Stormwater Management Plan

Streets of West Pryor
Lee's Summit, MO

April 23, 2020

Prepared By:

SM Engineering
5507 High Meadow Circle
Manhattan, KS 66503

Samuel D. Malinowsky, P.E.

Table of Contents

INTRODUCTION

This Stormwater report has been prepared to address the proposed revisions to the outlet structure and overflow weir related to the existing south detention/retention pond in the Streets of West Pryor commercial development. The location of the site is shown in Figure 1 below. Figure 2 depicts the actual location of the pond as illustrated in the construction plans for the Streets of West Pryor.

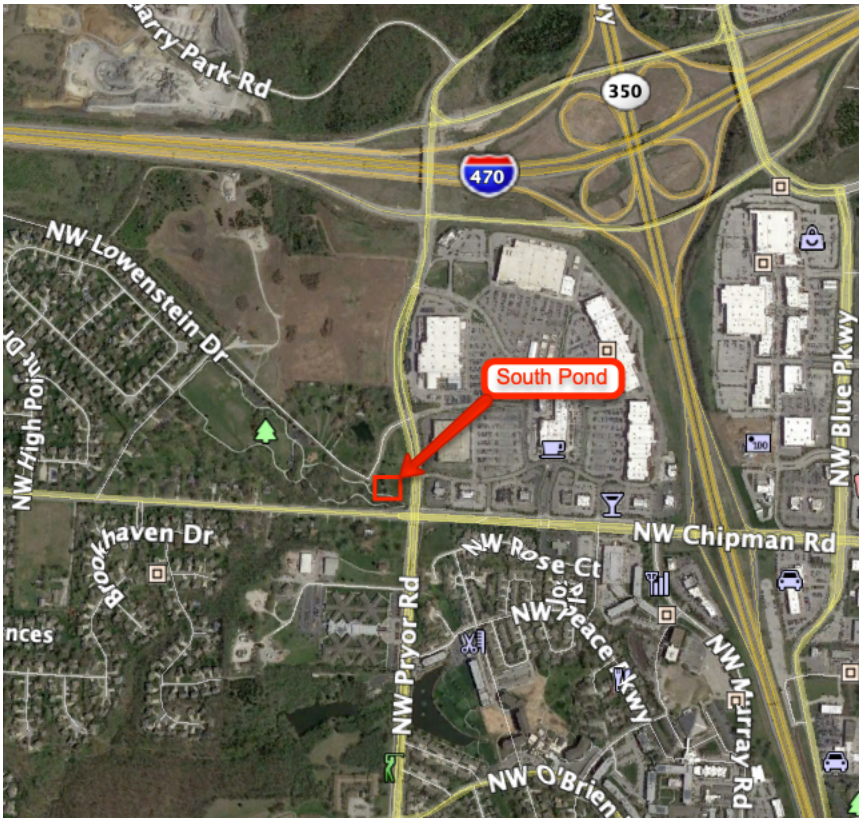

Figure 1: Site Location Map

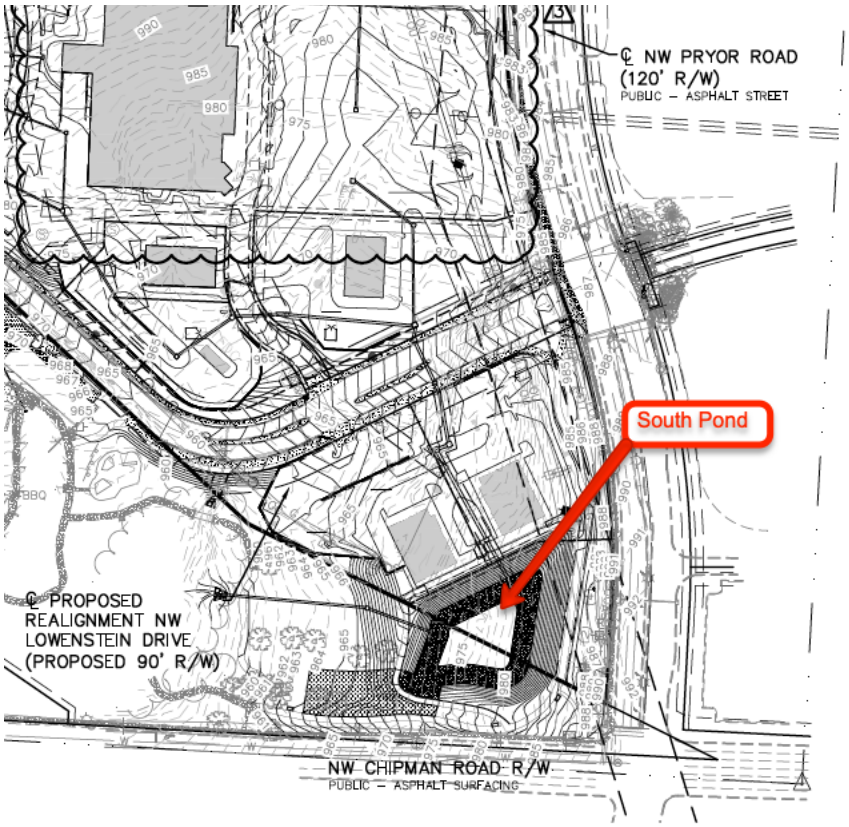

Figure 2: Pond Location

The purpose of the study is to analyze the effects of raising the permanent pool elevation in the pond to elevation 970.50. This will necessitate revising the primary outlet structure and raising the elevation of the emergency spillway in order to be 0.5 feet above the 100 yr WSE.

DRAINAGE ANALYSIS METHODS AND CALCULATIONS

The drainage analysis was prepared using Hydrology Studio software to analyze the revised outlet structure. (the Hydrology Studio report pages are included in the appendix). This pond was originally analyzed and designed based on the "Final Stormwater Report for Streets of West Pryor" prepared by Kaw Valley Engineering (KVE) in January of 2016. The rainfall input perimeters we used closely matched those shown in the KVE report as evidenced by the peak flows for the existing conditions listed below.

Pre-developed Release Rates

Storm	KVE Rate	SME Rate
2 yr	41 cfs	41.35 cfs
10 yr	80 cfs	80.23 cfs
100 yr	161 cfs	160.8cfs

The SCS method for determining runoff was used per APWA Section 5600, Storm Drainage Systems and Facilities – Kansas Metropolitan Chapter.

PROPOSED PLAN

Currently the primary outlet for the pond is a 5'x5' riser with a grate inlet. The riser has a 36" x 18" opening at elevation 970', 3-8" orifices at elevation 968 and one 2.5" orifice at elevation 966. The plan is to raise the permanent pool elevation to 970.5'. To achieve this we will be providing construction plans showing to modify the 36" x 18" opening to be 6" x 12" and to close off all the orifices. We will also be raising the outside walls of the structure to an elevation 973.9 feet from the constructed elevation of 973.00 feet. In order to maintain the 6" freeboard above the 100 yr maximum water surface elevation the emergency overflow will be revised to show construction of a concrete weir wall immediately upstream of the walking path. This will raise the emergency overflow from 973.50' to 975.21'.

PROPOSED DRAINAGE PLAN

As discussed above we have closely matched the KVE reports input data and reran the hydrology using the revised outlet structure. The plan sheet for the outlet structure revision is included in the appendix. As shown below the total release rate from the combination of the undetained and less than or slightly greater than what is allowed per APWA. The 2 yr and 100 yr outflows are within 5% of what is allowed. Considering the evaporation rate for the pond and the inconsistency of rainfall events this overage will not effect the functionality of the pond. Also included in the chart are the values for the undetained runoff from the KVE report. The Hydrology Studio printouts are included in the appendix.

Summary of Discharge Rates

Storm	KVE Undetained	SME Undetained	Combined release rate (undetained + pond) South Outflow	Allowable Release Rate
2 yr	9.70 cfs	9.61 cfs	12.60 cfs	12 cfs
10 yr	14.80 cfs	14.66 cfs	18.98 cfs	48 cfs
100 yr	24.56 cfs	24.33 cfs	73.65	72 cfs

STORMWATER TREATMENT

Per APWA the pond is required to provide 40-hour extended detention of the runoff from the runoff of the 90% mean annual event. The water quality volume for this drainage area is 32,770

cf as calculated in the KVE report. As shown on the Stage-Storage-Discharge Summary the water quality volume is realized at stage 1.3 ft. Looking at the Pond Drawdown report this equates to 42 hour drain time, which exceeds the 40 hr required.

CONCLUSION

As shown above if constructed as proposed the pond improvements will result in a higher permanent pool elevation while maintaining operational characteristics as originally designed. If constructed as proposed there will be no increase in downstream flooding potential.

Appendix A

- Construction Plans

STREETS OF WEST PRYOR

FOR

SOUTH POND IMPROVEMENTS

LEE'S SUMMIT, MO

SM Engineering
5507 High Meadow Circle
Manhattan Kansas, 66503
smcivilengr@gmail.com
785.341.9747

Revisions

UTILITIES

Electric Service
Evergy
Nathan Michael
913-347-4310
Nathan.michael@evergy.com

Gas Service
Spire
Katie Darnell
816-969-2247
Katie.darnell@spireenergy.com

Water/Sanitary Sewer
Water Utilities Department
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Lee's Summit, Mo 64081
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816-969-1900
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Communication Service
AT&T Carrie Cilke
816-703-4386
cc3527@att.com

Time Warner Cable
Steve Baxter
913-643-1928
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Comcast
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Becky Davis
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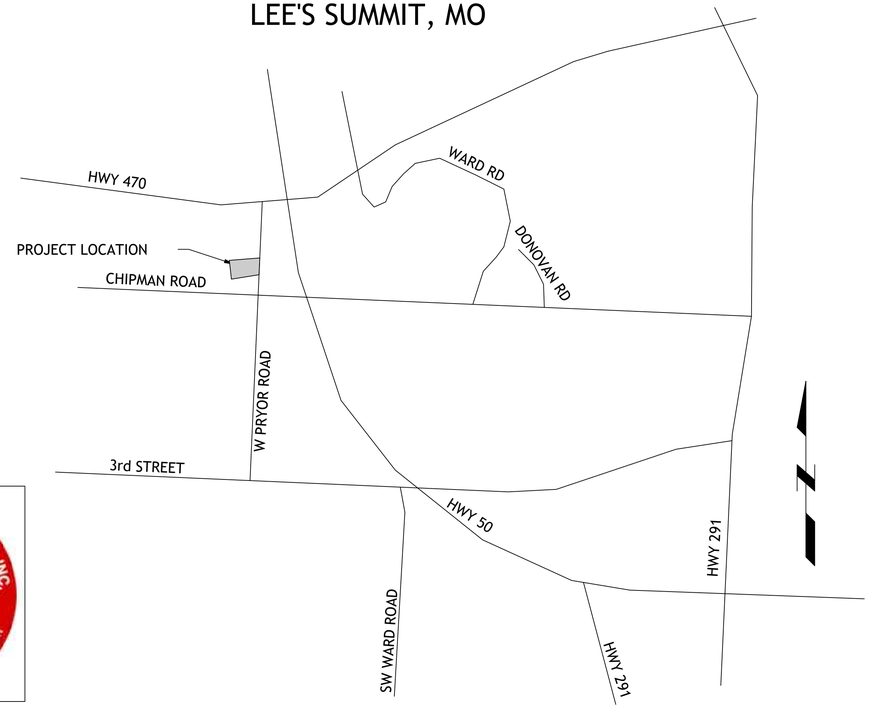


LOCATION MAP

INDEX OF SHEETS

UTILITY STATEMENT:
THE UNDERGROUND UTILITIES SHOWN HEREON ARE FROM FIELD SURVEY INFORMATION OF ONE-CALL LOCATED UTILITIES, FIELD SURVEY INFORMATION OF ABOVE GROUND OBSERVABLE EVIDENCE, AND/OR THE SCALING AND PLOTTING OF EXISTING UTILITY MAPS AND DRAWINGS AVAILABLE TO THE SURVEYOR AT THE TIME OF SURVEY. THE SURVEYOR MAKES NO GUARANTEE THAT THE UNDERGROUND UTILITIES SHOWN COMPRISE ALL SUCH UTILITIES IN THE AREA, EITHER IN SERVICE OR ABANDONED. FURTHERMORE, THE SURVEYOR DOES NOT WARRANT THAT THE UNDERGROUND UTILITIES SHOWN ARE IN THE EXACT LOCATION INDICATED ALTHOUGH HE DOES CERTIFY THAT THEY ARE LOCATED AS ACCURATELY AS POSSIBLE FROM INFORMATION AVAILABLE. THE SURVEYOR HAS NOT PHYSICALLY LOCATED THE UNDERGROUND UTILITIES BY EXCAVATION UNLESS OTHERWISE NOTED ON THIS SURVEY.
SAFETY NOTICE TO CONTRACTOR
IN ACCORDANCE WITH GENERALLY ACCEPTED CONSTRUCTION PRACTICE, THE CONTRACTOR WILL BE SOLELY AND COMPLETELY RESPONSIBLE FOR CONDITIONS OF THE JOB SITE, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY DURING PERFORMANCE OF THE WORK. THIS REQUIREMENT WILL APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS.

WARRANTY/DISCLAIMER
THE DESIGNS REPRESENTED IN THESE PLANS ARE IN ACCORDANCE WITH ESTABLISHED PRACTICES OF CIVIL ENGINEERING FOR THE DESIGN FUNCTIONS AND USES INTENEDED BY THE OWNER AT THIS TIME. HOWEVER, NEITHER SM ENGINEERING NOR ITS PERSONNEL CAN OR DO WARRANTY THESE DESIGNS OR PLANS AS CONSTRUCTED, EXCEPT IN THE SPECIFIC CASES WHERE SM ENGINEERING PERSONNEL INSPECT AND CONTROL THE PHYSICAL CONSTRUCTION ON A CONTEMPORARY BASIS AT THE SITE.

CAUTION- NOTICE TO CONTRACTOR
THE CONTRACTOR IS SPECIFICALLY CAUTIONED THAT THE LOCATION AND/OR ELEVATION OF EXISTING UTILITIES AS SHOWN ON THESE PLANS IS BASED ON RECORDS OF THE VARIOUS UTILITY COMPANIES AND, WHERE POSSIBLE, MEASUREMENTS TAKEN IN THE FIELD. THE INFORMATION IS NOT TO BE RELIED ON AS BEING EXACT OR COMPLETE. THE CONTRACTOR MUST CALL THE APPROPRIATE UTILITY COMPANY AT LEAST 72 HOURS BEFORE ANY EXCAVATION TO REQUEST EXACT FIELD LOCATION OF UTILITIES. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO RELOCATE ALL EXISTING UTILITIES WHICH CONFLICT WITH PROPOSED IMPROVEMENTS SHOWN ON THE PLANS. THE CONTRACTOR SHALL EXPOSE EXISTING UTILITIES AT LOCATIONS OF POSSIBLE CONFLICTS PRIOR TO ANY CONSTRUCTION.

ALL EXISTING TOPOGRAPHIC DATA AND INFRASTRUCTURE IMPROVEMENTS SHOWN BASED ON INFORMATION BY KAW VALLEY ENGINEERING

BENCHMARKS:
#1 CHISELED "SQUARE" ON TOP OF CURB POINT OF INTERSECTION OF WEST PARK PARKING LOT AT EAST DRIVE ENTRANCE
ELEVATION 985.05

#2 CHISELED "SQUARE" ON NORTHWEST CORNER AREA INLET, 25' EAST OF CURB LINE AND ON-LINE WITH SOUTH CURB OF LOWENSTEIN DRIVE AT 90° BEND IN ROAD
ELEVATION 971.06

DEVELOPER

SWP III, LLC
C/O DRAKE DEVELOPMENT, LLC
7200 W 132nd ST, SUITE 150
OVERLAND PARK, KS 66213
913-662-2630

ENGINEER

SM ENGINEERING
SAM MALINOWSKY
5507 HIGH MEADOW CIRCLE
MANHATTAN KANSAS, 66503
SMCIVILENGR@GMAIL.COM
785.341.9747

SAMUEL D. MALINOWSKY
PROFESSIONAL ENGINEEER

STREETS OF WEST PRYOR
LEES SUMMIT, MISSOURI

sheet
C1.0
Civil
COVER SHEET
permit
20 APRIL 2020

LOT 1

24B 148.9 LF

TW=978.00
TOE=977.0

FUTURE BUILDING FF=982.5

FUTURE BUILDING FF=982.5

PROP. 20' UTILITY ESMT

PROP. SIDEWALK ESMT

PROP. 16' SIDEWALK ESMT

529+41

PROPOSED FOUNTAIN

PROP. 15' UTILITY ESMT

TRACT "D"

CONTRACTOR TO CONSTRUCT CONCRETE BLOCK EXTENSION ON ALL 4 SIDES OF EXISTING GRATE INLET. SEE DETAIL THIS SHEET.

N1005100.1144
E2813518.1660

N1005055.9973
E2813574.3757

CONSTRUCT 12" WIDE WEIR WALL TO THE LIMITS AS SHOWN. SEE DETAIL THIS SHEET

UTILITY VAULT

PROP. 100' KCP&L ESMT

PROP. 16' SIDEWALK ESMT

PROP. UTILITY ESMT

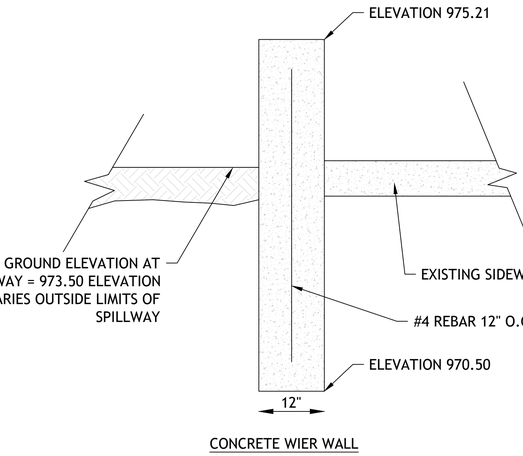
GAS SUBSTATION

RETAINING WALL

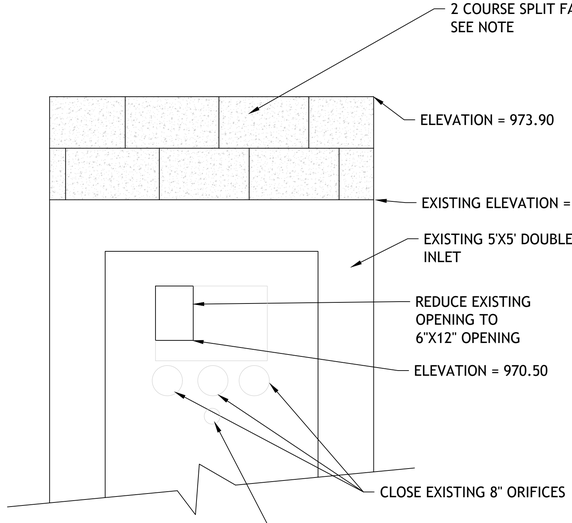
LEE'S SUMMIT PARKS AND RECREATION LOWENSTEIN PARK

4.5' TALL ELECTRIC BOX

METAL UTILITY POLE



CONCRETE WIER WALL



DOUBLE GRATE INLET EXTENSION

PLACE 2 COURSES ON SPLIT FACE BLOCK ON ALL 4 SIDES OF EXISTING STRUCTURE. ADJUST MORTAR JOINT AS REQUIRED TO ACHIEVE TOP ELEVATION. BLOCK TO BE INTEGRALLY COLORED, WITH COLOR SELECTED BY OWNER. #4 REBAR VERTICAL IN EACH CELL GROUTED FULL. REBAR SHALL BE IMBEDDED INTO EXISTING STRUCTURE A MINIMUM OF 4" WITH EPOXY. TOP COUSE SHALL BE BOND BEAM SHAPE. GROUT SOLID WITH CEMENT WASH ON TOP. MORTAR COLOR TO MATCH CMU.

1"=20'
0 10' 20'

SM Engineering
SME
5507 High Meadow Circle
Manhattan Kansas, 66503
smcivilengr@gmail.com
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STATE OF MISSOURI
SAMUEL D. MALINOWSKY
NUMBER
PE-2010020572
PROFESSIONAL ENGINEER

Revisions

STREETS OF WEST PRYOR

LEE'S SUMMIT, MISSOURI

sheet
C2.0
Civil
POND IMPROVEMENTS
permit
20 APRIL 2020

Appendix B

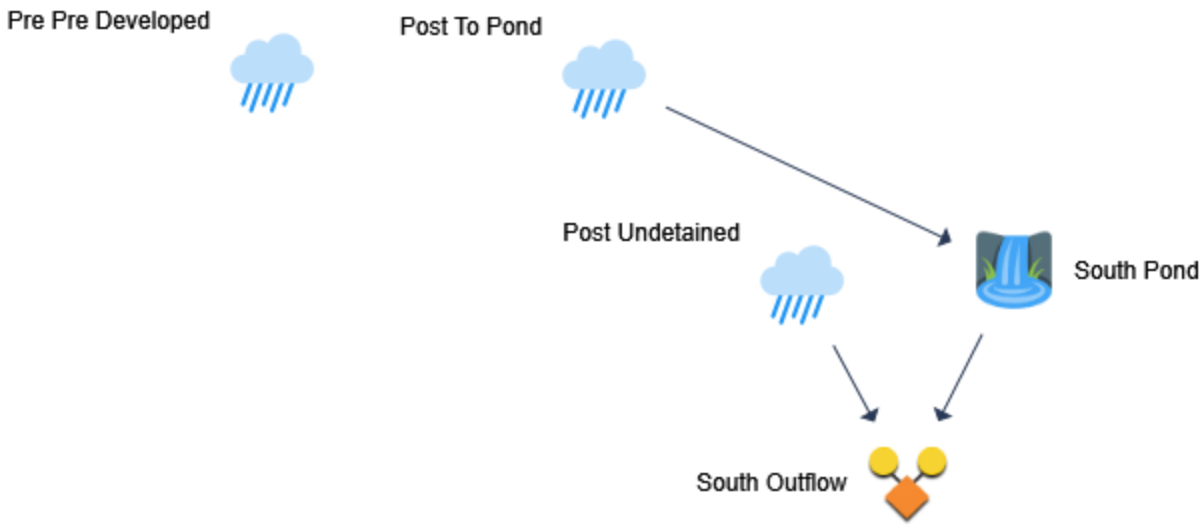
- Hydrology Studios Printout

Basin Model

Hydrology Studio v 3.0.0.14

Project Name: SOWP South Pond

04-23-2020



Hydrograph by Return Period

Project Name: SOWP South Pond

04-23-2020

Hydrology Studio v 3.0.0.14

Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Outflow (cfs)							
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
1	NRCS Runoff	Pre Pre Developed		41.35			80.23			160.98
2	NRCS Runoff	Post To Pond		48.05			73.31			121.7
3	NRCS Runoff	Post Undetained		9.610			14.66			24.33
4	Pond Route	South Pond		3.072			4.839			60.36
5	Junction	South Outflow		11.87			17.95			73.65

Hydrograph 2-yr Summary

Project Name: SOWP South Pond

04-23-2020

Hydrology Studio v 3.0.0.14

Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Flow (cfs)	Time to Peak (hrs)	Hydrograph Volume (cuft)	Inflow Hyd(s)	Maximum Elevation (ft)	Maximum Storage (cuft)
1	NRCS Runoff	Pre Pre Developed	41.35	12.08	131,134	----		
2	NRCS Runoff	Post To Pond	48.05	11.98	117,121	----		
3	NRCS Runoff	Post Undetained	9.610	11.98	23,424	----		
4	Pond Route	South Pond	3.072	12.75	102,963	2	972.63	72,018
5	Junction	South Outflow	11.87	11.98	126,388	3, 4		

Hydrograph Report

Project Name: SOWP South Pond

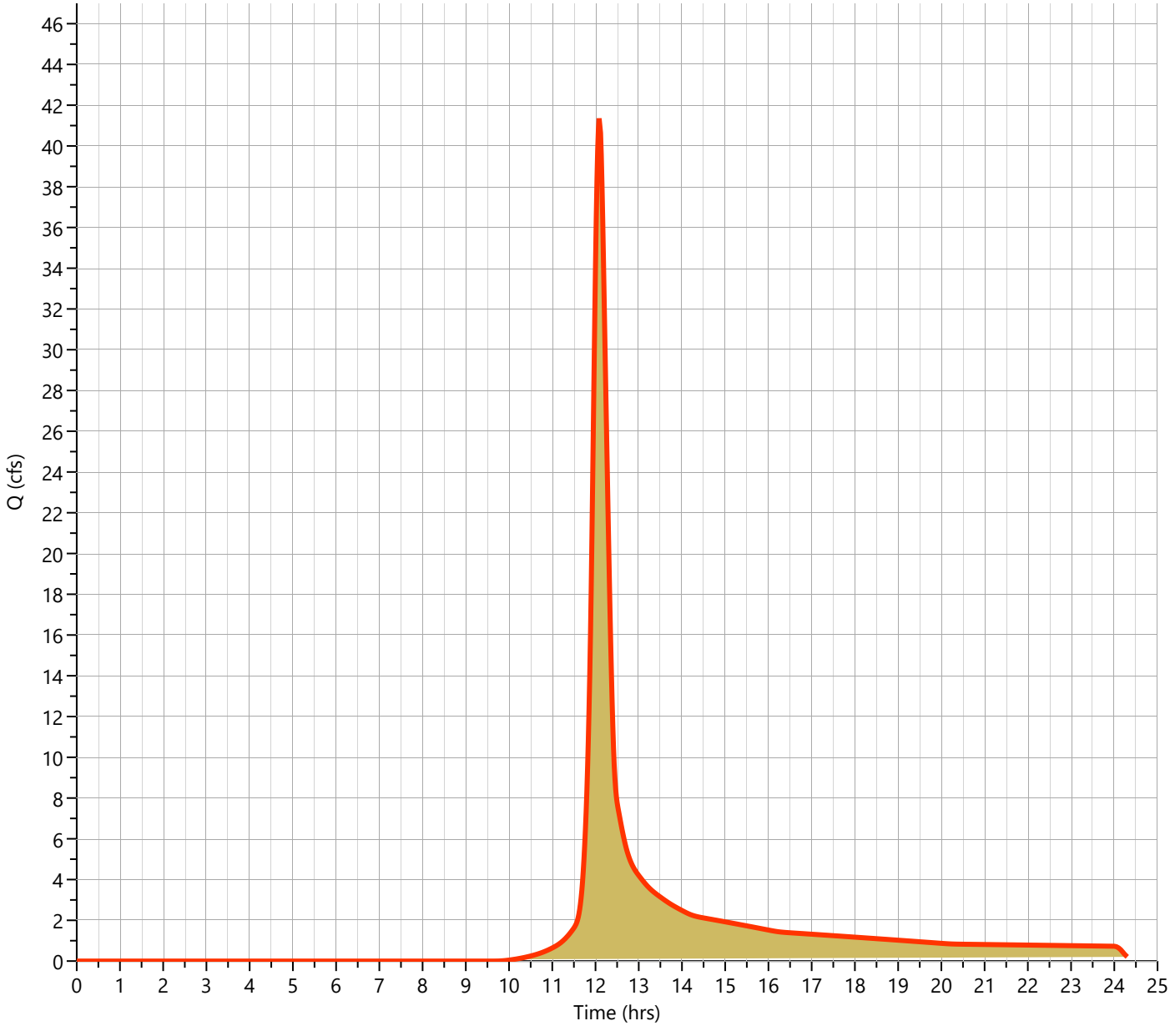
Hydrology Studio v 3.0.0.14

04-23-2020

Pre Pre Developed

Hyd. No. 1

Hydrograph Type	= NRCS Runoff	Peak Flow	= 41.35 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.08 hrs
Time Interval	= 1 min	Runoff Volume	= 131,134 cuft
Drainage Area	= 24.0 ac	Curve Number	= 77
Tc Method	= User	Time of Conc. (Tc)	= 20.0 min
Total Rainfall	= 3.60 in	Design Storm	= Type II
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name: SOWP South Pond

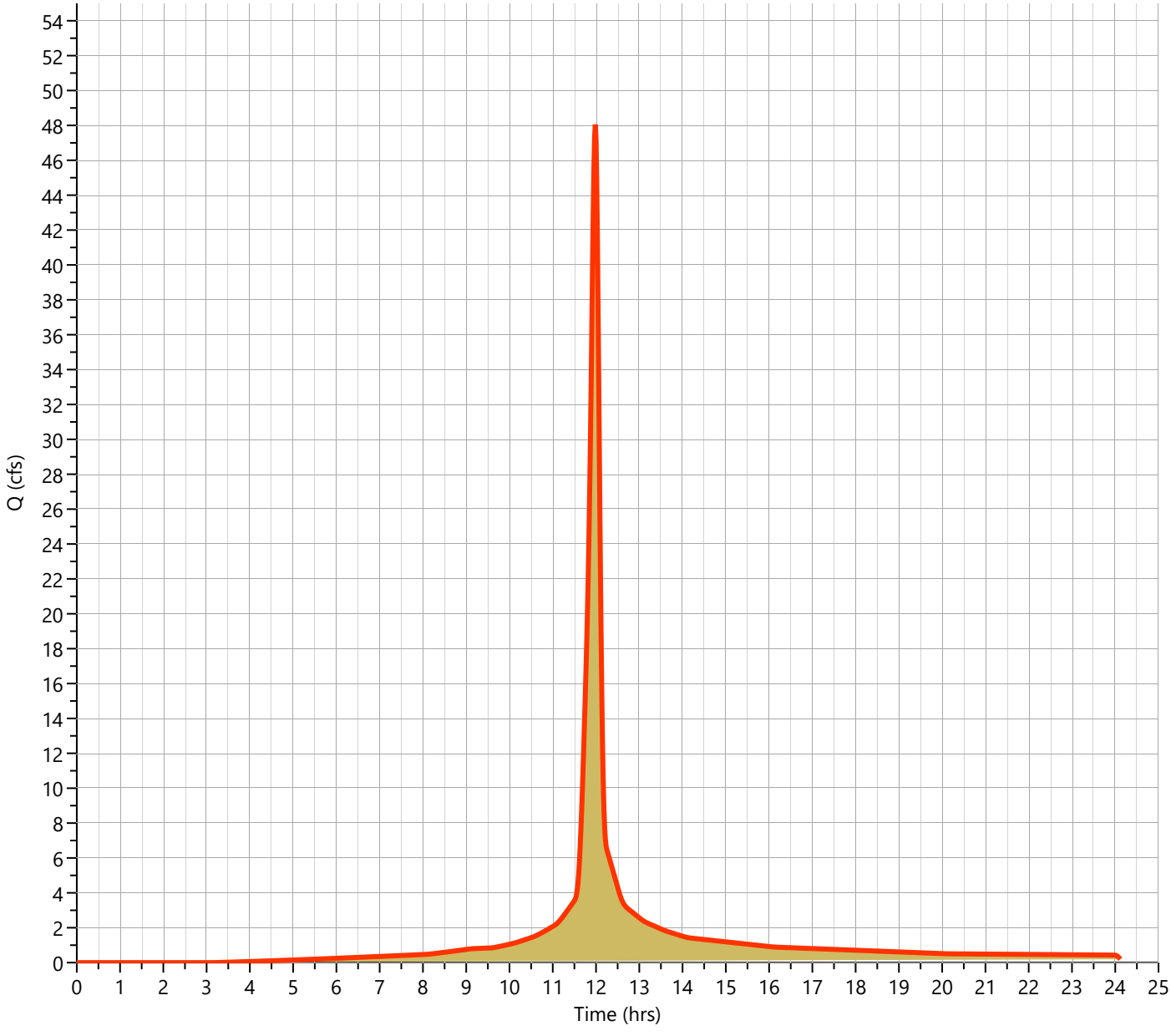
Hydrology Studio v 3.0.0.14

04-23-2020

Post To Pond

Hyd. No. 2

Hydrograph Type	= NRCS Runoff	Peak Flow	= 48.05 cfs
Storm Frequency	= 2-yr	Time to Peak	= 11.98 hrs
Time Interval	= 1 min	Runoff Volume	= 117,121 cuft
Drainage Area	= 11.0 ac	Curve Number	= 94
Tc Method	= User	Time of Conc. (Tc)	= 10.0 min
Total Rainfall	= 3.60 in	Design Storm	= Type II
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name: SOWP South Pond

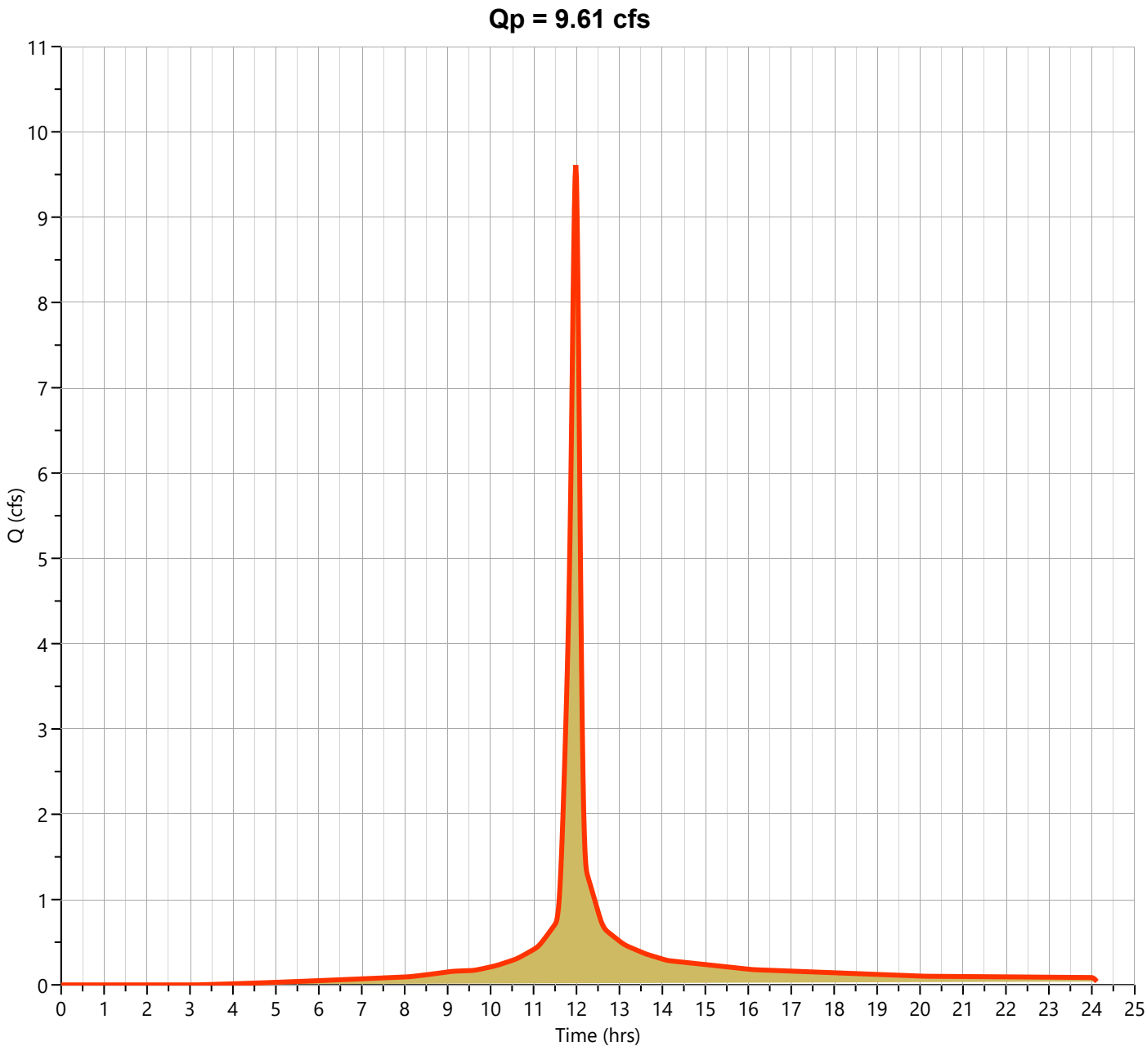
Hydrology Studio v 3.0.0.14

04-23-2020

Post Undetained

Hyd. No. 3

Hydrograph Type	= NRCS Runoff	Peak Flow	= 9.610 cfs
Storm Frequency	= 2-yr	Time to Peak	= 11.98 hrs
Time Interval	= 1 min	Runoff Volume	= 23,424 cuft
Drainage Area	= 2.2 ac	Curve Number	= 94
Tc Method	= User	Time of Conc. (Tc)	= 10.0 min
Total Rainfall	= 3.60 in	Design Storm	= Type II
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name: SOWP South Pond

Hydrology Studio v 3.0.0.14

04-23-2020

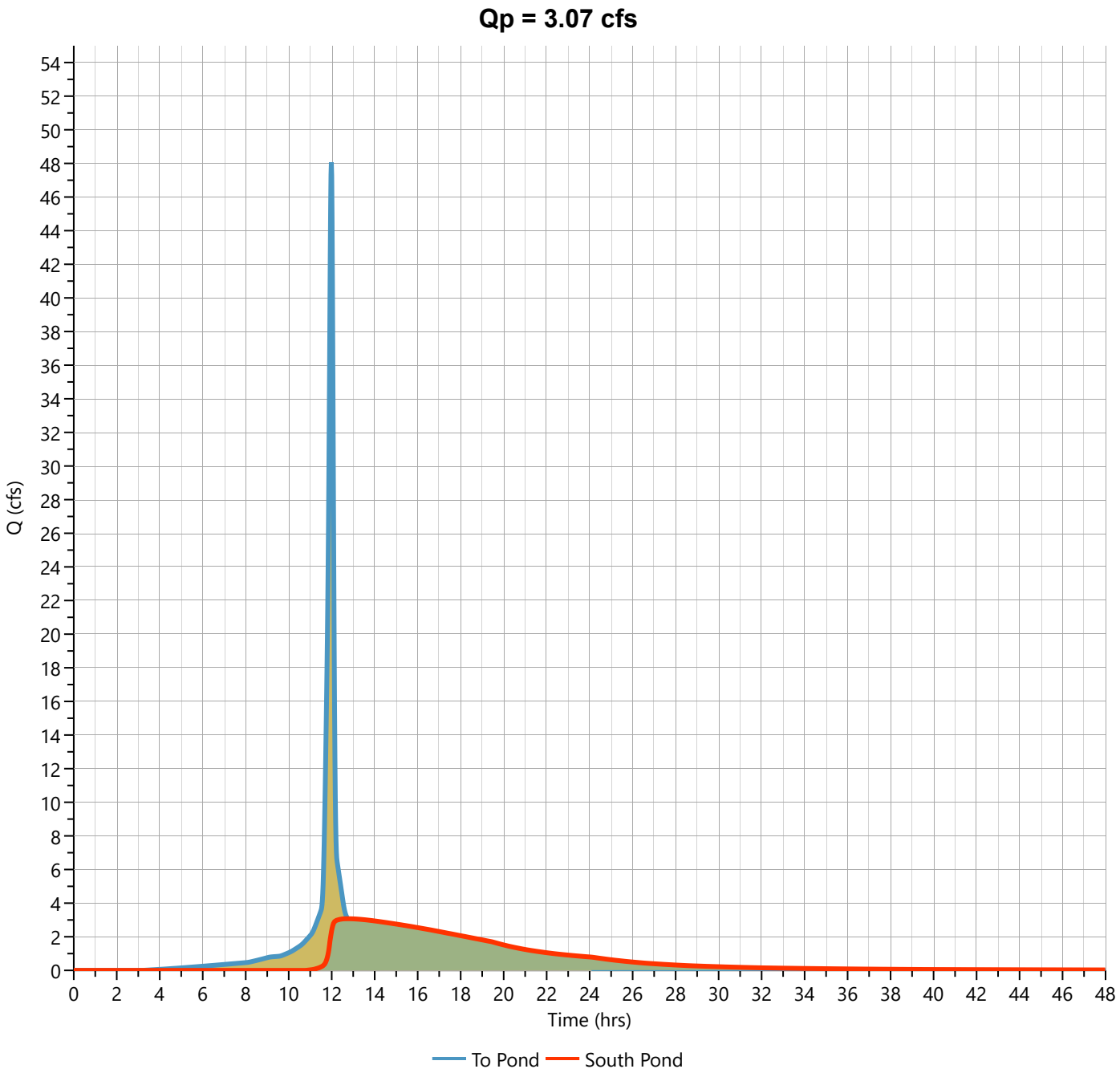
South Pond

Hyd. No. 4

Hydrograph Type	= Pond Route	Peak Flow	= 3.072 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.75 hrs
Time Interval	= 1 min	Hydrograph Volume	= 102,963 cuft
Inflow Hydrograph	= 2 - To Pond	Max. Elevation	= 972.63 ft
Pond Name	= South Pond	Max. Storage	= 72,018 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 5.78 hrs



Pond Report

Project Name: SOWP South Pond

Hydrology Studio v 3.0.0.14

04-23-2020

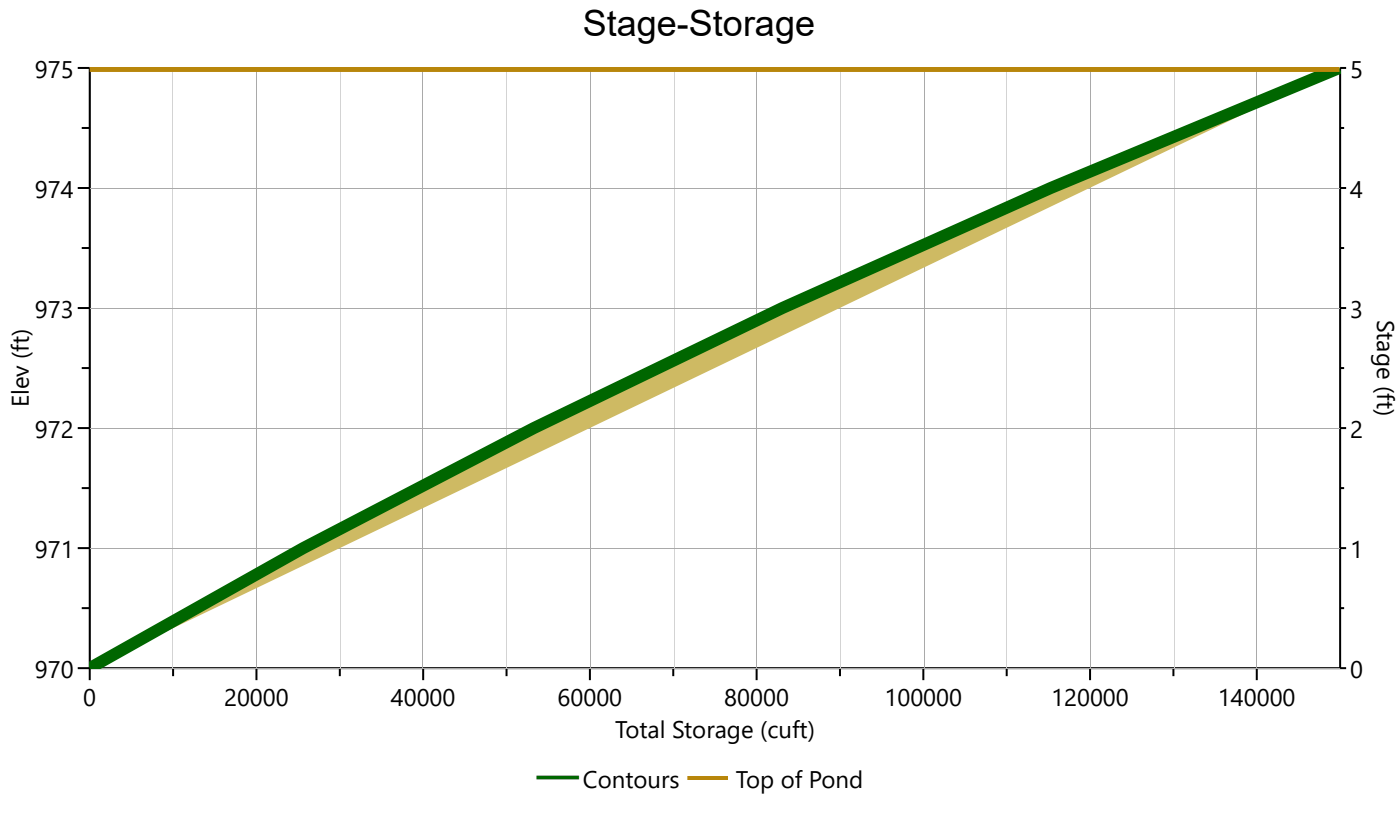
South Pond

Stage-Storage

User Defined Contours	
Description	**Input**
Bottom Elevation, ft	970.00
Voids (%)	100.00
Volume Calc	None

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour Area (sqft)	Incr. Storage (cuft)	Total Storage (cuft)
0.00	970.00	24,594	0.000	0.000
1.00	971.00	26,618	25,606	25,606
2.00	972.00	28,711	27,665	53,271
3.00	973.00	30,908	29,810	83,080
4.00	974.00	33,487	32,198	115,278
5.00	975.00	35,796	34,642	149,919



Pond Report

Project Name: SOWP South Pond

Hydrology Studio v 3.0.0.14

04-23-2020

South Pond

Stage-Discharge

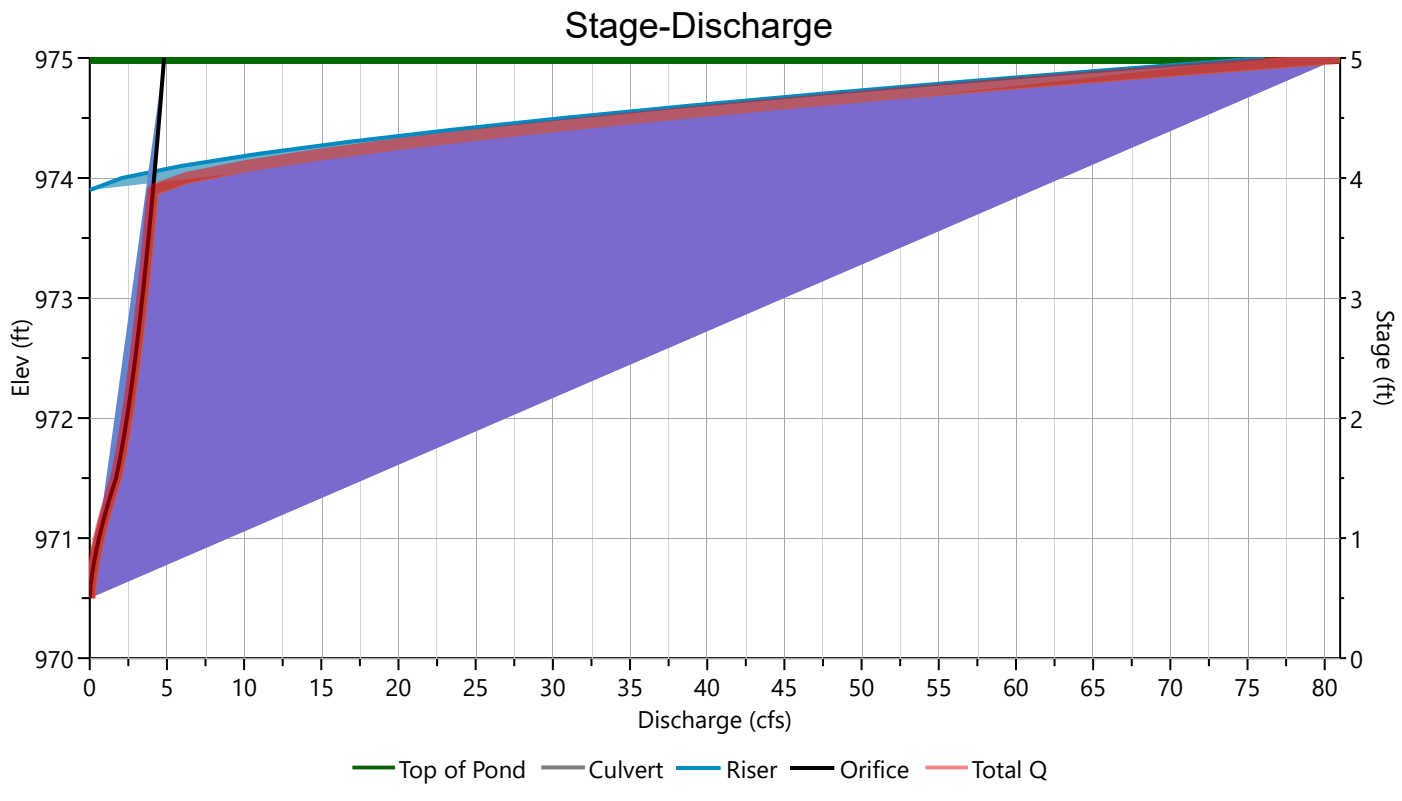
Culvert / Orifices	Culvert	Orifices		
		1*	2	3
Rise, in	36	12		
Span, in	36	6		
No. Barrels	1	1		
Invert Elevation, ft	960.00	970.50		
Orifice Coefficient, Co	0.60	0.60		
Length, ft	50			
Barrel Slope, %	.01			
N-Value, n	0.013			

Orifice Plate	
Orifice Dia, in	
No. Orifices	
Invert Elevation, ft	
Height, ft	
Orifice Coefficient, Co	

Weirs	Riser*	Weirs		
		1	2	3
Shape / Type	Box			
Crest Elevation, ft	973.9			
Crest Length, ft	20			
Angle, deg				
Weir Coefficient, Cw	3.3			

Ancillary	
Exfiltration, in/hr	

**Routes through Culvert.*



Pond Report

Project Name: SOWP South Pond

Hydrology Studio v 3.0.0.14

04-23-2020

South Pond

Stage-Storage-Discharge Summary

Stage (ft)	Elev. (ft)	Storage (cuft)	Culvert (cfs)	Orifices, cfs			Riser (cfs)	Weirs, cfs			Pf Riser (cfs)	Exfil (cfs)	User (cfs)	Total (cfs)
				1	2	3		1	2	3				
0.00	970.00	0.000	0.000	0.000			0.000							0.000
1.00	971.00	25,606	0.602 ic	0.602			0.000							0.602
2.00	972.00	53,271	2.407 ic	2.407			0.000							2.407
3.00	973.00	83,080	3.405 ic	3.405			0.000							3.405
4.00	974.00	115,278	6.256 ic	4.170			2.086							6.256
5.00	975.00	149,919	80.96 ic	4.815			76.14							80.96

Suffix key: ic = inlet control, oc = outlet control, s = submerged weir

Pond Report

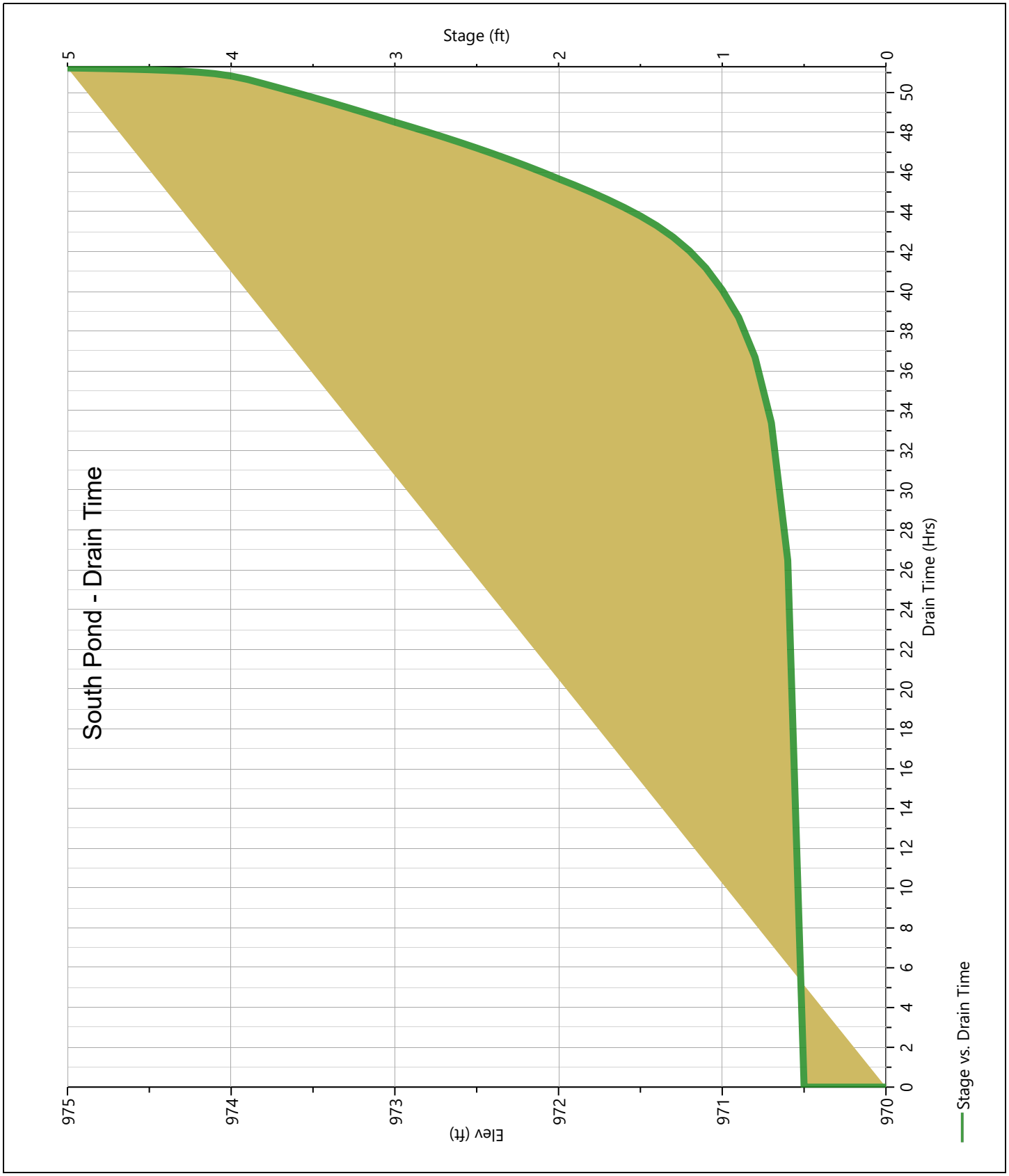
Project Name: SOWP South Pond

Hydrology Studio v 3.0.0.14

04-23-2020

South Pond

Pond Drawdown



Hydrograph Report

Project Name: SOWP South Pond

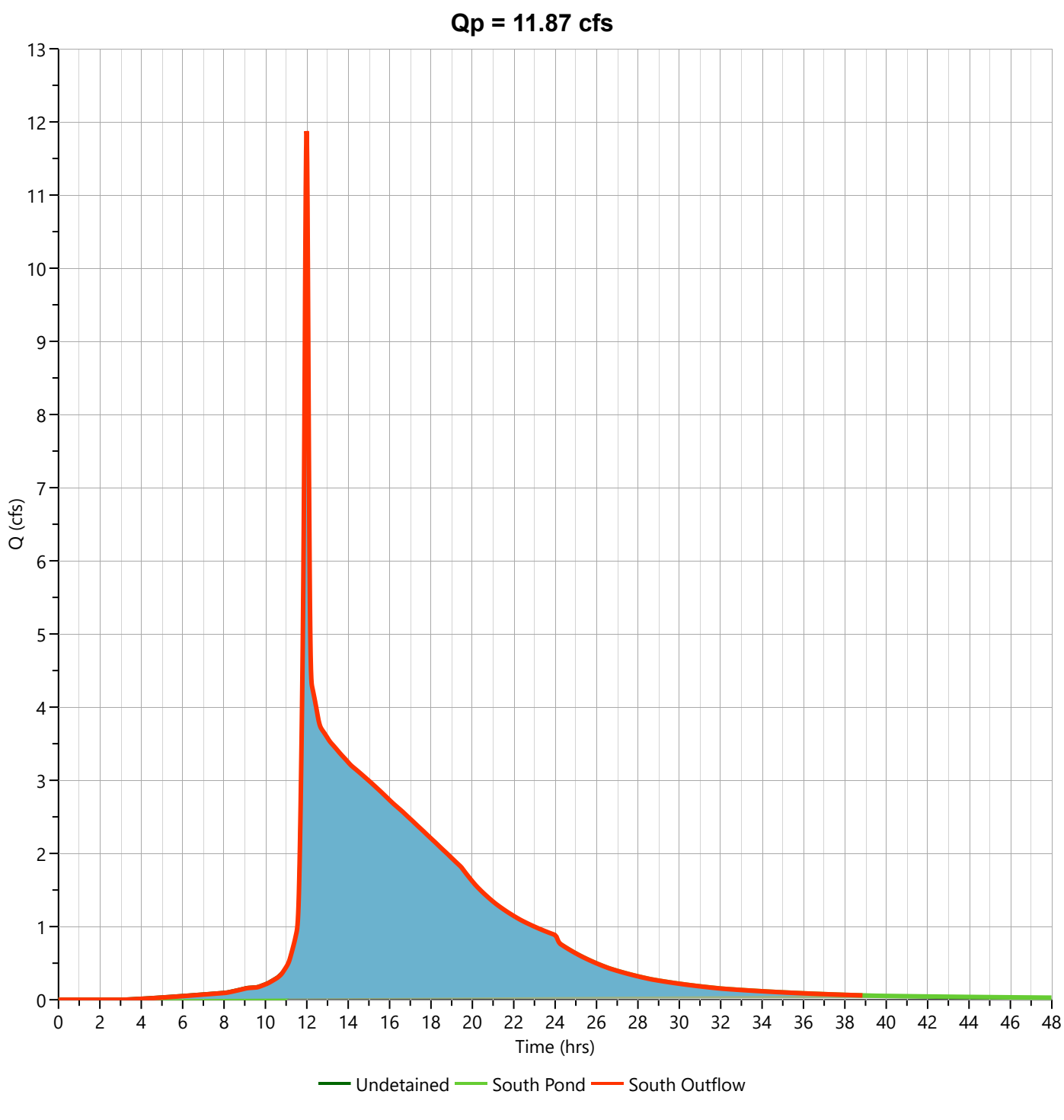
Hydrology Studio v 3.0.0.14

04-23-2020

South Outflow

Hyd. No. 5

Hydrograph Type	= Junction	Peak Flow	= 11.87 cfs
Storm Frequency	= 2-yr	Time to Peak	= 11.98 hrs
Time Interval	= 1 min	Hydrograph Volume	= 126,388 cuft
Inflow Hydrographs	= 3, 4	Total Contrib. Area	= 2.2 ac



Hydrograph 10-yr Summary

Project Name: SOWP South Pond

04-23-2020

Hydrology Studio v 3.0.0.14

Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Flow (cfs)	Time to Peak (hrs)	Hydrograph Volume (cuft)	Inflow Hyd(s)	Maximum Elevation (ft)	Maximum Storage (cuft)
1	NRCS Runoff	Pre Pre Developed	80.23	12.08	250,547	----		
2	NRCS Runoff	Post To Pond	73.31	11.98	183,844	----		
3	NRCS Runoff	Post Undetained	14.66	11.98	36,769	----		
4	Pond Route	South Pond	4.839	12.68	169,383	2	973.93	113,162
5	Junction	South Outflow	17.95	11.98	206,152	3, 4		

Hydrograph Report

Project Name: SOWP South Pond

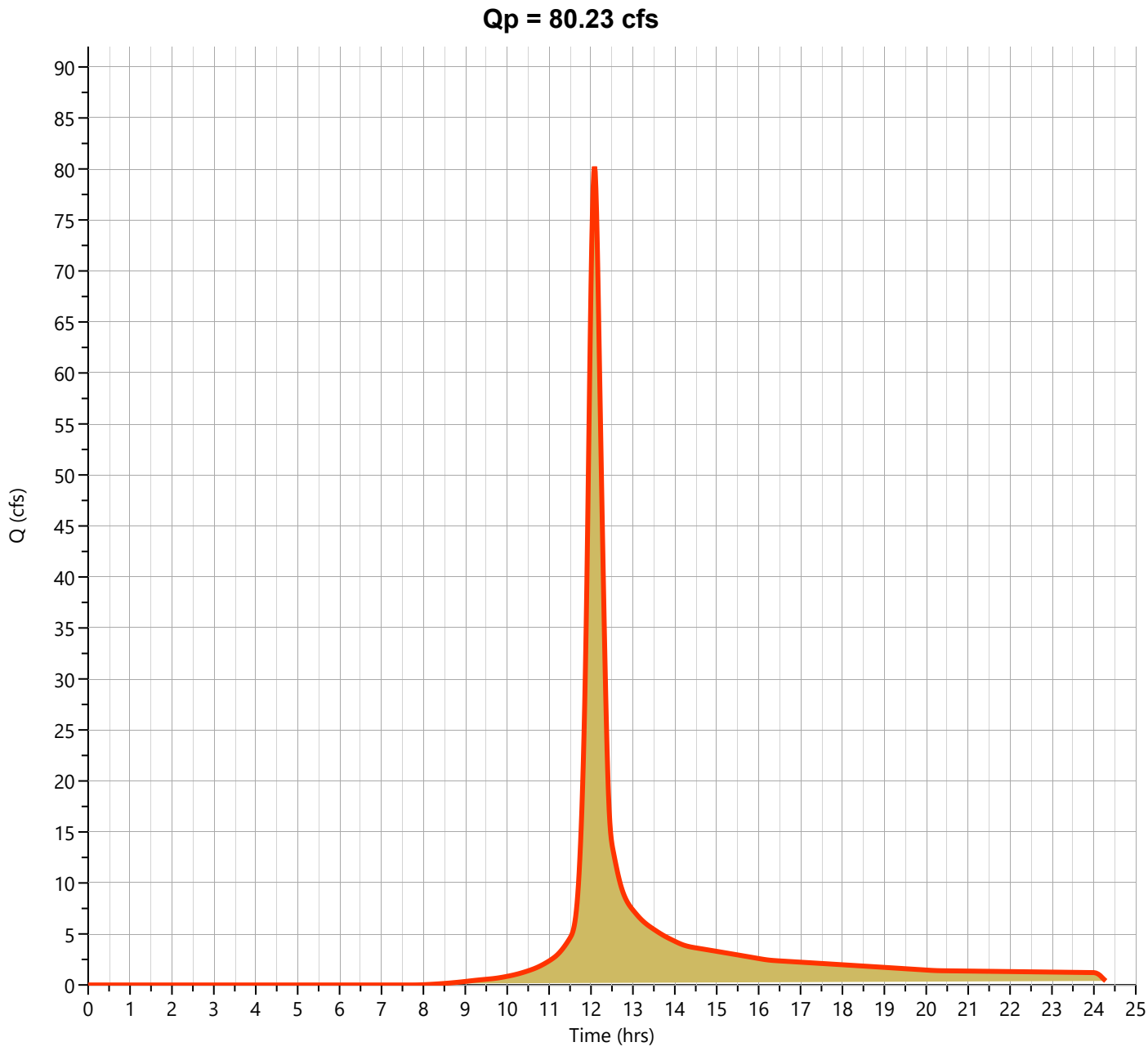
Hydrology Studio v 3.0.0.14

04-23-2020

Pre Pre Developed

Hyd. No. 1

Hydrograph Type	= NRCS Runoff	Peak Flow	= 80.23 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.08 hrs
Time Interval	= 1 min	Runoff Volume	= 250,547 cuft
Drainage Area	= 24.0 ac	Curve Number	= 77
Tc Method	= User	Time of Conc. (Tc)	= 20.0 min
Total Rainfall	= 5.30 in	Design Storm	= Type II
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name: SOWP South Pond

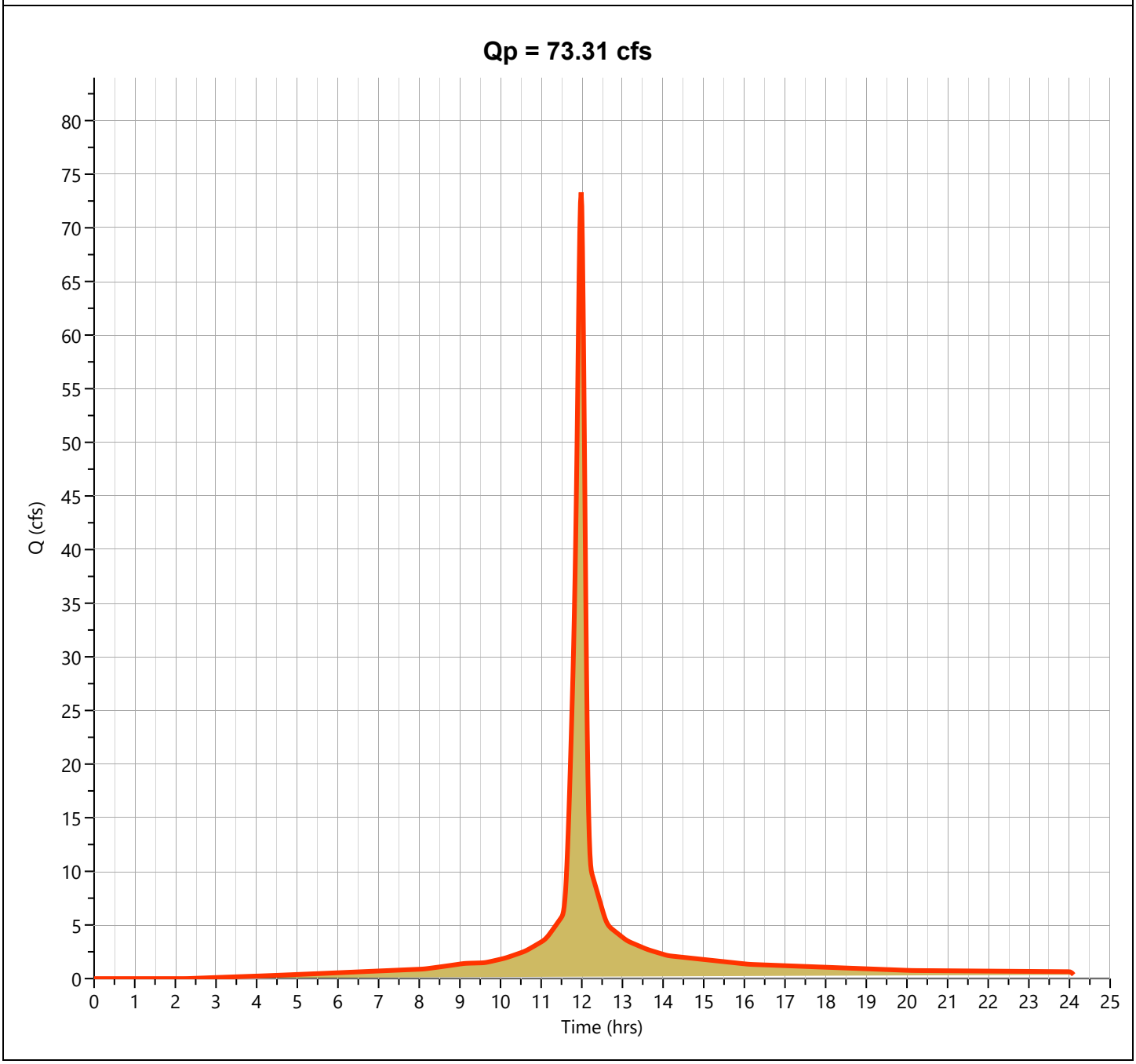
Hydrology Studio v 3.0.0.14

04-23-2020

Post To Pond

Hyd. No. 2

Hydrograph Type	= NRCS Runoff	Peak Flow	= 73.31 cfs
Storm Frequency	= 10-yr	Time to Peak	= 11.98 hrs
Time Interval	= 1 min	Runoff Volume	= 183,844 cuft
Drainage Area	= 11.0 ac	Curve Number	= 94
Tc Method	= User	Time of Conc. (Tc)	= 10.0 min
Total Rainfall	= 5.30 in	Design Storm	= Type II
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name: SOWP South Pond

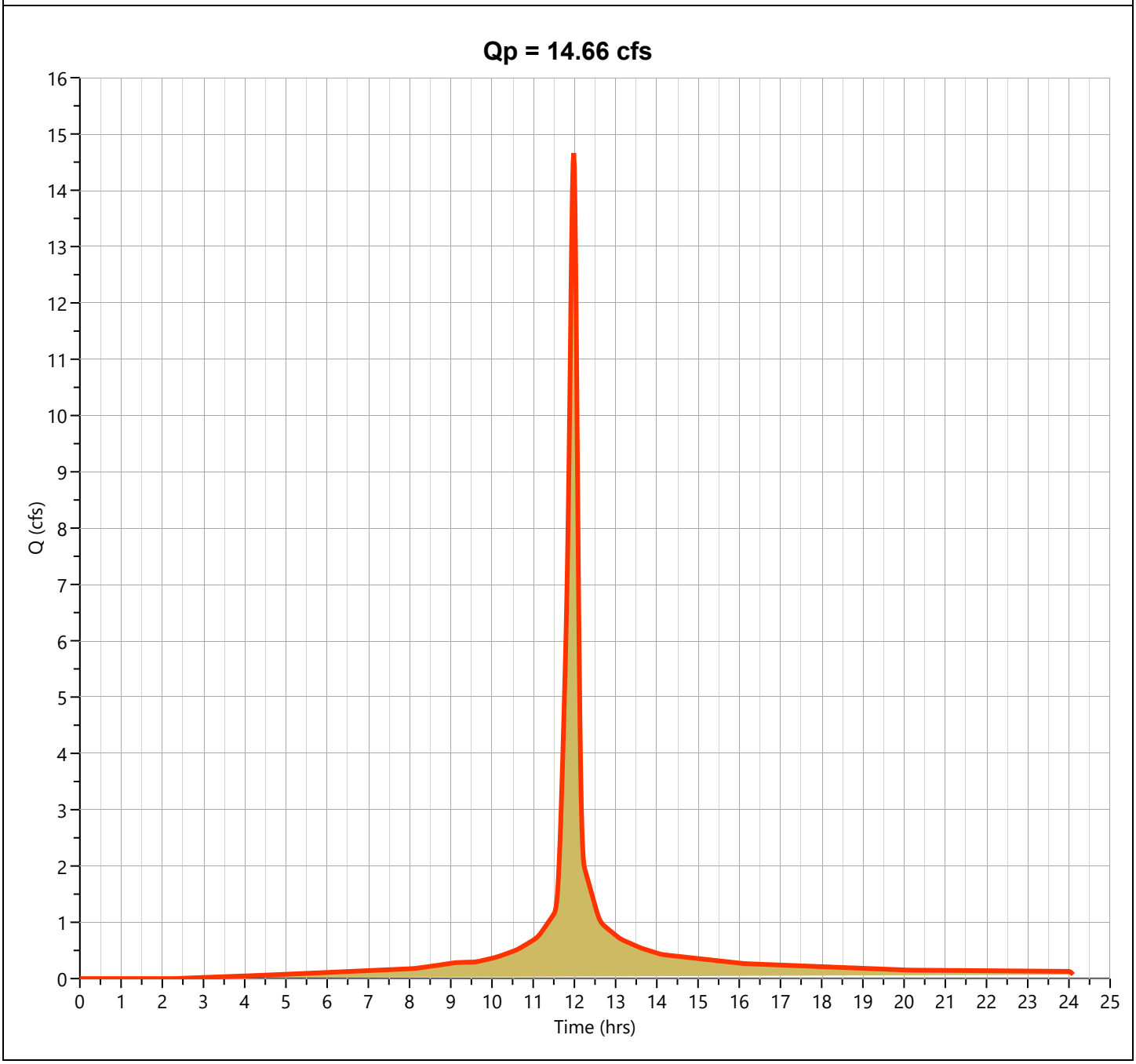
Hydrology Studio v 3.0.0.14

04-23-2020

Post Undetained

Hyd. No. 3

Hydrograph Type	= NRCS Runoff	Peak Flow	= 14.66 cfs
Storm Frequency	= 10-yr	Time to Peak	= 11.98 hrs
Time Interval	= 1 min	Runoff Volume	= 36,769 cuft
Drainage Area	= 2.2 ac	Curve Number	= 94
Tc Method	= User	Time of Conc. (Tc)	= 10.0 min
Total Rainfall	= 5.30 in	Design Storm	= Type II
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name: SOWP South Pond

Hydrology Studio v 3.0.0.14

04-23-2020

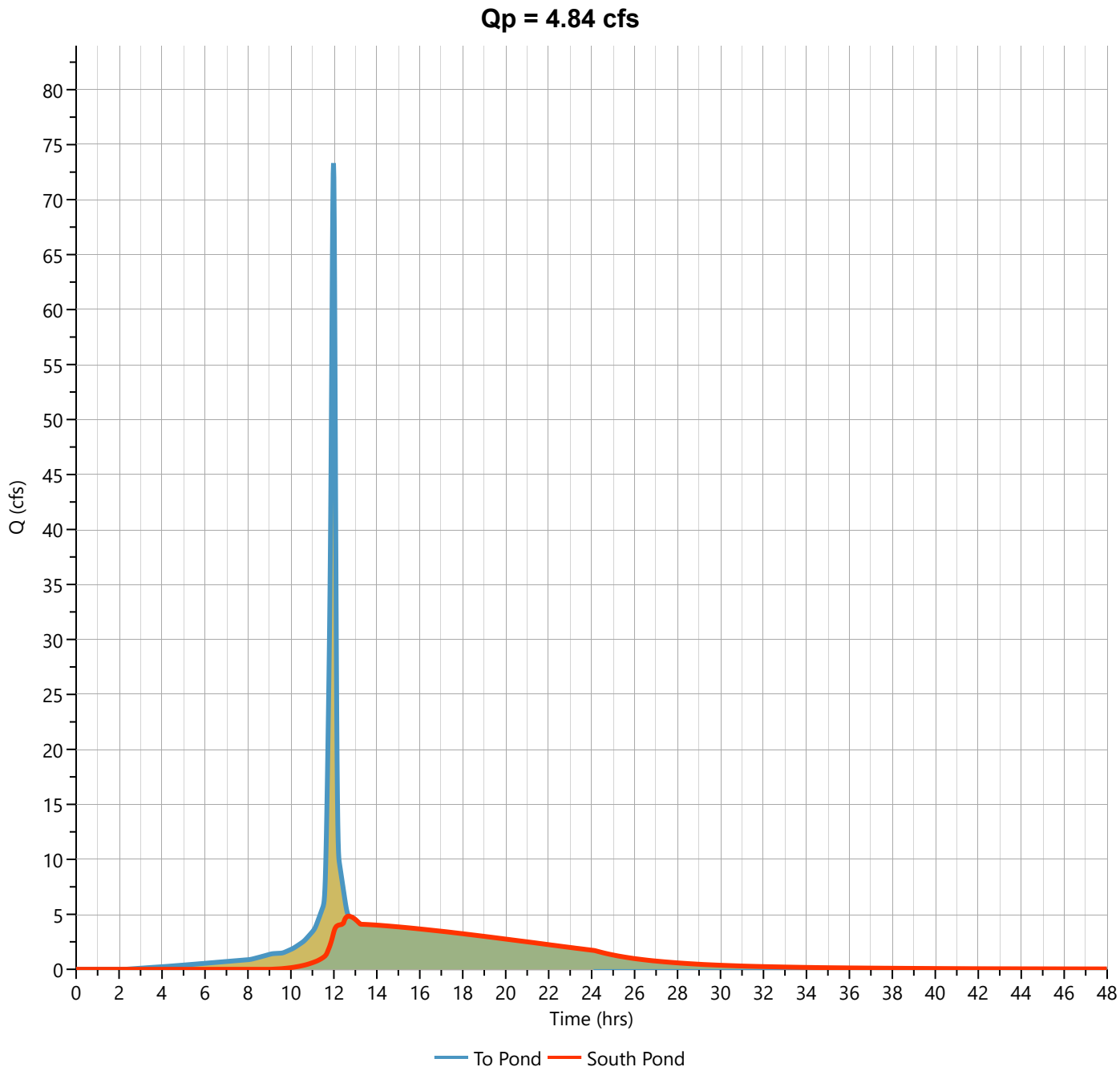
South Pond

Hyd. No. 4

Hydrograph Type	= Pond Route	Peak Flow	= 4.839 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.68 hrs
Time Interval	= 1 min	Hydrograph Volume	= 169,383 cuft
Inflow Hydrograph	= 2 - To Pond	Max. Elevation	= 973.93 ft
Pond Name	= South Pond	Max. Storage	= 113,162 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 6.25 hrs



Hydrograph Report

Project Name: SOWP South Pond

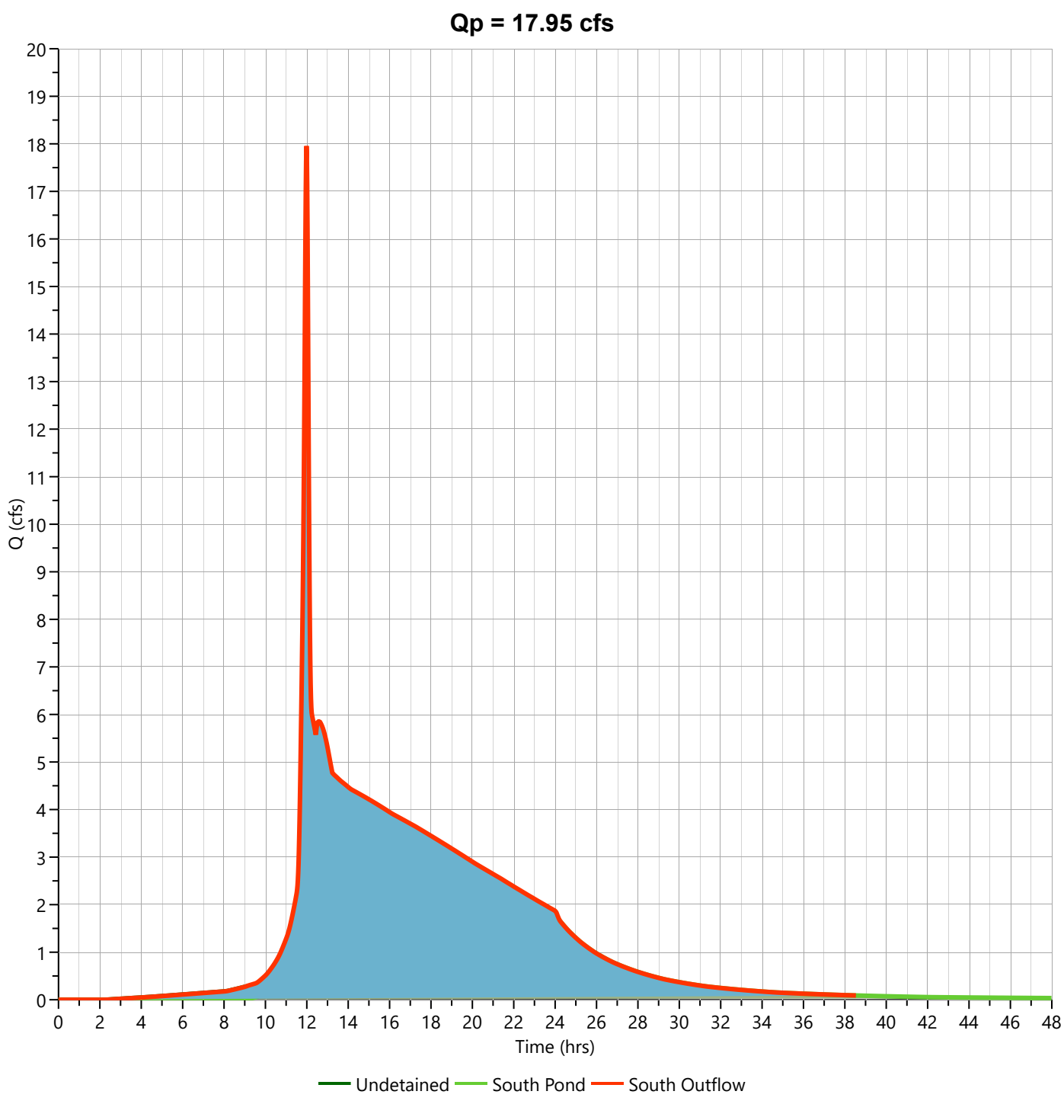
Hydrology Studio v 3.0.0.14

04-23-2020

South Outflow

Hyd. No. 5

Hydrograph Type	= Junction	Peak Flow	= 17.95 cfs
Storm Frequency	= 10-yr	Time to Peak	= 11.98 hrs
Time Interval	= 1 min	Hydrograph Volume	= 206,152 cuft
Inflow Hydrographs	= 3, 4	Total Contrib. Area	= 2.2 ac



Hydrograph 100-yr Summary

Project Name: SOWP South Pond

04-23-2020

Hydrology Studio v 3.0.0.14

Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Flow (cfs)	Time to Peak (hrs)	Hydrograph Volume (cuft)	Inflow Hyd(s)	Maximum Elevation (ft)	Maximum Storage (cuft)
1	NRCS Runoff	Pre Pre Developed	160.8	12.08	507,689	----		
2	NRCS Runoff	Post To Pond	121.7	11.98	314,599	----		
3	NRCS Runoff	Post Undetained	24.33	11.98	62,920	----		
4	Pond Route	South Pond	60.36	12.10	300,920	2	974.98	149,014
5	Junction	South Outflow	73.65	12.08	363,839	3, 4		

Hydrograph Report

Project Name: SOWP South Pond

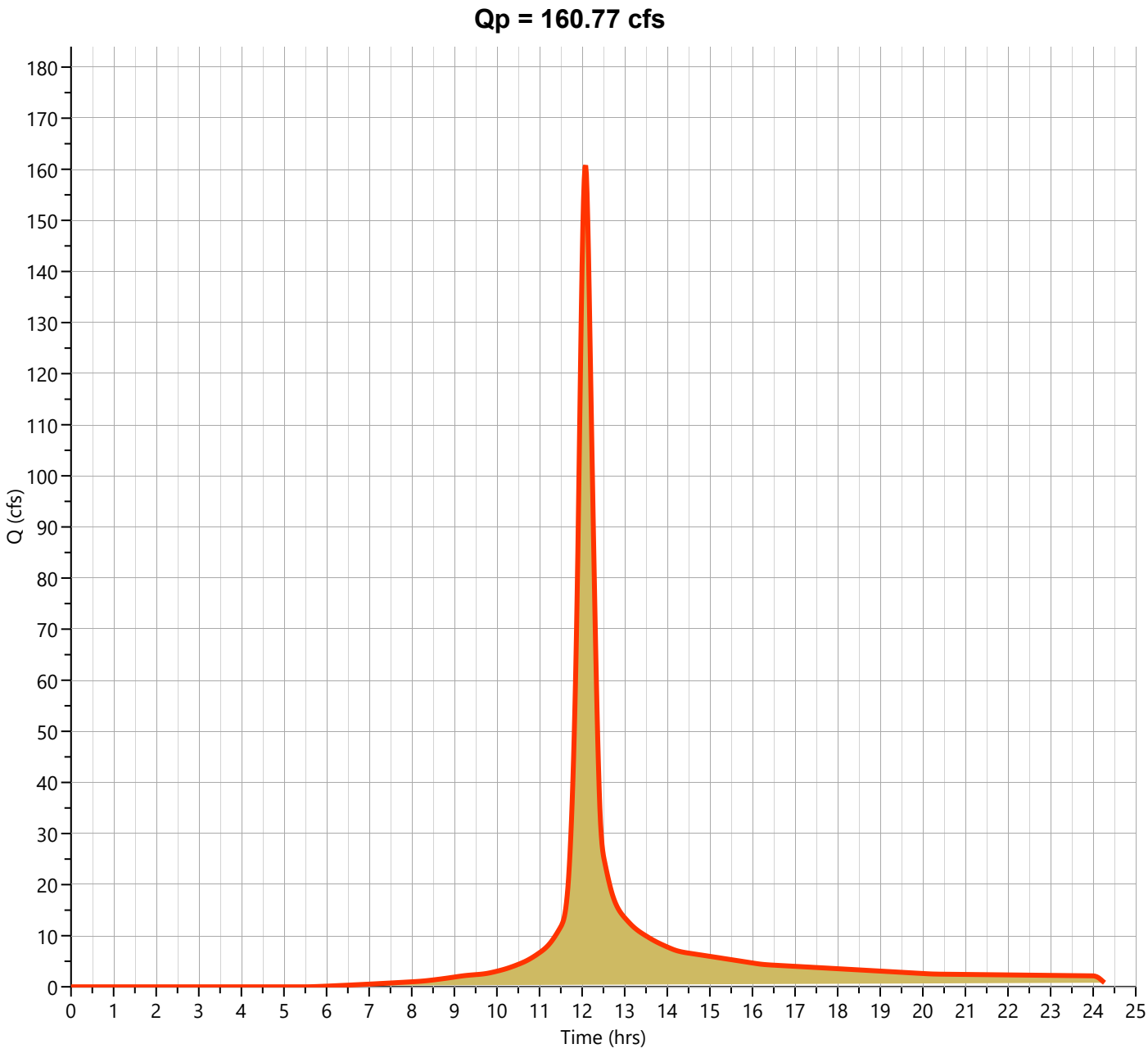
Hydrology Studio v 3.0.0.14

04-23-2020

Pre Pre Developed

Hyd. No. 1

Hydrograph Type	= NRCS Runoff	Peak Flow	= 160.8 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.08 hrs
Time Interval	= 1 min	Runoff Volume	= 507,689 cuft
Drainage Area	= 24.0 ac	Curve Number	= 77
Tc Method	= User	Time of Conc. (Tc)	= 20.0 min
Total Rainfall	= 8.60 in	Design Storm	= Type II
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name: SOWP South Pond

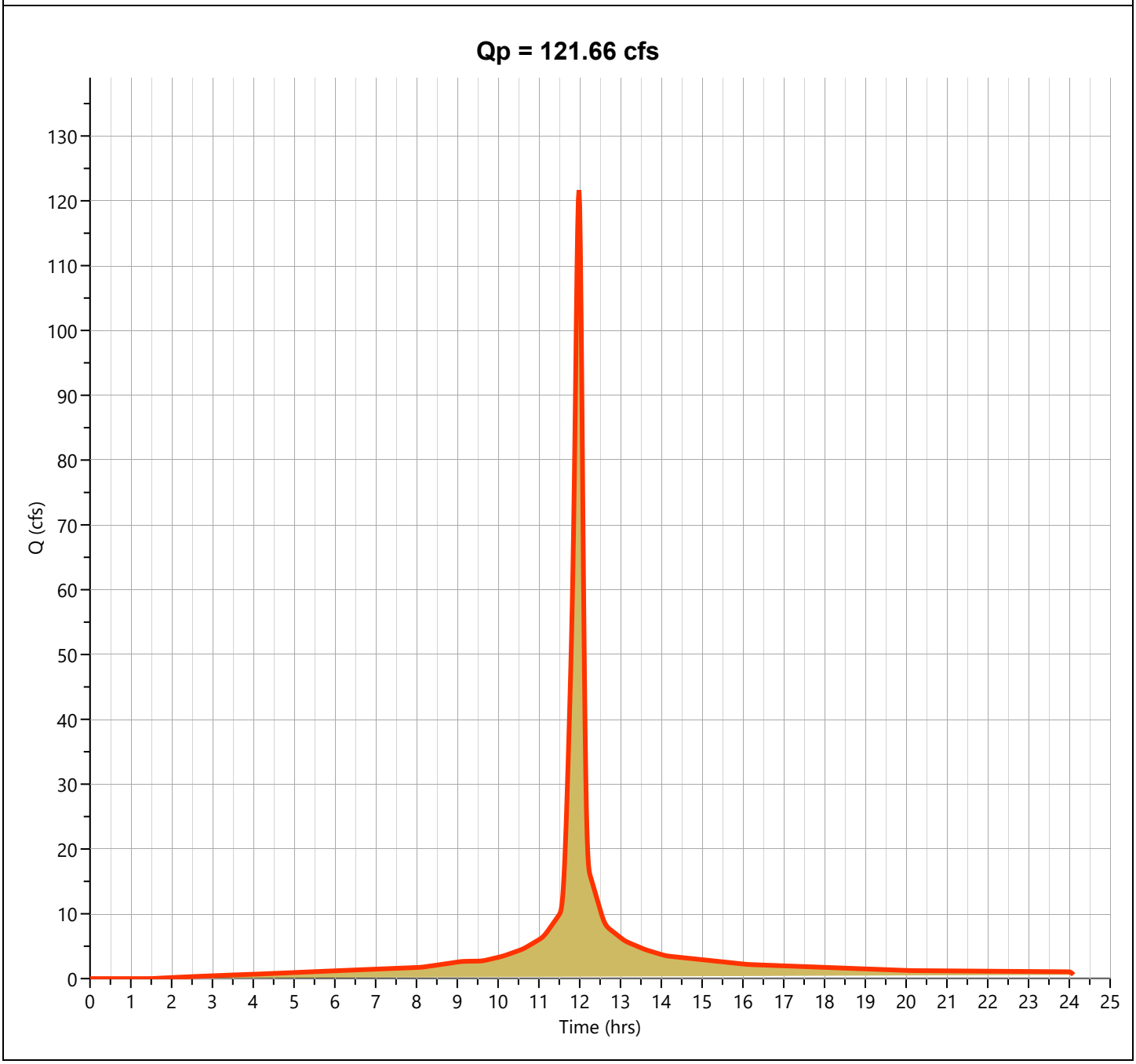
Hydrology Studio v 3.0.0.14

04-23-2020

Post To Pond

Hyd. No. 2

Hydrograph Type	= NRCS Runoff	Peak Flow	= 121.7 cfs
Storm Frequency	= 100-yr	Time to Peak	= 11.98 hrs
Time Interval	= 1 min	Runoff Volume	= 314,599 cuft
Drainage Area	= 11.0 ac	Curve Number	= 94
Tc Method	= User	Time of Conc. (Tc)	= 10.0 min
Total Rainfall	= 8.60 in	Design Storm	= Type II
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name: SOWP South Pond

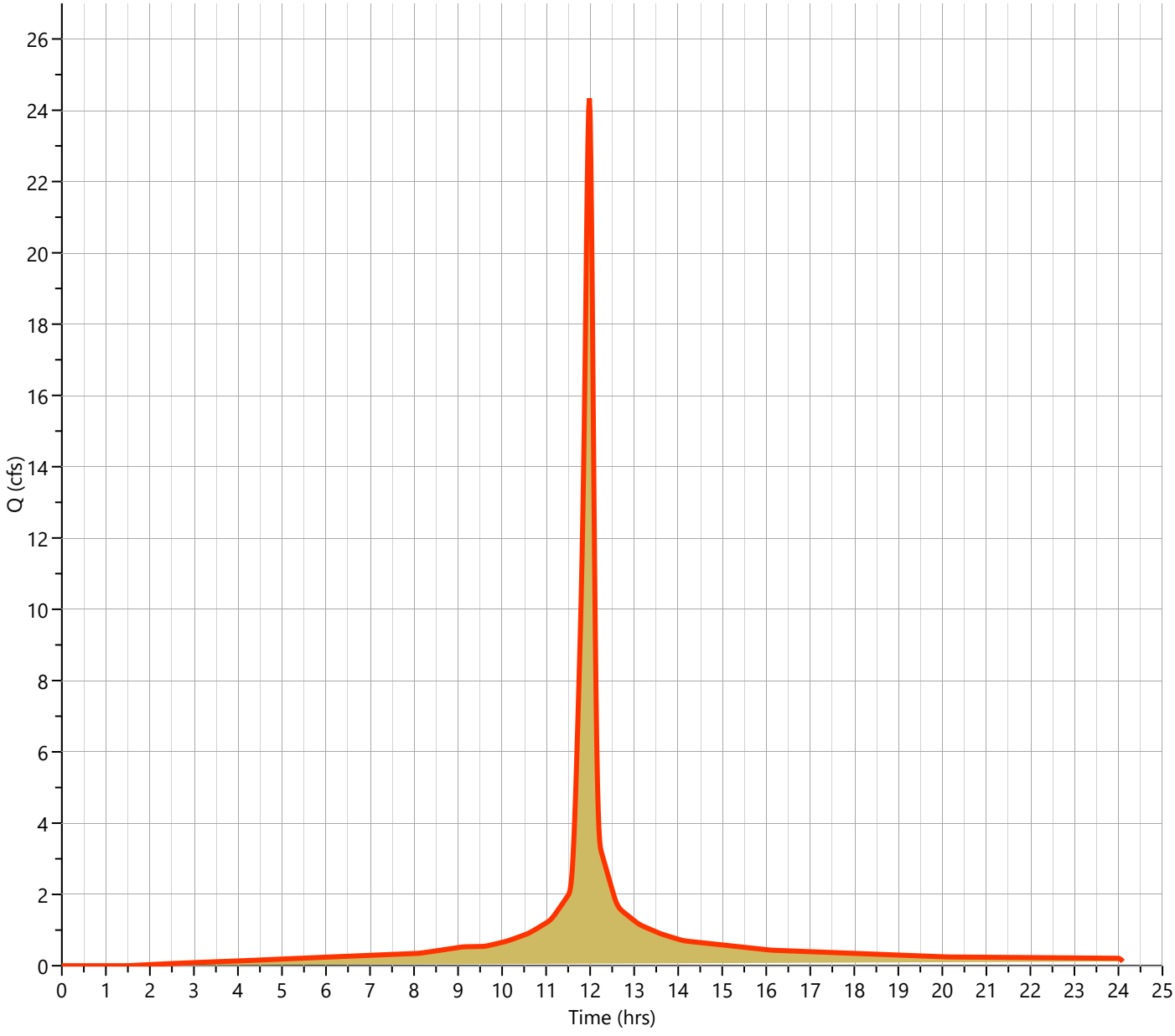
Hydrology Studio v 3.0.0.14

04-23-2020

Post Undetained

Hyd. No. 3

Hydrograph Type	= NRCS Runoff	Peak Flow	= 24.33 cfs
Storm Frequency	= 100-yr	Time to Peak	= 11.98 hrs
Time Interval	= 1 min	Runoff Volume	= 62,920 cuft
Drainage Area	= 2.2 ac	Curve Number	= 94
Tc Method	= User	Time of Conc. (Tc)	= 10.0 min
Total Rainfall	= 8.60 in	Design Storm	= Type II
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name: SOWP South Pond

Hydrology Studio v 3.0.0.14

04-23-2020

South Pond

Hyd. No. 4

Hydrograph Type	= Pond Route	Peak Flow	= 60.36 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 300,920 cuft
Inflow Hydrograph	= 2 - To Pond	Max. Elevation	= 974.98 ft
Pond Name	= South Pond	Max. Storage	= 149,014 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 3.64 hrs