30…-…28-Jun…22:30
Flow (m³/s)
Rainfall (mm/hr)
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
0
50
100
150
200
250
Measured…Flow
Simulated…with…PCSWMM
Summary:
Total…Rainfall…Volume:…17.6…mm
Measured…Peak…Flow:…0.49…m³/s
Simulated…Peak…Flow:…0.64…m³/s
Peak…Flow…Difference:…0.15…m³/s
Peak…Flow…Ratio…(S/M):…1.31
Measured…Volume:…740.0…m³
Simulated…Volume:…1180.0…m³
Volume…Difference:…441.0…m³
Volume…Ratio…(S/M):…1.6
R²:…0.86
Nash-Sutcliffe:…0.47
28-Jun…12:00
28-Jun…14:00
28-Jun…16:00
28-Jun…18:00
28-Jun…20:00
28-Jun…22:00



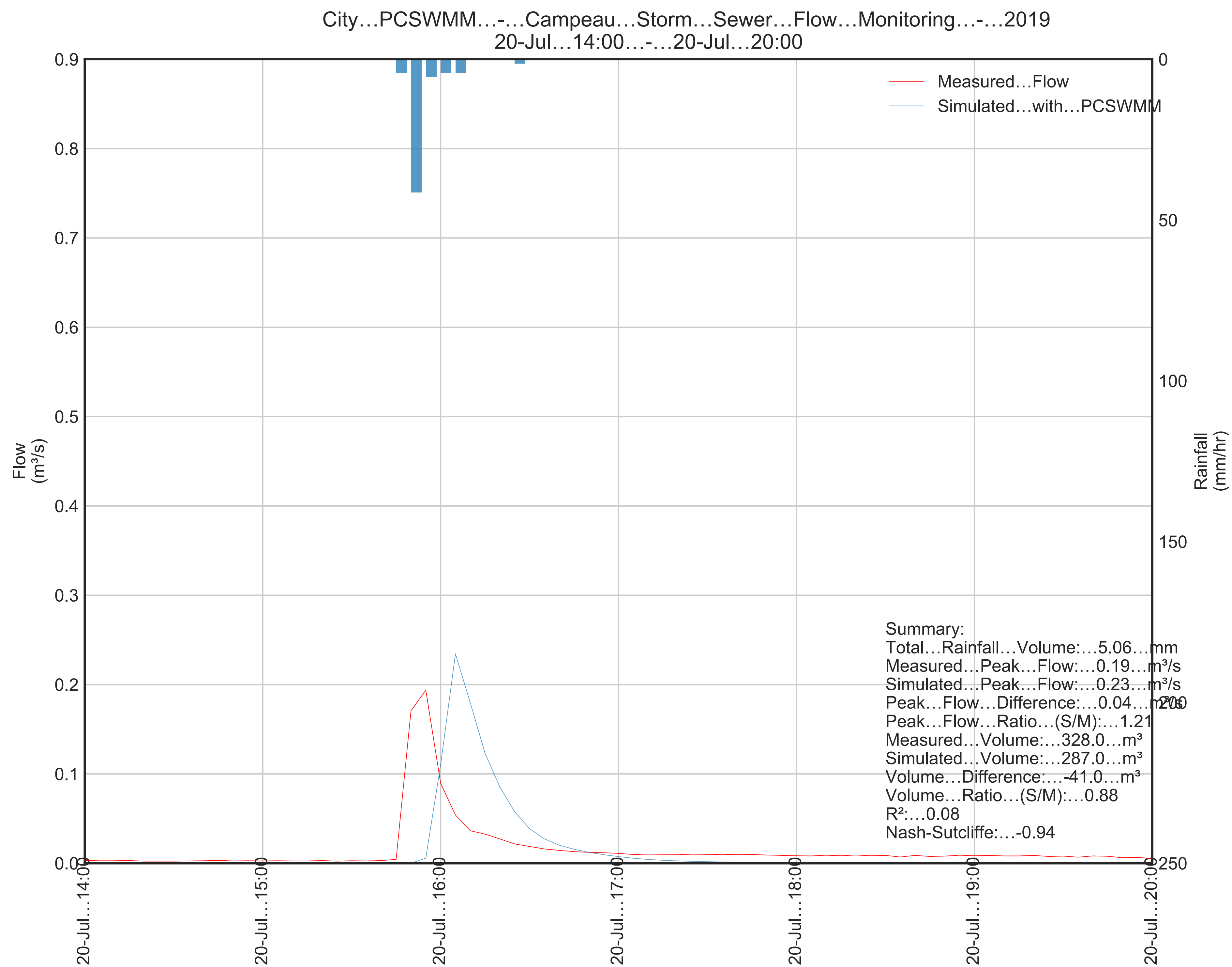
City PCSWMM - Campeau Storm Sewer Flow Monitoring - 2019
29-Jun 15:00 - 30-Jun 03:00
Flow (m³/s)
Rainfall (mm/hr)
Measured Flow
Simulated with PCSWMM
Summary:
Total Rainfall Volume: 28.64 mm
Measured Peak Flow: 0.49 m³/s
Simulated Peak Flow: 0.85 m³/s
Peak Flow Difference: 0.36 m³/s
Peak Flow Ratio (S/M): 1.73
Measured Volume: 1293.0 m³
Simulated Volume: 2243.0 m³
Volume Difference: 950.0 m³
Volume Ratio (S/M): 1.74
R²: 0.95
Nash-Sutcliffe: 0.12
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
0
50
100
150
200
250
29-Jun 16:00
29-Jun 18:00
29-Jun 20:00
29-Jun 22:00
30-Jun 00:00
30-Jun 02:00



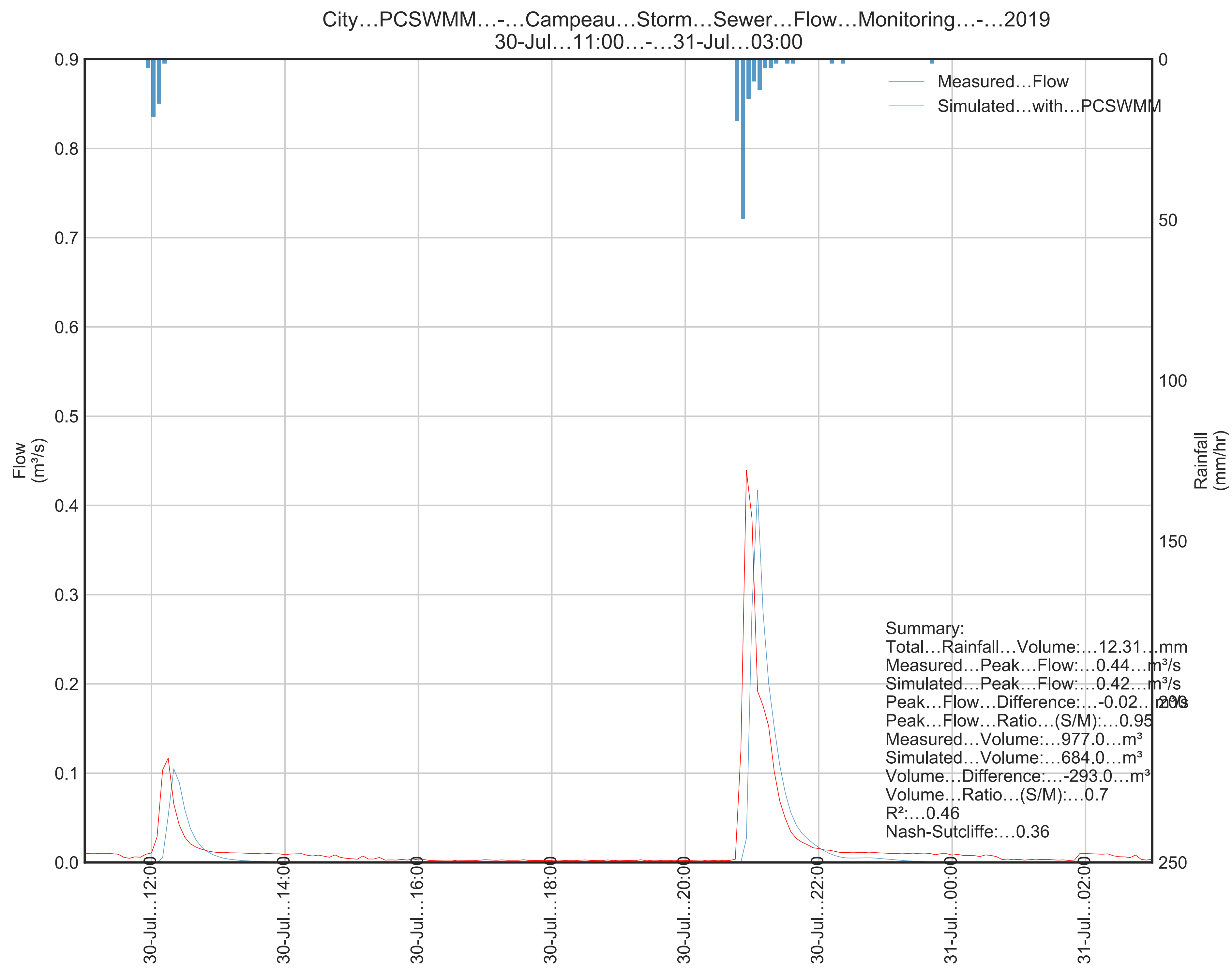
City…PCSWMM…-…Campeau…Storm…Sewer…Flow…Monitoring…-…2019
05-Jul…15:00…-…05-Jul…21:00
Measured…Flow
Simulated…with…PCSWMM
Flow
(m³/s)
Rainfall
(mm/hr)
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
0
50
100
150
200
250
05-Jul…15:00
05-Jul…16:00
05-Jul…17:00
05-Jul…18:00
05-Jul…19:00
05-Jul…20:00
05-Jul…21:00
Summary:
Total…Rainfall…Volume:…14.26…mm
Measured…Peak…Flow:…0.38…m³/s
Simulated…Peak…Flow:…0.68…m³/s
Peak…Flow…Difference:…0.3…m³/s
Peak…Flow…Ratio…(S/M):…1.8
Measured…Volume:…533.0…m³
Simulated…Volume:…914.0…m³
Volume…Difference:…381.0…m³
Volume…Ratio…(S/M):…1.72
R²:…0.41
Nash-Sutcliffe:…-1.43

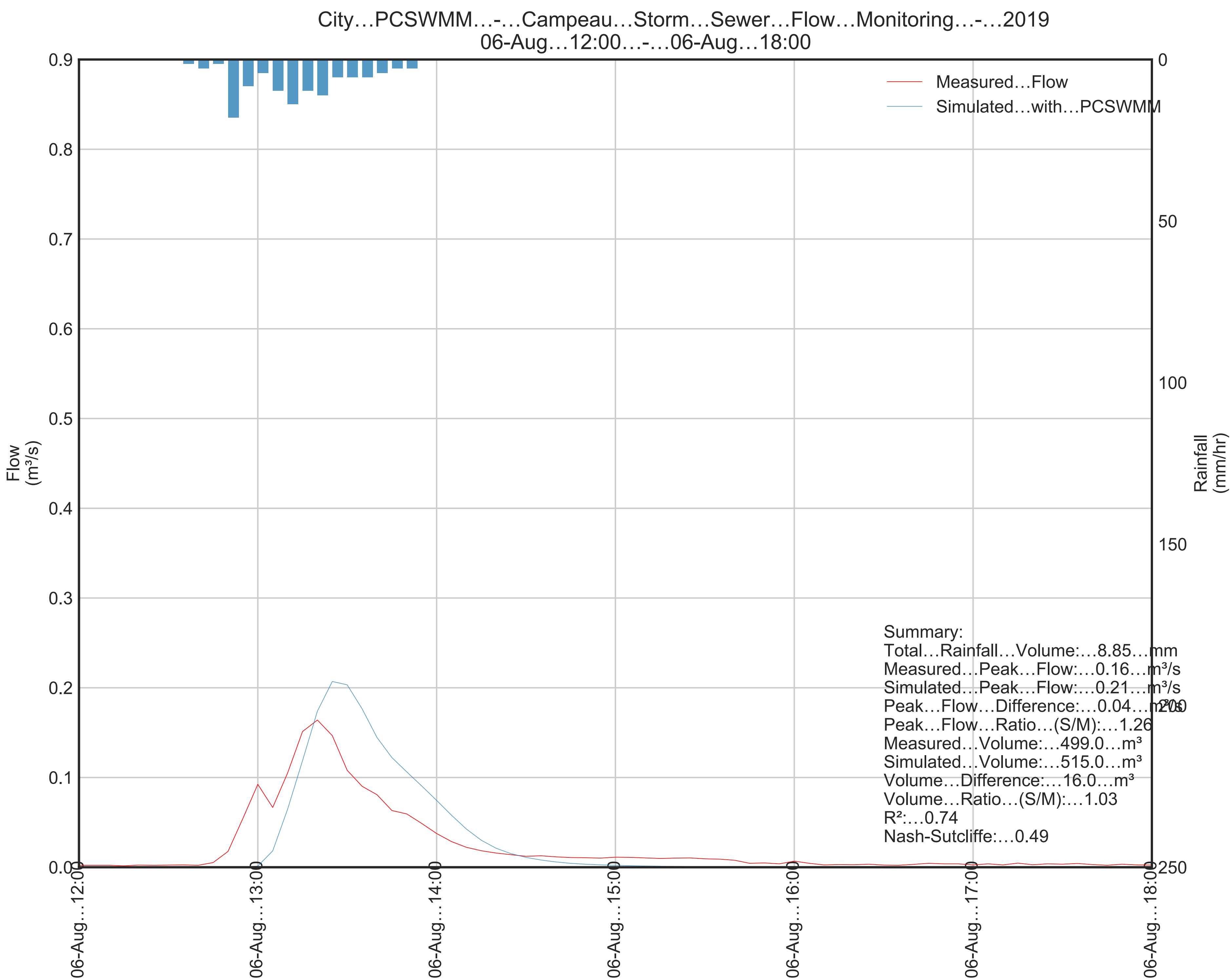


City…PCSWMM…-…Campeau…Storm…Sewer…Flow…Monitoring…-…2019
11-Jul…14:00…-…11-Jul…20:00
Flow (m³/s)
Rainfall (mm/hr)
Measured…Flow
Simulated…with…PCSWMM
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
0
50
100
150
200
250
11-Jul…14:00
11-Jul…15:00
11-Jul…16:00
11-Jul…17:00
11-Jul…18:00
11-Jul…19:00
11-Jul…20:00
Summary:
Total…Rainfall…Volume:…16.56…mm
Measured…Peak…Flow:…0.6…m³/s
Simulated…Peak…Flow:…0.74…m³/s
Peak…Flow…Difference:…0.14…m³/s
Peak…Flow…Ratio…(S/M):…1.23
Measured…Volume:…672.0…m³
Simulated…Volume:…1086.0…m³
Volume…Difference:…413.0…m³
Volume…Ratio…(S/M):…1.61
R²:…0.43
Nash-Sutcliffe:…-0.22

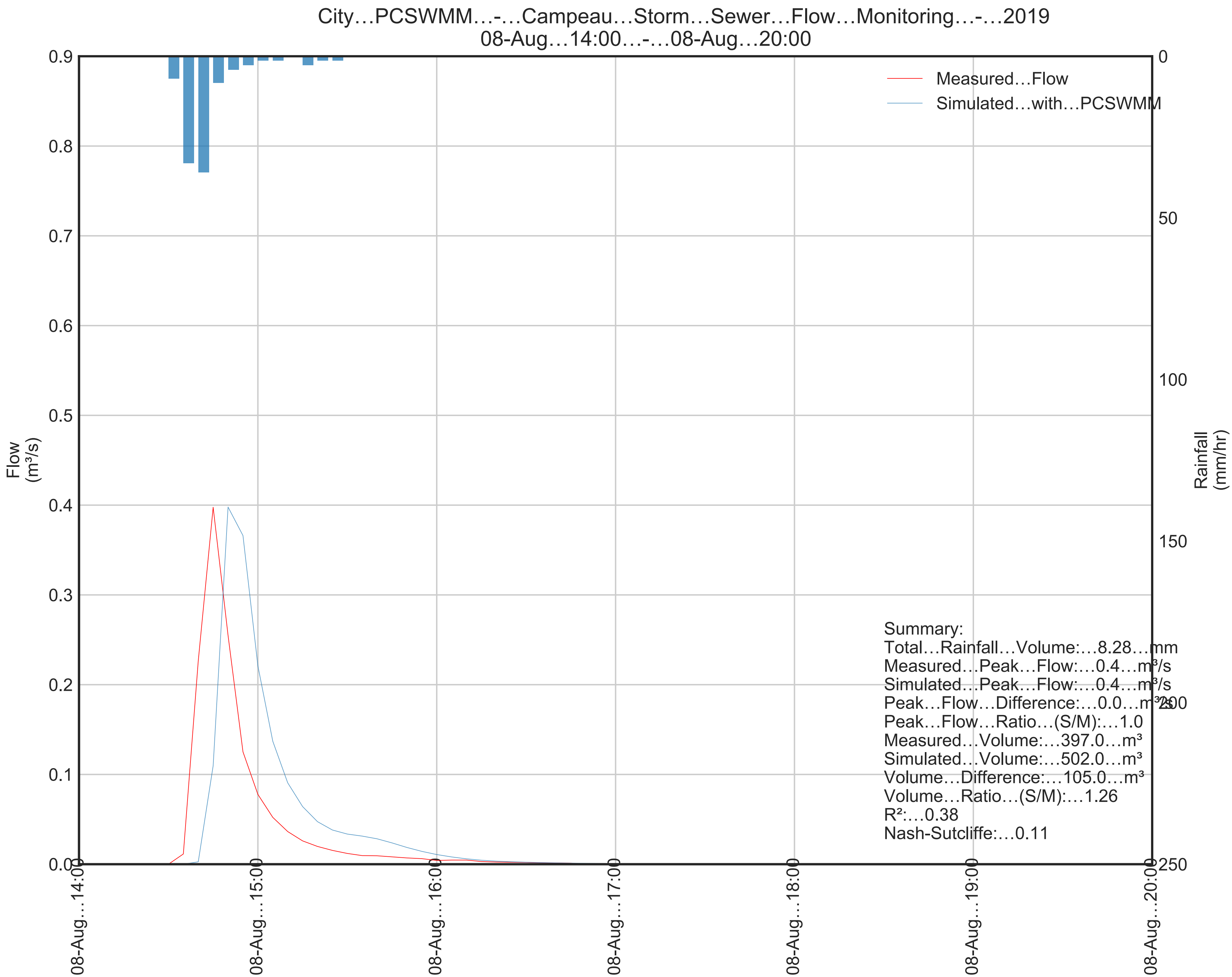


City…PCSWMM…-…Campeau…Storm…Sewer…Flow…Monitoring…-…2019
20-Jul…14:00…-…20-Jul…20:00
Flow (m³/s)
Rainfall (mm/hr)
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
0
50
100
150
200
250
20-Jul…14:00
20-Jul…15:00
20-Jul…16:00
20-Jul…17:00
20-Jul…18:00
20-Jul…19:00
20-Jul…20:00
Measured…Flow
Simulated…with…PCSWMM
Summary:
Total…Rainfall…Volume:…5.06…mm
Measured…Peak…Flow:…0.19…m³/s
Simulated…Peak…Flow:…0.23…m³/s
Peak…Flow…Difference:…0.04…m³/s
Peak…Flow…Ratio…(S/M):…1.21
Measured…Volume:…328.0…m³
Simulated…Volume:…287.0…m³
Volume…Difference:…-41.0…m³
Volume…Ratio…(S/M):…0.88
R²:…0.08
Nash-Sutcliffe:…-0.94

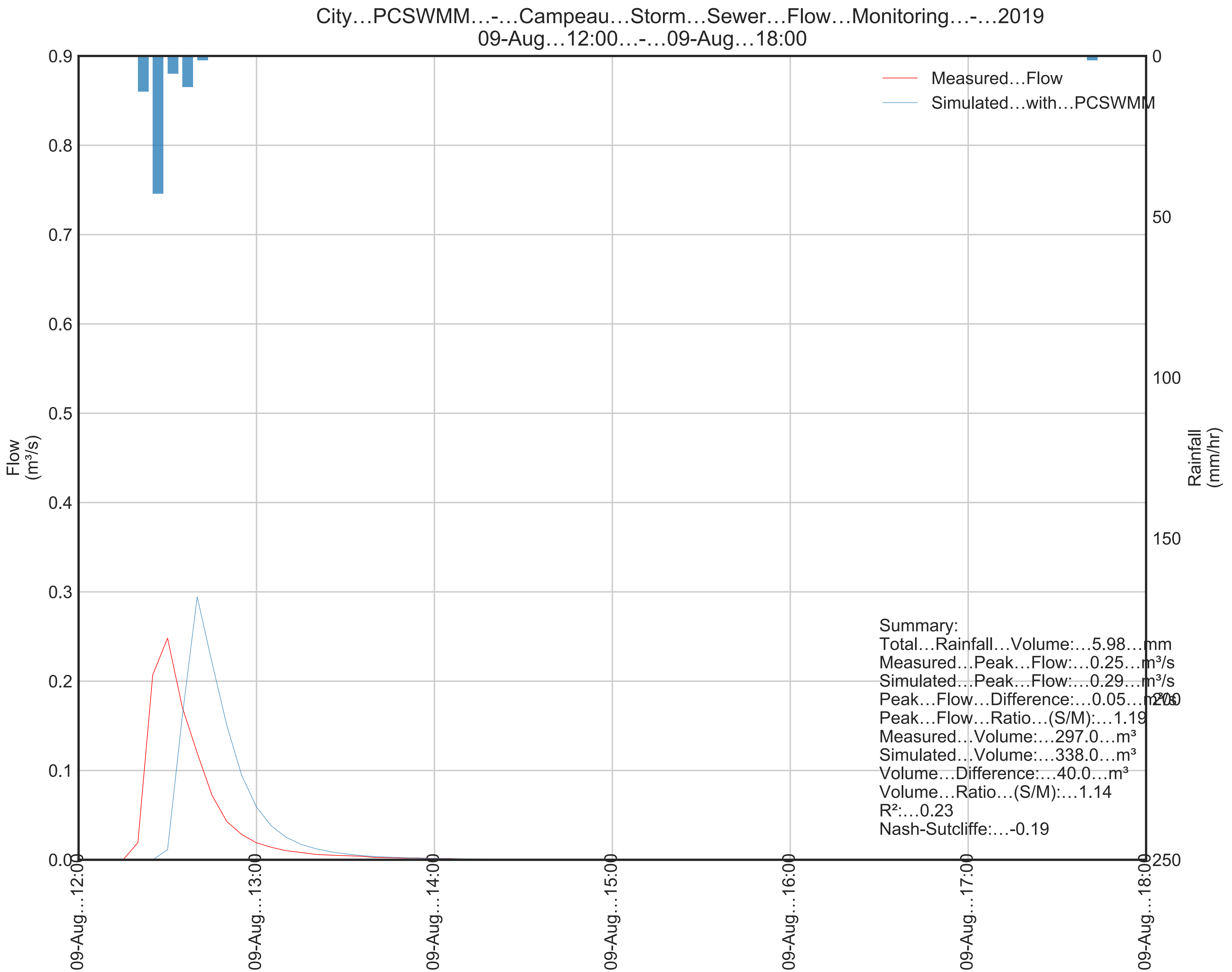

City…PCSWMM…-…Campeau…Storm…Sewer…Flow…Monitoring…-…2019
30-Jul…11:00…-…31-Jul…03:00
Flow
(m³/s)
Rainfall
(mm/hr)
Measured…Flow
Simulated…with…PCSWMM
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
0
50
100
150
200
250
30-Jul…12:00
30-Jul…14:00
30-Jul…16:00
30-Jul…18:00
30-Jul…20:00
30-Jul…22:00
31-Jul…00:00
31-Jul…02:00
Summary:
Total…Rainfall…Volume:…12.31…mm
Measured…Peak…Flow:…0.44…m³/s
Simulated…Peak…Flow:…0.42…m³/s
Peak…Flow…Difference:…-0.02…m³/s
Peak…Flow…Ratio…(S/M):…0.95
Measured…Volume:…977.0…m³
Simulated…Volume:…684.0…m³
Volume…Difference:…-293.0…m³
Volume…Ratio…(S/M):…0.7
R²:…0.46
Nash-Sutcliffe:…0.36



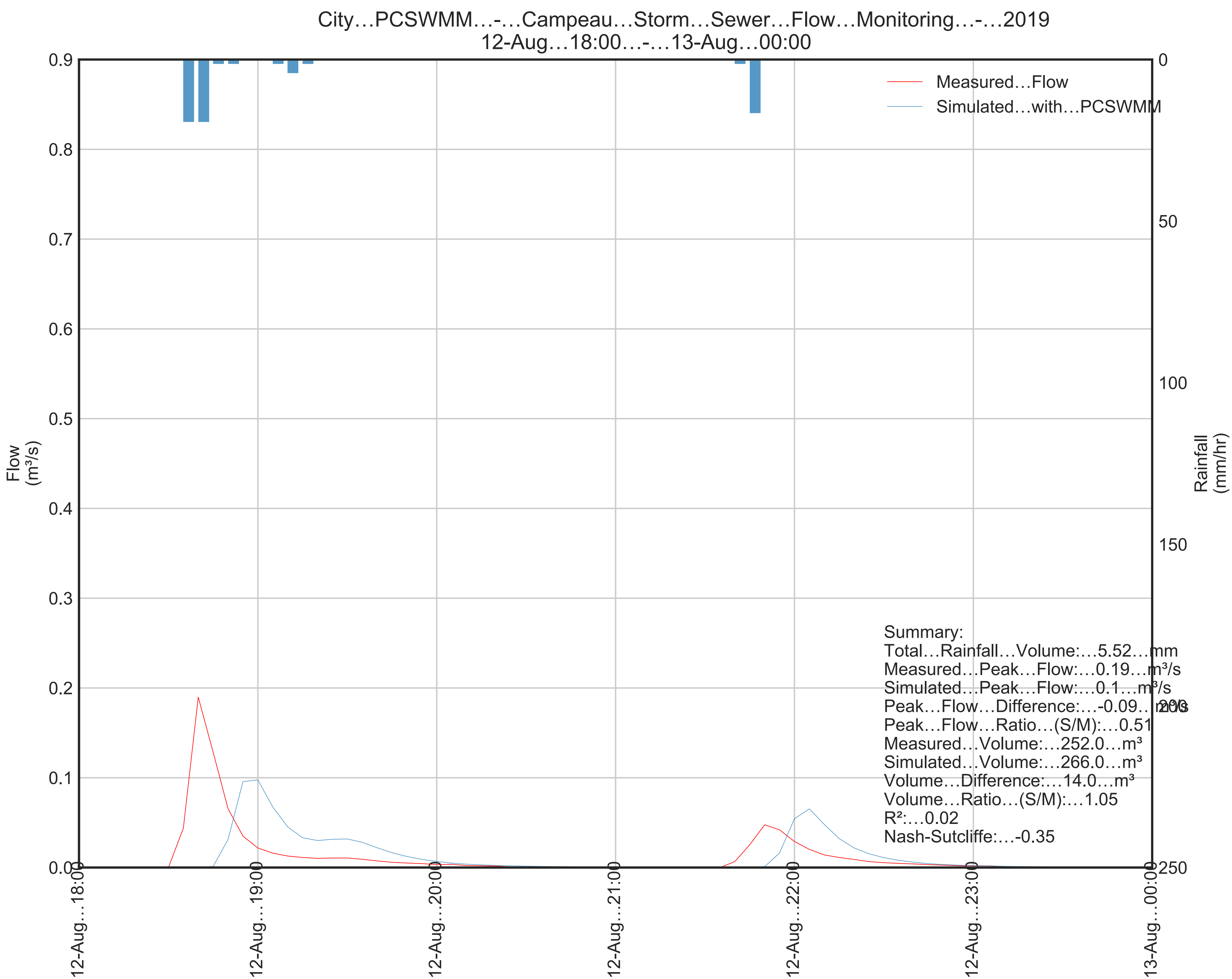
City…PCSWMM…-…Campeau…Storm…Sewer…Flow…Monitoring…-…2019
06-Aug…12:00…-…06-Aug…18:00
Measured…Flow
Simulated…with…PCSWMM
Flow (m³/s)
Rainfall (mm/hr)
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
0
50
100
150
200
250
06-Aug…12:00
06-Aug…13:00
06-Aug…14:00
06-Aug…15:00
06-Aug…16:00
06-Aug…17:00
06-Aug…18:00
Summary:
Total…Rainfall…Volume:…8.85…mm
Measured…Peak…Flow:…0.16…m³/s
Simulated…Peak…Flow:…0.21…m³/s
Peak…Flow…Difference:…0.04…m³/s
Peak…Flow…Ratio…(S/M):…1.26
Measured…Volume:…499.0…m³
Simulated…Volume:…515.0…m³
Volume…Difference:…16.0…m³
Volume…Ratio…(S/M):…1.03
R²:…0.74
Nash-Sutcliffe:…0.49



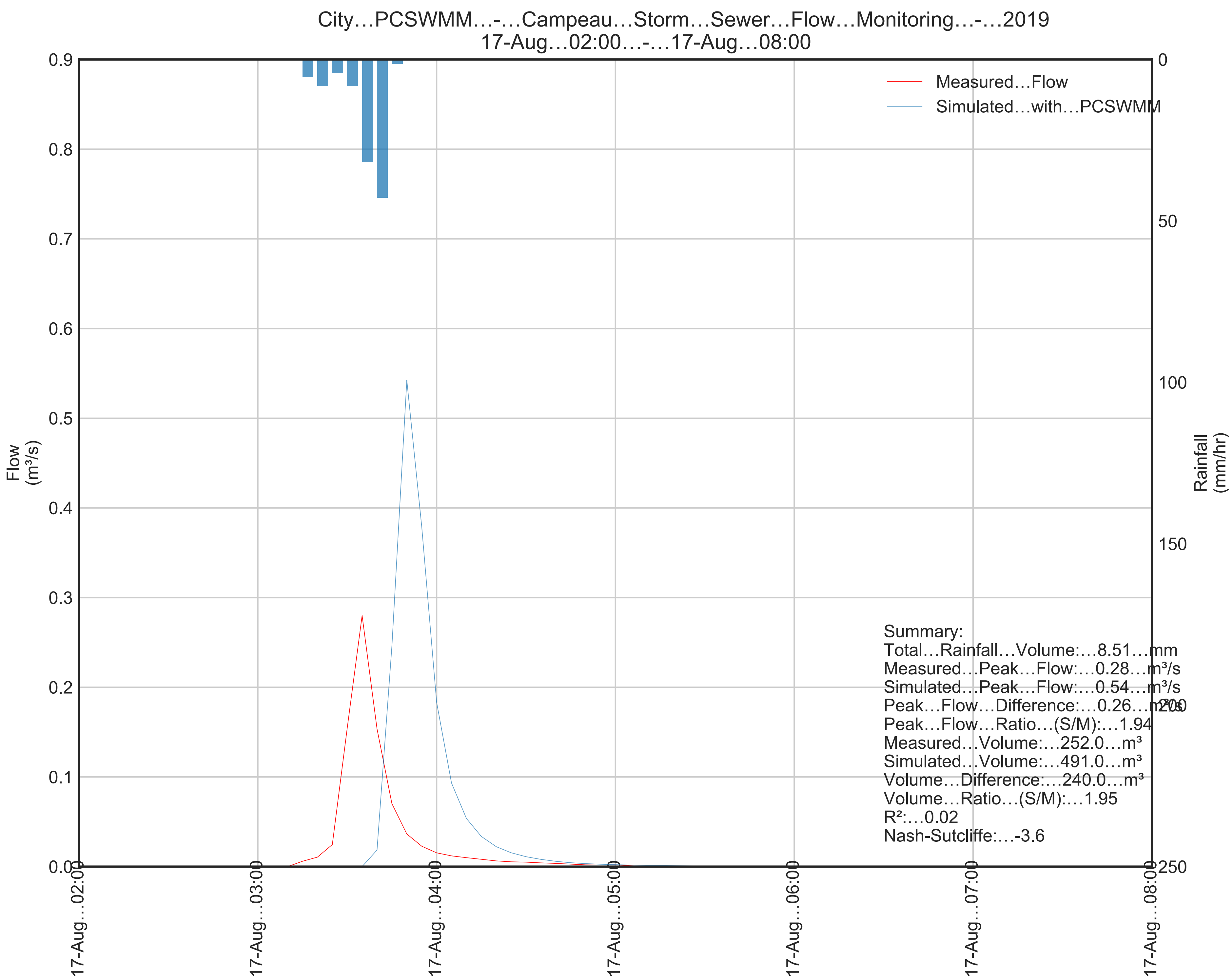
City PCSWMM - Campeau Storm Sewer Flow Monitoring - 2019
08-Aug 14:00 - 08-Aug 20:00
Flow (m³/s)
Rainfall (mm/hr)
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
0
50
100
150
200
250
Measured Flow
Simulated with PCSWMM
Summary:
Total Rainfall Volume: 8.28 mm
Measured Peak Flow: 0.4 m³/s
Simulated Peak Flow: 0.4 m³/s
Peak Flow Difference: 0.0 m³/s
Peak Flow Ratio (S/M): 1.0
Measured Volume: 397.0 m³
Simulated Volume: 502.0 m³
Volume Difference: 105.0 m³
Volume Ratio (S/M): 1.26
R²: 0.38
Nash-Sutcliffe: 0.11
08-Aug 14:00
08-Aug 15:00
08-Aug 16:00
08-Aug 17:00
08-Aug 18:00
08-Aug 19:00
08-Aug 20:00

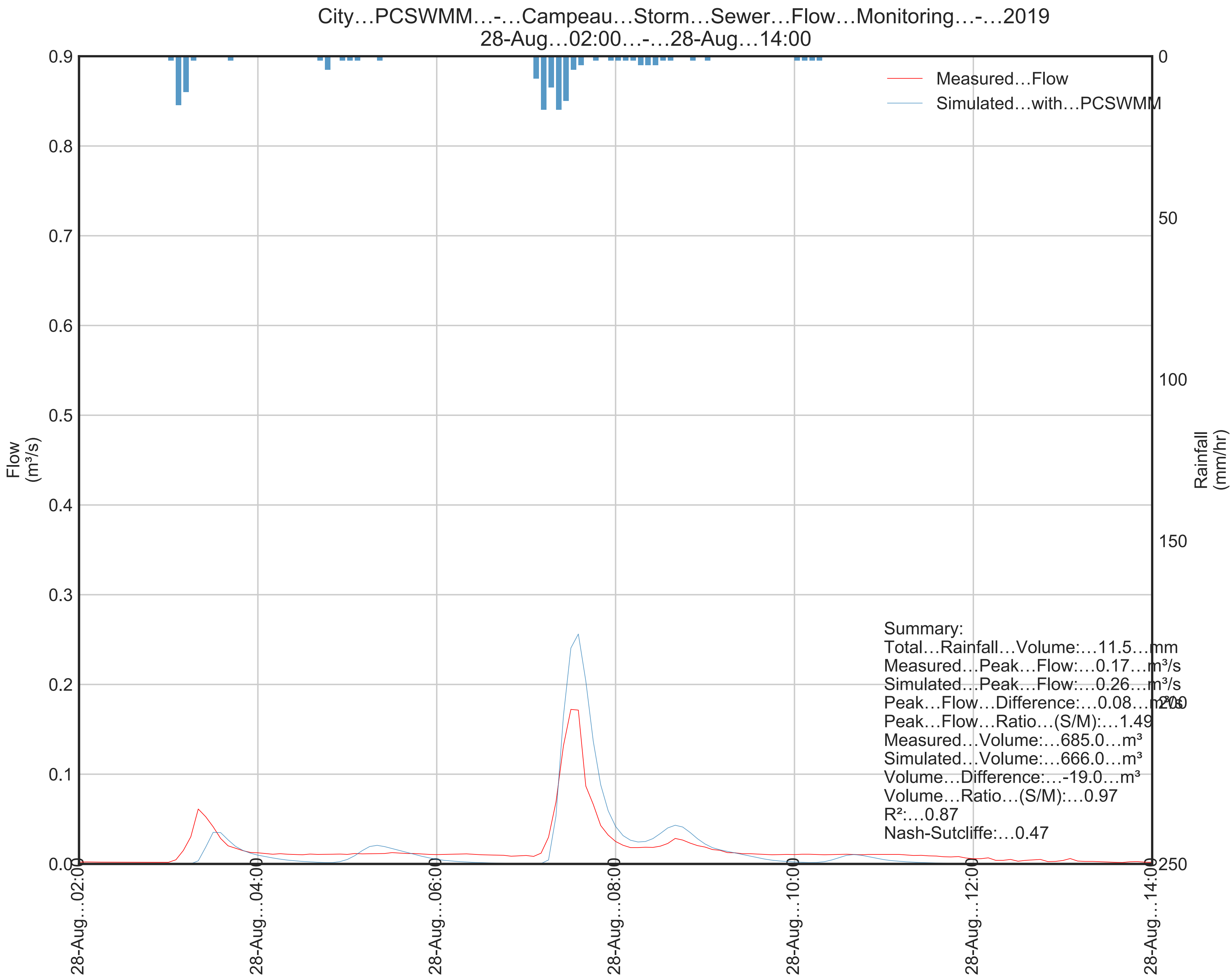


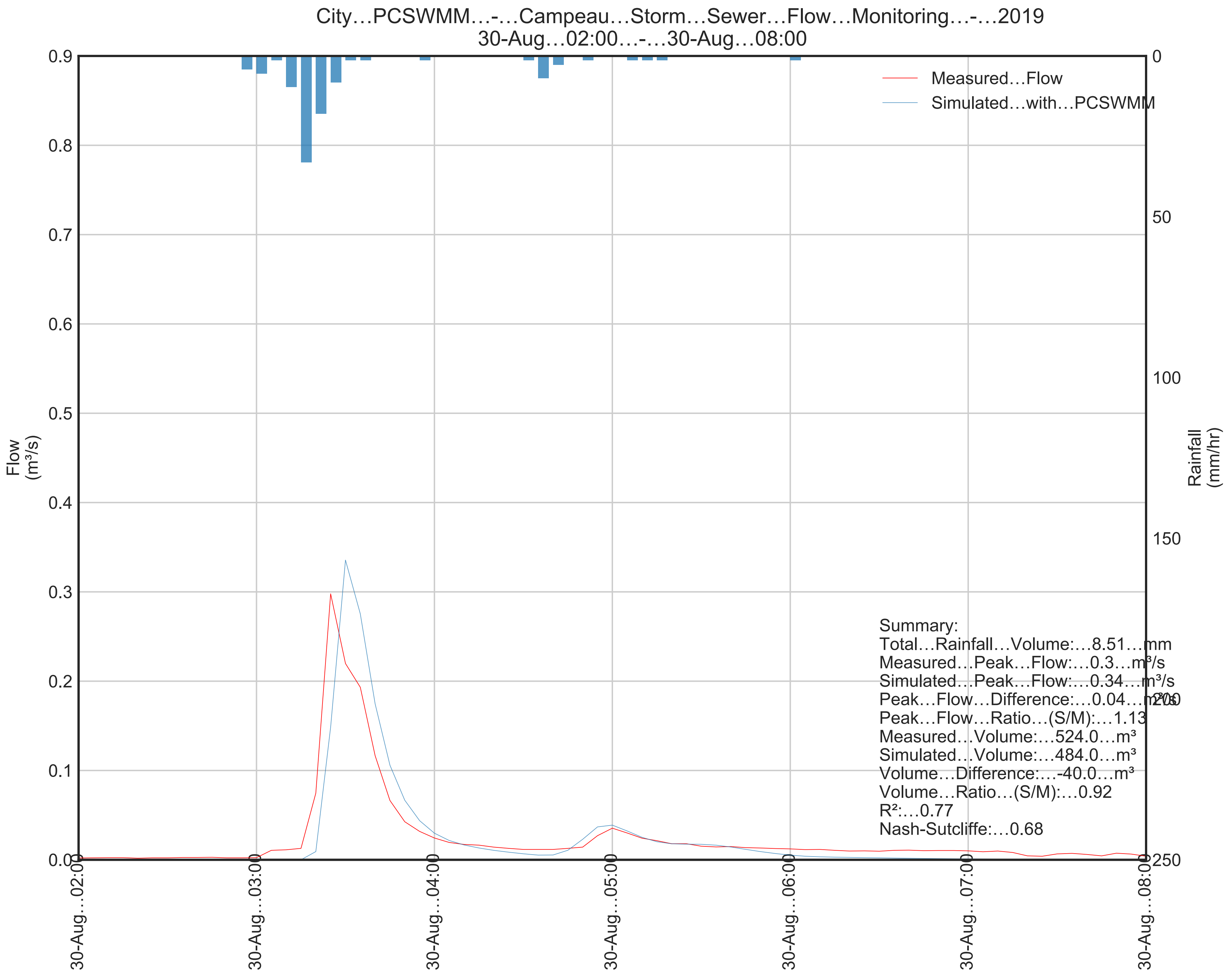
City…PCSWMM…-…Campeau…Storm…Sewer…Flow…Monitoring…-…2019
09-Aug…12:00…-…09-Aug…18:00
Measured…Flow
Simulated…with…PCSWMM
Flow
(m³/s)
Rainfall
(mm/hr)
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
0
50
100
150
200
250
Summary:
Total…Rainfall…Volume:…5.98…mm
Measured…Peak…Flow:…0.25…m³/s
Simulated…Peak…Flow:…0.29…m³/s
Peak…Flow…Difference:…0.05…m³/s
Peak…Flow…Ratio…(S/M):…1.19
Measured…Volume:…297.0…m³
Simulated…Volume:…338.0…m³
Volume…Difference:…40.0…m³
Volume…Ratio…(S/M):…1.14
R²:…0.23
Nash-Sutcliffe:…-0.19
09-Aug…12:00
09-Aug…13:00
09-Aug…14:00
09-Aug…15:00
09-Aug…16:00
09-Aug…17:00
09-Aug…18:00

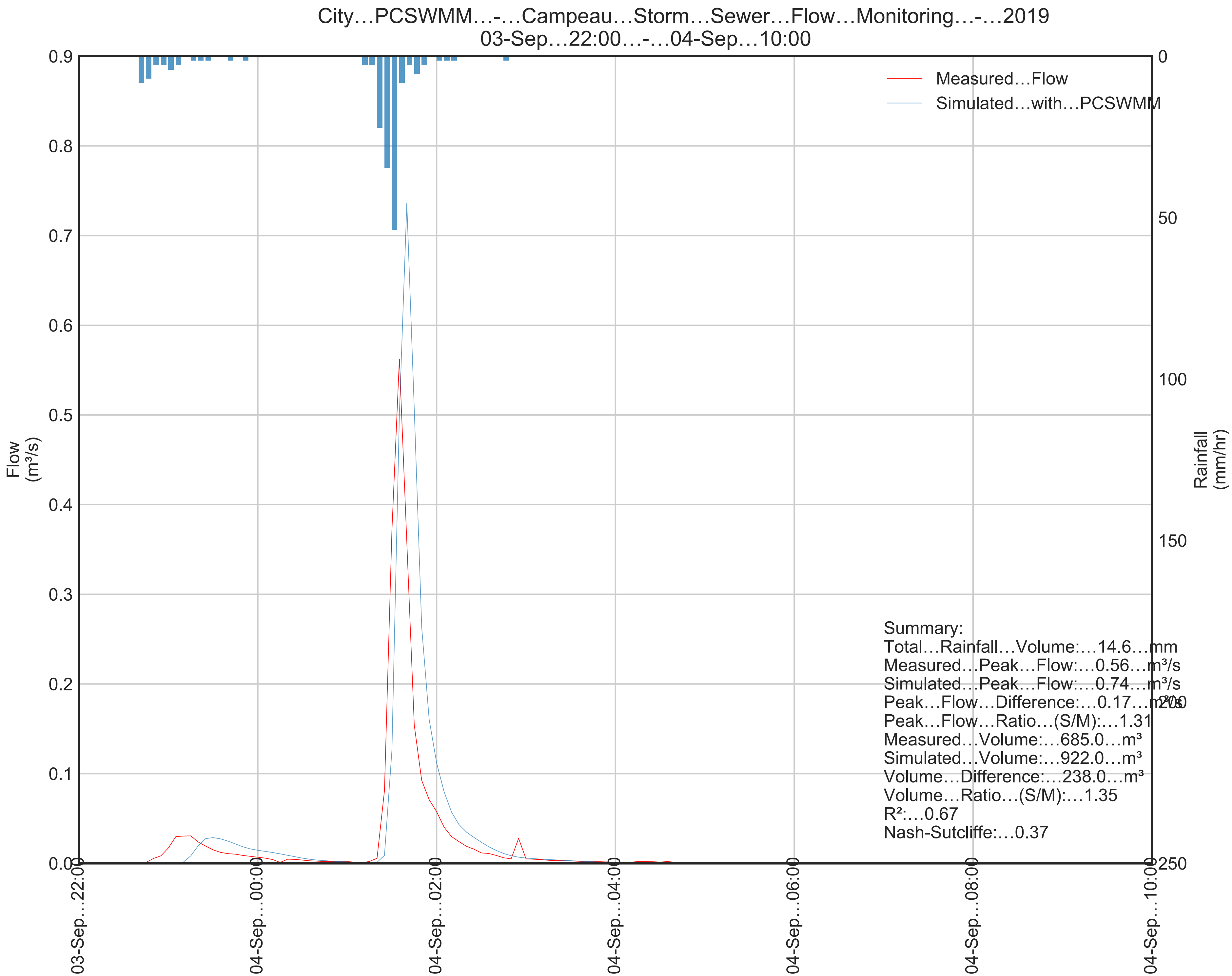


City…PCSWMM…-…Campeau…Storm…Sewer…Flow…Monitoring…-…2019
12-Aug…18:00…-…13-Aug…00:00
Flow
(m³/s)
Rainfall
(mm/hr)
Measured…Flow
Simulated…with…PCSWMM
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
0
50
100
150
200
250
12-Aug…18:00
12-Aug…19:00
12-Aug…20:00
12-Aug…21:00
12-Aug…22:00
12-Aug…23:00
13-Aug…00:00
Summary:
Total…Rainfall…Volume:…5.52…mm
Measured…Peak…Flow:…0.19…m³/s
Simulated…Peak…Flow:…0.1…m³/s
Peak…Flow…Difference:…-0.09…m³/s
Peak…Flow…Ratio…(S/M):…0.51
Measured…Volume:…252.0…m³
Simulated…Volume:…266.0…m³
Volume…Difference:…14.0…m³
Volume…Ratio…(S/M):…1.05
R²:…0.02
Nash-Sutcliffe:…-0.35

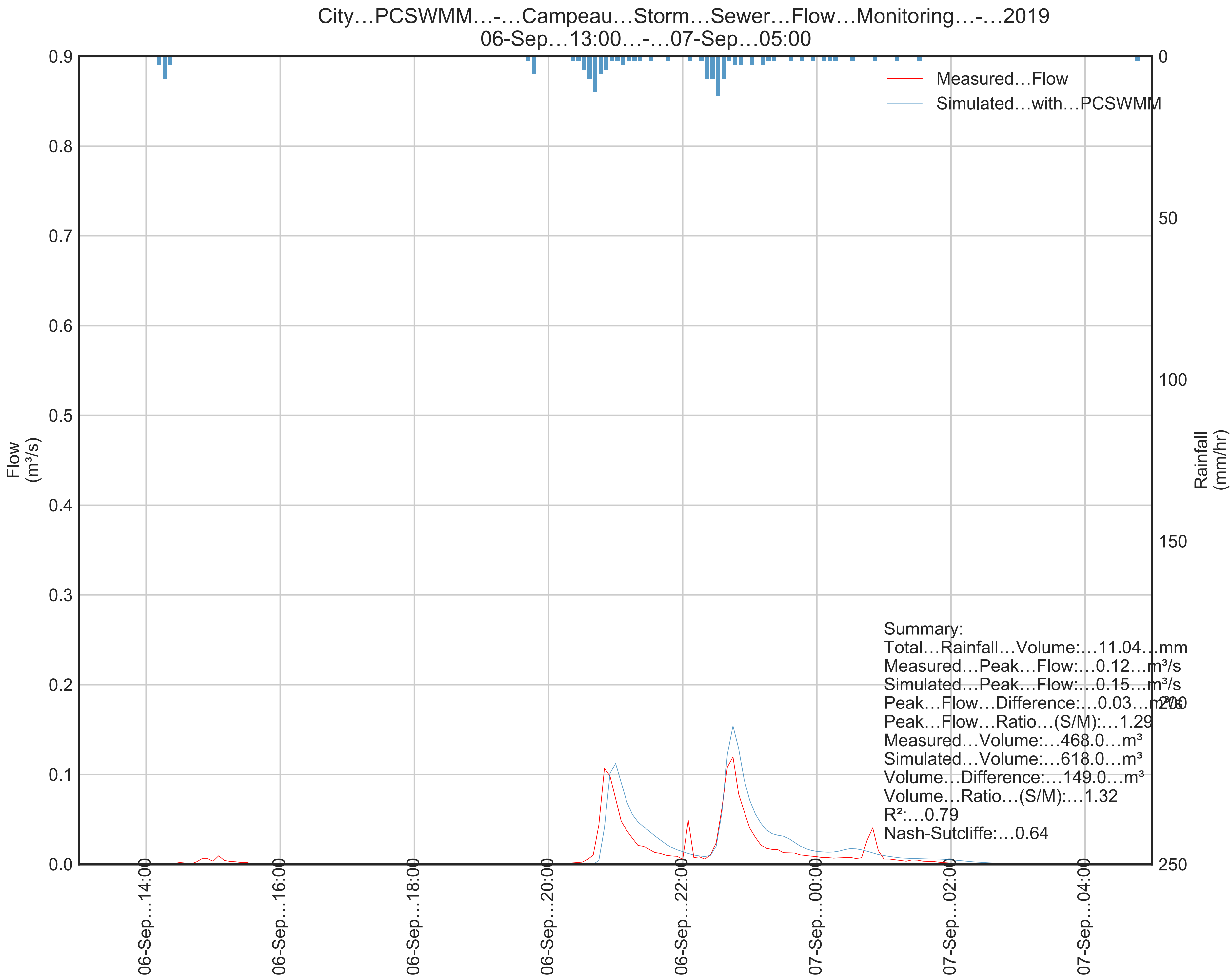

City…PCSWMM…-…Campeau…Storm…Sewer…Flow…Monitoring…-…2019
17-Aug…02:00…-…17-Aug…08:00
Flow (m³/s)
Rainfall (mm/hr)
Measured…Flow
Simulated…with…PCSWMM
Summary:
Total…Rainfall…Volume:…8.51…mm
Measured…Peak…Flow:…0.28…m³/s
Simulated…Peak…Flow:…0.54…m³/s
Peak…Flow…Difference:…0.26…m³/s
Peak…Flow…Ratio…(S/M):…1.94
Measured…Volume:…252.0…m³
Simulated…Volume:…491.0…m³
Volume…Difference:…240.0…m³
Volume…Ratio…(S/M):…1.95
R²:…0.02
Nash-Sutcliffe:…-3.6
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
0
50
100
150
200
250
17-Aug…02:00
17-Aug…03:00
17-Aug…04:00
17-Aug…05:00
17-Aug…06:00
17-Aug…07:00
17-Aug…08:00


City…PCSWMM…-…Campeau…Storm…Sewer…Flow…Monitoring…-…2019
28-Aug…02:00…-…28-Aug…14:00
Measured…Flow
Simulated…with…PCSWMM
Flow (m³/s)
Rainfall (mm/hr)
Summary:
Total…Rainfall…Volume:…11.5…mm
Measured…Peak…Flow:…0.17…m³/s
Simulated…Peak…Flow:…0.26…m³/s
Peak…Flow…Difference:…0.08…m³/s
Peak…Flow…Ratio…(S/M):…1.49
Measured…Volume:…685.0…m³
Simulated…Volume:…666.0…m³
Volume…Difference:…-19.0…m³
Volume…Ratio…(S/M):…0.97
R²:…0.87
Nash-Sutcliffe:…0.47
28-Aug…02:00
28-Aug…04:00
28-Aug…06:00
28-Aug…08:00
28-Aug…10:00
28-Aug…12:00
28-Aug…14:00

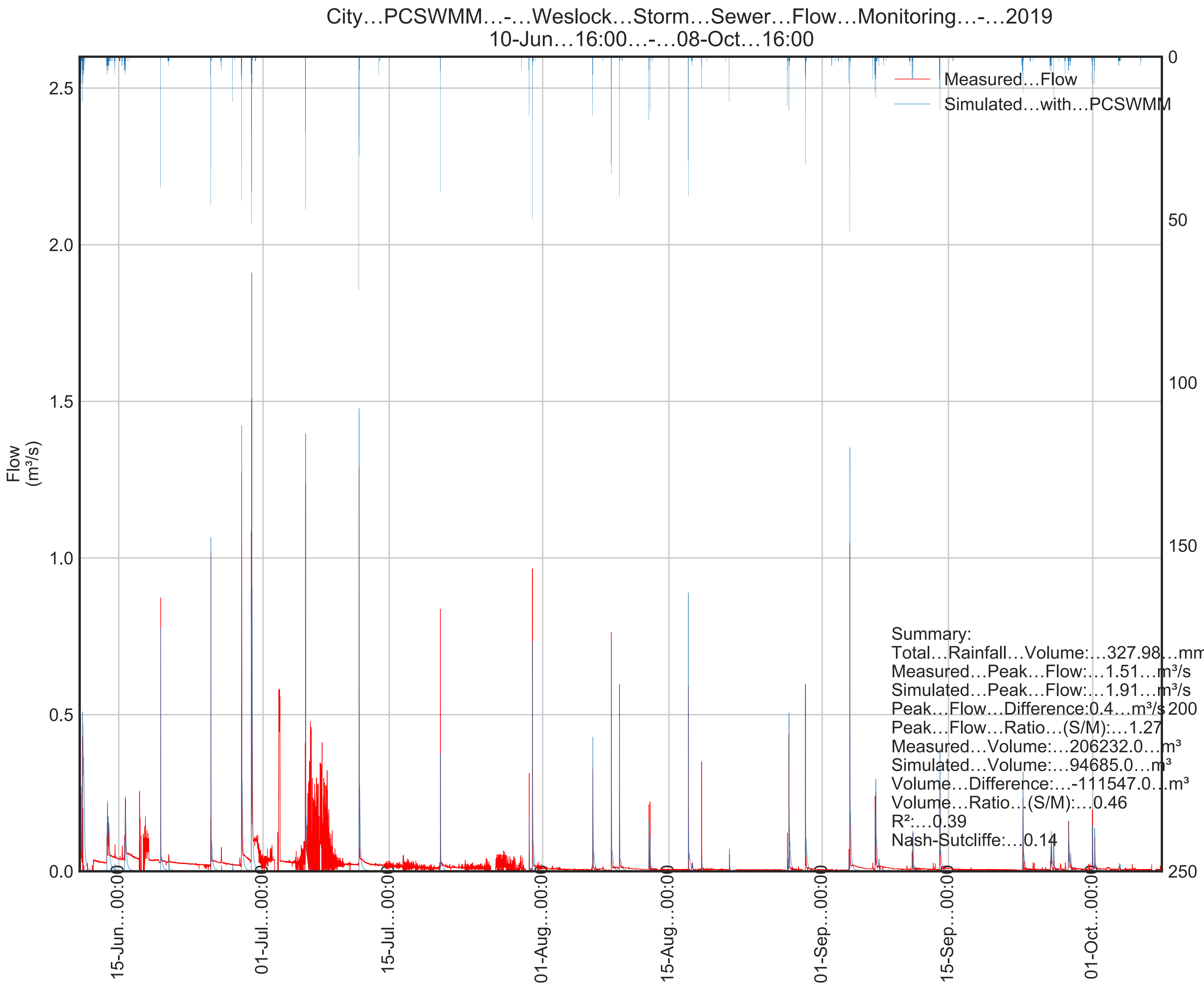

City PCSWMM - Campeau Storm Sewer Flow Monitoring - 2019
30-Aug 02:00 - 30-Aug 08:00
Flow (m³/s)
Rainfall (mm/hr)
Measured Flow
Simulated with PCSWMM
Summary:
Total Rainfall Volume: 8.51 mm
Measured Peak Flow: 0.3 m³/s
Simulated Peak Flow: 0.34 m³/s
Peak Flow Difference: 0.04 m³/s
Peak Flow Ratio (S/M): 1.13
Measured Volume: 524.0 m³
Simulated Volume: 484.0 m³
Volume Difference: -40.0 m³
Volume Ratio (S/M): 0.92
R²: 0.77
Nash-Sutcliffe: 0.68
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
0
50
100
150
200
250
30-Aug 02:00
30-Aug 03:00
30-Aug 04:00
30-Aug 05:00
30-Aug 06:00
30-Aug 07:00
30-Aug 08:00

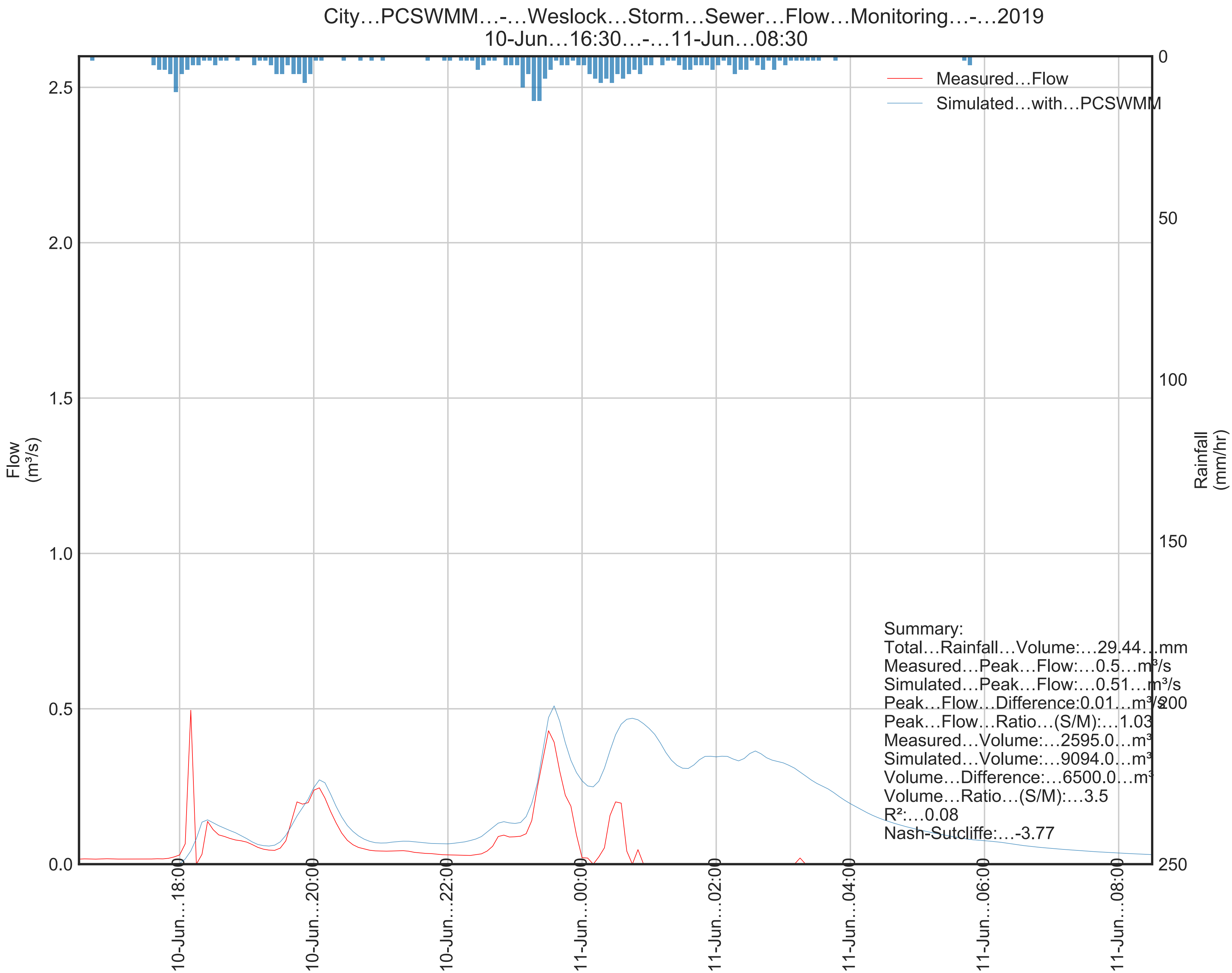


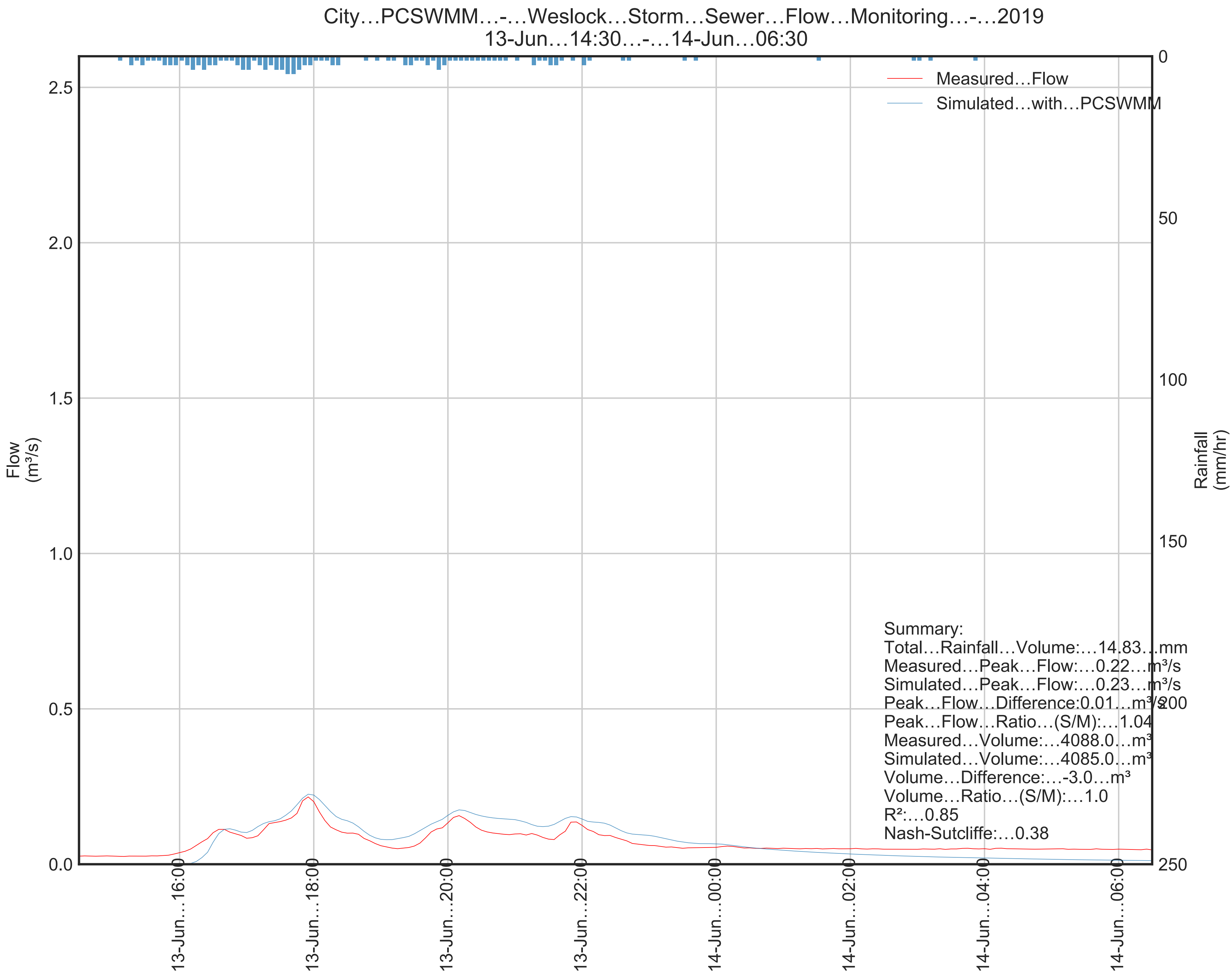
City PCSWMM - Campeau Storm Sewer Flow Monitoring - 2019
03-Sep 22:00 - 04-Sep 10:00
Flow (m³/s)
Rainfall (mm/hr)
Measured Flow
Simulated with PCSWMM
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
0
50
100
150
200
250
03-Sep 22:00
04-Sep 00:00
04-Sep 02:00
04-Sep 04:00
04-Sep 06:00
04-Sep 08:00
04-Sep 10:00
Summary:
Total Rainfall Volume: 14.6 mm
Measured Peak Flow: 0.56 m³/s
Simulated Peak Flow: 0.74 m³/s
Peak Flow Difference: 0.17 m³/s
Peak Flow Ratio (S/M): 1.31
Measured Volume: 685.0 m³
Simulated Volume: 922.0 m³
Volume Difference: 238.0 m³
Volume Ratio (S/M): 1.35
R²: 0.67
Nash-Sutcliffe: 0.37



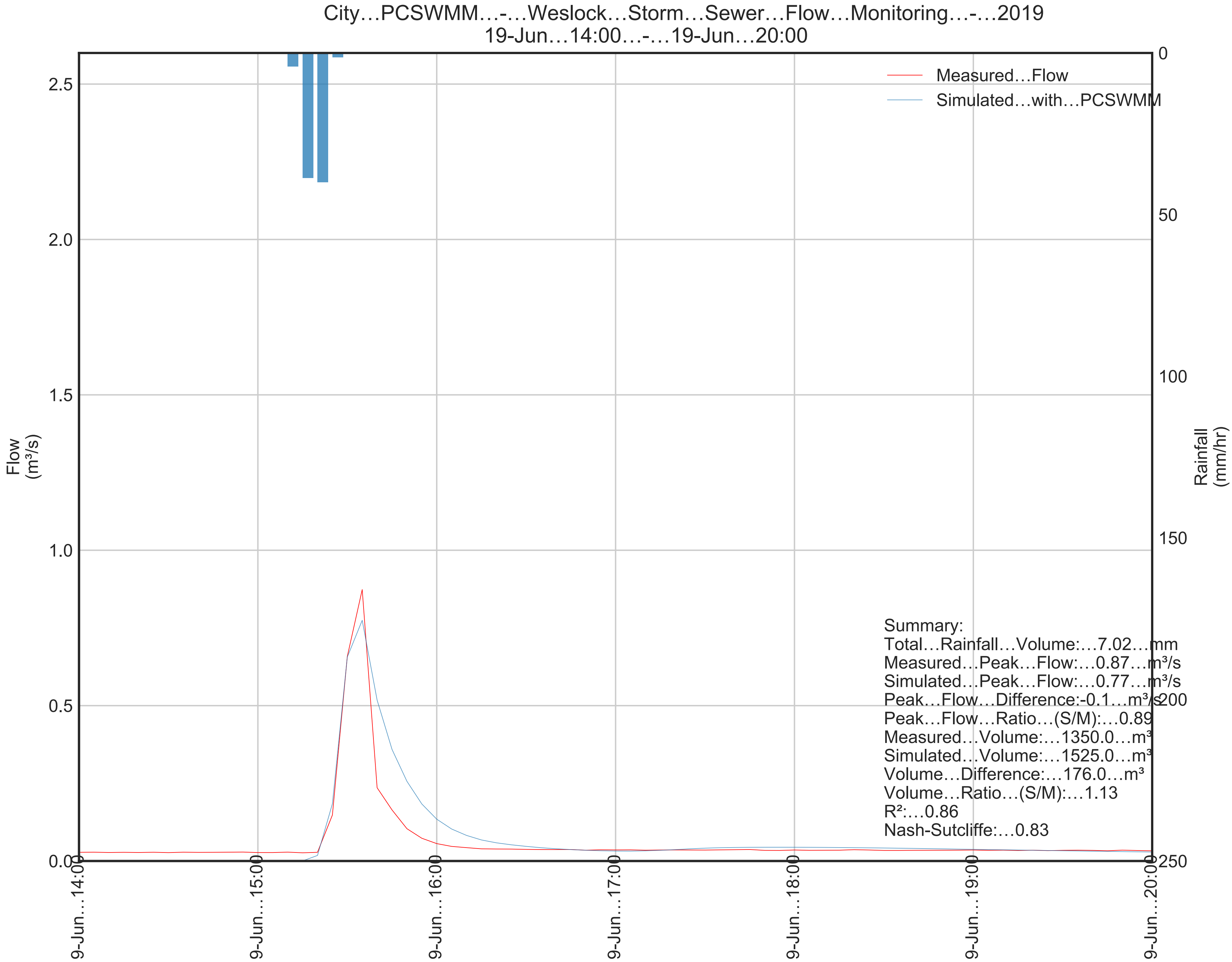
City…PCSWMM…-…Campeau…Storm…Sewer…Flow…Monitoring…-…2019
06-Sep…13:00…-…07-Sep…05:00
Flow (m³/s)
Rainfall (mm/hr)
Measured…Flow
Simulated…with…PCSWMM
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
0
50
100
150
200
250
06-Sep…14:00
06-Sep…16:00
06-Sep…18:00
06-Sep…20:00
06-Sep…22:00
07-Sep…00:00
07-Sep…02:00
07-Sep…04:00
Summary:
Total…Rainfall…Volume:…11.04…mm
Measured…Peak…Flow:…0.12…m³/s
Simulated…Peak…Flow:…0.15…m³/s
Peak…Flow…Difference:…0.03…m³/s
Peak…Flow…Ratio…(S/M):…1.29
Measured…Volume:…468.0…m³
Simulated…Volume:…618.0…m³
Volume…Difference:…149.0…m³
Volume…Ratio…(S/M):…1.32
R²:…0.79
Nash-Sutcliffe:…0.64

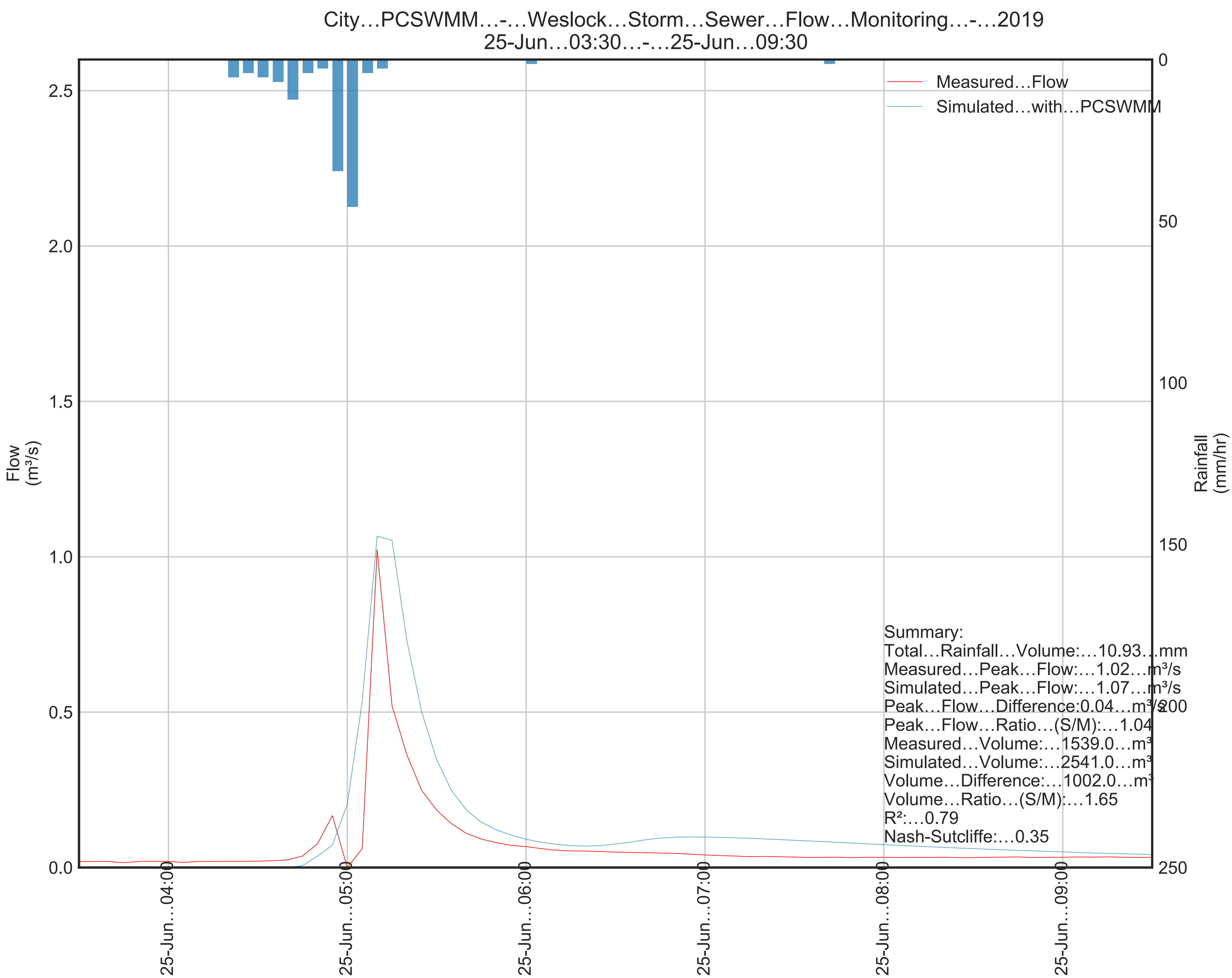

City…PCSWMM…-…Weslock…Storm…Sewer…Flow…Monitoring…-…2019
10-Jun…16:00…-…08-Oct…16:00
Flow
(m³/s)
Rainfall
(mm/hr)
Measured…Flow
Simulated…with…PCSWMM
Summary:
Total…Rainfall…Volume:…327.98…mm
Measured…Peak…Flow:…1.51…m³/s
Simulated…Peak…Flow:…1.91…m³/s
Peak…Flow…Difference:0.4…m³/s
Peak…Flow…Ratio…(S/M):…1.27
Measured…Volume:…206232.0…m³
Simulated…Volume:…94685.0…m³
Volume…Difference:…-111547.0…m³
Volume…Ratio…(S/M):…0.46
R²:…0.39
Nash-Sutcliffe:…0.14
15-Jun…00:00
01-Jul…00:00
15-Jul…00:00
01-Aug…00:00
15-Aug…00:00
01-Sep…00:00
15-Sep…00:00
01-Oct…00:00

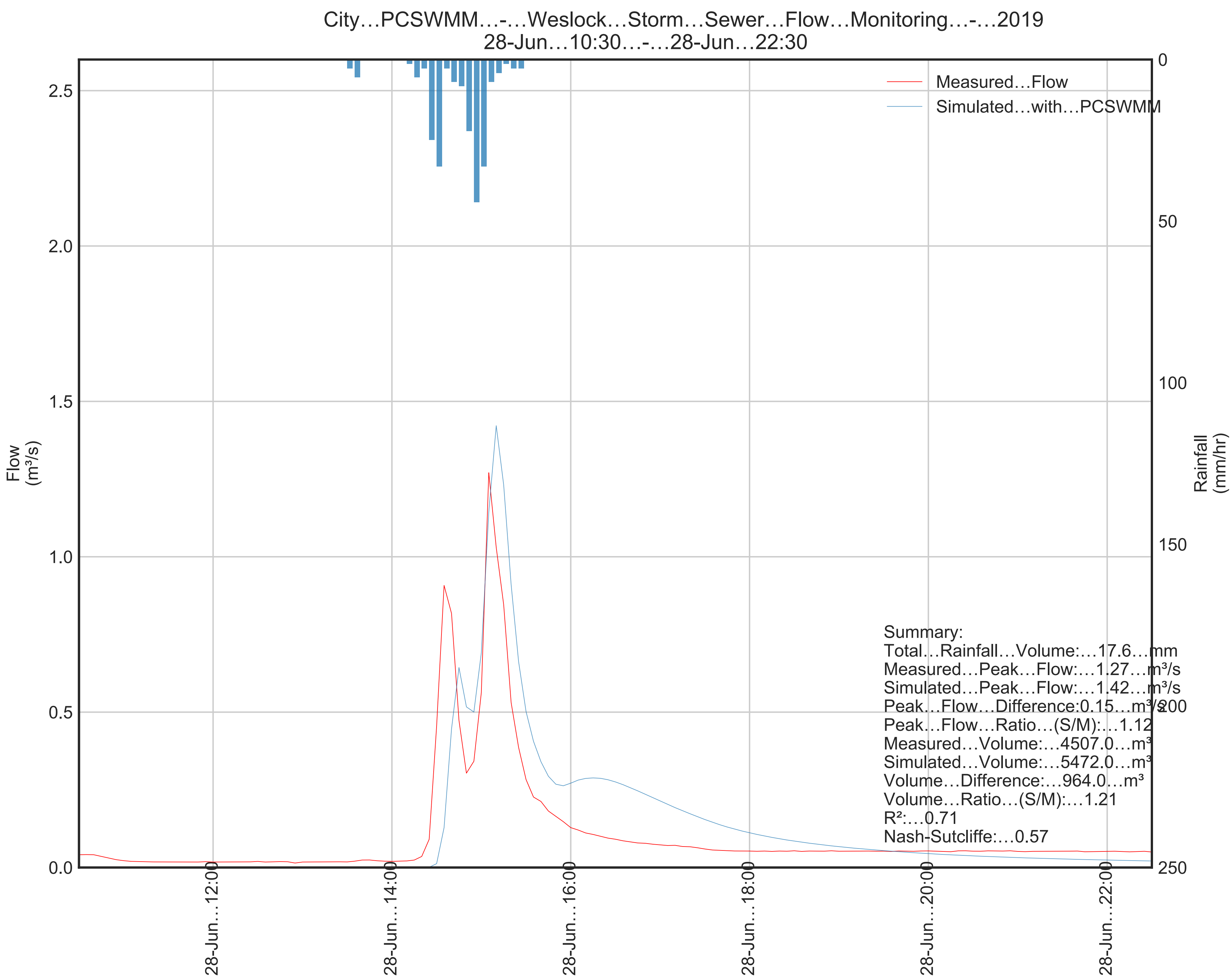

City…PCSWMM…-…Weslock…Storm…Sewer…Flow…Monitoring…-…2019
10-Jun…16:30…-…11-Jun…08:30
Measured…Flow
Simulated…with…PCSWMM
Flow (m³/s)
Rainfall (mm/hr)
0.0
0.5
1.0
1.5
2.0
2.5
0
50
100
150
200
250
10-Jun…18:00
10-Jun…20:00
10-Jun…22:00
11-Jun…00:00
11-Jun…02:00
11-Jun…04:00
11-Jun…06:00
11-Jun…08:00
Summary:
Total…Rainfall…Volume:…29.44…mm
Measured…Peak…Flow:…0.5…m³/s
Simulated…Peak…Flow:…0.51…m³/s
Peak…Flow…Difference:0.01…m³/s
Peak…Flow…Ratio…(S/M):…1.03
Measured…Volume:…2595.0…m³
Simulated…Volume:…9094.0…m³
Volume…Difference:…6500.0…m³
Volume…Ratio…(S/M):…3.5
R²:…0.08
Nash-Sutcliffe:…-3.77

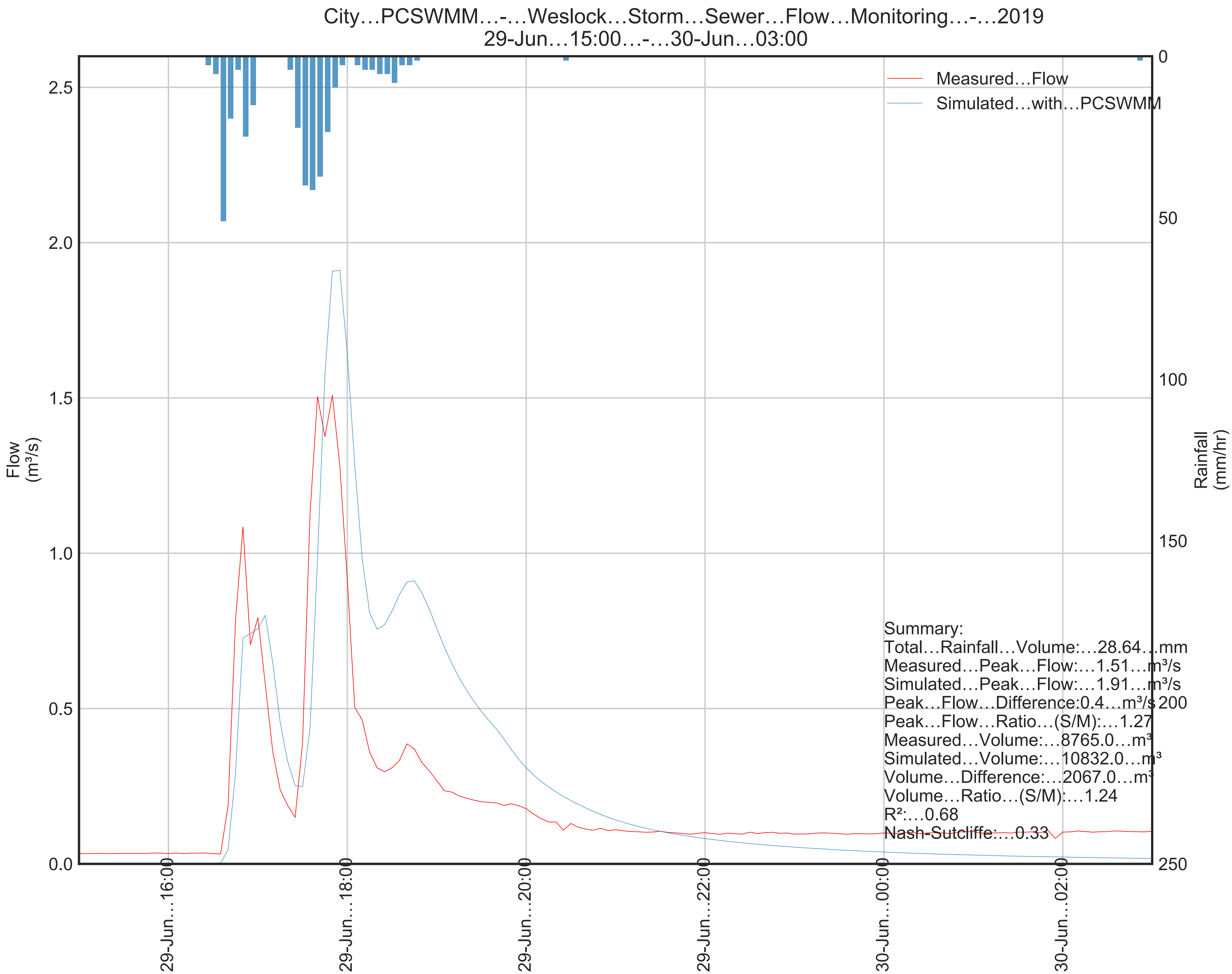


City PCSWMM - Weslock Storm Sewer Flow Monitoring - 2019
13-Jun 14:30 - 14-Jun 06:30
Flow (m³/s)
Rainfall (mm/hr)
Measured Flow
Simulated with PCSWMM
0.0
0.5
1.0
1.5
2.0
2.5
0
50
100
150
200
250
13-Jun 16:00
13-Jun 18:00
13-Jun 20:00
13-Jun 22:00
14-Jun 00:00
14-Jun 02:00
14-Jun 04:00
14-Jun 06:00
Summary:
Total Rainfall Volume: 14.83 mm
Measured Peak Flow: 0.22 m³/s
Simulated Peak Flow: 0.23 m³/s
Peak Flow Difference:0.01 m³/s
Peak Flow Ratio (S/M): 1.04
Measured Volume: 4088.0 m³
Simulated Volume: 4085.0 m³
Volume Difference: -3.0 m³
Volume Ratio (S/M): 1.0
R²: 0.85
Nash-Sutcliffe: 0.38

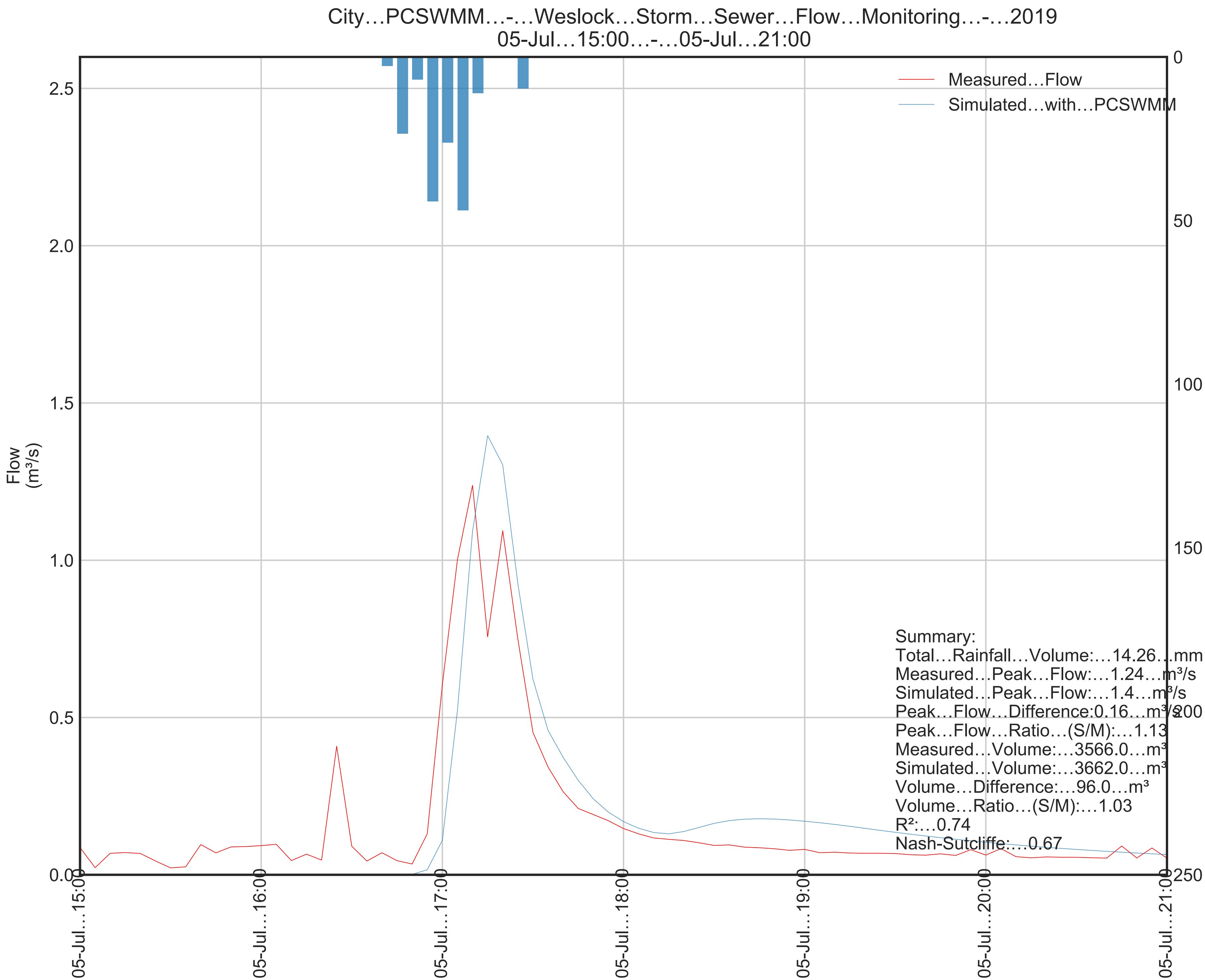

City PCSWMM - Weslock Storm Sewer Flow Monitoring - 2019
19-Jun 14:00 - 19-Jun 20:00
Flow
(m³/s)
Rainfall
(mm/hr)
Measured Flow
Simulated with PCSWMM
0.0
0.5
1.0
1.5
2.0
2.5
0
50
100
150
200
250
19-Jun 14:00
19-Jun 15:00
19-Jun 16:00
19-Jun 17:00
19-Jun 18:00
19-Jun 19:00
19-Jun 20:00
Summary:
Total Rainfall Volume: 7.02 mm
Measured Peak Flow: 0.87 m³/s
Simulated Peak Flow: 0.77 m³/s
Peak Flow Difference: -0.1 m³/s
Peak Flow Ratio (S/M): 0.89
Measured Volume: 1350.0 m³
Simulated Volume: 1525.0 m³
Volume Difference: 176.0 m³
Volume Ratio (S/M): 1.13
R²: 0.86
Nash-Sutcliffe: 0.83

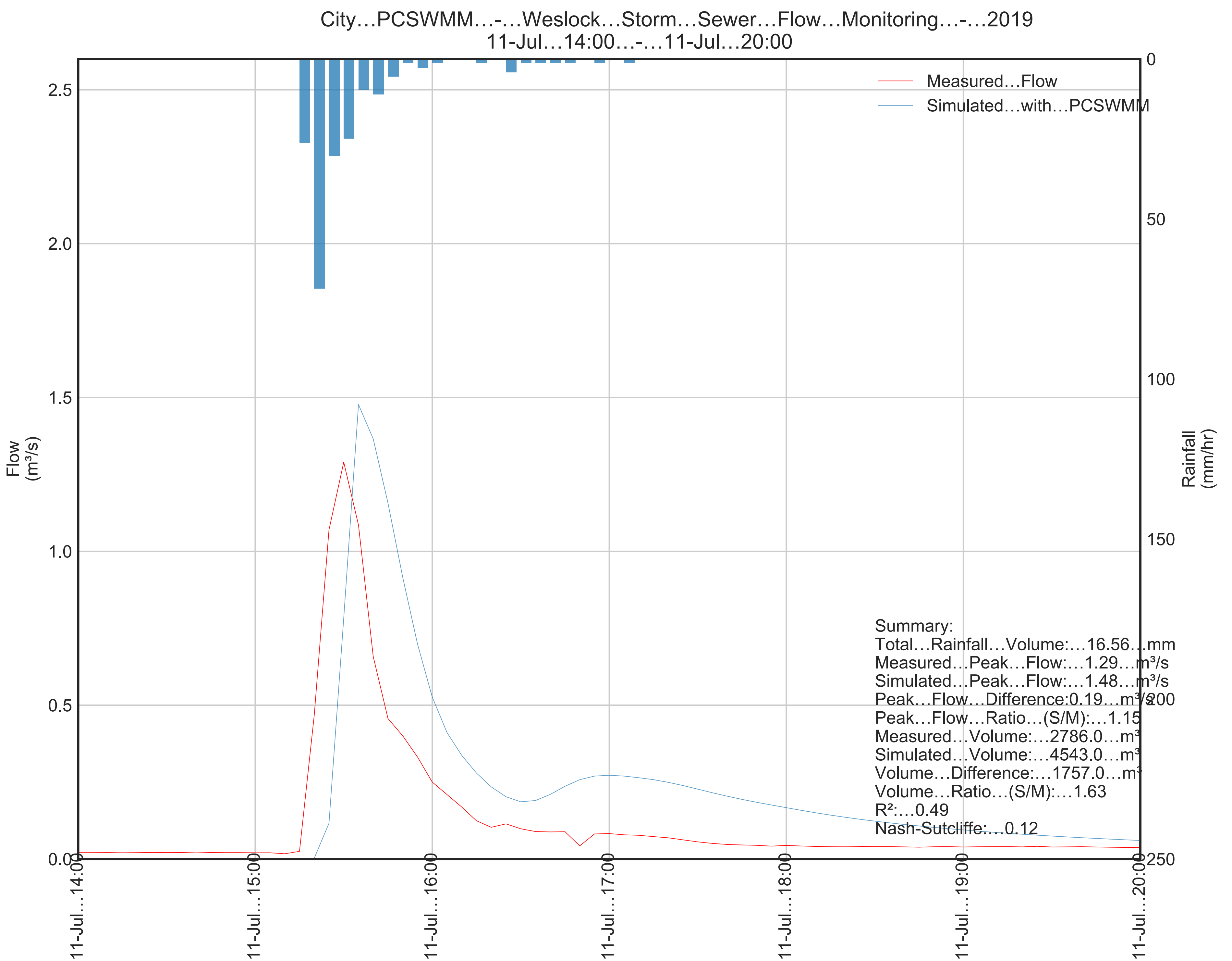

City…PCSWMM…-…Weslock…Storm…Sewer…Flow…Monitoring…-…2019
25-Jun…03:30…-…25-Jun…09:30
Flow
(m³/s)
Rainfall
(mm/hr)
2.5
2.0
1.5
1.0
0.5
0.0
0
50
100
150
200
250
Measured…Flow
Simulated…with…PCSWMM
Summary:
Total…Rainfall…Volume:…10.93…mm
Measured…Peak…Flow:…1.02…m³/s
Simulated…Peak…Flow:…1.07…m³/s
Peak…Flow…Difference:0.04…m³/s
Peak…Flow…Ratio…(S/M):…1.04
Measured…Volume:…1539.0…m³
Simulated…Volume:…2541.0…m³
Volume…Difference:…1002.0…m³
Volume…Ratio…(S/M):…1.65
R²:…0.79
Nash-Sutcliffe:…0.35
25-Jun…04:00
25-Jun…05:00
25-Jun…06:00
25-Jun…07:00
25-Jun…08:00
25-Jun…09:00

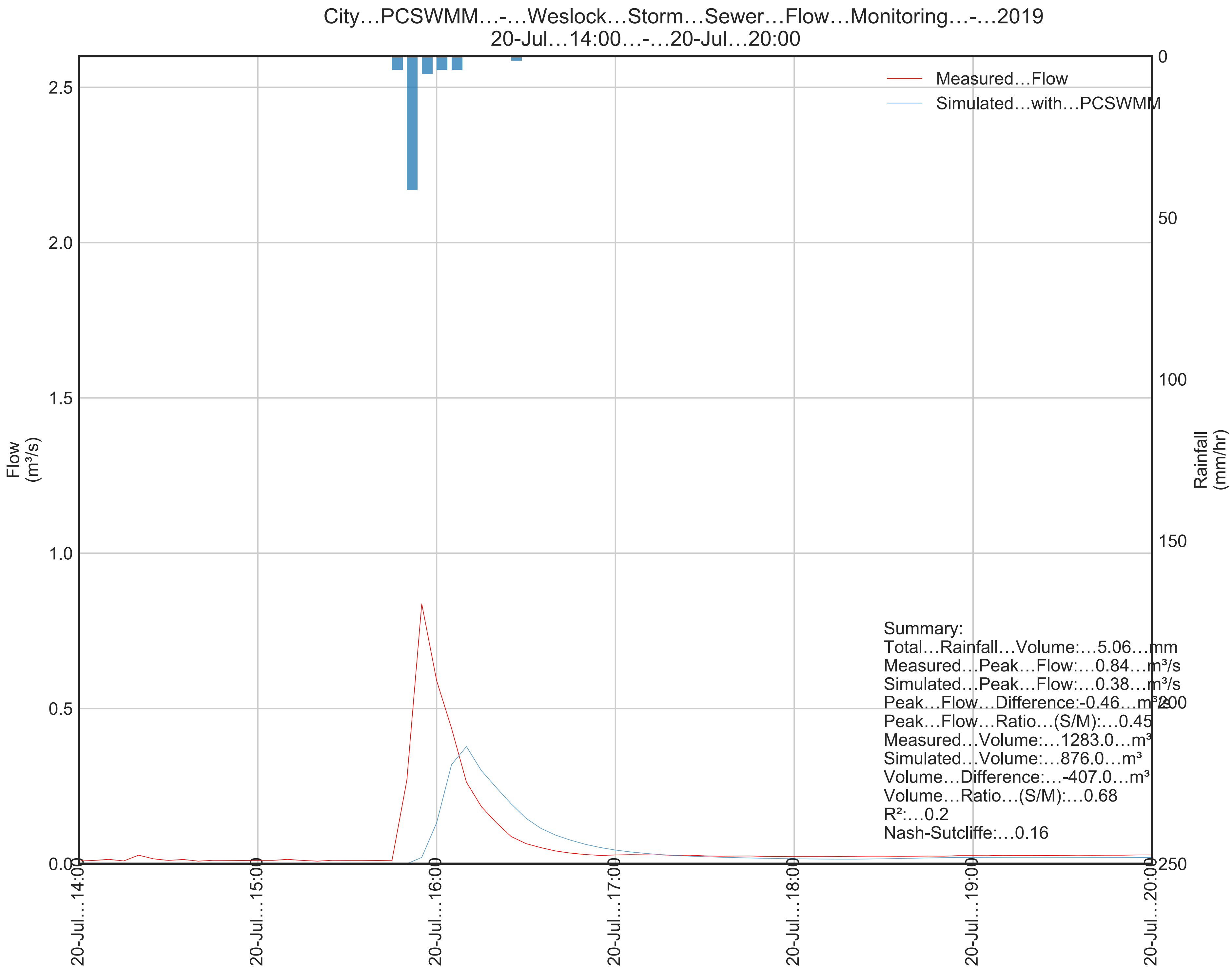

City…PCSWMM…-…Weslock…Storm…Sewer…Flow…Monitoring…-…2019
28-Jun…10:30…-…28-Jun…22:30
Measured…Flow
Simulated…with…PCSWMM
Flow (m³/s)
Rainfall (mm/hr)
0.0
0.5
1.0
1.5
2.0
2.5
0
50
100
150
200
250
28-Jun…12:00
28-Jun…14:00
28-Jun…16:00
28-Jun…18:00
28-Jun…20:00
28-Jun…22:00
Summary:
Total…Rainfall…Volume:…17.6…mm
Measured…Peak…Flow:…1.27…m³/s
Simulated…Peak…Flow:…1.42…m³/s
Peak…Flow…Difference:0.15…m³/s
Peak…Flow…Ratio…(S/M):…1.12
Measured…Volume:…4507.0…m³
Simulated…Volume:…5472.0…m³
Volume…Difference:…964.0…m³
Volume…Ratio…(S/M):…1.21
R²:…0.71
Nash-Sutcliffe:…0.57



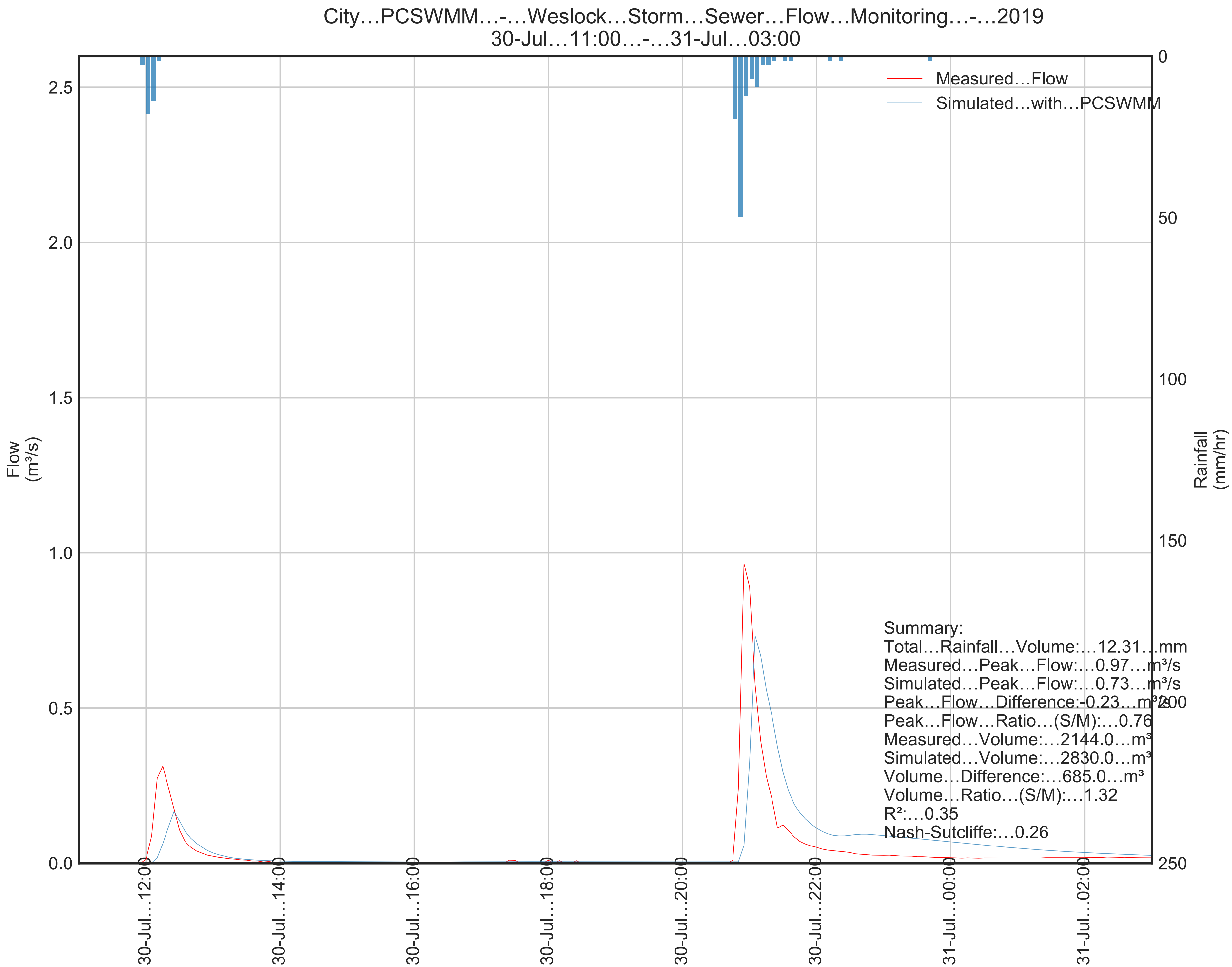
City PCSWMM - Weslock Storm Sewer Flow Monitoring - 2019
29-Jun 15:00 - 30-Jun 03:00
Flow (m³/s)
Rainfall (mm/hr)
Measured Flow
Simulated with PCSWMM
0.0
0.5
1.0
1.5
2.0
2.5
0
50
100
150
200
250
29-Jun 16:00
29-Jun 18:00
29-Jun 20:00
29-Jun 22:00
30-Jun 00:00
30-Jun 02:00
Summary:
Total Rainfall Volume: 28.64 mm
Measured Peak Flow: 1.51 m³/s
Simulated Peak Flow: 1.91 m³/s
Peak Flow Difference:0.4 m³/s
Peak Flow Ratio (S/M): 1.27
Measured Volume: 8765.0 m³
Simulated Volume: 10832.0 m³
Volume Difference: 2067.0 m³
Volume Ratio (S/M): 1.24
R²: 0.68
Nash-Sutcliffe: 0.33

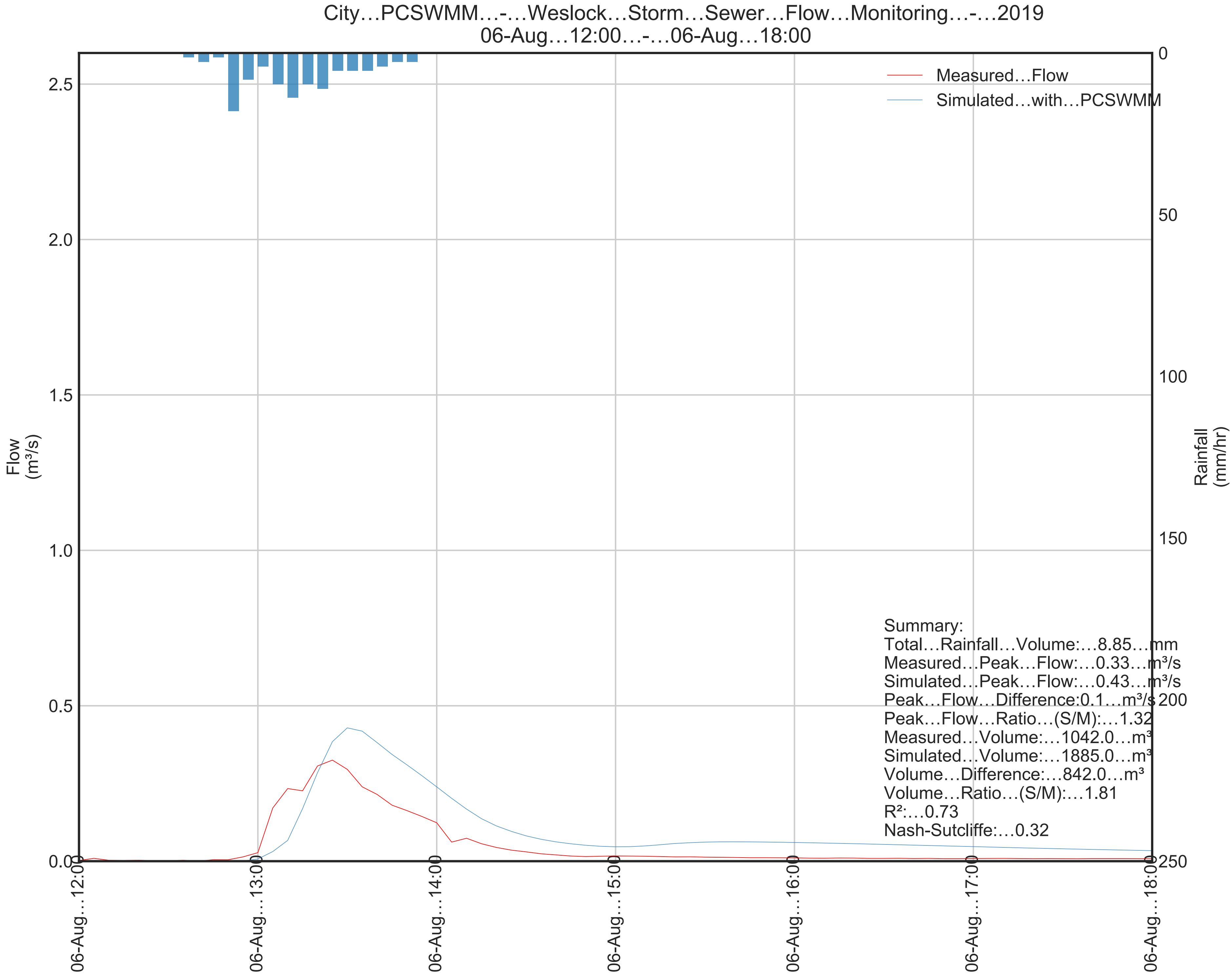

City…PCSWMM…-…Weslock…Storm…Sewer…Flow…Monitoring…-…2019
05-Jul…15:00…-…05-Jul…21:00
Flow
(m³/s)
Rainfall
(mm/hr)
Measured…Flow
Simulated…with…PCSWMM
0.0
0.5
1.0
1.5
2.0
2.5
0
50
100
150
200
250
05-Jul…15:00
05-Jul…16:00
05-Jul…17:00
05-Jul…18:00
05-Jul…19:00
05-Jul…20:00
05-Jul…21:00
Summary:
Total…Rainfall…Volume:…14.26…mm
Measured…Peak…Flow:…1.24…m³/s
Simulated…Peak…Flow:…1.4…m³/s
Peak…Flow…Difference:0.16…m³/s
Peak…Flow…Ratio…(S/M):…1.13
Measured…Volume:…3566.0…m³
Simulated…Volume:…3662.0…m³
Volume…Difference:…96.0…m³
Volume…Ratio…(S/M):…1.03
R²:…0.74
Nash-Sutcliffe:…0.67

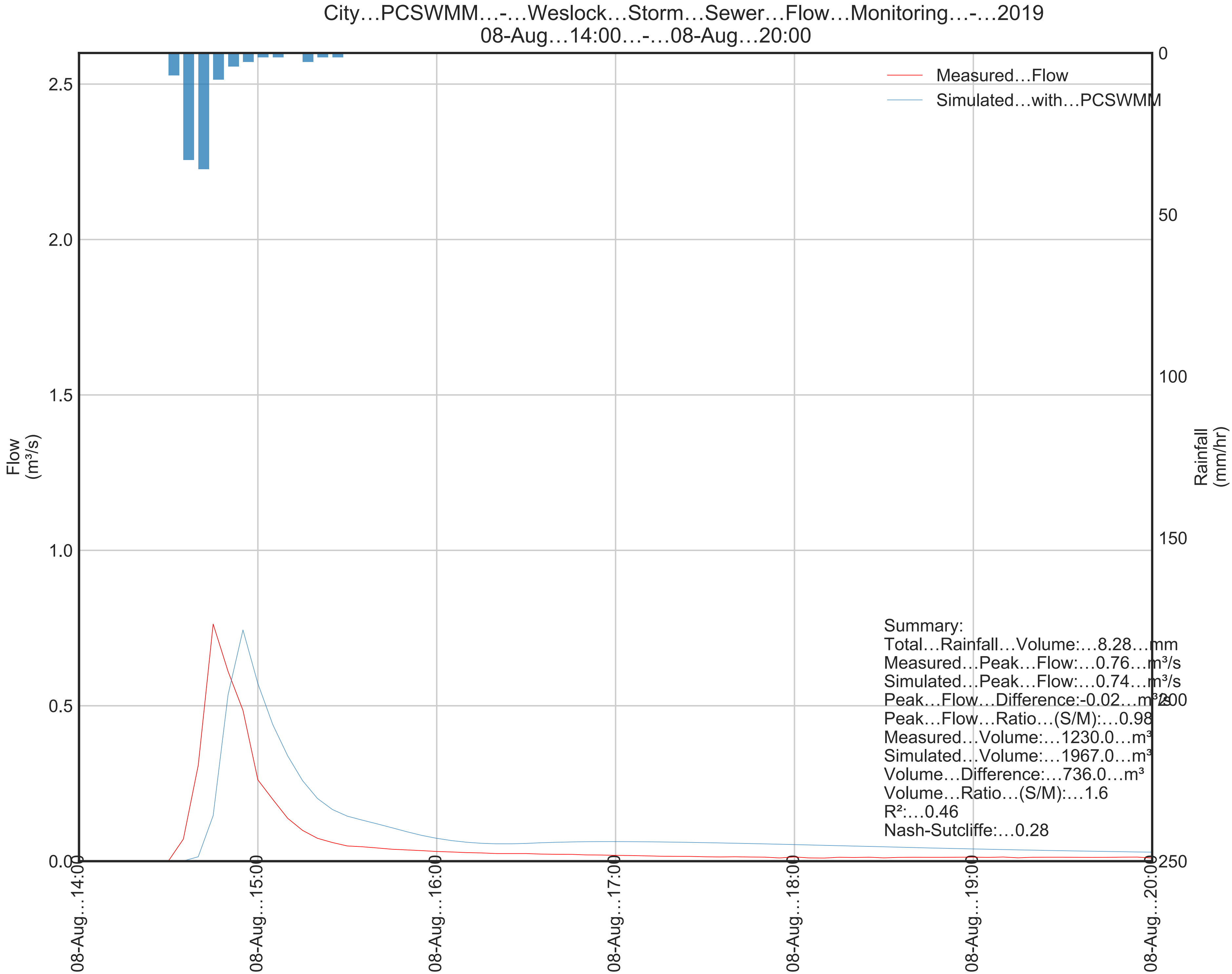

City…PCSWMM…-…Weslock…Storm…Sewer…Flow…Monitoring…-…2019
11-Jul…14:00…-…11-Jul…20:00
Flow
(m³/s)
Rainfall
(mm/hr)
Measured…Flow
Simulated…with…PCSWMM
Summary:
Total…Rainfall…Volume:…16.56…mm
Measured…Peak…Flow:…1.29…m³/s
Simulated…Peak…Flow:…1.48…m³/s
Peak…Flow…Difference:0.19…m³/s
Peak…Flow…Ratio…(S/M):…1.15
Measured…Volume:…2786.0…m³
Simulated…Volume:…4543.0…m³
Volume…Difference:…1757.0…m³
Volume…Ratio…(S/M):…1.63
R²:…0.49
Nash-Sutcliffe:…0.12
0.0
0.5
1.0
1.5
2.0
2.5
0
50
100
150
200
250
11-Jul…14:00
11-Jul…15:00
11-Jul…16:00
11-Jul…17:00
11-Jul…18:00
11-Jul…19:00
11-Jul…20:00

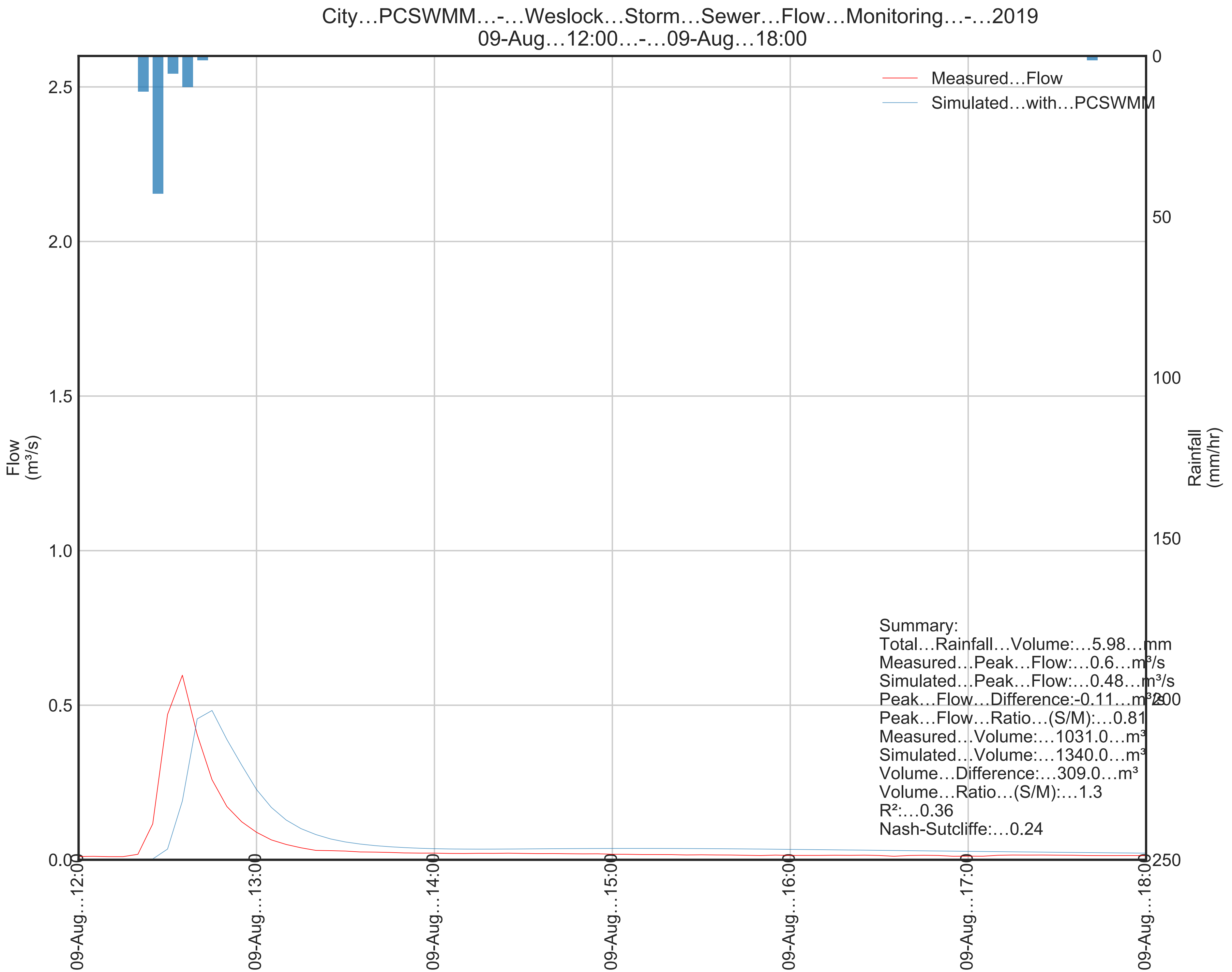


City…PCSWMM…-…Weslock…Storm…Sewer…Flow…Monitoring…-…2019
20-Jul…14:00…-…20-Jul…20:00
Measured…Flow
Simulated…with…PCSWMM
Flow (m³/s)
Rainfall (mm/hr)
0.0
0.5
1.0
1.5
2.0
2.5
0
50
100
150
200
250
20-Jul…14:00
20-Jul…15:00
20-Jul…16:00
20-Jul…17:00
20-Jul…18:00
20-Jul…19:00
20-Jul…20:00
Summary:
Total…Rainfall…Volume:…5.06…mm
Measured…Peak…Flow:…0.84…m³/s
Simulated…Peak…Flow:…0.38…m³/s
Peak…Flow…Difference:-0.46…m³/s
Peak…Flow…Ratio…(S/M):…0.45
Measured…Volume:…1283.0…m³
Simulated…Volume:…876.0…m³
Volume…Difference:…-407.0…m³
Volume…Ratio…(S/M):…0.68
R²:…0.2
Nash-Sutcliffe:…0.16

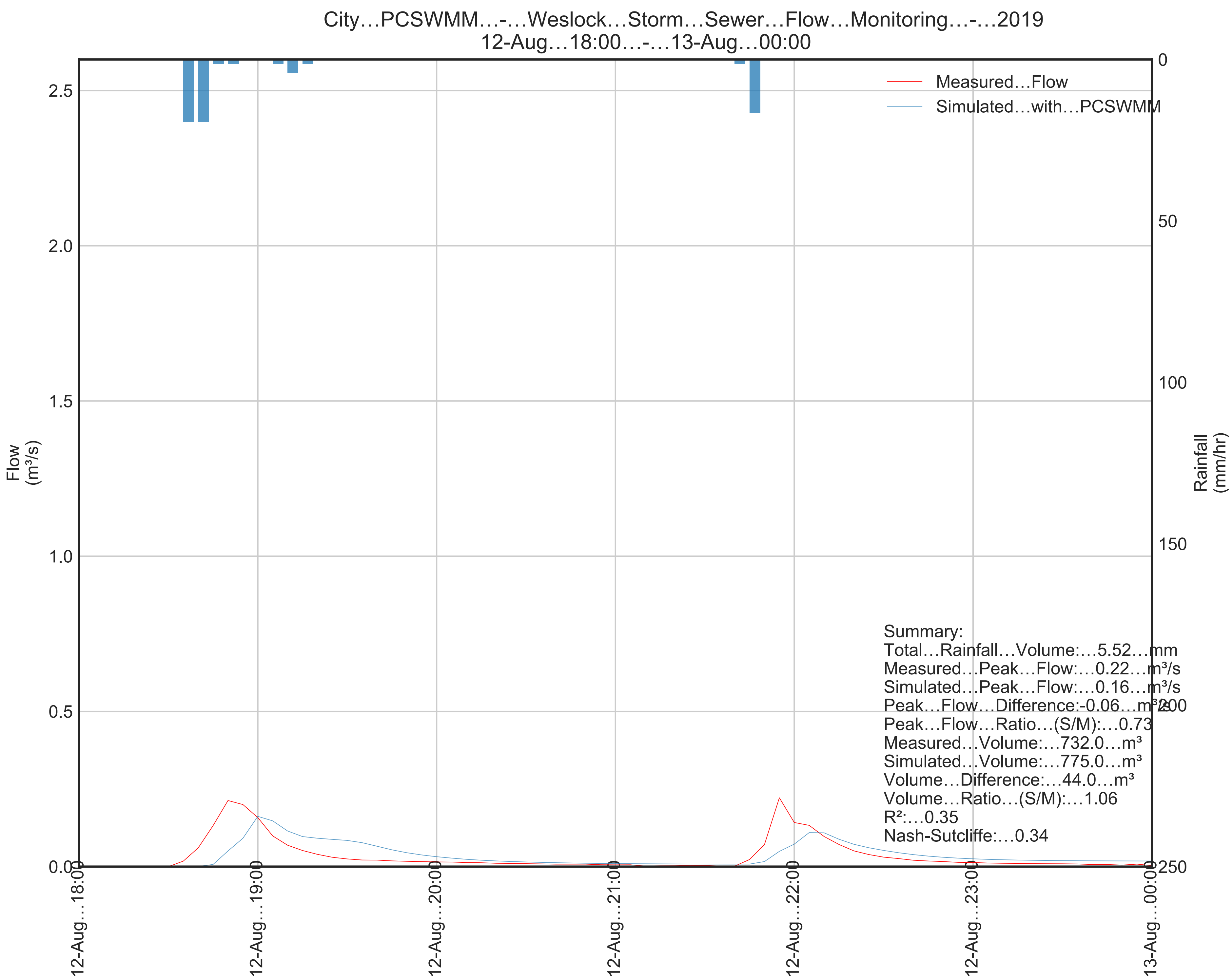

City…PCSWMM…-…Weslock…Storm…Sewer…Flow…Monitoring…-…2019
30-Jul…11:00…-…31-Jul…03:00
Flow
(m³/s)
Rainfall
(mm/hr)
Measured…Flow
Simulated…with…PCSWMM
Summary:
Total…Rainfall…Volume:…12.31…mm
Measured…Peak…Flow:…0.97…m³/s
Simulated…Peak…Flow:…0.73…m³/s
Peak…Flow…Difference:-0.23…m³/s
Peak…Flow…Ratio…(S/M):…0.76
Measured…Volume:…2144.0…m³
Simulated…Volume:…2830.0…m³
Volume…Difference:…685.0…m³
Volume…Ratio…(S/M):…1.32
R²:…0.35
Nash-Sutcliffe:…0.26
30-Jul…12:00
30-Jul…14:00
30-Jul…16:00
30-Jul…18:00
30-Jul…20:00
30-Jul…22:00
31-Jul…00:00
31-Jul…02:00

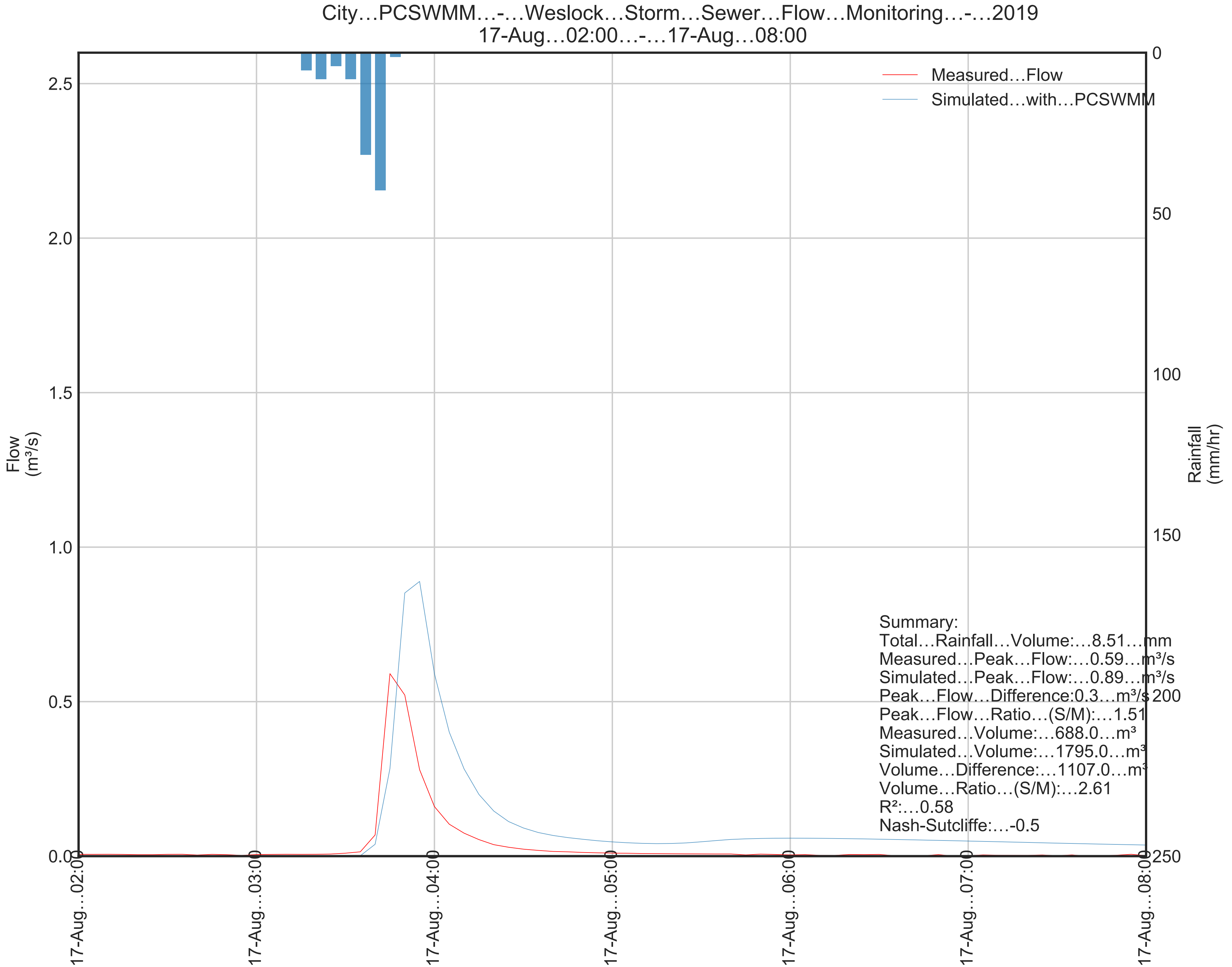

City…PCSWMM…-…Weslock…Storm…Sewer…Flow…Monitoring…-…2019
06-Aug…12:00…-…06-Aug…18:00
Measured…Flow
Simulated…with…PCSWMM
Flow
(m³/s)
Rainfall
(mm/hr)
0.0
0.5
1.0
1.5
2.0
2.5
0
50
100
150
200
250
06-Aug…12:00
06-Aug…13:00
06-Aug…14:00
06-Aug…15:00
06-Aug…16:00
06-Aug…17:00
06-Aug…18:00
Summary:
Total…Rainfall…Volume:…8.85…mm
Measured…Peak…Flow:…0.33…m³/s
Simulated…Peak…Flow:…0.43…m³/s
Peak…Flow…Difference:0.1…m³/s
Peak…Flow…Ratio…(S/M):…1.32
Measured…Volume:…1042.0…m³
Simulated…Volume:…1885.0…m³
Volume…Difference:…842.0…m³
Volume…Ratio…(S/M):…1.81
R²:…0.73
Nash-Sutcliffe:…0.32


City…PCSWMM…-…Weslock…Storm…Sewer…Flow…Monitoring…-…2019
08-Aug…14:00…-…08-Aug…20:00
Measured…Flow
Simulated…with…PCSWMM
Flow
(m³/s)
Rainfall
(mm/hr)
0.0
0.5
1.0
1.5
2.0
2.5
0
50
100
150
200
250
08-Aug…14:00
08-Aug…15:00
08-Aug…16:00
08-Aug…17:00
08-Aug…18:00
08-Aug…19:00
08-Aug…20:00
Summary:
Total…Rainfall…Volume:…8.28…mm
Measured…Peak…Flow:…0.76…m³/s
Simulated…Peak…Flow:…0.74…m³/s
Peak…Flow…Difference:-0.02…m³/s
Peak…Flow…Ratio…(S/M):…0.98
Measured…Volume:…1230.0…m³
Simulated…Volume:…1967.0…m³
Volume…Difference:…736.0…m³
Volume…Ratio…(S/M):…1.6
R²:…0.46
Nash-Sutcliffe:…0.28

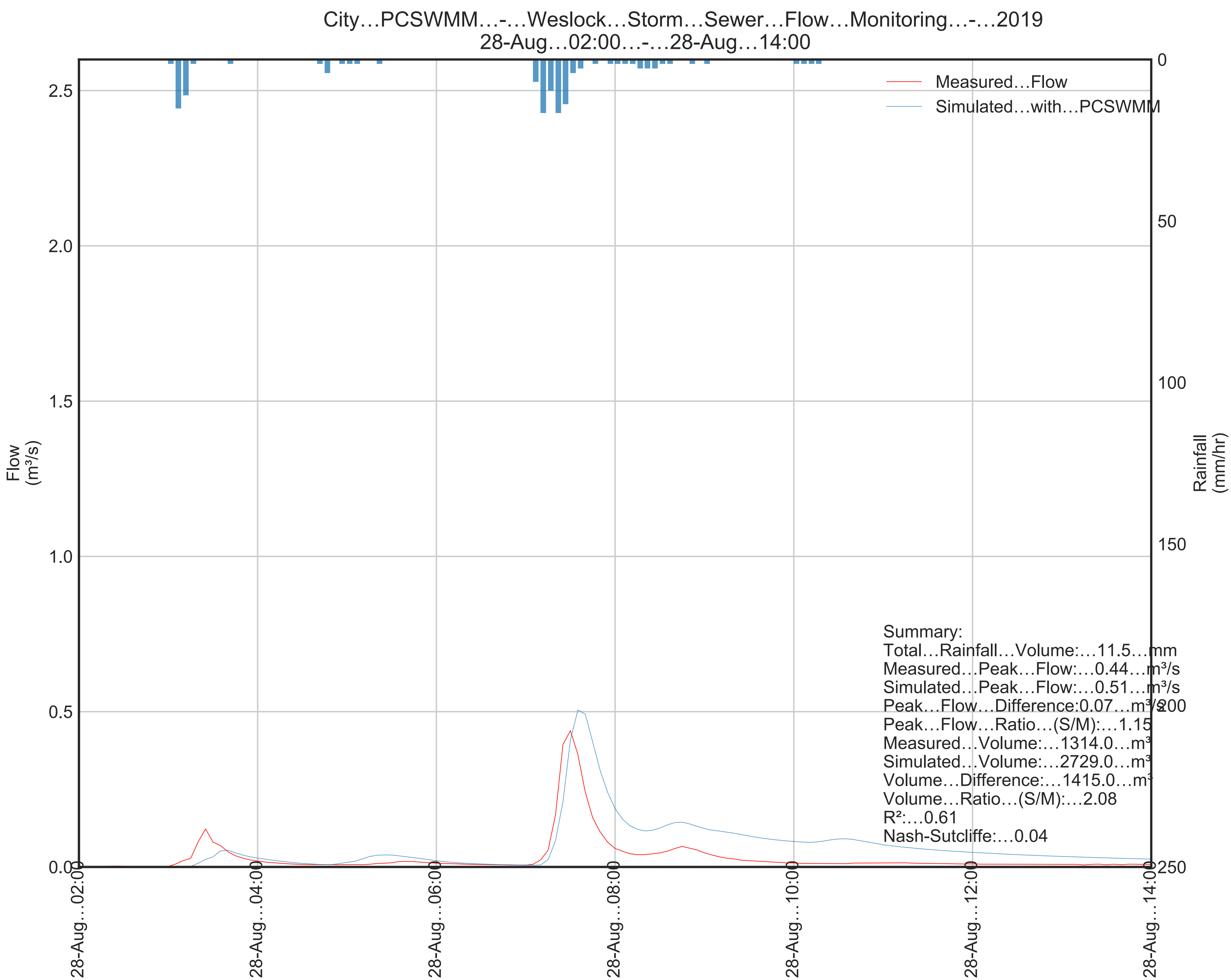


City PCSWMM - Weslock Storm Sewer Flow Monitoring - 2019
09-Aug 12:00 - 09-Aug 18:00
Measured Flow
Simulated with PCSWMM
Flow (m³/s)
Rainfall (mm/hr)
Summary:
Total Rainfall Volume: 5.98 mm
Measured Peak Flow: 0.6 m³/s
Simulated Peak Flow: 0.48 m³/s
Peak Flow Difference: -0.11 m³/s
Peak Flow Ratio (S/M): 0.81
Measured Volume: 1031.0 m³
Simulated Volume: 1340.0 m³
Volume Difference: 309.0 m³
Volume Ratio (S/M): 1.3
R²: 0.36
Nash-Sutcliffe: 0.24
09-Aug 12:00
09-Aug 13:00
09-Aug 14:00
09-Aug 15:00
09-Aug 16:00
09-Aug 17:00
09-Aug 18:00

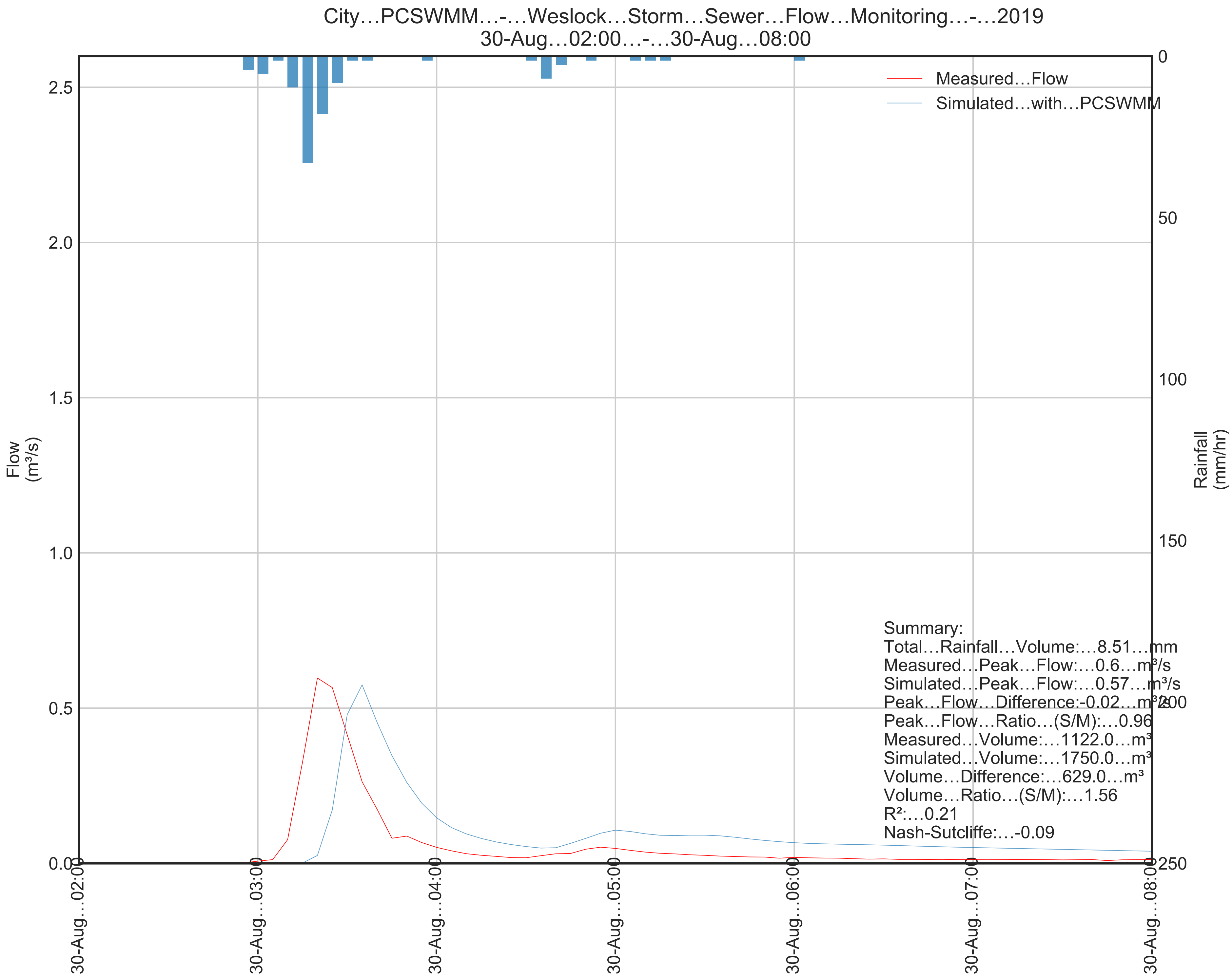

City PCSWMM - Weslock Storm Sewer Flow Monitoring - 2019
12-Aug 18:00 - 13-Aug 00:00
Measured Flow
Simulated with PCSWMM
Flow (m³/s)
Rainfall (mm/hr)
0.0
0.5
1.0
1.5
2.0
2.5
0
50
100
150
200
250
12-Aug 18:00
12-Aug 19:00
12-Aug 20:00
12-Aug 21:00
12-Aug 22:00
12-Aug 23:00
13-Aug 00:00
Summary:
Total Rainfall Volume: 5.52 mm
Measured Peak Flow: 0.22 m³/s
Simulated Peak Flow: 0.16 m³/s
Peak Flow Difference:-0.06 m³/s
Peak Flow Ratio (S/M): 0.73
Measured Volume: 732.0 m³
Simulated Volume: 775.0 m³
Volume Difference: 44.0 m³
Volume Ratio (S/M): 1.06
R²: 0.35
Nash-Sutcliffe: 0.34



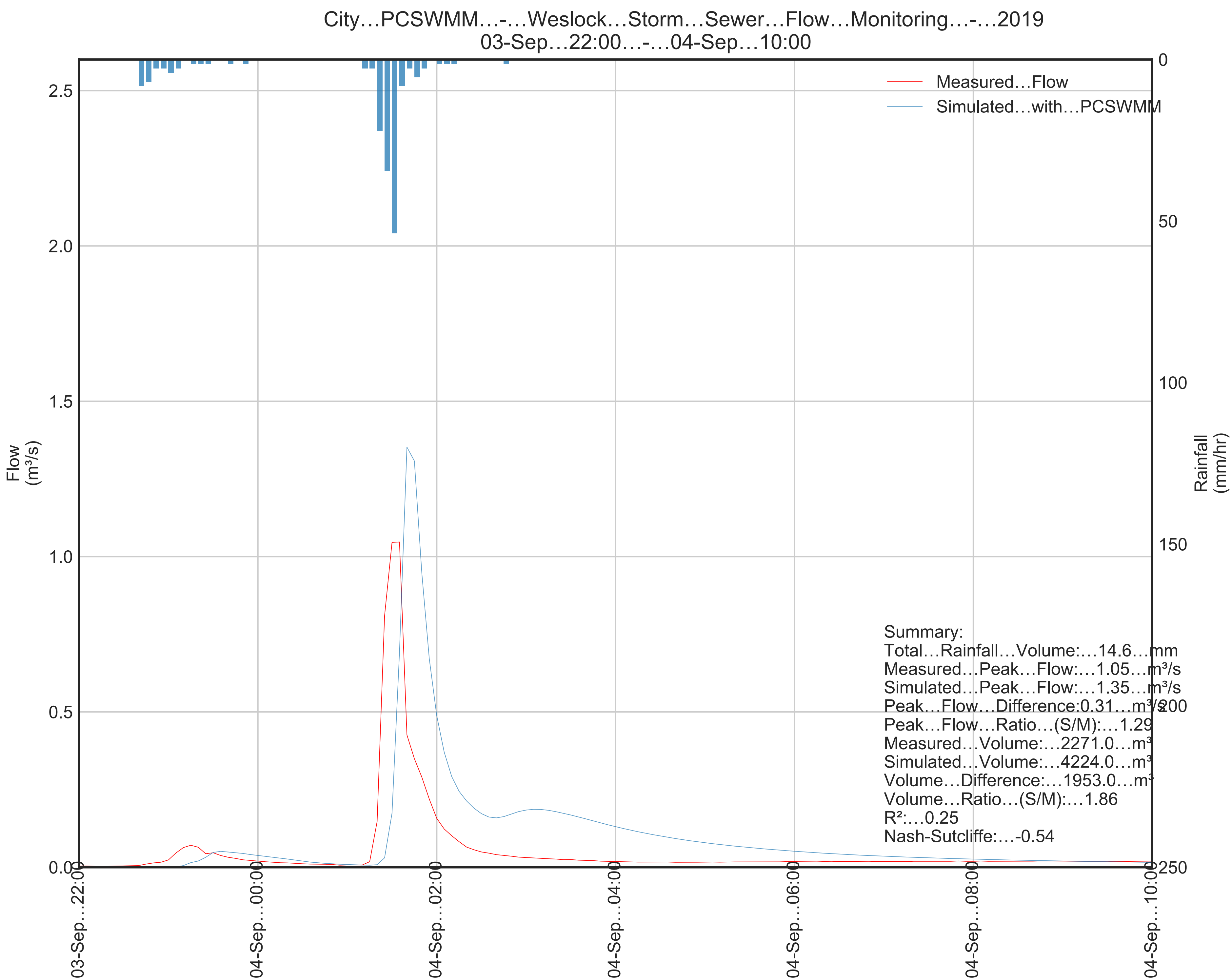
City…PCSWMM…-…Weslock…Storm…Sewer…Flow…Monitoring…-…2019
17-Aug…02:00…-…17-Aug…08:00
Measured…Flow
Simulated…with…PCSWMM
Flow (m³/s)
Rainfall (mm/hr)
0.0
0.5
1.0
1.5
2.0
2.5
0
50
100
150
200
250
17-Aug…02:00
17-Aug…03:00
17-Aug…04:00
17-Aug…05:00
17-Aug…06:00
17-Aug…07:00
17-Aug…08:00
Summary:
Total…Rainfall…Volume:…8.51…mm
Measured…Peak…Flow:…0.59…m³/s
Simulated…Peak…Flow:…0.89…m³/s
Peak…Flow…Difference:0.3…m³/s
Peak…Flow…Ratio…(S/M):…1.51
Measured…Volume:…688.0…m³
Simulated…Volume:…1795.0…m³
Volume…Difference:…1107.0…m³
Volume…Ratio…(S/M):…2.61
R²:…0.58
Nash-Sutcliffe:…-0.5



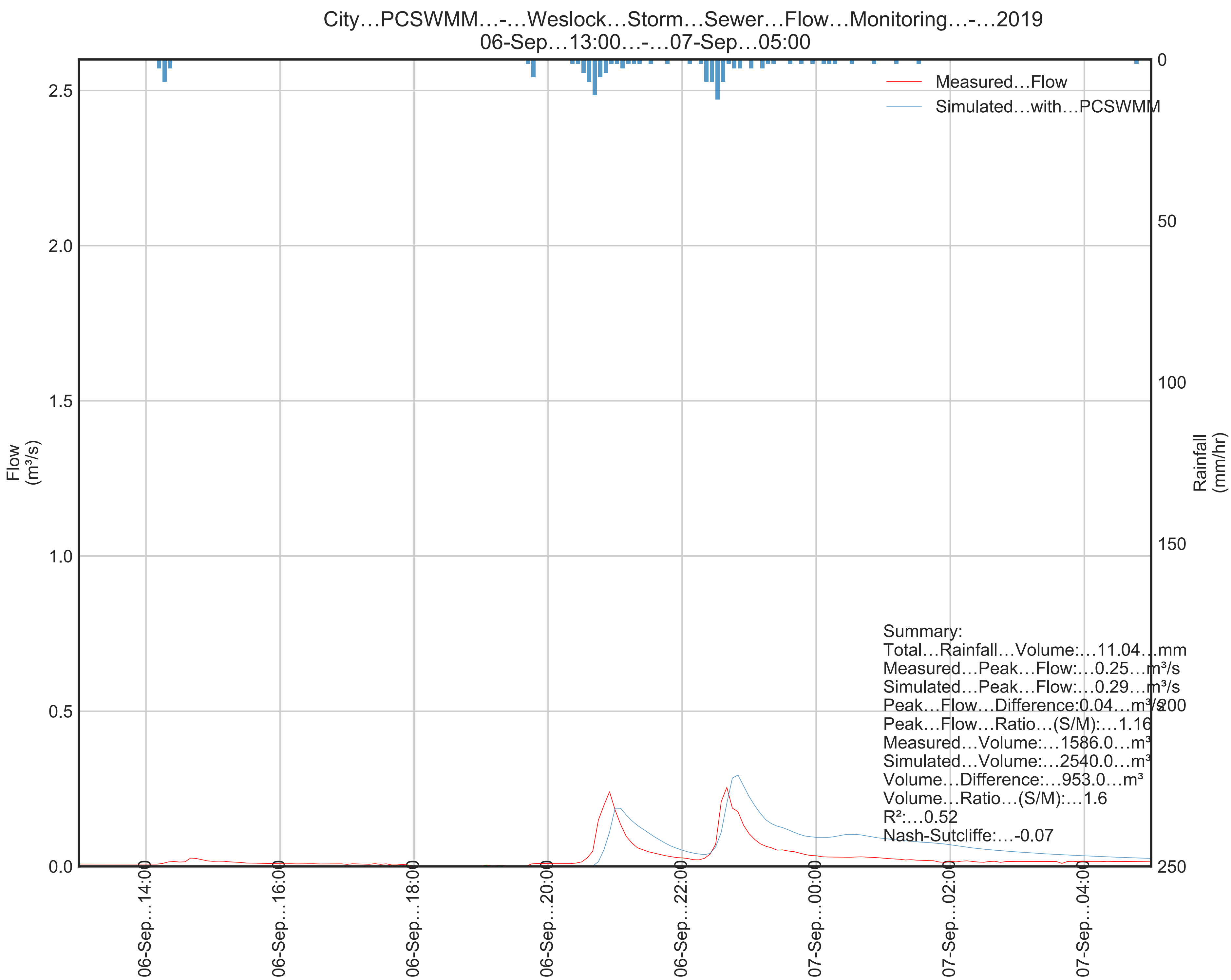
City…PCSWMM…-…Weslock…Storm…Sewer…Flow…Monitoring…-…2019
28-Aug…02:00…-…28-Aug…14:00
Measured…Flow
Simulated…with…PCSWMM
Flow
(m³/s)
Rainfall
(mm/hr)
0.0
0.5
1.0
1.5
2.0
2.5
0
50
100
150
200
250
28-Aug…02:00
28-Aug…04:00
28-Aug…06:00
28-Aug…08:00
28-Aug…10:00
28-Aug…12:00
28-Aug…14:00
Summary:
Total…Rainfall…Volume:…11.5…mm
Measured…Peak…Flow:…0.44…m³/s
Simulated…Peak…Flow:…0.51…m³/s
Peak…Flow…Difference:0.07…m³/s
Peak…Flow…Ratio…(S/M):…1.15
Measured…Volume:…1314.0…m³
Simulated…Volume:…2729.0…m³
Volume…Difference:…1415.0…m³
Volume…Ratio…(S/M):…2.08
R²:…0.61
Nash-Sutcliffe:…0.04

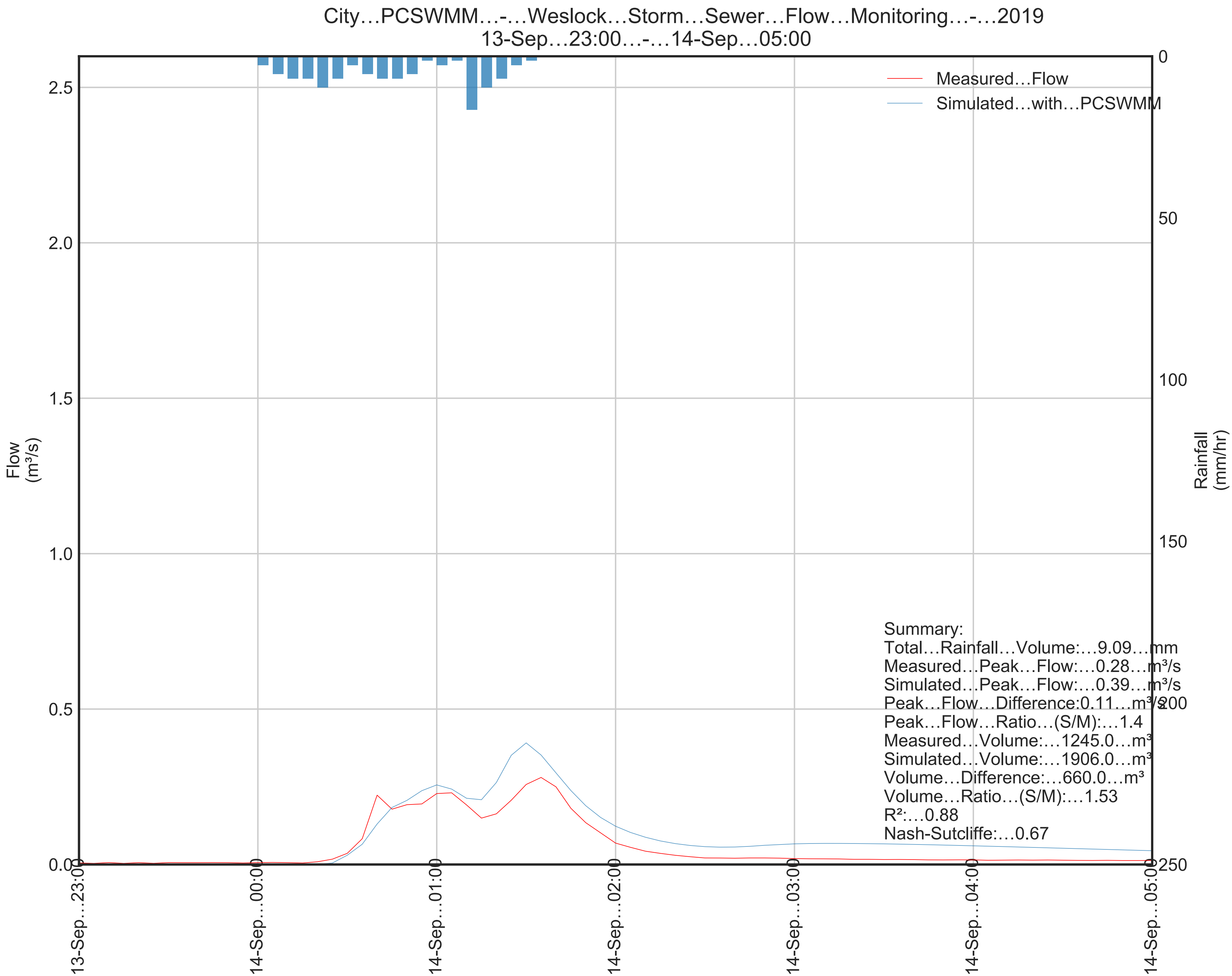


City…PCSWMM…-…Weslock…Storm…Sewer…Flow…Monitoring…-…2019
30-Aug…02:00…-…30-Aug…08:00
Flow
(m³/s)
Rainfall
(mm/hr)
Measured…Flow
Simulated…with…PCSWMM
0.0
0.5
1.0
1.5
2.0
2.5
0
50
100
150
200
250
30-Aug…02:00
30-Aug…03:00
30-Aug…04:00
30-Aug…05:00
30-Aug…06:00
30-Aug…07:00
30-Aug…08:00
Summary:
Total…Rainfall…Volume:…8.51…mm
Measured…Peak…Flow:…0.6…m³/s
Simulated…Peak…Flow:…0.57…m³/s
Peak…Flow…Difference:-0.02…m³/s
Peak…Flow…Ratio…(S/M):…0.96
Measured…Volume:…1122.0…m³
Simulated…Volume:…1750.0…m³
Volume…Difference:…629.0…m³
Volume…Ratio…(S/M):…1.56
R²:…0.21
Nash-Sutcliffe:…-0.09

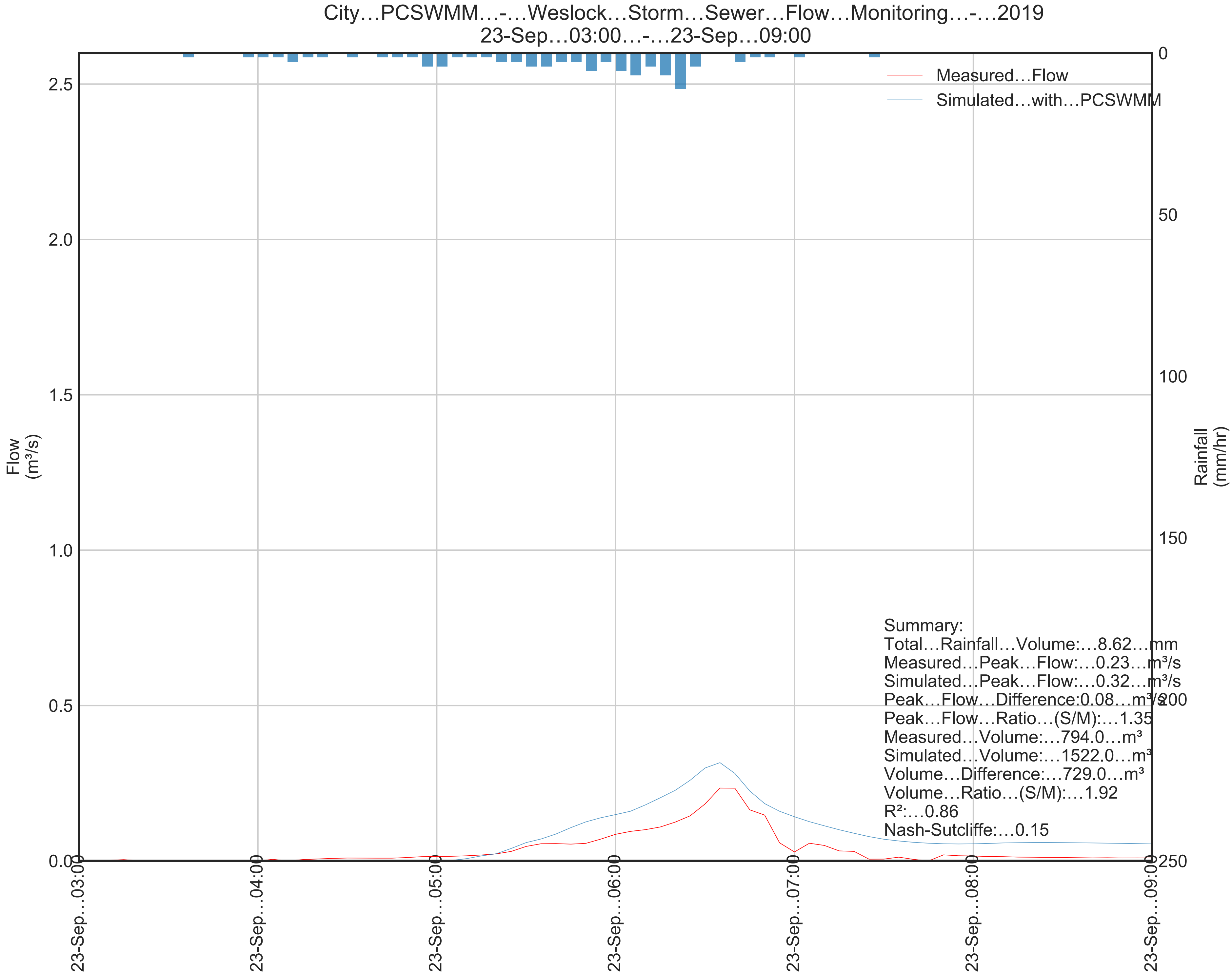


City…PCSWMM…-…Weslock…Storm…Sewer…Flow…Monitoring…-…2019
03-Sep…22:00…-…04-Sep…10:00
Measured…Flow
Simulated…with…PCSWMM
Flow (m³/s)
Rainfall (mm/hr)
0.0
0.5
1.0
1.5
2.0
2.5
0
50
100
150
200
250
03-Sep…22:00
04-Sep…00:00
04-Sep…02:00
04-Sep…04:00
04-Sep…06:00
04-Sep…08:00
04-Sep…10:00
Summary:
Total…Rainfall…Volume:…14.6…mm
Measured…Peak…Flow:…1.05…m³/s
Simulated…Peak…Flow:…1.35…m³/s
Peak…Flow…Difference:0.31…m³/s
Peak…Flow…Ratio…(S/M):…1.29
Measured…Volume:…2271.0…m³
Simulated…Volume:…4224.0…m³
Volume…Difference:…1953.0…m³
Volume…Ratio…(S/M):…1.86
R²:…0.25
Nash-Sutcliffe:…-0.54

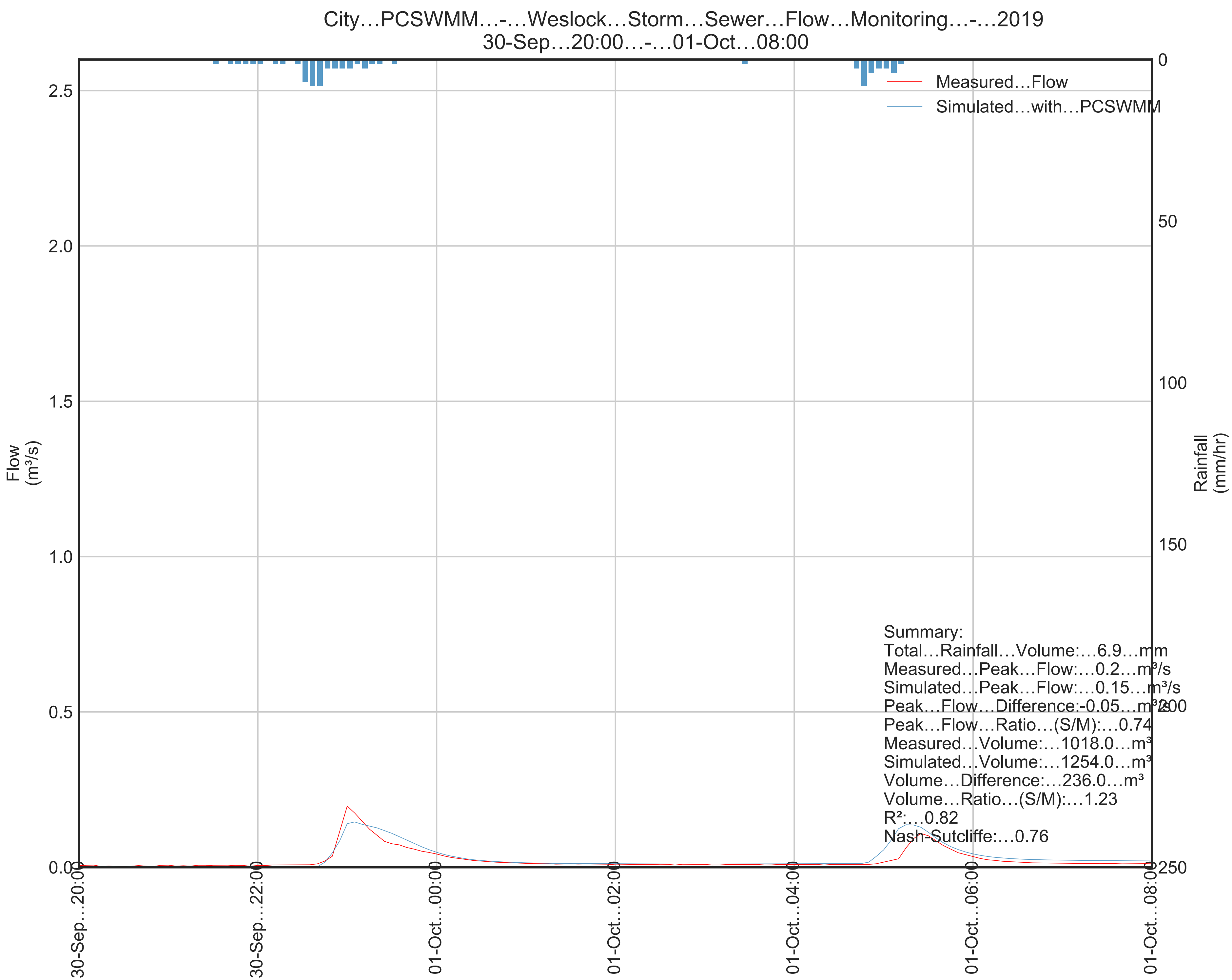

City - PCSWMM - Weslock Storm Sewer Flow Monitoring - 2019
06-Sep 13:00 - 07-Sep 05:00
Flow (m³/s)
Rainfall (mm/hr)
Measured Flow
Simulated with PCSWMM
0.0
0.5
1.0
1.5
2.0
2.5
0
50
100
150
200
250
06-Sep 14:00
06-Sep 16:00
06-Sep 18:00
06-Sep 20:00
06-Sep 22:00
07-Sep 00:00
07-Sep 02:00
07-Sep 04:00
Summary:
Total Rainfall Volume: 11.04 mm
Measured Peak Flow: 0.25 m³/s
Simulated Peak Flow: 0.29 m³/s
Peak Flow Difference:0.04 m³/s
Peak Flow Ratio (S/M): 1.16
Measured Volume: 1586.0 m³
Simulated Volume: 2540.0 m³
Volume Difference: 953.0 m³
Volume Ratio (S/M): 1.6
R²: 0.52
Nash-Sutcliffe: -0.07



City…PCSWMM…-…Weslock…Storm…Sewer…Flow…Monitoring…-…2019
13-Sep…23:00…-…14-Sep…05:00
Measured…Flow
Simulated…with…PCSWMM
Flow (m³/s)
Rainfall (mm/hr)
0.0
0.5
1.0
1.5
2.0
2.5
0
50
100
150
200
250
13-Sep…23:00
14-Sep…00:00
14-Sep…01:00
14-Sep…02:00
14-Sep…03:00
14-Sep…04:00
14-Sep…05:00
Summary:
Total…Rainfall…Volume:…9.09…mm
Measured…Peak…Flow:…0.28…m³/s
Simulated…Peak…Flow:…0.39…m³/s
Peak…Flow…Difference:0.11…m³/s
Peak…Flow…Ratio…(S/M):…1.4
Measured…Volume:…1245.0…m³
Simulated…Volume:…1906.0…m³
Volume…Difference:…660.0…m³
Volume…Ratio…(S/M):…1.53
R²:…0.88
Nash-Sutcliffe:…0.67



City…PCSWMM…-…Weslock…Storm…Sewer…Flow…Monitoring…-…2019
23-Sep…03:00…-…23-Sep…09:00
Flow (m³/s)
Rainfall (mm/hr)
Measured…Flow
Simulated…with…PCSWMM
Summary:
Total…Rainfall…Volume:…8.62…mm
Measured…Peak…Flow:…0.23…m³/s
Simulated…Peak…Flow:…0.32…m³/s
Peak…Flow…Difference:0.08…m³/s
Peak…Flow…Ratio…(S/M):…1.35
Measured…Volume:…794.0…m³
Simulated…Volume:…1522.0…m³
Volume…Difference:…729.0…m³
Volume…Ratio…(S/M):…1.92
R²:…0.86
Nash-Sutcliffe:…0.15
23-Sep…03:00
23-Sep…04:00
23-Sep…05:00
23-Sep…06:00
23-Sep…07:00
23-Sep…08:00
23-Sep…09:00



City…PCSWMM…-…Weslock…Storm…Sewer…Flow…Monitoring…-…2019
30-Sep…20:00…-…01-Oct…08:00
Measured…Flow
Simulated…with…PCSWMM
Flow (m³/s)
Rainfall (mm/hr)
0.0
0.5
1.0
1.5
2.0
2.5
0
50
100
150
200
250
30-Sep…20:00
30-Sep…22:00
01-Oct…00:00
01-Oct…02:00
01-Oct…04:00
01-Oct…06:00
01-Oct…08:00
Summary:
Total…Rainfall…Volume:…6.9…mm
Measured…Peak…Flow:…0.2…m³/s
Simulated…Peak…Flow:…0.15…m³/s
Peak…Flow…Difference:-0.05…m³/s
Peak…Flow…Ratio…(S/M):…0.74
Measured…Volume:…1018.0…m³
Simulated…Volume:…1254.0…m³
Volume…Difference:…236.0…m³
Volume…Ratio…(S/M):…1.23
R²:…0.82
Nash-Sutcliffe:…0.76

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Ottawa, ON K2S 1B9
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Paris. ON
Gatineau. QC
Montréal. QC
Québec. QC

Attachment B

Proposed Conditions Model Overview

Legend

Kinematic Model Subcatchments

J.F. Sabourin and Associates Inc.
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(613) 836-3884
www.jfsa.com

DSEL
david schaeffer engineering ltd

SCALE : 1:10,000

0 250 500 750 1,000 m

PROJECT :

7000 Campeau Drive

TITLE :

Figure B-1: Kinematic Model Subcatchments

PROJECT	1581-17
DRAWN:	JB
DATE:	May 2020


N
Legend
Dynamic Model Subcatchments
J.F. Sabourin and Associates Inc.
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52 Springbrook Drive
Ottawa, ON, K2S 1B9
(613) 836-3884
www.jfsa.com
DSEL
david schaeffer engineering ltd
SCALE: 1:10000
0
200
400 m
700 Campeau Drive
Figure B-2: Dynamic Model Subcatchments
PROJECT
1581-17
DRAWN:
MP
DATE:
JUNE 2021

J.F. Sabourin and Associates Inc.
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DSEL
david schaeffer engineering ltd

SCALE: 1:6500

0 150 300 m

700 Campeau Drive

Figure B-3: Major System Overview

PROJECT	1581-17
DRAWN:	MP
DATE:	JUNE 2021

N

Legend

- Development Plan
- Proposed Minor System
- Existing Minor System
- Proposed Manhole
- Existing Manhole
- Proposed SWM Ponds
- Underground Storage Units

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SCALE: 1:6500

0 150 300 m

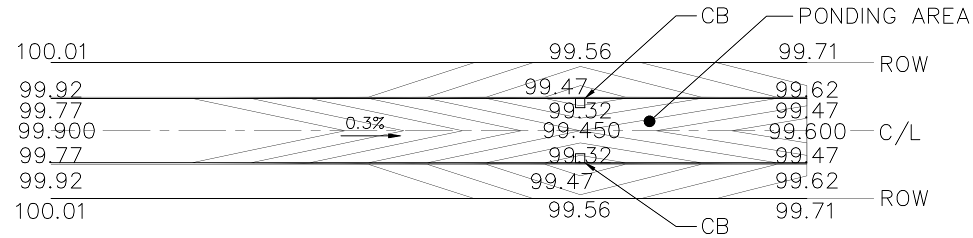
700 Campeau Drive

Figure B-4: Minor System Overview

PROJECT	1581-17
DRAWN:	MP
DATE:	JUNE 2021

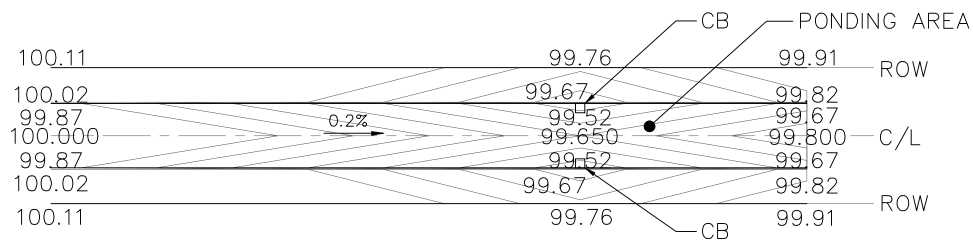
0.3% HIGH POINT TO HIGH POINT ROAD PONDING

STAGE (m)	AREA (m2)
99.32	0.72
99.35	10.88
99.4	77.42
99.45	204.46
99.5	372.54
99.55	592.2
99.6	838.95
99.65	1060.96



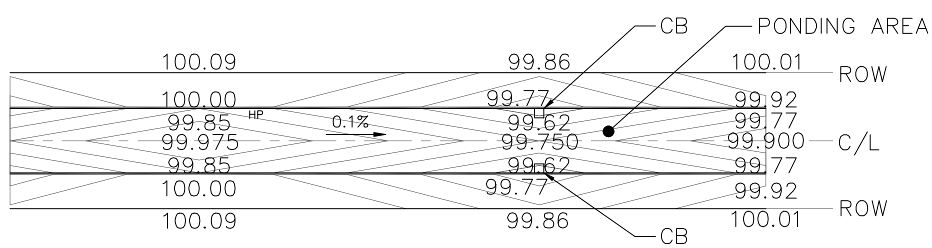
0.2% HIGH POINT TO HIGH POINT ROAD PONDING

STAGE (m)	AREA (m2)
99.52	0.72
99.55	12.24
99.6	87.08
99.65	229.33
99.7	419.77
99.75	671.5
99.8	957.94
99.85	1219.86



0.1% HIGH POINT TO HIGH POINT ROAD PONDING

STAGE (m)	AREA (m2)
99.62	0.36
99.65	12.12
99.7	86.14
99.75	233.37
99.8	457.52
99.85	776.36
99.9	1122.94
99.95	1427.83



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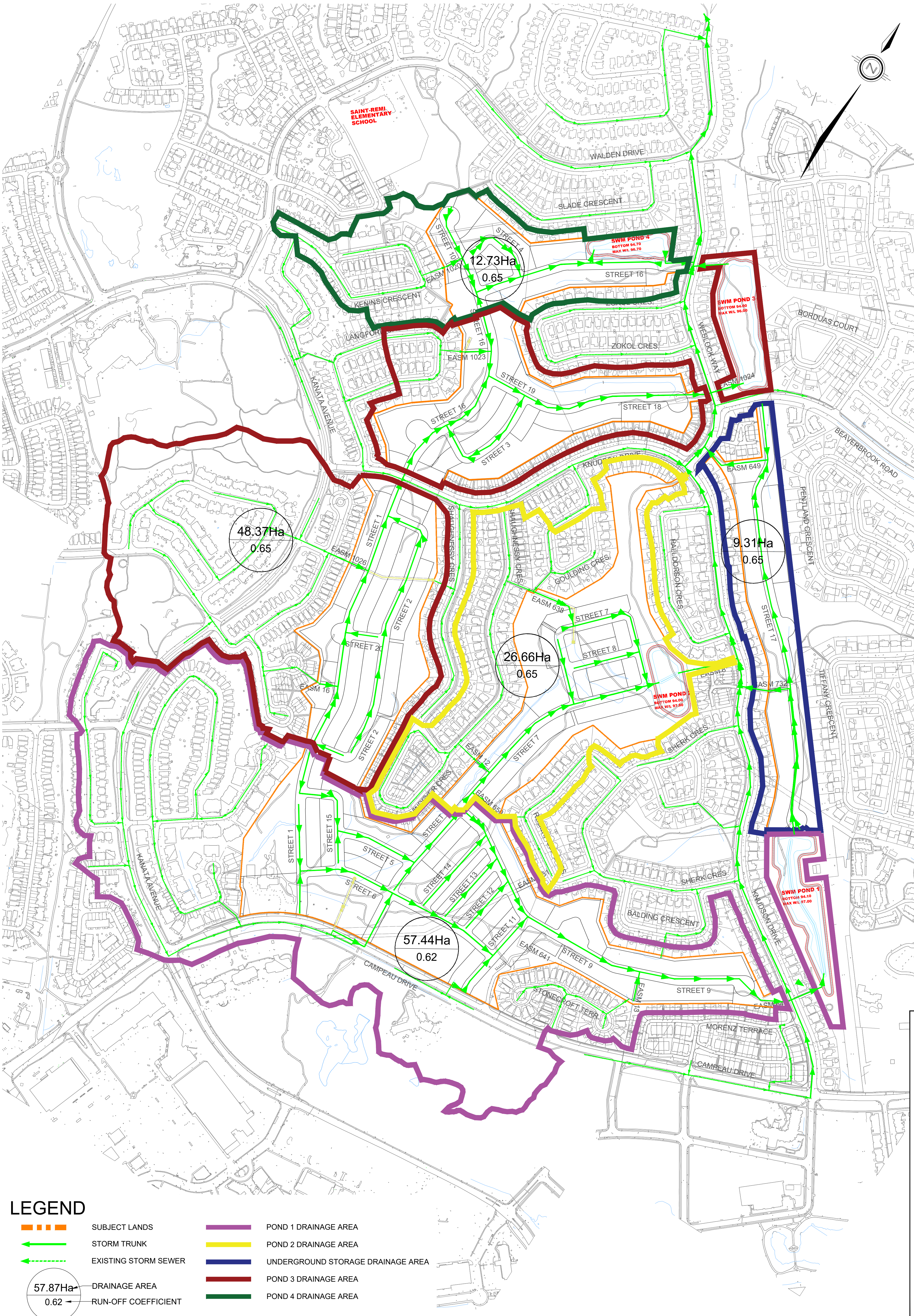
7000 CAMPEAU DRIVE

CITY OF OTTAWA

FIGURE B5: ROAD SAG PONDING DEPTH / AREA

SCALE:	1:1000	PROJECT No.:	1061
DATE:	2021-06-04	FIGURE:	05F



CITY FILE No. D07-16-19-0026 CITY PLAN No. XXXXX

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CITY OF OTTAWA

FIGURE B6: STORM DRAINAGE

SCALE:	1:7000	PROJECT No.:	1061
DATE:	MAY 2021	FIGURE:	02F

MANHOLE LOSS COEFFICIENT NOMOGRAPH AND TABLE

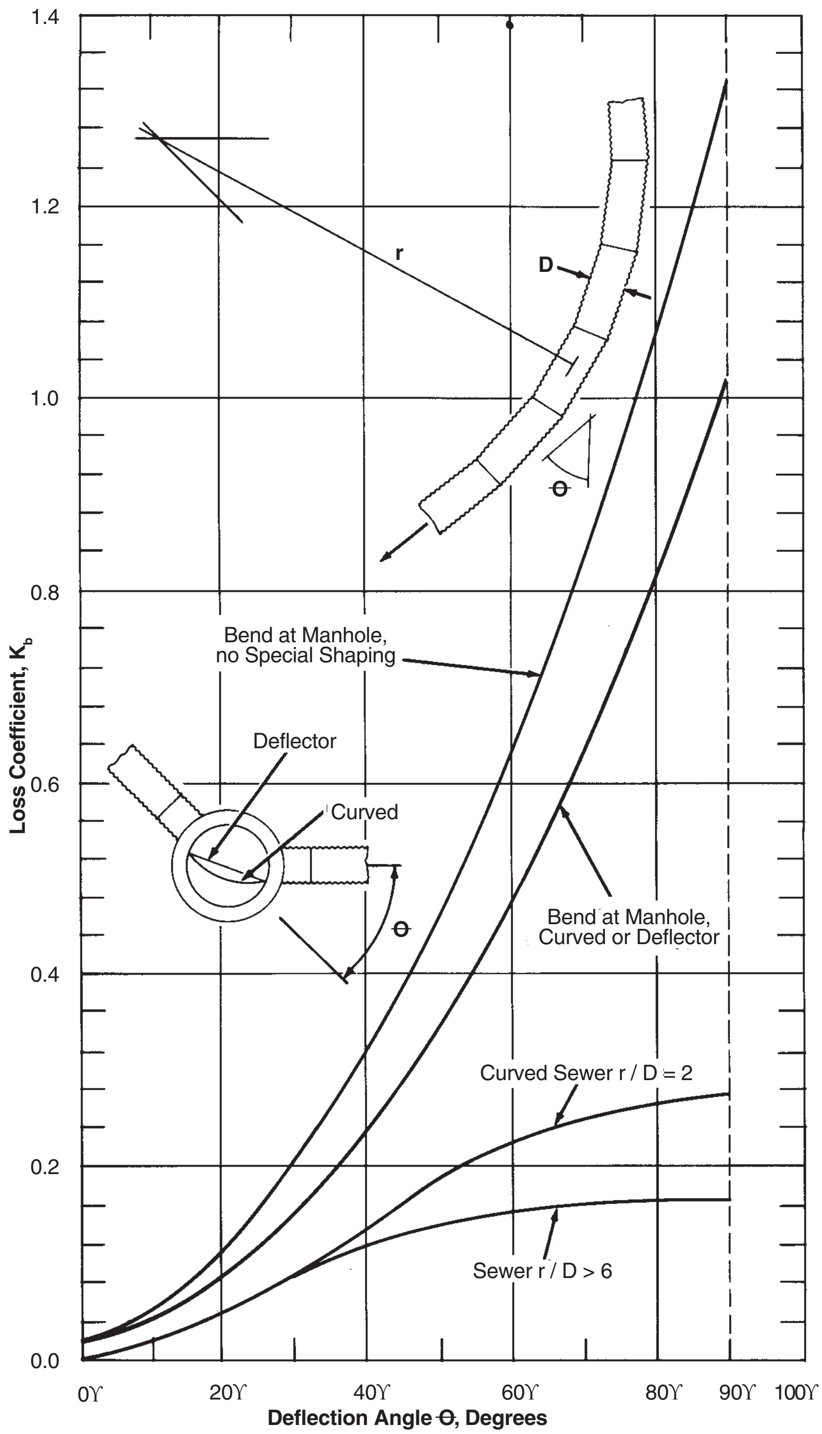

Figure 4.13 Sewer bend loss coefficient[16]

Angle	Exit Loss
0	0.02
5	0.035
10	0.055
15	0.08
20	0.11
25	0.16
30	0.21
35	0.26
40	0.32
45	0.39
50	0.47
55	0.54
60	0.635
65	0.73
70	0.84
75	0.95
80	1.07
85	1.19
90	1.33

STORM SEWER CALCULATION SHEET (RATIONAL METHOD)

Local Roads Return Frequency = 2 years
Collector Roads Return Frequency = 5 years
Manning 0.013 Arterial Roads Return Frequency = 10 years

LOCATION			AREA (Ha)																FLOW						SEWER DATA									
			2 YEAR				5 YEAR				10 YEAR				100 YEAR				Time of	Intensity	Intensity	Intensity	Intensity	Peak Flow	DIA. (mm)	DIA. (mm)	TYPE	SLOPE	LENGTH	CAPACITY	VELOCITY	TIME OF	RATIO
			AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	Conc.	2 Year	5 Year	10 Year	100 Year										
Location	From Node	To Node	(Ha)		2.78 AC	2.78 AC	(Ha)		2.78 AC	2.78 AC	(Ha)		2.78 AC	2.78 AC	(Ha)		2.78 AC	2.78 AC	(min)	(mm/h)	(mm/h)	(mm/h)	(mm/h)	Q (l/s)	(actual)	(nominal)		(%)	(m)	(l/s)	(m/s)	LOW (min	Q/Q full
Street 4																																	
	5010	5011	0.14	0.65	0.25	0.25			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	19	300	300	PVC	0.75	17.0	83.75	1.18	0.24	0.23
					0.00	0.25	0.09	0.65	0.16	0.16			0.00	0.00			0.00	0.00															
	5011	5012	0.30	0.65	0.54	0.80			0.00	0.16			0.00	0.00			0.00	0.00	10.24	75.90	102.95	120.67	176.40	77	375	375	PVC	0.60	16.0	135.81	1.23	0.22	0.57
	5012	5013			0.00	0.80			0.00	0.16			0.00	0.00			0.00	0.00	10.46	75.10	101.84	119.38	174.49	76	375	375	PVC	0.30	15.0	96.03	0.87	0.29	0.79
					0.00	0.80	0.11	0.65	0.20	0.36			0.00	0.00			0.00	0.00															
	5013	5014	0.48	0.65	0.87	1.66			0.00	0.36			0.00	0.00			0.00	0.00	10.74	74.06	100.42	117.70	172.04	159	450	450	CONC	0.55	50.0	211.44	1.33	0.63	0.75
	5014	5015			0.00	1.66			0.00	0.36			0.00	0.00			0.00	0.00	11.37	71.92	97.47	114.23	166.93	155	450	450	CONC	0.50	10.5	201.60	1.27	0.14	0.77
	5015	5016	0.22	0.65	0.40	2.06			0.00	0.36			0.00	0.00			0.00	0.00	11.51	71.46	96.85	113.49	165.85	182	450	450	CONC	0.65	37.0	229.86	1.45	0.43	0.79
To Street 16, Pipe 5016 - 5017						2.06				0.36				0.00				0.00	11.94														
EASM 1020																																	
	5003	5004			0.00	0.00	3.20	0.65	5.78	5.78			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	602	675	675	CONC	0.65	35.0	677.70	1.89	0.31	0.89
To STREET 10, Pipe 5004 - 5005						0.00				5.78				0.00				0.00	10.31														
To SWM Pond 4																																	
Contribution From Street 16, Pipe 5017 - 5022						8.42				10.53				0.00				0.00	13.01														
Contribution From Street 16, Pipe 5020 - 5022						1.37				0.56				0.00				0.00	12.69														
	5021	5022			0.00	9.79			0.00	11.09			0.00	0.00			0.00	0.00	13.01	66.91	90.60	106.14	155.05	1660	975	975	CONC	0.85	27.5	2066.15	2.77	0.17	0.80
EASM 1023																																	
	4033	4034			0.00	0.00	1.60	0.65	2.89	2.89			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	301	750	750	CONC	0.20	52.0	497.87	1.13	0.77	0.61
To STREET 10, Pipe 4034 - 4035						0.00				2.89				0.00				0.00	10.77														
STREET 3																																	
					0.00	0.00	0.46	0.65	0.83	0.83			0.00	0.00			0.00	0.00															
	4029	4030	1.07	0.65	1.93	1.93			0.00	0.83			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	235	450	450	CONC	1.05	43.5	292.15	1.84	0.39	0.80
	4030	4036	0.49	0.65	0.89	2.82			0.00	0.83			0.00	0.00			0.00	0.00	10.39	75.32	102.15	119.74	175.03	297	525	525	CONC	1.65	77.5	552.42	2.55	0.51	0.54
To STREET 19, Pipe 4036 - 4037						2.82				0.83				0.00				0.00	10.90														
					0.00	0.00	0.10	0.65	0.18	0.18			0.00	0.00			0.00	0.00															
	4029	4028	0.29	0.65	0.52	0.52			0.00	0.18			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	59	300	300	PVC	0.60	49.5	74.90	1.06	0.78	0.79
					0.00	0.52	0.11	0.65	0.20	0.38			0.00	0.00			0.00	0.00															
	4028	4027	0.37	0.65	0.67	1.19			0.00	0.38			0.00	0.00			0.00	0.00	10.78	73.94	100.25	117.50	171.74	126	375	375	PVC	0.95	10.5	170.89	1.55	0.11	0.74
	4027	4026			0.00	1.19			0.00	0.38			0.00	0.00			0.00	0.00	10.89	73.54	99.71	116.86	170.80	126	375	375	PVC	3.45	68.5	325.66	2.95	0.39	0.39
To STREET 10, Pipe 4026 - 4025						1.19				0.38				0.00				0.00	11.28														
EASM 1026																																	
	4009	4010			0.00	0.00	13.13	0.65	23.73	23.73			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	2472	1500	1500	CONC	0.15	85.5	2737.76	1.55	0.92	0.90
To STREET 1, Pipe 4010 - 4019						0.00				23.73				0.00				0.00	10.92														
STREET 20																																	
	4006	4007	0.11	0.65	0.20	0.20			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	15	300	300	PVC	0.35	64.0	57.21	0.81	1.32	0.27
To STREET 1, Pipe 4007 - 4008						0.20				0.00				0.00				0.00	11.32														
EASM 16																																	
	4004	4005			0.00	0.00			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	0	825	825	PVC	0.35	35.5	849.22	1.59	0.37	0.00
To STREET 1, Pipe 4005 - 4007						0.00				0.00				0.00				0.00	10.37														
STREET 2																																	
	4000	4001	0.25	0.65	0.45	0.45			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	35	300	300	PVC	0.50	64.0	68.38	0.97	1.10	0.51
To STREET 1, Pipe 4001 - 4002						0.45				0.00				0.00				0.00	11.10														
					0.00	0.00	0.20	0.65	0.36	0.36			0.00	0.00			0.00	0.00															
	4011	4012	0.68	0.65	1.23	1.23			0.00	0.36			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	132	525	525	CONC	0.20	54.5	192.33	0.89	1.02	0.69
					0.00	1.23	0.08	0.65	0.14	0.51			0.00	0.00			0.00	0.00															
	4012	4013	0.23	0.65	0.42	1.64			0.00	0.51			0.00	0.00			0.00	0.00	11.02	73.09	99.09	116.13	169.72	170	600	600	CONC	0.15	50.0	237.81	0.84	0.99	0.72

Definitions:
Q = 2.78 AIR, where
Q = Peak Flow in Litres per second (L/s)
A = Areas in hectares (ha)
I = Rainfall Intensity (mm/h)
R = Runoff Coefficient

Notes:
1) Ottawa Rainfall-Intensity Curve
2) Min. Velocity = 0.80 m/s

Designed: GGG	PROJECT:		**7000 Campeau Drive**	
Checked: SLM	LOCATION:		**City of Ottawa**	
Dwg. Reference: 03D	File Ref:	18-1061	Date: 15 Jun 2021	Sheet No. SHEET 1 OF 10

STORM SEWER CALCULATION SHEET (RATIONAL METHOD)

Local Roads Return Frequency = 2 years
Collector Roads Return Frequency = 5 years
Manning 0.013 Arterial Roads Return Frequency = 10 years

LOCATION			AREA (Ha)																FLOW						SEWER DATA								
			2 YEAR				5 YEAR				10 YEAR				100 YEAR				Time of	Intensity	Intensity	Intensity	Intensity	Peak Flow	DIA. (mm)	DIA. (mm)	TYPE	SLOPE	LENGTH	CAPACITY	VELOCITY	TIME OF	RATIO
			AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	Conc.	2 Year	5 Year	10 Year	100 Year										
Location	From Node	To Node	(Ha)		2.78 AC	2.78 AC	(Ha)		2.78 AC	2.78 AC	(Ha)		2.78 AC	2.78 AC	(Ha)		2.78 AC	2.78 AC	(min)	(mm/h)	(mm/h)	(mm/h)	(mm/h)	Q (l/s)	(actual)	(nominal)		(%)	(m)	(l/s)	(m/s)	LOW (min	Q/Q full
					0.00	1.64	0.25	0.65	0.45	0.96			0.00	0.00			0.00	0.00															
	4013	4014	1.06	0.65	1.92	3.56			0.00	0.96			0.00	0.00			0.00	0.00	12.01	69.85	94.64	110.89	162.04	339	825	825	CONC	0.10	77.0	453.92	0.85	1.51	0.75
					0.00	3.56	0.15	0.65	0.27	1.23			0.00	0.00			0.00	0.00															
	4014	4015	0.86	0.65	1.55	5.11			0.00	1.23			0.00	0.00			0.00	0.00	13.52	65.48	88.65	103.84	151.68	444	975	975	CONC	0.10	83.5	708.68	0.95	1.47	0.63
					0.00	5.11	0.20	0.65	0.36	1.59			0.00	0.00			0.00	0.00															
	4015	4016	0.84	0.65	1.52	6.63			0.00	1.59			0.00	0.00			0.00	0.00	14.99	61.79	83.59	97.89	142.95	543	1050	1050	CONC	0.10	93.5	863.53	1.00	1.56	0.63
					0.00	6.63	0.23	0.65	0.42	2.01			0.00	0.00			0.00	0.00															
	4016	4017	0.76	0.65	1.37	8.01			0.00	2.01			0.00	0.00			0.00	0.00	16.55	58.33	78.85	92.32	134.78	625	1050	1050	CONC	0.10	94.0	863.53	1.00	1.57	0.72
					0.00	8.01	0.13	0.65	0.23	2.24			0.00	0.00			0.00	0.00															
	4017	4018	0.14	0.65	0.25	8.26			0.00	2.24			0.00	0.00			0.00	0.00	18.12	55.26	74.66	87.39	127.54	624	1050	1050	CONC	0.10	10.5	863.53	1.00	0.18	0.72
	4018	4019	0.28	0.65	0.51	8.76			0.00	2.24			0.00	0.00			0.00	0.00	18.30	54.94	74.22	86.87	126.79	648	1200	1200	CONC	0.10	69.0	1232.89	1.09	1.05	0.53
To STREET 1, Pipe 4019 - 4020						8.76				2.24				0.00				0.00	19.35														
STREET 10																																	
			0.38	0.65	0.69	0.69			0.00	0.00			0.00	0.00			0.00	0.00															
	5007	5008			0.00	0.69	0.67	0.65	1.21	1.21			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	179	450	450	CONC	1.00	30.5	285.11	1.79	0.28	0.63
To Street 16, Pipe 5008 - 5009						0.69				1.21				0.00				0.00	10.28														
STREET 16																																	
					0.00	0.00	0.11	0.65	0.20	0.20			0.00	0.00			0.00	0.00															
					0.00	0.00	0.12	0.65	0.22	0.42			0.00	0.00			0.00	0.00															
	4031	4032	0.84	0.65	1.52	1.52			0.00	0.42			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	160	450	450	CONC	0.50	68.0	201.60	1.27	0.89	0.79
	4032	4034			0.00	1.52			0.00	0.42			0.00	0.00			0.00	0.00	10.89	73.53	99.70	116.85	170.78	153	450	450	CONC	0.45	11.0	191.26	1.20	0.15	0.80
Contribution From EASM 1023, Pipe 4033 - 4034						0.00				2.89				0.00				0.00	10.77														
					0.00	1.52	0.06	0.65	0.11	3.42			0.00	0.00			0.00	0.00															
					0.00	1.52	0.07	0.65	0.13	3.54			0.00	0.00			0.00	0.00															
	4034	4035	0.58	0.65	1.05	2.57			0.00	3.54			0.00	0.00			0.00	0.00	11.05	73.01	98.97	115.99	169.53	538	975	975	CONC	0.10	64.0	708.68	0.95	1.12	0.76
To STREET 19, Pipe 4035 - 4036						2.57				3.54				0.00				0.00	12.17														
STREET 10																																	
					0.00	0.00	0.06	0.65	0.11	0.11			0.00	0.00			0.00	0.00															
			0.56	0.65	1.01	1.01			0.00	0.11			0.00	0.00			0.00	0.00															
	5000	5001			0.00	1.01	0.93	0.65	1.68	1.79			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	264	525	525	CONC	0.95	29.5	419.17	1.94	0.25	0.63
	5001	5002			0.00	1.01			0.00	1.79			0.00	0.00			0.00	0.00	10.25	75.84	102.87	120.58	176.27	261	525	525	CONC	1.80	12.0	576.99	2.67	0.08	0.45
					0.00	1.01	0.10	0.65	0.18	1.97			0.00	0.00			0.00	0.00															
	5002	5004	0.40	0.65	0.72	1.73			0.00	1.97			0.00	0.00			0.00	0.00	10.33	75.56	102.49	120.13	175.61	333	600	600	CONC	0.75	68.5	531.75	1.88	0.61	0.63
Contribution From EASM 1020, Pipe 5003 - 5004						0.00				5.78				0.00				0.00	10.31														
					0.00	1.73	0.06	0.65	0.11	7.86			0.00	0.00			0.00	0.00															
	5004	5005	0.28	0.65	0.51	2.24			0.00	7.86			0.00	0.00			0.00	0.00	10.94	73.39	99.50	116.61	170.43	947	825	825	CONC	0.55	39.5	1064.55	1.99	0.33	0.89
					0.00	2.24	0.08	0.65	0.14	8.01			0.00	0.00			0.00	0.00															
	5005	5006	0.34	0.65	0.61	2.86			0.00	8.01			0.00	0.00			0.00	0.00	11.27	72.26	97.95	114.79	167.75	990	825	825	CONC	0.60	22.0	1111.88	2.08	0.18	0.89
	5006	5008			0.00	2.86			0.00	8.01			0.00	0.00			0.00	0.00	11.44	71.68	97.14	113.84	166.36	982	825	825	CONC	0.60	11.0	1111.88	2.08	0.09	0.88
To Street 16, Pipe 5008 - 5009						2.86				8.01				0.00				0.00	11.53														
STREET 16																																	
Contribution From STREET 1, Pipe 4019 - 4020						17.62				28.93				0.00				0.00	20.18														
					0.00	17.62	0.04	0.65	0.07	29.00			0.00	0.00			0.00	0.00															
	4020	4021	0.36	0.65	0.65	18.27			0.00	29.00			0.00	0.00			0.00	0.00	20.18	51.75	69.86	81.76	119.28	2972	1650	1650	CONC	0.20	53.0	4076.11	1.91	0.46	0.73
					0.00	18.27	0.37	0.65	0.67	29.67			0.00	0.00			0.00	0.00															
	4021	4022	1.26	0.65	2.28	20.55			0.00	29.67			0.00	0.00			0.00	0.00	20.64	51.02	68.88	80.59	117.58	3092	1650	1650	CONC	0.25	53.5	4557.22	2.13	0.42	0.68
	4022	4026			0.00	20.55			0.00	29.67			0.00	0.00			0.00	0.00	21.06	50.39	68.01	79.58	116.09	3053	1650	1650	CONC	0.20	29.5	4076.11	1.91	0.26	0.75
Contribution From STREET 3, Pipe 4027 - 4026						1.19				0.38				0.00				0.00	11.28														
					0.00	21.74	0.05	0.65	0.09	30.14			0.00	0.00			0.00	0.00															
	4026	4025	0.25	0.65	0.45	22.19			0.00	30.14			0.00	0.00			0.00	0.00	21.32	50.00	67.49	78.96	115.19	3144	1650	1650	CONC	0.25	31.0	4557.22	2.13	0.24	0.69
					0.00	22.19	0.06	0.65	0.11	30.25			0.00	0.00			0.00	0.00															
	4025	4024	0.33	0.65	0.60	22.79			0.00	30.25			0.00	0.00			0.00	0.00	21.56	49.65	67.00	78.40	114.36	3158	1650	1650	CONC	0.25	37.5	4557.22	2.13	0.29	0.69
					0.00	22.79	0.06	0.65	0.11	30.36			0.00	0.00			0.00	0.00															
	4024	4035	0.48	0.65	0.87	23.65			0.00	30.36			0.00	0.00			0.00	0.00	21.85	49.23	66.43	77.72	113.37	3181	1650	1650	PVC	0.36	77.5	5468.67	2.56	0.51	0.58
To STREET 19, Pipe 4035 - 4036						23.65				30.36				0.00				0.00	22.36														

Definitions:
Q = 2.78 AIR, where
Q = Peak Flow in Litres per second (L/s)
A = Areas in hectares (ha)
I = Rainfall Intensity (mm/h)
R = Runoff Coefficient

Notes:
1) Ottawa Rainfall-Intensity Curve
2) Min. Velocity = 0.80 m/s

Designed: GGG	PROJECT: 7000 Campeau Drive			
Checked: SLM	LOCATION: City of Ottawa			
Dwg. Reference: 03D	File Ref: 18-1061	Date: 15 Jun 2021	Sheet No. SHEET 2 OF 10	

STORM SEWER CALCULATION SHEET (RATIONAL METHOD)

Local Roads Return Frequency = 2 years
Collector Roads Return Frequency = 5 years
Manning 0.013 — Arterial Roads Return Frequency = 10 years

Ottawa

Location	From Node	To Node	2 YEAR AREA (Ha)	2 YEAR R	2 YEAR Indiv. 2.78 AC	2 YEAR Accum. 2.78 AC	5 YEAR AREA (Ha)	5 YEAR R	5 YEAR Indiv. 2.78 AC	5 YEAR Accum. 2.78 AC	10 YEAR AREA (Ha)	10 YEAR R	10 YEAR Indiv. 2.78 AC	10 YEAR Accum. 2.78 AC	100 YEAR AREA (Ha)	100 YEAR R	100 YEAR Indiv. 2.78 AC	100 YEAR Accum. 2.78 AC	Time of Conc. (min)	Intensity 2 Year (mm/h)	Intensity 5 Year (mm/h)	Intensity 10 Year (mm/h)	Intensity 100 Year (mm/h)	Peak Flow Q (l/s)	DIA. (mm) (actual)	DIA. (mm) (nominal)	TYPE	SLOPE (%)	LENGTH (m)	CAPACITY (l/s)	VELOCITY (m/s)	TIME OF FLOW (min)	RATIO Q/Q full
STREET 19																																	
Contribution From STREET 10, Pipe 4024 - 4035						23.65				30.36				0.00				0.00	22.36														
Contribution From STREET 10, Pipe 4034 - 4035						2.57				3.54				0.00				0.00	12.17														
					0.00	26.22	0.07	0.65	0.13	34.03			0.00	0.00			0.00	0.00															
	4035	4036	0.29	0.65	0.52	26.74			0.00	34.03			0.00	0.00			0.00	0.00	22.36	48.52	65.47	76.59	111.71	3525	1650	1650	CONC	0.30	60.0	4992.19	2.33	0.43	0.71
Contribution From STREET 3, Pipe 4030 - 4036						2.82				0.83				0.00				0.00	10.90														
					0.00	29.56	0.07	0.65	0.13	34.98			0.00	0.00			0.00	0.00															
	4036	4037	0.23	0.65	0.42	29.98			0.00	34.98			0.00	0.00			0.00	0.00	22.79	47.94	64.67	75.66	110.35	3700	1650	1650	CONC	0.30	50.0	4992.19	2.33	0.36	0.74
					0.00	29.98	0.04	0.65	0.07	35.06			0.00	0.00			0.00	0.00															
	4037	4038	0.40	0.65	0.72	30.70			0.00	35.06			0.00	0.00			0.00	0.00	23.14	47.47	64.03	74.90	109.24	3702	1650	1650	CONC	0.30	42.5	4992.19	2.33	0.30	0.74
					0.00	30.70	0.10	0.65	0.18	35.24			0.00	0.00			0.00	0.00															
					0.00	30.70	0.12	0.65	0.22	35.45			0.00	0.00			0.00	0.00															
	4038	4039	0.48	0.65	0.87	31.57			0.00	35.45			0.00	0.00			0.00	0.00	23.45	47.07	63.49	74.27	108.32	3737	1650	1650	CONC	0.30	44.0	4992.19	2.33	0.31	0.75
					0.00	31.57	0.08	0.65	0.14	35.60			0.00	0.00			0.00	0.00															
					0.00	31.57	0.09	0.65	0.16	35.76			0.00	0.00			0.00	0.00															
	4039	4040	0.39	0.65	0.70	32.27			0.00	35.76			0.00	0.00			0.00	0.00	23.76	46.67	62.95	73.63	107.38	3757	1650	1650	CONC	0.30	45.5	4992.19	2.33	0.32	0.75
					0.00	32.27	0.17	0.65	0.31	36.07			0.00	0.00			0.00	0.00															
					0.00	32.27	0.18	0.65	0.33	36.39			0.00	0.00			0.00	0.00															
	4040	4041	0.77	0.65	1.39	33.66			0.00	36.39			0.00	0.00			0.00	0.00	24.09	46.27	62.40	72.98	106.43	3828	1650	1650	CONC	0.30	90.5	4992.19	2.33	0.65	0.77
To EASM 1024, Pipe 4041 - 4042						33.66				36.39				0.00				0.00	24.73														
EASM 1024																																	
Contribution From STREET 19, Pipe 4040 - 4041						33.66				36.39				0.00				0.00	24.73														
					0.00	33.66	0.20	0.65	0.36	36.75			0.00	0.00			0.00	0.00															
					0.00	33.66	0.40	0.65	0.72	37.48			0.00	0.00			0.00	0.00															
	4041	4042	0.70	0.65	1.26	34.93			0.00	37.48			0.00	0.00			0.00	0.00	24.73	45.48	61.33	71.73	104.59	3887	1650	1650	CONC	0.45	90.5	6114.16	2.86	0.53	0.64
	4042	4043			0.00	34.93			0.00	37.48			0.00	0.00			0.00	0.00	25.26	44.87	60.49	70.74	103.14	3834	1950	1950	CONC	0.10	78.0	4499.86	1.51	0.86	0.85
SWM Pond 4 Outlet																																	
					0.00	0.00	0.72	0.65	1.30	1.30			0.00	0.00			0.00	0.00															
	5023	5024	0.86	0.65	1.55	1.55			0.00	1.30			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	255	525	525	CONC	0.55	19.0	318.94	1.47	0.21	0.80
To Street 16, Pipe 5024 - 5025						1.55				1.30				0.00				0.00	10.21														
Street 16																																	
	5019	5020	0.16	0.65	0.29	0.29			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	22	300	300	PVC	0.35	19.0	57.21	0.81	0.39	0.39
					0.00	0.29	0.31	0.65	0.56	0.56			0.00	0.00			0.00	0.00															
	5020	5022	0.60	0.65	1.08	1.37			0.00	0.56			0.00	0.00			0.00	0.00	10.39	75.33	102.17	119.76	175.06	161	600	600	CONC	0.15	116.0	237.81	0.84	2.30	0.68
To SWM POND 4 - 1021, Pipe 5022 - 5021						1.37				0.56				0.00				0.00	12.69														
Contribution From SWM Pond 4 Outlet, Pipe 5023 - 5024						1.55				1.30				0.00				0.00	10.21														
	5024	5025			0.00	1.55			0.00	1.30			0.00	0.00			0.00	0.00	10.21	75.99	103.07	120.82	176.62	252	600	600	CONC	0.50	56.0	434.17	1.54	0.61	0.58
To WESLOCK WAY, Pipe 5025 - 228						1.55				1.30				0.00				0.00	10.82														
Contribution From STREET 10, Pipe 5006 - 5008						2.86				8.01				0.00				0.00	11.53														
Contribution From STREET 10, Pipe 5007 - 5008						0.69				1.21				0.00				0.00	10.28														
	5008	5009	0.08	0.65	0.14	3.69			0.00	9.22			0.00	0.00			0.00	0.00	11.53	71.39	96.75	113.37	165.68	1155	900	900	CONC	0.65	47.0	1459.52	2.29	0.34	0.79
					0.00	3.69	0.08	0.65	0.14	9.36			0.00	0.00			0.00	0.00															
	5009	5016	0.29	0.65	0.52	4.21			0.00	9.36			0.00	0.00			0.00	0.00	11.87	70.29	95.24	111.60	163.08	1187	975	975	CONC	0.55	45.5	1662.01	2.23	0.34	0.71
Contribution From Street 4, Pipe 5015 - 5016						2.06				0.36				0.00				0.00	11.94														
					0.00	6.27	0.10	0.65	0.18	9.90			0.00	0.00			0.00	0.00															
					0.00	6.27	0.16	0.65	0.29	10.19			0.00	0.00			0.00	0.00															
	5016	5017	0.70	0.65	1.26	7.54			0.00	10.19			0.00	0.00			0.00	0.00	12.21	69.24	93.80	109.90	160.58	1478	975	975	CONC	0.95	83.0	2184.31	2.93	0.47	0.68
					0.00	7.54	0.09	0.65	0.16	10.35			0.00	0.00			0.00	0.00															
					0.00	7.54	0.10	0.65	0.18	10.53			0.00	0.00			0.00	0.00															
	5017	5022	0.49	0.65	0.89	8.42			0.00	10.53			0.00	0.00			0.00	0.00	12.69	67.83	91.86	107.63	157.24	1539	975	975	CONC	0.95	56.5	2184.31	2.93	0.32	0.70
To Unknown Road3 - 1021, Pipe 5021 - 5022						8.42				10.53				0.00				0.00	13.01														

Definitions:
Q = 2.78 AIR, where
Q = Peak Flow in Litres per second (L/s)
A = Areas in hectares (ha)
I = Rainfall Intensity (mm/h)
R = Runoff Coefficient

Notes:
1) Ottawa Rainfall-Intensity Curve
2) Min. Velocity = 0.80 m/s

Designed: GGG	PROJECT: 7000 Campeau Drive	
Checked: SLM	LOCATION: City of Ottawa	
Dwg. Reference: 03D	File Ref: 18-1061	Date: 15 Jun 2021 — Sheet No. SHEET 3 OF 10

STORM SEWER CALCULATION SHEET (RATIONAL METHOD)

Local Roads Return Frequency = 2 years
Collector Roads Return Frequency = 5 years
Manning 0.013 Arterial Roads Return Frequency = 10 years

	LOCATION		AREA (Ha) 2 YEAR				5 YEAR				10 YEAR				100 YEAR				FLOW						SEWER DATA								
Location	From Node	To Node	AREA (Ha)	R	Indiv. 2.78 AC	Accum. 2.78 AC	AREA (Ha)	R	Indiv. 2.78 AC	Accum. 2.78 AC	AREA (Ha)	R	Indiv. 2.78 AC	Accum. 2.78 AC	AREA (Ha)	R	Indiv. 2.78 AC	Accum. 2.78 AC	Time of Conc. (min)	Intensity 2 Year (mm/h)	Intensity 5 Year (mm/h)	Intensity 10 Year (mm/h)	Intensity 100 Year (mm/h)	Peak Flow Q (l/s)	DIA. (mm) (actual)	DIA. (mm) (nominal)	TYPE	SLOPE (%)	LENGTH (m)	CAPACITY (l/s)	VELOCITY (m/s)	TIME OF FLOW (min)	RATIO Q/Q full
SWM Pond 3 Outlet																																	
	4044	4054			0.00	0.00			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	0	825	825	CONC	0.30	69.5	786.22	1.47	0.79	0.00
To WESLOCK WAY, Pipe 4054 - 5025						0.00				0.00				0.00				0.00	10.79														
EASM 649																																	
Contribution From STREET 17, Pipe 6012 - 6014						11.29				1.49				0.00				0.00	20.68														
Contribution From STREET 17, Pipe 6013 - 6014						0.61				0.00				0.00				0.00	12.17														
	6014	6015			0.00	11.91			0.00	1.49			0.00	0.00			0.00	0.00	20.68	50.96	68.79	80.49	117.43	709	1050	1050	CONC	0.10	92.0	863.53	1.00	1.54	0.82
	6015	6017			0.00	11.91			0.00	1.49			0.00	0.00			0.00	0.00	22.22	48.71	65.73	76.90	112.16	678	1050	1050	CONC	0.10	49.5	863.53	1.00	0.83	0.78
To WESLOCK WAY, Pipe 6017 - 212						11.91				1.49				0.00				0.00	23.05														
EASM 8																																	
					0.00	0.00	0.15	0.65	0.27	0.27			0.00	0.00			0.00	0.00															
	2023	2024	1.27	0.65	2.29	2.29			0.00	0.27			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	205	600	600	CONC	0.20	78.0	274.59	0.97	1.34	0.74
	2024	6019			0.00	2.29			0.00	0.27			0.00	0.00			0.00	0.00	11.34	72.02	97.62	114.40	167.18	192	600	600	CONC	0.20	42.0	274.59	0.97	0.72	0.70
To KNUDSON DRIVE, Pipe 6019 - 154						2.29				0.27				0.00				0.00	12.06														
STREET 17																																	
	6013	6014	0.34	0.65	0.61	0.61			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	47	825	825	CONC	0.10	110.5	453.92	0.85	2.17	0.10
To EASM 649, Pipe 6014 - 6015						0.61				0.00				0.00				0.00	12.17														
					0.00	0.00	0.00	0.00	0.00	0.00			0.00	0.00			0.00	0.00						1179									
	1050	1051			0.00	0.00	1.07	0.25	0.74	0.74			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	1256	1200	1200	CONC	0.15	49.5	1509.97	1.34	0.62	0.83
	1051	1052			0.00	0.00			0.00	0.74			0.00	0.00			0.00	0.00	10.62	74.51	101.04	118.43	173.10	1254	1200	1200	CONC	0.15	104.5	1509.97	1.34	1.30	0.83
	1052	1053			0.00	0.00			0.00	0.74			0.00	0.00			0.00	0.00	11.92	70.14	95.03	111.35	162.71	1250	1200	1200	CONC	0.15	66.5	1509.97	1.34	0.83	0.83
	1053	1054			0.00	0.00			0.00	0.74			0.00	0.00			0.00	0.00	12.75	67.64	91.60	107.31	156.78	1247	1200	1200	CONC	0.15	66.5	1509.97	1.34	0.83	0.83
To EASM 732, Pipe 1054 - 1055						0.00				0.74				0.00				0.00	13.58					1179									
					0.00	0.00	0.16	0.25	0.11	0.11			0.00	0.00			0.00	0.00															
	6000	6001	0.43	0.65	0.78	0.78			0.00	0.11			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	71	375	375	PVC	0.30	33.0	96.03	0.87	0.63	0.74
	6001	6002			0.00	0.78			0.00	0.11			0.00	0.00			0.00	0.00	10.63	74.46	100.97	118.34	172.98	69	375	375	PVC	0.30	10.5	96.03	0.87	0.20	0.72
					0.00	0.78	0.22	0.25	0.15	0.26			0.00	0.00			0.00	0.00															
	6002	6003	0.76	0.65	1.37	2.15			0.00	0.26			0.00	0.00			0.00	0.00	10.83	73.75	99.99	117.19	171.28	185	600	600	CONC	0.20	104.5	274.59	0.97	1.79	0.67
					0.00	2.15	0.27	0.25	0.19	0.45			0.00	0.00			0.00	0.00															
	6003	6004	0.66	0.65	1.19	3.34			0.00	0.45			0.00	0.00			0.00	0.00	12.63	68.00	92.10	107.90	157.65	269	600	600	CONC	0.30	84.5	336.31	1.19	1.18	0.80
					0.00	3.34	0.25	0.25	0.17	0.63			0.00	0.00			0.00	0.00															
	6004	6005	0.62	0.65	1.12	4.46			0.00	0.63			0.00	0.00			0.00	0.00	13.81	64.72	87.61	102.61	149.88	344	750	750	CONC	0.20	84.5	497.87	1.13	1.25	0.69
					0.00	4.46	0.14	0.25	0.10	0.72			0.00	0.00			0.00	0.00															
	6005	6006	0.40	0.65	0.72	5.19			0.00	0.72			0.00	0.00			0.00	0.00	15.06	61.62	83.36	97.62	142.56	380	750	750	CONC	0.20	61.0	497.87	1.13	0.90	0.76
					0.00	5.19	0.20	0.25	0.14	0.86			0.00	0.00			0.00	0.00															
	6006	6007	0.56	0.65	1.01	6.20			0.00	0.86			0.00	0.00			0.00	0.00	15.96	59.58	80.57	94.34	137.74	439	750	750	CONC	0.25	69.5	556.64	1.26	0.92	0.79
					0.00	6.20	0.27	0.25	0.19	1.05			0.00	0.00			0.00	0.00															
	6007	6008	0.73	0.65	1.32	7.52			0.00	1.05			0.00	0.00			0.00	0.00	16.88	57.65	77.93	91.24	133.19	515	825	825	CONC	0.20	78.0	641.95	1.20	1.08	0.80
					0.00	7.52	0.21	0.25	0.15	1.20			0.00	0.00			0.00	0.00															
	6008	6009	0.65	0.65	1.17	8.69			0.00	1.20			0.00	0.00			0.00	0.00	17.96	55.55	75.06	87.86	128.24	573	825	825	CONC	0.25	70.5	717.72	1.34	0.88	0.80
					0.00	8.69	0.20	0.25	0.14	1.33			0.00	0.00			0.00	0.00															
	6009	6010	0.64	0.65	1.16	9.85			0.00	1.33			0.00	0.00			0.00	0.00	18.84	53.98	72.90	85.33	124.52	629	825	825	CONC	0.30	70.5	786.22	1.47	0.80	0.80
					0.00	9.85	0.08	0.25	0.06	1.39			0.00	0.00			0.00	0.00															
	6010	6011	0.36	0.65	0.65	10.50			0.00	1.39			0.00	0.00			0.00	0.00	19.64	52.62	71.05	83.15	121.33	651	825	825	CONC	0.35	15.5	849.22	1.59	0.16	0.77
	6011	6012			0.00	10.50			0.00	1.39			0.00	0.00			0.00	0.00	19.80	52.35	70.69	82.73	120.71	648	975	975	CONC	0.15	44.5	867.96	1.16	0.64	0.75
					0.00	10.50	0.14	0.25	0.10	1.49			0.00	0.00			0.00	0.00															
	6012	6014	0.44	0.65	0.80	11.29			0.00	1.49			0.00	0.00			0.00	0.00	20.44	51.33	69.30	81.09	118.31	683	1050	1050	CONC	0.10	14.5	863.53	1.00	0.24	0.79
To EASM 649, Pipe 6014 - 6015						11.29				1.49				0.00				0.00	20.68														
EASM 732																																	
Contribution From STREET 17, Pipe 1053 - 1054						0.00				0.74				0.00				0.00	13.58					1179									
	1054	1055			0.00	0.00			0.00	0.74			0.00	0.00			0.00	0.00	13.58	65.33	88.43	103.59	151.31	1245	1200	1200	CONC	0.15	41.5	1509.97	1.34	0.52	0.82

Definitions:
Q = 2.78 AIR, where
Q = Peak Flow in Litres per second (L/s)
A = Areas in hectares (ha)
I = Rainfall Intensity (mm/h)
R = Runoff Coefficient

Notes:
1) Ottawa Rainfall-Intensity Curve
2) Min. Velocity = 0.80 m/s

Designed: GGG	PROJECT: 7000 Campeau Drive		
Checked: SLM	LOCATION: City of Ottawa		
Dwg. Reference: 03D	File Ref: 18-1061	Date: 15 Jun 2021	Sheet No. SHEET 4 OF 10

STORM SEWER CALCULATION SHEET (RATIONAL METHOD)

Local Roads Return Frequency = 2 years
Collector Roads Return Frequency = 5 years
Manning 0.013 Arterial Roads Return Frequency = 10 years

Ottawa

LOCATION			AREA (Ha) 2 YEAR				5 YEAR				10 YEAR				100 YEAR				FLOW Time of Conc.	Intensity 2 Year	Intensity 5 Year	Intensity 10 Year	Intensity 100 Year	Peak Flow	SEWER DATA DIA. (mm)	DIA. (mm)	TYPE	SLOPE	LENGTH	CAPACITY	VELOCITY	TIME OF	RATIO
Location	From Node	To Node	AREA (Ha)	R	Indiv. 2.78 AC	Accum. 2.78 AC	AREA (Ha)	R	Indiv. 2.78 AC	Accum. 2.78 AC	AREA (Ha)	R	Indiv. 2.78 AC	Accum. 2.78 AC	AREA (Ha)	R	Indiv. 2.78 AC	Accum. 2.78 AC	(min)	(mm/h)	(mm/h)	(mm/h)	(mm/h)	Q (l/s)	(actual)	(nominal)		(%)	(m)	(l/s)	(m/s)	LOW (min	Q/Q full
	1055	1069			0.00	0.00			0.00	0.74			0.00	0.00			0.00	0.00	14.10	63.97	86.58	101.41	148.11	1243	1200	1200	CONC	0.15	56.5	1509.97	1.34	0.71	0.82
To KNUDSON DRIVE, Pipe 1069 - 146						0.00				0.74				0.00				0.00	14.81					1179									
KNUDSON DRIVE																																	
					0.00	0.00	8.99	0.65	16.24	16.24			0.00	0.00			0.00	0.00	20.00														
					0.00	0.00	1.43	0.65	2.58	18.83			0.00	0.00			0.00	0.00	17.00														
					0.00	0.00	0.82	0.65	1.48	20.31			0.00	0.00			0.00	0.00	15.00														
					0.00	0.00	4.76	0.65	8.60	28.91			0.00	0.00			0.00	0.00	13.00														
	209	210			0.00	0.00			0.00	28.91			0.00	0.00			0.00	0.00	20.00	52.03	70.25	82.21	119.95	2031	1200	1200	CONC	0.15	38.0	1509.97	1.34	0.47	1.35
To WESLOCK WAY, Pipe 210 - 6017						0.00				28.91				0.00				0.00	20.47														
					0.00	0.00	6.71	0.70	13.06	13.06			0.00	0.00			0.00	0.00	14.00														
	112	113			0.00	0.00			0.00	13.06			0.00	0.00			0.00	0.00	14.00	64.23	86.93	101.82	148.72	1135	750	750	CONC	0.35	62.8	658.62	1.49	0.70	1.72
	113	114			0.00	0.00			0.00	13.06			0.00	0.00			0.00	0.00	14.70	62.48	84.53	99.00	144.58	1104	750	750	CONC	0.39	64.9	690.77	1.56	0.69	1.60
	114	115			0.00	0.00			0.00	13.06			0.00	0.00			0.00	0.00	15.39	60.85	82.31	96.38	140.74	1075	750	750	CONC	0.35	103.7	655.79	1.48	1.16	1.64
					0.00	0.00	1.26	0.65	2.28	15.33			0.00	0.00			0.00	0.00	10.00														
	115	116			0.00	0.00			0.00	15.33			0.00	0.00			0.00	0.00	16.56	58.32	78.84	92.31	134.76	1209	750	750	CONC	0.60	112.5	859.46	1.95	0.96	1.41
	116	132			0.00	0.00			0.00	15.33			0.00	0.00			0.00	0.00	17.52	56.39	76.21	89.21	130.22	1169	750	750	CONC	0.68	110.8	916.00	2.07	0.89	1.28
					0.00	0.00	5.41	0.65	9.78	25.11			0.00	0.00			0.00	0.00	15.00														
	132	133			0.00	0.00			0.00	25.11			0.00	0.00			0.00	0.00	18.41	54.73	73.94	86.55	126.31	1857	1050	1050	CONC	0.58	45.2	2070.67	2.39	0.32	0.90
					0.00	0.00	3.25	0.25	2.26	27.37			0.00	0.00			0.00	0.00	25.00														
	133	138			0.00	0.00			0.00	27.37			0.00	0.00			0.00	0.00	25.00	45.17	60.90	71.22	103.85	1667	1050	1050	CONC	0.73	61.8	2329.93	2.69	0.38	0.72
					0.00	0.00	1.21	0.65	2.19	29.56			0.00	0.00			0.00	0.00	12.00														
	138	139			0.00	0.00			0.00	29.56			0.00	0.00			0.00	0.00	25.38	44.72	60.29	70.51	102.81	1782	1050	1050	CONC	0.61	78.8	2131.02	2.46	0.53	0.84
	139	140			0.00	0.00			0.00	29.56			0.00	0.00			0.00	0.00	25.92	44.12	59.47	69.55	101.40	1758	1050	1050	CONC	0.57	51.1	2058.03	2.38	0.36	0.85
					0.00	0.00	3.33	0.65	6.02	35.57			0.00	0.00			0.00	0.00	12.00														
	140	144			0.00	0.00			0.00	35.57			0.00	0.00			0.00	0.00	26.28	43.73	58.93	68.92	100.47	2096	1050	1050	CONC	0.65	72.6	2196.49	2.54	0.48	0.95
	144	145			0.00	0.00			0.00	35.57			0.00	0.00			0.00	0.00	26.75	43.21	58.23	68.10	99.27	2072	1050	1050	CONC	0.43	34.9	1790.66	2.07	0.28	1.16
	145	1069			0.00	0.00			0.00	35.57			0.00	0.00			0.00	0.00	27.03	42.91	57.83	67.63	98.58	2057	2100	2100	CONC	0.17	42.5	7043.14	2.03	0.35	0.29
Contribution From EASM 732, Pipe 1055 - 1069						0.00				0.74				0.00				0.00	14.81					1179									
	1069	146			0.00	0.00			0.00	36.32			0.00	0.00			0.00	0.00	27.38	42.55	57.34	67.05	97.73	3261	2100	2100	CONC	0.14	21.2	6417.78	1.85	0.19	0.51
					0.00	0.00	1.49	0.65	2.69	39.01			0.00	0.00			0.00	0.00	20.00														
	146	148			0.00	0.00			0.00	39.01			0.00	0.00			0.00	0.00	27.57	42.36	57.08	66.74	97.28	3405	2100	2100	CONC	0.16	29.2	6957.25	2.01	0.24	0.49
	148	6019			0.00	0.00			0.00	39.01			0.00	0.00			0.00	0.00	27.81	42.11	56.74	66.35	96.71	3392	2100	2100	CONC	0.15	5.2	6804.32	1.96	0.04	0.50
Contribution From EASM 8, Pipe 2024 - 6019						2.29				0.27				0.00				0.00	12.06														
	6019	154			0.00	2.29			0.00	39.28			0.00	0.00			0.00	0.00	27.86	42.07	56.68	66.28	96.60	3502	2100	2100	CONC	0.16	52.1	7000.33	2.02	0.43	0.50
					0.00	2.29	1.13	0.65	2.04	41.32			0.00	0.00			0.00	0.00	12.00														
	154	155			0.00	2.29			0.00	41.32			0.00	0.00			0.00	0.00	28.29	41.65	56.11	65.60	95.61	3593	2100	2100	CONC	0.17	53.7	7149.06	2.06	0.43	0.50
	155	156			0.00	2.29			0.00	41.32			0.00	0.00			0.00	0.00	28.72	41.23	55.54	64.93	94.63	3568	2100	2100	CONC	0.18	96.7	7437.61	2.15	0.75	0.48
					0.00	2.29	3.94	0.65	7.12	48.44			0.00	0.00			0.00	0.00	11.00														
	156	158			0.00	2.29			0.00	48.44			0.00	0.00			0.00	0.00	29.47	40.52	54.58	63.81	92.99	3916	2100	2100	CONC	0.18	101.5	7335.86	2.12	0.80	0.53
	158	159			0.00	2.29			0.00	48.44			0.00	0.00			0.00	0.00	30.27	39.80	53.60	62.66	91.31	3867	2100	2100	CONC	0.21	45.6	8002.29	2.31	0.33	0.48
	159	210			0.00	2.29			0.00	48.44			0.00	0.00			0.00	0.00	30.60	39.51	53.21	62.20	90.63	3847	2100	2100	CONC	0.18	46.1	7397.08	2.14	0.36	0.52
To WESLOCK WAY, Pipe 210 - 6017						2.29				48.44				0.00				0.00	30.96					1179									
WESLOCK WAY																																	
Contribution From KNUDSON DRIVE, Pipe 159 - 210						2.29				48.44				0.00				0.00	30.96					1179									
Contribution From KNUDSON DRIVE, Pipe 209 - 210						0.00				28.91				0.00				0.00	20.47														
	210	6017			0.00	2.29			0.00	77.35			0.00	0.00			0.00	0.00	30.96	39.20	52.79	61.71	89.91	5352	2250	2250	CONC	0.17	55.1	8643.52	2.17	0.42	0.62
Contribution From EASM 649, Pipe 6015 - 6017						11.91				1.49				0.00				0.00	23.05														
	6017	212			0.00	14.20			0.00	78.84			0.00	0.00			0.00	0.00	31.38	38.85	52.30	61.14	89.08	5854	2250	2250	CONC	0.16	39.2	8362.57	2.10	0.31	0.70
	212	213			0.00	14.20			0.00	78.84			0.00	0.00			0.00	0.00	31.69	38.59	51.95	60.73	88.47	5823	2250	2250	CONC	0.16	44.9	8336.55	2.10	0.36	0.70
					0.00	14.20	1.75	0.65	3.16	82.00			0.00	0.00			0.00	0.00	15.00														
	213	220			0.00	14.20			0.00	82.00			0.00	0.00			0.00	0.00	32.05	38.30	51.56	60.26	87.79	5951	2550	2550	CONC	0.36	125.0	17507.92	3.43	0.61	0.34
	220	221			0.00	14.20			0.00	82.00			0.00	0.00			0.00	0.00	32.66	37.81	50.90	59.49	86.66	5890	2550	2550	CONC	0.13	46.4	10451.42	2.05	0.38	0.56
	221	226			0.00	14.20			0.00	82.00			0.00	0.00			0.00	0.00	33.03	37.52	50.49	59.02	85.97	5853	2550	2550	CONC	0.15	42.2	11419.33	2.24	0.31	0.51
	226	4054			0.00	14.20			0.00	82.00			0.00	0.00			0.00	0.00	33.35	37.27	50.17	58.63	85.41	5822	2700	2700	CONC	0.10	70.4	10929.32	1.91	0.61	0.53

Definitions:
Q = 2.78 AIR, where
Q = Peak Flow in Litres per second (L/s)
A = Areas in hectares (ha)
I = Rainfall Intensity (mm/h)
R = Runoff Coefficient

Notes:
1) Ottawa Rainfall-Intensity Curve
2) Min. Velocity = 0.80 m/s

Designed: GGG	PROJECT: 7000 Campeau Drive		
Checked: SLM	LOCATION: City of Ottawa		
Dwg. Reference: 03D	File Ref: 18-1061	Date: 15 Jun 2021	Sheet No. SHEET 5 OF 10

STORM SEWER CALCULATION SHEET (RATIONAL METHOD)

Local Roads Return Frequency = 2 years
Collector Roads Return Frequency = 5 years
Manning 0.013 Arterial Roads Return Frequency = 10 years

Ottawa

LOCATION			AREA (Ha)																FLOW						SEWER DATA									
			2 YEAR				5 YEAR				10 YEAR				100 YEAR				Time of Conc.	Intensity 2 Year	Intensity 5 Year	Intensity 10 Year	Intensity 100 Year	Peak Flow	DIA. (mm)	DIA. (mm)	TYPE	SLOPE	LENGTH	CAPACITY	VELOCITY	TIME OF FLOW (min)	RATIO
Location	From Node	To Node	AREA (Ha)	R	Indiv. 2.78 AC	Accum. 2.78 AC	AREA (Ha)	R	Indiv. 2.78 AC	Accum. 2.78 AC	AREA (Ha)	R	Indiv. 2.78 AC	Accum. 2.78 AC	AREA (Ha)	R	Indiv. 2.78 AC	Accum. 2.78 AC	(min)	(mm/h)	(mm/h)	(mm/h)	(mm/h)	Q (l/s)	(actual)	(nominal)		(%)	(m)	(l/s)	(m/s)		Q/Q full
Contribution From SWM Pond 3 Outlet, Pipe 4044 - 4054						0.00				0.00				0.00				0.00	10.79														
	4054	5025			0.00	14.20			0.00	82.00			0.00	0.00			0.00	0.00	33.96	36.81	49.54	57.90	84.33	5764	2700	2700	CONC	0.07	8.1	9237.85	1.61	0.08	0.62
Contribution From Street 16, Pipe 5024 - 5025						1.55				1.30				0.00				0.00	10.82														
	5025	228			0.00	15.76			0.00	83.30			0.00	0.00			0.00	0.00	34.05	36.75	49.45	57.80	84.19	5878	2700	2700	CONC	0.07	59.5	9244.07	1.61	0.61	0.64
					0.00	15.76	9.43	0.65	17.04	100.34			0.00	0.00			0.00	0.00	14.00														
					0.00	15.76	1.47	0.65	2.66	103.00			0.00	0.00			0.00	0.00	10.00														
	228	242			0.00	15.76			0.00	103.00			0.00	0.00			0.00	0.00	34.66	36.30	48.85	57.09	83.14	6782	2700	2700	CONC	0.08	160.6	9465.07	1.65	1.62	0.72
	242	243			0.00	15.76			0.00	103.00			0.00	0.00			0.00	0.00	36.28	35.18	47.32	55.30	80.52	6607	2700	2700	CONC	0.21	55.1	15567.46	2.72	0.34	0.42
	243	244			0.00	15.76			0.00	103.00			0.00	0.00			0.00	0.00	36.62	34.95	47.01	54.94	80.00	6572	2700	2700	CONC	0.10	44.4	10770.53	1.88	0.39	0.61
					0.00	15.76	2.75	0.65	4.97	107.97			0.00	0.00			0.00	0.00	14.00														
					0.00	15.76	1.98	0.65	3.58	111.55			0.00	0.00			0.00	0.00	10.00														
	244	254			0.00	15.76			0.00	111.55			0.00	0.00			0.00	0.00	37.01	34.69	46.66	54.53	79.40	6931	2700	2700	CONC	0.12	132.6	11934.04	2.08	1.06	0.58
	254	255			0.00	15.76			0.00	111.55			0.00	0.00			0.00	0.00	38.07	34.02	45.75	53.46	77.83	6818	2700	2700	CONC	0.05	32.8	7728.20	1.35	0.41	0.88
	255	256			0.00	15.76			0.00	111.55			0.00	0.00			0.00	0.00	38.48	33.77	45.41	53.06	77.25	6777	2700	2700	CONC	0.13	20.2	12405.92	2.17	0.16	0.55
EASM 13																																	
	1042	1043			0.00	0.00	1.80	0.70	3.50	3.50			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	365	750	750	CONC	1.00	58.5	1113.28	2.52	0.39	0.33
To STREET 9, Pipe 1043 - 1044						0.00				3.50				0.00				0.00	10.39														
CAMPEAU DRIVE																																	
					0.00	0.00	21.34	0.65	38.56	38.56			0.00	0.00			0.00	0.00	20.00														
	1032	1033			0.00	0.00			0.00	38.56			0.00	0.00			0.00	0.00	20.00	52.03	70.25	82.21	119.95	2709	1650	1650	CONC	0.15	69.5	3530.01	1.65	0.70	0.77
To STREET 7, Pipe 1033 - 1034						0.00				38.56				0.00				0.00	20.70														
STREET 6																																	
Contribution From STREET 1, Pipe 1026 - 1029						2.87				0.00				0.00				0.00	11.52														
Contribution From STREET 1, Pipe 1028 - 1029						3.81				0.94				0.00				0.00	12.07														
	1029	1030	0.12	0.65	0.22	6.90			0.00	0.94			0.00	0.00			0.00	0.00	12.07	69.68	94.41	110.62	161.64	570	825	825	CONC	0.25	75.0	717.72	1.34	0.93	0.79
	1030	1031	0.12	0.65	0.22	7.12			0.00	0.94			0.00	0.00			0.00	0.00	13.00	66.93	90.63	106.18	155.12	562	825	825	CONC	0.25	29.5	717.72	1.34	0.37	0.78
	1031	1034	0.91	0.65	1.64	8.76			0.00	0.94			0.00	0.00			0.00	0.00	13.36	65.92	89.24	104.54	152.71	662	975	975	CONC	0.15	86.5	867.96	1.16	1.24	0.76
Contribution From STREET 7, Pipe 1033 - 1034						1.34				38.56				0.00				0.00	22.09														
	1034	1035	0.51	0.65	0.92	11.02			0.00	39.50			0.00	0.00			0.00	0.00	22.09	48.89	65.97	77.19	112.59	3145	1800	1800	CONC	0.15	63.0	4451.90	1.75	0.60	0.71
	1035	1036	0.53	0.65	0.96	11.98			0.00	39.50			0.00	0.00			0.00	0.00	22.69	48.07	64.85	75.87	110.65	3138	1800	1800	CONC	0.15	47.5	4451.90	1.75	0.45	0.70
	1036	1037	0.77	0.65	1.39	13.37			0.00	39.50			0.00	0.00			0.00	0.00	23.14	47.47	64.03	74.90	109.24	3164	1800	1800	CONC	0.15	47.0	4451.90	1.75	0.45	0.71
	1037	1038	0.13	0.65	0.23	13.61			0.00	39.50			0.00	0.00			0.00	0.00	23.59	46.89	63.24	73.98	107.88	3136	1800	1800	CONC	0.15	75.0	4451.90	1.75	0.71	0.70
To STREET 11, Pipe 1038 - 1039						13.61				39.50				0.00				0.00	24.31														
STREET 11																																	
					0.00	0.00	3.32	0.20	1.85	1.85			0.00	0.00			0.00	0.00	25.00														
					0.00	0.00	3.11	0.50	4.32	6.17			0.00	0.00			0.00	0.00	13.00														
					0.00	0.00	0.06	0.65	0.11	6.28			0.00	0.00			0.00	0.00															
	1024	1025	0.26	0.65	0.47	0.47			0.00	6.28			0.00	0.00			0.00	0.00	25.00	45.17	60.90	71.22	103.85	403	750	750	CONC	0.25	21.5	556.64	1.26	0.28	0.72
					0.00	0.47	0.09	0.65	0.16	6.44			0.00	0.00			0.00	0.00															
	1025	1038	0.47	0.65	0.85	1.32			0.00	6.44			0.00	0.00			0.00	0.00	25.28	44.84	60.45	70.70	103.07	448	825	825	CONC	0.20	67.0	641.95	1.20	0.93	0.70
Contribution From STREET 6, Pipe 1037 - 1038						13.61				39.50				0.00				0.00	24.31														
					0.00	14.93	0.09	0.65	0.16	46.10			0.00	0.00			0.00	0.00															
	1038	1039	0.82	0.65	1.48	16.41			0.00	46.10			0.00	0.00			0.00	0.00	26.21	43.79	59.02	69.03	100.63	3440	1800	1800	CONC	0.15	102.5	4451.90	1.75	0.98	0.77
To STREET 9, Pipe 1039 - 1040						16.41				46.10				0.00				0.00	27.19														
STREET 12																																	
	1019	1020	0.37	0.65	0.67	0.67			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	51	300	300	PVC	1.05	62.0	99.09	1.40	0.74	0.52
	1020	1021	0.28	0.65	0.51	1.17			0.00	0.00			0.00	0.00			0.00	0.00	10.74	74.09	100.45	117.74	172.09	87	375	375	PVC	1.00	62.0	175.33	1.59	0.65	0.50
To STREET 9, Pipe 1021 - 1022						1.17				0.00				0.00				0.00	11.39														
STREET 13																																	
	1016	1017	0.35	0.65	0.63	0.63			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	49	450	450	CONC	0.20	77.0	127.50	0.80	1.60	0.38

Definitions:
Q = 2.78 AIR, where
Q = Peak Flow in Litres per second (L/s)
A = Areas in hectares (ha)
I = Rainfall Intensity (mm/h)
R = Runoff Coefficient

Notes:
1) Ottawa Rainfall-Intensity Curve
2) Min. Velocity = 0.80 m/s

Designed: GGG	PROJECT:		7000 Campeau Drive	
Checked: SLM	LOCATION:		City of Ottawa	
Dwg. Reference: 03D	File Ref: 18-1061		Date: 15 Jun 2021	Sheet No. SHEET 6 OF 10

STORM SEWER CALCULATION SHEET (RATIONAL METHOD)

Manning 0.013

Local Roads Return Frequency = 2 years
Collector Roads Return Frequency = 5 years
Arterial Roads Return Frequency = 10 years

Location	From Node	To Node	2 YEAR AREA (Ha)	2 YEAR R	2 YEAR Indiv. 2.78 AC	2 YEAR Accum. 2.78 AC	5 YEAR AREA (Ha)	5 YEAR R	5 YEAR Indiv. 2.78 AC	5 YEAR Accum. 2.78 AC	10 YEAR AREA (Ha)	10 YEAR R	10 YEAR Indiv. 2.78 AC	10 YEAR Accum. 2.78 AC	100 YEAR AREA (Ha)	100 YEAR R	100 YEAR Indiv. 2.78 AC	100 YEAR Accum. 2.78 AC	Time of Conc. (min)	Intensity 2 Year (mm/h)	Intensity 5 Year (mm/h)	Intensity 10 Year (mm/h)	Intensity 100 Year (mm/h)	Peak Flow Q (l/s)	DIA. (mm) (actual)	DIA. (mm) (nominal)	TYPE	SLOPE (%)	LENGTH (m)	CAPACITY (l/s)	VELOCITY (m/s)	TIME OF FLOW (min)	RATIO Q/Q full
	1017	1018	0.30	0.65	0.54	1.17			0.00	0.00			0.00	0.00			0.00	0.00	11.60	71.16	96.44	113.01	165.14	84	450	450	CONC	0.20	77.0	127.50	0.80	1.60	0.66
To STREET 9, Pipe 1018 - 1021						1.17				0.00				0.00				0.00	13.20														
STREET 14																																	
	1013	1014	0.37	0.65	0.67	0.67			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	51	375	375	PVC	0.35	92.5	103.73	0.94	1.64	0.50
	1014	1015	0.49	0.65	0.89	1.55			0.00	0.00			0.00	0.00			0.00	0.00	11.64	71.03	96.25	112.79	164.83	110	450	450	CONC	0.30	92.5	156.16	0.98	1.57	0.71
To STREET 9, Pipe 1015 - 1018						1.55				0.00				0.00				0.00	13.21														
STREET 1																																	
					0.00	0.00	0.25	0.65	0.45	0.45			0.00	0.00			0.00	0.00															
	1000	1001	0.51	0.65	0.92	0.92			0.00	0.45			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	118	375	375	PVC	2.45	86.0	274.44	2.48	0.58	0.43
To STREET 15, Pipe 1001 - 1002						0.92				0.45				0.00				0.00	10.58														
	1026	1029	1.59	0.65	2.87	2.87			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	221	675	675	CONC	0.15	83.0	325.56	0.91	1.52	0.68
To STREET 6, Pipe 1029 - 1030						2.87				0.00				0.00				0.00	11.52														
					0.00	0.00	0.23	0.65	0.42	0.42			0.00	0.00			0.00	0.00															
	1027	1028	0.82	0.65	1.48	1.48			0.00	0.42			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	157	525	525	CONC	0.25	65.5	215.03	0.99	1.10	0.73
					0.00	1.48	0.29	0.65	0.52	0.94			0.00	0.00			0.00	0.00															
	1028	1029	1.29	0.65	2.33	3.81			0.00	0.94			0.00	0.00			0.00	0.00	11.10	72.83	98.73	115.70	169.10	370	750	750	CONC	0.20	65.5	497.87	1.13	0.97	0.74
To STREET 6, Pipe 1029 - 1030						3.81				0.94				0.00				0.00	12.07														
Contribution From STREET 2, Pipe 4000 - 4001						0.45				0.00				0.00				0.00	11.10														
					0.00	0.45	0.16	0.65	0.29	0.29			0.00	0.00			0.00	0.00															
	4001	4002	0.48	0.65	0.87	1.32			0.00	0.29			0.00	0.00			0.00	0.00	11.10	72.82	98.71	115.68	169.07	125	450	450	CONC	0.50	81.0	201.60	1.27	1.07	0.62
					0.00	1.32	0.29	0.65	0.52	0.81			0.00	0.00			0.00	0.00															
	4002	4003	0.44	0.65	0.80	2.11			0.00	0.81			0.00	0.00			0.00	0.00	12.17	69.38	93.99	110.12	160.91	223	525	525	CONC	0.45	25.0	288.49	1.33	0.31	0.77
	4003	4005			0.00	2.11			0.00	0.81			0.00	0.00			0.00	0.00	12.48	68.43	92.69	108.60	158.67	220	525	525	CONC	0.40	15.5	272.00	1.26	0.21	0.81
Contribution From EASM 16, Pipe 4004 - 4005						0.00				0.00				0.00				0.00	10.37														
					0.00	2.11	0.59	0.65	1.07	1.88			0.00	0.00			0.00	0.00															
	4005	4007	1.25	0.65	2.26	4.37			0.00	1.88			0.00	0.00			0.00	0.00	12.69	67.83	91.86	107.63	157.24	469	975	975	CONC	0.20	106.5	1002.23	1.34	1.32	0.47
Contribution From STREET 20, Pipe 4006 - 4007						0.20				0.00				0.00				0.00	11.32														
	4007	4008	0.16	0.65	0.29	4.86			0.00	1.88			0.00	0.00			0.00	0.00	14.01	64.21	86.90	101.79	148.67	475	975	975	CONC	0.20	43.0	1002.23	1.34	0.53	0.47
					0.00	4.86	0.20	0.65	0.36	2.24			0.00	0.00			0.00	0.00															
	4008	4010	0.70	0.65	1.26	6.13			0.00	2.24			0.00	0.00			0.00	0.00	14.54	62.87	85.07	99.63	145.50	576	1200	1200	CONC	0.10	86.0	1232.89	1.09	1.31	0.47
Contribution From EASM 1026, Pipe 4009 - 4010						0.00				23.73				0.00				0.00	10.92														
					0.00	6.13	0.25	0.65	0.45	26.42			0.00	0.00			0.00	0.00															
	4010	4019	0.91	0.65	1.64	7.77			0.00	26.42			0.00	0.00			0.00	0.00	15.86	59.82	80.89	94.71	138.29	2602	1650	1650	CONC	0.10	114.5	2882.24	1.35	1.42	0.90
Contribution From STREET 2, Pipe 4018 - 4019						8.76				2.24				0.00				0.00	19.35														
					0.00	16.53	0.15	0.65	0.27	28.93			0.00	0.00			0.00	0.00															
	4019	4020	0.60	0.65	1.08	17.62			0.00	28.93			0.00	0.00			0.00	0.00	19.35	53.09	71.70	83.91	122.45	3010	1650	1650	CONC	0.15	81.5	3530.01	1.65	0.82	0.85
To STREET 10, Pipe 4020 - 4021						17.62				28.93				0.00				0.00	20.18														
STREET 15																																	
	1004	1005	0.32	0.65	0.58	0.58			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	44	300	300	PVC	0.60	64.0	74.90	1.06	1.01	0.59
To STREET 5, Pipe 1005 - 1006						0.58				0.00				0.00				0.00	11.01														
Contribution From STREET 1, Pipe 1000 - 1001						0.92				0.45				0.00				0.00	10.58														
					0.00	0.92	0.02	0.65	0.04	0.49			0.00	0.00			0.00	0.00															
	1001	1002	0.34	0.65	0.61	1.54			0.00	0.49			0.00	0.00			0.00	0.00	10.58	74.66	101.24	118.67	173.45	164	525	525	CONC	0.25	67.5	215.03	0.99	1.13	0.76
	1002	1003			0.00	1.54			0.00	0.49			0.00	0.00			0.00	0.00	11.71	70.81	95.95	112.44	164.31	156	525	525	CONC	0.25	10.5	215.03	0.99	0.18	0.72
					0.00	1.54	0.07	0.65	0.13	0.61			0.00	0.00			0.00	0.00															
	1003	1005	0.42	0.65	0.76	2.29			0.00	0.61			0.00	0.00			0.00	0.00	11.89	70.25	95.19	111.54	162.98	220	525	525	CONC	0.55	59.0	318.94	1.47	0.67	0.69
To STREET 5, Pipe 1005 - 1006						2.29				0.61				0.00				0.00	12.55														

Definitions:
Q = 2.78 AIR, where
Q = Peak Flow in Litres per second (L/s)
A = Areas in hectares (ha)
I = Rainfall Intensity (mm/h)
R = Runoff Coefficient

Notes:
1) Ottawa Rainfall-Intensity Curve
2) Min. Velocity = 0.80 m/s

Designed: GGG	PROJECT: 7000 Campeau Drive		
Checked: SLM	LOCATION: City of Ottawa		
Dwg. Reference: 03D	File Ref: 18-1061	Date: 15 Jun 2021	Sheet No. SHEET 7 OF 10

STORM SEWER CALCULATION SHEET (RATIONAL METHOD)

Local Roads Return Frequency = 2 years
Collector Roads Return Frequency = 5 years
Manning 0.013 Arterial Roads Return Frequency = 10 years

Ottawa

LOCATION: Location	LOCATION: From Node	LOCATION: To Node	AREA (Ha) 2 YEAR: AREA (Ha)	2 YEAR: R	2 YEAR: Indiv. 2.78 AC	2 YEAR: Accum. 2.78 AC	5 YEAR: AREA (Ha)	5 YEAR: R	5 YEAR: Indiv. 2.78 AC	5 YEAR: Accum. 2.78 AC	10 YEAR: AREA (Ha)	10 YEAR: R	10 YEAR: Indiv. 2.78 AC	10 YEAR: Accum. 2.78 AC	100 YEAR: AREA (Ha)	100 YEAR: R	100 YEAR: Indiv. 2.78 AC	100 YEAR: Accum. 2.78 AC	FLOW: Time of Conc. (min)	Intensity 2 Year (mm/h)	Intensity 5 Year (mm/h)	Intensity 10 Year (mm/h)	Intensity 100 Year (mm/h)	Peak Flow Q (l/s)	SEWER DATA: DIA. (mm) (actual)	DIA. (mm) (nominal)	TYPE	SLOPE (%)	LENGTH (m)	CAPACITY (l/s)	VELOCITY (m/s)	TIME OF FLOW (min)	RATIO Q/Q full
STREET 5																																	
Contribution From STREET 15, Pipe 1003 - 1005						2.29				0.61				0.00				0.00	12.55														
Contribution From STREET 15, Pipe 1004 - 1005						0.58				0.00				0.00				0.00	11.01														
					0.00	2.87	0.03	0.65	0.05	0.67			0.00	0.00			0.00	0.00															
	1005	1006	0.38	0.65	0.69	3.56			0.00	0.67			0.00	0.00			0.00	0.00	12.55	68.22	92.40	108.25	158.16	305	675	675	CONC	0.25	62.5	420.29	1.17	0.89	0.72
					0.00	3.56	0.12	0.65	0.22	0.89			0.00	0.00			0.00	0.00															
	1006	1008	0.65	0.65	1.17	4.73			0.00	0.89			0.00	0.00			0.00	0.00	13.44	65.71	88.96	104.21	152.23	390	750	750	CONC	0.20	101.0	497.87	1.13	1.49	0.78
To STREET 7, Pipe 1008 - 1009						4.73				0.89				0.00				0.00	14.93														
STREET 9																																	
Contribution From STREET 7, Pipe 1009 - 1010						6.85				1.17				0.00				0.00	16.65														
	1010	1011	0.22	0.65	0.40	7.25			0.00	1.17			0.00	0.00			0.00	0.00	16.65	58.13	78.58	92.00	134.30	513	900	900	CONC	0.15	49.5	701.13	1.10	0.75	0.73
					0.00	7.25	0.05	0.65	0.09	1.26			0.00	0.00			0.00	0.00															
	1011	1012	0.13	0.65	0.23	7.48			0.00	1.26			0.00	0.00			0.00	0.00	17.40	56.63	76.53	89.59	130.77	520	900	900	CONC	0.15	10.5	701.13	1.10	0.16	0.74
	1012	1015			0.00	7.48			0.00	1.26			0.00	0.00			0.00	0.00	17.56	56.32	76.11	89.10	130.05	518	900	900	CONC	0.15	11.0	701.13	1.10	0.17	0.74
Contribution From STREET 14, Pipe 1014 - 1015						1.55				0.00				0.00				0.00	13.21														
					0.00	9.04	0.10	0.65	0.18	1.45			0.00	0.00			0.00	0.00															
	1015	1018	0.24	0.65	0.43	9.47			0.00	1.45			0.00	0.00			0.00	0.00	17.72	56.01	75.68	88.59	129.30	640	900	900	CONC	0.20	50.0	809.60	1.27	0.65	0.79
Contribution From STREET 13, Pipe 1017 - 1018						1.17				0.00				0.00				0.00	13.20														
					0.00	10.64	0.12	0.65	0.22	1.66			0.00	0.00			0.00	0.00															
	1018	1021	0.24	0.65	0.43	11.08			0.00	1.66			0.00	0.00			0.00	0.00	18.38	54.79	74.02	86.64	126.45	730	900	900	CONC	0.30	50.0	991.55	1.56	0.53	0.74
Contribution From STREET 12, Pipe 1020 - 1021						1.17				0.00				0.00				0.00	11.39														
					0.00	12.25	0.10	0.65	0.18	1.84			0.00	0.00			0.00	0.00															
	1021	1022	0.35	0.65	0.63	12.88			0.00	1.84			0.00	0.00			0.00	0.00	18.91	53.85	72.73	85.12	124.22	828	975	975	CONC	0.25	62.0	1120.53	1.50	0.69	0.74
	1022	1039			0.00	12.88			0.00	1.84			0.00	0.00			0.00	0.00	19.60	52.68	71.14	83.25	121.48	810	975	975	CONC	0.25	17.5	1120.53	1.50	0.19	0.72
Contribution From STREET 11, Pipe 1038 - 1039						16.41				46.10				0.00				0.00	27.19														
					0.00	29.29	0.08	0.65	0.14	48.09			0.00	0.00			0.00	0.00															
					0.00	29.29	0.41	0.65	0.74	48.83			0.00	0.00			0.00	0.00															
	1039	1040	1.18	0.65	2.13	31.42			0.00	48.83			0.00	0.00			0.00	0.00	27.19	42.75	57.61	67.37	98.19	4157	2100	2100	CONC	0.10	95.0	5483.08	1.58	1.00	0.76
					0.00	31.42	0.11	0.65	0.20	49.03			0.00	0.00			0.00	0.00															
					0.00	31.42	0.22	0.65	0.40	49.43			0.00	0.00			0.00	0.00															
	1040	1041	0.82	0.65	1.48	32.91			0.00	49.43			0.00	0.00			0.00	0.00	28.19	41.74	56.24	65.75	95.83	4153	2100	2100	CONC	0.10	95.0	5483.08	1.58	1.00	0.76
					0.00	32.91	0.10	0.65	0.18	49.61			0.00	0.00			0.00	0.00															
					0.00	32.91	0.16	0.65	0.29	49.90			0.00	0.00			0.00	0.00															
	1041	1043	0.53	0.65	0.96	33.86			0.00	49.90			0.00	0.00			0.00	0.00	29.19	40.78	54.93	64.23	93.60	4122	2100	2100	CONC	0.10	56.0	5483.08	1.58	0.59	0.75
Contribution From EASM 13, Pipe 1042 - 1043						0.00				3.50				0.00				0.00	10.39														
					0.00	33.86	0.13	0.65	0.23	53.64			0.00	0.00			0.00	0.00															
					0.00	33.86	0.40	0.65	0.72	54.36			0.00	0.00			0.00	0.00															
	1043	1044	0.71	0.65	1.28	35.15			0.00	54.36			0.00	0.00			0.00	0.00	29.78	40.24	54.20	63.36	92.33	4360	2100	2100	CONC	0.10	68.5	5483.08	1.58	0.72	0.80
					0.00	35.15	0.11	0.65	0.20	54.56			0.00	0.00			0.00	0.00															
					0.00	35.15	0.11	0.65	0.20	54.76			0.00	0.00			0.00	0.00															
	1044	1045	0.58	0.65	1.05	36.19			0.00	54.76			0.00	0.00			0.00	0.00	30.50	39.60	53.32	62.34	90.83	4353	2100	2100	CONC	0.10	64.0	5483.08	1.58	0.67	0.79
					0.00	36.19	0.09	0.65	0.16	54.92			0.00	0.00			0.00	0.00															
			0.57	0.65	1.03	37.22			0.00	54.92			0.00	0.00			0.00	0.00															
	1045	1046			0.00	37.22	0.64	0.65	1.16	56.08			0.00	0.00			0.00	0.00	31.18	39.02	52.54	61.41	89.48	4399	2100	2100	CONC	0.15	64.0	6715.38	1.94	0.55	0.65
To EASM 646, Pipe 1046 - 1047						37.22				56.08				0.00				0.00	31.73														
EASM 646																																	
Contribution From STREET 9, Pipe 1045 - 1046						37.22				56.08				0.00				0.00	31.73														
					0.00	37.22	0.10	0.65	0.18	56.26			0.00	0.00			0.00	0.00															
					0.00	37.22	0.22	0.65	0.40	56.65			0.00	0.00			0.00	0.00															
	1046	1047	0.37	0.65	0.67	37.89			0.00	56.65			0.00	0.00			0.00	0.00	31.73	38.56	51.91	60.68	88.41	4402	2100	2100	CONC	0.15	59.0	6715.38	1.94	0.51	0.66
					0.00	37.89	0.07	0.65	0.13	56.78			0.00	0.00			0.00	0.00															
	1047	1048	0.14	0.65	0.25	38.15			0.00	56.78			0.00	0.00			0.00	0.00	32.23	38.15	51.35	60.03	87.45	4371	2100	2100	CONC	0.10	50.5	5483.08	1.58	0.53	0.80
	1048	6020			0.00	38.15			0.00	56.78			0.00	0.00			0.00	0.00	32.76	37.73	50.78	59.35	86.46	4322	2100	2100	CONC	0.10	75.5	5483.08	1.58	0.79	0.79
To SWM Pond 1 Inlet, Pipe 6020 - 1049						38.15				56.78				0.00				0.00	33.56														

Definitions:
Q = 2.78 AIR, where
Q = Peak Flow in Litres per second (L/s)
A = Areas in hectares (ha)
I = Rainfall Intensity (mm/h)
R = Runoff Coefficient

Notes:
1) Ottawa Rainfall-Intensity Curve
2) Min. Velocity = 0.80 m/s

Designed: GGG
Checked: SLM
Dwg. Reference: 03D

PROJECT: **7000 Campeau Drive**
LOCATION: **City of Ottawa**
File Ref: 18-1061
Date: 15 Jun 2021
Sheet No. SHEET 8 OF 10

STORM SEWER CALCULATION SHEET (RATIONAL METHOD)

Local Roads Return Frequency = 2 years
Collector Roads Return Frequency = 5 years
Manning 0.013 Arterial Roads Return Frequency = 10 years

Ottawa

LOCATION			AREA (Ha)																FLOW						SEWER DATA								
			2 YEAR				5 YEAR				10 YEAR				100 YEAR				Time of	Intensity	Intensity	Intensity	Intensity	Peak Flow	DIA. (mm)	DIA. (mm)	TYPE	SLOPE	LENGTH	CAPACITY	VELOCITY	TIME OF	RATIO
			AREA (Ha)	R	Indiv. 2.78 AC	Accum. 2.78 AC	AREA (Ha)	R	Indiv. 2.78 AC	Accum. 2.78 AC	AREA (Ha)	R	Indiv. 2.78 AC	Accum. 2.78 AC	AREA (Ha)	R	Indiv. 2.78 AC	Accum. 2.78 AC	Conc. (min)	2 Year (mm/h)	5 Year (mm/h)	10 Year (mm/h)	100 Year (mm/h)	Q (l/s)	(actual)	(nominal)		(%)	(m)	(l/s)	(m/s)	FLOW (min)	Q/Q full
Location	From Node	To Node																															
SWM Pond 1 Inlet																																	
Contribution From EASM 646, Pipe 1048 - 6020						38.15				56.78				0.00				0.00	33.56														
	6020	1049			0.00	38.15			0.00	56.78			0.00	0.00			0.00	0.00	33.56	37.11	49.95	58.38	85.04	4252	2100	2100	CONC	0.10	27.0	5483.08	1.58	0.28	0.78
STREET 8																																	
	2018	2019	0.38	0.65	0.69	0.69			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	53	450	450	CONC	0.20	66.0	127.50	0.80	1.37	0.41
	2019	2020	0.27	0.65	0.49	1.17			0.00	0.00			0.00	0.00			0.00	0.00	11.37	71.91	97.46	114.22	166.92	84	450	450	CONC	0.20	66.0	127.50	0.80	1.37	0.66
To STREET 7, Pipe 2020 - 2021						1.17				0.00				0.00				0.00	12.74														
EASM 638																																	
	2013	2014			0.00	0.00	4.76	0.65	8.60	8.60			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	896	750	750	CONC	0.38	76.0	686.27	1.55	0.82	1.31
	2014	2015			0.00	0.00			0.00	8.60			0.00	0.00			0.00	0.00	10.82	73.81	100.07	117.29	171.43	861	975	975	CONC	0.25	39.5	1120.53	1.50	0.44	0.77
To STREET 7, Pipe 2015 - 2016						0.00				8.60				0.00				0.00	11.25														
EASM 12																																	
	2003	2004			0.00	0.00	3.56	0.65	6.43	6.43			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	670	750	750	CONC	0.77	32.5	976.90	2.21	0.24	0.69
To STREET 7, Pipe 2004 - 2005						0.00				6.43				0.00				0.00	10.24														
EASM 650																																	
	2001	2002			0.00	0.00	1.48	0.65	2.67	2.67			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	279	600	600	CONC	0.35	68.0	363.25	1.28	0.88	0.77
To STREET 7, Pipe 2002 - 2004						0.00				2.67				0.00				0.00	10.88														
STREET 7																																	
					0.00	0.00	0.30	0.65	0.54	0.54			0.00	0.00			0.00	0.00															
	2008	2009	0.90	0.65	1.63	1.63			0.00	0.54			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	181	375	375	PVC	1.85	63.0	238.47	2.16	0.49	0.76
					0.00	1.63	0.05	0.65	0.09	0.63			0.00	0.00			0.00	0.00															
	2009	2010	0.63	0.65	1.14	2.76			0.00	0.63			0.00	0.00			0.00	0.00	10.49	74.99	101.69	119.20	174.23	272	525	525	CONC	1.20	68.0	471.11	2.18	0.52	0.58
Contribution From CAMPEAU DRIVE, Pipe 1032 - 1033						0.00				38.56				0.00				0.00	20.70														
	1033	1034	0.74	0.65	1.34	1.34			0.00	38.56			0.00	0.00			0.00	0.00	20.70	50.93	68.75	80.44	117.36	2719	1800	1800	CONC	0.10	119.0	3634.96	1.43	1.39	0.75
To STREET 6, Pipe 1034 - 1035						1.34				38.56				0.00				0.00	22.09														
					0.00	0.00	0.17	0.65	0.31	0.31			0.00	0.00			0.00	0.00															
	2012	2015	0.76	0.65	1.37	1.37			0.00	0.31			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	137	375	375	PVC	0.95	20.0	170.89	1.55	0.22	0.80
Contribution From EASM 638, Pipe 2014 - 2015						0.00				8.60				0.00				0.00	11.25														
					0.00	1.37	0.21	0.65	0.38	9.29			0.00	0.00			0.00	0.00															
	2015	2016	1.05	0.65	1.90	3.27			0.00	9.29			0.00	0.00			0.00	0.00	11.25	72.30	98.00	114.85	167.85	1147	1200	1200	CONC	0.15	100.5	1509.97	1.34	1.25	0.76
					0.00	3.27	0.56	0.65	1.01	10.30			0.00	0.00			0.00	0.00															
					0.00	3.27	0.77	0.65	1.39	11.69			0.00	0.00			0.00	0.00															
	2016	2017	1.58	0.65	2.86	6.13			0.00	11.69			0.00	0.00			0.00	0.00	12.51	68.35	92.58	108.47	158.47	1501	1200	1200	CONC	0.25	15.0	1949.37	1.72	0.15	0.77
					0.00	6.13	0.16	0.65	0.29	11.98			0.00	0.00			0.00	0.00															
	2017	2020	0.55	0.65	0.99	7.12			0.00	11.98			0.00	0.00			0.00	0.00	12.65	67.92	91.99	107.78	157.46	1586	1350	1350	CONC	0.15	70.5	2067.17	1.44	0.81	0.77
Contribution From STREET 8, Pipe 2019 - 2020						1.17				0.00				0.00				0.00	12.74														
	2020	2021	0.24	0.65	0.43	8.73			0.00	11.98			0.00	0.00			0.00	0.00	13.47	65.64	88.86	104.09	152.05	1637	1350	1350	CONC	0.15	68.0	2067.17	1.44	0.78	0.79
To SWM Pond 2 Inlet, Pipe 2021 - 2022						8.73				11.98				0.00				0.00	14.25														
	1007	1008	0.31	0.65	0.56	0.56			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	43	300	300	PVC	0.35	67.5	57.21	0.81	1.39	0.75
Contribution From STREET 5, Pipe 1006 - 1008						4.73				0.89				0.00				0.00	14.93														
					0.00	5.29	0.04	0.65	0.07	0.96			0.00	0.00			0.00	0.00															
	1008	1009	0.33	0.65	0.60	5.89			0.00	0.96			0.00	0.00			0.00	0.00	14.93	61.92	83.77	98.10	143.27	445	750	750	CONC	0.30	62.0	609.77	1.38	0.75	0.73
					0.00	5.89	0.12	0.65	0.22	1.17			0.00	0.00			0.00	0.00															
	1009	1010	0.53	0.65	0.96	6.85			0.00	1.17			0.00	0.00			0.00	0.00	15.68	60.20	81.42	95.33	139.20	508	825	825	CONC	0.25	78.0	717.72	1.34	0.97	0.71
To STREET 9, Pipe 1010 - 1011						6.85				1.17				0.00				0.00	16.65														
					0.00	0.00	0.21	0.65	0.38	0.38			0.00	0.00			0.00	0.00															
	2000	2002	0.75	0.65	1.36	1.36			0.00	0.38			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	144	825	825	CONC	0.10	26.0	453.92	0.85	0.51	0.32
Contribution From EASM 650, Pipe 2001 - 2002						0.00				2.67				0.00				0.00	10.88														
	2002	2004			0.00	1.36	0.11	0.65	0.20	3.25			0.00	0.00			0.00	0.00	10.88	73.58	99.75	116.91	170.88	424	900	900	CONC	0.10	51.0	572.47	0.90	0.94	0.74

Definitions:
Q = 2.78 AIR, where
Q = Peak Flow in Litres per second (L/s)
A = Areas in hectares (ha)
I = Rainfall Intensity (mm/h)
R = Runoff Coefficient

Notes:
1) Ottawa Rainfall-Intensity Curve
2) Min. Velocity = 0.80 m/s

Designed: GGG	PROJECT: 7000 Campeau Drive		
Checked: SLM	LOCATION: City of Ottawa		
Dwg. Reference: 03D	File Ref: 18-1061	Date: 15 Jun 2021	Sheet No. SHEET 9 OF 10

STORM SEWER CALCULATION SHEET (RATIONAL METHOD)

Local Roads Return Frequency = 2 years
Collector Roads Return Frequency = 5 years
Manning 0.013 Arterial Roads Return Frequency = 10 years

LOCATION			AREA (Ha) 2 YEAR				5 YEAR				10 YEAR				100 YEAR				FLOW Time of Conc.	Intensity 2 Year	Intensity 5 Year	Intensity 10 Year	Intensity 100 Year	Peak Flow	SEWER DATA DIA. (mm)	DIA. (mm)	TYPE	SLOPE	LENGTH	CAPACITY	VELOCITY	TIME OF FLOW	RATIO
Location	From Node	To Node	AREA (Ha)	R	Indiv. 2.78 AC	Accum. 2.78 AC	AREA (Ha)	R	Indiv. 2.78 AC	Accum. 2.78 AC	AREA (Ha)	R	Indiv. 2.78 AC	Accum. 2.78 AC	AREA (Ha)	R	Indiv. 2.78 AC	Accum. 2.78 AC	(min)	(mm/h)	(mm/h)	(mm/h)	(mm/h)	Q (l/s)	(actual)	(nominal)		(%)	(m)	(l/s)	(m/s)	(min)	Q/Q full
Contribution From EASM 12, Pipe 2003 - 2004						0.00				6.43				0.00				0.00	10.24														
					0.00	1.36	0.13	0.65	0.23	9.92			0.00	0.00			0.00	0.00															
					0.00	1.36	0.15	0.65	0.27	10.19			0.00	0.00			0.00	0.00															
	2004	2005	0.69	0.65	1.25	2.60			0.00	10.19			0.00	0.00			0.00	0.00	11.83	70.44	95.44	111.84	163.42	1156	1050	1050	CONC	0.30	65.5	1495.68	1.73	0.63	0.77
					0.00	2.60	0.12	0.65	0.22	10.41			0.00	0.00			0.00	0.00															
					0.00	2.60	0.19	0.65	0.34	10.75			0.00	0.00			0.00	0.00															
	2005	2006	0.74	0.65	1.34	3.94			0.00	10.75			0.00	0.00			0.00	0.00	12.46	68.50	92.78	108.70	158.82	1267	1050	1050	CONC	0.35	66.0	1615.52	1.87	0.59	0.78
					0.00	3.94	0.07	0.65	0.13	10.88			0.00	0.00			0.00	0.00															
					0.00	3.94	0.13	0.65	0.23	11.11			0.00	0.00			0.00	0.00															
	2006	2007	0.74	0.65	1.34	5.28			0.00	11.11			0.00	0.00			0.00	0.00	13.05	66.79	90.44	105.95	154.78	1358	1050	1050	CONC	0.40	57.0	1727.06	1.99	0.48	0.79
	2007	2010			0.00	5.28			0.00	11.11			0.00	0.00			0.00	0.00	13.52	65.48	88.65	103.84	151.68	1331	1050	1050	CONC	0.40	28.5	1727.06	1.99	0.24	0.77
					0.00	8.04	0.29	0.65	0.52	12.27			0.00	0.00			0.00	0.00															
	2010	2011	0.74	0.65	1.34	9.38			0.00	12.27			0.00	0.00			0.00	0.00	13.76	64.85	87.78	102.82	150.18	1685	1200	1200	CONC	0.30	78.0	2135.42	1.89	0.69	0.79
					0.00	9.38	0.16	0.65	0.29	12.56			0.00	0.00			0.00	0.00															
	2011	2021	1.00	0.65	1.81	11.19			0.00	12.56			0.00	0.00			0.00	0.00	14.45	63.09	85.37	99.99	146.03	1778	1200	1200	CONC	0.35	71.0	2306.52	2.04	0.58	0.77
To SWM Pond 2 Inlet, Pipe 2021 - 2022						11.19				12.56				0.00				0.00	15.03														
SWM Pond 2 Inlet																																	
Contribution From STREET 7, Pipe 2011 - 2021						11.19				12.56				0.00				0.00	15.03														
Contribution From STREET 7, Pipe 2020 - 2021						8.73				11.98				0.00				0.00	14.25														
	2021	2022			0.00	19.91			0.00	24.54			0.00	0.00			0.00	0.00	15.03	61.69	83.46	97.73	142.72	3276	1350	1350	CONC	0.60	23.0	4134.33	2.89	0.13	0.79

Definitions:
Q = 2.78 AIR, where
Q = Peak Flow in Litres per second (L/s)
A = Areas in hectares (ha)
I = Rainfall Intensity (mm/h)
R = Runoff Coefficient

Notes:
1) Ottawa Rainfall-Intensity Curve
2) Min. Velocity = 0.80 m/s

Designed: GGG	PROJECT: 7000 Campeau Drive		
Checked: SLM	LOCATION: City of Ottawa		
Dwg. Reference: 03D	File Ref: 18-1061	Date: 15 Jun 2021	Sheet No. SHEET 10 OF 10

Table B-1: Stage-Storage-Outflow Curve for Pond 1 SWM Facility (Free Outfall Conditions)

			Quantity Control 1		Quantity Control 1		Emergency Overflow			
			Vertical Orifice		Vertical Orifice		Broad Crested Weir			
			Dia (m)	0.100	Width (m)	0.250	L (m)	20.000		
					Height (m)	0.100				
			Area (m^2)	0.008	Area (m^2)	0.025				
			Invert (m)	94.789	Invert (m)	95.000	C_w	1.800		
			C_o	0.62	C_o	0.62	Invert (m)	97.06		
			Q @ D	0.005	C_w	1.800	n contr.	0		
Elevation	Depth	Active Sto.	Head	Outflow	Head	Outflow	Head	Outflow	Outflow	Storage
(m)	(m)	(m^3)	(m)	(m^3/s)	(m)	(m^3/s)	(m)	(m^3/s)	(m^3/s)	(ha·m)
94.10	0.00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
94.20	0.10	234	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.023
94.30	0.20	543	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.054
94.40	0.30	928	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.093
94.50	0.40	1,390	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.139
94.60	0.50	1,927	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.193
94.70	0.60	2,540	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.254
94.80	0.70	3,230	0.011	0.001	0.000	0.000	0.000	0.000	0.001	0.323
94.90	0.80	3,995	0.111	0.005	0.000	0.000	0.000	0.000	0.005	0.399
95.00	0.90	4,836	0.211	0.009	0.000	0.000	0.000	0.000	0.009	0.484
95.10	1.00	5,727	0.311	0.011	0.100	0.013	0.000	0.000	0.024	0.573
95.20	1.10	6,642	0.411	0.013	0.200	0.027	0.000	0.000	0.040	0.664
95.30	1.20	7,582	0.511	0.015	0.300	0.034	0.000	0.000	0.049	0.758
95.40	1.30	8,546	0.611	0.016	0.400	0.041	0.000	0.000	0.057	0.855
95.50	1.40	9,534	0.711	0.018	0.500	0.046	0.000	0.000	0.064	0.953
95.60	1.50	10,546	0.811	0.019	0.600	0.051	0.000	0.000	0.070	1.055
95.70	1.60	11,583	0.911	0.020	0.700	0.055	0.000	0.000	0.075	1.158
95.80	1.70	12,644	1.011	0.021	0.800	0.059	0.000	0.000	0.081	1.264
95.90	1.80	13,729	1.111	0.022	0.900	0.063	0.000	0.000	0.086	1.373
96.00	1.90	14,838	1.211	0.023	1.000	0.067	0.000	0.000	0.090	1.484
96.10	2.00	15,972	1.311	0.024	1.100	0.070	0.000	0.000	0.095	1.597
96.20	2.10	17,129	1.411	0.025	1.200	0.074	0.000	0.000	0.099	1.713
96.30	2.20	18,311	1.511	0.026	1.300	0.077	0.000	0.000	0.103	1.831
96.40	2.30	19,518	1.611	0.027	1.400	0.080	0.000	0.000	0.107	1.952
96.50	2.40	20,748	1.711	0.028	1.500	0.083	0.000	0.000	0.110	2.075
96.60	2.50	22,003	1.811	0.029	1.600	0.085	0.000	0.000	0.114	2.200
96.70	2.60	23,282	1.911	0.029	1.700	0.088	0.000	0.000	0.118	2.328
96.80	2.70	24,585	2.011	0.030	1.800	0.091	0.000	0.000	0.121	2.459
96.90	2.80	25,913	2.111	0.031	1.900	0.093	0.000	0.000	0.124	2.591
97.00	2.90	27,265	2.211	0.032	2.000	0.096	0.000	0.000	0.128	2.726
97.15	3.05	29,617	2.361	0.033	2.150	0.099	0.090	0.972	1.104	2.962

Table B-2: Stage-Storage-Outflow Curve for Pond 2 SWM Facility (Free Outfall Conditions)

			Quantity Control 1		Quantity Control 1		Emergency Overflow			
			Vertical Orifice		Vertical Orifice		Broad Crested Weir			
			Dia (m)	0.100	Width (m)	0.150	L (m)	15.000		
					Height (m)	0.250				
			Area (m^2)	0.008	Area (m^2)	0.038				
			Invert (m)	94.000	Invert (m)	95.700	C_w	1.800		
			C_o	0.62	C_o	0.62	Invert (m)	97.40		
			Q @ D	0.005	C_w	1.800	n contr.	4		
Elevation	Depth	Active Sto.	Head	Outflow	Head	Outflow	Head	Outflow	Outflow	Storage
(m)	(m)	(m^3)	(m)	(m^3/s)	(m)	(m^3/s)	(m)	(m^3/s)	(m^3/s)	(ha·m)
94.00	0.00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
94.10	0.10	3	0.100	0.005	0.000	0.000	0.000	0.000	0.005	0.000
94.20	0.20	9	0.200	0.008	0.000	0.000	0.000	0.000	0.008	0.001
94.30	0.30	17	0.300	0.011	0.000	0.000	0.000	0.000	0.011	0.002
94.40	0.40	28	0.400	0.013	0.000	0.000	0.000	0.000	0.013	0.003
94.50	0.50	41	0.500	0.014	0.000	0.000	0.000	0.000	0.014	0.004
94.60	0.60	56	0.600	0.016	0.000	0.000	0.000	0.000	0.016	0.006
94.70	0.70	74	0.700	0.017	0.000	0.000	0.000	0.000	0.017	0.007
94.80	0.80	94	0.800	0.019	0.000	0.000	0.000	0.000	0.019	0.009
94.90	0.90	117	0.900	0.020	0.000	0.000	0.000	0.000	0.020	0.012
95.00	1.00	142	1.000	0.021	0.000	0.000	0.000	0.000	0.021	0.014
95.10	1.10	211	1.100	0.022	0.000	0.000	0.000	0.000	0.022	0.021
95.20	1.20	365	1.200	0.023	0.000	0.000	0.000	0.000	0.023	0.037
95.30	1.30	605	1.300	0.024	0.000	0.000	0.000	0.000	0.024	0.061
95.40	1.40	930	1.400	0.025	0.000	0.000	0.000	0.000	0.025	0.093
95.50	1.50	1,341	1.500	0.026	0.000	0.000	0.000	0.000	0.026	0.134
95.60	1.60	1,798	1.600	0.027	0.000	0.000	0.000	0.000	0.027	0.180
95.70	1.70	2,266	1.700	0.028	0.000	0.000	0.000	0.000	0.028	0.227
95.80	1.80	2,742	1.800	0.029	0.100	0.007	0.000	0.000	0.036	0.274
95.90	1.90	3,228	1.900	0.029	0.200	0.018	0.000	0.000	0.047	0.323
96.00	2.00	3,724	2.000	0.030	0.300	0.043	0.000	0.000	0.073	0.372
96.10	2.10	4,229	2.100	0.031	0.400	0.054	0.000	0.000	0.085	0.423
96.20	2.20	4,743	2.200	0.032	0.500	0.063	0.000	0.000	0.095	0.474
96.30	2.30	5,267	2.300	0.032	0.600	0.071	0.000	0.000	0.103	0.527
96.40	2.40	5,800	2.400	0.033	0.700	0.078	0.000	0.000	0.111	0.580
96.50	2.50	6,343	2.500	0.034	0.800	0.085	0.000	0.000	0.118	0.634
96.60	2.60	6,895	2.600	0.034	0.900	0.091	0.000	0.000	0.125	0.690
96.70	2.70	7,457	2.700	0.035	1.000	0.096	0.000	0.000	0.131	0.746
96.80	2.80	8,028	2.800	0.036	1.100	0.102	0.000	0.000	0.137	0.803
96.90	2.90	8,608	2.900	0.036	1.200	0.107	0.000	0.000	0.143	0.861
97.00	3.00	9,198	3.000	0.037	1.300	0.112	0.000	0.000	0.149	0.920
97.10	3.10	9,797	3.100	0.038	1.400	0.116	0.000	0.000	0.154	0.980
97.20	3.20	10,406	3.200	0.038	1.500	0.121	0.000	0.000	0.159	1.041
97.30	3.30	11,024	3.300	0.039	1.600	0.125	0.000	0.000	0.164	1.102
97.40	3.40	11,652	3.400	0.039	1.700	0.129	0.000	0.000	0.169	1.165
97.50	3.50	12,289	3.500	0.040	1.800	0.133	0.100	0.852	1.025	1.229

Table B-3: Stage-Storage-Outflow Curve for Pond 3 SWM Facility (Free Outfall Conditions)

			Quantity Control 1		Quantity Control 1		Emergency Overflow			
			Vertical Orifice		Vertical Orifice		Broad Crested Weir			
			Dia (m)	0.100	Width (m)	1.000	L (m)	20.000		
					Height (m)	0.100				
			Area (m^2)	0.008	Area (m^2)	0.100				
			Invert (m)	94.000	Invert (m)	94.300	C_w	1.800		
			C_o	0.62	C_o	0.62	Invert (m)	96.00		
			Q @ D	0.005	C_w	1.800	n contr.	0		
Elevation (m)	Depth (m)	Active Sto. (m^3)	Head (m)	Outflow (m^3/s)	Head (m)	Outflow (m^3/s)	Head (m)	Outflow (m^3/s)	Outflow (m^3/s)	Storage (ha·m)
94.00	0.00	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
94.10	0.10	1,032	0.100	0.005	0.000	0.000	0.000	0.000	0.005	0.103
94.20	0.20	2,086	0.200	0.008	0.000	0.000	0.000	0.000	0.008	0.209
94.30	0.30	3,163	0.300	0.011	0.000	0.000	0.000	0.000	0.011	0.316
94.40	0.40	4,262	0.400	0.013	0.100	0.056	0.000	0.000	0.069	0.426
94.50	0.50	5,384	0.500	0.014	0.200	0.106	0.000	0.000	0.121	0.538
94.60	0.60	6,527	0.600	0.016	0.300	0.137	0.000	0.000	0.153	0.653
94.70	0.70	7,693	0.700	0.017	0.400	0.162	0.000	0.000	0.180	0.769
94.80	0.80	8,882	0.800	0.019	0.500	0.184	0.000	0.000	0.203	0.888
94.90	0.90	10,092	0.900	0.020	0.600	0.204	0.000	0.000	0.224	1.009
95.00	1.00	11,325	1.000	0.021	0.700	0.221	0.000	0.000	0.242	1.133
95.10	1.10	12,581	1.100	0.022	0.800	0.238	0.000	0.000	0.260	1.258
95.20	1.20	13,858	1.200	0.023	0.900	0.253	0.000	0.000	0.276	1.386
95.30	1.30	15,158	1.300	0.024	1.000	0.268	0.000	0.000	0.292	1.516
95.40	1.40	16,480	1.400	0.025	1.100	0.281	0.000	0.000	0.306	1.648
95.50	1.50	17,825	1.500	0.026	1.200	0.295	0.000	0.000	0.320	1.783
95.60	1.60	19,192	1.600	0.027	1.300	0.307	0.000	0.000	0.334	1.919
95.70	1.70	20,581	1.700	0.028	1.400	0.319	0.000	0.000	0.347	2.058
95.80	1.80	21,993	1.800	0.029	1.500	0.331	0.000	0.000	0.359	2.199
95.90	1.90	23,427	1.900	0.029	1.600	0.342	0.000	0.000	0.371	2.343
96.00	2.00	24,883	2.000	0.030	1.700	0.353	0.000	0.000	0.383	2.488
96.15	2.15	27,313	2.150	0.031	1.850	0.368	0.150	2.091	2.491	2.731

Table B-4: Stage-Storage-Outflow Curve for Pond 4 SWM Facility
(Free Outfall Conditions)

			Quantity Control 1		Emergency Overflow			
			Vertical Orifice		Broad Crested Weir			
			Dia (m)	0.125	L (m)	10.000		
			Area (m^2)	0.012				
			Invert (m)	94.700	C_w	1.800		
			C_o	0.62	Invert (m)	96.75		
			Q @ D	0.008	n contr.	0		
Elevation	Depth	Active Sto.	Head	Outflow	Head	Outflow	Outflow	Storage
(m)	(m)	(m^3)	(m)	(m^3/s)	(m)	(m^3/s)	(m^3/s)	(ha·m)
94.70	0.00	0	0.000	0.000	0.000	0.000	0.000	0.000
94.80	0.10	247	0.100	0.007	0.000	0.000	0.007	0.025
94.90	0.20	507	0.200	0.012	0.000	0.000	0.012	0.051
95.00	0.30	780	0.300	0.016	0.000	0.000	0.016	0.078
95.10	0.40	1,067	0.400	0.020	0.000	0.000	0.020	0.107
95.20	0.50	1,368	0.500	0.022	0.000	0.000	0.022	0.137
95.30	0.60	1,682	0.600	0.025	0.000	0.000	0.025	0.168
95.40	0.70	2,009	0.700	0.027	0.000	0.000	0.027	0.201
95.50	0.80	2,350	0.800	0.029	0.000	0.000	0.029	0.235
95.60	0.90	2,704	0.900	0.031	0.000	0.000	0.031	0.270
95.70	1.00	3,072	1.000	0.033	0.000	0.000	0.033	0.307
95.80	1.10	3,453	1.100	0.034	0.000	0.000	0.034	0.345
95.90	1.20	3,847	1.200	0.036	0.000	0.000	0.036	0.385
96.00	1.30	4,255	1.300	0.037	0.000	0.000	0.037	0.425
96.10	1.40	4,676	1.400	0.039	0.000	0.000	0.039	0.468
96.20	1.50	5,111	1.500	0.040	0.000	0.000	0.040	0.511
96.30	1.60	5,559	1.600	0.042	0.000	0.000	0.042	0.556
96.40	1.70	6,021	1.700	0.043	0.000	0.000	0.043	0.602
96.50	1.80	6,496	1.800	0.044	0.000	0.000	0.044	0.650
96.60	1.90	6,984	1.900	0.046	0.000	0.000	0.046	0.698
96.70	2.00	7,486	2.000	0.047	0.000	0.000	0.047	0.749
96.85	2.15	8,385	2.150	0.049	0.100	0.569	0.618	0.838

Table B-5: Stage-Storage-Outflow Curve for Underground Storage Unit (Free Outfall Conditions)

	Quantity Control 1		Emergency Overflow	
	Vertical Orifice		Broad Crested Weir	
	Dia (m)	0.650	L (m)	10.000
	Area (m^2)	0.332		
	Invert (m)	92.624	C_w	1.800
	C_o	0.62	Invert (m)	94.03
	Q @ D	0.520	n contr.	0

Elevation (m)	Depth (m)	Active Sto. (m^3)	Head (m)	Outflow (m^3/s)	Head (m)	Outflow (m^3/s)	Outflow (m^3/s)	Storage (ha·m)
92.62	0.00	0	0.000	0.000	0.000	0.000	0.000	0.000
92.72	0.10	100	0.100	0.080	0.000	0.000	0.080	0.010
92.82	0.20	200	0.200	0.160	0.000	0.000	0.160	0.020
92.92	0.30	300	0.300	0.240	0.000	0.000	0.240	0.030
93.02	0.40	400	0.400	0.320	0.000	0.000	0.320	0.040
93.12	0.50	500	0.500	0.400	0.000	0.000	0.400	0.050
93.22	0.60	600	0.600	0.480	0.000	0.000	0.480	0.060
93.32	0.70	700	0.700	0.558	0.000	0.000	0.558	0.070
93.42	0.80	800	0.800	0.628	0.000	0.000	0.628	0.080
93.52	0.90	900	0.900	0.691	0.000	0.000	0.691	0.090
93.62	1.00	1,000	1.000	0.749	0.000	0.000	0.749	0.100
93.72	1.10	1,001	1.100	0.802	0.000	0.000	0.802	0.100
93.82	1.20	1,002	1.200	0.852	0.000	0.000	0.852	0.100
93.92	1.30	1,003	1.300	0.900	0.000	0.000	0.900	0.100
94.02	1.40	1,004	1.400	0.945	0.000	0.000	0.945	0.100
94.12	1.50	1,005	1.500	0.988	0.094	0.519	1.507	0.101
94.22	1.60	1,006	1.600	1.029	0.194	1.538	2.567	0.101
94.32	1.70	1,007	1.700	1.069	0.294	2.869	3.938	0.101
94.42	1.80	1,008	1.800	1.107	0.394	4.452	5.558	0.101
94.52	1.90	1,009	1.900	1.144	0.494	6.250	7.393	0.101
94.62	2.00	1,010	2.000	1.179	0.594	8.240	9.420	0.101
94.72	2.10	1,011	2.100	1.214	0.694	10.407	11.621	0.101

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Attachment C

Model Results Summary

Table C1 : Major System Depth Velocity Summary

Link	100 Year 24Hr SCS Max Depth (m)	100 Year 24Hr SCS Max Velocity (m/s)	100 Year 24Hr SCS Depth x Velocity (m^2/s)	100 Year 3Hr Chicago Max Depth (m)	100 Year 3Hr Chicago Max Velocity (m/s)	100 Year 3Hr Chicago Depth x Velocity (m^2/s)
Maj_002	0.25	0.59	0.15	0.14	0.35	0.05
Maj_003	0.15	0.07	0.01	0.06	0.00	0.00
Maj_004	0.26	0.15	0.04	0.16	2.13	0.33
Maj_005	0.16	0.92	0.14	0.11	0.92	0.10
Maj_005	0.09	0.35	0.03	0.08	0.33	0.03
Maj_007	0.24	0.19	0.05	0.22	0.22	0.05
Maj_008	0.14	0.03	0.00	0.13	0.04	0.01
Maj_009	0.25	0.49	0.12	0.23	0.53	0.12
Maj_010	0.13	0.80	0.11	0.13	0.89	0.11
Maj_010	0.08	0.28	0.02	0.07	0.31	0.02
Maj_012	0.07	2.30	0.17	0.07	2.47	0.18
Maj_013	0.13	0.99	0.12	0.13	0.82	0.11
Maj_014	0.11	0.80	0.09	0.13	0.85	0.11
Maj_015	0.11	0.78	0.09	0.12	0.82	0.10
Maj_016	0.11	0.78	0.09	0.12	0.81	0.10
Maj_017	0.11	0.77	0.09	0.12	0.82	0.10
Maj_018	0.11	0.81	0.09	0.12	0.84	0.10
Maj_019	0.10	0.51	0.05	0.10	0.56	0.06
Maj_020	0.07	0.80	0.06	0.08	0.90	0.07
Maj_021	0.06	1.18	0.07	0.07	1.28	0.08
Maj_022	0.05	1.31	0.07	0.07	1.43	0.09
Maj_023	0.03	0.00	0.00	0.03	0.00	0.00
Maj_024	0.03	0.00	0.00	0.03	0.00	0.00
Maj_024	0.00	0.00	0.00	0.00	0.00	0.00
Maj_025	0.00	0.00	0.00	0.00	0.00	0.00
Maj_026	0.12	0.78	0.09	0.13	0.75	0.10
Maj_027	0.14	0.62	0.09	0.16	0.62	0.10
Maj_028	0.13	0.71	0.09	0.13	0.77	0.10
Maj_029	0.10	0.54	0.06	0.11	0.37	0.04
Maj_030	0.04	0.00	0.00	0.04	0.00	0.00
Maj_031	0.00	0.00	0.00	0.00	0.00	0.00
Maj_031	0.00	0.00	0.00	0.00	0.00	0.00
Maj_032	0.16	0.68	0.11	0.16	0.66	0.11
Maj_033	0.17	0.73	0.12	0.17	0.70	0.12
Maj_034	0.17	0.77	0.13	0.17	0.74	0.13
Maj_035	0.19	0.82	0.15	0.18	0.80	0.14
Maj_036	0.20	0.84	0.17	0.19	0.83	0.15
Maj_037	0.20	0.75	0.15	0.19	0.74	0.14
Maj_038	0.19	0.61	0.12	0.19	0.64	0.12
Maj_039	0.16	0.92	0.15	0.17	0.91	0.15
Maj_040	0.15	1.02	0.15	0.16	1.04	0.16
Maj_041	0.13	0.91	0.12	0.14	0.79	0.11
Maj_042	0.11	0.81	0.09	0.12	0.84	0.10
Maj_043	0.11	0.80	0.09	0.12	0.83	0.10
Maj_044	0.11	0.78	0.09	0.12	0.80	0.10
Maj_045	0.11	0.80	0.09	0.12	0.85	0.10

Table C1 : Major System Depth Velocity Summary

Link	100 Year 24Hr SCS			100 Year 3Hr Chicago		
	Max Depth (m)	Max Velocity (m/s)	Depth x Velocity (m²/s)	Max Depth (m)	Max Velocity (m/s)	Depth x Velocity (m²/s)
Maj_046	0.11	0.78	0.09	0.12	0.81	0.10
Maj_047	0.10	0.77	0.08	0.10	0.67	0.07
Maj_048	0.09	0.50	0.05	0.10	0.52	0.05
Maj_049	0.10	0.72	0.07	0.10	0.75	0.08
Maj_049	0.10	0.51	0.05	0.10	0.58	0.06
Maj_050	0.10	0.72	0.07	0.11	0.75	0.08
Maj_051	0.09	0.74	0.07	0.10	0.52	0.05
Maj_052	0.08	0.62	0.05	0.08	0.74	0.06
Maj_053	0.08	0.63	0.05	0.08	0.73	0.06
Maj_054	0.08	1.20	0.10	0.09	1.18	0.11
Maj_055	0.03	0.00	0.00	0.03	0.00	0.00
Maj_055	0.05	0.00	0.00	0.05	0.00	0.00
Maj_056	0.17	0.61	0.10	0.16	0.63	0.10
Maj_057	0.10	0.80	0.08	0.10	0.81	0.08
Maj_058	0.06	1.18	0.07	0.06	1.20	0.07
Maj_059	0.05	0.69	0.03	0.05	0.71	0.04
Maj_060	0.05	0.66	0.04	0.05	0.67	0.04
Maj_061	0.13	0.56	0.07	0.14	0.58	0.08
Maj_062	0.12	0.74	0.09	0.12	0.75	0.09
Maj_063	0.12	0.74	0.09	0.12	0.74	0.09
Maj_064	0.11	1.30	0.15	0.12	1.04	0.12
Maj_065	0.11	0.71	0.08	0.11	0.73	0.08
Maj_066	0.11	0.77	0.08	0.11	0.79	0.09
Maj_067	0.10	0.82	0.08	0.11	0.72	0.08
Maj_068	0.10	0.72	0.07	0.10	0.78	0.08
Maj_069	0.10	0.62	0.06	0.11	0.57	0.06
Maj_070	0.08	0.67	0.06	0.10	0.75	0.07
Maj_071	0.08	0.66	0.06	0.10	0.71	0.07
Maj_072	0.09	0.66	0.06	0.10	0.71	0.07
Maj_073	0.08	0.52	0.04	0.09	0.55	0.05
Maj_074	0.07	0.73	0.05	0.07	0.59	0.04
Maj_075	0.06	0.52	0.03	0.07	0.61	0.04
Maj_076	0.05	0.57	0.03	0.05	0.63	0.03
Maj_077	0.04	0.68	0.03	0.04	0.73	0.03
Maj_077	0.04	0.42	0.02	0.05	0.45	0.02
Maj_079	0.10	0.53	0.05	0.12	0.64	0.08
Maj_080	0.05	0.47	0.03	0.07	0.72	0.05
Maj_081	0.03	0.73	0.02	0.03	0.76	0.02
Maj_082	0.02	0.88	0.02	0.03	0.99	0.03
Maj_083	0.01	0.00	0.00	0.01	0.00	0.00
Maj_084	0.00	0.00	0.00	0.00	0.00	0.00
Maj_085	0.05	0.17	0.01	0.04	0.03	0.00
Maj_085	0.00	0.00	0.00	0.00	0.00	0.00
Maj_086	0.09	0.15	0.01	0.11	0.15	0.02
Maj_087	0.04	0.00	0.00	0.04	0.00	0.00
Maj_088	0.20	1.25	0.25	0.20	1.27	0.26

Table C1 : Major System Depth Velocity Summary

Link	100 Year 24Hr SCS Max Depth (m)	100 Year 24Hr SCS Max Velocity (m/s)	100 Year 24Hr SCS Depth x Velocity (m^2/s)	100 Year 3Hr Chicago Max Depth (m)	100 Year 3Hr Chicago Max Velocity (m/s)	100 Year 3Hr Chicago Depth x Velocity (m^2/s)
Maj_089	0.22	0.90	0.19	0.22	0.95	0.21
Maj_090	0.18	1.34	0.24	0.18	1.40	0.25
Maj_091	0.15	1.81	0.27	0.16	1.85	0.29
Maj_092	0.16	1.66	0.26	0.16	1.70	0.28
Maj_093	0.16	1.53	0.25	0.17	1.57	0.26
Maj_094	0.14	0.78	0.11	0.15	0.85	0.13
Maj_095	0.13	1.00	0.13	0.13	1.06	0.14
Maj_096	0.13	0.94	0.12	0.13	0.98	0.13
Maj_097	0.13	0.97	0.12	0.13	1.02	0.13
Maj_098	0.13	1.03	0.13	0.13	0.96	0.13
Maj_099	0.12	0.95	0.11	0.13	0.98	0.12
Maj_100	0.12	0.97	0.12	0.13	1.00	0.13
Maj_100	0.12	0.98	0.12	0.13	1.01	0.13
Maj_101	0.10	1.49	0.15	0.09	1.42	0.13
Maj_102	0.08	1.17	0.10	0.06	1.11	0.07
Maj_103	0.08	1.16	0.10	0.06	0.97	0.06
Maj_104	0.04	0.00	0.00	0.03	0.00	0.00
Maj_105	0.18	0.42	0.08	0.18	0.43	0.08
Maj_106	0.10	0.34	0.03	0.10	0.35	0.03
Maj_107	0.15	1.00	0.15	0.16	0.98	0.15
Maj_108	0.14	1.11	0.16	0.14	1.12	0.16
Maj_109	0.07	0.00	0.00	0.07	0.00	0.00
Maj_110	0.14	0.93	0.13	0.14	1.04	0.14
Maj_111	0.13	0.98	0.12	0.13	1.02	0.13
Maj_113	0.14	1.60	0.22	0.18	1.57	0.28
Maj_114	0.10	0.71	0.07	0.10	0.61	0.06
Maj_115	0.08	0.66	0.06	0.09	0.60	0.05
Maj_116	0.08	0.64	0.05	0.09	0.66	0.06
Maj_117	0.08	0.78	0.06	0.08	0.53	0.04
Maj_118	0.07	0.84	0.06	0.08	0.90	0.07
Maj_119	0.07	0.83	0.05	0.07	0.88	0.06
Maj_120	0.06	0.98	0.06	0.07	1.02	0.07
Maj_121	0.05	1.19	0.06	0.05	1.24	0.07
Maj_122	0.05	1.36	0.07	0.05	1.42	0.08
Maj_123	0.05	1.35	0.06	0.05	1.41	0.08
Maj_124	0.05	1.17	0.06	0.06	1.22	0.07
Maj_125	0.06	0.91	0.05	0.07	0.94	0.06
Maj_126	0.08	0.56	0.04	0.08	0.60	0.05
Maj_127	0.08	0.30	0.03	0.09	0.30	0.03
Maj_128	0.06	0.19	0.01	0.06	0.18	0.01
Maj_128	0.05	0.16	0.01	0.05	0.05	0.00
Maj_130	0.16	0.32	0.05	0.17	0.30	0.05
Maj_131	0.10	0.56	0.06	0.11	0.58	0.07
Maj_132	0.11	0.64	0.07	0.11	0.66	0.08
Maj_133	0.11	0.66	0.08	0.12	0.68	0.08
Maj_134	0.11	0.64	0.07	0.11	0.68	0.08

Table C1 : Major System Depth Velocity Summary

Link	100 Year 24Hr SCS Max Depth (m)	100 Year 24Hr SCS Max Velocity (m/s)	100 Year 24Hr SCS Depth x Velocity (m^2/s)	100 Year 3Hr Chicago Max Depth (m)	100 Year 3Hr Chicago Max Velocity (m/s)	100 Year 3Hr Chicago Depth x Velocity (m^2/s)
Maj_135	0.08	1.00	0.08	0.09	1.01	0.09
Maj_136	0.07	1.24	0.09	0.07	1.28	0.09
Maj_137	0.07	0.52	0.03	0.07	0.42	0.03
Maj_138	0.05	0.25	0.01	0.06	0.25	0.02
Maj_138	0.05	0.47	0.02	0.05	0.52	0.02
Maj_139	0.06	0.44	0.03	0.07	0.45	0.03
Maj_139	0.05	0.57	0.03	0.06	0.63	0.04
Maj_140	0.06	0.78	0.05	0.06	0.85	0.05
Maj_141	0.05	1.04	0.05	0.05	1.16	0.06
Maj_142	0.06	0.72	0.04	0.06	0.73	0.04
Maj_142	0.05	0.87	0.04	0.05	0.88	0.05
Maj_143	0.05	1.64	0.08	0.05	1.35	0.06
Maj_144	0.05	0.81	0.04	0.05	0.83	0.04
Maj_144	0.05	0.96	0.05	0.04	0.95	0.04
Maj_145	0.07	0.72	0.05	0.07	0.69	0.05
Maj_146	0.16	0.34	0.06	0.18	0.39	0.07
Maj_146	0.11	1.02	0.12	0.13	0.92	0.12
Maj_147	0.14	0.39	0.06	0.16	0.51	0.08
Maj_148	0.09	0.89	0.08	0.10	0.93	0.09
Maj_149	0.09	0.89	0.08	0.10	0.93	0.09
Maj_150	0.07	0.33	0.02	0.08	0.29	0.02
Maj_151	0.06	0.44	0.03	0.07	0.55	0.04
Maj_152	0.04	0.67	0.03	0.04	0.48	0.02
Maj_153	0.04	0.54	0.02	0.04	0.59	0.02
Maj_154	0.10	0.41	0.04	0.10	0.43	0.04
Maj_155	0.08	0.53	0.04	0.09	0.53	0.05
Maj_156	0.09	0.56	0.05	0.09	0.56	0.05
Maj_157	0.06	0.56	0.03	0.05	0.50	0.02
Maj_158	0.05	0.36	0.02	0.04	0.31	0.01
Maj_158	0.06	0.60	0.04	0.05	0.55	0.03
Maj_159	0.08	0.49	0.04	0.07	0.43	0.03
Maj_160	0.10	0.52	0.05	0.08	0.46	0.04
Maj_162	0.04	0.00	0.00	0.04	0.00	0.00
Maj_163	0.00	0.00	0.00	0.00	0.00	0.00
Maj_163	0.00	0.00	0.00	0.00	0.00	0.00
Maj_164	0.07	0.45	0.03	0.07	0.40	0.03
Maj_165	0.04	0.21	0.01	0.04	0.17	0.01
Maj_166	0.08	0.90	0.08	0.08	0.81	0.07
Maj_167	0.06	0.24	0.01	0.07	0.31	0.02
Maj_168	0.04	0.29	0.01	0.05	0.32	0.02
Maj_169	0.02	0.00	0.00	0.03	0.00	0.00
Maj_170	0.04	0.27	0.01	0.04	0.28	0.01
Maj_171	0.06	0.80	0.05	0.05	0.72	0.03
Maj_172	0.08	0.63	0.05	0.08	0.62	0.05
Maj_173	0.08	0.70	0.05	0.08	0.72	0.06
Maj_174	0.08	0.69	0.06	0.08	0.68	0.05

Table C1 : Major System Depth Velocity Summary

Link	100 Year 24Hr SCS Max Depth (m)	100 Year 24Hr SCS Max Velocity (m/s)	100 Year 24Hr SCS Depth x Velocity (m²/s)	100 Year 3Hr Chicago Max Depth (m)	100 Year 3Hr Chicago Max Velocity (m/s)	100 Year 3Hr Chicago Depth x Velocity (m²/s)
Maj_175	0.08	0.85	0.07	0.07	0.76	0.05
Maj_176	0.07	0.37	0.02	0.06	0.36	0.02
Maj_176	0.07	0.64	0.05	0.07	0.71	0.05
Maj_177	0.07	0.33	0.02	0.07	0.38	0.03
Maj_178	0.05	0.45	0.02	0.05	0.48	0.03
Maj_179	0.04	0.88	0.03	0.04	0.92	0.04
Maj_180	0.04	1.02	0.04	0.04	1.08	0.04
Maj_181	0.04	1.03	0.04	0.04	1.10	0.04
Maj_182	0.04	0.90	0.03	0.04	0.94	0.04
Maj_183	0.10	0.40	0.04	0.08	0.44	0.04
Maj_184	0.09	0.38	0.03	0.08	0.33	0.03
Maj_185	0.09	0.44	0.04	0.08	0.41	0.03
Maj_186	0.08	0.21	0.02	0.07	0.19	0.01
Maj_187	0.10	0.63	0.06	0.11	0.59	0.06
Maj_188	0.10	0.69	0.07	0.10	0.70	0.07
Maj_189	0.06	0.62	0.04	0.07	0.60	0.04
Maj_190	0.05	0.73	0.04	0.06	0.80	0.05
Maj_191	0.13	0.31	0.04	0.13	0.30	0.04
Maj_192	0.10	0.70	0.07	0.10	0.73	0.07
Maj_193	0.07	1.03	0.07	0.07	1.00	0.07
Maj_194	0.07	1.33	0.09	0.06	1.31	0.08
Maj_195	0.06	1.56	0.09	0.06	1.52	0.09
Maj_196	0.05	1.05	0.06	0.05	0.89	0.05
Maj_197	0.05	1.52	0.07	0.05	1.02	0.05
Maj_198	0.04	1.15	0.05	0.04	1.28	0.05
Maj_199	0.04	0.99	0.04	0.04	0.98	0.04
Maj_200	0.05	0.77	0.04	0.05	0.76	0.04
Maj_201	0.07	0.41	0.03	0.07	0.44	0.03
Maj_203	0.16	0.51	0.08	0.16	0.53	0.09
Maj_204	0.13	0.73	0.10	0.14	0.72	0.10
Maj_205	0.14	0.72	0.10	0.14	0.74	0.10
Maj_206	0.10	0.34	0.03	0.10	0.30	0.03
Maj_207	0.07	0.51	0.04	0.07	0.58	0.04
Maj_207	0.07	0.49	0.04	0.07	0.51	0.04
Maj_208	0.00	0.00	0.00	0.00	0.00	0.00
Maj_208	0.04	0.00	0.00	0.04	0.00	0.00
Maj_209	0.25	1.42	0.36	0.22	1.33	0.30
Maj_209	0.16	0.51	0.08	0.16	0.52	0.08
Maj_210	0.19	0.90	0.17	0.17	0.85	0.14
Maj_211	0.19	0.83	0.16	0.18	0.78	0.14
Maj_212	0.17	0.86	0.14	0.16	0.83	0.13
Maj_213	0.14	1.18	0.17	0.13	1.08	0.14
Maj_214	0.13	0.94	0.12	0.12	1.17	0.14
Maj_215	0.10	0.64	0.07	0.10	0.56	0.05
Maj_216	0.08	0.80	0.07	0.08	0.80	0.07
Maj_217	0.09	0.80	0.07	0.08	0.78	0.07

Table C1 : Major System Depth Velocity Summary

	100 Year 24Hr SCS			100 Year 3Hr Chicago		
Link	Max Depth (m)	Max Velocity (m/s)	Depth x Velocity (m^2/s)	Max Depth (m)	Max Velocity (m/s)	Depth x Velocity (m^2/s)
Maj_218	0.04	0.00	0.00	0.04	0.00	0.00
Maj_219	0.13	0.61	0.08	0.13	0.71	0.09
Maj_220	0.11	0.81	0.09	0.12	0.70	0.08
Maj_221	0.11	0.79	0.09	0.12	0.70	0.08
Maj_222	0.11	0.62	0.07	0.12	0.67	0.08
Maj_223	0.11	0.90	0.10	0.13	0.82	0.10
Maj_224	0.11	0.64	0.07	0.13	0.68	0.09
Maj_225	0.11	0.64	0.07	0.13	0.69	0.09
Maj_227	0.14	0.21	0.03	0.13	0.30	0.04
Maj_228	0.09	0.54	0.05	0.08	0.57	0.05
Maj_229	0.08	0.63	0.05	0.08	0.59	0.05
Maj_230	0.07	0.50	0.04	0.07	0.59	0.04
Maj_232	0.00	0.00	0.00	0.00	0.00	0.00
Maj_233	0.00	0.00	0.00	0.00	0.00	0.00
Maj_234	0.04	0.31	0.01	0.05	0.38	0.02
Maj_235	0.06	0.42	0.03	0.07	0.44	0.03
Maj_236	0.07	0.39	0.03	0.07	0.42	0.03
Maj_237	0.07	0.41	0.03	0.07	0.43	0.03
Maj_238	0.07	0.45	0.03	0.08	0.48	0.04
Maj_239	0.07	0.45	0.03	0.08	0.51	0.04
Maj_240	0.05	0.36	0.02	0.06	0.39	0.02
Maj_241	0.06	0.44	0.03	0.07	0.45	0.03
Maj_242	0.06	0.33	0.02	0.06	0.33	0.02
Maj_243	0.07	0.44	0.03	0.07	0.47	0.03
Maj_244	0.04	0.24	0.01	0.05	0.28	0.02
Maj_245	0.05	0.40	0.02	0.06	0.43	0.03
Maj_246	0.03	0.21	0.01	0.04	0.32	0.01
Maj_247	0.05	0.37	0.02	0.05	0.41	0.02
Maj_248	0.05	0.31	0.02	0.06	0.34	0.02
Maj_249	0.06	0.43	0.03	0.07	0.46	0.03
Maj_250	0.05	0.30	0.01	0.05	0.35	0.02
Maj_251	0.06	0.42	0.03	0.07	0.44	0.03
Maj_252	0.05	0.30	0.02	0.06	0.30	0.02
Maj_253	0.07	0.44	0.03	0.07	0.46	0.03
Maj_254	0.04	0.00	0.00	0.04	0.00	0.00
Maj_255	0.00	0.00	0.00	0.00	0.00	0.00
Maj_256	0.05	0.43	0.02	0.06	0.46	0.03
Maj_257	0.03	0.00	0.00	0.03	0.00	0.00
Average	**0.09**	**0.64**	**0.06**	**0.09**	**0.65**	**0.07**
Max	**0.26**	**2.30**	**0.36**	**0.23**	**2.47**	**0.33**

Table C2 : Major System Ponding Depth Summary

Node	100 Year 24Hr SCS Max Depth (m)	100 Year CHI 3Hr Max Depth (m)
Maj_001	0.27	0.19
Maj_002	0.22	0.13
Maj_003	0.07	0.00
Maj_004	0.24	0.15
Maj_006	0.26	0.25
Maj_007	0.21	0.20
Maj_008	0.07	0.05
Maj_009	0.23	0.22
Maj_011	0.00	0.00
Maj_012	0.14	0.14
Maj_013	0.11	0.12
Maj_014	0.11	0.12
Maj_015	0.11	0.12
Maj_016	0.11	0.12
Maj_017	0.11	0.12
Maj_018	0.11	0.12
Maj_019	0.08	0.09
Maj_020	0.06	0.07
Maj_021	0.06	0.06
Maj_022	0.06	0.06
Maj_023	0.00	0.00
Maj_024	0.00	0.00
Maj_025	0.00	0.00
Maj_028	0.12	0.13
Maj_029	0.08	0.09
Maj_030	0.00	0.00
Maj_031	0.00	0.00
Maj_039	0.15	0.15
Maj_040	0.15	0.15
Maj_041	0.12	0.12
Maj_042	0.12	0.12
Maj_043	0.12	0.12
Maj_044	0.11	0.12
Maj_045	0.11	0.12
Maj_046	0.11	0.12
Maj_050	0.10	0.11
Maj_051	0.08	0.08
Maj_052	0.08	0.09
Maj_053	0.08	0.09
Maj_054	0.09	0.10
Maj_055	0.00	0.00
Maj_056	0.15	0.13
Maj_057	0.06	0.06

Table C2 : Major System Ponding Depth Summary

Node	100 Year 24Hr SCS Max Depth (m)	100 Year CHI 3Hr Max Depth (m)
Maj_058	0.06	0.06
Maj_059	0.05	0.05
Maj_060	0.06	0.06
Maj_061	0.12	0.12
Maj_062	0.12	0.12
Maj_063	0.12	0.12
Maj_064	0.11	0.12
Maj_065	0.11	0.11
Maj_066	0.11	0.11
Maj_067	0.09	0.10
Maj_068	0.10	0.10
Maj_069	0.09	0.09
Maj_070	0.09	0.10
Maj_071	0.09	0.10
Maj_072	0.09	0.10
Maj_073	0.08	0.08
Maj_074	0.06	0.06
Maj_075	0.06	0.07
Maj_076	0.04	0.05
Maj_077	0.04	0.05
Maj_078	0.12	0.14
Maj_079	0.09	0.11
Maj_080	0.03	0.03
Maj_081	0.03	0.03
Maj_082	0.03	0.03
Maj_083	0.00	0.00
Maj_084	0.00	0.00
Maj_086	0.07	0.08
Maj_087	0.00	0.00
Maj_088	0.23	0.23
Maj_089	0.21	0.21
Maj_090	0.15	0.15
Maj_091	0.15	0.15
Maj_092	0.16	0.17
Maj_093	0.16	0.17
Maj_094	0.13	0.13
Maj_095	0.13	0.13
Maj_096	0.13	0.13
Maj_097	0.13	0.13
Maj_098	0.12	0.13
Maj_099	0.12	0.12
Maj_100	0.12	0.13
Maj_101	0.08	0.06

Table C2 : Major System Ponding Depth Summary

Node	100 Year 24Hr SCS Max Depth (m)	100 Year CHI 3Hr Max Depth (m)
Maj_102	0.08	0.06
Maj_103	0.08	0.06
Maj_104	0.00	0.00
Maj_107	0.14	0.14
Maj_108	0.14	0.14
Maj_109	0.00	0.00
Maj_110	0.13	0.13
Maj_111	0.12	0.13
Maj_112	0.18	0.26
Maj_113	0.11	0.11
Maj_114	0.09	0.10
Maj_115	0.08	0.09
Maj_116	0.08	0.09
Maj_117	0.07	0.08
Maj_118	0.07	0.07
Maj_119	0.06	0.07
Maj_120	0.06	0.06
Maj_121	0.05	0.05
Maj_122	0.05	0.05
Maj_123	0.05	0.05
Maj_124	0.06	0.06
Maj_125	0.07	0.07
Maj_129	0.21	0.23
Maj_130	0.10	0.11
Maj_133	0.12	0.12
Maj_135	0.07	0.07
Maj_136	0.07	0.07
Maj_138	0.05	0.05
Maj_140	0.05	0.05
Maj_141	0.04	0.04
Maj_142	0.06	0.06
Maj_143	0.05	0.04
Maj_144	0.05	0.05
Maj_146	0.11	0.13
Maj_147	0.09	0.10
Maj_148	0.09	0.10
Maj_149	0.09	0.09
Maj_150	0.06	0.06
Maj_151	0.06	0.07
Maj_152	0.04	0.04
Maj_153	0.05	0.05
Maj_157	0.06	0.05
Maj_162	0.00	0.00

Table C2 : Major System Ponding Depth Summary

Node	100 Year 24Hr SCS Max Depth (m)	100 Year CHI 3Hr Max Depth (m)
Maj_163	0.00	0.00
Maj_166	0.08	0.08
Maj_171	0.06	0.05
Maj_172	0.08	0.08
Maj_173	0.08	0.08
Maj_174	0.08	0.08
Maj_175	0.07	0.07
Maj_177	0.07	0.07
Maj_178	0.04	0.04
Maj_179	0.03	0.04
Maj_180	0.03	0.04
Maj_181	0.03	0.04
Maj_182	0.04	0.04
Maj_188	0.07	0.07
Maj_189	0.06	0.06
Maj_190	0.06	0.06
Maj_192	0.08	0.08
Maj_193	0.07	0.06
Maj_194	0.06	0.06
Maj_195	0.06	0.06
Maj_196	0.05	0.05
Maj_197	0.04	0.04
Maj_198	0.04	0.04
Maj_199	0.04	0.04
Maj_200	0.05	0.05
Maj_202	0.18	0.19
Maj_203	0.13	0.13
Maj_206	0.07	0.07
Maj_207	0.07	0.07
Maj_208	0.00	0.00
Maj_210	0.19	0.18
Maj_212	0.14	0.13
Maj_213	0.14	0.13
Maj_214	0.11	0.11
Maj_215	0.09	0.08
Maj_216	0.09	0.08
Maj_217	0.09	0.08
Maj_218	0.00	0.00
Maj_219	0.11	0.12
Maj_220	0.11	0.12
Maj_221	0.11	0.12
Maj_222	0.11	0.12
Maj_223	0.11	0.13

Table C2 : Major System Ponding Depth Summary

Node	100 Year 24Hr SCS Max Depth (m)	100 Year CHI 3Hr Max Depth (m)
Maj_224	0.11	0.13
Maj_225	0.11	0.13
Maj_227	0.09	0.08
Maj_228	0.09	0.09
Maj_229	0.07	0.07
Maj_230	0.07	0.07
Maj_231	0.00	0.00
Maj_232	0.00	0.00
Maj_005	0.23	0.23
Maj_010	0.21	0.22
Maj_026	0.32	0.33
Maj_027	0.30	0.31
Maj_032	0.31	0.31
Maj_033	0.32	0.32
Maj_034	0.33	0.33
Maj_035	0.34	0.34
Maj_036	0.35	0.34
Maj_037	0.35	0.35
Maj_038	0.33	0.33
Maj_047	0.24	0.24
Maj_048	0.24	0.25
Maj_049	0.25	0.25
Maj_085	0.00	0.01
Maj_105	0.28	0.29
Maj_106	0.22	0.22
Maj_126	0.24	0.24
Maj_127	0.23	0.23
Maj_128	0.07	0.14
Maj_131	0.25	0.26
Maj_132	0.26	0.27
Maj_134	0.25	0.26
Maj_137	0.21	0.22
Maj_139	0.22	0.22
Maj_145	0.24	0.24
Maj_154	0.23	0.24
Maj_155	0.24	0.24
Maj_156	0.24	0.25
Maj_158	0.21	0.20
Maj_159	0.24	0.23
Maj_160	0.25	0.24
Maj_164	0.23	0.23
Maj_165	0.18	0.18
Maj_167	0.11	0.14

Table C2 : Major System Ponding Depth Summary

Node	100 Year 24Hr SCS Max Depth (m)	100 Year CHI 3Hr Max Depth (m)
Maj_168	0.20	0.21
Maj_169	0.11	0.12
Maj_170	0.20	0.20
Maj_176	0.22	0.22
Maj_183	0.25	0.24
Maj_184	0.23	0.22
Maj_185	0.25	0.24
Maj_186	0.21	0.20
Maj_187	0.28	0.28
Maj_191	0.27	0.27
Maj_201	0.23	0.23
Maj_204	0.29	0.29
Maj_205	0.29	0.29
Maj_209	0.25	0.22
Maj_211	0.35	0.33
Maj_233	0.02	0.10
Maj_234	0.19	0.21
Maj_235	0.21	0.22
Maj_236	0.21	0.22
Maj_237	0.22	0.22
Maj_238	0.22	0.23
Maj_239	0.22	0.23
Maj_240	0.20	0.21
Maj_241	0.22	0.22
Maj_242	0.20	0.21
Maj_243	0.22	0.23
Maj_244	0.18	0.19
Maj_245	0.21	0.22
Maj_246	0.17	0.20
Maj_247	0.20	0.21
Maj_248	0.20	0.21
Maj_249	0.22	0.22
Maj_250	0.19	0.20
Maj_251	0.22	0.22
Maj_252	0.19	0.20
Maj_253	0.22	0.23
Maj_254	0.00	0.00
Maj_255	0.18	0.19
Maj_256	0.29	0.29
Maj_257	0.00	0.00
Average	0.13	0.13
Max	0.35	0.35

Table C3 :Rear Yard Ponding Depth Summary

Node	Invert Elevation (m)	100 Year 24Hr SCS Max HGL (m)	100 Year 24Hr SCS Max Surface Ponding Depth (m)	100 Year 3HrCHI Max HGL (m)	100 Year 3HrCHI Max Surface Ponding Depth (m)
RY001	97.50	96.74	0.00	96.45	0.00
RY002	99.98	100.17	0.19	100.17	0.19
RY003	100.87	101.07	0.20	101.07	0.20
RY004	101.75	101.90	0.15	101.91	0.16
RY005	101.85	102.01	0.16	102.01	0.16
RY006	96.75	96.82	0.07	96.40	0.00
RY007	97.29	97.54	0.25	97.52	0.23
RY008	97.82	97.60	0.00	97.55	0.00
RY009	99.12	99.25	0.13	99.25	0.13
RY010	99.55	99.55	0.00	99.55	0.00
RY011	98.47	98.67	0.20	98.67	0.20
RY012	98.85	99.16	0.31	99.15	0.30
RY013	98.37	98.39	0.02	98.34	0.00
RY014	98.04	98.28	0.24	98.24	0.20
RY015	97.91	97.80	0.00	97.67	0.00
RY016	97.14	97.33	0.19	97.31	0.17
RY017	96.45	96.63	0.18	96.48	0.02
RY018	101.26	101.43	0.17	101.41	0.15
RY019	98.22	98.29	0.07	98.03	0.00
RY020	99.02	99.22	0.20	99.22	0.20
RY021	99.36	99.52	0.16	99.52	0.16
RY025	96.69	96.85	0.16	96.85	0.16
RY026	96.10	96.36	0.26	96.36	0.26
RY027	95.86	96.15	0.29	96.14	0.28
RY028	95.70	95.46	0.00	95.18	0.00
RY029	94.95	95.03	0.08	94.95	0.00
RY030	95.21	95.05	0.00	94.90	0.00
RY031	95.39	95.58	0.19	95.57	0.18
RY032	95.37	95.60	0.23	95.58	0.21
RY033	95.24	95.51	0.27	95.25	0.01
RY034	95.22	95.48	0.26	95.46	0.24
RY035	95.56	95.74	0.18	95.73	0.17
RY036	95.35	95.61	0.26	95.59	0.24
RY037	95.22	95.23	0.01	94.83	0.00
RY038	95.36	95.54	0.18	95.54	0.18
RY040	103.61	103.61	0.00	103.61	0.00
RY041	103.30	99.84	0.00	99.53	0.00
RY042	100.20	99.89	0.00	99.59	0.00
RY043	100.50	100.07	0.00	100.00	0.00
RY044	100.67	100.67	0.00	100.67	0.00

Table C3 :Rear Yard Ponding Depth Summary

Node	Invert Elevation (m)	100 Year 24Hr SCS Max HGL (m)	100 Year 24Hr SCS Max Surface Ponding Depth (m)	100 Year 3HrCHI Max HGL (m)	100 Year 3HrCHI Max Surface Ponding Depth (m)
RY045	101.28	100.64	0.00	100.12	0.00
RY046	100.96	100.96	0.00	100.96	0.00
RY047	101.10	100.95	0.00	100.80	0.00
RY048	101.46	101.28	0.00	100.97	0.00
RY049	101.68	101.92	0.24	101.91	0.23
RY050	101.83	102.01	0.18	102.01	0.18
RY051	101.87	102.09	0.22	102.09	0.22
RY053	102.45	102.60	0.15	102.59	0.14
RY054	101.90	102.01	0.11	102.01	0.11
RY055	101.35	101.52	0.17	101.51	0.16
RY056	100.26	99.64	0.00	99.58	0.00
RY057	98.06	98.33	0.27	98.31	0.25
RY058	97.97	97.79	0.00	97.05	0.00
RY059	97.87	97.98	0.11	98.04	0.17
RY060	97.81	97.83	0.02	97.88	0.07
RY061	97.73	97.75	0.02	97.78	0.05
RY062	97.71	97.21	0.00	97.03	0.00
RY069	101.16	101.41	0.25	101.40	0.24
RY070	101.02	101.09	0.07	100.30	0.00
RY071	102.90	103.00	0.10	102.99	0.09
RY072	101.15	100.38	0.00	99.80	0.00
RY073	101.29	101.42	0.13	101.41	0.12
RY074	101.76	101.88	0.12	101.87	0.11
RY075	100.35	100.59	0.24	100.54	0.19
RY076	100.30	100.58	0.28	100.23	0.00
RY081	98.00	97.20	0.00	97.03	0.00
RY082	97.63	97.86	0.23	97.85	0.22
RY083	97.82	97.75	0.00	97.74	0.00
RY084	97.88	98.13	0.25	98.12	0.24
RY085	97.92	98.15	0.23	98.13	0.21
RY086	98.10	97.48	0.00	97.03	0.00
RY087	98.34	98.52	0.18	98.51	0.17
RY088	98.38	98.07	0.00	98.08	0.00
RY089	99.53	99.68	0.15	99.67	0.14
RY090	99.60	98.06	0.00	98.04	0.00
RY091	100.77	100.90	0.13	100.90	0.13
RY092	100.82	100.89	0.07	100.88	0.06
RY093	101.30	99.13	0.00	98.49	0.00
RY094	101.96	102.08	0.12	102.08	0.12
RY095	104.45	104.57	0.12	104.57	0.12

Table C3 :Rear Yard Ponding Depth Summary

Node	Invert Elevation (m)	100 Year 24Hr SCS		100 Year 3HrCHI	
		Max HGL (m)	Max Surface Ponding Depth (m)	Max HGL (m)	Max Surface Ponding Depth (m)
RY096	102.02	97.88	0.00	97.77	0.00
RY097	102.01	102.21	0.20	102.20	0.19
RY098	100.86	99.75	0.00	99.10	0.00
RY099	102.66	102.76	0.10	102.76	0.10
RY100	103.60	103.71	0.11	103.71	0.11
RY101	102.50	99.04	0.00	98.51	0.00
RY102	102.10	102.13	0.03	101.90	0.00
RY103	105.30	105.47	0.17	105.46	0.16
RY104	106.53	106.67	0.14	106.67	0.14
RY105	105.20	105.51	0.31	105.49	0.29
RY106	105.50	103.28	0.00	103.22	0.00
Average	-	-	**0.12**	-	**0.10**
Max	-	-	**0.31**	-	**0.30**

Table C4 : Minor System Freebaord Summary

Name	Invert (m)	Top of MH (m)	100 Year 24Hr SCS			100 Year 3 Hr Chicago			Notes
			Rep. Max. Depth (m)	Max HGL (m)	Freeboard (m)	Rep. Max. Depth (m)	Max HGL (m)	Freeboard (m)	
MH-1000	102.05	104.21	0.00	102.05	2.16	0.00	102.05	2.16	
MH-1001	99.79	102.36	0.25	100.04	2.32	0.25	100.04	2.32	
MH-1002	99.59	101.98	0.30	99.89	2.09	0.30	99.89	2.09	
MH-1003	99.54	101.90	0.27	99.81	2.09	0.27	99.81	2.09	
MH-1004	99.79	101.89	0.00	99.79	2.10	0.00	99.79	2.10	
MH-1005	99.03	101.53	0.42	99.45	2.08	0.41	99.44	2.09	
MH-1006	98.70	101.35	0.68	99.38	1.97	0.67	99.37	1.98	
MH-1007	99.13	101.55	0.22	99.35	2.20	0.22	99.35	2.20	
MH-1008	98.44	101.05	0.60	99.04	2.01	0.59	99.03	2.02	
MH-1009	98.18	100.86	0.71	98.89	1.97	0.71	98.89	1.97	
MH-1010	97.91	100.67	0.69	98.60	2.07	0.68	98.59	2.08	
MH-1011	97.81	101.12	0.70	98.51	2.61	0.69	98.50	2.63	
MH-1012	97.76	101.21	0.72	98.48	2.73	0.71	98.47	2.74	
MH-1013	99.76	101.94	0.00	99.76	2.18	0.00	99.76	2.18	
MH-1014	99.36	101.64	0.20	99.56	2.08	0.20	99.56	2.08	
MH-1015	97.71	101.31	0.74	98.45	2.86	0.73	98.44	2.87	
MH-1016	99.84	102.09	0.10	99.94	2.15	0.11	99.95	2.14	
MH-1017	99.67	101.95	0.27	99.94	2.01	0.27	99.94	2.01	
MH-1018	97.59	101.77	0.75	98.34	3.43	0.73	98.32	3.45	
MH-1019	100.99	103.09	0.00	100.99	2.10	0.00	100.99	2.10	
MH-1020	100.26	102.45	0.15	100.41	2.04	0.15	100.41	2.04	
MH-1021	97.37	101.85	0.81	98.18	3.67	0.79	98.16	3.69	
MH-1022	97.18	102.32	0.78	97.96	4.36	0.74	97.92	4.40	
MH-1024	100.66	104.67	0.63	101.29	3.38	0.62	101.28	3.39	
MH-1025	100.53	104.99	0.67	101.20	3.79	0.66	101.19	3.80	
MH-1026	99.12	101.59	0.47	99.59	2.00	0.47	99.59	2.00	
MH-1027	100.00	102.33	0.31	100.31	2.02	0.31	100.31	2.02	
MH-1028	99.61	102.23	0.53	100.14	2.09	0.53	100.14	2.09	
MH-1029	98.84	102.13	0.57	99.41	2.72	0.57	99.41	2.72	
MH-1030	98.63	101.98	0.53	99.16	2.82	0.53	99.16	2.82	
MH-1031	98.40	101.93	0.63	99.03	2.90	0.63	99.03	2.90	
MH-1033	97.05	103.27	1.65	98.70	4.57	1.62	98.67	4.60	
MH-1034	96.87	101.77	1.70	98.57	3.20	1.66	98.53	3.24	
MH-1035	96.75	101.96	1.76	98.51	3.45	1.72	98.47	3.49	
MH-1036	96.65	102.10	1.82	98.47	3.63	1.78	98.43	3.67	
MH-1037	96.55	103.12	1.86	98.41	4.71	1.83	98.38	4.74	
MH-1038	96.38	104.92	1.82	98.20	6.72	1.78	98.16	6.76	
MH-1039	95.92	103.25	1.94	97.86	5.39	1.89	97.81	5.44	
MH-1040	95.81	104.97	1.95	97.76	7.21	1.90	97.71	7.26	
MH-1041	95.68	104.88	1.94	97.62	7.26	1.89	97.57	7.31	
MH-1042	100.42	103.40	0.47	100.89	2.51	0.42	100.84	2.56	
MH-1043	95.60	103.67	1.95	97.55	6.12	1.91	97.51	6.16	
MH-1044	95.50	103.11	1.93	97.43	5.68	1.89	97.39	5.72	
MH-1045	95.41	102.78	1.92	97.33	5.45	1.87	97.28	5.50	
MH-1046	95.29	102.37	1.80	97.09	5.28	1.76	97.05	5.32	
MH-1047	95.17	101.52	1.52	96.69	4.83	1.48	96.65	4.87	
MH-1048	94.16	102.31	2.53	96.69	5.62	2.17	96.33	5.98	
MH-1049	94.00	100.75	2.70	96.70	4.05	2.37	96.37	4.38	
MH-1050	94.80	97.06	0.27	95.07	1.99	0.21	95.01	2.05	
MH-1051	94.69	96.95	0.37	95.06	1.89	0.25	94.94	2.01	
MH-1052	94.51	96.68	0.53	95.04	1.64	0.42	94.93	1.75	No STM Connections
MH-1053	94.39	96.50	0.61	95.00	1.50	0.53	94.92	1.58	No STM Connections
MH-1054	94.23	96.35	0.74	94.97	1.38	0.66	94.89	1.46	No STM Connections
MH-1055	94.14	95.83	0.83	94.97	0.87	0.74	94.88	0.96	No STM Connections
MH-2000	96.37	100.71	1.09	97.46	3.25	0.66	97.03	3.68	

Table C4 : Minor System Freebaord Summary

Name	Invert (m)	Top of MH (m)	100 Year 24Hr SCS			100 Year 3 Hr Chicago			Notes
			Rep. Max. Depth (m)	Max HGL (m)	Freeboard (m)	Rep. Max. Depth (m)	Max HGL (m)	Freeboard (m)	
MH-2001	97.35	101.00	0.62	97.97	3.03	0.63	97.98	3.02	
MH-2002	96.27	101.00	1.19	97.46	3.54	0.76	97.03	3.97	
MH-2003	96.62	100.00	1.03	97.65	2.35	0.79	97.41	2.59	
MH-2004	96.07	100.46	1.33	97.40	3.06	0.96	97.03	3.43	
MH-2005	95.84	100.24	1.42	97.26	2.98	1.19	97.03	3.21	
MH-2006	95.58	100.03	1.62	97.20	2.83	1.45	97.03	3.00	
MH-2007	95.32	99.85	1.88	97.20	2.65	1.71	97.03	2.82	
MH-2008	98.19	101.07	0.00	98.19	2.88	0.00	98.19	2.88	
MH-2009	96.88	99.96	0.33	97.21	2.76	0.20	97.08	2.88	
MH-2010	95.06	99.76	2.15	97.21	2.55	1.97	97.03	2.73	
MH-2011	94.81	99.50	2.40	97.21	2.29	2.23	97.04	2.46	
MH-2012	98.03	100.91	0.00	98.03	2.88	0.00	98.03	2.88	
MH-2013	96.70	101.00	0.57	97.27	3.73	0.55	97.25	3.75	
MH-2014	96.30	101.00	0.91	97.21	3.79	0.73	97.03	3.97	
MH-2015	96.09	100.76	1.12	97.21	3.56	0.94	97.03	3.74	
MH-2016	95.90	100.04	1.33	97.23	2.81	1.12	97.02	3.02	
MH-2017	95.72	99.96	1.52	97.24	2.72	1.31	97.03	2.93	
MH-2018	96.29	99.92	0.93	97.22	2.70	0.75	97.04	2.88	
MH-2019	96.14	99.70	1.08	97.22	2.48	0.90	97.04	2.66	
MH-2020	95.56	99.48	1.66	97.22	2.26	1.47	97.03	2.45	
MH-2021	94.48	99.01	2.72	97.20	1.81	2.55	97.03	1.98	
MH-2022	94.34	99.00	2.87	97.21	1.79	2.69	97.03	1.97	SWM Pond MH
MH-2023	93.90	97.70	0.63	94.53	3.17	0.62	94.52	3.18	
MH-2024	94.04	97.91	0.38	94.42	3.49	0.37	94.41	3.50	
MH-4000	102.33	104.44	0.00	102.33	2.11	0.00	102.33	2.11	
MH-4001	101.86	104.13	0.13	101.99	2.14	0.13	101.99	2.14	
MH-4002	101.38	103.72	0.22	101.60	2.12	0.22	101.60	2.12	
MH-4003	101.24	103.59	0.29	101.53	2.06	0.29	101.53	2.06	
MH-4004	99.86	101.96	1.36	101.22	0.74	1.06	100.92	1.04	Rear Yard MH
MH-4005	99.06	103.52	1.70	100.76	2.76	1.35	100.41	3.11	
MH-4006	101.03	103.13	0.15	101.18	1.95	0.15	101.18	1.95	
MH-4007	98.82	102.98	1.51	100.33	2.65	1.19	100.01	2.97	
MH-4008	98.36	102.77	1.69	100.05	2.72	1.44	99.80	2.97	
MH-4010	97.85	102.07	2.03	99.88	2.19	1.74	99.59	2.48	
MH-4011	99.54	104.33	0.65	100.19	4.14	0.28	99.82	4.51	
MH-4012	99.36	104.06	0.80	100.16	3.90	0.35	99.71	4.35	
MH-4013	99.06	103.80	1.08	100.14	3.66	0.63	99.69	4.11	
MH-4014	98.83	103.42	1.25	100.08	3.34	0.84	99.67	3.75	
MH-4015	98.67	103.00	1.35	100.02	2.98	0.97	99.64	3.36	
MH-4016	98.55	102.54	1.40	99.95	2.59	1.06	99.61	2.93	
MH-4017	98.42	102.07	1.43	99.85	2.22	1.12	99.54	2.53	
MH-4018	98.26	102.02	1.56	99.82	2.20	1.25	99.51	2.51	
MH-4019	97.70	101.73	2.03	99.73	2.00	1.75	99.45	2.28	
MH-4020	97.55	101.36	2.00	99.55	1.81	1.74	99.29	2.07	
MH-4021	97.41	101.28	2.00	99.41	1.87	1.75	99.16	2.12	
MH-4022	97.25	101.20	2.00	99.25	1.95	1.78	99.03	2.17	
MH-4024	96.93	101.06	1.95	98.88	2.18	1.76	98.69	2.37	
MH-4025	97.05	101.11	1.98	99.03	2.08	1.78	98.83	2.28	
MH-4026	97.16	101.16	2.00	99.16	2.00	1.78	98.94	2.22	
MH-4027	100.87	103.08	0.16	101.03	2.05	0.16	101.03	2.05	
MH-4028	101.01	103.23	0.15	101.16	2.07	0.15	101.16	2.07	
MH-4029	101.23	103.48	0.00	101.23	2.25	0.00	101.23	2.25	
MH-4030	99.63	103.07	0.20	99.83	3.24	0.20	99.83	3.24	
MH-4031	99.24	101.49	0.00	99.24	2.25	0.00	99.24	2.25	
MH-4032	98.87	101.22	0.26	99.13	2.09	0.26	99.13	2.09	

Table C4 : Minor System Freebaord Summary

Name	Invert (m)	Top of MH (m)	100 Year 24Hr SCS Rep. Max. Depth (m)	100 Year 24Hr SCS Max HGL (m)	100 Year 24Hr SCS Freeboard (m)	100 Year 3 Hr Chicago Rep. Max. Depth (m)	100 Year 3 Hr Chicago Max HGL (m)	100 Year 3 Hr Chicago Freeboard (m)	Notes
MH-4033	97.65	100.12	1.03	98.68	1.44	0.86	98.51	1.61	Rear Yard MH
MH-4034	97.43	101.17	1.19	98.62	2.55	1.02	98.45	2.72	
MH-4035	96.65	100.93	1.95	98.60	2.34	1.79	98.44	2.50	
MH-4036	96.45	100.85	1.90	98.35	2.51	1.76	98.21	2.65	
MH-4037	96.27	100.61	1.79	98.06	2.55	1.67	97.94	2.68	
MH-4038	96.11	100.39	1.69	97.80	2.59	1.59	97.70	2.69	
MH-4039	95.95	100.17	1.62	97.57	2.61	1.54	97.49	2.69	
MH-4040	95.78	99.95	1.52	97.30	2.65	1.46	97.24	2.71	
MH-4041	94.79	99.49	1.58	96.37	3.13	1.51	96.30	3.19	
MH-4042	94.08	97.85	1.71	95.79	2.06	1.53	95.61	2.24	
MH-4043	94.00	96.30	1.70	95.70	0.60	1.48	95.48	0.82	SWM Pond MH
MH-4044	93.45	96.07	0.46	93.91	2.16	0.43	93.88	2.19	
MH-5000	100.93	103.25	0.00	100.93	2.33	0.00	100.93	2.33	
MH-5001	100.61	102.97	0.16	100.77	2.20	0.16	100.77	2.20	
MH-5002	99.83	102.72	0.18	100.01	2.71	0.18	100.01	2.71	
MH-5003	99.22	101.77	0.48	99.70	2.07	0.48	99.70	2.07	
MH-5004	98.96	101.59	0.46	99.42	2.17	0.46	99.42	2.17	
MH-5005	98.72	101.37	0.58	99.30	2.08	0.58	99.30	2.08	
MH-5006	98.55	101.23	0.73	99.28	1.95	0.73	99.28	1.95	
MH-5007	99.18	101.43	0.00	99.18	2.25	0.00	99.18	2.25	
MH-5008	98.41	101.15	0.46	98.87	2.28	0.46	98.87	2.28	
MH-5009	98.03	100.86	0.47	98.50	2.36	0.47	98.50	2.36	
MH-5010	99.44	101.54	0.00	99.44	2.10	0.00	99.44	2.10	
MH-5011	99.23	101.42	0.10	99.33	2.09	0.10	99.33	2.09	
MH-5012	99.08	101.31	0.23	99.31	2.00	0.23	99.31	2.00	
MH-5013	98.95	101.24	0.17	99.12	2.12	0.17	99.12	2.12	
MH-5014	98.64	100.92	0.27	98.91	2.01	0.27	98.91	2.01	
MH-5015	98.56	100.87	0.29	98.85	2.02	0.30	98.86	2.01	
MH-5016	97.60	100.56	0.46	98.06	2.50	0.46	98.06	2.50	
MH-5017	96.46	99.59	0.62	97.08	2.51	0.62	97.08	2.51	
MH-5019	96.01	99.19	0.63	96.64	2.55	0.30	96.31	2.88	
MH-5020	95.65	98.90	1.00	96.65	2.25	0.65	96.30	2.60	
MH-5021	94.93	98.73	1.55	96.48	2.25	1.28	96.21	2.52	
MH-5022	94.70	98.73	1.70	96.40	2.33	1.51	96.21	2.52	
MH-5023	94.38	96.70	0.15	94.53	2.18	0.15	94.53	2.18	
MH-5024	94.19	98.03	0.14	94.33	3.70	0.13	94.32	3.71	
MH-6000	95.48	97.06	0.08	95.56	1.50	0.08	95.56	1.50	Sump Pump Connection
MH-6001	95.35	96.97	0.21	95.56	1.41	0.21	95.56	1.41	Sump Pump Connection
MH-6002	95.09	96.95	0.22	95.31	1.65	0.21	95.30	1.66	Sump Pump Connection
MH-6003	94.85	96.68	0.48	95.33	1.35	0.32	95.17	1.51	Sump Pump Connection
MH-6004	94.44	96.46	0.82	95.26	1.20	0.65	95.09	1.37	Sump Pump Connection
MH-6005	94.24	96.24	0.98	95.22	1.02	0.77	95.01	1.23	Sump Pump Connection
MH-6006	94.09	96.08	1.14	95.23	0.85	0.83	94.92	1.16	Sump Pump Connection
MH-6007	93.83	96.22	1.35	95.18	1.04	1.22	95.05	1.17	Sump Pump Connection
MH-6008	93.64	96.02	1.40	95.04	0.98	1.36	95.00	1.02	Sump Pump Connection
MH-6009	93.44	95.83	1.45	94.89	0.94	1.23	94.67	1.16	Sump Pump Connection
MH-6010	93.20	95.65	1.46	94.66	0.99	1.22	94.42	1.23	Sump Pump Connection
MH-6011	93.00	95.61	1.62	94.62	1.00	1.34	94.34	1.28	Sump Pump Connection
MH-6012	92.85	95.50	1.80	94.65	0.84	1.39	94.24	1.26	Sump Pump Connection
MH-6013	92.89	95.17	1.52	94.41	0.76	2.28	95.17	0.00	Sump Pump Connection
MH-6014	92.78	95.46	1.82	94.60	0.86	1.42	94.20	1.26	Sump Pump Connection
MH-6020	94.03	100.75	2.67	96.70	4.05	2.33	96.36	4.39	
				Average	2.594		Average	2.700	

Table C5 : Existing Upstream Minor System HGL Summary

STM ID	Location	Existing Condition 5 Year Chicago 3Hr	Existing Condition 100 Year Chicago 3Hr	Existing Condition 100 Year SCS 24Hr	Proposed Condition 5 Year Chicago 3Hr	Proposed Condition 100 Year Chicago 3Hr	Proposed Condition 100 Year SCS 24Hr	Difference 5 Year Chicago 3Hr	Difference 100 Year Chicago 3Hr	Difference 100 Year SCS 24Hr
MHST12451	Campeau Drive West	98.84	99.17	99.18	98.61	98.98	99.00	-0.24	-0.19	-0.18
MHST12845	Hodgson Court	102.28	102.29	102.28	101.68	102.02	102.06	-0.60	-0.27	-0.22
MHST13136	Sherring Court	99.58	100.88	100.98	98.85	99.65	99.93	-0.73	-1.23	-1.05
MHST11761	Langford Crescent	100.82	101.08	101.13	100.00	100.32	100.32	-0.82	-0.76	-0.81
MHST12871	Kenins Crescent	100.36	100.79	100.78	100.31	100.75	100.75	-0.04	-0.04	-0.03
MHST11678*	Goulding Crescent	97.65	98.29	98.36	97.69	98.11	98.12	0.04	-0.18	-0.24
MHST11682	Shanghnessy Crescent North	97.36	97.66	97.69	97.35	97.51	97.54	0.00	-0.15	-0.15
MHST11661	Shanghnessy Crescent South	98.60	98.90	98.02	97.52	97.84	98.01	-1.08	-1.05	-0.01
MHST12204	Rosenfeld Crescent	98.16	98.25	98.32	98.14	98.21	98.23	-0.02	-0.05	-0.09
MHST12962	Stonecroft Terrace	101.77	101.88	101.87	101.78	101.89	101.87	0.00	0.00	0.00
MHST01107*	Campeau Drive East	101.87	101.97	101.97	101.89	102.02	102.02	0.02	0.05	0.05

*Increases in HGL due to increases in drainage area of the existing development in the proposed conditions model, not due to HGL constrictions of the downstream minor system

Table C6 : Existing Downstream Minor System HGL Summary

			Existing Condition				Proposed Condition				Difference			
STM ID	Location	Description	5 Year Chicago 3Hr	100 Year Chicago 3Hr	100 Year SCS 24Hr	100 Year SCS 24Hr + 20%	5 Year Chicago 3Hr	100 Year Chicago 3Hr	100 Year SCS 24Hr	100 Year SCS 24Hr + 20%	5 Year Chicago 3Hr	100 Year Chicago 3Hr	100 Year SCS 24Hr	100+20%
MHST11730	Knudson Drive	D/S SWMF Ponds 1 & 2	93.06	93.90	93.94	94.08	92.96	93.58	93.79	94.12	-0.11	-0.32	-0.15	0.04
MHST11789	Weslock Way	D/S Storage Units	92.93	93.50	93.54	93.65	92.84	93.31	93.50	93.75	-0.09	-0.19	-0.03	0.10
MHST11927	Wesltlock Way	D/S Pond outlets 4 & 5	92.74	93.01	93.03	93.09	92.71	92.94	93.02	93.14	-0.04	-0.07	-0.01	0.05