KCF Groundwater, Inc.

A Report on the Stormwater Runoff Monitoring, Modeling, and Karst-Loss Infiltration Volumes and Rates at the fYNOP Site, York, PA

Prepared for:
Groundwater Sciences Corporation

Prepared by:

Karst Groundwater Consultants
Mechanicsburg, PA 17055
(717) 691-8025
kcfgroundwater.com

September 5, 2014

KCF Groundwater, Inc.

A Report on the Stormwater Runoff Monitoring, Modeling, and Karst-Loss Infiltration Volumes and Rates at the fYNOP Site, York, PA

TABLE OF CONTENTS

1. Introduction and Background 1
2. Karst Loss Determination Methods, and Observed Features at YNOP 2
3. Storm Flow Measurement Methods and Instrumentation 3
   - 3.1 Flow Monitoring Instruments 3
   - 3.2 Flow Monitoring Locations 3
4. Discussion of Three Different Sources of Rainfall Data for Stormflow Modeling 5
5. Post-Development Stormwater Runoff Model Calculations for Peak Heights, Flows, and Hydrographs, for Karst-Impacted Areas 5
   - 5.1 Means and Methods 5
   - 5.2 Drainage Areas 6
   - 5.3 Land Cover and Hydrologic Soil Group 6
   - 5.4 Time of Concentration 7
   - 5.5 Stormwater Management Facilities 7
   - 5.6 Selection of September and October 2013 Storm Events 8
   - 5.7 Calculated Peak Heights, Flow Rates, and Stormwater Volumes 9
     - 5.7.1 Tri-Hills, York Rainfall 9
     - 5.7.2 East York Rainfall 9
     - 5.7.3 fYNOP Rainfall 10
6. Stormflow Measurement Results 11
7. Karst Loss Calculations 11
   - 7.1 Tri-Hills, York Rainfall 12
   - 7.2 East York Rainfall 13
   - 7.3 fYNOP Rainfall 13
8. Discussion of the Results, with Perspectives on Groundwater Capture 14
9. References 18

Figures

1. Location Map, and Stormwater and Sanitary Sewer Site Plan
2. Drainage Area Location Map
3. Rainfall – September 21, 2013 Storm: Tri Hill Gauge
4. Rainfall – October 10-11, 2013 Storm: Tri Hill Gauge
5. Rainfall – September 21, 2013 Storm: East York Gauge
6. Rainfall – October 10-11, 2013 Storm: East York Gauge

7. **Rainfall – September 21, 2013 Storm: fYNOP Gauge**
8. **Rainfall – October 10-11, 2013 Storm: fYNOP Gauge**
9. **Rainfall – October 7, 2013 Storm: fYNOP Gauge**
10. **Modeled Stormflow Hydrograph: 1001+1002; September 21 Storm; Tri Hill Gauge**
11. **Modeled Stormflow Hydrograph: 1003; September 21 Storm; Tri Hill Gauge**
12. **Modeled Stormflow Hydrograph: 1004+1005; September 21 Storm; Tri Hill Gauge**
13. **Modeled Stormflow Hydrograph: Sinkhole; September 21 Storm; Tri Hill Gauge**
14. **Modeled Stormflow Hydrograph: 1001+1002; October 10-11 Storm; Tri Hill Gauge**
15. **Modeled Stormflow Hydrograph: 1003; October 10-11 Storm; Tri Hill Gauge**
16. **Modeled Stormflow Hydrograph: 1004+1005; October 10-11 Storm; Tri Hill Gauge**
17. **Modeled Stormflow Hydrograph: Sinkhole; October 10-11 Storm; Tri Hill Gauge**
18. **Modeled Stormflow Hydrograph: 1001+1002; September 21 Storm; East York Gauge**
19. **Modeled Stormflow Hydrograph: 1003; September 21 Storm; East York Gauge**
20. **Modeled Stormflow Hydrograph: 1004+1005; September 21 Storm; East York Gauge**
21. **Modeled Stormflow Hydrograph: Sinkhole; September 21 Storm; East York Gauge**
22. **Modeled Stormflow Hydrograph: 1001+1002; October 10-11 Storm; East York Gauge**
23. **Modeled Stormflow Hydrograph: 1003; October 10-11 Storm; East York Gauge**
24. **Modeled Stormflow Hydrograph: 1004+1005; October 10-11 Storm; East York Gauge**
25. **Modeled Stormflow Hydrograph: Sinkhole; October 10-11 Storm; East York Gauge**
26. **Modeled Stormflow Hydrograph: 1001+1002; September 21 Storm; fYNOP Gauge**
27. **Modeled Stormflow Hydrograph: 1003; September 21 Storm; fYNOP Gauge**
28. **Modeled Stormflow Hydrograph: 1004+1005; September 21 Storm; fYNOP Gauge**
29. **Modeled Stormflow Hydrograph: Sinkhole; September 21 Storm; fYNOP Gauge**
30. **Modeled Stormflow Hydrograph: 1001+1002; October 10-11 Storm; fYNOP Gauge**
31. **Modeled Stormflow Hydrograph: 1003; October 10-11 Storm; fYNOP Gauge**
32. **Modeled Stormflow Hydrograph: 1004+1005; October 10-11 Storm; fYNOP Gauge**
33. **Modeled Stormflow Hydrograph: Sinkhole; October 10-11 Storm; fYNOP Gauge**
34. **Modeled Stormflow Hydrograph: 1001+1002; October 7 Storm; fYNOP Gauge**
35. **Modeled Stormflow Hydrograph: 1003; October 7 Storm; fYNOP Gauge**
36. **Modeled Stormflow Hydrograph: 1004+1005; October 7 Storm; fYNOP Gauge**
37. **Modeled Stormflow Hydrograph: Sinkhole; October 7 Storm; fYNOP Gauge**
38. **Measured Stormflow Hydrograph: 1001+1002 meters; September 21 Storm**
39. **Measured Stormflow Hydrograph: 1003 meter; September 21 Storm**
40. **Measured Stormflow Hydrograph: 1004+1005 meters; September 21 Storm**
41. **Measured Stormflow Hydrograph: 1001+1002 meters; October 7 Storm**
42. **Measured Stormflow Hydrograph: 1003 meter; October 7 Storm**
43. **Measured Stormflow Hydrograph: 1004+1005 meters; October 7 Storm**
44. **Measured Stormflow Hydrograph: 1001+1002 meters; October 10-11 Storm**
45. **Measured Stormflow Hydrograph: 1003 meter; October 10-11 Storm**
46. **Measured Stormflow Hydrograph: 1004+1005 meters; October 10-11 Storm**
47. **Measured Well Hydrograph MW-97: September and October, 2013**
48. **Measured Well Hydrograph MW-96D: September and October, 2013**

Appendix A – Data Tables

1. **Summary of September 21 rainfall data: Tri-Hill Gauge**
2. **Summary of October 10-11 rainfall data: Tri-Hill Gauge**
3. **Summary of September 21 rainfall data: East York Gauge**

4. **Summary of October 10-11 rainfall data: East York Gauge**
5. **Summary of September 21 rainfall data: fYNOP Gauge**
6. **Summary of October 10-11 rainfall data: fYNOP Gauge**
7. **Summary of October 7 rainfall data: fYNOP Gauge**

Appendix B – Drainage Areas

8. **Comparison Table of Drainage Area Calculations**

PREFACE

The purpose of this report is an effort to quantify karst-loss type of stormwater infiltration to the Site, in terms of volumes and rates, in the various sub-basins and to determine attenuation coefficients for estimating karst-loss volume for future storms to the Site. The karst-loss assessment is one prong in a multi-pronged plan to come up with methodologies to prevent off-site migration of COCs. This assessment is intended to add to the body of knowledge about infiltration of stormwater to the karst aquifer beneath the Site. To some extent our results were diminished by the discrepancies between rainfall measured and runoff measured and modeled. There was an inability to reconcile site data with modeled flow volumes for one of the rain events. However, much of the karst loss results provide insight to make the assessment worthwhile.

This report is not intended to assess the impact of karst loss on the existing groundwater extraction system's ability to prevent offsite migration of COCs. Additional investigation involving deployment of continuous water level and water quality recorders in wells that intersect karst features through the drawdown area of the system would be required to monitor the impact of karst loss infiltration while the extraction system is operating.

A Report on the Stormwater Runoff Monitoring, Modeling, and Karst-Loss Infiltration Volumes and Rates at the fYNOP Site, York, PA

1. Introduction and Background

The fYNOP site is partly underlain by carbonate bedrock which has enlarged openings from groundwater solutioning over geologic time periods. Other areas of the site are underlain by non-carbonate bedrock which tend to be more elevated. Stormwater runoff flows from the upland areas to the carbonate lowland areas, and stormwater falls directly onto the carbonate areas. A portion of the stormwater from these off-site and on-site sources recharges the epikarstic aquifer, which is a subterraneous zone containing large water reserves, and which is a highly-solutioned zone on top of the thick carbonate aquifer beneath the site.

"Recharge" is the hydrologic process where water moves downward from surface water to groundwater. The portion of the stormwater that does not enter the ground as recharge runs off the site. Both soil-infiltration and karst-loss-type of recharge occur on the site. Karst-loss is surface runoff loss into the underlying bedrock through karst features. Karst-loss provides substantially more recharge than soil infiltration through the karstic openings that are found in the unpaved areas of the karst terrain. The recovery well network beneath the West Parking Lot and vicinity is intended to capture the recharge as groundwater flow through the karst aquifer. The objectives of the karst loss site assessment which is described in the following text, are: (1) to estimate the karst-loss recharge amounts for the karst areas of the fYNOP site corresponding to several substantial storms using a flow balance technique, and to verify those amounts as reasonable for the site; and (2) to estimate the additional rate of pumping from those contaminated areas of the aquifer which have been impacted by karst-loss, such that groundwater capture is maintained.

The area of the fYNOP site that is karst terrain generally experiences some enhanced infiltration and recharge to the underlying aquifer due to runoff into sinks and depressions, swallets, and swallow holes. Karst terrain is typified by shallow, closed depressions into which stormwater flows and collects during rainstorms. The depressions have formed as the result of scouring and piping of soil overburden into the underlying epikarst bedrock layer that contains interconnected conduit-type permeability, causing a minor subsidence. Shallow ground depressions often can be found to contain small openings in the soil, termed swallets or swallow holes, into which stormwater flows downwards to the karst bedrock. The

size of the openings can range from a centimeter to more than several inches in diameter. Typically the openings fall into the category of nuisance-type formations and therefore are mostly left open. Sinkholes also contribute to stormwater recharge through drainage into exposed rock throats. White (1988) and Palmer (2004) provide detailed descriptions of these types of enhanced stormwater infiltration mechanisms for karst terrain.

The stormwater recharge to the epikarst bedrock layer causes the water table to elevate locally around the areas of recharge forming a mound. The karstic groundwater flows outwards and downwards away from the mound until the driving head dissipates. The local epikarstic recharge becomes entrained in the regional groundwater flow system.

Karst-loss is the term given to enhanced stormwater recharge, or infiltration, into the epikarst aquifer. Because the karst bedrock openings act like open drains, the stormwater recharge occurs at much faster rate than soil infiltration can. The karst-loss mechanism can substantially consume stormwater flow through a watershed located in karst terrain. As an example, at a karst site in King of Prussia, PA, karst-loss was estimated to have recharged the 2-year stormflow peak discharge by between 36 and 43 percent.

Generally, the PSU-IV model approach is the industry-standard approach for estimating karst-loss type of infiltration for undeveloped/natural sites, and in the technical guidance on the subject (Aron et al., 1981), a demonstration calculation is provided showing a peak storm flow attenuation for a 2 year storm of 26 percent by the karst-loss recharge mechanism. The approach is not a computer-model, but rather an empirical method that makes use of site conditions. The approach is intended for karst-conditions only. However, the PSU-IV model calculation approach is not appropriate for developed sites such as fYNOP (the 'Site') because of the modified karst-loss behavior. The modifications result from the impervious surface cover, and the soil re-grading and compaction associated with site construction. Stormflow computer modeling software, of which there are several including Bentley Systems Pondpack, does not include karst-loss recharge mechanisms. Therefore, an appropriate approach for the Site is to measure the stormflow runoff inclusive of karst-loss, and model the stormflow runoff which would not include karst-loss, with the net difference in stormflow volume between measured and modeled being the karst-loss recharge. The methods of direct measurement of stormwater discharge from the Site are discussed below.

2. Karst Loss Determination Methods, and Observed Features at fYNOP

The direct measurement of the stormwater runoff volume associated with a substantial storm event, and comparison with the modeled post-development runoff hydrograph can produce a karst-loss reduction, or attenuation, factor. The karst-loss reduction factor has been determined for several

significant storm events by taking the ratio of the measured peak storm flow to the modeled USDA Soil Conservation Service SCS hydrograph peak discharge rate curve. Also, the difference in stormwater volume under the discharge curves has been determined, and this estimated volume of water is the amount of karst-loss recharge for the Site for a particular storm event. An adjusted reduction factor for post-development karst-loss effects has been calculated for the Site, and these factors corresponding to the three different rain-gauge datasets are reported in Tables in Sections 7.1, 7.2, and 7.3. This adjusted reduction factor would be applied to each of the modeled runoff hydrograph peak discharge curves for different magnitudes of storms, and the annual karst-loss recharge volume to the Site would come out of these calculations. This karst-loss volume of stormwater would be compared to the previously estimated soil infiltration volume for significance. If significant, the current groundwater recovery volume by the pump and treat system might possibly consider being increased by this amount to capture the storm-related epikarstic groundwater flow.

The improved sinkhole near the old Eden Road entrance at Route 30, which is shown in Photos #1 and #2, is an example of a typical karst loss feature which is found on the Site, and which conveys stormwater into the underlying epikarst bedrock.

Photos #1 and #2 showing the improved sinkhole feature, looking south.

3. Storm Flow Measurement Methods and Instrumentation

The total storm runoff from the local watershed in which the Site is located has been monitored at multiple locations for storm flow rate over time. The data has been collected using HACH automated sensing and datalogging equipment. The stormwater discharges from the Site have been located and examined, and each of these features has been evaluated for availability to be instrumented, accessibility, and feasibility of instrumentation, prior to equipment installation. The flow monitoring equipment has been installed into each of the stormwater discharges from the Site as described below, and the equipment was programmed for the pipe dimensions in which it was located, and the instruments collected and stored in memory the water depth, the volumetric flow rate, and the cumulative volume of stormwater discharge. A continuous rainfall recorder and datalogger was

installed at the site by GSC. After completion of the runoff monitoring at all of the discharge outfalls, the stormflow data was harvested from each of the loggers, and hydrographs were generated.

3.1 Flow Monitoring Instruments The instrumentation that was selected for the stormwater discharge monitoring has reliable continuous flow measurement and data recording capability. HACH flow monitoring equipment was selected. Each stormwater discharge monitoring location was equipped with a Sigma 910 Area Velocity Flow Meter and an area-velocity sensor. Each sensor was secured using a scissor band placed inside of the stormwater pipe, and suspended from the highest point so as not to be submerged in the storm flow. The Users Manual, and Equipment Specifications summary is available at http://www.hachflow.com/pdf/4975_910-920manual.pdf.

3.2 Flow Monitoring Locations The following flow monitoring locations were instrumented on September 17, 2013. The locations of the monitoring equipment across the Site, which are referenced in the following discussion, are shown in Figure 1. The locations of the drainage areas, or sub-basins, which are referenced throughout the report are shown in Figure 2.

1. # **1001** - The "Vault" or F1.1 Stormwater Inlet (est. 100 feet east of offsite Outfall A) Outfall A receives stormwater from DA-1 and a portion of DA-6, and is located in a large rectangular concrete manhole just west of Eden Road, and southwest of the West parking lot. Using confined space entry safety precautions, an expansion ring was installed with a flow monitoring sensor(s) inside of the 42 inch diameter reinforced concrete pipe (RCP), 7 feet down the discharge pipe from the manhole (see inset Photo #3). The Sigma 910 Flow Meter was suspended outside of the manhole on a post. A laptop computer was connected by wire to the meter to download the data, and test the meter and sensor for proper operation on a periodic basis.

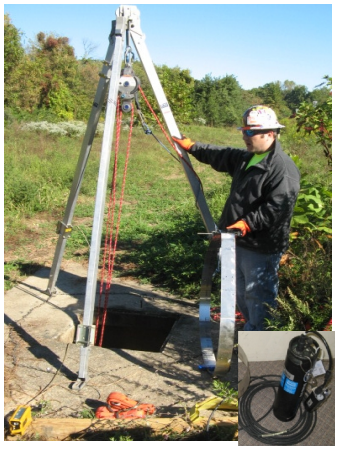


Photo #3, looking north. The scissor band and flow sensor being installed into the Vault.

2. # **1002** - Manhole F2.2 Alternate Stormwater Inlet to Outfall B This outfall receives stormwater from a portion of DA-6, and is located in a manhole which drains to Outfall B. The manhole is located directly adjacent to the concrete block retaining wall at Eden Road. Using confined space entry safety precautions, an expansion ring was used to install the flow monitoring sensor(s) inside of the 48 inch diameter reinforced concrete pipe (RCP) at a location 8 feet down the discharge pipe. The Sigma 910 Flow Meter was suspended inside of the manhole just beneath the manhole lid.

3. **# 1003 -** F9.4 Stormwater Inlet This outfall receives stormwater from the northwest-most area of DA-6, with most of the stormflow originating as runoff from Eden Road. The basin in front of the

Vortechnics treatment unit is clay-lined. The discharge occurs from an 18 inch diameter corrugated poly pipe and endwall. An expansion ring was used to install the flow monitoring sensor(s) inside of the 18 inch diameter poly pipe at a location 18 inches up the pipe from the endwall (see inset Photo #4). The Sigma 910 Flow Meter was suspended outside of the endwall in a tree to keep it elevated above flood level in the creek. It was noted during the site walkover that some risk of backflow from Johnson's Run creek exists during larger storm events, pe SAIC.

Photo #4, looking south. Scissor band and flow sensor.

4. **# 1004 and 1005** - Johnson's Run Creek at the Historical Steel Driving Trail Bridge (north-central area of the Site) Beneath the old steel driving bridge over Johnson's Run on the H-D property lies two identical and parallel 30 inch corrugated metal pipes (CMPs), through which Johnson's Run creek flows east to west (see inset Photo #5). The creek bed was dewatered at the locations of the culverts, and a flow sensor was installed into each culvert using scissor bands. Each sensor has its own meter, and the meters were suspended from the bridge supports to keep them out of flood waters during the period of monitoring.

Photo #5, looking north. Flow sensor installation location.

The discharge from drainage areas DA-2A + DA-2B enters into an improved sinkhole at the old Eden Road entrance at Route 30, and reportedly is entirely consumed by karst loss. Therefore, an attenuation factor of 0.01, or 100 percent attenuation by karst loss, is appropriate for these drainage areas. In other words, the improved sinkhole structure attenuated all of the stormflow from the 2A and 2B basins. The flow was not monitored at this location, but rather, the storm discharge rate and volume was modeled for the two selected storms, and the full modeled volume of stormwater was assigned as recharge into the sinkhole structure.

4. Discussion of the Three Different Sources of Rainfall Data for Stormflow Modeling

Stormwater runoff modeling for the Site has been completed using the rainfall gauge data from three different sources. The sources of rainfall data are: the fYNOP site, the nearby East York gauge, and the nearby Tri-Hill gauge. The fYNOP gauge recorded 6.4 inches of rainfall for the October 10-11, 2013 storm event, however the stormflow model using this data vastly under-predicted the measured storm runoff volume for the Site. This large discrepancy prompted a survey of the nearby weather stations which showed that rainfall for the October 10-11 storm event fell into the range of 8.59 to 14.7 inches. The East York gauge measured 8.41 inches, and the Tri-Hill gauge measured 11.36 inches, for the

October 10-11 storm event. The fYNOP team decided to complete the stormflow modeling, and the karst loss analysis, for the Site gauge, East York gauge, and Tri-Hill gauge, and to compare and contrast the results.

The Tri Hill weather station data for the period of monitoring was obtained from Weather Underground using weather station identifier 'KPAYORK32' (see Weather Underground reference for Link). Tri Hill, PA is located roughly 2.5 miles south of the Site in the Valley View area of York. The rainfall data is reported at 15 minute increments, which is excellent for providing good definition to the modeled storm runoff. The two largest storms were selected for evaluation of karst loss infiltration on the Site: September 21 and October 10-11, 2013. The Site received 0.95 inches of rainfall during the September 21 storm event, and 11.36 inches of rainfall during the October 10-11 storm event. The rainfall data corresponding to the two separate storm events is shown in Figures 3 and 4, and is presented in Tables 1 and 2, respectively.

The East York rainfall gauge reports rainfall every 5 minutes, and the September 21 storm event provided 0.84 inches, and the October 10-11 storm provided 8.41 inches of rainfall to the area. The rainfall data corresponding to these storm events is shown in Figures 5 and 6, and is presented in Tables 3 and 4, respectively.

The on-site rainfall gauge reports rainfall hourly, and the three largest storms were selected from the on-site gauge data for evaluation of karst loss infiltration to the Site: September 21 storm at 0.69 inches, October 7 storm at 0.95 inches, and October 10-11 storm at 6.4 inches. The rainfall data corresponding to the three separate storm events is shown in Figures 7, 8, and 9, and is presented in Tables 5, 6, and 7, respectively.

5. Post-Development Stormwater Runoff Model Calculations for Peak Flows and Hydrographs, for Karst-Impacted Areas

5.1 Means and Methods

The stormflow has been modeled using the generally recognized Bentley PondPack software, version 10.1, from Bentley Systems (2013). The stormflow hydrographs for the site were developed using Technical Release 55 (TR-55) "Urban Hydrology for Small Watersheds" as published by the U.S.D.A.-Soil Conservation Service, another commonly recognized methodology. Using the rainfall data from the nearby Tri-Hills, PA weather station, and the hydrologic information summarized in the following sections, a model was created to produce a hydrograph at each general HACH flow measuring location on the site. The hydrographs were compared to the measured data from the HACH flow

monitoring units to assess the effects of enhanced stormwater infiltration to karst terrain. Flow rates in 0.05 hour increments and total volume to each HACH unit were calculated.

5.2 Drainage Areas

The stormwater sewer site plan in Figure 1 and the drainage areas for the Site in Figure 2 were provided by H-D, and the plans have been used as the basis in determining the sub-basin drainage areas to each flow metering location. The table below summarizes the drainage area to each metering location, and the corresponding drainage area designation from the map provided.

Drainage Area to Each Stormflow Metering Location

Stormwater Outfall Locations	Drainage Area (acres)	Corresponding Drainage Area Based on Drainage Area Map
HACH 1001 (metered)	46.64	DA-1 and portion of DA-6
HACH 1002 (metered)	15.53	Portion of DA-6
HACH 1003 (metered)	1.34	Portion of DA-6
HACH 1004/1005 (metered)	60.80	Most of DA-4
Sinkhole (Old Eden Rd at Route 30) (not metered)	43.10	DA-2A and DA-2B

Note: the HACH-1001 and HACH-1002 meter locations are connected by an equalizing pipe and therefore have been combined for the purposes of the stormflow modeling. HACH-1004 and HACH-1005 have also been combined as the flow metering units were located in adjacent stormwater pipes within the same drainage area. Finally, the drainage area to the sinkhole that is located at the Old Eden Road at Route 30 area was included in the model to be all-inclusive of karst-loss, since field observation by others indicated that no flow was leaving the sinkhole (i.e., 100% karst-loss recharge of the basin discharge).

The drainage area numbers in the above table are somewhat smaller than the H-D-reported areas which are summarized in Table 8, and this is because a small portion of the full drainage areas DA-4 and DA-6 bypasses the HACH flow measuring units, and enters Johnson's Run further downstream. The HACH 1004/1005 meter location was upstream of the groundwater spring recharge to Johnson's Run, and therefore, spring recharge was not included in the modeled stormflow for this basin area. The 84 Lumber property stormwater runoff enters into a well-developed sinkhole cluster located just north of the property, and therefore, the runoff was not included in the modeled stormflow for the drainage areas contributing to the 1001/1002 metered outfalls.

5.3 Land Cover and Hydrologic Soil Group

Based on the drainage areas described above, and as referenced above, the existing-conditions-hydrology was developed using Technical Release 55 (TR-55) "Urban Hydrology for Small Watersheds" as published by the U.S.D.A. – Soil Conservation Service. TR-55 guidance was used to develop the curve numbers for each drainage area. Curve numbers (CN) are used for determining the amount of runoff from a rainfall event in a particular area. Curve numbers were computed based on the land cover and Hydrologic Soil Group. Land cover was assigned based on provided topographic survey information and field observation as well as aerial photography for the site. Hydrologic Soil Group was based on the United States Department of Agriculture Soil Survey information. A number of different CN values can exist for each drainage area. The composite CN value is calculated by taking the weighted average of the different CN values for each separate drainage area.

HACH-1001 measures flow from drainage area DA-1 and a portion of drainage area DA-6 that flows through a pipe system to outfall A. The majority of the system is piped directly to Outfall A. The area in the southwest corner of the site bypasses or is otherwise downstream of the HACH unit and therefore is not captured in the data.

The hydrology calculations do not include an infiltration rate for Basin C, therefore the volume into the basin is the volume out of the basin. It was assumed that the basin bottom was lawn for the analysis.

In general the higher the CN value the more impervious the surface becomes and the less infiltration occurs, and vice versa. As an example, a CN value of 98 has been used for impervious surfaces with a Hydrologic Soil Group B, and with a rainfall depth of 11.36 inches, the corresponding runoff depth would be 11.12 inches. Whereas, a CN value of 61 has been used for Lawn in good condition with a Hydrologic Soil Group B, and with a rainfall depth of 11.36 inches, the runoff depth would be 6.17 inches. The impervious surface creates a much larger runoff depth, and the remainder of the total rainfall depth is assumed to infiltrate. The calculated composite CN values for each of the drainage areas are shown in the following table.

Calculated Composite CN Values for Each of the Metered Drainage Areas

Stormwater Outfall	Total Area (acres)	Impervious Area (acres)	Lawn Area (acres)	Wooded Area (acres)	Composite CN Value
HACH-1001	46.64	38.38	8.26	--	93
HACH-1002	15.53	12.59	2.94	--	93
HACH-1003	1.34	0.79	0.55	--	88
HACH-1004/1005	60.80	6.08	23.85	30.87	62
Sinkhole (Old Eden Road at Route 30)	43.10	24.43	16.12	2.55	82

5.4 Time of Concentration

Time of concentration was computed based on Technical Release 55 (TR-55) "Urban Hydrology for Small Watersheds" as published by the U.S.D.A. – Soil Conservation Service. The time of concentration is based on the time for water to reach the point of analysis from the hydraulically most distant point in the watershed. The slope and land cover based on the topographic survey information and field observation were used to calculate time of concentration. It should be noted that the time of concentration affects the peak flow rates of the drainage area but does not impact the runoff volume for the drainage area. From the measured data it was found that the time of concentrations were longer than the calculated values. Additional lag time was added to the HACH-1001 and HACH-1002 drainage areas in order to adjust the peak flows to more accurately represent the measured data.

5.5 Stormwater Management Facilities

The Stormwater Management Facilities that were modeled are as shown on the topographic survey and include SWMF #1, SWMF #2, and Basin C. These stormwater management facilities were included in the calculations to account for the flow reductions associated with the storage volume and outlet control structure for each system. The storage volume was calculated based on the topographic survey information. The outlet control structure was input into the model based on the details of the outlet structures provided and additional field observation. It should be noted that no infiltration in the basin was taken into account; therefore, the same volume into the SWMF leaves the SWMF.

HACH-1001 measures flow from drainage area DA-1 and a portion of drainage area DA-6 that flows through a pipe system to outfall A. The majority of the system is piped directly to Outfall A. The storm runoff from Eden Road that is piped to Basin A has been considered in the runoff modeling. The area in the furthest southwest corner of the site bypasses or is otherwise downstream of the HACH unit and therefore is not captured in the data.

5.6 Selection of September and October 2013 Storm Events

Typically, the karst-loss analysis would be performed on a larger sized, and a smaller sized storm event, to provide an upper and lower bound on the calculated karst-loss adjustment factors. The reason for this is that the karst loss infiltration continues to increase with stormflow until it reaches a maximum, which is when the swallets or other epikarst openings become flooded with water during runoff from very large storms.

However, the rainstorms to the Site during the September through November period of monitoring were either less than a 1 year - 24 hour event (September 21 and October 7, 2013) or were more than a

50 year - 24 hour event (October 10-11, 2013), according to NOAA Point Precipitation Frequency Estimates. As a result, selection of the September 21, October 7, and October 10-11 storms provided the range of runoff magnitudes that was available to us, from which to evaluate the karst loss behavior. A comparison of results showed a logical progression in karst-loss recharge, and attenuation factors for the September 21 and October 7 storms, but not for the October 10-11 storm event.

5.7 Calculated Peak Heights, Flow Rates, and Storm Volumes

5.7.1 ***Tri-Hill area rain gauge data*** Figures 10 through 13 present the modeled peak heights and storm flow rates for the September 21 storm event, and Figures 14 through 17 present the modeled peak heights and storm flow rates for the October 10-11 storm event, using the Tri-Hill gauge data. The figures show the calculated runoff hydrographs for each of the five different stormwater outfall locations. The modeled discharges for sub-basins 1001 and 1002 have been combined into a single hydrograph because these stormwater discharge pipes have been connected by an overflow pipe which is located upstream of the two flow sensors.

The modeling software was used to integrate the stormwater volume beneath the calculated hydrographs for the September and October storm event as measured at the Tri-Hill gauge, and those volumes are found in the following table.

Modeled Stormwater Volumes to Each of the Metered Discharges

Stormwater Outfall Location	September 21, 2013 storm at 0.95 in.	October 10-11, 2013 storm at 11.36 in.
	Modeled runoff volume, in cu. ft.	Modeled runoff volume, in cu. ft.
1001	103,629	1,775,766
1002	34,107	593,679
1001+1002	137,736	2,369,446
1003	2,178	47,872
1004+1005	8,058 (verified)	1,366,695
Sinkhole (Old Eden Road Entrance at Route 30)	65,252	1,411,474

5.7.2 ***East York rain gauge data*** Figures 18 through 21 present the modeled peak heights and storm flow rates for the September 21 storm event, and Figures 22 through 25 present the modeled peak heights and storm flow rates for the October 10-11 storm event, using the East York rain gauge data. The figures show the calculated runoff hydrographs for each of the five different stormwater outfall locations, where sub-basins 1001 and 1002 have been combined into a single hydrograph.

The modeling software was used to integrate the stormwater volume beneath the calculated hydrographs for the September and October storm event as measured at the East York rain gauge, and those volumes are found in the following table.

Modeled Stormwater Volumes to Each of the Metered Discharges

Stormwater Outfall Location	September 21, 2013 storm; 0.84 in.	October 10-11, 2013 storm; 8.41 in.
	Modeled runoff volume, in cu. ft.	Modeled runoff volume, in cu. ft.
1001	88,731	1,285,368
1002	29,141	429,850
1001+1002	117,873	1,715,218
1003	1,829	34,020
1004+1005	6,359	842,319
Sinkhole (Old Eden Road Entrance at Route 30)	55,843	985,327

5.7.3 ***fYNOP on-site rain gauge data*** Figures 26 through 29 present the modeled peak heights and storm flow rates for the September 21 storm event, and Figures 30 through 33 present the modeled peak heights and storm flow rates for the October 10-11 storm event, using the fYNOP on-site rain gauge data. As discussed above, for this rain gauge dataset only, the October 7, 2013 rainstorm was modeled, and the results are presented in Figures 34 through 37. The figures show the calculated runoff hydrographs for each of the five different stormwater outfall locations, where sub-basins 1001 and 1002 have been combined into a single hydrograph.

The modeling software was used to integrate the stormwater volume beneath the calculated hydrographs for the September 21, the October 7, and October 10-11 storm event, for the fYNOP rain gauge, and those volumes are found in the following table.

Modeled Stormwater Volumes to Each of the Metered Discharges

Stormwater Outfall Location	September 21, 2013 storm event; 0.69 in.	October 7, 2013 storm event; 0.95 in.	October 10-11, 2013 storm event; 6.4 in.
	Modeled runoff volume, in cu. ft.	Modeled runoff volume, in cu. ft.	Modeled runoff volume, in cu. ft.
1001	70,131	103,629	954,399
1002	22,999	34,107	319,207
1001+1002	93,131	137,736	1,273,607
1003	1,437	2,178	24,698
1004+1005	4,356	8,058	520,019

Sinkhole (Old Eden Road Entrance at Route 30)	43,995	65,252	705,410

6.0 Stormflow Measurement Results

The measured stormwater runoff volume for each of the selected storm events, at each monitored outfall location, has been summarized in the following table. Figures 38, 39, and 40 present the measured storm flow hydrographs for the September 21 storm event for each of the monitored locations. Figures 41, 42, and 43 present the measured hydrographs for the October 7 storm event, and Figures 44, 45, and 46 present the measured storm flow hydrographs for the October 10-11 storm event for each of the monitored locations. The measured discharges for locations 1001 and 1002 have been combined into a single hydrograph for comparison with the modeled hydrograph. The discharge from the DA-2A + DA-2B stormwater basins was not monitored due to the observation by others that all storm flow recharges an improved sinkhole that is adjacent to the basin outfall. Therefore, the hydrograph for this outfall is not included in the figures.

Measured Runoff Volume to Each of the Metered Discharges

Stormwater Outfall Location	September 21, 2013 storm	October 7, 2013 storm	October 10-11, 2013 storm
	Measured runoff volume, in cu. ft.	Measured runoff volume, in cu. ft.	Measured runoff volume, in cu. ft.
1001	43,035	80,954	1,893,164
1002	30,605	34,577	676,748
1001+1002	73,640	115,531	2,569,912
1003	1,229	2,076	29,769
1004+1005	42,728	303	1,326,357
Sinkhole (Old Eden Road Entrance at Route 30)	0 (100% recharged)	0 (100% recharged)	0 (100% recharged)

7.0 Karst Loss Calculations

The post-development runoff hydrographs for the September 21, 2013, October 7, 2013, and October 10-11, 2013 storm events, for Tri Hill, East York, and fYNOP rainfall data, have been modeled using an approach described earlier in the report. The reason for the three different rainfall datasets has also been discussed above. The stormflow modeling method for determining the existing runoff peak rate lacks

allowance for runoff losses into sinkholes and other forms of karst loss features on the Site. Therefore, we have utilized the measured stormflow data and the modeled stormflow data for a calculation of the estimated karst-loss quantities for each of the modeled storms from each rainfall dataset, and for each of the modeled sub-basins. Also, we have compared the storm peaks for the measured and modeled data from which we have calculated a karst-loss attenuation factor. The karst-loss attenuation factor is a hydrologic characteristic of the Site for calculating stormwater infiltration quantities attributable to karst loss behaviors. The karst loss quantity increases quite rapidly with increasing magnitude of storm events until the karstic openings in the ground become flooded with water, which causes the water transmitting capacity of the openings to reach a maximum rate. As the stormwater level builds over the flooded openings, the hydraulic head forces some additional recharge through the openings causing comparatively small increases in recharge.

The following table summarizes the estimated volume of stormwater which has infiltrated the Site by karst-loss mechanisms during each of the storm events, and for the amount of rainfall shown. The source of the rainfall dataset is provided for reference. Also shown are the karst-loss attenuation factors which have been calculated using the measured and modeled stormflow hydrograph peak heights, for the targeted storm events. Karst-loss impacts the height of the measured storm peaks, but is not considered in the model calculations. Therefore, the attenuation factors have been derived by comparing measured against modeled stormflow peak heights, with the ratio of these two numbers becoming the factor reported in the following tables. The karst loss volume was estimated by integrating the measured stormflow rates, to produce a total volume of flow per storm event, and subtracting the measured total volume from the modeled volume.

7.1 Tri-Hill Area, York Rainfall Data

Calculated Karst-Loss Volume, and Attenuation Factors				
	September 21, 2013 Storm 0.95 inches rainfall		October 10-11, 2013 Storm 11.36 inches rainfall	
Sub-basin designation	Estimated Karst-loss Volume (cu. ft.)	Attenuation Factor	Estimated Karst-loss Volume (cu. ft.)	Attenuation Factor
1001+1002	64,096	0.76	0 (modeled volume is somewhat less than measured)	0.98
1003	949	0.49	18,103	0.98
1004+1005	0 (modeled volume is somewhat less than measured)	1.0	40,338	0.39
Sinkhole (DA2A+DA2B)	65,252	0.01*	1,411,474	0.01*

Footnote: * DA-2A + DA-2B attenuation of stormflow discharge, by an improved sinkhole at the old Eden Road entrance location at Route 30, was adopted from observations by others.

7.2 East York Rainfall Data

Calculated Karst-Loss Volume, and Attenuation Factors				
	September 21, 2013 Storm 0.84 inches rainfall		October 10-11, 2013 Storm 8.41 inches rainfall	
Sub-basin designation	Estimated Karst-loss Volume (cu. ft.)	Attenuation Factor	Estimated Karst-loss Volume (cu. ft.)	Attenuation Factor
1001+1002	45,696	0.92	0 **	1.0 **
1003	600	0.58	4,251	1.0 **
1004+1005	0	1.0 **	0 **	0.59
Sinkhole (DA2A+DA2B)	55,843	0.01 *	985,327	0.01 *

Footnotes: * DA-2A + DA-2B attenuation of stormflow discharge, by an improved sinkhole at the old Eden Road entrance location at Route 30, was adopted from observations by others.

** As requested, KCF also performed calculations using the data from the East York and fYNOP rain gauges, however the results are flawed, given the undersized rainfall amounts. Therefore, zero-values have been entered for the karst-loss amount, and unity has been entered for the attenuation factor.

7.3 fYNOP Site Rainfall Gauge Data

Calculated Karst-Loss Volume, and Attenuation Factors						
	September 21, 2013 Storm 0.69 inches rainfall		October 7, 2013 Storm 0.95 inches rainfall		October 10-11, 2013 Storm 6.4 inches rainfall	
Sub-basin designation	Estimated Karst-loss Volume (cu. ft.)	Attenuation Factor	Estimated Karst-loss Volume (cu. ft.)	Attenuation Factor	Estimated Karst-loss Volume (cu. ft.)	Attenuation Factor
1001+1002	19,491	1.0 **	22,205	1.0 **	0 **	1.0 **
1003	208	1.0 **	102	0.81	0 **	1.0 **
1004+1005	0	1.0 **	7,755	NA	0 **	1.0 **
Sinkhole (DA2A+ DA2B)	43,995	0.01 *	65,252	0.01 *	705,410	0.01 *

Footnotes: * DA-2A + DA-2B attenuation of stormflow discharge, by an improved sinkhole at the old Eden Road entrance location at Route 30, was adopted from observations by others.

** As requested, KCF also performed calculations using the data from the East York and fYNOP rain gauges, however the results are flawed, given the undersized rainfall amounts. Therefore, zero-values have been entered for the amount.

NA Not available. From our inspection of the measured stormflow data at this location for the October 7 storm, there is a discrepancy in the modeled stormflow hydrograph peaks which may be caused by short term stormflow surges.

8.0 Discussion of the Results, with Perspectives on Groundwater Capture

Karst-loss can be thought of as stormwater recharge to an epikarst aquifer which occurs in addition to normal soil infiltration. Studies of karst-loss are typically done to adjust downwards the modeled amounts of stormwater runoff from sites, and the site owners are responsible for managing the volume of stormwater which is the difference between the adjusted pre-development runoff quantity and the post-development quantity, for some reference storm event. However, our use of the karst-loss volume is somewhat different, as other team members are attempting to determine whether or not, and by how much, groundwater capture beneath the Site should possibly be increased to capture the karst-loss recharge, and the dissolved contaminant mass in that recharge.

In the areas of karst loss, the enhanced infiltration would create an area containing a groundwater mound. Groundwater would drain away from the mound in all directions at faster-than-normal rates causing a dissipation of the mound feature. As a result, soon after the karst-loss infiltration had ended, the water table mound would dissipate and the recharge would be assimilated into the regional karstic flow system. Where contaminant source areas occur within the area of influence of the mounding, groundwater would likely dissolve and transport contaminants away from the source areas at faster than normal rates until the mound had dissipated.

Infiltration recharge for the September 21 storm event For the Tri-Hill 0.95 inch rainfall event, the volume of karst-loss infiltration that has been estimated for the DA-6 drainage areas at the 1001+1002 sub-basins, and DA-1, is roughly 64,000 cubic feet (478,758 gallons). These drainage areas encompass the Building 58 area and the former Building 2 and 4 areas, TCA tank area, the west parking lot, and the area immediately to the east and south of former building 2. The infiltration occurs over about 9 hours, with the average rate of karst-loss recharge during this period being 880 gallons per minute. The large majority of the infiltration occurs during the high runoff period between hours 3 and 7 of the storm hydrograph.

As requested, two additional rainfall gauge datasets for this storm were also considered: the East York data at 0.84 inches, and the fYNOP data at 0.69 inches. For the East York 0.84 inch rainfall event, the volume of karst-loss infiltration at the 1001+1002 sub-basins and DA-1 is roughly 46,000 cubic feet (344,103 gallons). The infiltration occurs over about 7 hours, with the average rate of karst-loss recharge during this period being 820 gallons per minute. The large majority of the infiltration occurs during the high runoff period between hours 2.5 and 6 of the storm hydrograph.

For the fYNOP 0.69 inch rainfall event, the volume of karst-loss infiltration at the 1001+1002 sub-basins and DA-1 is roughly 19,500 cubic feet (145,870 gallons). The infiltration occurs over about 8 hours, with the average rate of karst-loss recharge during this period being 304 gallons per minute. The

large majority of the infiltration occurs during the high runoff period between hours 3.5 and 6.5 of the storm hydrograph.

The down-gradient groundwater pumping wells for these drainage areas are the west parking lot wells and the TCA tank area well. The karst loss recharge would temporarily elevate the water table throughout the pumping well field, and the extent of the water table rise would be dictated by the magnitude of the storm. The karst loss assessment has demonstrated that during larger storm events, it seems possible that the individual zones of capture surrounding each of the capture wells could become temporarily disconnected, resulting in east to west flow through the capture well field. If capturing this temporary flow-through is deemed important, then increasing the individual dewatering rates for these wells should be considered.

KCF inspected the hydrograph of well MW97 (see Figure 47) for evidence of water table mounding. The well is located inside of the 1001+1002 sub-basin areas and west of the WPL area. No evidence of water table mounding during the September 21 storm was found at this location, however, the existence of the paved parking lot surface in this area which would have prevented storm infiltration from occurring to the underlying epikarst in this specific area.

For the Tri-Hill 0.95 inch rainfall event, the karst-loss infiltration to the 1003 sub-basin area of DA-6, which is located at the far north end of the west parking lot, is roughly 949 cubic feet (7,100 gallons). For the East York 0.84 inch rainfall event, the infiltration to the 1003 sub-basin area is roughly 600 cubic feet (4,488 gallons), and for the fYNOP 0.69 inch rainfall event, the infiltration to the basin is roughly 200 cubic feet (1,496 gallons). The hydrograph for the well MW96D (Figure 48), which is located near the south end of this sub-basin, showed no response to the September 21 rainfall event, which is likely explained by the small infiltration rate of less than 40 gallons per minute that occurred to this area.

The karst-loss infiltration to the 1004/1005 sub-basin area of the DA-4 drainage area is inconsequential, due largely to the small storm size and the very small portion of this sub-basin in the vicinity of Johnson's Run that is underlain by epikarst bedrock. Discrepancy exists between the measured and modeled stormflow data, for the smaller sized storm events, when compared to the results from the large storm event. Whatever is causing the discrepancy, and we have examined the data from a number of different directions, it seems to be related somehow to the measuring/modeling of very low flows during the very small storms.

For the Tri-Hill 0.95 inch rainfall event, the karst-loss infiltration to the improved sinkhole at the old Eden Road entrance at Route 30 from the DA2A+DA2B drainage areas is estimated at 65,250 cubic feet (488,109 gallons). These two drainage areas encompass the new plant, the upper and lower parking lots,

and the new Eden Road entrance area and the adjacent stormwater pond. Occurring during a 9 hour period, the average rate of recharge is roughly 900 gallons per minute. For the East York 0.84 inch rainfall event, the karst-loss infiltration to the improved sinkhole at the old Eden Road entrance is estimated at 55,800 cubic feet (417,412 gallons). For the fYNOP 0.69 inch rainfall event, the karst-loss infiltration to the improved sinkhole at the old Eden Road entrance is estimated at 44,000 cubic feet (329,142 gallons). Our understanding is that this epikarst recharge does not impact the groundwater extraction area, and has been provided in the discussion to be generally inclusive of our assessment of karst-loss behavior occurring on the site. No hydrographs from monitoring wells located in this area or close vicinity were available for inspection for water table response to infiltration.

The karst loss attenuation factor is on the order of 0.76, which means that the stormflow peak rates are being reduced in magnitude by 24 percent from karst-loss behaviors. Smaller factors are observed for the much smaller 1003 sub-basin area, however the small size of the basin likely means that these factors are less representative of the Site. A comparison of the factors for each of the three different modeled rainfall data sets shows the increase in the attenuation factor (= decrease in karst loss effect) with lessening storm event magnitudes, from 0.95 inches to 0.69 inches of rainfall.

Infiltration recharge for the October 10-11, and October 7 storm events For the Tri-Hill storm data set, and the October 10-11 storm, a nearly 50-year-storm rate of rainfall was measured. A karst-loss attenuation factor of 0.98 was calculated from the measured and modeled hydrographs for the storm event for the 1001+1002 metered sub-basin area. Karst-loss behavior was recorded in the MW-97 well hydrograph (Figure 47), which shows a 6 foot rise, and dissipation, in the water table corresponding to this storm event. However, no karst-loss infiltration quantity can be discerned from the flow monitoring and flow modeling data, as the measured quantity of stormflow was somewhat larger than the modeled quantity for the 1001+1002 sub-basin area. A possible explanation could be that more rain fell to the site than was recorded by the Tri-Hill gauge. Neither a comparative karst-loss volume or attenuation factor could be calculated from the modeled and measured data for the East York and the fYNOP rain gauge data sets because the modeled stormflow volume, and hydrograph peak heights, were substantially less than the measured flow data.

For the October 10-11 storm, Tri-Hill rainfall data set, the karst-loss infiltration to the 1003 monitored area, has been estimated to be 18,100 cubic feet (135,400 gallons). Over 53 hours of infiltration, the average rate of recharge is estimated at 43 gallons per minute. The MW-96D well hydrograph (Figure 48) does show a 6 foot rise and dissipation in the water table corresponding to this event. A karst-loss attenuation factor of 0.98 was calculated from the measured and modeled hydrographs. For comparison with the East York rainfall data set, the karst-loss has been estimated at about 4,250 cubic feet (31,792 gallons). Over 40 hours of infiltration, the average rate of recharge is

estimated at 13 gallons per minute. No karst-loss volume or attenuation factor could be calculated using the fYNOP rain gauge data set, because the modeled storm volume and flow rates were substantially less than the measured flow volumes and rates. Capturing of the mounded epikarstic groundwater flow described above could be accomplished using a nearby capture well. The groundwater pumping well closest to sub-basin 1003 is CW-17.

For the Tri-Hill rainfall data set, the karst-loss to the small portion of the DA-4 drainage area (1004+1005 metered sub-basin) that is underlain by karst in the northeast quadrant of the property is estimated to be 40,300 cubic feet (301,468 gallons). For the 53 hours of runoff across the basin area, the average rate of recharge is estimated at 95 gallons per minute, which could create a small mounding effect to the water table. A karst-loss attenuation factor of 0.39 was calculated from the measured and modeled hydrographs. A comparison of the Tri-Hill data with the karst-loss volume and attenuation factor for the East York and fYNOP rain gauge data sets is not possible, because the modeled stormflow volume using these two lesser storms is substantially less than the measured flow data. Capture of the mounded epikarstic groundwater flow described above could be accomplished using a hydraulically down-gradient capture well. The groundwater pumping wells located down-gradient of this karst loss area are the west parking lot wells, and CW-15A.

For the Tri-Hill rainfall data set, the karst-loss infiltration to the improved sinkhole at the old Eden Road entrance at Route 30, which is at the discharge end of the DA2A+DA2B drainage areas, is estimated at 1,411,474 cubic feet (10,558,672 gallons). This drainage area encompasses the new plant, upper and lower parking lots, and the new Eden Road entrance area and the adjacent stormwater pond. Over 53 hours, the average rate of recharge has been estimated at 3,320 gallons per minute. A large recharge event of similar magnitude should be observed at the improved sinkhole location to validate this very large infiltration volume and rate. If in fact the sinkhole accepts the entire stormflow discharge from the sub-basin area, the attenuation factor would be effectively zero, meaning that karst-loss has attenuated the entire storm discharge. For comparison, karst-loss volumes and average recharge rates for the East York and fYNOP rain gauge data sets are roughly: 985,300 cubic feet (7,370,537 gallons; 2,318 gallons per minute), and 705,400 cubic feet (5,276,745 gallons; 1,659 gallons per minute).

At the old Eden Road entrance sinkhole, the very large stormwater recharge rate would create an extensive water table mound, which would re-direct the local groundwater flow direction through the epikarst bedrock, and could cause temporary changes in deeper groundwater flow direction and rate in this area. The mound would dissipate slowly after the recharge had ended. However, since this recharge area likely does not impact a groundwater extraction area, it has been included in the discussion simply to be inclusive of the karst-loss behaviors on the site.

For the October 7 storm event, stormflow modeling was completed using the hourly fYNOP rainfall data set, and the measured and modeled results in terms of flow volumes are found in the above tables. The estimated karst-loss volume of stormwater, and average recharge rate, to the 1001+1002 sub-basins is 22,200 cubic feet (166,067 gallons; 461 gallons per minute). A measured and modeled stormflow peak height comparison was completed for the karst attenuation factor, however the measured peak heights are consistently larger than the modeled peak flows. This type of inconsistency can occur when the rainfall occurs rapidly to a Site, causing short term surges in stormwater discharge rate. The hourly rainfall data record would have correctly recorded the amount of rainfall, but would not necessarily describe the spikes in rainfall rate that would cause the runoff surges. For comparison, the Tri-Hill rainfall data, at 15 minute increments, shows the occurrences of heavy surges of rainfall to the area over periods of 15 to 30 minutes during the October 7, 2013 storm event.

For the October 7, 2013 rainfall dataset, the karst-loss infiltration to the 1003 sub-basin area has been estimated to be roughly 100 cubic feet (748 gallons). Over 6 hours of infiltration, the average rate of recharge is estimated at 2 gallons per minute, which is inconsequential. A karst-loss attenuation factor of 0.81 was calculated from the measured and modeled hydrographs. The karst-loss infiltration to the 1004+1005 sub-basin area has been estimated to be roughly 7,755 cubic feet (58,011 gallons). Over 6 hours of infiltration, the average rate of recharge is estimated at 161 gallons per minute. A karst-loss attenuation factor could not be calculated due to a lack of agreement between measured and modeled stormflow hydrograph peaks, which may be caused by short term stormflow surges, as discussed above. The karst-loss infiltration to the improved sinkhole at the old Eden Road entrance at Route 30 is estimated to be 65,252 cubic feet (488,118 gallons).

The opinions expressed in this report are based upon our current level of understanding of the site stormwater management facilities and other conditions as provided by Harley Davidson and Leidos (formerly SAIC). The interpretation of the data has been performed to a reasonable degree of scientific certainty. We welcome the opportunity to re-evaluate the data, and adjust our discussions and conclusions, in light of new pertinent information on site conditions.

9.0 References

Aron, G., and Kibler, D.F., 1981. Procedure PSU-IV for estimating design flood peaks on ungaged Pennsylvania watersheds: Institute of Research on Land and Water Resources, FHWA/PA 81-013.

Bentley Systems, 2013. PondPack Stormflow Modeling Software, Version 10.1, for AutoCAD.

Palmer, A.N., 2004. Growth and modification of epikarst. Karst Waters Institute, Special Publication 9.

United States Department of Agriculture, 1986. *Urban hydrology for small watersheds*. Technical Release 55 (TR-55) (Second Edition). Natural Resources Conservation Service, Conservation Engineering Division.

Virginia Department of Conservation and Recreation (DCR), 1999. Hydrologic Modeling and Design in Karst, Virginia DCR Technical Bulletin No. 2. *http://www.dcr.virginia.gov/sw/ docs/swm/tecbltn2*.

Weather Underground – Tri Hill, PA Weather Station data link: http://www.wunderground.com/weatherstation/WXDailyHistory.asp?ID=KPAYORK32.

White, W.B., 1988. Geomorphology and Hydrology of Karst Terrains. Oxford University Press, New York, 464 pp.

Acknowledgments

Mr. Christopher Crane, P.E., Maser Consultants, has assisted KCF Groundwater, Inc. with stormflow modeling. His considerable efforts are gratefully acknowledged.

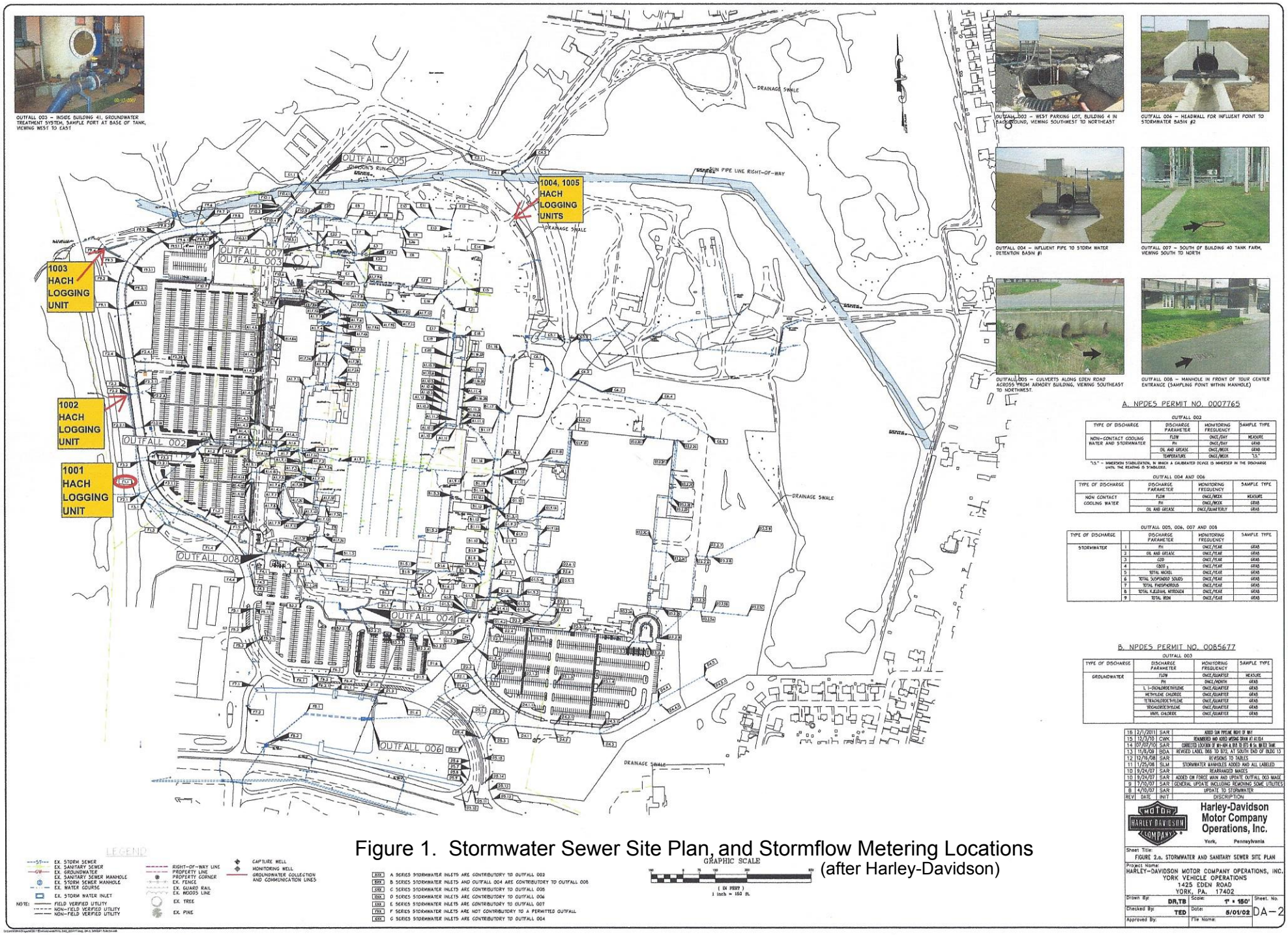


Figure 1. Stormwater Sewer Site Plan, and Stormflow Metering Locations (after Harley-Davidson)

Figure 2. Drainage Areas, and Modeled Drainage Sub-Basins

(Basemap after Harley Davidson)

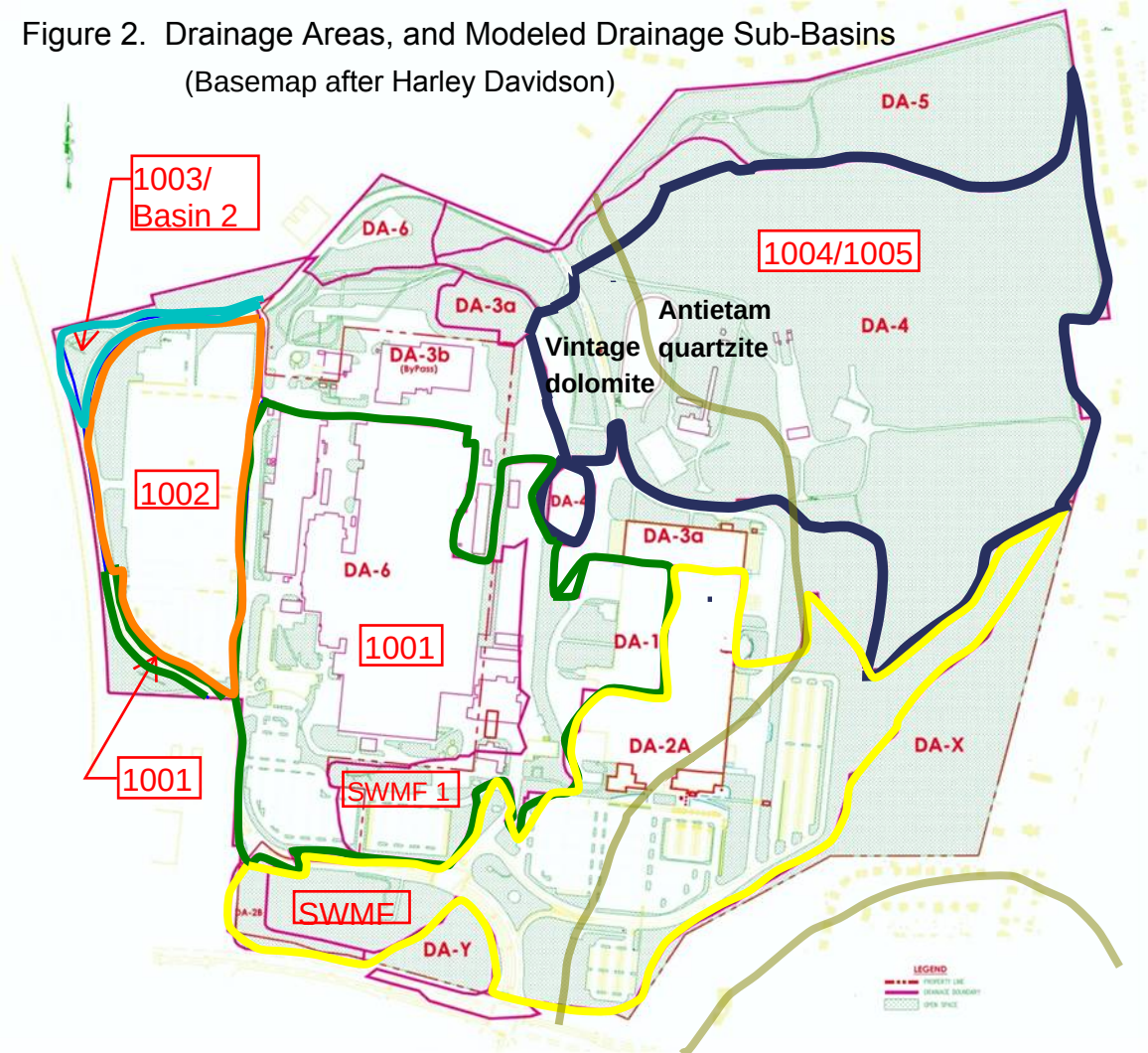
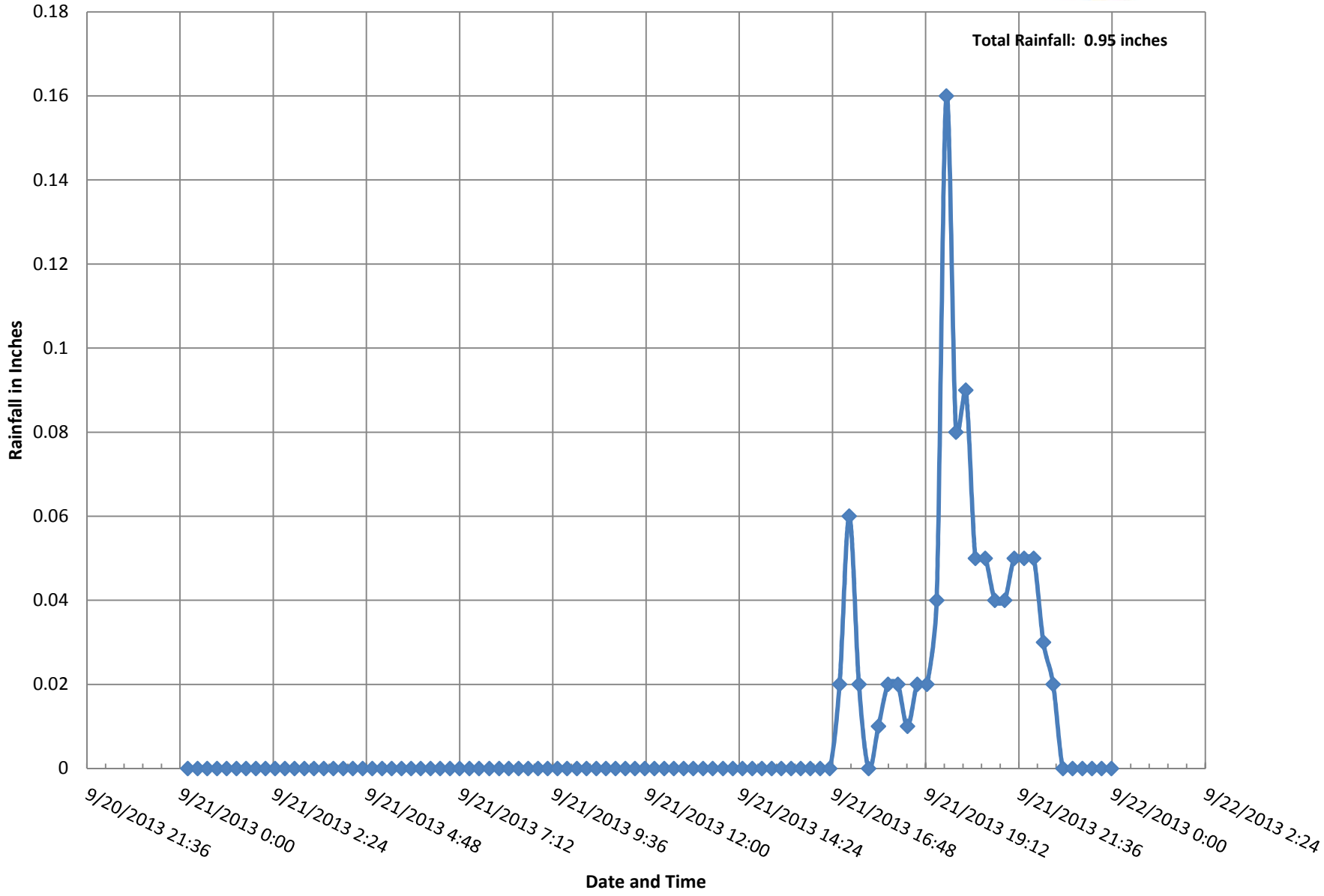


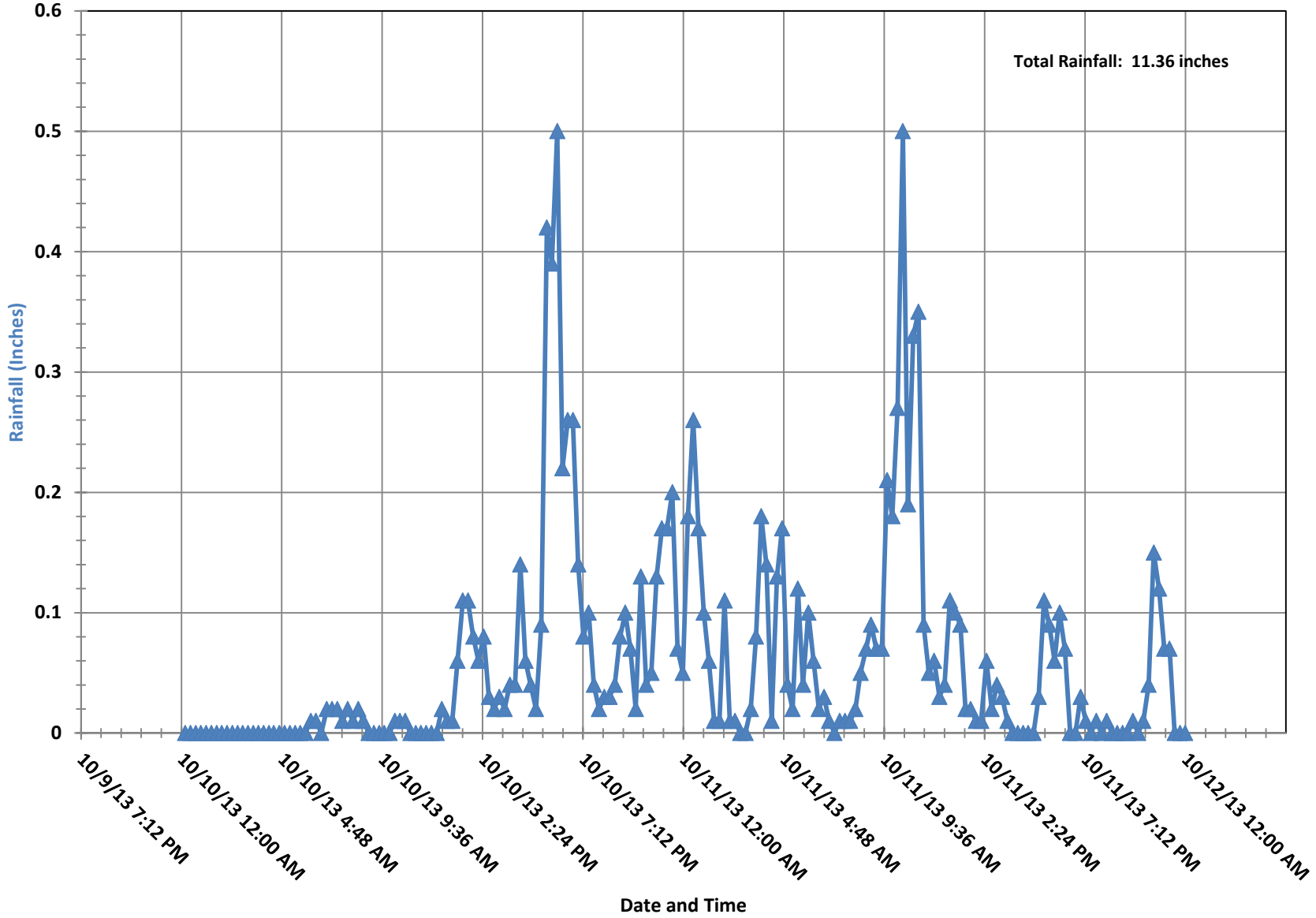
Figure 3: September 21, 2013 Storm Data for Tri-Hill, York, PA

KCF Groundwater, Inc.



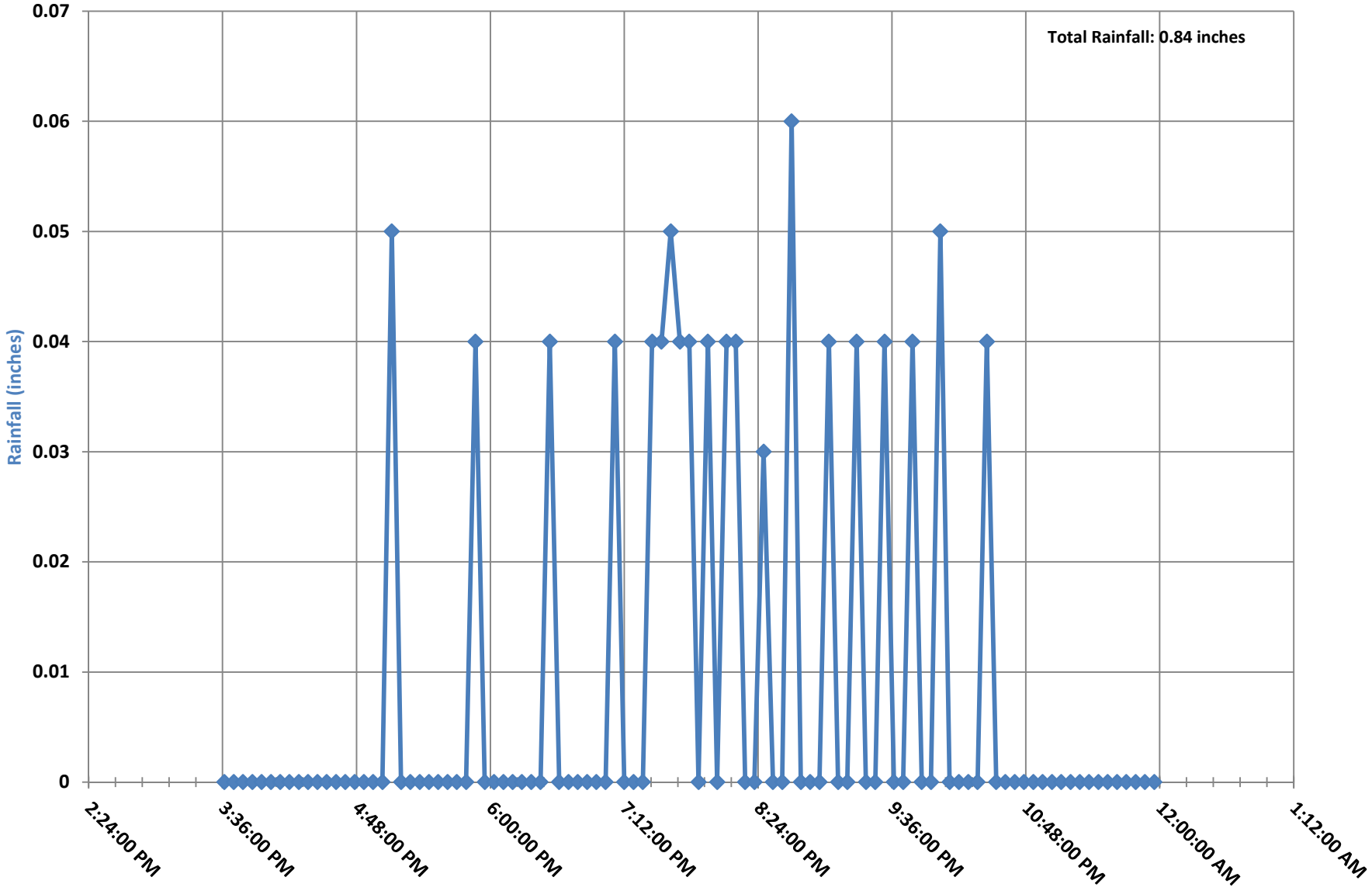
KCF Groundwater, Inc.

Figure 4: Rainfall on October 10-11, 2013 for Tri-Hill, York, PA



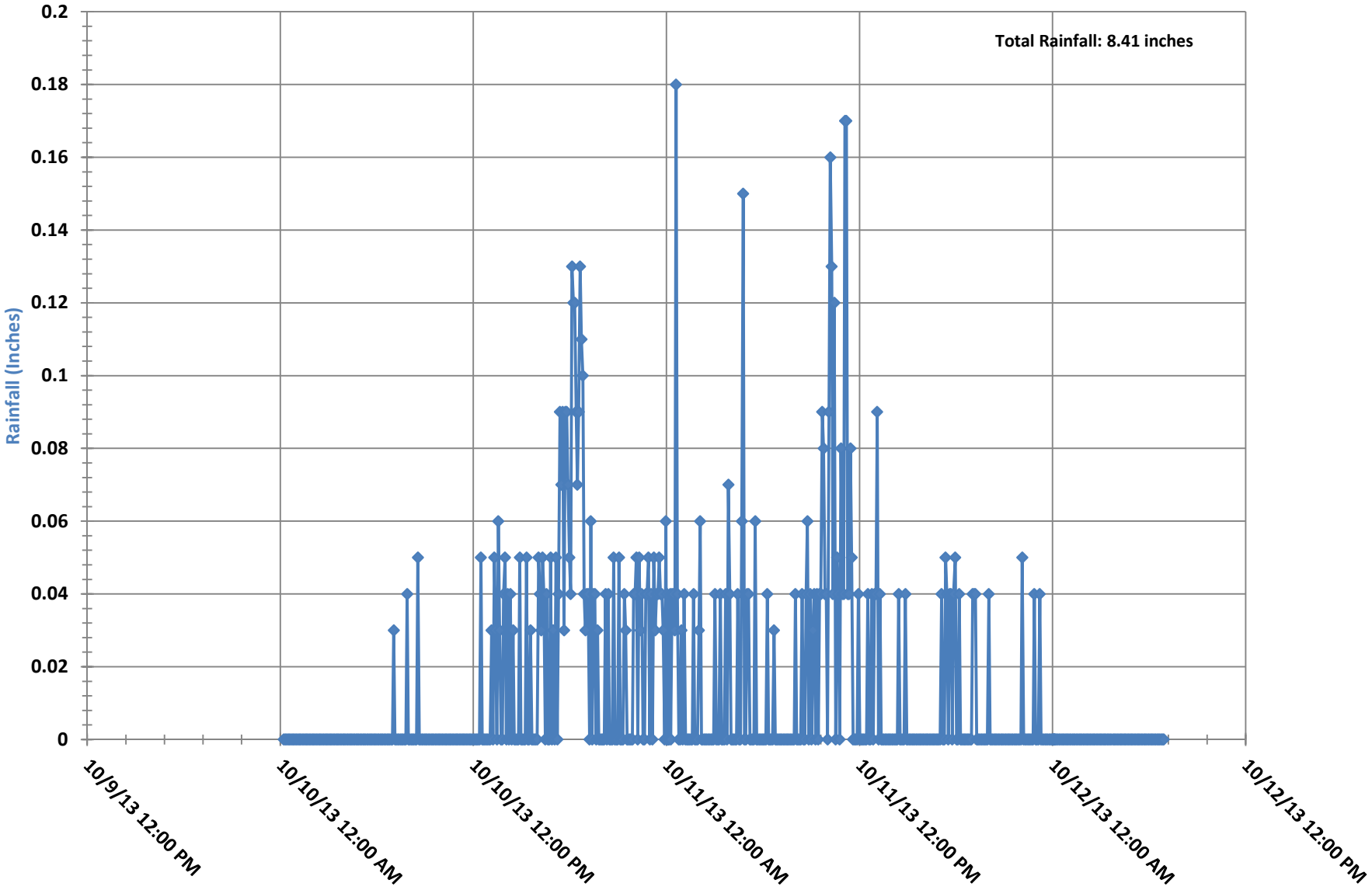
KCF Groundwater, Inc.

Figure 5: East York Rain Gauge: September 21, 2013 Rainfall



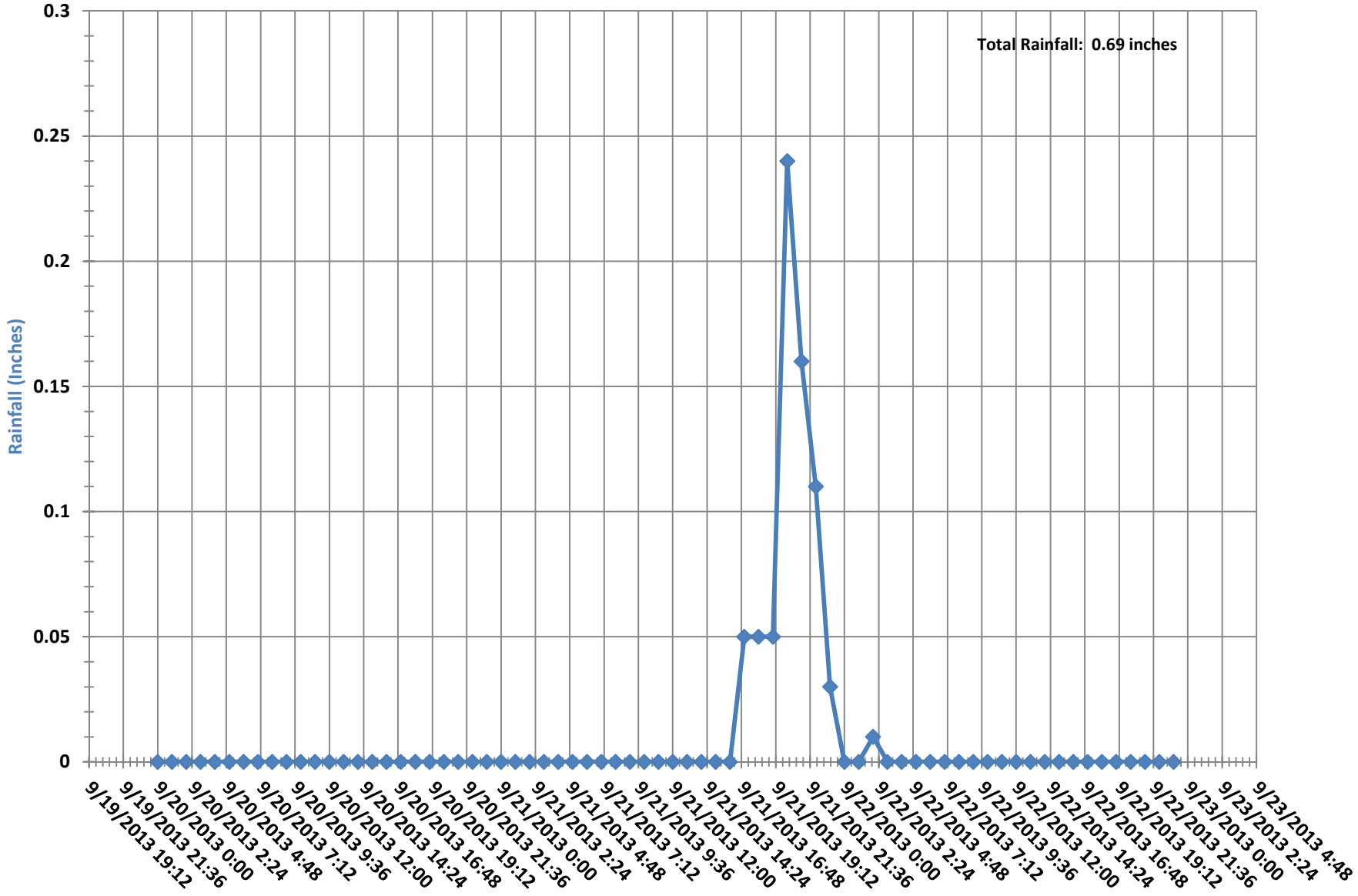
KCF Groundwater, Inc.

Figure 6: East York Rain Gauge: October 10-11, 2013 Rainfall



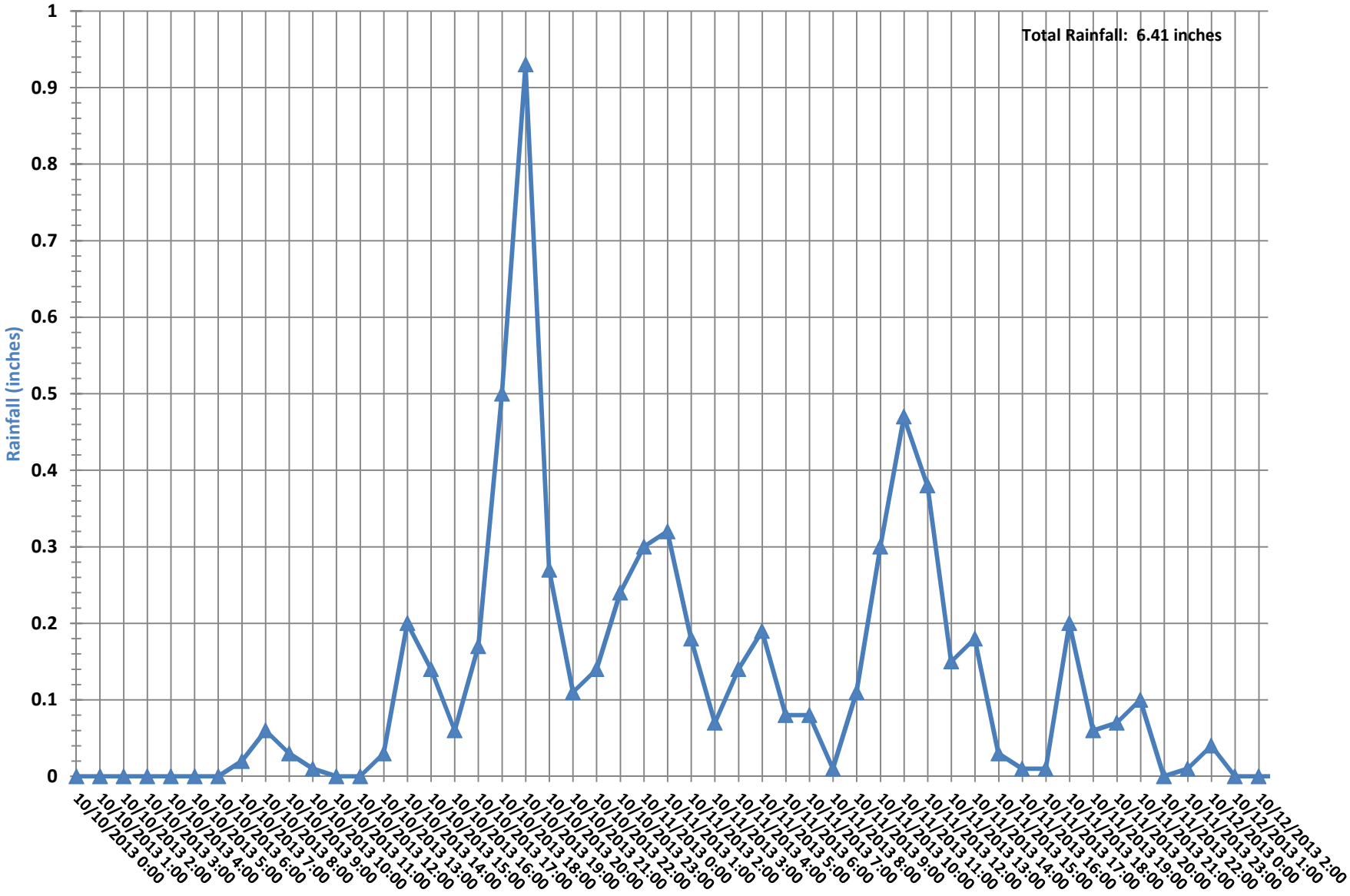
KCF Groundwater, Inc.

Figure 7: fYNOP Site Gauge - September 21, 2013 Rainfall



KCF Groundwater, Inc.

Figure 8: fYNOP Site Gauge - October 10-11, 2013 Rainfall



KCF Groundwater, Inc.

Figure 9: fYNOP Rain Gauge: October 7, 2013 Rainfall

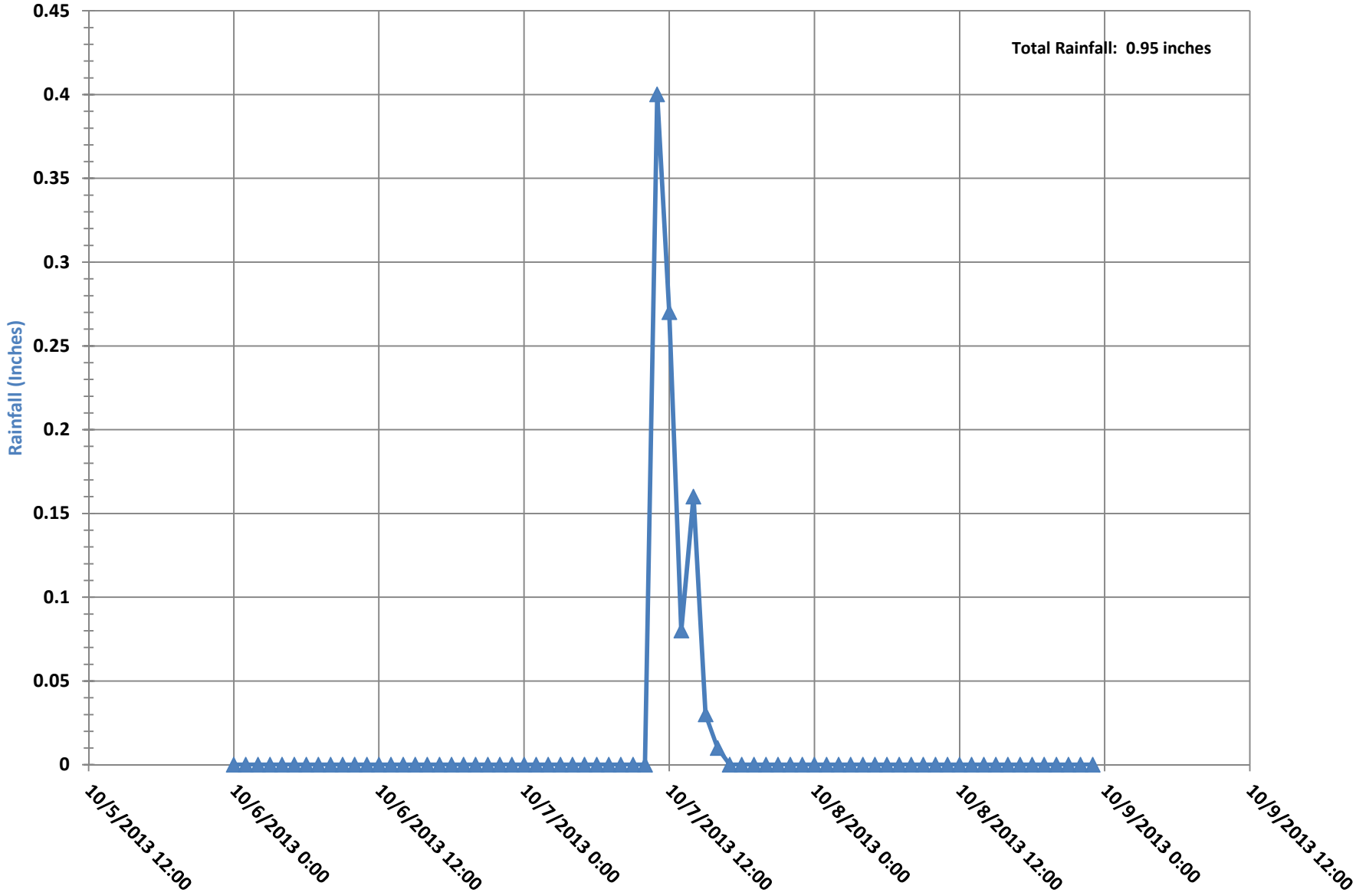


Figure 10: fYNOP Modeled Stormflow: Tri-Hill Gauge
HACH 1001+1002 Sept. 21, 2013 Storm

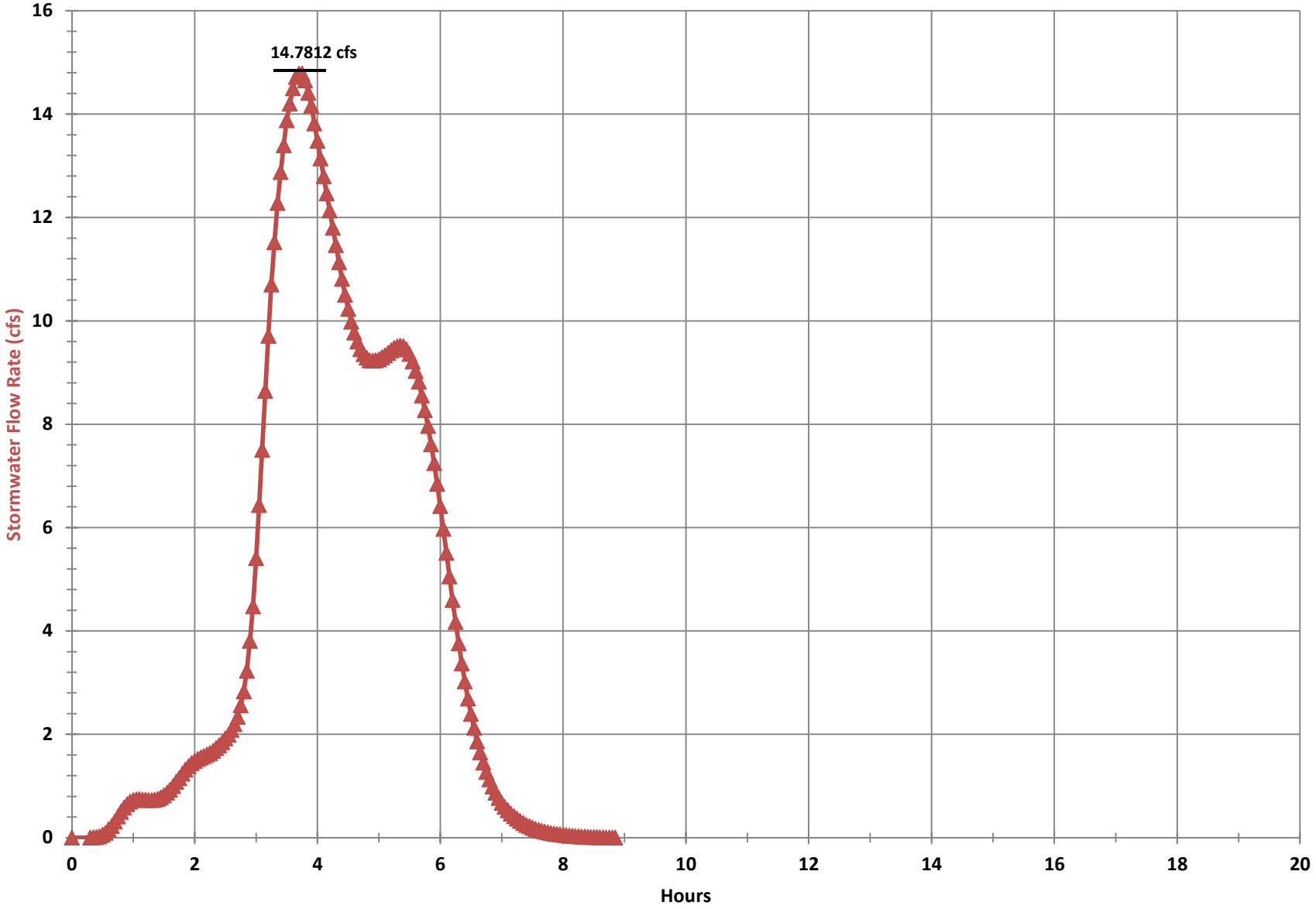


Figure 11: fYNOP Modeled Stormflow: Tri-Hills Gauge
HACH 1003 - Sept. 21, 2013 Storm

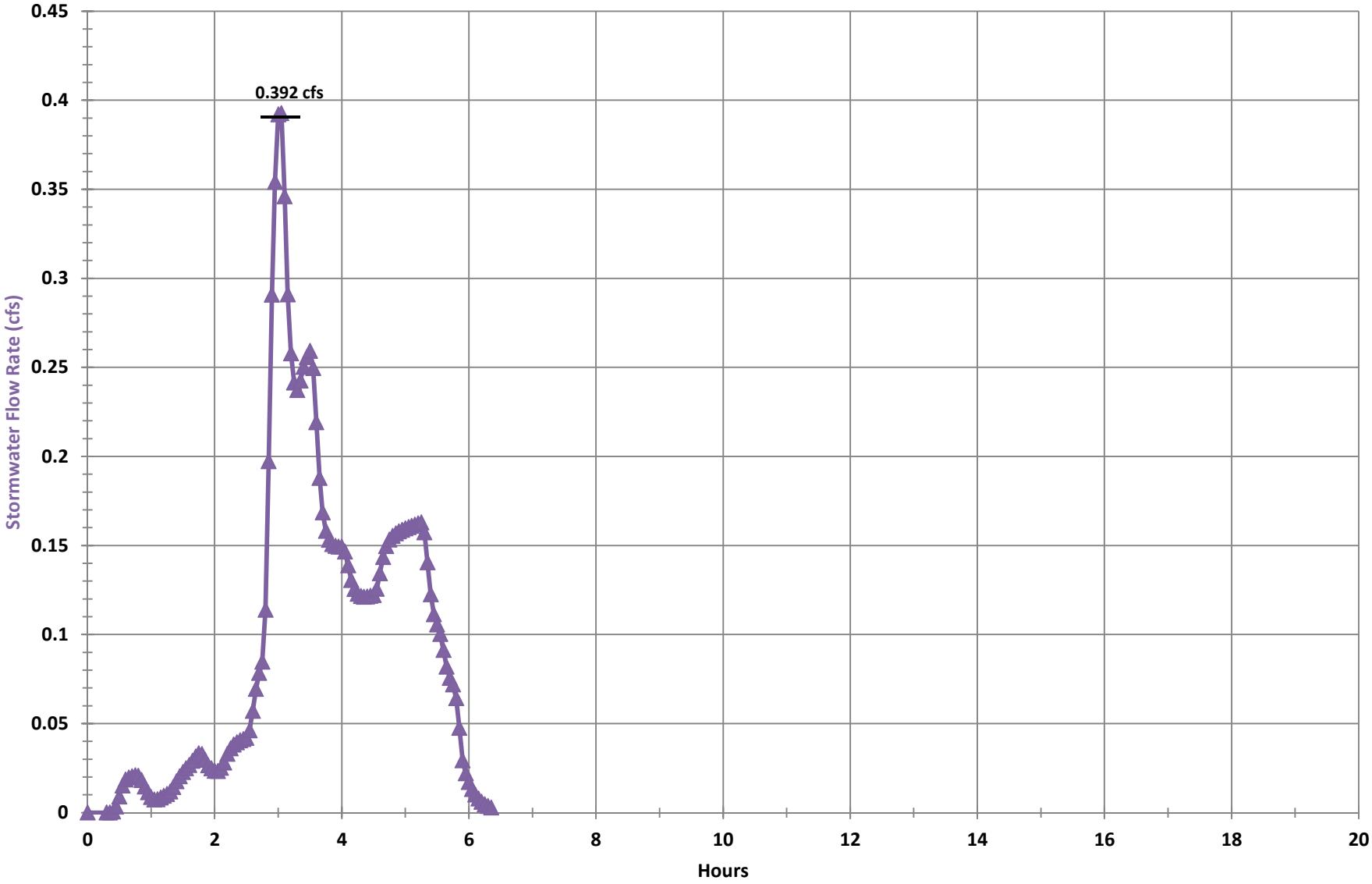


Figure 12: fYNOP Modeled Stormflow: Tri-Hill Gauge
HACH 1004+1005 Sept. 21, 2013 Storm

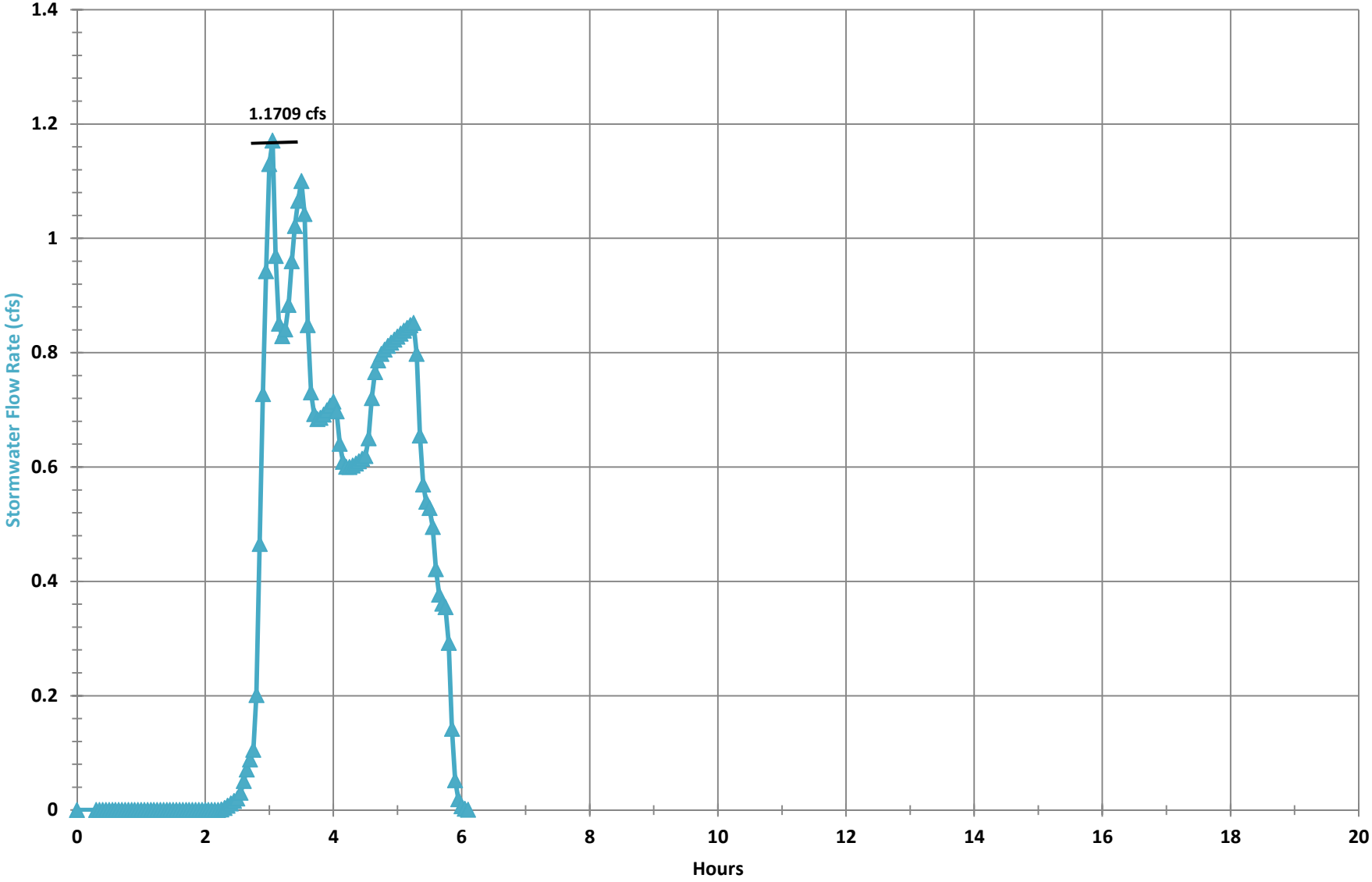


Figure 13: fYNOP Modeled Stormflow: Tri-Hill Gauge Sinkhole September 21, 2013 Storm

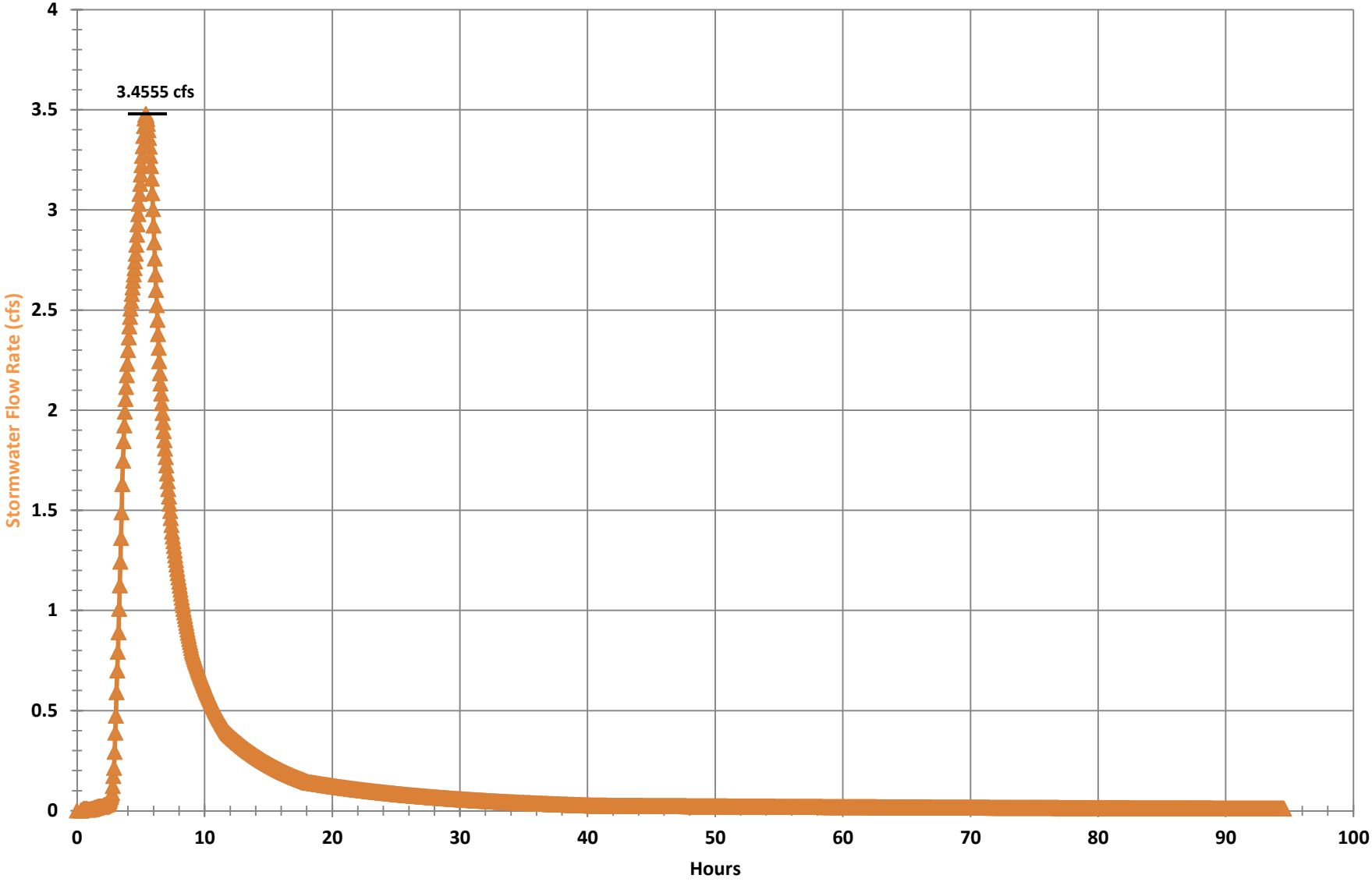


Figure 14: fYNOP Modeled Stormflow: Tri-Hill Gauge
HACH 1001+1002 Oct. 10-11, 2013 Storm

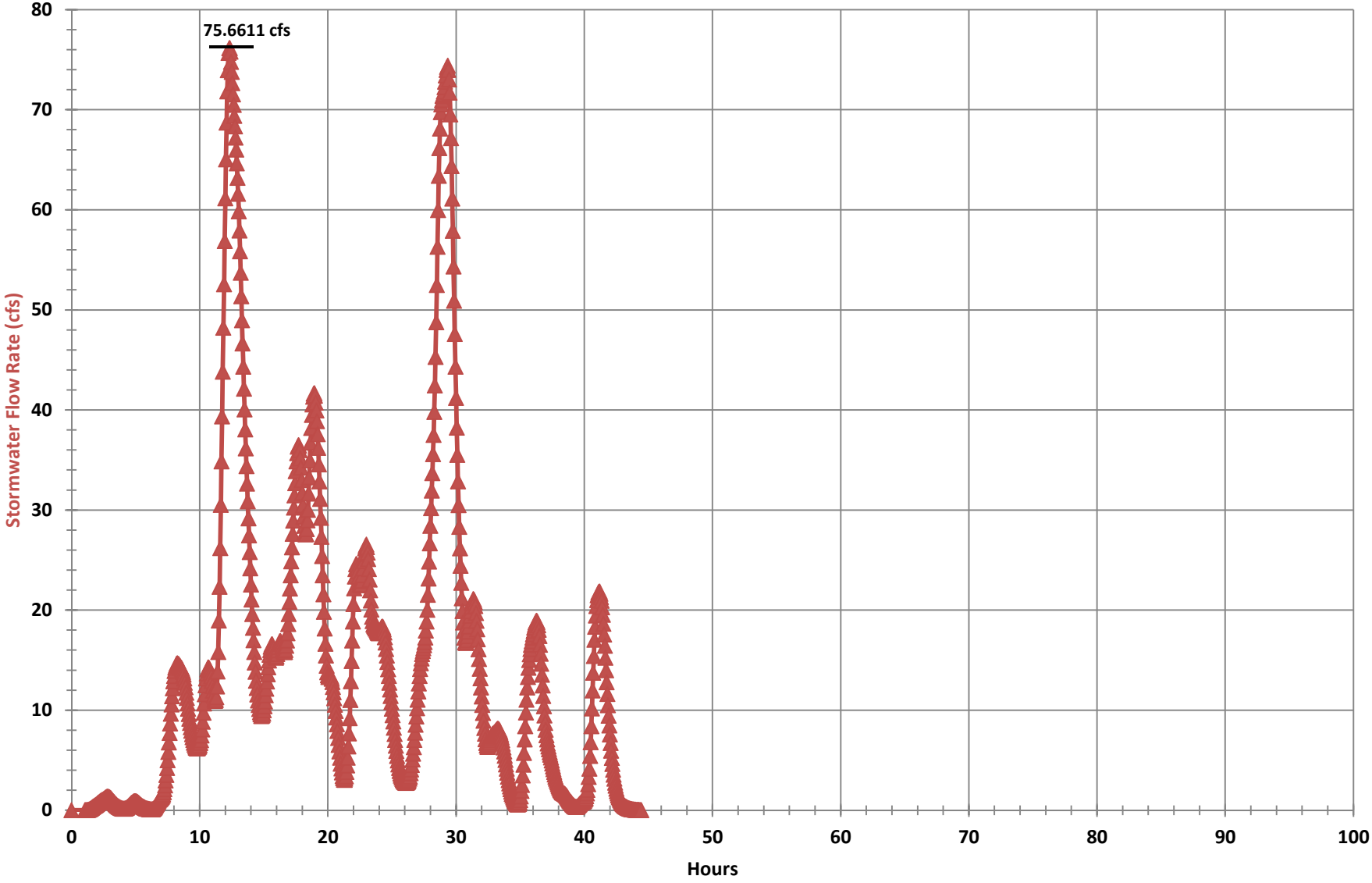


Figure 15: fYNOP Modeled Stormflow: Tri-Hill Gauge
HACH 1003 Oct. 10-11, 2013 Storm

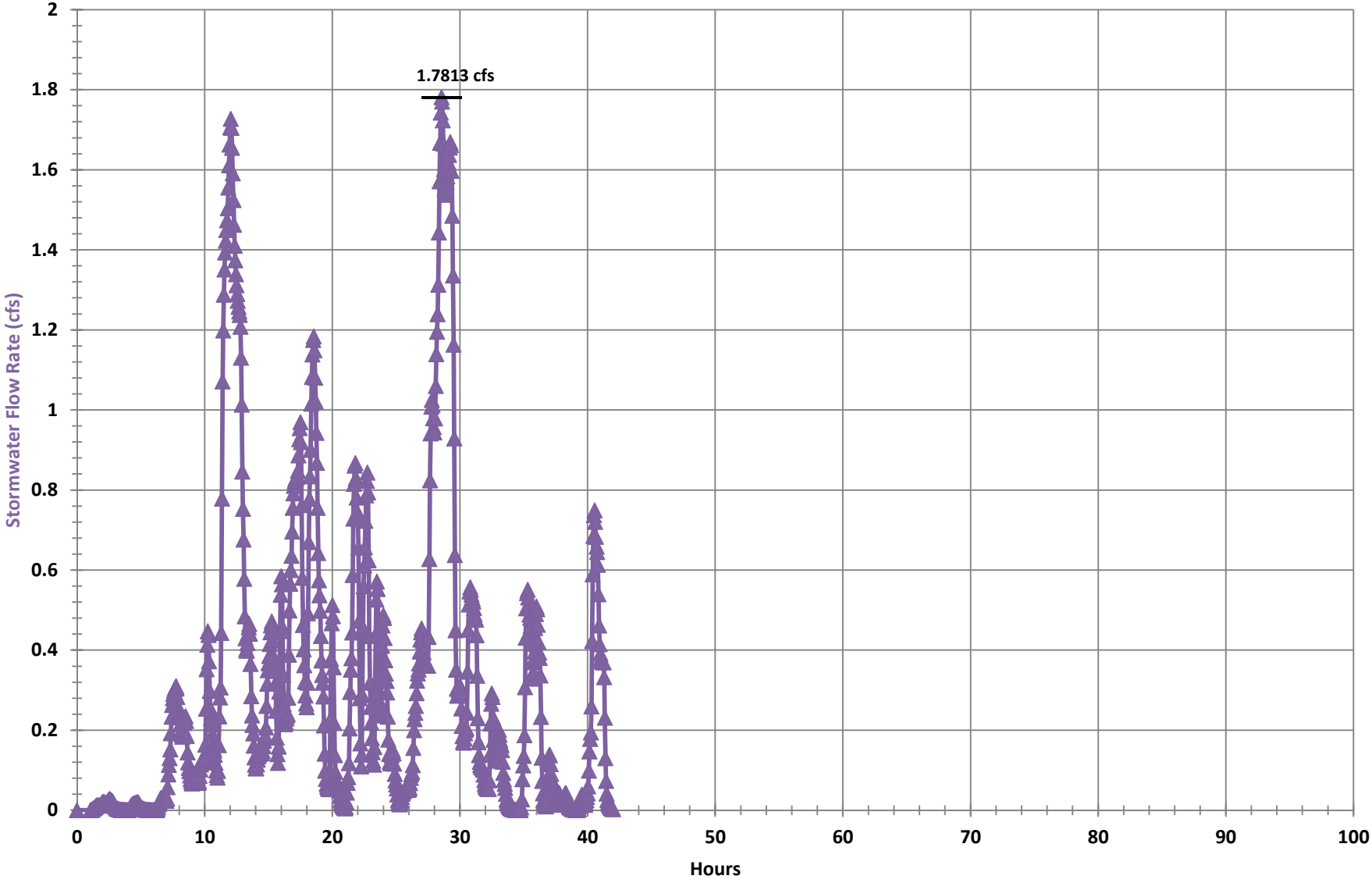


Figure 16: fYNOP Modeled Stormflow: Tri-Hill Gauge
HACH 1004+1005 Oct. 10-11, 2013 Storm

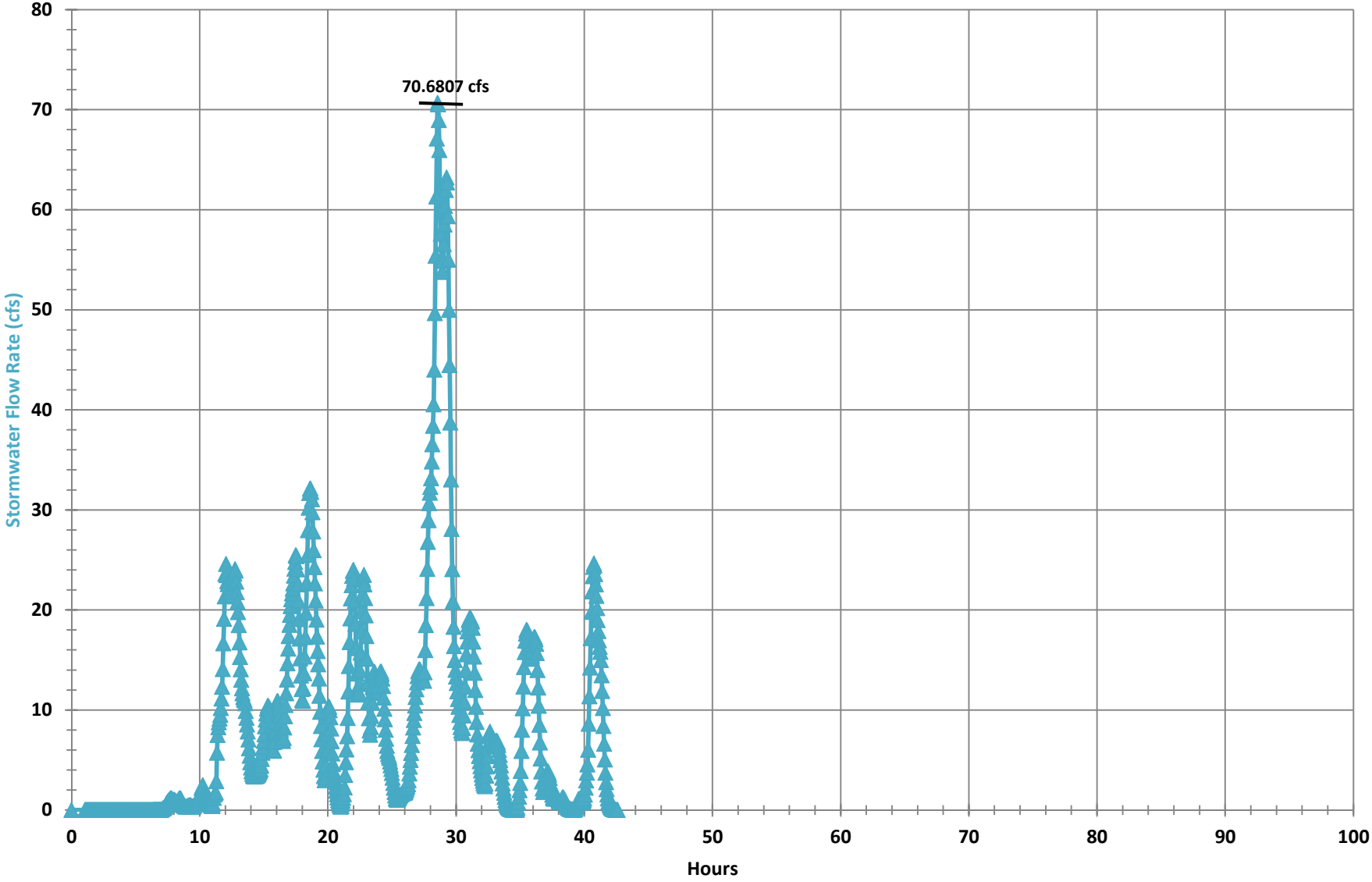


Figure 17: fYNOP Modeled Stormflow: Tri-Hill Gauge Sinkhole Oct. 10-11, 2013 Storm

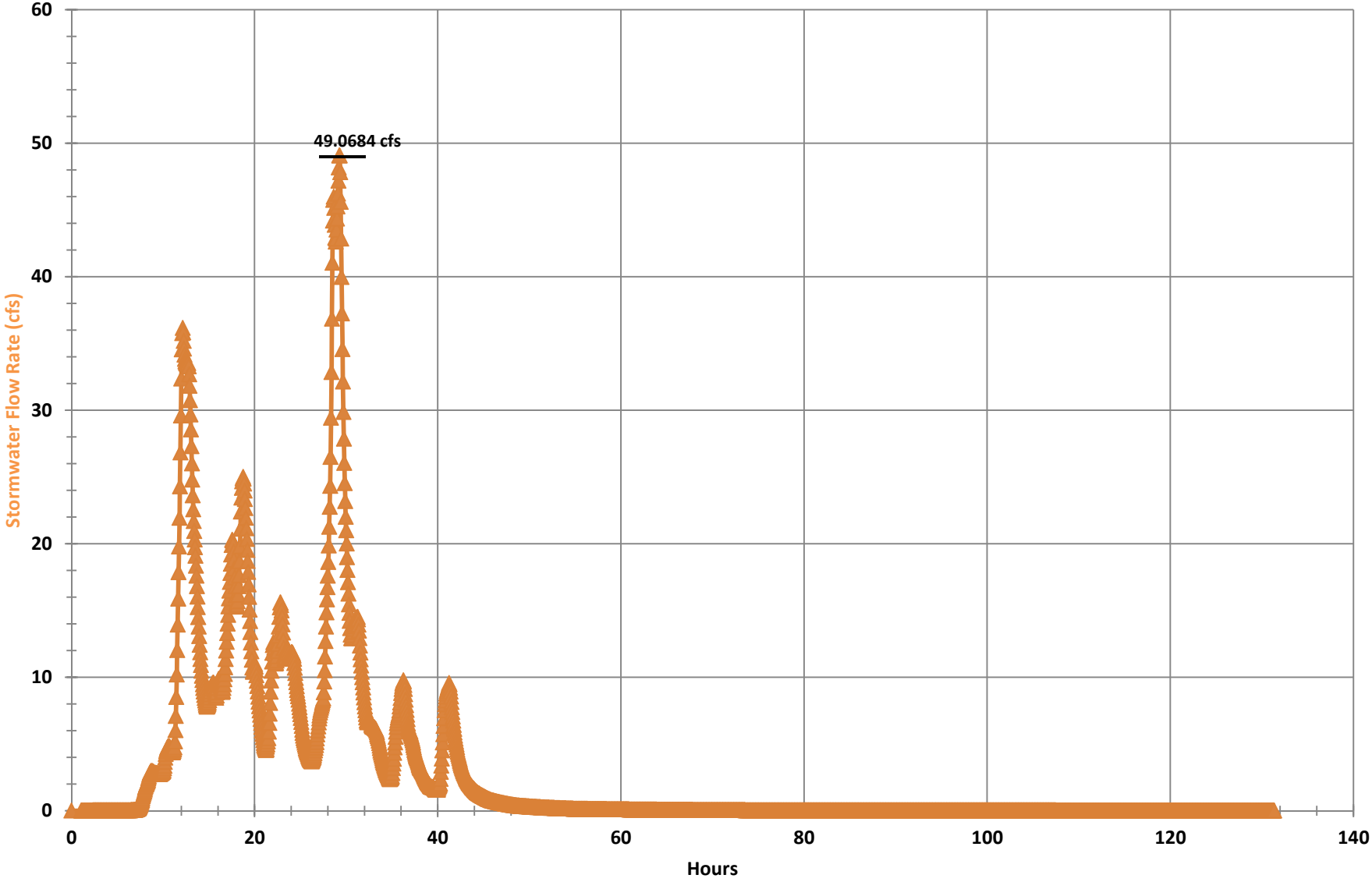


Figure 18: fYNOP Modeled Stormflow: East York Rain Gauge Data
HACH 1001+1002 - Sept. 21, 2013 Storm

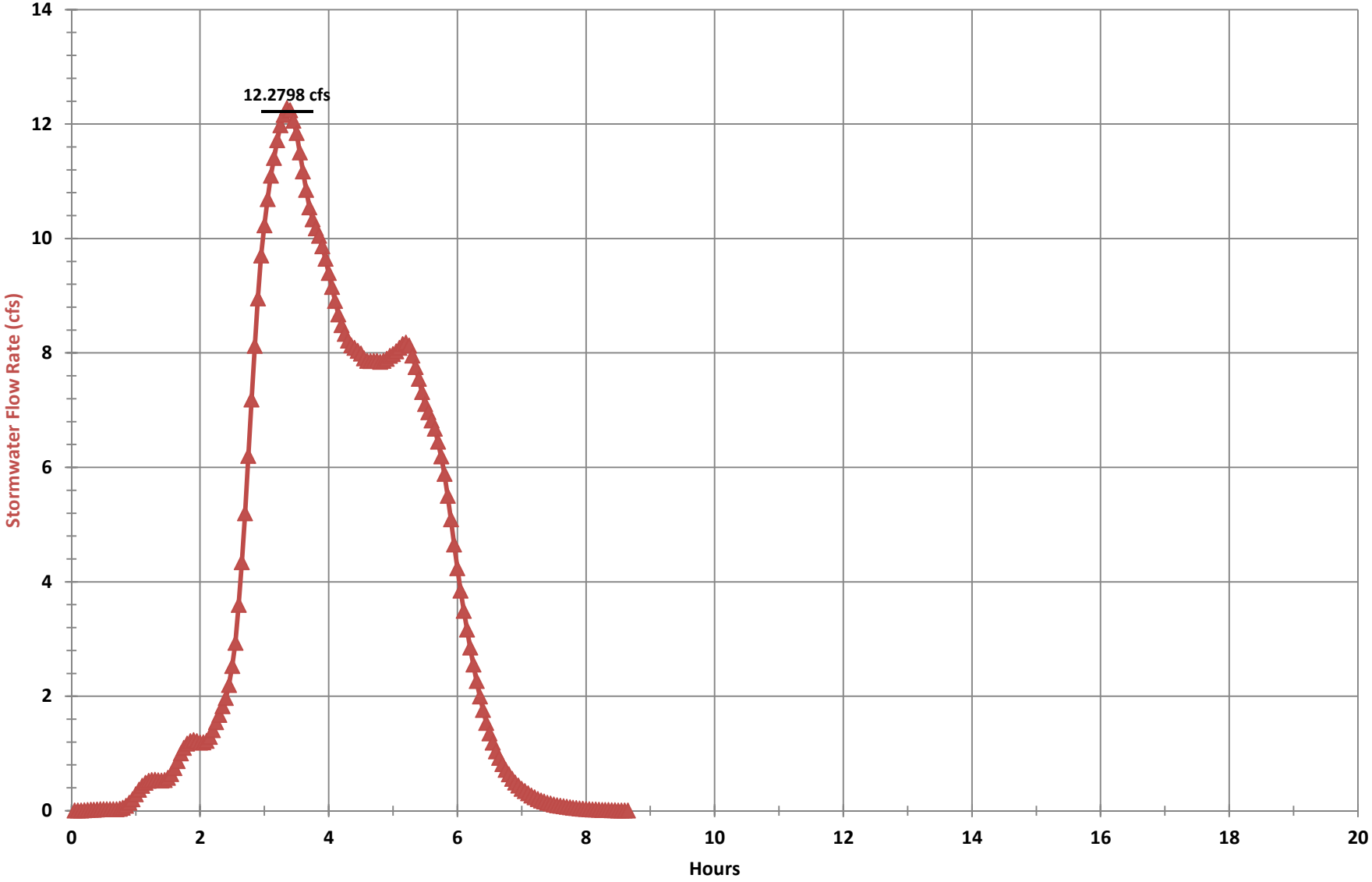


Figure 19: fYNOP Modeled Stormwater Flow: East York Rain Gauge Data
HACH 1003 - Sept. 21, 2013 Storm

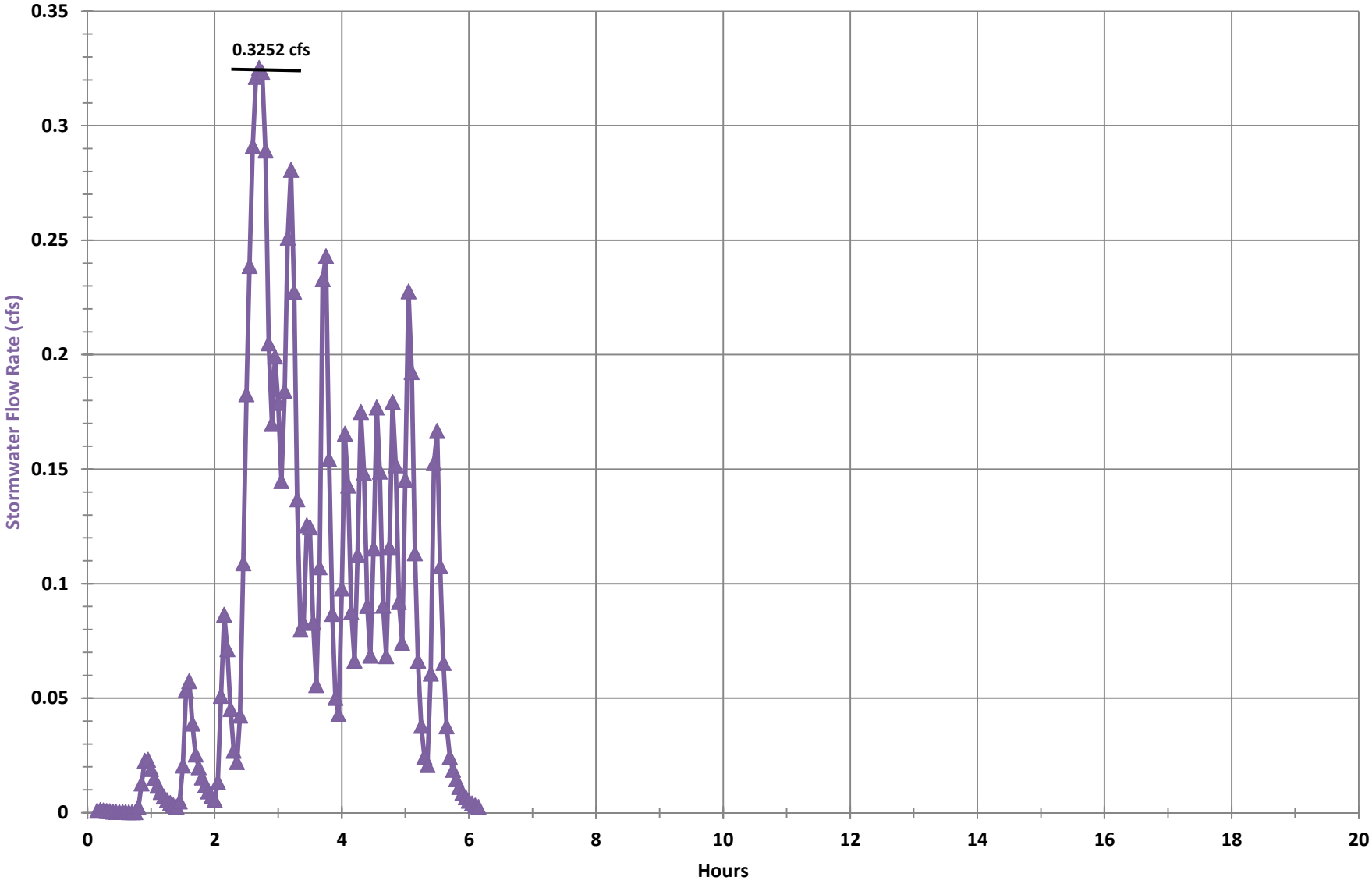


Figure 20: fYNOP Modeled Stormflow: East York Rain Gauge Data
HACH 1004+1005 - Sept. 21, 2013 Storm

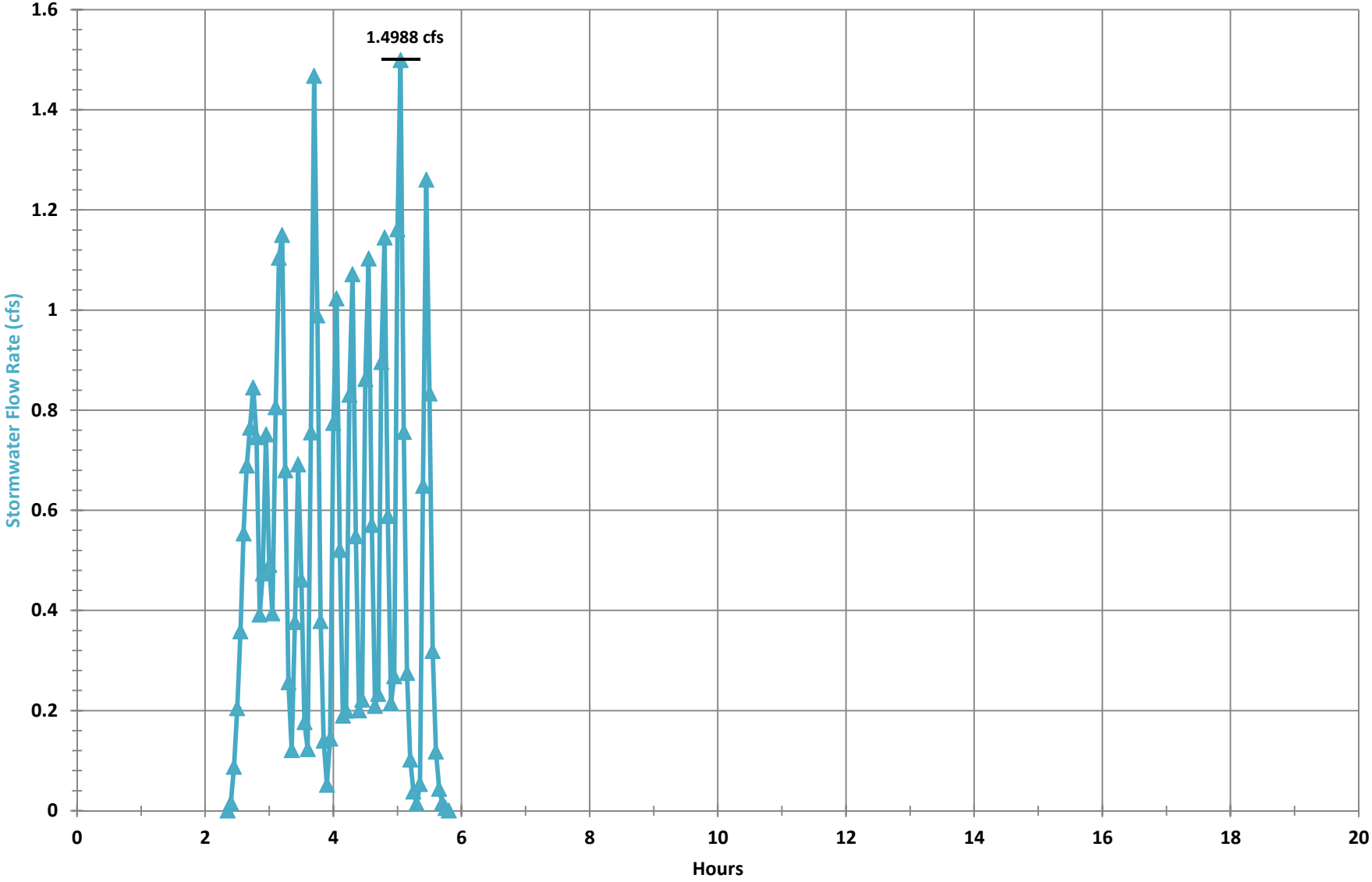


Figure 21: fYNOP Modeled Stormflow: East York Gauge Sinkhole Sept. 21, 2013 Storm

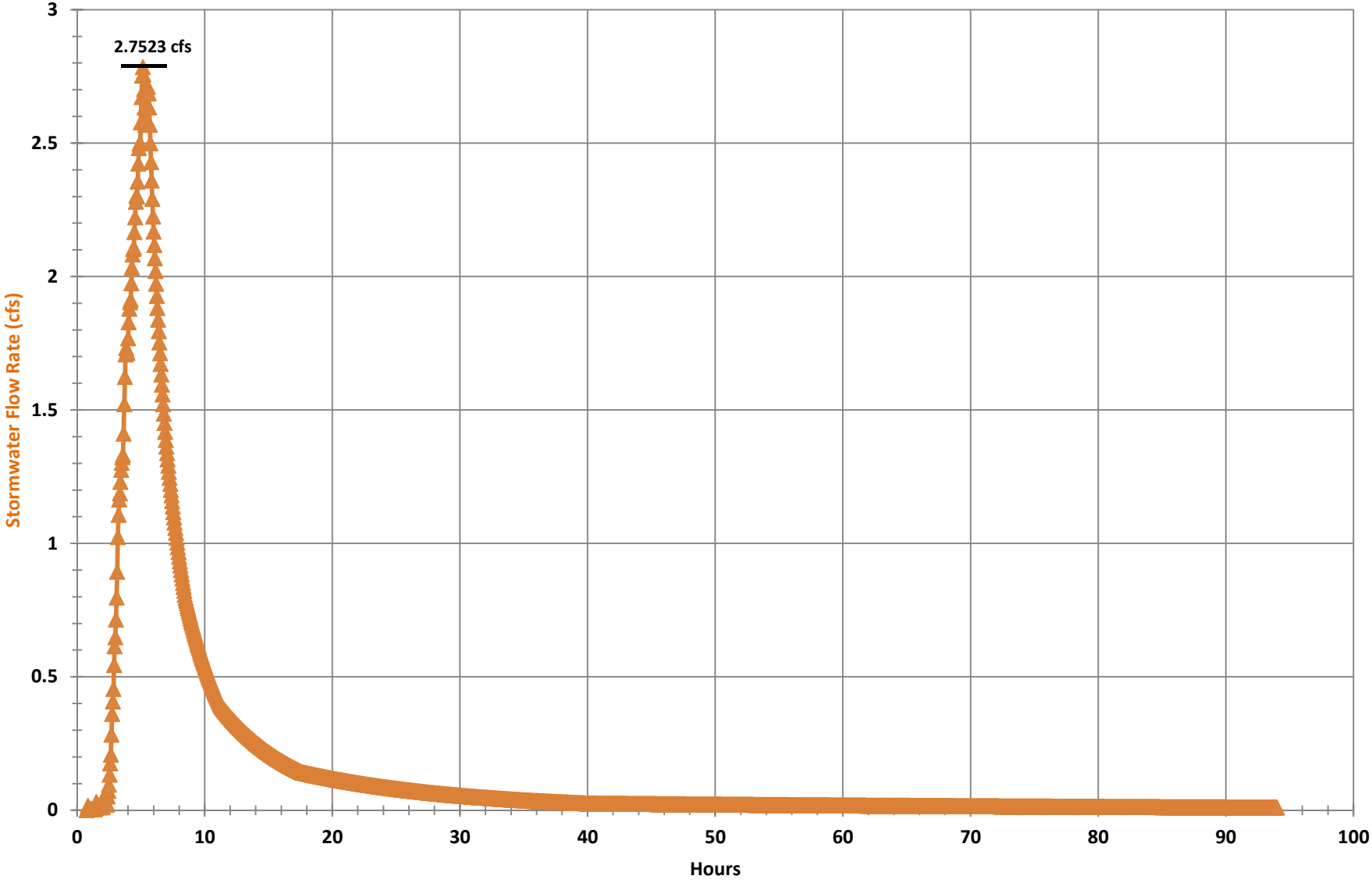


Figure 22: fYNOP Modeled Stormflow: East York Rain Gauge Data
HACH 1001+1002 October 10-11, 2013 Storm

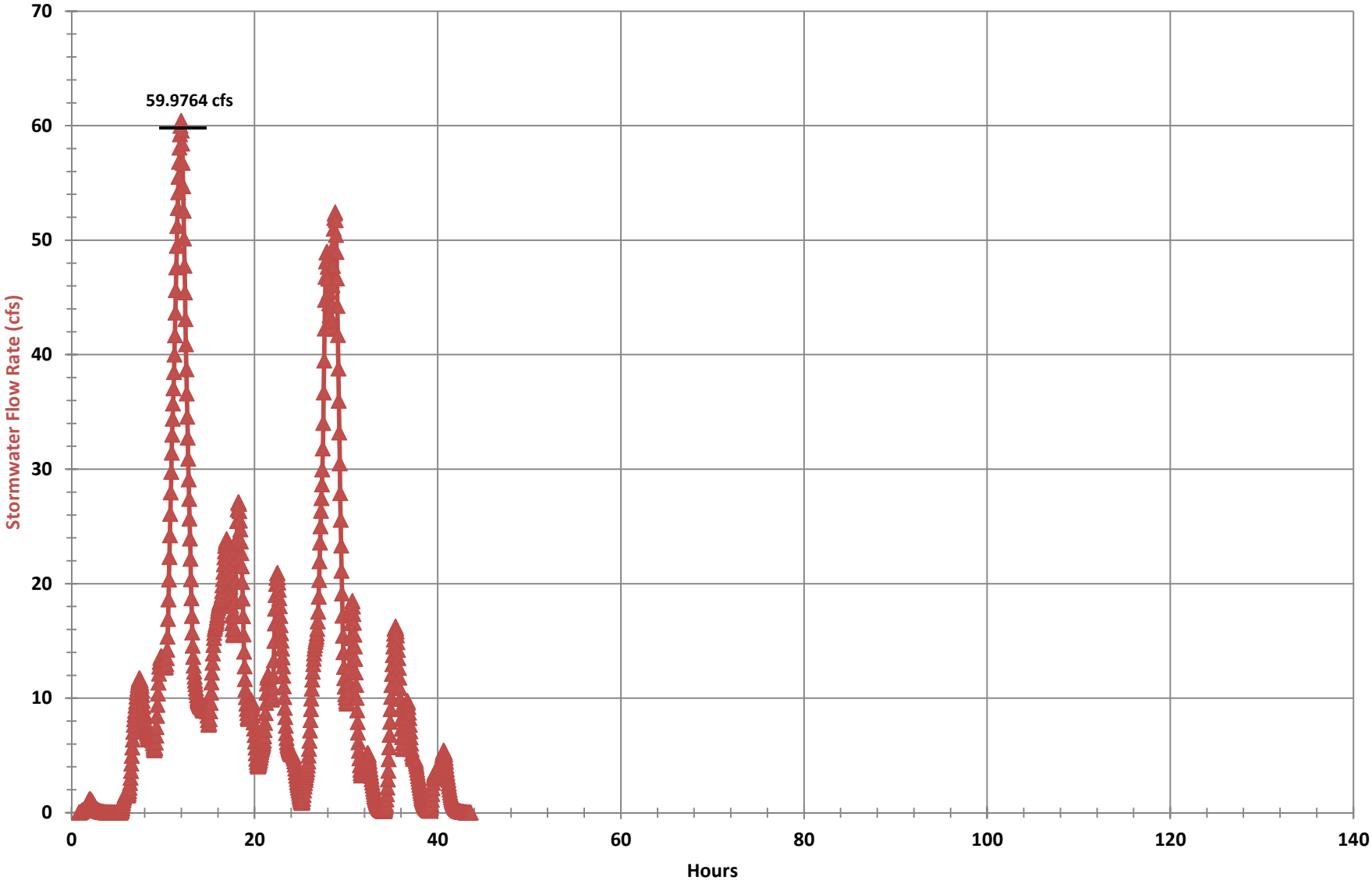


Figure 23: fYNOP Modeled Stormflow: East York Rain Gauge Data
HACH 1003 October 10-11, 2013 Storm

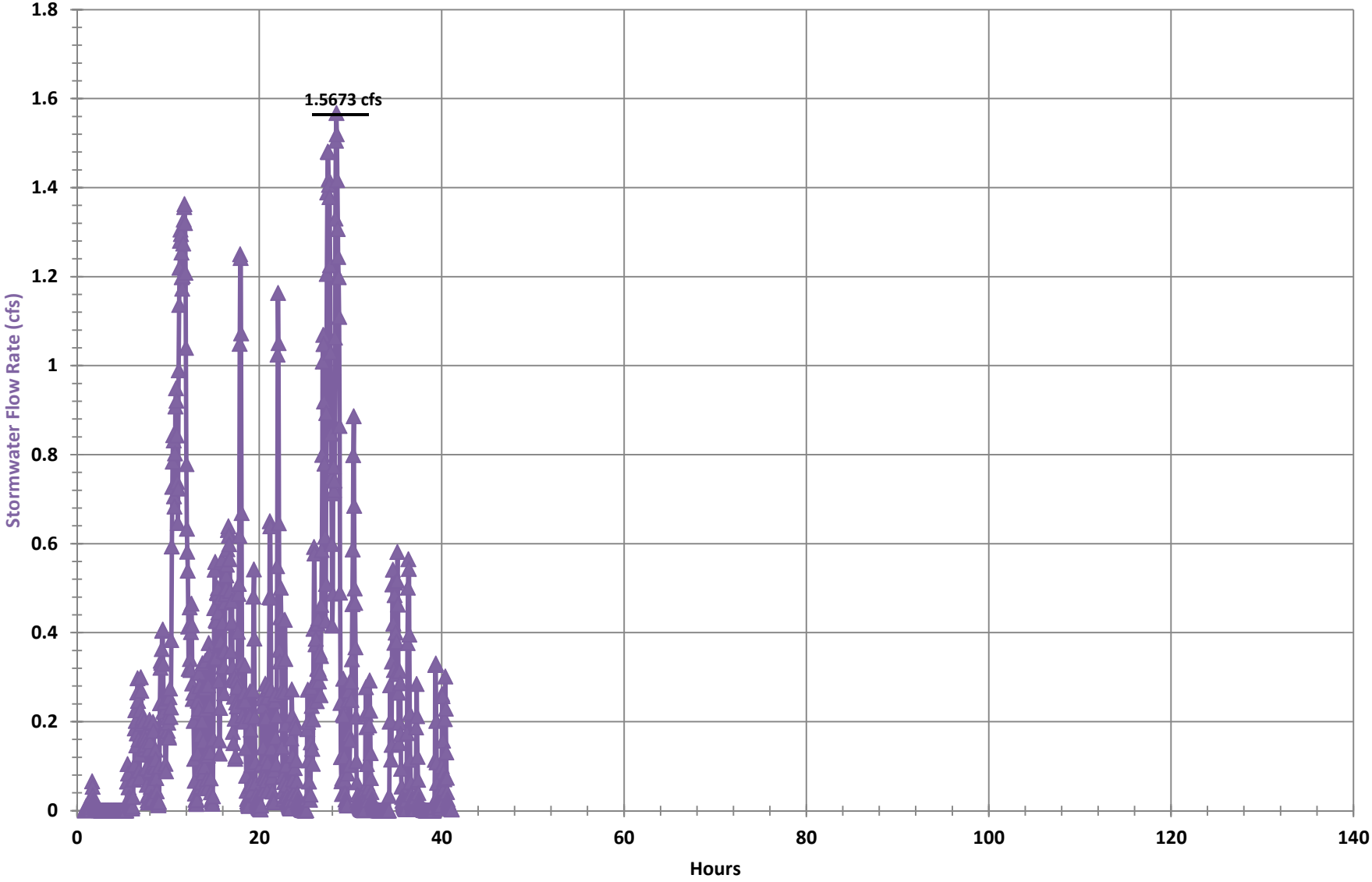


Figure 24: fYNOP Modeled Stormflow: East York Rain Gauge Data
HACH 1004+1005 October 10-11, 2013 Storm

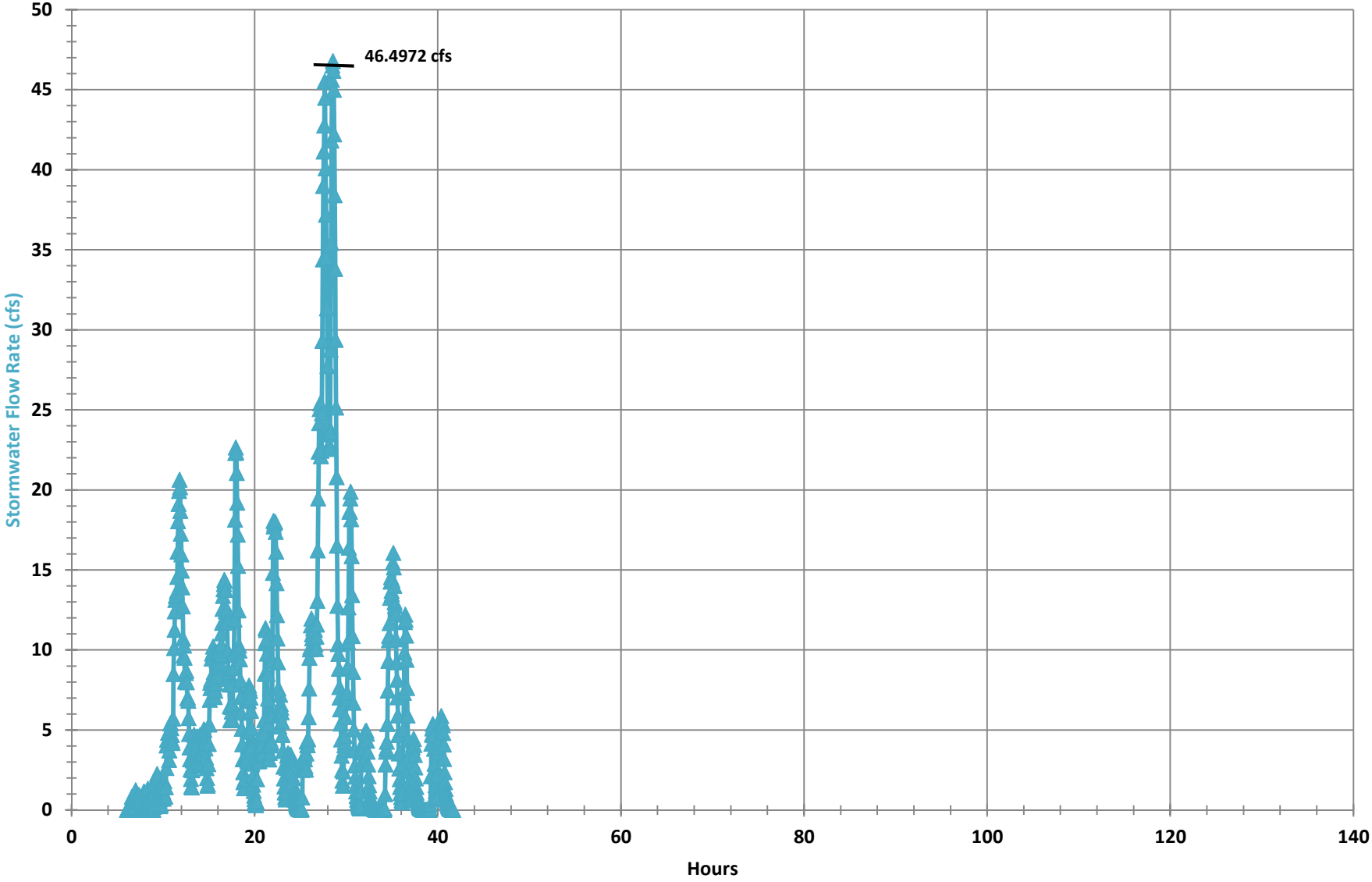


Figure 25: fYNOP Modeled Stormflow: East York Gauge Sinkhole Oct. 10-11, 2013 Storm

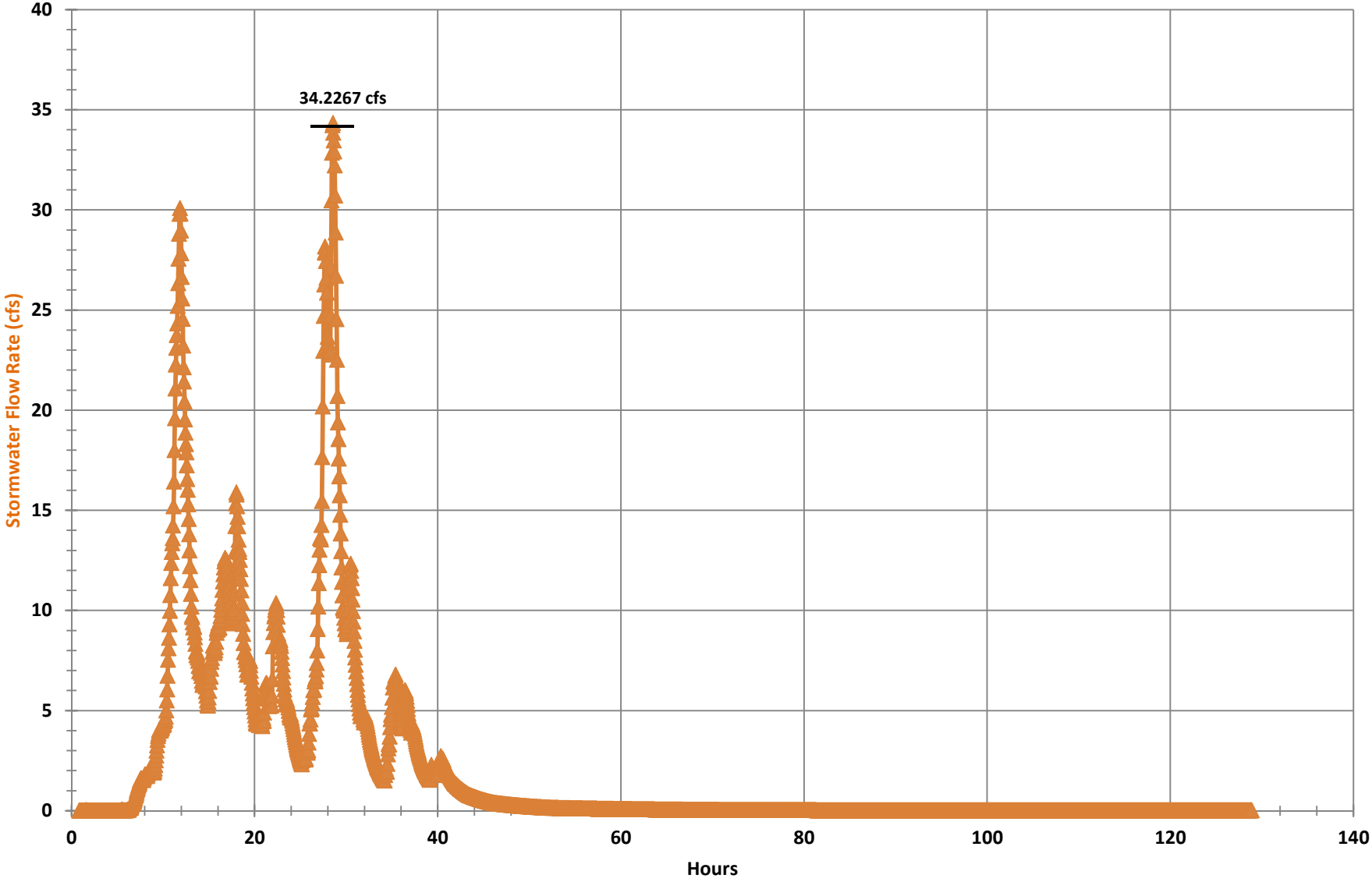


Figure 26: fYNOP Modeled Stormflow: fYNOP Rain Gauge Data
HACH 1001+1002 Sept. 21, 2013 Storm

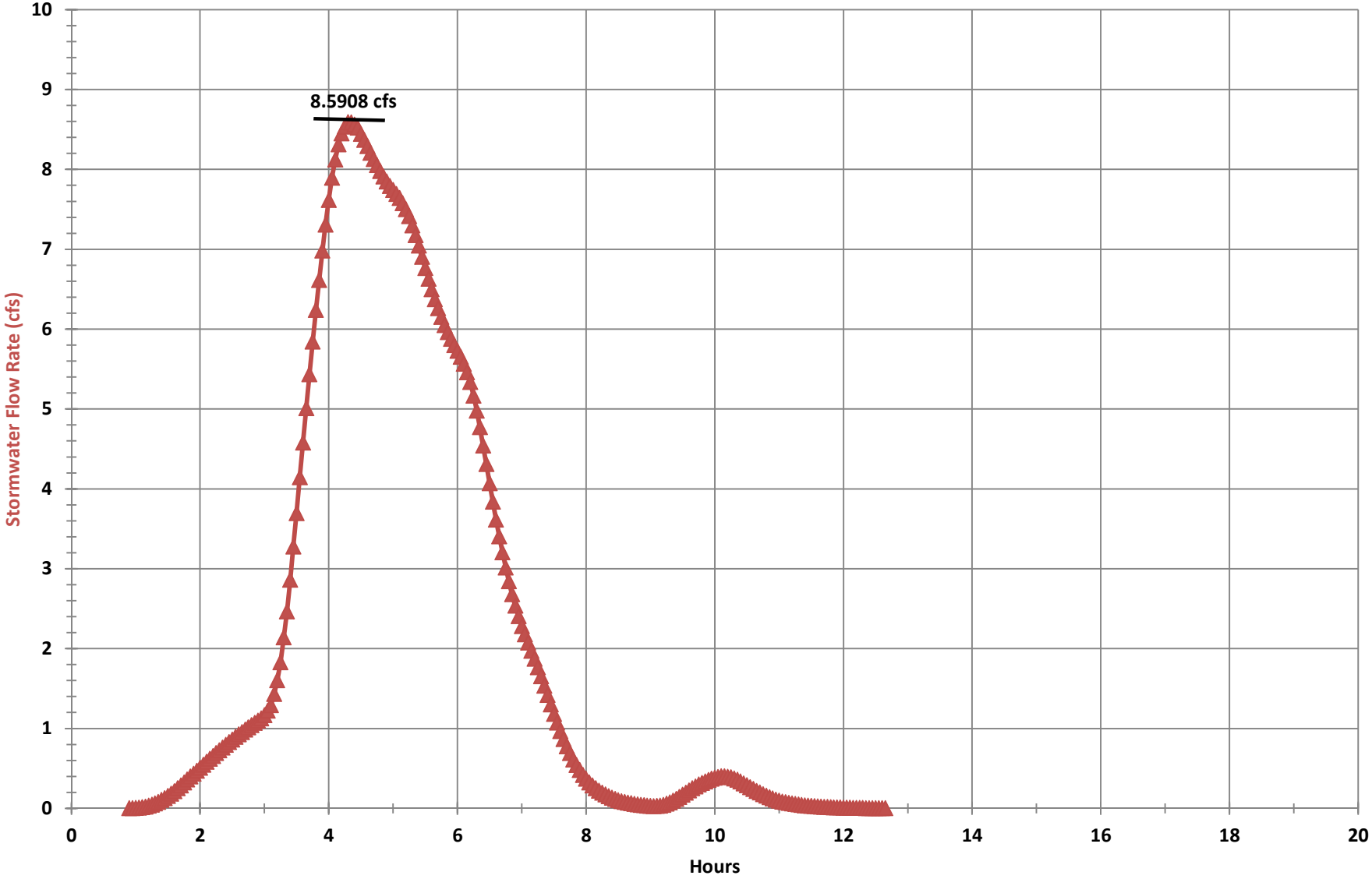


Figure 27: fYNOP Modeled Stormflow: fYNOP Rain Gauge Data
HACH 1003 Sept. 21, 2013 Storm

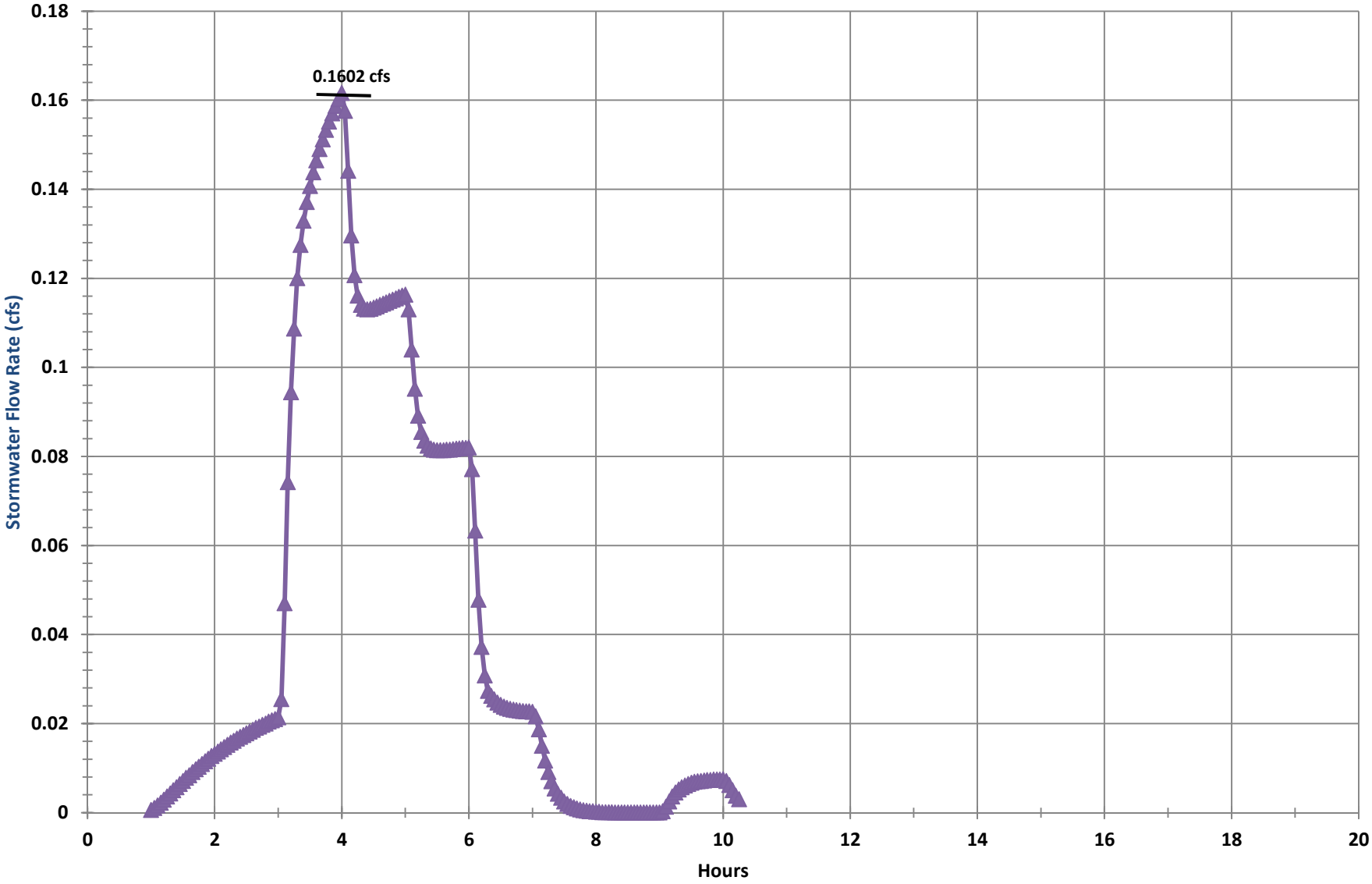


Figure 28: fYNOP Modeled Stormflow: fYNOP Rain Gauge Data
HACH 1004+1005 Sept. 21, 2013 Storm

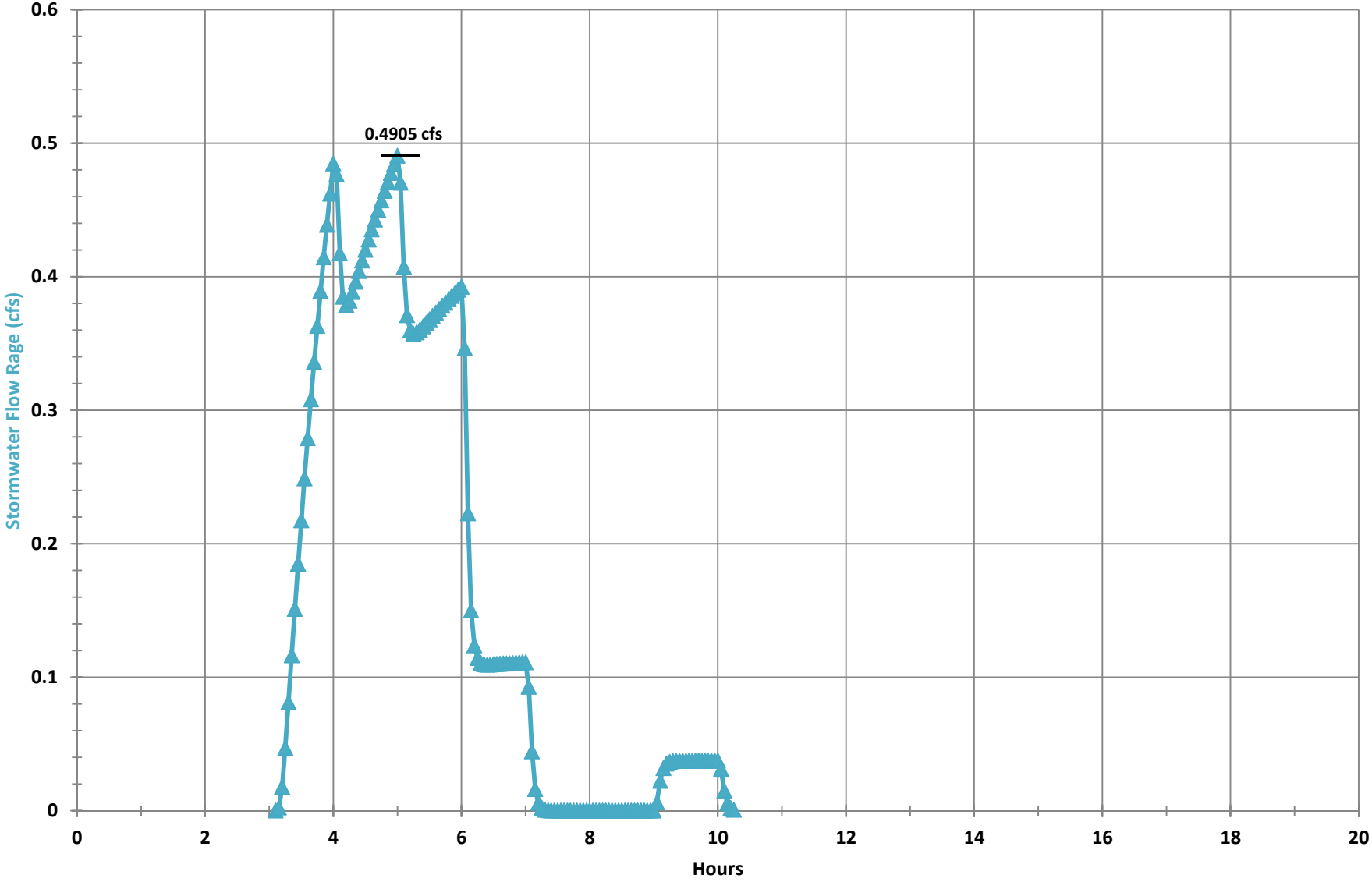


Figure 29: fYNOP Modeled Stormflow: fYNOP Site Gauge Sinkhole Sept. 21, 2013 Storm

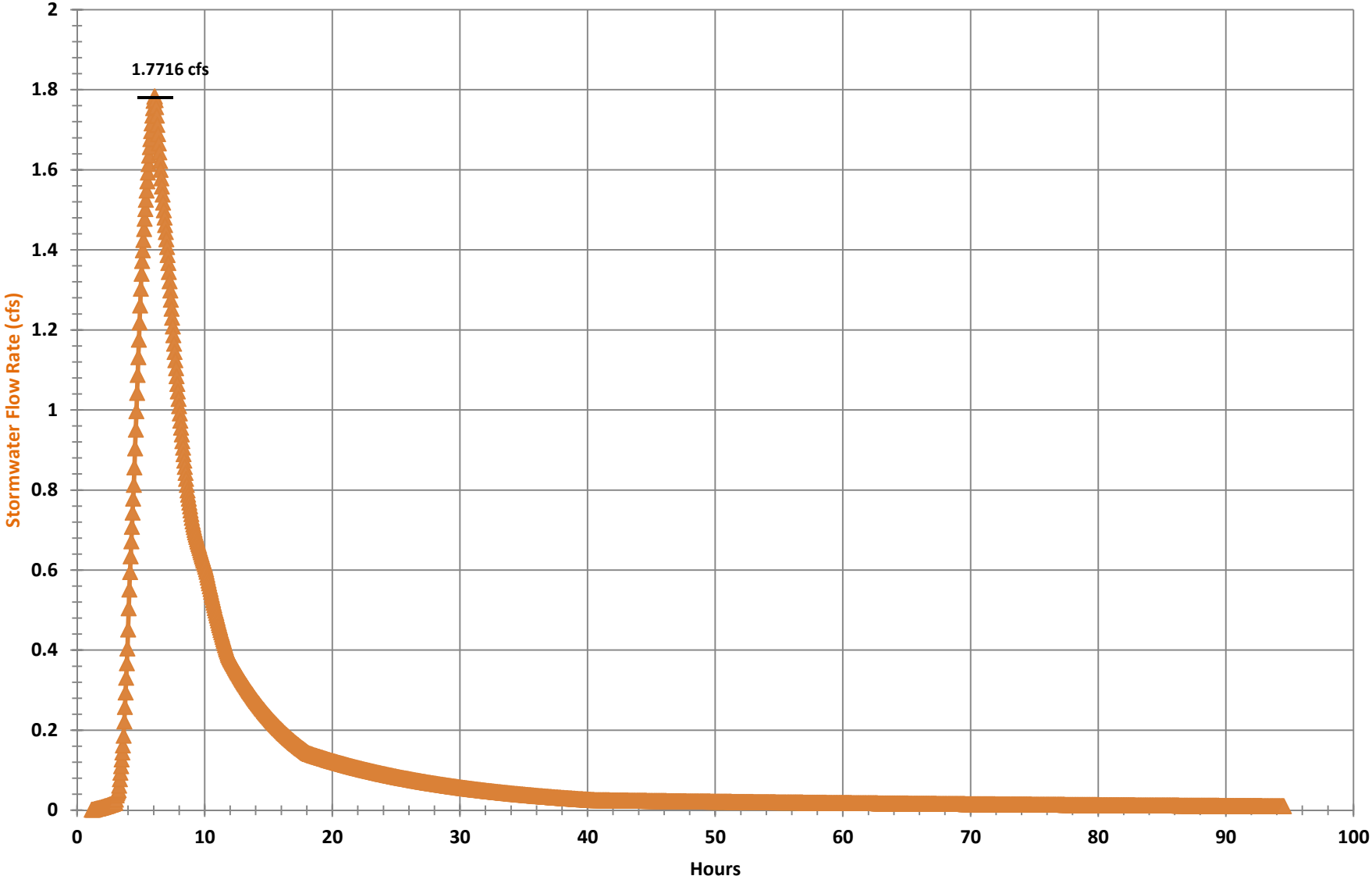


Figure 30: fYNOP Modeled Stormflow: fYNOP Rain Gauge Data
HACH 1001+1002 October 10-11, 2013 Storm

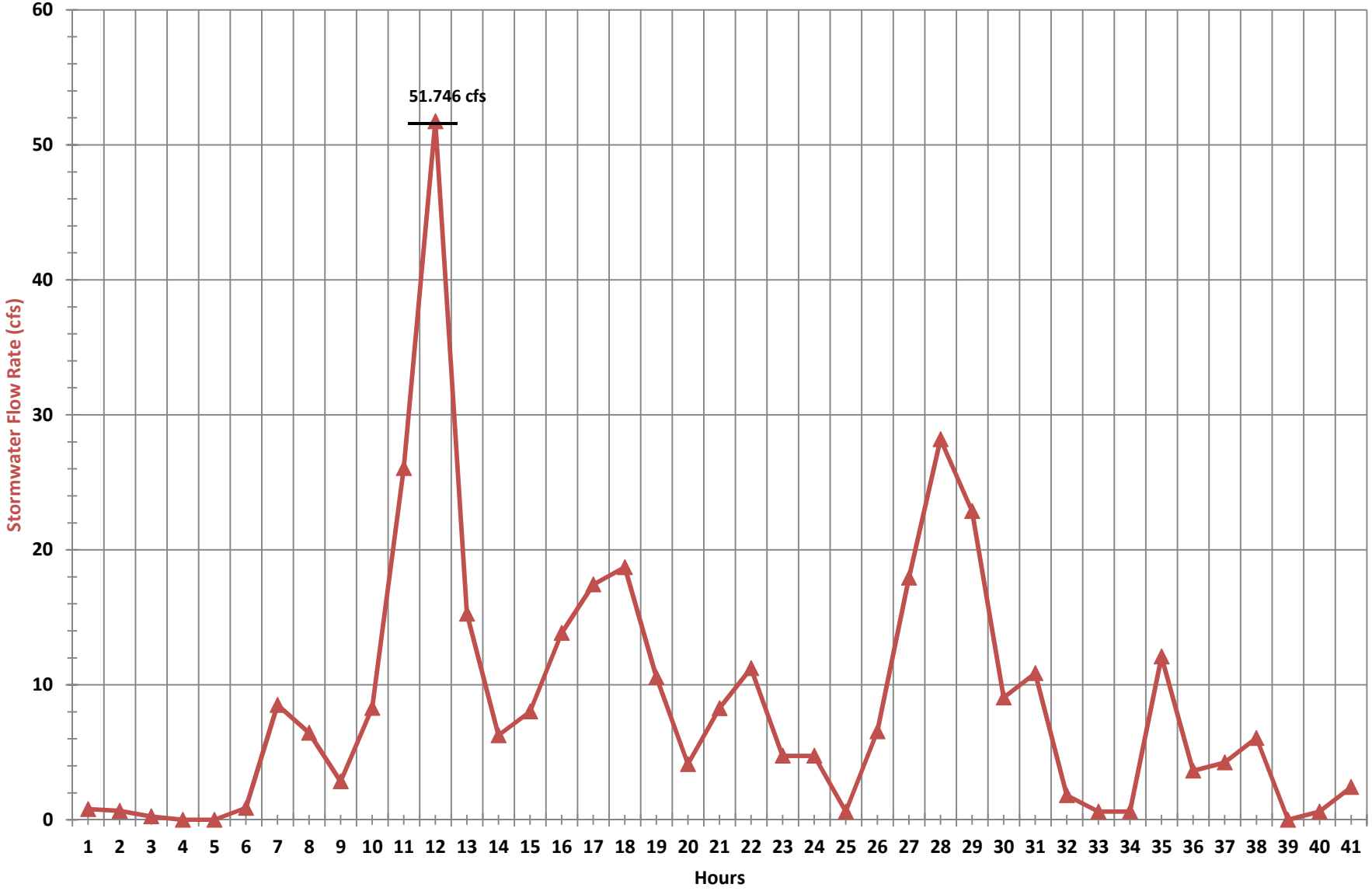


Figure 31: fYNOP Modeled Stormflow: fYNOP Rain Gauge Data
HACH 1003 October 10-11, 2013 Storm

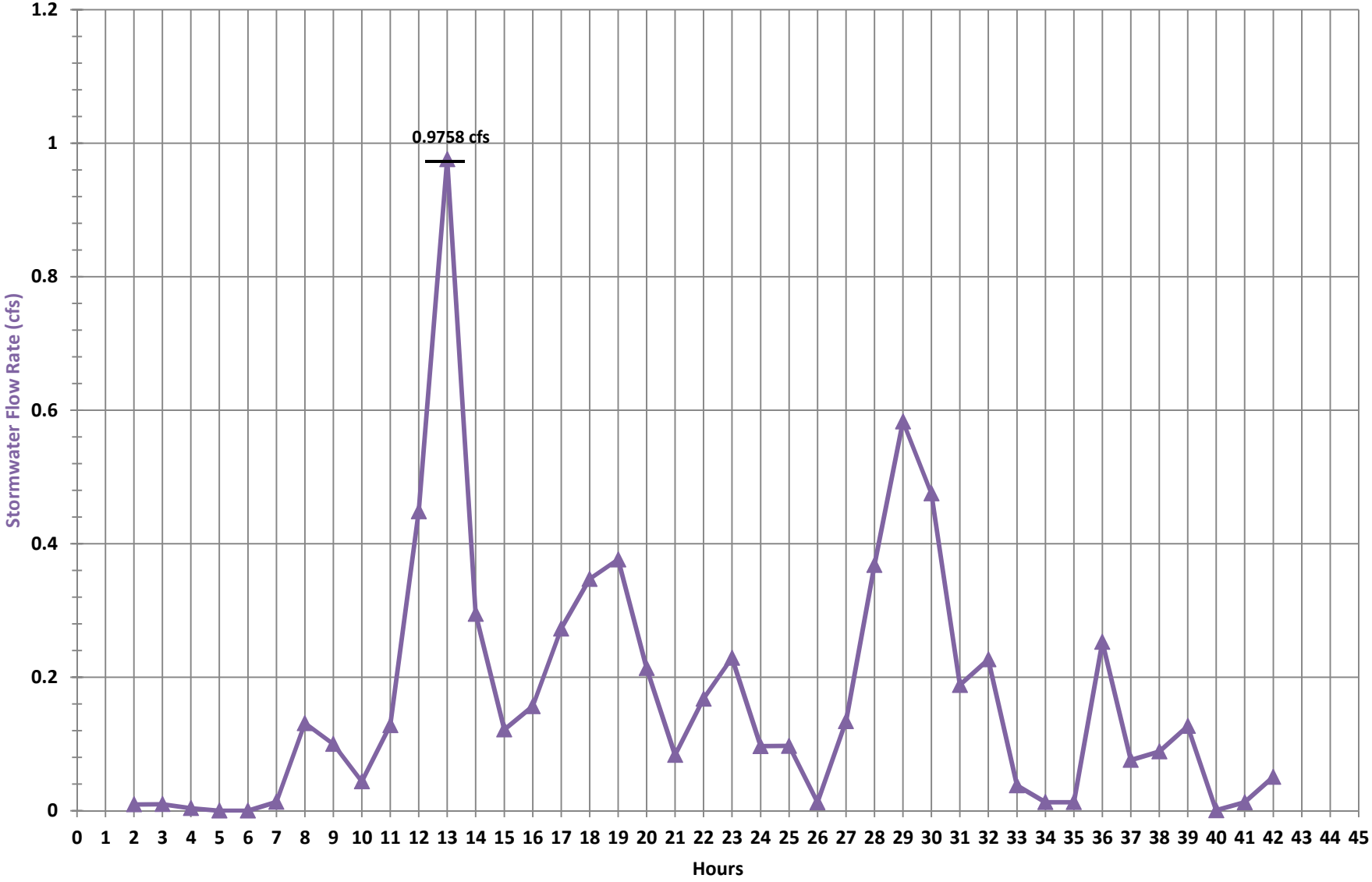


Figure 32: fYNOP Modeled Stormflow: fYNOP Rain Gauge Data
HACH 1004+1005 October 10-11, 2013 Storm

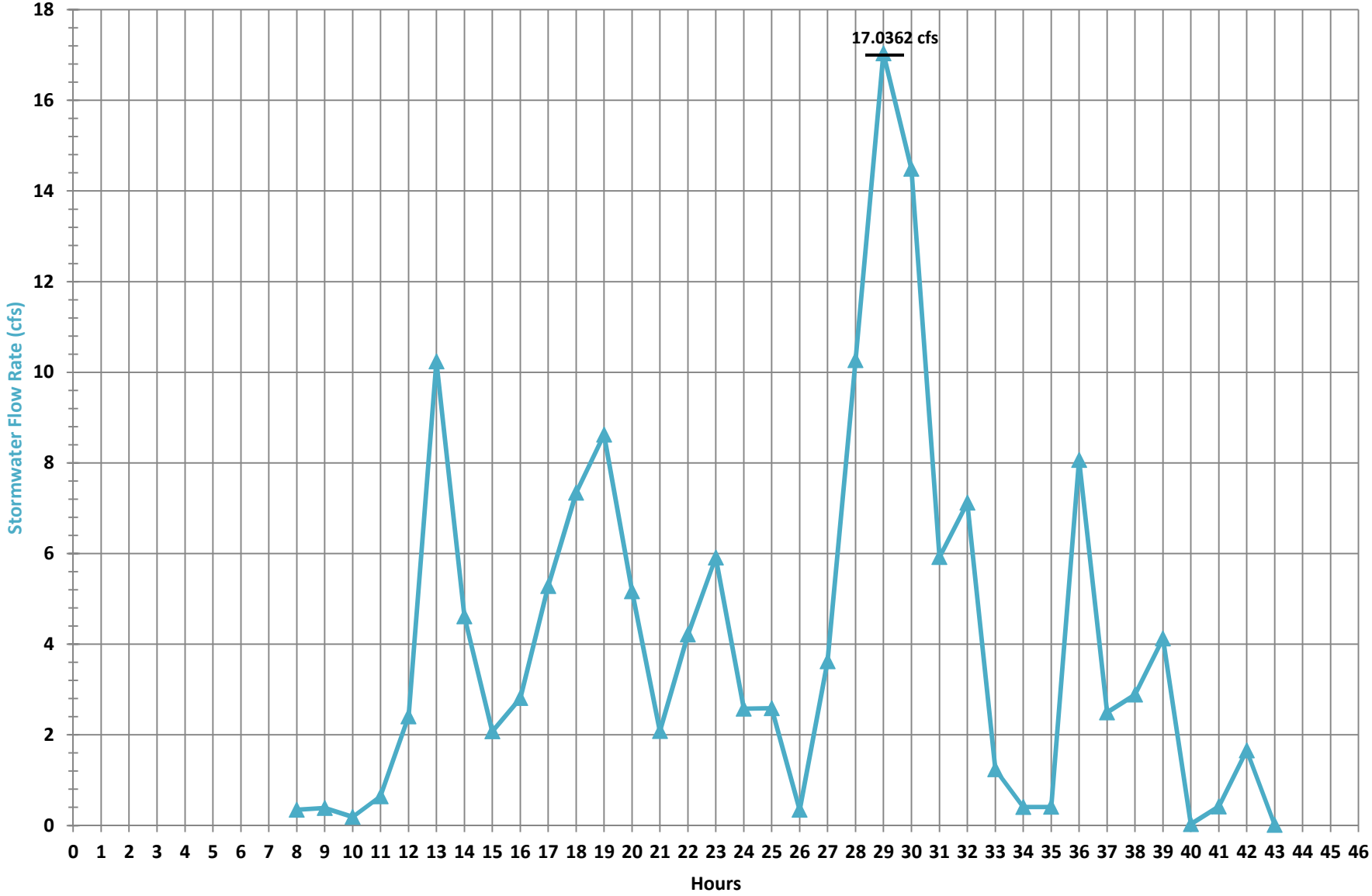


Figure 33: fYNOP Modeled Stormflow: fYNOP Site Gauge Sinkhole Oct. 10-11, 2013 Storm

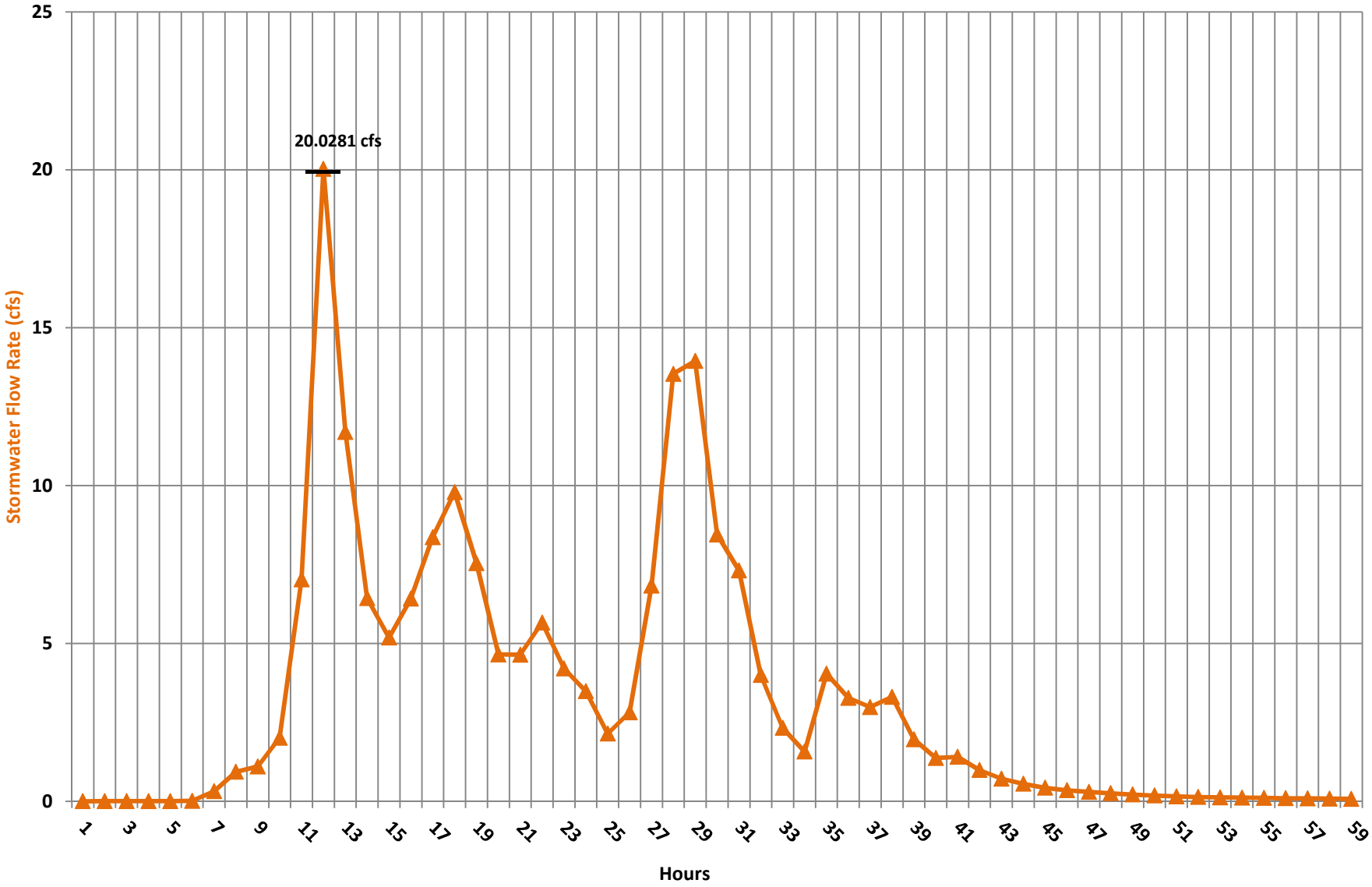


Figure 34: fYNOP Modeled Stormflow: fYNOP Rain Gauge Data
HACH 1001 + 1002 October 7, 2013 Storm

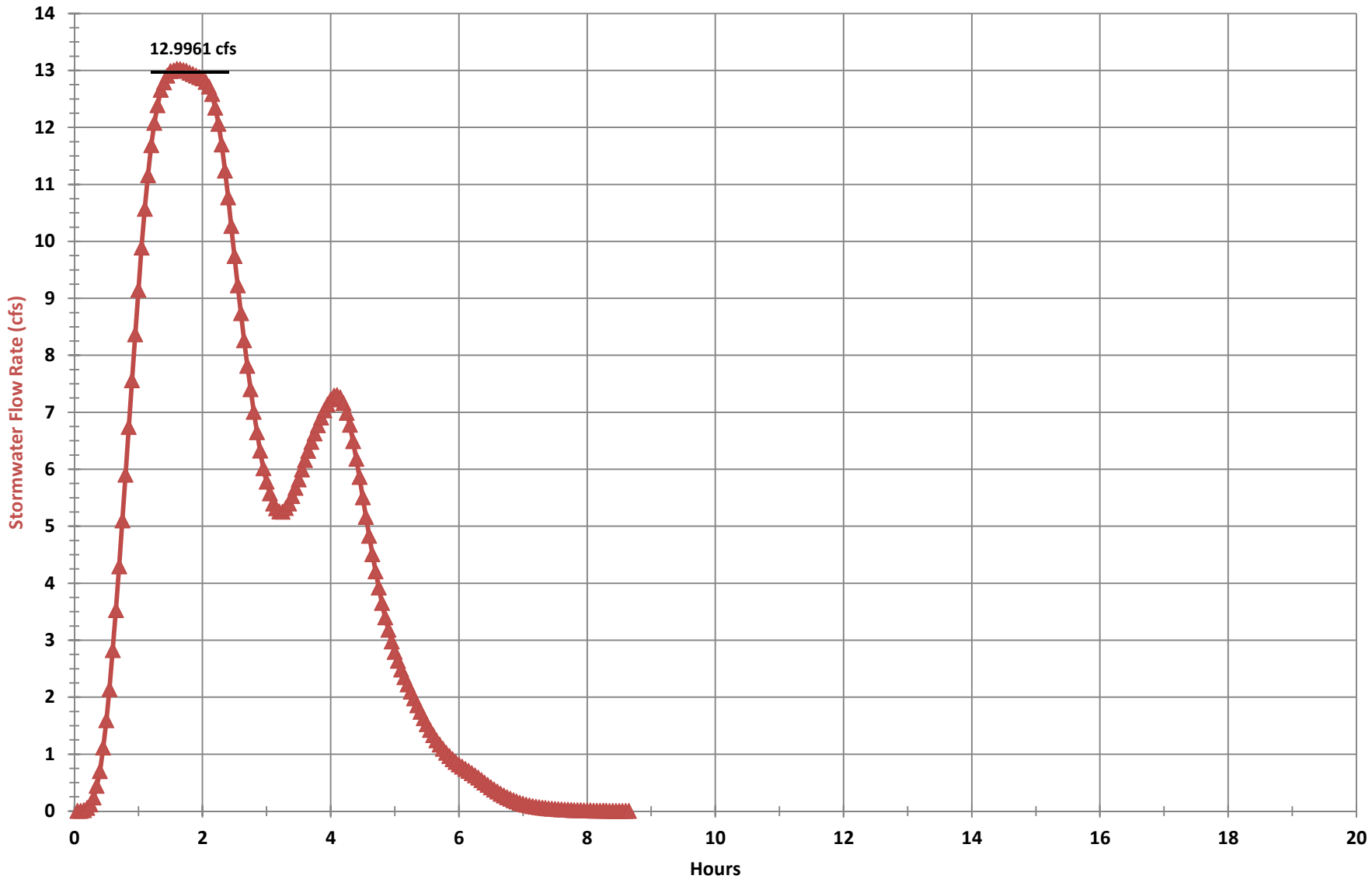


Figure 35: fYNOP Modeled Stormflow: fYNOP Rain Gauge Data
HACH 1003 October 7, 2013 Storm

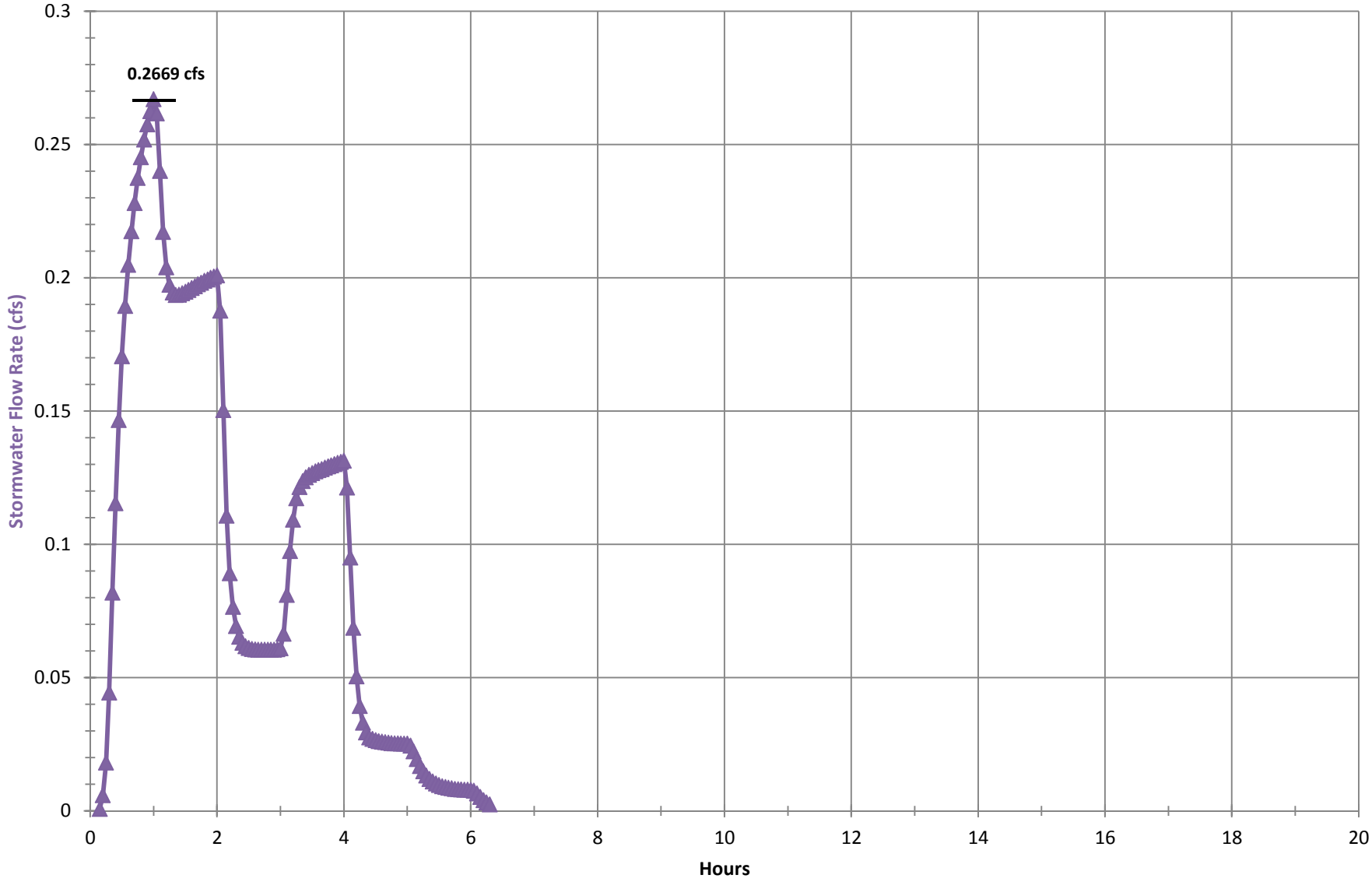


Figure 36: fYNOP Modeled Stormflow: fYNOP Rain Gauge Data
HACH 1004+1005 October 7, 2013 Storm

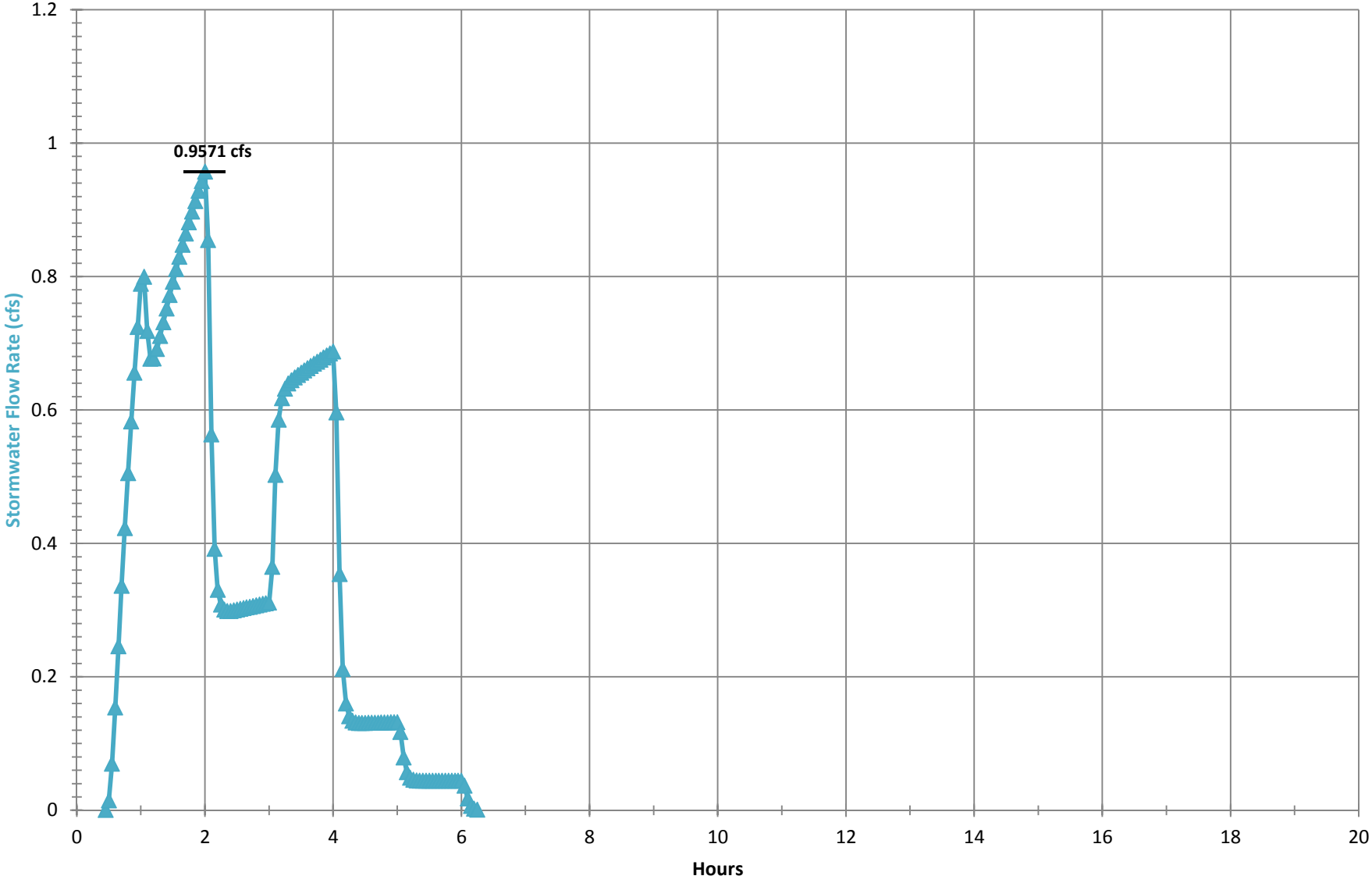


Figure 37: fYNOP Modeled Stormflow: fYNOP Site Gauge Sinkhole Oct. 7, 2013 Storm

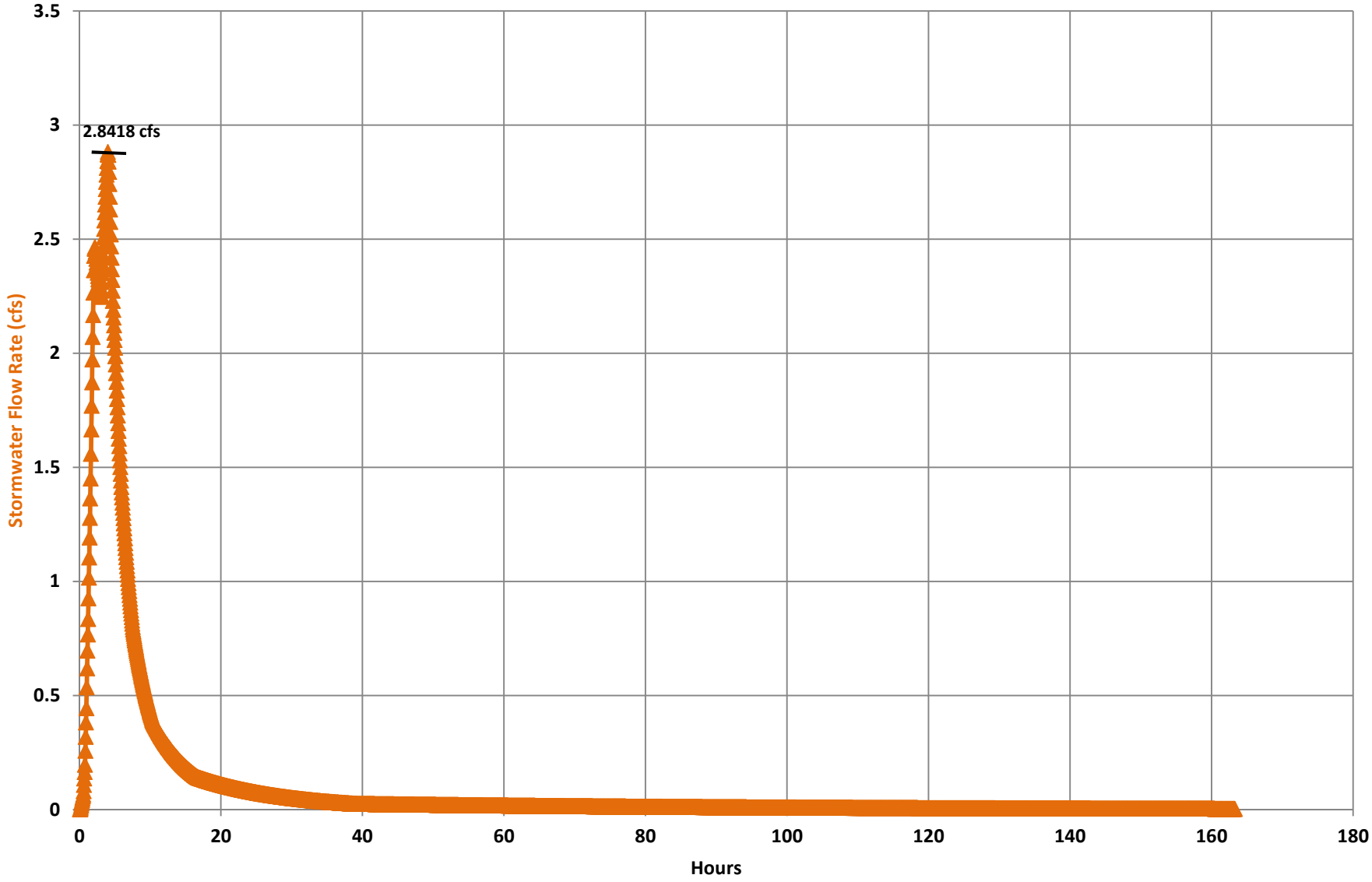


Figure 38: fYNOP Measured Stormflow
HACH 1001+1002 September 21, 2013 Storm

KCF Groundwater, Inc.

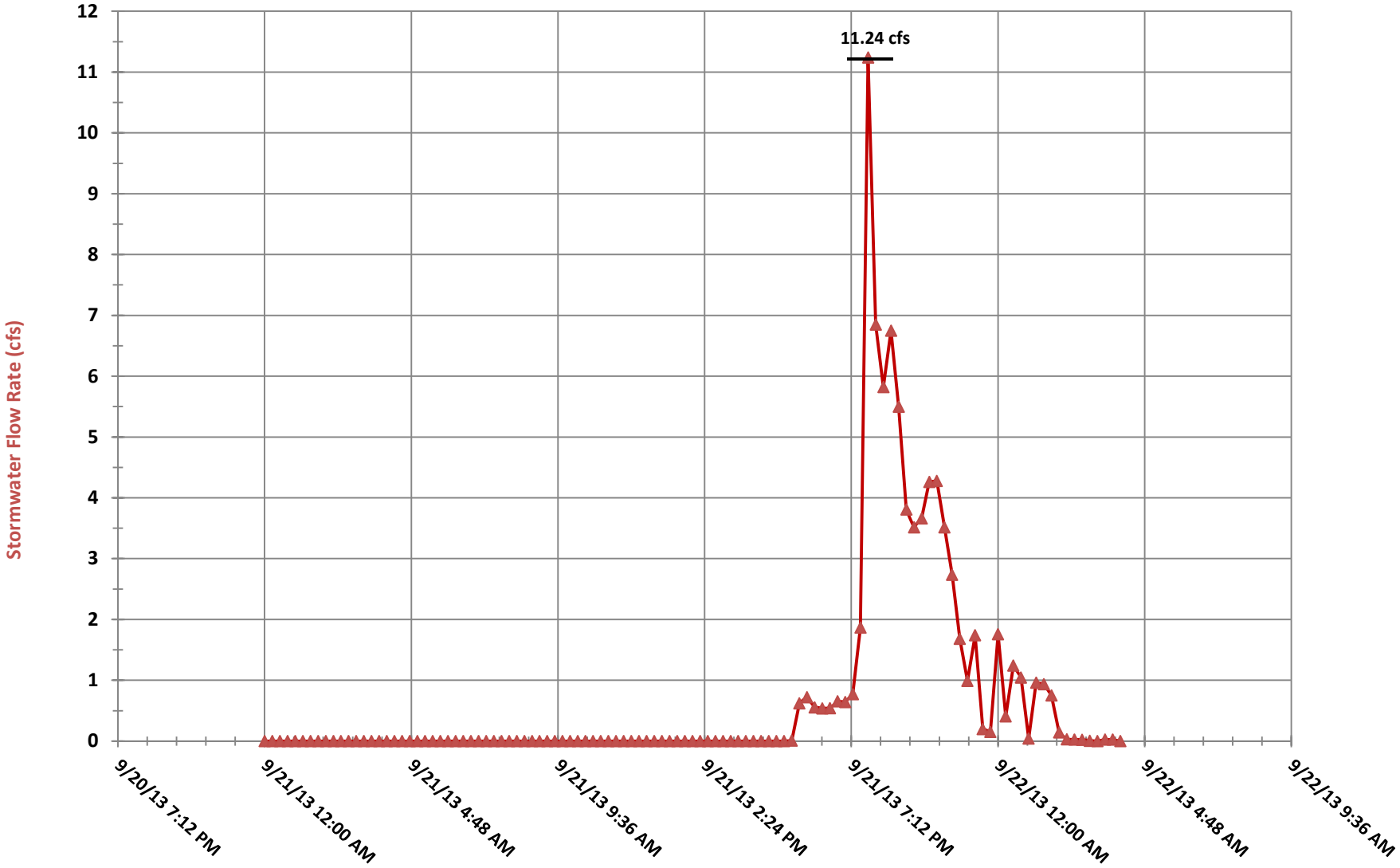


Figure 39: fYNOP Measured Stormflow
HACH 1003 September 21, 2013 Storm

KCF Groundwater, Inc.

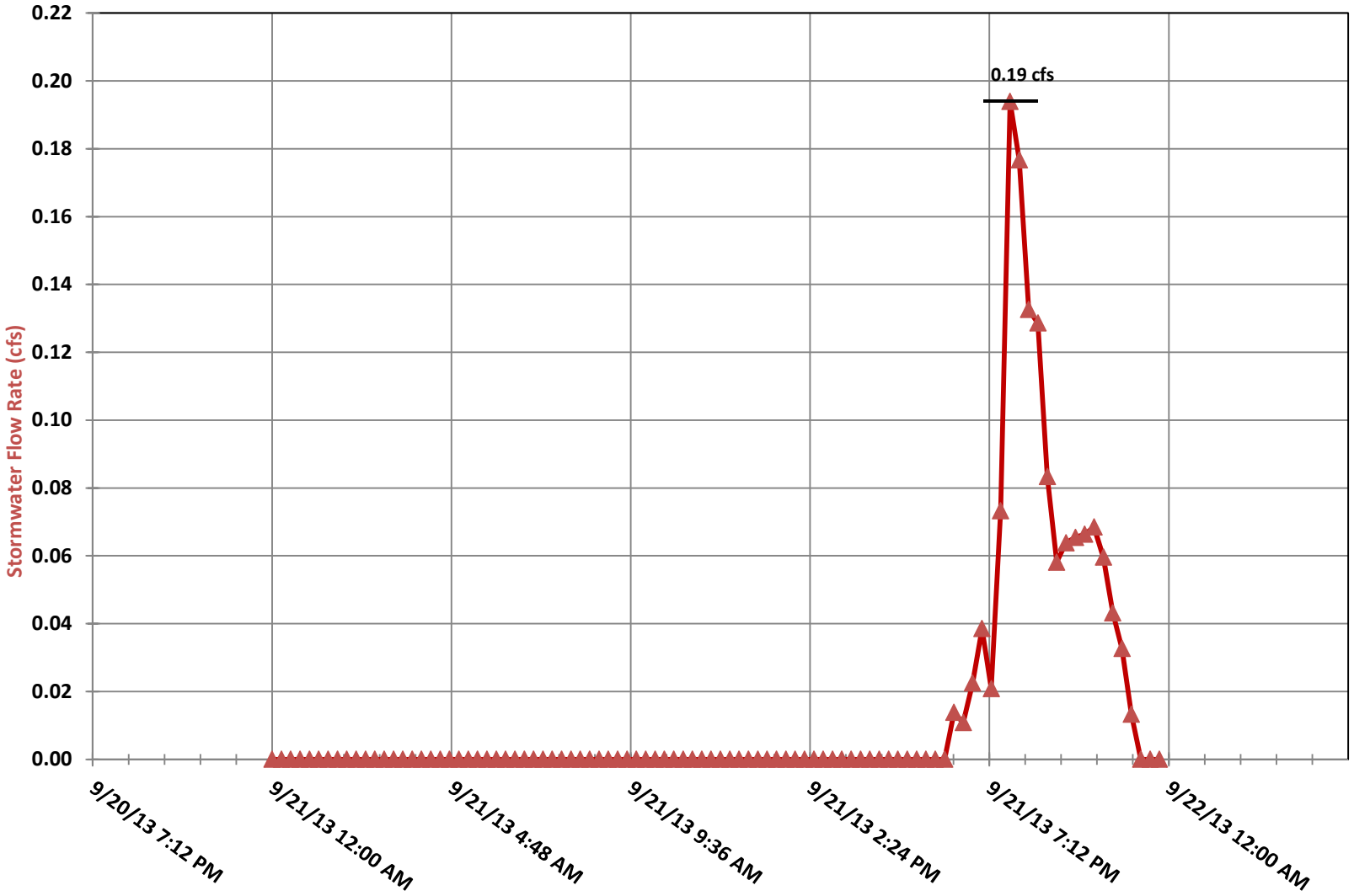


Figure 40: fYNOP Measured Stormflow
HACH 1004 + 1005 September 21, 2013

KCF Groundwater, Inc.

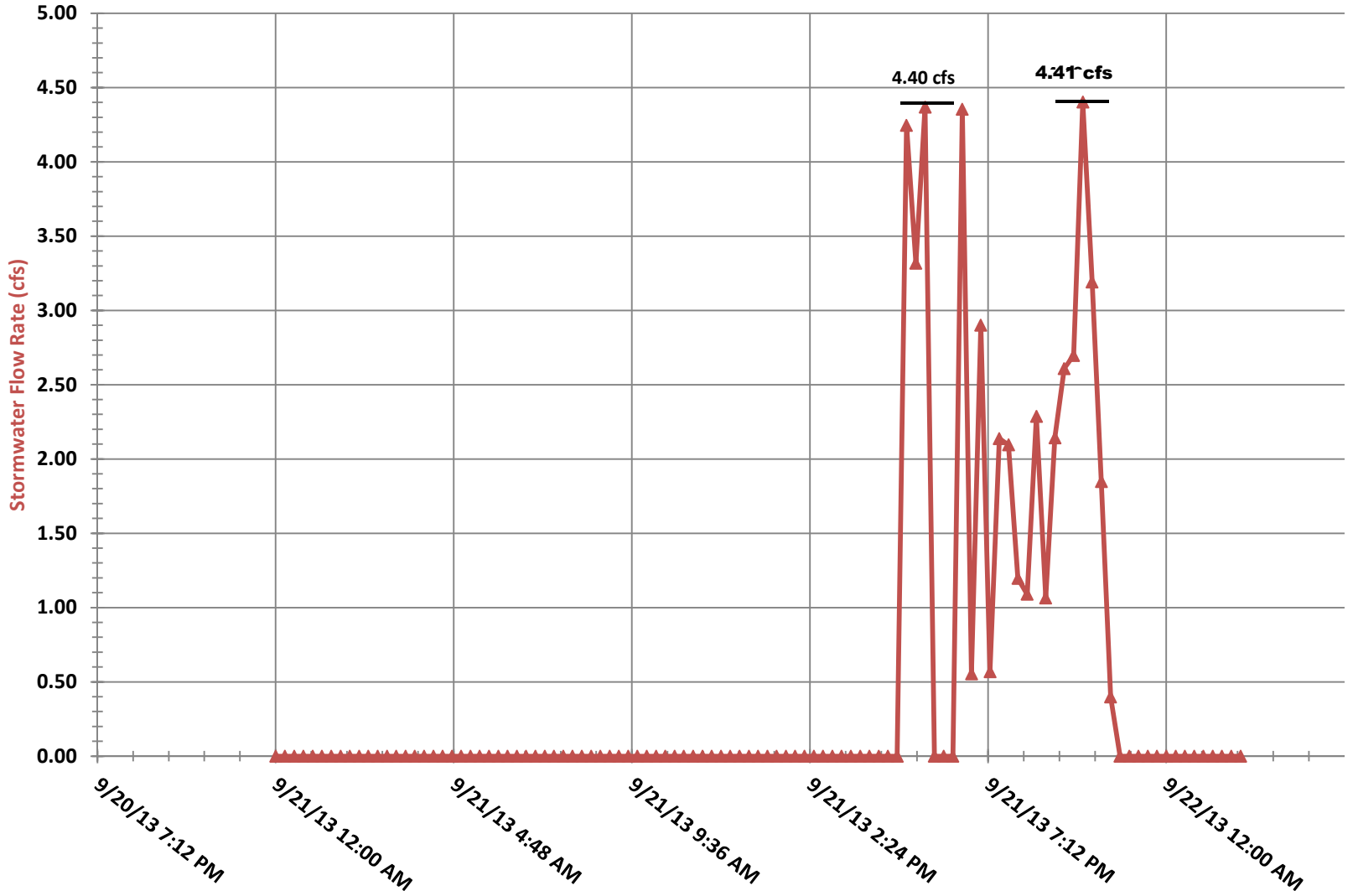


Figure 41: fYNOP Measured Stormflow
HACH 1001+1002 October 7, 2013 Storm

KCF Groundwater, Inc.

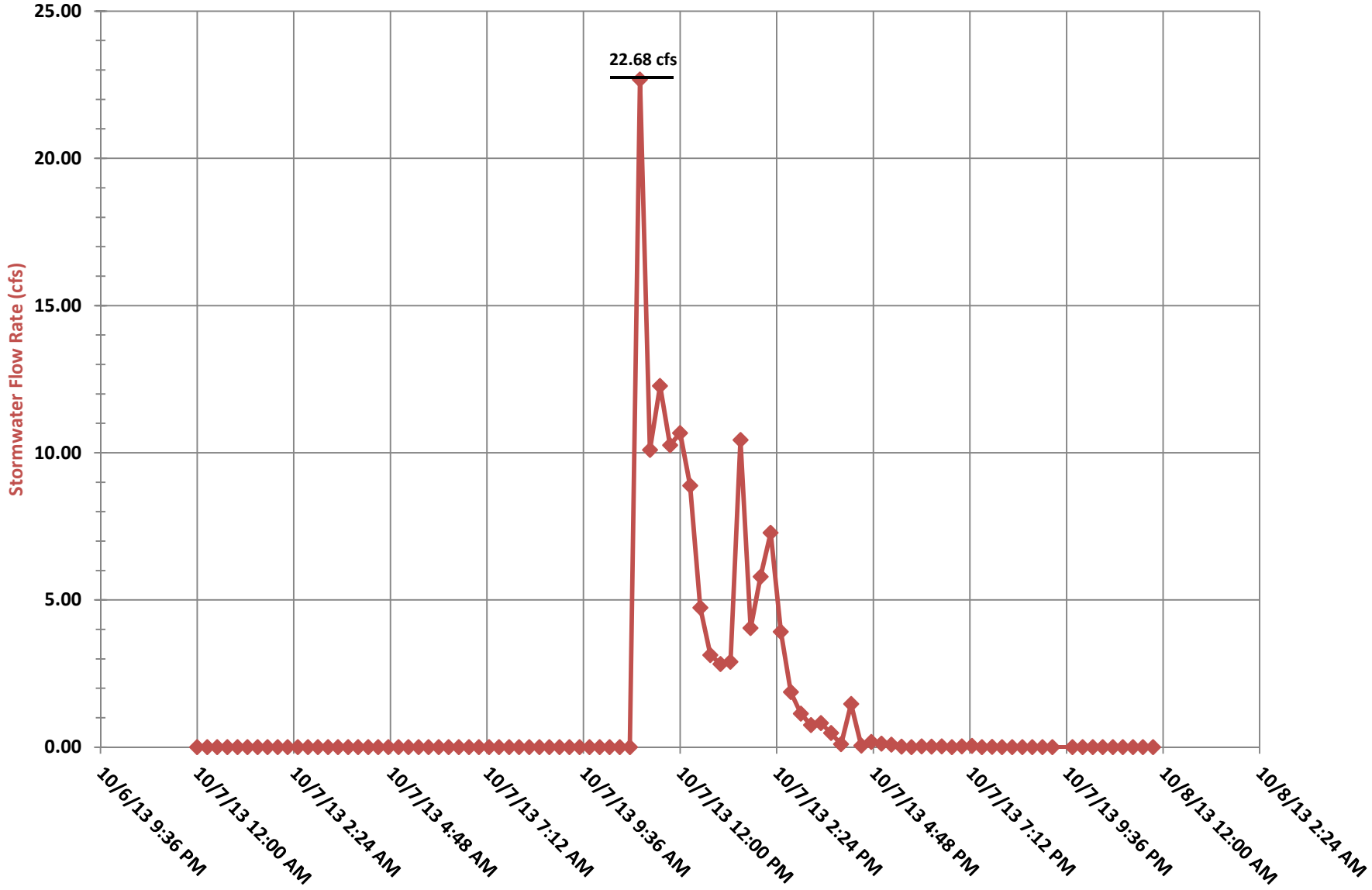


Figure 42: fYNOP Measured Stormflow
HACH 1003 October 7, 2013 Storm

KCF Groundwater, Inc.

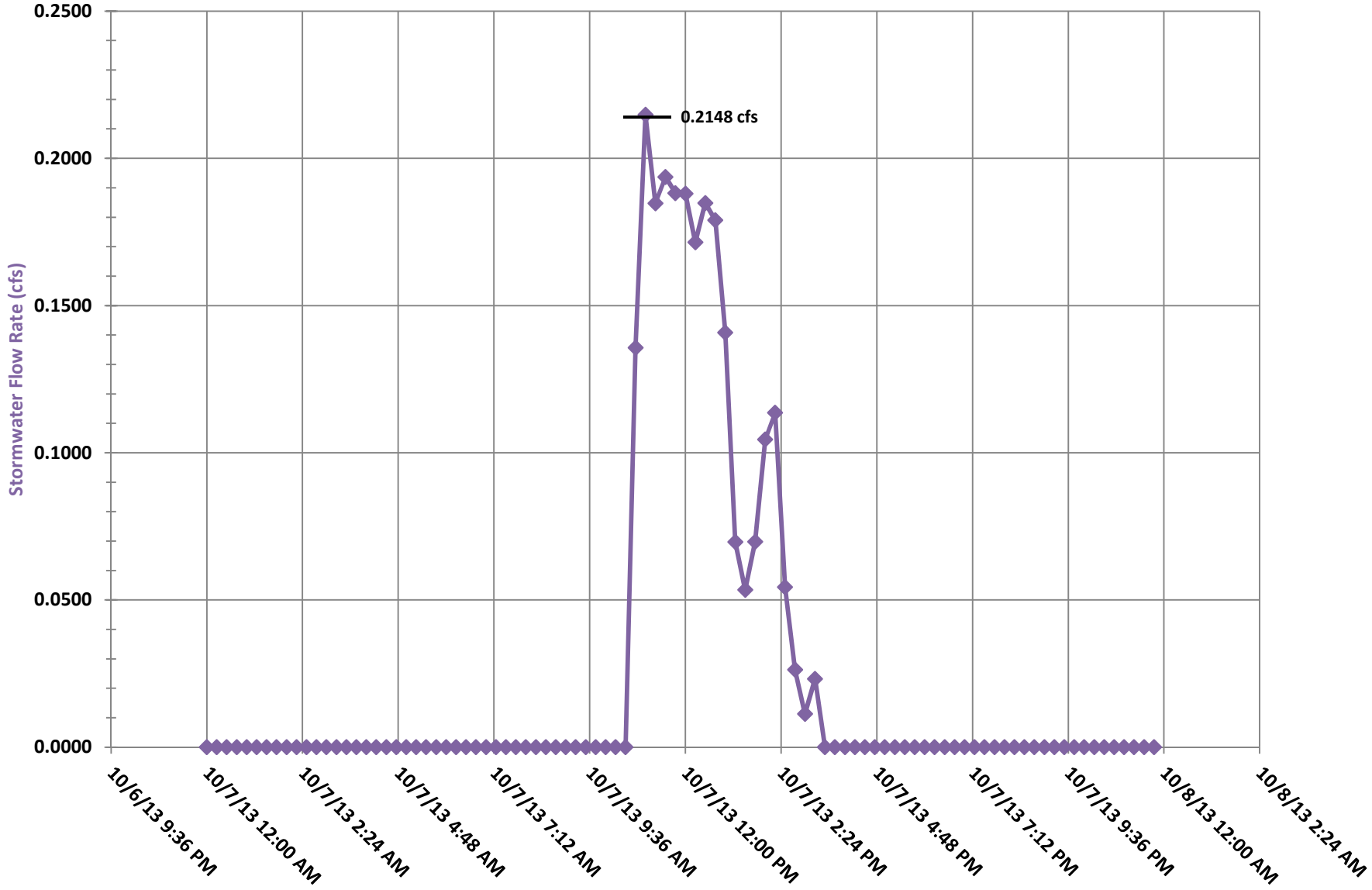


Figure 43: fYNOP Measured Stormflow
HACH 1004+1005 October 7, 2013 Storm

KCF Groundwater, Inc.

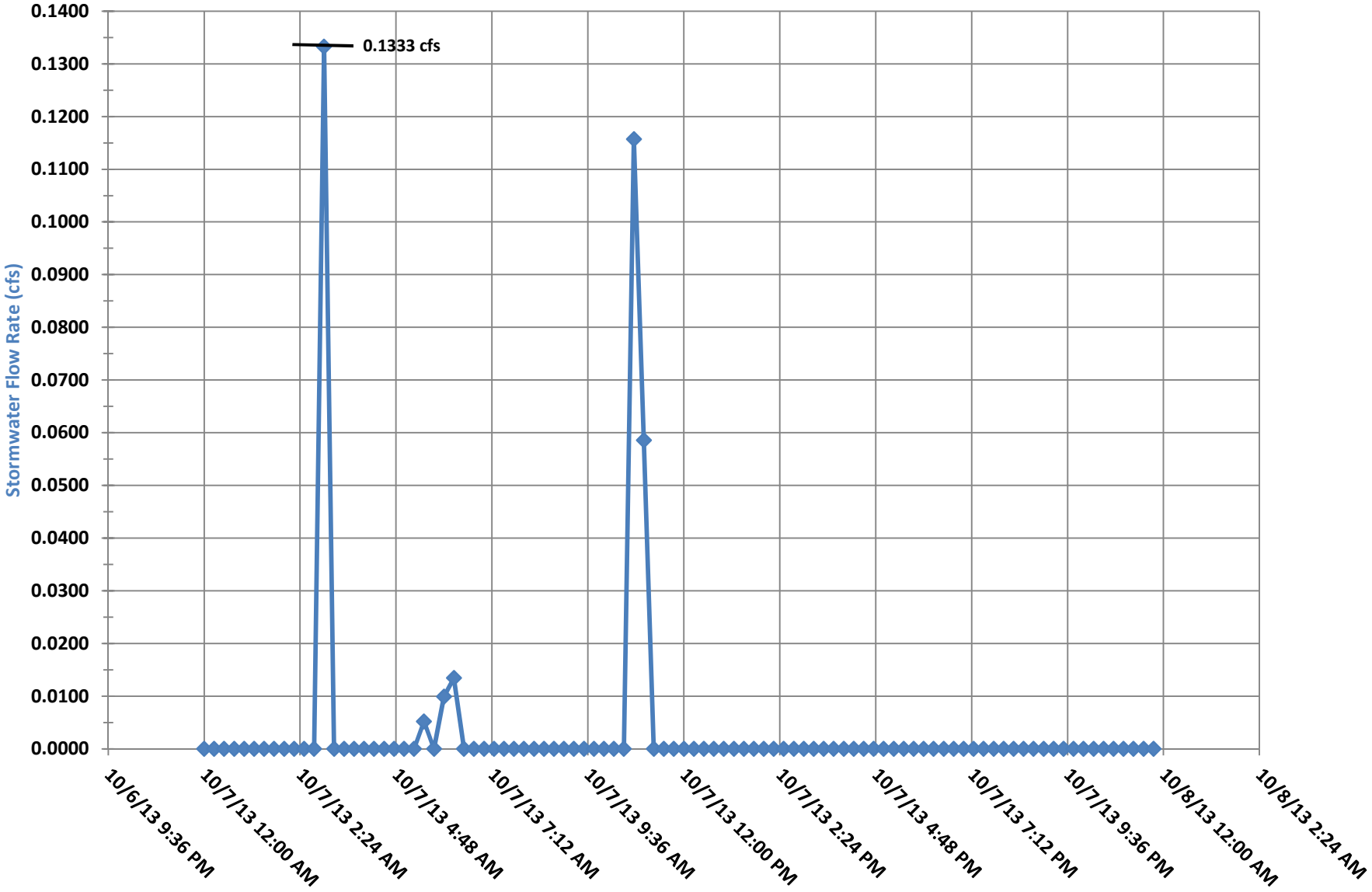


Figure 44: fYNOP Measured Stormflow
HACH 1001 + 1002 October 10-11, 2013 Storm

KCF Groundwater, Inc.

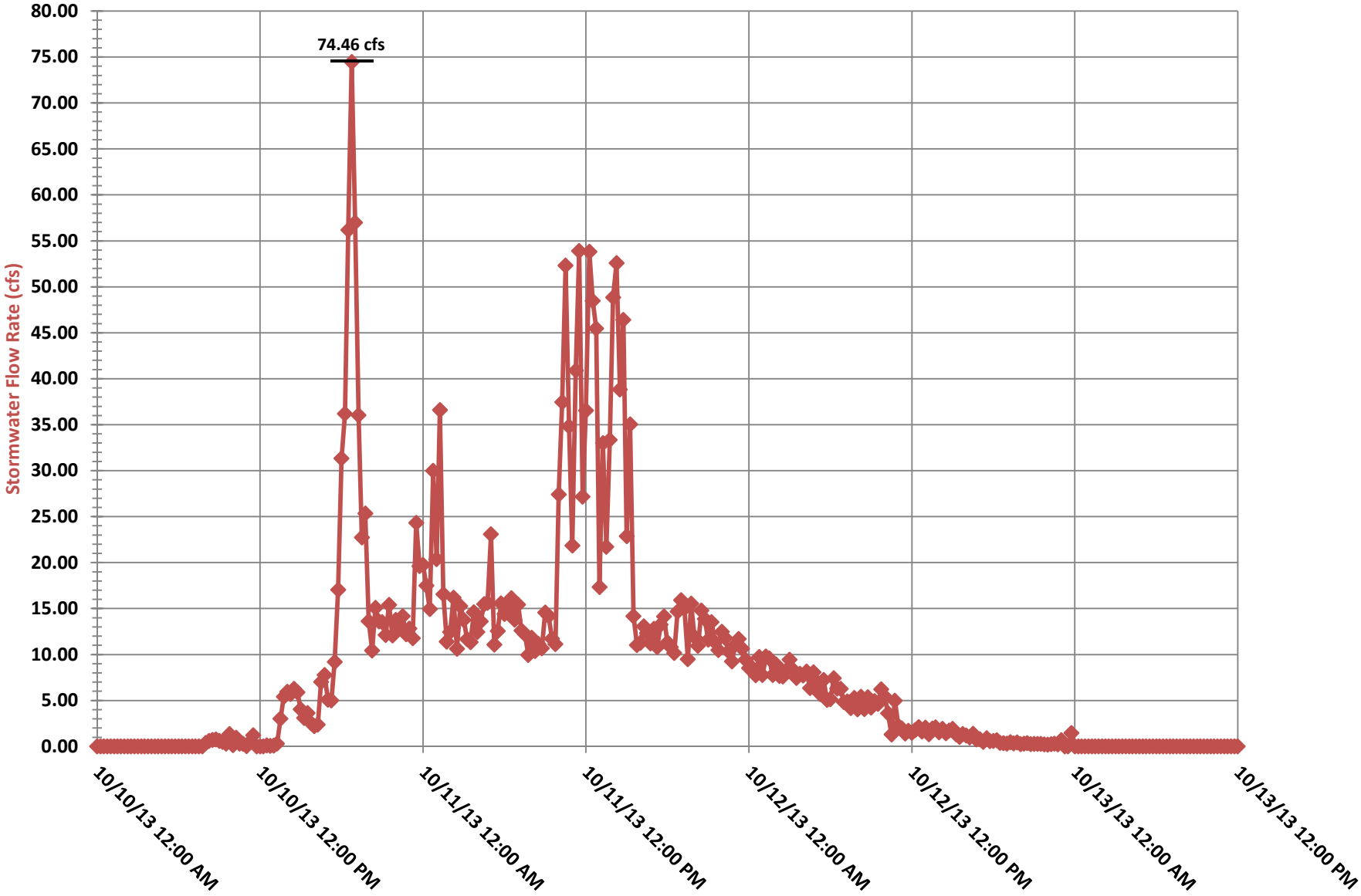


Figure 45: fYNOP Measured Stormflow
HACH 1003 October 10-11 Storm

KCF Groundwater, Inc.

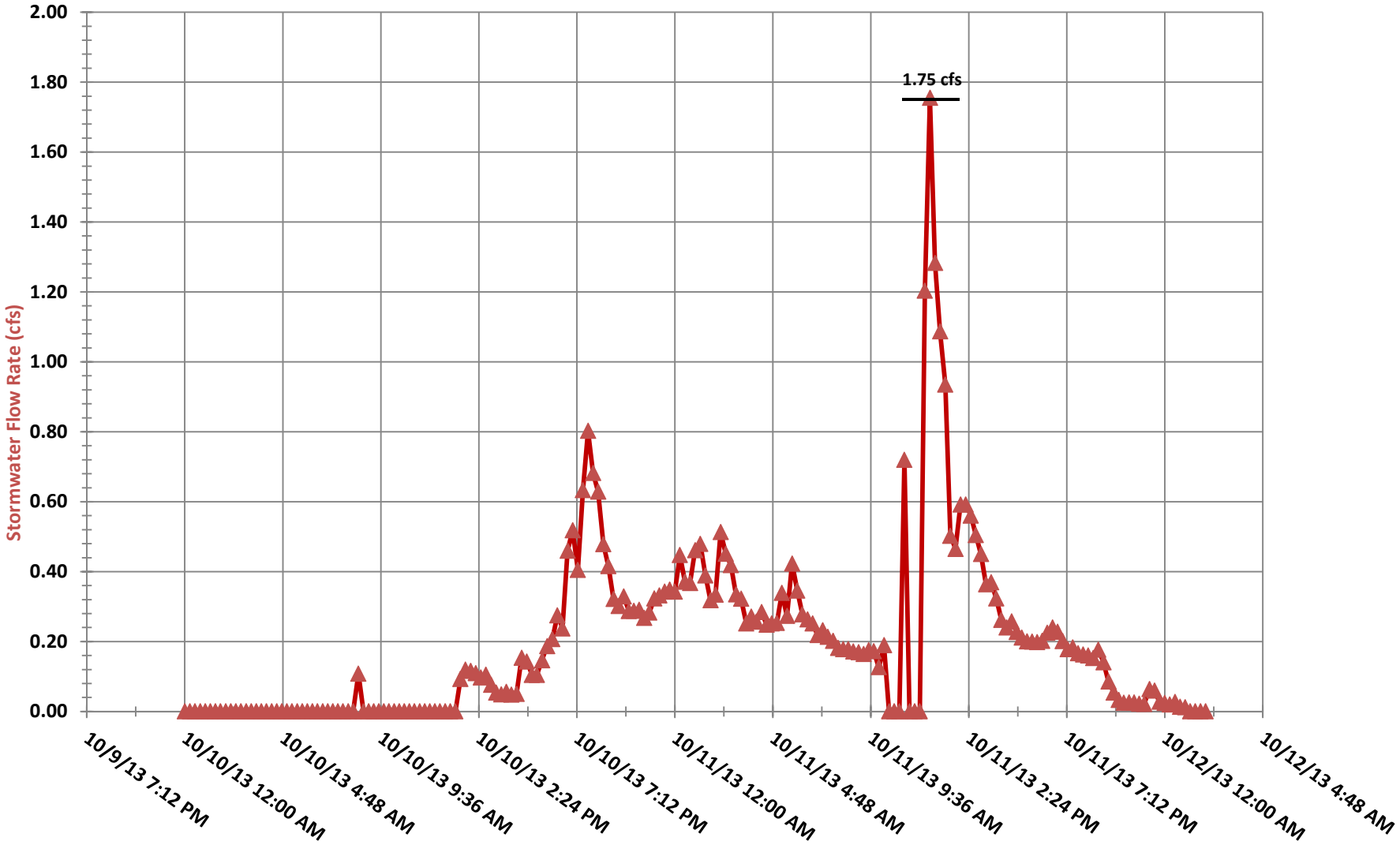


Figure 46: fYNOP Measured Stormflow
HACH 1004 + 1005 October 10-13, 2013

KCF Groundwater, Inc.

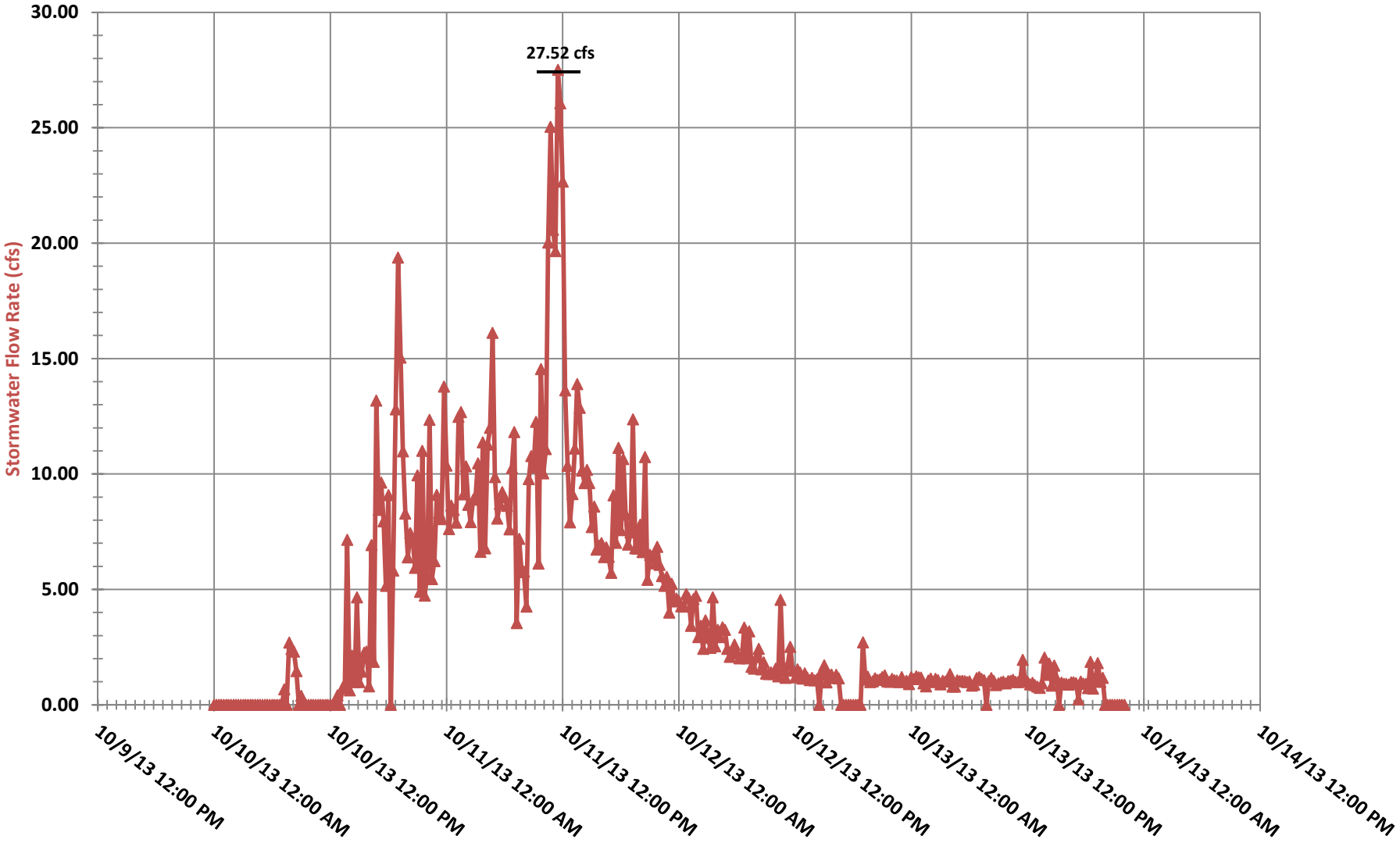
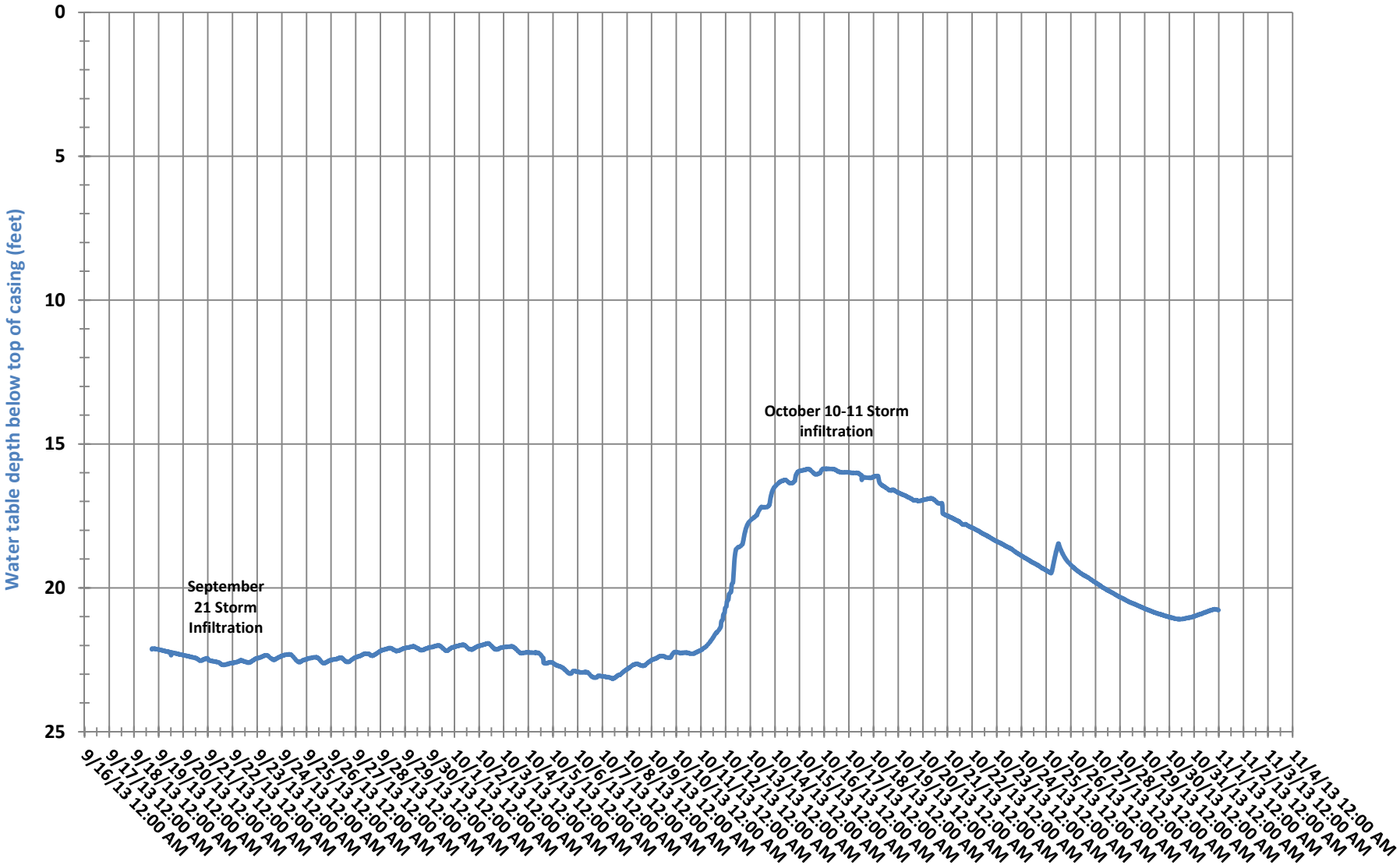
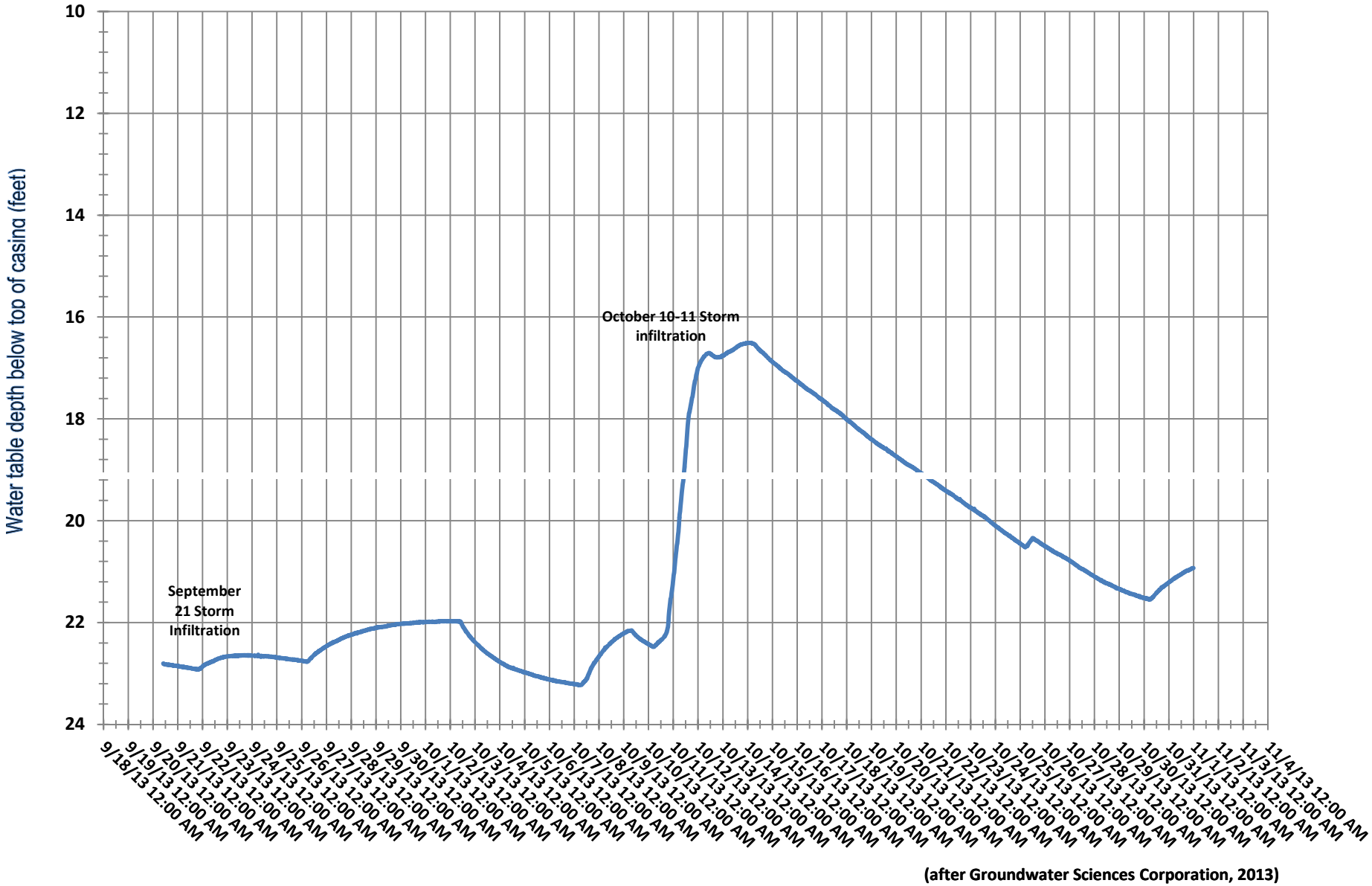


Figure 47: fYNOP MW-97 Well Hydrograph



(after Groundwater Sciences Corporation, 2013)

Figure 48. fYNOP - MW96D Well Hydrograph



(after Groundwater Sciences Corporation, 2013)

Appendix A

Tables 1 through 7

Rain Gauge Data

Table 1.

Tri-Hills, York, PA - Weather Station Download

Date	Time	Date and Time	rainfall inches
9/21/2013	0:12	9/21/2013 0:12	0
9/21/2013	0:27	9/21/2013 0:27	0
9/21/2013	0:42	9/21/2013 0:42	0
9/21/2013	0:57	9/21/2013 0:57	0
9/21/2013	1:12	9/21/2013 1:12	0
9/21/2013	1:27	9/21/2013 1:27	0
9/21/2013	1:42	9/21/2013 1:42	0
9/21/2013	1:57	9/21/2013 1:57	0
9/21/2013	2:12	9/21/2013 2:12	0
9/21/2013	2:27	9/21/2013 2:27	0
9/21/2013	2:42	9/21/2013 2:42	0
9/21/2013	2:57	9/21/2013 2:57	0
9/21/2013	3:12	9/21/2013 3:12	0
9/21/2013	3:27	9/21/2013 3:27	0
9/21/2013	3:42	9/21/2013 3:42	0
9/21/2013	3:57	9/21/2013 3:57	0
9/21/2013	4:12	9/21/2013 4:12	0
9/21/2013	4:27	9/21/2013 4:27	0
9/21/2013	4:42	9/21/2013 4:42	0
9/21/2013	4:57	9/21/2013 4:57	0
9/21/2013	5:12	9/21/2013 5:12	0
9/21/2013	5:27	9/21/2013 5:27	0
9/21/2013	5:42	9/21/2013 5:42	0
9/21/2013	5:57	9/21/2013 5:57	0
9/21/2013	6:12	9/21/2013 6:12	0
9/21/2013	6:27	9/21/2013 6:27	0
9/21/2013	6:42	9/21/2013 6:42	0
9/21/2013	6:57	9/21/2013 6:57	0
9/21/2013	7:12	9/21/2013 7:12	0
9/21/2013	7:27	9/21/2013 7:27	0
9/21/2013	7:42	9/21/2013 7:42	0
9/21/2013	7:58	9/21/2013 7:58	0
9/21/2013	8:13	9/21/2013 8:13	0
9/21/2013	8:28	9/21/2013 8:28	0
9/21/2013	8:43	9/21/2013 8:43	0
9/21/2013	8:58	9/21/2013 8:58	0
9/21/2013	9:13	9/21/2013 9:13	0
9/21/2013	9:28	9/21/2013 9:28	0
9/21/2013	9:43	9/21/2013 9:43	0
9/21/2013	9:58	9/21/2013 9:58	0
9/21/2013	10:13	9/21/2013 10:13	0
9/21/2013	10:28	9/21/2013 10:28	0
9/21/2013	10:43	9/21/2013 10:43	0
9/21/2013	10:58	9/21/2013 10:58	0

9/21/2013	11:13	9/21/2013 11:13	0
9/21/2013	11:28	9/21/2013 11:28	0
9/21/2013	11:43	9/21/2013 11:43	0
9/21/2013	11:58	9/21/2013 11:58	0
9/21/2013	12:13	9/21/2013 12:13	0
9/21/2013	12:28	9/21/2013 12:28	0
9/21/2013	12:43	9/21/2013 12:43	0
9/21/2013	12:58	9/21/2013 12:58	0
9/21/2013	13:13	9/21/2013 13:13	0
9/21/2013	13:28	9/21/2013 13:28	0
9/21/2013	13:43	9/21/2013 13:43	0
9/21/2013	13:59	9/21/2013 13:59	0
9/21/2013	14:14	9/21/2013 14:14	0
9/21/2013	14:29	9/21/2013 14:29	0
9/21/2013	14:44	9/21/2013 14:44	0
9/21/2013	14:59	9/21/2013 14:59	0
9/21/2013	15:14	9/21/2013 15:14	0
9/21/2013	15:29	9/21/2013 15:29	0
9/21/2013	15:44	9/21/2013 15:44	0
9/21/2013	15:59	9/21/2013 15:59	0
9/21/2013	16:14	9/21/2013 16:14	0
9/21/2013	16:29	9/21/2013 16:29	0
9/21/2013	16:44	9/21/2013 16:44	0
9/21/2013	16:59	9/21/2013 16:59	0.02
9/21/2013	17:14	9/21/2013 17:14	0.06
9/21/2013	17:29	9/21/2013 17:29	0.02
9/21/2013	17:44	9/21/2013 17:44	0
9/21/2013	17:59	9/21/2013 17:59	0.01
9/21/2013	18:14	9/21/2013 18:14	0.02
9/21/2013	18:29	9/21/2013 18:29	0.02
9/21/2013	18:44	9/21/2013 18:44	0.01
9/21/2013	18:59	9/21/2013 18:59	0.02
9/21/2013	19:14	9/21/2013 19:14	0.02
9/21/2013	19:29	9/21/2013 19:29	0.04
9/21/2013	19:44	9/21/2013 19:44	0.16
9/21/2013	19:59	9/21/2013 19:59	0.08
9/21/2013	20:14	9/21/2013 20:14	0.09
9/21/2013	20:29	9/21/2013 20:29	0.05
9/21/2013	20:44	9/21/2013 20:44	0.05
9/21/2013	20:59	9/21/2013 20:59	0.04
9/21/2013	21:14	9/21/2013 21:14	0.04
9/21/2013	21:29	9/21/2013 21:29	0.05
9/21/2013	21:44	9/21/2013 21:44	0.05
9/21/2013	21:59	9/21/2013 21:59	0.05
9/21/2013	22:14	9/21/2013 22:14	0.03
9/21/2013	22:29	9/21/2013 22:29	0.02
9/21/2013	22:44	9/21/2013 22:44	0

9/21/2013	22:59	9/21/2013 22:59	0
9/21/2013	23:14	9/21/2013 23:14	0
9/21/2013	23:29	9/21/2013 23:29	0
9/21/2013	23:44	9/21/2013 23:44	0
9/21/2013	23:59	9/21/2013 23:59	0
		Total inches	**0.95**

TABLE 2.			
Tri-Hill, York, PA Weather Station Download			
Date	**Time**	**Date and Time**	**Rainfall Inches**
10/10/2013	0:11	10/10/13 12:11 AM	0
10/10/2013	0:26	10/10/13 12:26 AM	0
10/10/2013	0:41	10/10/13 12:41 AM	0
10/10/2013	0:56	10/10/13 12:56 AM	0
10/10/2013	1:11	10/10/13 1:11 AM	0
10/10/2013	1:26	10/10/13 1:26 AM	0
10/10/2013	1:41	10/10/13 1:41 AM	0
10/10/2013	1:56	10/10/13 1:56 AM	0
10/10/2013	2:11	10/10/13 2:11 AM	0
10/10/2013	2:26	10/10/13 2:26 AM	0
10/10/2013	2:41	10/10/13 2:41 AM	0
10/10/2013	2:56	10/10/13 2:56 AM	0
10/10/2013	3:11	10/10/13 3:11 AM	0
10/10/2013	3:26	10/10/13 3:26 AM	0
10/10/2013	3:41	10/10/13 3:41 AM	0
10/10/2013	3:56	10/10/13 3:56 AM	0
10/10/2013	4:11	10/10/13 4:11 AM	0
10/10/2013	4:25	10/10/13 4:25 AM	0
10/10/2013	4:41	10/10/13 4:41 AM	0
10/10/2013	4:56	10/10/13 4:56 AM	0
10/10/2013	5:11	10/10/13 5:11 AM	0
10/10/2013	5:26	10/10/13 5:26 AM	0
10/10/2013	5:41	10/10/13 5:41 AM	0
10/10/2013	5:56	10/10/13 5:56 AM	0
10/10/2013	6:11	10/10/13 6:11 AM	0.01
10/10/2013	6:26	10/10/13 6:26 AM	0.01
10/10/2013	6:41	10/10/13 6:41 AM	0
10/10/2013	6:57	10/10/13 6:57 AM	0.02
10/10/2013	7:12	10/10/13 7:12 AM	0.02
10/10/2013	7:27	10/10/13 7:27 AM	0.02
10/10/2013	7:42	10/10/13 7:42 AM	0.01
10/10/2013	7:57	10/10/13 7:57 AM	0.02
10/10/2013	8:12	10/10/13 8:12 AM	0.01
10/10/2013	8:27	10/10/13 8:27 AM	0.02
10/10/2013	8:42	10/10/13 8:42 AM	0.01
10/10/2013	8:57	10/10/13 8:57 AM	0
10/10/2013	9:12	10/10/13 9:12 AM	0
10/10/2013	9:27	10/10/13 9:27 AM	0
10/10/2013	9:42	10/10/13 9:42 AM	0
10/10/2013	9:57	10/10/13 9:57 AM	0
10/10/2013	10:12	10/10/13 10:12 AM	0.01
10/10/2013	10:27	10/10/13 10:27 AM	0.01
10/10/2013	10:42	10/10/13 10:42 AM	0.01

10/10/2013	10:57	10/10/13 10:57 AM	0
10/10/2013	11:12	10/10/13 11:12 AM	0
10/10/2013	11:27	10/10/13 11:27 AM	0
10/10/2013	11:42	10/10/13 11:42 AM	0
10/10/2013	11:57	10/10/13 11:57 AM	0
10/10/2013	12:12	10/10/13 12:12 PM	0
10/10/2013	12:27	10/10/13 12:27 PM	0.02
10/10/2013	12:42	10/10/13 12:42 PM	0.01
10/10/2013	12:57	10/10/13 12:57 PM	0.01
10/10/2013	13:12	10/10/13 1:12 PM	0.06
10/10/2013	13:27	10/10/13 1:27 PM	0.11
10/10/2013	13:42	10/10/13 1:42 PM	0.11
10/10/2013	13:57	10/10/13 1:57 PM	0.08
10/10/2013	14:12	10/10/13 2:12 PM	0.06
10/10/2013	14:27	10/10/13 2:27 PM	0.08
10/10/2013	14:42	10/10/13 2:42 PM	0.03
10/10/2013	14:57	10/10/13 2:57 PM	0.02
10/10/2013	15:12	10/10/13 3:12 PM	0.03
10/10/2013	15:27	10/10/13 3:27 PM	0.02
10/10/2013	15:42	10/10/13 3:42 PM	0.04
10/10/2013	15:57	10/10/13 3:57 PM	0.04
10/10/2013	16:12	10/10/13 4:12 PM	0.14
10/10/2013	16:27	10/10/13 4:27 PM	0.06
10/10/2013	16:42	10/10/13 4:42 PM	0.04
10/10/2013	16:57	10/10/13 4:57 PM	0.02
10/10/2013	17:12	10/10/13 5:12 PM	0.09
10/10/2013	17:28	10/10/13 5:28 PM	0.42
10/10/2013	17:43	10/10/13 5:43 PM	0.39
10/10/2013	17:58	10/10/13 5:58 PM	0.5
10/10/2013	18:13	10/10/13 6:13 PM	0.22
10/10/2013	18:28	10/10/13 6:28 PM	0.26
10/10/2013	18:43	10/10/13 6:43 PM	0.26
10/10/2013	18:58	10/10/13 6:58 PM	0.14
10/10/2013	19:13	10/10/13 7:13 PM	0.08
10/10/2013	19:28	10/10/13 7:28 PM	0.1
10/10/2013	19:43	10/10/13 7:43 PM	0.04
10/10/2013	19:58	10/10/13 7:58 PM	0.02
10/10/2013	20:13	10/10/13 8:13 PM	0.03
10/10/2013	20:28	10/10/13 8:28 PM	0.03
10/10/2013	20:43	10/10/13 8:43 PM	0.04
10/10/2013	20:58	10/10/13 8:58 PM	0.08
10/10/2013	21:13	10/10/13 9:13 PM	0.1
10/10/2013	21:28	10/10/13 9:28 PM	0.07
10/10/2013	21:43	10/10/13 9:43 PM	0.02
10/10/2013	21:58	10/10/13 9:58 PM	0.13
10/10/2013	22:13	10/10/13 10:13 PM	0.04
10/10/2013	22:28	10/10/13 10:28 PM	0.05

10/10/2013	22:43	10/10/13 10:43 PM	0.13
10/10/2013	22:58	10/10/13 10:58 PM	0.17
10/10/2013	23:13	10/10/13 11:13 PM	0.17
10/10/2013	23:28	10/10/13 11:28 PM	0.2
10/10/2013	23:43	10/10/13 11:43 PM	0.07
10/10/2013	23:58	10/10/13 11:58 PM	0.05
10/11/2013	0:13	10/11/13 12:13 AM	0.18
10/11/2013	0:28	10/11/13 12:28 AM	0.26
10/11/2013	0:43	10/11/13 12:43 AM	0.17
10/11/2013	0:58	10/11/13 12:58 AM	0.1
10/11/2013	1:13	10/11/13 1:13 AM	0.06
10/11/2013	1:28	10/11/13 1:28 AM	0.01
10/11/2013	1:43	10/11/13 1:43 AM	0.01
10/11/2013	1:58	10/11/13 1:58 AM	0.11
10/11/2013	2:13	10/11/13 2:13 AM	0.01
10/11/2013	2:28	10/11/13 2:28 AM	0.01
10/11/2013	2:43	10/11/13 2:43 AM	0
10/11/2013	2:58	10/11/13 2:58 AM	0
10/11/2013	3:13	10/11/13 3:13 AM	0.02
10/11/2013	3:28	10/11/13 3:28 AM	0.08
10/11/2013	3:43	10/11/13 3:43 AM	0.18
10/11/2013	3:58	10/11/13 3:58 AM	0.14
10/11/2013	4:13	10/11/13 4:13 AM	0.01
10/11/2013	4:28	10/11/13 4:28 AM	0.13
10/11/2013	4:43	10/11/13 4:43 AM	0.17
10/11/2013	4:58	10/11/13 4:58 AM	0.04
10/11/2013	5:13	10/11/13 5:13 AM	0.02
10/11/2013	5:28	10/11/13 5:28 AM	0.12
10/11/2013	5:43	10/11/13 5:43 AM	0.04
10/11/2013	5:58	10/11/13 5:58 AM	0.1
10/11/2013	6:13	10/11/13 6:13 AM	0.06
10/11/2013	6:28	10/11/13 6:28 AM	0.02
10/11/2013	6:43	10/11/13 6:43 AM	0.03
10/11/2013	6:58	10/11/13 6:58 AM	0.01
10/11/2013	7:13	10/11/13 7:13 AM	0
10/11/2013	7:28	10/11/13 7:28 AM	0.01
10/11/2013	7:43	10/11/13 7:43 AM	0.01
10/11/2013	7:58	10/11/13 7:58 AM	0.01
10/11/2013	8:13	10/11/13 8:13 AM	0.02
10/11/2013	8:28	10/11/13 8:28 AM	0.05
10/11/2013	8:44	10/11/13 8:44 AM	0.07
10/11/2013	8:58	10/11/13 8:58 AM	0.09
10/11/2013	9:13	10/11/13 9:13 AM	0.07
10/11/2013	9:29	10/11/13 9:29 AM	0.07
10/11/2013	9:44	10/11/13 9:44 AM	0.21
10/11/2013	9:59	10/11/13 9:59 AM	0.18
10/11/2013	10:14	10/11/13 10:14 AM	0.27

10/11/2013	10:29	10/11/13 10:29 AM	0.5
10/11/2013	10:44	10/11/13 10:44 AM	0.19
10/11/2013	10:59	10/11/13 10:59 AM	0.33
10/11/2013	11:14	10/11/13 11:14 AM	0.35
10/11/2013	11:29	10/11/13 11:29 AM	0.09
10/11/2013	11:44	10/11/13 11:44 AM	0.05
10/11/2013	11:59	10/11/13 11:59 AM	0.06
10/11/2013	12:14	10/11/13 12:14 PM	0.03
10/11/2013	12:29	10/11/13 12:29 PM	0.04
10/11/2013	12:44	10/11/13 12:44 PM	0.11
10/11/2013	12:59	10/11/13 12:59 PM	0.1
10/11/2013	13:14	10/11/13 1:14 PM	0.09
10/11/2013	13:29	10/11/13 1:29 PM	0.02
10/11/2013	13:44	10/11/13 1:44 PM	0.02
10/11/2013	13:59	10/11/13 1:59 PM	0.01
10/11/2013	14:14	10/11/13 2:14 PM	0.01
10/11/2013	14:29	10/11/13 2:29 PM	0.06
10/11/2013	14:44	10/11/13 2:44 PM	0.02
10/11/2013	14:59	10/11/13 2:59 PM	0.04
10/11/2013	15:14	10/11/13 3:14 PM	0.03
10/11/2013	15:29	10/11/13 3:29 PM	0.01
10/11/2013	15:44	10/11/13 3:44 PM	0
10/11/2013	15:59	10/11/13 3:59 PM	0
10/11/2013	16:14	10/11/13 4:14 PM	0
10/11/2013	16:29	10/11/13 4:29 PM	0
10/11/2013	16:44	10/11/13 4:44 PM	0
10/11/2013	16:59	10/11/13 4:59 PM	0.03
10/11/2013	17:14	10/11/13 5:14 PM	0.11
10/11/2013	17:29	10/11/13 5:29 PM	0.09
10/11/2013	17:44	10/11/13 5:44 PM	0.06
10/11/2013	17:59	10/11/13 5:59 PM	0.1
10/11/2013	18:14	10/11/13 6:14 PM	0.07
10/11/2013	18:29	10/11/13 6:29 PM	0
10/11/2013	18:44	10/11/13 6:44 PM	0
10/11/2013	18:59	10/11/13 6:59 PM	0.03
10/11/2013	19:14	10/11/13 7:14 PM	0.01
10/11/2013	19:29	10/11/13 7:29 PM	0
10/11/2013	19:44	10/11/13 7:44 PM	0.01
10/11/2013	19:59	10/11/13 7:59 PM	0
10/11/2013	20:14	10/11/13 8:14 PM	0.01
10/11/2013	20:29	10/11/13 8:29 PM	0
10/11/2013	20:44	10/11/13 8:44 PM	0
10/11/2013	20:59	10/11/13 8:59 PM	0
10/11/2013	21:14	10/11/13 9:14 PM	0
10/11/2013	21:29	10/11/13 9:29 PM	0.01
10/11/2013	21:44	10/11/13 9:44 PM	0
10/11/2013	21:59	10/11/13 9:59 PM	0.01

10/11/2013	22:14	10/11/13 10:14 PM	0.04
10/11/2013	22:29	10/11/13 10:29 PM	0.15
10/11/2013	22:44	10/11/13 10:44 PM	0.12
10/11/2013	22:59	10/11/13 10:59 PM	0.07
10/11/2013	23:14	10/11/13 11:14 PM	0.07
10/11/2013	23:29	10/11/13 11:29 PM	0
10/11/2013	23:44	10/11/13 11:44 PM	0
10/11/2013	23:59	10/11/13 11:59 PM	0
		Total inches	**11.36**

Table 3.			
East York, PA Weather Station Download			
Date	**Time**	**Date and Time**	**Rainfall (Inches)**
9/21/2013	0:00	9/21/13 12:00 AM	0
9/21/2013	0:02	9/21/13 12:02 AM	0
9/21/2013	0:03	9/21/2013 0:03	0
9/21/2013	0:04	9/21/2013 0:04	0
9/21/2013	0:05	9/21/13 12:05 AM	0
9/21/2013	0:10	9/21/13 12:10 AM	0
9/21/2013	0:15	9/21/13 12:15 AM	0
9/21/2013	0:20	9/21/13 12:20 AM	0
9/21/2013	0:25	9/21/13 12:25 AM	0
9/21/2013	0:30	9/21/13 12:30 AM	0
9/21/2013	0:34	9/21/13 12:34 AM	0
9/21/2013	0:39	9/21/13 12:39 AM	0
9/21/2013	0:44	9/21/13 12:44 AM	0
9/21/2013	0:49	9/21/13 12:49 AM	0
9/21/2013	0:54	9/21/13 12:54 AM	0
9/21/2013	0:59	9/21/13 12:59 AM	0
9/21/2013	1:06	9/21/13 1:04 AM	0
9/21/2013	1:11	9/21/13 1:09 AM	0
9/21/2013	1:16	9/21/13 1:14 AM	0
9/21/2013	1:21	9/21/13 1:19 AM	0
9/21/2013	1:26	9/21/13 1:24 AM	0
9/21/2013	1:31	9/21/13 1:29 AM	0
9/21/2013	1:36	9/21/13 1:34 AM	0
9/21/2013	1:41	9/21/13 1:39 AM	0
9/21/2013	1:46	9/21/13 1:44 AM	0
9/21/2013	1:51	9/21/13 1:49 AM	0
9/21/2013	1:56	9/21/13 1:54 AM	0
9/21/2013	2:01	9/21/13 1:59 AM	0
9/21/2013	2:06	9/21/13 2:04 AM	0
9/21/2013	2:11	9/21/13 2:09 AM	0
9/21/2013	2:16	9/21/13 2:14 AM	0
9/21/2013	2:21	9/21/13 2:19 AM	0
9/21/2013	2:26	9/21/13 2:24 AM	0
9/21/2013	2:31	9/21/13 2:29 AM	0
9/21/2013	2:36	9/21/13 2:34 AM	0
9/21/2013	2:41	9/21/13 2:39 AM	0
9/21/2013	2:46	9/21/13 2:44 AM	0
9/21/2013	2:51	9/21/13 2:49 AM	0
9/21/2013	2:56	9/21/13 2:54 AM	0
9/21/2013	3:01	9/21/13 2:59 AM	0
9/21/2013	3:06	9/21/13 3:04 AM	0

9/21/2013	3:11	9/21/13 3:09 AM	0
9/21/2013	3:16	9/21/13 3:14 AM	0
9/21/2013	3:21	9/21/13 3:19 AM	0
9/21/2013	3:26	9/21/13 3:24 AM	0
9/21/2013	3:31	9/21/13 3:29 AM	0
9/21/2013	3:36	9/21/13 3:34 AM	0
9/21/2013	3:41	9/21/13 3:39 AM	0
9/21/2013	3:46	9/21/13 3:44 AM	0
9/21/2013	3:51	9/21/13 3:49 AM	0
9/21/2013	3:56	9/21/13 3:54 AM	0
9/21/2013	4:01	9/21/13 3:59 AM	0
9/21/2013	4:06	9/21/13 4:04 AM	0
9/21/2013	4:11	9/21/13 4:09 AM	0
9/21/2013	4:16	9/21/13 4:14 AM	0
9/21/2013	4:21	9/21/13 4:19 AM	0
9/21/2013	4:26	9/21/13 4:24 AM	0
9/21/2013	4:31	9/21/13 4:29 AM	0
9/21/2013	4:36	9/21/13 4:34 AM	0
9/21/2013	4:41	9/21/13 4:39 AM	0
9/21/2013	4:46	9/21/13 4:44 AM	0
9/21/2013	4:51	9/21/13 4:49 AM	0
9/21/2013	4:56	9/21/13 4:54 AM	0
9/21/2013	5:01	9/21/13 4:59 AM	0
9/21/2013	5:06	9/21/13 5:04 AM	0
9/21/2013	5:11	9/21/13 5:09 AM	0
9/21/2013	5:16	9/21/13 5:14 AM	0
9/21/2013	5:21	9/21/13 5:19 AM	0
9/21/2013	5:26	9/21/13 5:24 AM	0
9/21/2013	5:31	9/21/13 5:29 AM	0
9/21/2013	5:36	9/21/13 5:34 AM	0
9/21/2013	5:41	9/21/13 5:39 AM	0
9/21/2013	5:46	9/21/13 5:44 AM	0
9/21/2013	5:51	9/21/13 5:49 AM	0
9/21/2013	5:56	9/21/13 5:54 AM	0
9/21/2013	6:01	9/21/13 5:59 AM	0
9/21/2013	6:06	9/21/13 6:04 AM	0
9/21/2013	6:11	9/21/13 6:09 AM	0
9/21/2013	6:16	9/21/13 6:14 AM	0
9/21/2013	6:21	9/21/13 6:19 AM	0
9/21/2013	6:26	9/21/13 6:24 AM	0
9/21/2013	6:31	9/21/13 6:29 AM	0
9/21/2013	6:36	9/21/13 6:34 AM	0
9/21/2013	6:41	9/21/13 6:39 AM	0
9/21/2013	6:46	9/21/13 6:44 AM	0
9/21/2013	6:51	9/21/13 6:49 AM	0
9/21/2013	6:56	9/21/13 6:54 AM	0
9/21/2013	7:01	9/21/13 6:59 AM	0

9/21/2013	7:06	9/21/13 7:04 AM	0
9/21/2013	7:11	9/21/13 7:09 AM	0
9/21/2013	7:16	9/21/13 7:14 AM	0
9/21/2013	7:21	9/21/13 7:19 AM	0
9/21/2013	7:26	9/21/13 7:24 AM	0
9/21/2013	7:31	9/21/13 7:29 AM	0
9/21/2013	7:36	9/21/13 7:34 AM	0
9/21/2013	7:41	9/21/13 7:39 AM	0
9/21/2013	7:46	9/21/13 7:44 AM	0
9/21/2013	7:51	9/21/13 7:49 AM	0
9/21/2013	7:56	9/21/13 7:54 AM	0
9/21/2013	8:01	9/21/13 7:59 AM	0
9/21/2013	8:06	9/21/13 8:04 AM	0
9/21/2013	8:11	9/21/13 8:09 AM	0
9/21/2013	8:16	9/21/13 8:14 AM	0
9/21/2013	8:21	9/21/13 8:19 AM	0
9/21/2013	8:26	9/21/13 8:24 AM	0
9/21/2013	8:31	9/21/13 8:29 AM	0
9/21/2013	8:36	9/21/13 8:34 AM	0
9/21/2013	8:41	9/21/13 8:39 AM	0
9/21/2013	8:46	9/21/13 8:44 AM	0
9/21/2013	8:51	9/21/13 8:49 AM	0
9/21/2013	8:56	9/21/13 8:54 AM	0
9/21/2013	9:01	9/21/13 8:59 AM	0
9/21/2013	9:06	9/21/13 9:04 AM	0
9/21/2013	9:11	9/21/13 9:09 AM	0
9/21/2013	9:16	9/21/13 9:14 AM	0
9/21/2013	9:21	9/21/13 9:19 AM	0
9/21/2013	9:26	9/21/13 9:24 AM	0
9/21/2013	9:31	9/21/13 9:29 AM	0
9/21/2013	9:36	9/21/13 9:34 AM	0
9/21/2013	9:41	9/21/13 9:39 AM	0
9/21/2013	9:46	9/21/13 9:44 AM	0
9/21/2013	9:51	9/21/13 9:49 AM	0
9/21/2013	9:56	9/21/13 9:54 AM	0
9/21/2013	10:01	9/21/13 9:59 AM	0
9/21/2013	10:06	9/21/13 10:04 AM	0
9/21/2013	10:11	9/21/13 10:09 AM	0
9/21/2013	10:16	9/21/13 10:14 AM	0
9/21/2013	10:21	9/21/13 10:19 AM	0
9/21/2013	10:26	9/21/13 10:24 AM	0
9/21/2013	10:31	9/21/13 10:29 AM	0
9/21/2013	10:36	9/21/13 10:34 AM	0
9/21/2013	10:42	9/21/13 10:39 AM	0
9/21/2013	10:47	9/21/13 10:44 AM	0
9/21/2013	10:52	9/21/13 10:49 AM	0
9/21/2013	10:57	9/21/13 10:54 AM	0

9/21/2013	11:02	9/21/13 10:59 AM	0
9/21/2013	11:07	9/21/13 11:04 AM	0
9/21/2013	11:12	9/21/13 11:09 AM	0
9/21/2013	11:17	9/21/13 11:14 AM	0
9/21/2013	11:22	9/21/13 11:19 AM	0
9/21/2013	11:27	9/21/13 11:24 AM	0
9/21/2013	11:32	9/21/13 11:29 AM	0
9/21/2013	11:37	9/21/13 11:34 AM	0
9/21/2013	11:42	9/21/13 11:39 AM	0
9/21/2013	11:47	9/21/13 11:44 AM	0
9/21/2013	11:52	9/21/13 11:49 AM	0
9/21/2013	11:57	9/21/13 11:54 AM	0
9/21/2013	12:02	9/21/13 11:59 AM	0
9/21/2013	12:07	9/21/13 12:04 PM	0
9/21/2013	12:12	9/21/13 12:09 PM	0
9/21/2013	12:17	9/21/13 12:14 PM	0
9/21/2013	12:22	9/21/13 12:19 PM	0
9/21/2013	12:27	9/21/13 12:24 PM	0
9/21/2013	12:32	9/21/13 12:29 PM	0
9/21/2013	12:37	9/21/13 12:34 PM	0
9/21/2013	12:42	9/21/13 12:39 PM	0
9/21/2013	12:47	9/21/13 12:44 PM	0
9/21/2013	12:52	9/21/13 12:49 PM	0
9/21/2013	12:57	9/21/13 12:54 PM	0
9/21/2013	13:02	9/21/13 12:59 PM	0
9/21/2013	13:07	9/21/13 1:04 PM	0
9/21/2013	13:12	9/21/13 1:09 PM	0
9/21/2013	13:17	9/21/13 1:14 PM	0
9/21/2013	13:22	9/21/13 1:19 PM	0
9/21/2013	13:27	9/21/13 1:24 PM	0
9/21/2013	13:32	9/21/13 1:29 PM	0
9/21/2013	13:37	9/21/13 1:34 PM	0
9/21/2013	13:42	9/21/13 1:39 PM	0
9/21/2013	13:47	9/21/13 1:44 PM	0
9/21/2013	13:52	9/21/13 1:49 PM	0
9/21/2013	13:57	9/21/13 1:54 PM	0
9/21/2013	14:02	9/21/13 1:59 PM	0
9/21/2013	14:07	9/21/13 2:04 PM	0
9/21/2013	14:12	9/21/13 2:09 PM	0
9/21/2013	14:17	9/21/13 2:14 PM	0
9/21/2013	14:22	9/21/13 2:19 PM	0
9/21/2013	14:27	9/21/13 2:24 PM	0
9/21/2013	14:32	9/21/13 2:29 PM	0
9/21/2013	14:37	9/21/13 2:34 PM	0
9/21/2013	14:42	9/21/13 2:39 PM	0
9/21/2013	14:47	9/21/13 2:44 PM	0
9/21/2013	14:52	9/21/13 2:49 PM	0

9/21/2013	14:57	9/21/13 2:54 PM	0
9/21/2013	15:02	9/21/13 2:59 PM	0
9/21/2013	15:07	9/21/13 3:04 PM	0
9/21/2013	15:12	9/21/13 3:09 PM	0
9/21/2013	15:17	9/21/13 3:14 PM	0
9/21/2013	15:22	9/21/13 3:19 PM	0
9/21/2013	15:27	9/21/13 3:24 PM	0
9/21/2013	15:32	9/21/13 3:29 PM	0
9/21/2013	15:37	9/21/13 3:34 PM	0
9/21/2013	15:42	9/21/13 3:39 PM	0
9/21/2013	15:47	9/21/13 3:44 PM	0
9/21/2013	15:52	9/21/13 3:49 PM	0
9/21/2013	15:57	9/21/13 3:54 PM	0
9/21/2013	16:02	9/21/13 3:59 PM	0
9/21/2013	16:07	9/21/13 4:04 PM	0
9/21/2013	16:12	9/21/13 4:09 PM	0
9/21/2013	16:17	9/21/13 4:14 PM	0
9/21/2013	16:22	9/21/13 4:19 PM	0
9/21/2013	16:27	9/21/13 4:24 PM	0
9/21/2013	16:32	9/21/13 4:29 PM	0
9/21/2013	16:37	9/21/13 4:34 PM	0
9/21/2013	16:42	9/21/13 4:39 PM	0
9/21/2013	16:47	9/21/13 4:47 PM	0
9/21/2013	16:52	9/21/13 4:52 PM	0
9/21/2013	16:57	9/21/13 4:57 PM	0
9/21/2013	17:02	9/21/13 5:02 PM	0
9/21/2013	17:07	9/21/13 5:07 PM	0.05
9/21/2013	17:12	9/21/13 5:12 PM	0
9/21/2013	17:17	9/21/13 5:17 PM	0
9/21/2013	17:22	9/21/13 5:22 PM	0
9/21/2013	17:27	9/21/13 5:27 PM	0
9/21/2013	17:32	9/21/13 5:32 PM	0
9/21/2013	17:37	9/21/13 5:37 PM	0
9/21/2013	17:42	9/21/13 5:42 PM	0
9/21/2013	17:47	9/21/13 5:47 PM	0
9/21/2013	17:52	9/21/13 5:52 PM	0.04
9/21/2013	17:57	9/21/13 5:57 PM	0
9/21/2013	18:02	9/21/13 6:02 PM	0
9/21/2013	18:07	9/21/13 6:07 PM	0
9/21/2013	18:12	9/21/13 6:12 PM	0
9/21/2013	18:17	9/21/13 6:17 PM	0
9/21/2013	18:22	9/21/13 6:22 PM	0
9/21/2013	18:27	9/21/13 6:22 PM	0
9/21/2013	18:32	9/21/13 6:22 PM	0.04
9/21/2013	18:37	9/21/13 6:22 PM	0
9/21/2013	18:42	9/21/13 6:22 PM	0
9/21/2013	18:47	9/21/13 6:22 PM	0

9/21/2013	18:52	9/21/13 6:22 PM	0
9/21/2013	18:57	9/21/13 6:22 PM	0
9/21/2013	19:02	9/21/13 6:22 PM	0
9/21/2013	19:07	9/21/13 6:22 PM	0.04
9/21/2013	19:12	9/21/13 6:22 PM	0
9/21/2013	19:17	9/21/13 6:22 PM	0
9/21/2013	19:22	9/21/13 6:22 PM	0
9/21/2013	19:27	9/21/13 6:22 PM	0.04
9/21/2013	19:32	9/21/13 6:22 PM	0.04
9/21/2013	19:37	9/21/13 6:22 PM	0.05
9/21/2013	19:42	9/21/13 6:22 PM	0.04
9/21/2013	19:47	9/21/13 6:22 PM	0.04
9/21/2013	19:52	9/21/13 6:22 PM	0
9/21/2013	19:57	9/21/13 6:22 PM	0.04
9/21/2013	20:02	9/21/13 6:22 PM	0
9/21/2013	20:07	9/21/13 6:22 PM	0.04
9/21/2013	20:12	9/21/13 6:22 PM	0.04
9/21/2013	20:17	9/21/13 6:22 PM	0
9/21/2013	20:22	9/21/13 6:22 PM	0
9/21/2013	20:27	9/21/13 6:22 PM	0.03
9/21/2013	20:32	9/21/13 6:22 PM	0
9/21/2013	20:37	9/21/13 6:22 PM	0
9/21/2013	20:42	9/21/13 6:22 PM	0.06
9/21/2013	20:47	9/21/13 6:22 PM	0
9/21/2013	20:52	9/21/13 6:22 PM	0
9/21/2013	20:57	9/21/13 6:22 PM	0
9/21/2013	21:02	9/21/13 6:22 PM	0.04
9/21/2013	21:07	9/21/13 6:22 PM	0
9/21/2013	21:12	9/21/13 6:22 PM	0
9/21/2013	21:17	9/21/13 6:22 PM	0.04
9/21/2013	21:22	9/21/13 6:22 PM	0
9/21/2013	21:27	9/21/13 6:22 PM	0
9/21/2013	21:32	9/21/13 6:22 PM	0.04
9/21/2013	21:37	9/21/13 6:22 PM	0
9/21/2013	21:42	9/21/13 6:22 PM	0
9/21/2013	21:47	9/21/13 6:22 PM	0.04
9/21/2013	21:52	9/21/13 6:22 PM	0
9/21/2013	21:57	9/21/13 6:22 PM	0
9/21/2013	22:02	9/21/13 6:22 PM	0.05
9/21/2013	22:07	9/21/13 6:22 PM	0
9/21/2013	22:12	9/21/13 6:22 PM	0
9/21/2013	22:17	9/21/13 6:22 PM	0
9/21/2013	22:22	9/21/13 6:22 PM	0
9/21/2013	22:27	9/21/13 6:22 PM	0.04
9/21/2013	22:32	9/21/13 6:22 PM	0
9/21/2013	22:37	9/21/13 6:22 PM	0
9/21/2013	22:42	9/21/13 6:22 PM	0

9/21/2013	22:47	9/21/13 6:22 PM	0
9/21/2013	22:52	9/21/13 6:22 PM	0
9/21/2013	22:57	9/21/13 6:22 PM	0
9/21/2013	23:02	9/21/13 6:22 PM	0
9/21/2013	23:07	9/21/13 6:22 PM	0
9/21/2013	23:12	9/21/13 6:22 PM	0
9/21/2013	23:17	9/21/13 6:22 PM	0
9/21/2013	23:22	9/21/13 6:22 PM	0
9/21/2013	23:27	9/21/13 6:22 PM	0
9/21/2013	23:32	9/21/13 6:22 PM	0
9/21/2013	23:37	9/21/13 6:22 PM	0
9/21/2013	23:42	9/21/13 6:22 PM	0
9/21/2013	23:47	9/21/13 6:22 PM	0
9/21/2013	23:52	9/21/13 6:22 PM	0
9/21/2013	23:57	9/21/13 6:22 PM	0
		Total:	**0.84**

Table 4			
East York, Weather Station Download			
Date	**Time**	**Date and Time**	**Rainfall (Inches)**
10/10/2013	0:01	10/10/13 12:01 AM	0
10/10/2013	0:04	10/10/13 12:04 AM	0
10/10/2013	0:05	10/10/13 12:05 AM	0
10/10/2013	0:06	10/10/13 12:06 AM	0
10/10/2013	0:10	10/10/13 12:10 AM	0
10/10/2013	0:13	10/10/13 12:13 AM	0
10/10/2013	0:18	10/10/13 12:18 AM	0
10/10/2013	0:23	10/10/13 12:23 AM	0
10/10/2013	0:28	10/10/13 12:28 AM	0
10/10/2013	0:33	10/10/13 12:33 AM	0
10/10/2013	0:38	10/10/13 12:38 AM	0
10/10/2013	0:43	10/10/13 12:43 AM	0
10/10/2013	0:48	10/10/13 12:48 AM	0
10/10/2013	0:53	10/10/13 12:53 AM	0
10/10/2013	0:58	10/10/13 12:58 AM	0
10/10/2013	1:03	10/10/13 1:03 AM	0
10/10/2013	1:08	10/10/13 1:08 AM	0
10/10/2013	1:13	10/10/13 1:13 AM	0
10/10/2013	1:18	10/10/13 1:18 AM	0
10/10/2013	1:23	10/10/13 1:23 AM	0
10/10/2013	1:28	10/10/13 1:28 AM	0
10/10/2013	1:33	10/10/13 1:33 AM	0
10/10/2013	1:38	10/10/13 1:38 AM	0
10/10/2013	1:43	10/10/13 1:43 AM	0
10/10/2013	1:48	10/10/13 1:48 AM	0
10/10/2013	1:53	10/10/13 1:53 AM	0
10/10/2013	1:58	10/10/13 1:58 AM	0
10/10/2013	2:03	10/10/13 2:03 AM	0
10/10/2013	2:08	10/10/13 2:08 AM	0
10/10/2013	2:13	10/10/13 2:13 AM	0
10/10/2013	2:18	10/10/13 2:18 AM	0
10/10/2013	2:23	10/10/13 2:23 AM	0
10/10/2013	2:28	10/10/13 2:28 AM	0
10/10/2013	2:33	10/10/13 2:33 AM	0
10/10/2013	2:38	10/10/13 2:38 AM	0
10/10/2013	2:43	10/10/13 2:43 AM	0
10/10/2013	2:48	10/10/13 2:48 AM	0
10/10/2013	2:53	10/10/13 2:53 AM	0
10/10/2013	2:58	10/10/13 2:58 AM	0
10/10/2013	3:03	10/10/13 3:03 AM	0
10/10/2013	3:08	10/10/13 3:08 AM	0
10/10/2013	3:13	10/10/13 3:13 AM	0
10/10/2013	3:18	10/10/13 3:18 AM	0

10/10/2013	3:23	10/10/13 3:23 AM	0
10/10/2013	3:28	10/10/13 3:28 AM	0
10/10/2013	3:33	10/10/13 3:33 AM	0
10/10/2013	3:38	10/10/13 3:38 AM	0
10/10/2013	3:43	10/10/13 3:43 AM	0
10/10/2013	3:48	10/10/13 3:48 AM	0
10/10/2013	3:53	10/10/13 3:53 AM	0
10/10/2013	3:58	10/10/13 3:58 AM	0
10/10/2013	4:03	10/10/13 4:03 AM	0
10/10/2013	4:08	10/10/13 4:08 AM	0
10/10/2013	4:13	10/10/13 4:13 AM	0
10/10/2013	4:18	10/10/13 4:18 AM	0
10/10/2013	4:23	10/10/13 4:23 AM	0
10/10/2013	4:28	10/10/13 4:28 AM	0
10/10/2013	4:33	10/10/13 4:33 AM	0
10/10/2013	4:38	10/10/13 4:38 AM	0
10/10/2013	4:43	10/10/13 4:43 AM	0
10/10/2013	4:48	10/10/13 4:48 AM	0
10/10/2013	4:53	10/10/13 4:53 AM	0
10/10/2013	4:58	10/10/13 4:58 AM	0
10/10/2013	5:03	10/10/13 5:03 AM	0
10/10/2013	5:08	10/10/13 5:08 AM	0
10/10/2013	5:13	10/10/13 5:13 AM	0
10/10/2013	5:18	10/10/13 5:18 AM	0
10/10/2013	5:23	10/10/13 5:23 AM	0
10/10/2013	5:28	10/10/13 5:28 AM	0
10/10/2013	5:33	10/10/13 5:33 AM	0
10/10/2013	5:38	10/10/13 5:38 AM	0
10/10/2013	5:43	10/10/13 5:43 AM	0
10/10/2013	5:48	10/10/13 5:48 AM	0
10/10/2013	5:53	10/10/13 5:53 AM	0
10/10/2013	5:58	10/10/13 5:58 AM	0
10/10/2013	6:03	10/10/13 6:03 AM	0
10/10/2013	6:08	10/10/13 6:08 AM	0
10/10/2013	6:13	10/10/13 6:13 AM	0
10/10/2013	6:18	10/10/13 6:18 AM	0
10/10/2013	6:23	10/10/13 6:23 AM	0
10/10/2013	6:28	10/10/13 6:28 AM	0
10/10/2013	6:33	10/10/13 6:33 AM	0
10/10/2013	6:38	10/10/13 6:38 AM	0
10/10/2013	6:43	10/10/13 6:43 AM	0
10/10/2013	6:48	10/10/13 6:48 AM	0
10/10/2013	6:53	10/10/13 6:53 AM	0
10/10/2013	6:58	10/10/13 6:58 AM	0
10/10/2013	7:03	10/10/13 7:03 AM	0.03
10/10/2013	7:08	10/10/13 7:08 AM	0
10/10/2013	7:13	10/10/13 7:13 AM	0

10/10/2013	7:18	10/10/13 7:18 AM	0
10/10/2013	7:23	10/10/13 7:23 AM	0
10/10/2013	7:28	10/10/13 7:28 AM	0
10/10/2013	7:33	10/10/13 7:33 AM	0
10/10/2013	7:38	10/10/13 7:38 AM	0
10/10/2013	7:43	10/10/13 7:43 AM	0
10/10/2013	7:48	10/10/13 7:48 AM	0
10/10/2013	7:53	10/10/13 7:53 AM	0.04
10/10/2013	7:58	10/10/13 7:58 AM	0
10/10/2013	8:03	10/10/13 8:03 AM	0
10/10/2013	8:08	10/10/13 8:08 AM	0
10/10/2013	8:13	10/10/13 8:13 AM	0
10/10/2013	8:18	10/10/13 8:18 AM	0
10/10/2013	8:23	10/10/13 8:23 AM	0
10/10/2013	8:28	10/10/13 8:28 AM	0
10/10/2013	8:33	10/10/13 8:33 AM	0.05
10/10/2013	8:38	10/10/13 8:38 AM	0
10/10/2013	8:43	10/10/13 8:43 AM	0
10/10/2013	8:48	10/10/13 8:48 AM	0
10/10/2013	8:53	10/10/13 8:53 AM	0
10/10/2013	8:58	10/10/13 8:58 AM	0
10/10/2013	9:03	10/10/13 9:03 AM	0
10/10/2013	9:08	10/10/13 9:08 AM	0
10/10/2013	9:13	10/10/13 9:13 AM	0
10/10/2013	9:18	10/10/13 9:18 AM	0
10/10/2013	9:23	10/10/13 9:23 AM	0
10/10/2013	9:28	10/10/13 9:28 AM	0
10/10/2013	9:33	10/10/13 9:33 AM	0
10/10/2013	9:38	10/10/13 9:38 AM	0
10/10/2013	9:43	10/10/13 9:43 AM	0
10/10/2013	9:48	10/10/13 9:48 AM	0
10/10/2013	9:53	10/10/13 9:53 AM	0
10/10/2013	9:58	10/10/13 9:58 AM	0
10/10/2013	10:03	10/10/13 10:03 AM	0
10/10/2013	10:08	10/10/13 10:08 AM	0
10/10/2013	10:13	10/10/13 10:13 AM	0
10/10/2013	10:18	10/10/13 10:18 AM	0
10/10/2013	10:23	10/10/13 10:23 AM	0
10/10/2013	10:28	10/10/13 10:28 AM	0
10/10/2013	10:33	10/10/13 10:33 AM	0
10/10/2013	10:38	10/10/13 10:38 AM	0
10/10/2013	10:43	10/10/13 10:43 AM	0
10/10/2013	10:48	10/10/13 10:48 AM	0
10/10/2013	10:53	10/10/13 10:53 AM	0
10/10/2013	10:58	10/10/13 10:58 AM	0
10/10/2013	11:03	10/10/13 11:03 AM	0
10/10/2013	11:08	10/10/13 11:08 AM	0

10/10/2013	11:13	10/10/13 11:13 AM	0
10/10/2013	11:18	10/10/13 11:18 AM	0
10/10/2013	11:23	10/10/13 11:23 AM	0
10/10/2013	11:28	10/10/13 11:28 AM	0
10/10/2013	11:33	10/10/13 11:33 AM	0
10/10/2013	11:38	10/10/13 11:38 AM	0
10/10/2013	11:43	10/10/13 11:43 AM	0
10/10/2013	11:48	10/10/13 11:48 AM	0
10/10/2013	11:53	10/10/13 11:53 AM	0
10/10/2013	11:58	10/10/13 11:58 AM	0
10/10/2013	12:03	10/10/13 12:03 PM	0
10/10/2013	12:08	10/10/13 12:08 PM	0
10/10/2013	12:13	10/10/13 12:13 PM	0
10/10/2013	12:18	10/10/13 12:18 PM	0
10/10/2013	12:23	10/10/13 12:23 PM	0
10/10/2013	12:28	10/10/13 12:28 PM	0.05
10/10/2013	12:33	10/10/13 12:33 PM	0
10/10/2013	12:38	10/10/13 12:38 PM	0
10/10/2013	12:43	10/10/13 12:43 PM	0
10/10/2013	12:48	10/10/13 12:48 PM	0
10/10/2013	12:53	10/10/13 12:53 PM	0
10/10/2013	12:58	10/10/13 12:58 PM	0
10/10/2013	13:03	10/10/13 1:03 PM	0
10/10/2013	13:08	10/10/13 1:08 PM	0.03
10/10/2013	13:13	10/10/13 1:13 PM	0
10/10/2013	13:18	10/10/13 1:18 PM	0.05
10/10/2013	13:23	10/10/13 1:23 PM	0.03
10/10/2013	13:28	10/10/13 1:28 PM	0
10/10/2013	13:33	10/10/13 1:33 PM	0.06
10/10/2013	13:38	10/10/13 1:38 PM	0.03
10/10/2013	13:43	10/10/13 1:43 PM	0
10/10/2013	13:48	10/10/13 1:48 PM	0
10/10/2013	13:53	10/10/13 1:53 PM	0.04
10/10/2013	13:58	10/10/13 1:58 PM	0.05
10/10/2013	14:03	10/10/13 2:03 PM	0
10/10/2013	14:08	10/10/13 2:08 PM	0.04
10/10/2013	14:13	10/10/13 2:13 PM	0
10/10/2013	14:18	10/10/13 2:18 PM	0.04
10/10/2013	14:23	10/10/13 2:23 PM	0
10/10/2013	14:28	10/10/13 2:28 PM	0.03
10/10/2013	14:33	10/10/13 2:33 PM	0
10/10/2013	14:38	10/10/13 2:38 PM	0
10/10/2013	14:43	10/10/13 2:43 PM	0
10/10/2013	14:48	10/10/13 2:48 PM	0
10/10/2013	14:53	10/10/13 2:53 PM	0.05
10/10/2013	14:58	10/10/13 2:58 PM	0
10/10/2013	15:03	10/10/13 3:03 PM	0

10/10/2013	15:08	10/10/13 3:08 PM	0
10/10/2013	15:13	10/10/13 3:13 PM	0
10/10/2013	15:18	10/10/13 3:18 PM	0.05
10/10/2013	15:23	10/10/13 3:23 PM	0
10/10/2013	15:28	10/10/13 3:28 PM	0
10/10/2013	15:33	10/10/13 3:33 PM	0.03
10/10/2013	15:38	10/10/13 3:38 PM	0
10/10/2013	15:43	10/10/13 3:43 PM	0
10/10/2013	15:48	10/10/13 3:48 PM	0
10/10/2013	15:53	10/10/13 3:53 PM	0
10/10/2013	15:58	10/10/13 3:58 PM	0
10/10/2013	16:03	10/10/13 4:03 PM	0.05
10/10/2013	16:08	10/10/13 4:08 PM	0.04
10/10/2013	16:13	10/10/13 4:13 PM	0.03
10/10/2013	16:18	10/10/13 4:18 PM	0.05
10/10/2013	16:23	10/10/13 4:23 PM	0.04
10/10/2013	16:28	10/10/13 4:28 PM	0
10/10/2013	16:33	10/10/13 4:33 PM	0.04
10/10/2013	16:38	10/10/13 4:38 PM	0
10/10/2013	16:43	10/10/13 4:43 PM	0
10/10/2013	16:48	10/10/13 4:48 PM	0.05
10/10/2013	16:53	10/10/13 4:53 PM	0
10/10/2013	16:58	10/10/13 4:58 PM	0.03
10/10/2013	17:03	10/10/13 5:03 PM	0
10/10/2013	17:08	10/10/13 5:08 PM	0.05
10/10/2013	17:13	10/10/13 5:13 PM	0
10/10/2013	17:18	10/10/13 5:18 PM	0.04
10/10/2013	17:23	10/10/13 5:23 PM	0.09
10/10/2013	17:28	10/10/13 5:28 PM	0.07
10/10/2013	17:33	10/10/13 5:33 PM	0.09
10/10/2013	17:38	10/10/13 5:38 PM	0.03
10/10/2013	17:43	10/10/13 5:43 PM	0.09
10/10/2013	17:48	10/10/13 5:48 PM	0.09
10/10/2013	17:53	10/10/13 5:53 PM	0.07
10/10/2013	17:58	10/10/13 5:58 PM	0.05
10/10/2013	18:03	10/10/13 6:03 PM	0.04
10/10/2013	18:08	10/10/13 6:08 PM	0.13
10/10/2013	18:13	10/10/13 6:13 PM	0.12
10/10/2013	18:18	10/10/13 6:18 PM	0.12
10/10/2013	18:23	10/10/13 6:23 PM	0.09
10/10/2013	18:28	10/10/13 6:28 PM	0.07
10/10/2013	18:33	10/10/13 6:33 PM	0.09
10/10/2013	18:38	10/10/13 6:38 PM	0.13
10/10/2013	18:43	10/10/13 6:43 PM	0.11
10/10/2013	18:48	10/10/13 6:48 PM	0.1
10/10/2013	18:53	10/10/13 6:53 PM	0.04
10/10/2013	18:58	10/10/13 6:58 PM	0.03

10/10/2013	19:03	10/10/13 7:03 PM	0.04
10/10/2013	19:08	10/10/13 7:08 PM	0.04
10/10/2013	19:13	10/10/13 7:13 PM	0
10/10/2013	19:18	10/10/13 7:18 PM	0.06
10/10/2013	19:23	10/10/13 7:23 PM	0
10/10/2013	19:28	10/10/13 7:28 PM	0.04
10/10/2013	19:33	10/10/13 7:33 PM	0.04
10/10/2013	19:38	10/10/13 7:38 PM	0
10/10/2013	19:43	10/10/13 7:43 PM	0.03
10/10/2013	19:48	10/10/13 7:48 PM	0
10/10/2013	19:53	10/10/13 7:53 PM	0
10/10/2013	19:58	10/10/13 7:58 PM	0
10/10/2013	20:03	10/10/13 8:03 PM	0
10/10/2013	20:08	10/10/13 8:08 PM	0
10/10/2013	20:13	10/10/13 8:13 PM	0.04
10/10/2013	20:18	10/10/13 8:18 PM	0
10/10/2013	20:23	10/10/13 8:23 PM	0.04
10/10/2013	20:28	10/10/13 8:28 PM	0
10/10/2013	20:33	10/10/13 8:33 PM	0
10/10/2013	20:38	10/10/13 8:38 PM	0
10/10/2013	20:43	10/10/13 8:43 PM	0.05
10/10/2013	20:48	10/10/13 8:48 PM	0
10/10/2013	20:53	10/10/13 8:53 PM	0
10/10/2013	20:58	10/10/13 8:58 PM	0
10/10/2013	21:03	10/10/13 9:03 PM	0.05
10/10/2013	21:08	10/10/13 9:08 PM	0
10/10/2013	21:13	10/10/13 9:13 PM	0
10/10/2013	21:18	10/10/13 9:18 PM	0
10/10/2013	21:23	10/10/13 9:23 PM	0.04
10/10/2013	21:28	10/10/13 9:28 PM	0.03
10/10/2013	21:33	10/10/13 9:33 PM	0
10/10/2013	21:38	10/10/13 9:38 PM	0
10/10/2013	21:43	10/10/13 9:43 PM	0
10/10/2013	21:48	10/10/13 9:48 PM	0
10/10/2013	21:53	10/10/13 9:53 PM	0
10/10/2013	21:58	10/10/13 9:58 PM	0.04
10/10/2013	22:03	10/10/13 10:03 PM	0.04
10/10/2013	22:08	10/10/13 10:08 PM	0.05
10/10/2013	22:13	10/10/13 10:13 PM	0
10/10/2013	22:18	10/10/13 10:18 PM	0.05
10/10/2013	22:23	10/10/13 10:23 PM	0.03
10/10/2013	22:28	10/10/13 10:28 PM	0.04
10/10/2013	22:33	10/10/13 10:33 PM	0
10/10/2013	22:38	10/10/13 10:38 PM	0
10/10/2013	22:43	10/10/13 10:43 PM	0.04
10/10/2013	22:48	10/10/13 10:48 PM	0.04
10/10/2013	22:53	10/10/13 10:53 PM	0.05

10/10/2013	22:58	10/10/13 10:58 PM	0
10/10/2013	23:03	10/10/13 11:03 PM	0.04
10/10/2013	23:08	10/10/13 11:08 PM	0
10/10/2013	23:13	10/10/13 11:13 PM	0.05
10/10/2013	23:18	10/10/13 11:18 PM	0.03
10/10/2013	23:23	10/10/13 11:23 PM	0.04
10/10/2013	23:28	10/10/13 11:28 PM	0.04
10/10/2013	23:33	10/10/13 11:33 PM	0.05
10/10/2013	23:38	10/10/13 11:38 PM	0.04
10/10/2013	23:43	10/10/13 11:43 PM	0.04
10/10/2013	23:48	10/10/13 11:48 PM	0.03
10/10/2013	23:53	10/10/13 11:53 PM	0
10/10/2013	23:58	10/10/13 11:58 PM	0.06
10/11/2013	0:01	10/11/13 12:01 AM	0
10/11/2013	0:02	10/11/13 12:02 AM	0
10/11/2013	0:03	10/11/13 12:02 AM	0.04
10/11/2013	0:08	10/11/13 12:07 AM	0
10/11/2013	0:10	10/11/13 12:10 AM	0
10/11/2013	0:14	10/11/13 12:14 AM	0.04
10/11/2013	0:16	10/11/13 12:16 AM	0
10/11/2013	0:21	10/11/13 12:21 AM	0.04
10/11/2013	0:26	10/11/13 12:26 AM	0.04
10/11/2013	0:31	10/11/13 12:31 AM	0.03
10/11/2013	0:36	10/11/13 12:36 AM	0.18
10/11/2013	0:41	10/11/13 12:41 AM	0.04
10/11/2013	0:46	10/11/13 12:46 AM	0
10/11/2013	0:51	10/11/13 12:51 AM	0
10/11/2013	0:56	10/11/13 12:56 AM	0.03
10/11/2013	1:01	10/11/13 1:01 AM	0
10/11/2013	1:06	10/11/13 1:06 AM	0.04
10/11/2013	1:11	10/11/13 1:11 AM	0
10/11/2013	1:16	10/11/13 1:16 AM	0
10/11/2013	1:21	10/11/13 1:21 AM	0
10/11/2013	1:26	10/11/13 1:26 AM	0
10/11/2013	1:31	10/11/13 1:31 AM	0
10/11/2013	1:36	10/11/13 1:36 AM	0
10/11/2013	1:41	10/11/13 1:41 AM	0.04
10/11/2013	1:46	10/11/13 1:46 AM	0
10/11/2013	1:51	10/11/13 1:51 AM	0
10/11/2013	1:56	10/11/13 1:56 AM	0
10/11/2013	2:01	10/11/13 2:01 AM	0.03
10/11/2013	2:06	10/11/13 2:06 AM	0.06
10/11/2013	2:11	10/11/13 2:11 AM	0
10/11/2013	2:16	10/11/13 2:16 AM	0
10/11/2013	2:21	10/11/13 2:21 AM	0
10/11/2013	2:26	10/11/13 2:26 AM	0
10/11/2013	2:31	10/11/13 2:31 AM	0

10/11/2013	2:36	10/11/13 2:36 AM	0
10/11/2013	2:41	10/11/13 2:41 AM	0
10/11/2013	2:46	10/11/13 2:46 AM	0
10/11/2013	2:51	10/11/13 2:51 AM	0
10/11/2013	2:56	10/11/13 2:56 AM	0
10/11/2013	3:01	10/11/13 3:01 AM	0.04
10/11/2013	3:06	10/11/13 3:06 AM	0
10/11/2013	3:11	10/11/13 3:11 AM	0
10/11/2013	3:16	10/11/13 3:16 AM	0
10/11/2013	3:21	10/11/13 3:21 AM	0.04
10/11/2013	3:26	10/11/13 3:26 AM	0
10/11/2013	3:31	10/11/13 3:31 AM	0
10/11/2013	3:36	10/11/13 3:36 AM	0
10/11/2013	3:41	10/11/13 3:41 AM	0.04
10/11/2013	3:46	10/11/13 3:46 AM	0
10/11/2013	3:51	10/11/13 3:51 AM	0.07
10/11/2013	3:56	10/11/13 3:56 AM	0.04
10/11/2013	4:01	10/11/13 4:01 AM	0
10/11/2013	4:06	10/11/13 4:06 AM	0
10/11/2013	4:11	10/11/13 4:11 AM	0
10/11/2013	4:16	10/11/13 4:16 AM	0
10/11/2013	4:21	10/11/13 4:21 AM	0
10/11/2013	4:26	10/11/13 4:26 AM	0.04
10/11/2013	4:31	10/11/13 4:31 AM	0
10/11/2013	4:36	10/11/13 4:36 AM	0
10/11/2013	4:41	10/11/13 4:41 AM	0.06
10/11/2013	4:46	10/11/13 4:46 AM	0.15
10/11/2013	4:51	10/11/13 4:51 AM	0
10/11/2013	4:56	10/11/13 4:56 AM	0
10/11/2013	5:01	10/11/13 5:01 AM	0.04
10/11/2013	5:06	10/11/13 5:06 AM	0.04
10/11/2013	5:11	10/11/13 5:11 AM	0
10/11/2013	5:16	10/11/13 5:16 AM	0
10/11/2013	5:21	10/11/13 5:21 AM	0
10/11/2013	5:26	10/11/13 5:26 AM	0
10/11/2013	5:31	10/11/13 5:31 AM	0.06
10/11/2013	5:36	10/11/13 5:36 AM	0
10/11/2013	5:41	10/11/13 5:41 AM	0
10/11/2013	5:46	10/11/13 5:46 AM	0
10/11/2013	5:51	10/11/13 5:51 AM	0
10/11/2013	5:56	10/11/13 5:56 AM	0
10/11/2013	6:01	10/11/13 6:01 AM	0
10/11/2013	6:06	10/11/13 6:06 AM	0
10/11/2013	6:11	10/11/13 6:11 AM	0
10/11/2013	6:16	10/11/13 6:16 AM	0.04
10/11/2013	6:21	10/11/13 6:21 AM	0
10/11/2013	6:26	10/11/13 6:26 AM	0

10/11/2013	6:31	10/11/13 6:31 AM	0
10/11/2013	6:36	10/11/13 6:36 AM	0
10/11/2013	6:41	10/11/13 6:41 AM	0.03
10/11/2013	6:46	10/11/13 6:46 AM	0
10/11/2013	6:51	10/11/13 6:51 AM	0
10/11/2013	6:56	10/11/13 6:56 AM	0
10/11/2013	7:01	10/11/13 7:01 AM	0
10/11/2013	7:06	10/11/13 7:06 AM	0
10/11/2013	7:11	10/11/13 7:11 AM	0
10/11/2013	7:16	10/11/13 7:16 AM	0
10/11/2013	7:21	10/11/13 7:21 AM	0
10/11/2013	7:26	10/11/13 7:26 AM	0
10/11/2013	7:31	10/11/13 7:31 AM	0
10/11/2013	7:36	10/11/13 7:36 AM	0
10/11/2013	7:41	10/11/13 7:41 AM	0
10/11/2013	7:46	10/11/13 7:46 AM	0
10/11/2013	7:51	10/11/13 7:51 AM	0
10/11/2013	7:56	10/11/13 7:56 AM	0
10/11/2013	8:01	10/11/13 8:01 AM	0.04
10/11/2013	8:06	10/11/13 8:06 AM	0
10/11/2013	8:11	10/11/13 8:11 AM	0
10/11/2013	8:16	10/11/13 8:16 AM	0
10/11/2013	8:21	10/11/13 8:21 AM	0
10/11/2013	8:26	10/11/13 8:26 AM	0.04
10/11/2013	8:31	10/11/13 8:31 AM	0
10/11/2013	8:36	10/11/13 8:36 AM	0
10/11/2013	8:41	10/11/13 8:41 AM	0.04
10/11/2013	8:46	10/11/13 8:46 AM	0.06
10/11/2013	8:51	10/11/13 8:51 AM	0
10/11/2013	8:56	10/11/13 8:56 AM	0.04
10/11/2013	9:01	10/11/13 9:01 AM	0
10/11/2013	9:06	10/11/13 9:06 AM	0.03
10/11/2013	9:11	10/11/13 9:11 AM	0.04
10/11/2013	9:16	10/11/13 9:16 AM	0
10/11/2013	9:21	10/11/13 9:21 AM	0.04
10/11/2013	9:26	10/11/13 9:26 AM	0
10/11/2013	9:31	10/11/13 9:31 AM	0.04
10/11/2013	9:36	10/11/13 9:36 AM	0.04
10/11/2013	9:41	10/11/13 9:41 AM	0.09
10/11/2013	9:46	10/11/13 9:46 AM	0.08
10/11/2013	9:51	10/11/13 9:51 AM	0.04
10/11/2013	9:56	10/11/13 9:56 AM	0.04
10/11/2013	10:01	10/11/13 10:01 AM	0
10/11/2013	10:06	10/11/13 10:06 AM	0.09
10/11/2013	10:11	10/11/13 10:11 AM	0.16
10/11/2013	10:16	10/11/13 10:16 AM	0.13
10/11/2013	10:21	10/11/13 10:21 AM	0.04

10/11/2013	10:26	10/11/13 10:26 AM	0.12
10/11/2013	10:31	10/11/13 10:31 AM	0
10/11/2013	10:36	10/11/13 10:36 AM	0.05
10/11/2013	10:41	10/11/13 10:41 AM	0.04
10/11/2013	10:46	10/11/13 10:46 AM	0
10/11/2013	10:51	10/11/13 10:51 AM	0.08
10/11/2013	10:56	10/11/13 10:56 AM	0.04
10/11/2013	11:01	10/11/13 11:01 AM	0.04
10/11/2013	11:06	10/11/13 11:06 AM	0.17
10/11/2013	11:11	10/11/13 11:11 AM	0.17
10/11/2013	11:16	10/11/13 11:16 AM	0.04
10/11/2013	11:21	10/11/13 11:21 AM	0.04
10/11/2013	11:26	10/11/13 11:26 AM	0.08
10/11/2013	11:31	10/11/13 11:31 AM	0.05
10/11/2013	11:36	10/11/13 11:36 AM	0
10/11/2013	11:41	10/11/13 11:41 AM	0
10/11/2013	11:46	10/11/13 11:46 AM	0
10/11/2013	11:51	10/11/13 11:51 AM	0
10/11/2013	11:56	10/11/13 11:56 AM	0.04
10/11/2013	12:01	10/11/13 12:01 PM	0
10/11/2013	12:06	10/11/13 12:06 PM	0
10/11/2013	12:11	10/11/13 12:11 PM	0
10/11/2013	12:16	10/11/13 12:16 PM	0
10/11/2013	12:21	10/11/13 12:21 PM	0
10/11/2013	12:26	10/11/13 12:26 PM	0
10/11/2013	12:31	10/11/13 12:31 PM	0.04
10/11/2013	12:36	10/11/13 12:36 PM	0
10/11/2013	12:41	10/11/13 12:41 PM	0
10/11/2013	12:46	10/11/13 12:46 PM	0.04
10/11/2013	12:51	10/11/13 12:51 PM	0
10/11/2013	12:56	10/11/13 12:56 PM	0.04
10/11/2013	13:01	10/11/13 1:01 PM	0.04
10/11/2013	13:06	10/11/13 1:06 PM	0.09
10/11/2013	13:11	10/11/13 1:11 PM	0
10/11/2013	13:16	10/11/13 1:16 PM	0.04
10/11/2013	13:21	10/11/13 1:21 PM	0
10/11/2013	13:26	10/11/13 1:26 PM	0
10/11/2013	13:31	10/11/13 1:31 PM	0
10/11/2013	13:36	10/11/13 1:36 PM	0
10/11/2013	13:41	10/11/13 1:41 PM	0
10/11/2013	13:46	10/11/13 1:46 PM	0
10/11/2013	13:51	10/11/13 1:51 PM	0
10/11/2013	13:56	10/11/13 1:56 PM	0
10/11/2013	14:01	10/11/13 2:01 PM	0
10/11/2013	14:06	10/11/13 2:06 PM	0
10/11/2013	14:11	10/11/13 2:11 PM	0
10/11/2013	14:16	10/11/13 2:16 PM	0

10/11/2013	14:21	10/11/13 2:21 PM	0
10/11/2013	14:26	10/11/13 2:26 PM	0.04
10/11/2013	14:31	10/11/13 2:31 PM	0
10/11/2013	14:36	10/11/13 2:36 PM	0
10/11/2013	14:41	10/11/13 2:41 PM	0
10/11/2013	14:46	10/11/13 2:46 PM	0
10/11/2013	14:51	10/11/13 2:51 PM	0.04
10/11/2013	14:56	10/11/13 2:56 PM	0
10/11/2013	15:01	10/11/13 3:01 PM	0
10/11/2013	15:06	10/11/13 3:06 PM	0
10/11/2013	15:11	10/11/13 3:11 PM	0
10/11/2013	15:16	10/11/13 3:16 PM	0
10/11/2013	15:21	10/11/13 3:21 PM	0
10/11/2013	15:26	10/11/13 3:26 PM	0
10/11/2013	15:31	10/11/13 3:31 PM	0
10/11/2013	15:36	10/11/13 3:36 PM	0
10/11/2013	15:41	10/11/13 3:41 PM	0
10/11/2013	15:46	10/11/13 3:46 PM	0
10/11/2013	15:51	10/11/13 3:51 PM	0
10/11/2013	15:56	10/11/13 3:56 PM	0
10/11/2013	16:01	10/11/13 4:01 PM	0
10/11/2013	16:06	10/11/13 4:06 PM	0
10/11/2013	16:11	10/11/13 4:11 PM	0
10/11/2013	16:16	10/11/13 4:16 PM	0
10/11/2013	16:21	10/11/13 4:21 PM	0
10/11/2013	16:26	10/11/13 4:26 PM	0
10/11/2013	16:31	10/11/13 4:31 PM	0
10/11/2013	16:36	10/11/13 4:36 PM	0
10/11/2013	16:41	10/11/13 4:41 PM	0
10/11/2013	16:46	10/11/13 4:46 PM	0
10/11/2013	16:51	10/11/13 4:51 PM	0
10/11/2013	16:56	10/11/13 4:56 PM	0
10/11/2013	17:01	10/11/13 5:01 PM	0
10/11/2013	17:06	10/11/13 5:06 PM	0.04
10/11/2013	17:11	10/11/13 5:11 PM	0
10/11/2013	17:16	10/11/13 5:16 PM	0
10/11/2013	17:21	10/11/13 5:21 PM	0.05
10/11/2013	17:26	10/11/13 5:26 PM	0.04
10/11/2013	17:31	10/11/13 5:31 PM	0
10/11/2013	17:36	10/11/13 5:36 PM	0.04
10/11/2013	17:41	10/11/13 5:41 PM	0.04
10/11/2013	17:46	10/11/13 5:46 PM	0
10/11/2013	17:51	10/11/13 5:51 PM	0.04
10/11/2013	17:57	10/11/13 5:57 PM	0.05
10/11/2013	18:02	10/11/13 6:02 PM	0
10/11/2013	18:07	10/11/13 6:07 PM	0
10/11/2013	18:12	10/11/13 6:12 PM	0.04

10/11/2013	18:17	10/11/13 6:17 PM	0
10/11/2013	18:22	10/11/13 6:22 PM	0
10/11/2013	18:27	10/11/13 6:27 PM	0
10/11/2013	18:32	10/11/13 6:32 PM	0
10/11/2013	18:37	10/11/13 6:37 PM	0
10/11/2013	18:42	10/11/13 6:42 PM	0
10/11/2013	18:47	10/11/13 6:47 PM	0
10/11/2013	18:52	10/11/13 6:52 PM	0
10/11/2013	18:57	10/11/13 6:57 PM	0
10/11/2013	19:02	10/11/13 7:02 PM	0.04
10/11/2013	19:07	10/11/13 7:07 PM	0.04
10/11/2013	19:12	10/11/13 7:12 PM	0.04
10/11/2013	19:17	10/11/13 7:17 PM	0
10/11/2013	19:22	10/11/13 7:22 PM	0
10/11/2013	19:27	10/11/13 7:27 PM	0
10/11/2013	19:32	10/11/13 7:32 PM	0
10/11/2013	19:37	10/11/13 7:37 PM	0
10/11/2013	19:42	10/11/13 7:42 PM	0
10/11/2013	19:47	10/11/13 7:47 PM	0
10/11/2013	19:52	10/11/13 7:52 PM	0
10/11/2013	19:57	10/11/13 7:57 PM	0
10/11/2013	20:02	10/11/13 8:02 PM	0.04
10/11/2013	20:07	10/11/13 8:07 PM	0
10/11/2013	20:12	10/11/13 8:12 PM	0
10/11/2013	20:17	10/11/13 8:17 PM	0
10/11/2013	20:22	10/11/13 8:22 PM	0
10/11/2013	20:27	10/11/13 8:27 PM	0
10/11/2013	20:32	10/11/13 8:32 PM	0
10/11/2013	20:37	10/11/13 8:37 PM	0
10/11/2013	20:42	10/11/13 8:42 PM	0
10/11/2013	20:47	10/11/13 8:47 PM	0
10/11/2013	20:52	10/11/13 8:52 PM	0
10/11/2013	20:57	10/11/13 8:57 PM	0
10/11/2013	21:02	10/11/13 9:02 PM	0
10/11/2013	21:07	10/11/13 9:07 PM	0
10/11/2013	21:12	10/11/13 9:12 PM	0
10/11/2013	21:17	10/11/13 9:17 PM	0
10/11/2013	21:22	10/11/13 9:22 PM	0
10/11/2013	21:27	10/11/13 9:27 PM	0
10/11/2013	21:32	10/11/13 9:32 PM	0
10/11/2013	21:37	10/11/13 9:37 PM	0
10/11/2013	21:42	10/11/13 9:42 PM	0
10/11/2013	21:47	10/11/13 9:47 PM	0
10/11/2013	21:52	10/11/13 9:52 PM	0
10/11/2013	21:57	10/11/13 9:57 PM	0
10/11/2013	22:02	10/11/13 10:02 PM	0
10/11/2013	22:07	10/11/13 10:07 PM	0.05

10/11/2013	22:12	10/11/13 10:12 PM	0
10/11/2013	22:17	10/11/13 10:17 PM	0
10/11/2013	22:22	10/11/13 10:22 PM	0
10/11/2013	22:27	10/11/13 10:27 PM	0
10/11/2013	22:32	10/11/13 10:32 PM	0
10/11/2013	22:37	10/11/13 10:37 PM	0
10/11/2013	22:42	10/11/13 10:42 PM	0
10/11/2013	22:47	10/11/13 10:47 PM	0
10/11/2013	22:52	10/11/13 10:52 PM	0.04
10/11/2013	22:57	10/11/13 10:57 PM	0
10/11/2013	23:02	10/11/13 11:02 PM	0
10/11/2013	23:07	10/11/13 11:07 PM	0
10/11/2013	23:12	10/11/13 11:12 PM	0.04
10/11/2013	23:17	10/11/13 11:17 PM	0
10/11/2013	23:22	10/11/13 11:22 PM	0
10/11/2013	23:27	10/11/13 11:27 PM	0
10/11/2013	23:32	10/11/13 11:32 PM	0
10/11/2013	23:37	10/11/13 11:37 PM	0
10/11/2013	23:42	10/11/13 11:42 PM	0
10/11/2013	23:47	10/11/13 11:47 PM	0
10/11/2013	23:52	10/11/13 11:52 PM	0
10/11/2013	23:57	10/11/13 11:57 PM	0
10/12/2013	0:01	10/12/13 12:01 AM	0
10/12/2013	0:03	10/12/13 12:03 AM	0
10/12/2013	0:05	10/12/13 12:05 AM	0
10/12/2013	0:07	10/12/13 12:07 AM	0
10/12/2013	0:08	10/12/13 12:08 AM	0
10/12/2013	0:09	10/12/13 12:09 AM	0
10/12/2013	0:14	10/12/13 12:14 AM	0
10/12/2013	0:19	10/12/13 12:19 AM	0
10/12/2013	0:24	10/12/13 12:24 AM	0
10/12/2013	0:29	10/12/13 12:29 AM	0
10/12/2013	0:34	10/12/13 12:34 AM	0
10/12/2013	0:39	10/12/13 12:39 AM	0
10/12/2013	0:44	10/12/13 12:44 AM	0
10/12/2013	0:49	10/12/13 12:49 AM	0
10/12/2013	0:54	10/12/13 12:54 AM	0
10/12/2013	0:59	10/12/13 12:59 AM	0
10/12/2013	1:04	10/12/13 1:04 AM	0
10/12/2013	1:09	10/12/13 1:09 AM	0
10/12/2013	1:14	10/12/13 1:14 AM	0
10/12/2013	1:19	10/12/13 1:19 AM	0
10/12/2013	1:24	10/12/13 1:24 AM	0
10/12/2013	1:29	10/12/13 1:29 AM	0
10/12/2013	1:34	10/12/13 1:34 AM	0
10/12/2013	1:39	10/12/13 1:39 AM	0
10/12/2013	1:44	10/12/13 1:44 AM	0

10/12/2013	1:49	10/12/13 1:49 AM	0
10/12/2013	1:54	10/12/13 1:54 AM	0
10/12/2013	1:59	10/12/13 1:59 AM	0
10/12/2013	2:04	10/12/13 2:04 AM	0
10/12/2013	2:09	10/12/13 2:09 AM	0
10/12/2013	2:14	10/12/13 2:14 AM	0
10/12/2013	2:19	10/12/13 2:19 AM	0
10/12/2013	2:24	10/12/13 2:24 AM	0
10/12/2013	2:29	10/12/13 2:29 AM	0
10/12/2013	2:34	10/12/13 2:34 AM	0
10/12/2013	2:39	10/12/13 2:39 AM	0
10/12/2013	2:44	10/12/13 2:44 AM	0
10/12/2013	2:49	10/12/13 2:49 AM	0
10/12/2013	2:54	10/12/13 2:54 AM	0
10/12/2013	2:59	10/12/13 2:59 AM	0
10/12/2013	3:04	10/12/13 3:04 AM	0
10/12/2013	3:09	10/12/13 3:09 AM	0
10/12/2013	3:14	10/12/13 3:14 AM	0
10/12/2013	3:19	10/12/13 3:19 AM	0
10/12/2013	3:24	10/12/13 3:24 AM	0
10/12/2013	3:29	10/12/13 3:29 AM	0
10/12/2013	3:34	10/12/13 3:34 AM	0
10/12/2013	3:39	10/12/13 3:39 AM	0
10/12/2013	3:45	10/12/13 3:45 AM	0
10/12/2013	3:50	10/12/13 3:50 AM	0
10/12/2013	3:55	10/12/13 3:55 AM	0
10/12/2013	4:00	10/12/13 4:00 AM	0
10/12/2013	4:05	10/12/13 4:05 AM	0
10/12/2013	4:10	10/12/13 4:10 AM	0
10/12/2013	4:15	10/12/13 4:15 AM	0
10/12/2013	4:20	10/12/13 4:20 AM	0
10/12/2013	4:25	10/12/13 4:25 AM	0
10/12/2013	4:30	10/12/13 4:30 AM	0
10/12/2013	4:35	10/12/13 4:35 AM	0
10/12/2013	4:40	10/12/13 4:40 AM	0
10/12/2013	4:45	10/12/13 4:45 AM	0
10/12/2013	4:50	10/12/13 4:50 AM	0
10/12/2013	4:55	10/12/13 4:55 AM	0
10/12/2013	5:00	10/12/13 5:00 AM	0
10/12/2013	5:05	10/12/13 5:05 AM	0
10/12/2013	5:10	10/12/13 5:10 AM	0
10/12/2013	5:15	10/12/13 5:15 AM	0
10/12/2013	5:20	10/12/13 5:20 AM	0
10/12/2013	5:25	10/12/13 5:25 AM	0
10/12/2013	5:30	10/12/13 5:30 AM	0
10/12/2013	5:35	10/12/13 5:35 AM	0
10/12/2013	5:40	10/12/13 5:40 AM	0

10/12/2013	5:45	10/12/13 5:45 AM	0
10/12/2013	5:50	10/12/13 5:50 AM	0
10/12/2013	5:55	10/12/13 5:55 AM	0
10/12/2013	6:00	10/12/13 6:00 AM	0
10/12/2013	6:05	10/12/13 6:05 AM	0
10/12/2013	6:10	10/12/13 6:10 AM	0
10/12/2013	6:15	10/12/13 6:15 AM	0
10/12/2013	6:20	10/12/13 6:20 AM	0
10/12/2013	6:25	10/12/13 6:25 AM	0
10/12/2013	6:30	10/12/13 6:30 AM	0
10/12/2013	6:35	10/12/13 6:35 AM	0
10/12/2013	6:40	10/12/13 6:40 AM	0
10/12/2013	6:45	10/12/13 6:45 AM	0
10/12/2013	6:50	10/12/13 6:50 AM	0
10/12/2013	6:55	10/12/13 6:55 AM	0
		Total	**8.41**

Table 5	
fYNOP Gauge Data	
Date and Time	**Rainfall (inches)**
9/20/13 12:00 AM	0
9/20/13 1:00 AM	0
9/20/13 2:00 AM	0
9/20/13 3:00 AM	0
9/20/13 4:00 AM	0
9/20/13 5:00 AM	0
9/20/13 6:00 AM	0
9/20/13 7:00 AM	0
9/20/13 8:00 AM	0
9/20/13 9:00 AM	0
9/20/13 10:00 AM	0
9/20/13 11:00 AM	0
9/20/13 12:00 PM	0
9/20/13 1:00 PM	0
9/20/13 2:00 PM	0
9/20/13 3:00 PM	0
9/20/13 4:00 PM	0
9/20/13 5:00 PM	0
9/20/13 6:00 PM	0
9/20/13 7:00 PM	0
9/20/13 8:00 PM	0
9/20/13 9:00 PM	0
9/20/13 10:00 PM	0
9/20/13 11:00 PM	0
9/21/13 12:00 AM	0
9/21/13 1:00 AM	0
9/21/13 2:00 AM	0
9/21/13 3:00 AM	0
9/21/13 4:00 AM	0
9/21/13 5:00 AM	0
9/21/13 6:00 AM	0
9/21/13 7:00 AM	0
9/21/13 8:00 AM	0
9/21/13 9:00 AM	0
9/21/13 10:00 AM	0
9/21/13 11:00 AM	0
9/21/13 12:00 PM	0
9/21/13 1:00 PM	0
9/21/13 2:00 PM	0
9/21/13 3:00 PM	0
9/21/13 4:00 PM	0
9/21/13 5:00 PM	0.05
9/21/13 6:00 PM	0.05

9/21/13 7:00 PM	0.05
9/21/13 8:00 PM	0.24
9/21/13 9:00 PM	0.16
9/21/13 10:00 PM	0.11
9/21/13 11:00 PM	0.03
9/22/13 12:00 AM	0
9/22/13 1:00 AM	0
Total	**0.69**

Table 6	
fYNOP Site Gauge Data	
Date and Time	**Rainfall (inches)**
10/9/13 12:00 AM	0
10/9/13 1:00 AM	0
10/9/13 2:00 AM	0
10/9/13 3:00 AM	0
10/9/13 4:00 AM	0
10/9/13 5:00 AM	0
10/9/13 6:00 AM	0
10/9/13 7:00 AM	0
10/9/13 8:00 AM	0
10/9/13 9:00 AM	0
10/9/13 10:00 AM	0
10/9/13 11:00 AM	0
10/9/13 12:00 PM	0
10/9/13 1:00 PM	0
10/9/13 2:00 PM	0
10/9/13 3:00 PM	0
10/9/13 4:00 PM	0
10/9/13 5:00 PM	0
10/9/13 6:00 PM	0
10/9/13 7:00 PM	0
10/9/13 8:00 PM	0
10/9/13 9:00 PM	0
10/9/13 10:00 PM	0
10/9/13 11:00 PM	0
10/10/13 12:00 AM	0
10/10/13 1:00 AM	0
10/10/13 2:00 AM	0
10/10/13 3:00 AM	0
10/10/13 4:00 AM	0
10/10/13 5:00 AM	0
10/10/13 6:00 AM	0
10/10/13 7:00 AM	0.02
10/10/13 8:00 AM	0.06
10/10/13 9:00 AM	0.03
10/10/13 10:00 AM	0.01
10/10/13 11:00 AM	0
10/10/13 12:00 PM	0
10/10/13 1:00 PM	0.03
10/10/13 2:00 PM	0.2
10/10/13 3:00 PM	0.14
10/10/13 4:00 PM	0.06
10/10/13 5:00 PM	0.17
10/10/13 6:00 PM	0.5

10/10/13 7:00 PM	0.93
10/10/13 8:00 PM	0.27
10/10/13 9:00 PM	0.11
10/10/13 10:00 PM	0.14
10/10/13 11:00 PM	0.24
10/11/13 12:00 AM	0.3
10/11/13 1:00 AM	0.32
10/11/13 2:00 AM	0.18
10/11/13 3:00 AM	0.07
10/11/13 4:00 AM	0.14
10/11/13 5:00 AM	0.19
10/11/13 6:00 AM	0.08
10/11/13 7:00 AM	0.08
10/11/13 8:00 AM	0.01
10/11/13 9:00 AM	0.11
10/11/13 10:00 AM	0.3
10/11/13 11:00 AM	0.47
10/11/13 12:00 PM	0.38
10/11/13 1:00 PM	0.15
10/11/13 2:00 PM	0.18
10/11/13 3:00 PM	0.03
10/11/13 4:00 PM	0.01
10/11/13 5:00 PM	0.01
10/11/13 6:00 PM	0.2
10/11/13 7:00 PM	0.06
10/11/13 8:00 PM	0.07
10/11/13 9:00 PM	0.1
10/11/13 10:00 PM	0
10/11/13 11:00 PM	0.01
10/12/13 12:00 AM	0.04
10/12/13 1:00 AM	0
10/12/13 2:00 AM	0
10/12/13 3:00 AM	0
10/12/13 4:00 AM	0
10/12/13 5:00 AM	0
10/12/13 6:00 AM	0
10/12/13 7:00 AM	0
10/12/13 8:00 AM	0
10/12/13 9:00 AM	0
10/12/13 10:00 AM	0
10/12/13 11:00 AM	0
10/12/13 12:00 PM	0
10/12/13 1:00 PM	0
10/12/13 2:00 PM	0
10/12/13 3:00 PM	0
10/12/13 4:00 PM	0
10/12/13 5:00 PM	0

10/12/13 6:00 PM	0
10/12/13 7:00 PM	0
10/12/13 8:00 PM	0
10/12/13 9:00 PM	0
10/12/13 10:00 PM	0
10/12/13 11:00 PM	0.01
Total	**6.41**

Table 7	
fYNOP Site Gauge Data	
Date and Time	**Rainfall (inches)**
10/6/13 12:00 AM	0
10/6/13 1:00 AM	0
10/6/13 2:00 AM	0
10/6/13 3:00 AM	0
10/6/13 4:00 AM	0
10/6/13 5:00 AM	0
10/6/13 6:00 AM	0
10/6/13 7:00 AM	0
10/6/13 8:00 AM	0
10/6/13 9:00 AM	0
10/6/13 10:00 AM	0
10/6/13 11:00 AM	0
10/6/13 12:00 PM	0
10/6/13 1:00 PM	0
10/6/13 2:00 PM	0
10/6/13 3:00 PM	0
10/6/13 4:00 PM	0
10/6/13 5:00 PM	0
10/6/13 6:00 PM	0
10/6/13 7:00 PM	0
10/6/13 8:00 PM	0
10/6/13 9:00 PM	0
10/6/13 10:00 PM	0
10/6/13 11:00 PM	0
10/7/13 12:00 AM	0
10/7/13 1:00 AM	0
10/7/13 2:00 AM	0
10/7/13 3:00 AM	0
10/7/13 4:00 AM	0
10/7/13 5:00 AM	0
10/7/13 6:00 AM	0
10/7/13 7:00 AM	0
10/7/13 8:00 AM	0
10/7/13 9:00 AM	0
10/7/13 10:00 AM	0
10/7/13 11:00 AM	0.4
10/7/13 12:00 PM	0.27
10/7/13 1:00 PM	0.08
10/7/13 2:00 PM	0.16
10/7/13 3:00 PM	0.03
10/7/13 4:00 PM	0.01
10/7/13 5:00 PM	0
10/7/13 6:00 PM	0

10/7/13 7:00 PM	0
10/7/13 8:00 PM	0
10/7/13 9:00 PM	0
10/7/13 10:00 PM	0
10/7/13 11:00 PM	0
10/8/13 12:00 AM	0
10/8/13 1:00 AM	0
10/8/13 2:00 AM	0
10/8/13 3:00 AM	0
10/8/13 4:00 AM	0
10/8/13 5:00 AM	0
10/8/13 6:00 AM	0
10/8/13 7:00 AM	0
10/8/13 8:00 AM	0
10/8/13 9:00 AM	0
10/8/13 10:00 AM	0
10/8/13 11:00 AM	0
10/8/13 12:00 PM	0
10/8/13 1:00 PM	0
10/8/13 2:00 PM	0
10/8/13 3:00 PM	0
10/8/13 4:00 PM	0
10/8/13 5:00 PM	0
10/8/13 6:00 PM	0
10/8/13 7:00 PM	0
10/8/13 8:00 PM	0
10/8/13 9:00 PM	0
10/8/13 10:00 PM	0
10/8/13 11:00 PM	0
Total	**0.95**

Appendix B

Table 8. Comparison Table of Drainage Area Calculations

TABLE 8 fYNOP Drainage Area Calculations, after Harley Davidson

:

HARLEY-DAVIDSON

NPDES DRAINAGE AREA SUMMARY

Drainage Area	Impervious Surface		Open Space		Area
DA-1	405,776 sf	9.32 ac	205,806 sf	4.72 ac	14.04 ac
DA-2a	1,072,240 sf	24.62 ac	726,788 sf	16.68 ac	41.3 ac
DA-2b	6,591 sf	0.15 ac	60,927 sf	1.40 ac	1.55 ac
DA-3a	229,812 sf	5.28 ac	272,435 sf	6.25 ac	11.53 ac
DA-3b	409,867 sf	9.41 ac	180,371 sf	4.14 ac	13.55 ac
DA-4	320,061 sf	7.35 ac	2,449,484 sf	56.23 ac	63.58 ac
DA-5	116,950 sf	2.68 ac	582,188 sf	13.37 ac	16.05 ac
DA-6	1,882,383 sf	43.21 ac	544,345 sf	12.50 ac	55.71 ac
DA-X	0 sf	0.00 ac	452,153 sf	10.38 ac	10.38 ac
DA-Y	0 sf	0.00 ac	90,169 sf	2.07 ac	2.07 ac
TOTAL	4,443,680 sf	102.01 ac	5,022,344 sf	127.75 ac	229.76 ac