Stormwater Management Plan

Streets of West Pryor
Lee's Summit, MO
Lots 11 and 12

January 29, 2021

Prepared By:

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INTRODUCTION

This storm water report has been prepared to address the proposed improvements associated with Lots 11 and 12 of the Streets of West Pryor. This development is located in the southwest quadrant of NW Pryor Road and the eastbound I 470 offramp to Pryor Road. The proposed plan calls for regrading Lots 11 and 12 in order to facilitate future development. This report will address the additional runoff that will be directed to the East Watershed.

EXISTING STORMWATER RUNOFF CHARACTERISTICS

The Streets of West Pryor is a 72.7 acre mixed use development of which the above mentioned Lots 11 and 12 are apart. The entire development is comprised of 3 distinct waresheds, East, West and South. While a majority of the 72.7 acres of stormwater runoff is captured and routed through detention ponds a small portion has been allowed to drain offsite, undetained, as outlined in the Final Stormwater Report prepared for the Streets of West Pryor preliminary development plan. Lots 11 and 12 are included in the East watershed which was designed to allow 7.7 acres to drain offsite, undetained. The approved drainage area map is illustrated in Figure 1 below.

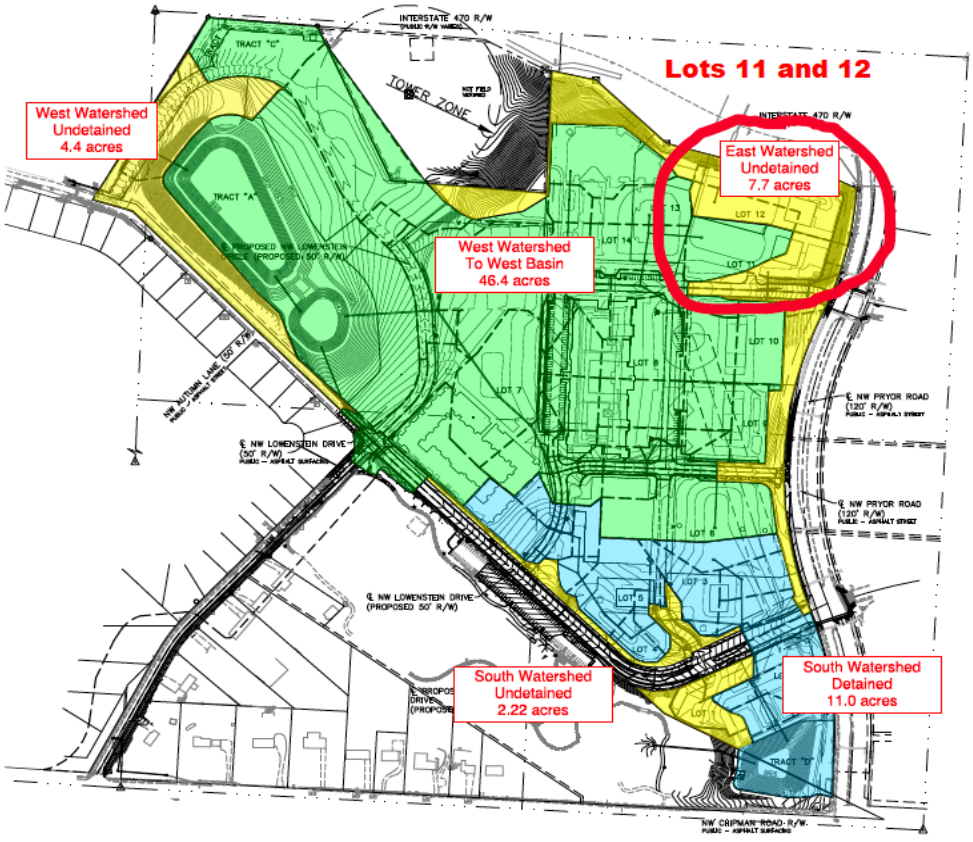

Figure 1, Approved Drainage Area Map

PROPOSED IMPROVEMENTS

Due to market demand and feedback from potential users, Lots 11 and 12 lack visibility from the adjacent NW Pryor Road. Currently the site is constructed such that there is a retaining wall on the east side of the site with the proposed finish floors of the potential buildings being 20' above Pryor Road. As such, visibility from Pryor Road is limited. The Streets of West Pryor development team is proposing to remove the retaining walls and lower the site 13' +/-. The proposed grading plan is included in Appendix A.

As discussed above 7.7 acres has been approved to drain offsite, undetained, to the NW Pryor Road drainage system and to the I 470 storm drainage system to the north. As a result of the proposed improvements an additional 1.27 acres will be directed, undetained, to the I470 storm drainage system. This additional area is illustrated below in Figure 2.

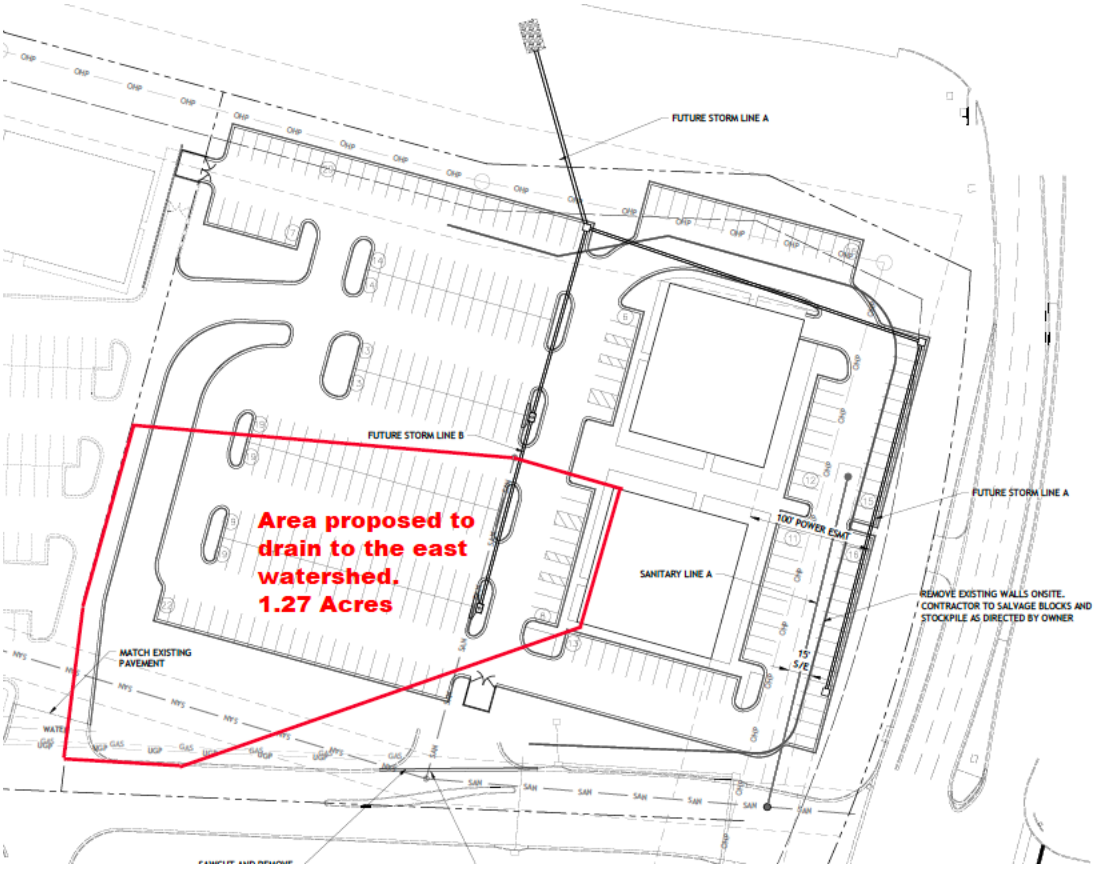

Figure 2. Additional Offsite Drainage Area

DRAINAGE ANALYSIS METHODS AND CALCULATIONS

As discussed in the Final Stormwater Report for Streets of West Pryor the original east watershed was 23 acres in size draining to the north. Per the approved stormwater report 15.3 acres of the watershed, upon completion of the Streets of West Pryor development, will be redirected to the west to a stormwater detention facility along Lowenstein Drive. The remaining 7.7 acres will continue to drain offsite to the north, undetained.

Per the City of Lee's Summit drainage criteria any development must limit the flow from a site per criteria outlined in APWA section 5608.4. Below is a chart showing a summary of the pre and post developed flows offsite to the north along with the allowable flow per APWA. Hydroflow printouts for the pre and post developed runoffs are included in Appendix B.

Design Storm	Pre-developed 23 acre runoff (cfs)	Allowable release rate per APWA (cfs/acre)	Allowable runoff for 23 acres (cfs)	Post-developed 7 acre runoff (cfs)
50% (2 yr)	41.4	0.5	11.5	31.3
10% (10 yr)	80.2	2	46	49.2
1% (100 yr)	160.3	3	69	83.5

As indicated in the Final Stormwater Report for Streets of West Pryor the post developed runoff exceeded the allowable runoff but was less than the predeveloped runoff. A variance was requested and was granted.

As discussed above the proposed regrading of Lots 11and 12 will direct an additional 1.27 acres of drainage offsite to the north. Below is a summary of the additional runoff from the 1.27 acres along with the total runoff that will be draining offsite to the north. Hydrology Studio printouts for the 1.27 acre runoff are included in Appendix B.

Design Storm	Post-developed 1.27 acre runoff (cfs)	Total undetained runoff east watershed (cfs)
50% (2 yr)	8.5	39.8
10% (10 yr)	12.9	62.1
1% (100 yr)	21.4	104.9

As illustrated in the chart above the proposed, developed runoff exceeds the allowable runoff but is less than the pre-developed runoff. As such we would like to request a variance.

CONCLUSION

As shown above if constructed as proposed the regrading of Lots 11 and 12 will redirect an additional 1.27 acres of drainage offsite to the north. However, the post developed runoff is less than the pre-developed runoff that drained to the north prior to any development being completed.

Appendix A

- Grading Plan

1"=30'
0 15' 30'

GRADING NOTES:

1. EARTHWORK UNDER THE BUILDING SHALL COMPLY WITH THE PROJECT ARCHITECTURAL PLANS. OTHER FILL MATERIAL SHALL BE MADE IN LIFTS NOT TO EXCEED EIGHT INCHES DEPTH COMPACTED TO 95% STANDARD PROCTOR DENSITY. FILL MATERIAL MAY INCLUDE ROCK FROM ON-SITE EXCAVATION IF CAREFULLY PLACED SO THAT LARGE STONES ARE WELL DISTRIBUTED AND VOIDS ARE COMPLETELY FILLED WITH SMALLER STONES, EARTH, SAND OR GRAVEL TO FURNISH A SOLID EMBANKMENT. NO ROCK LARGER THAN THREE INCHES IN ANY DIMENSION NOR ANY SHALE SHALL BE PLACED IN THE TOP 12 INCHES OF EMBANKMENT.

2. AREAS THAT ARE TO BE CUT TO SUBGRADE LEVELS SHALL BE PROOF ROLLED WITH A MODERATELY HEAVY LOADED DUMP TRUCK OR SIMILAR APPROVED CONSTRUCTION EQUIPMENT TO DETECT UNSUITABLE SOIL CONDITIONS.

3. IN ALL AREAS OF EXCAVATION, IF UNSUITABLE SOIL CONDITIONS ARE ENCOUNTERED. A QUALIFIED GEOTECHNICAL ENGINEER SHALL RECOMMEND TO THE OWNER THE METHODS OF UNDERCUTTING AND REPLACEMENT OF PROPERLY COMPACTED, APPROVED FILL MATERIAL. ALL PROOF ROLLING AND UNDERCUTTING SHOULD BE PERFORMED DURING A PERIOD OF DRY WEATHER.

4. CONTRACTOR SHALL USE SILT FENCE OR OTHER MEANS OF CONTROLLING EROSION ALONG THE EDGE OF THE PROPERTY OR OTHER BOTTOM OF SLOPE LOCATIONS.

5. CONTRACTOR IS TO REMOVE AND DISPOSE OF ALL DEBRIS, RUBBISH AND OTHER MATERIALS RESULTING FROM PREVIOUS AND CURRENT DEMOLITION OPERATIONS.

6. THE CONTRACTOR SHALL TAKE ALL PRECAUTIONS NECESSARY TO AVOID PROPERTY DAMAGE TO ADJACENT PROPERTIES DURING THE CONSTRUCTION PHASES OF THIS PROJECT. THE CONTRACTOR WILL BE HELD SOLELY RESPONSIBLE FOR ANY DAMAGES TO THE ADJACENT PROPERTIES OCCURRING DURING THE CONSTRUCTION PHASES OF THIS PROJECT.

7. IT IS NOT THE DUTY OF THE ENGINEER OR THE OWNER TO REVIEW THE ADEQUACY OF THE CONTRACTOR'S SAFETY MEASURES, IN, ON OR NEAR THE CONSTRUCTION SITE AT ANY TIME DURING CONSTRUCTION.

8. PIPE LENGTHS ARE CENTER TO CENTER OF STRUCTURE OR TO END OF END SECTIONS.

9. HANDICAP STALLS SHALL MEET ADA REQUIREMENTS AND SHALL NOT EXCEED 2% SLOPE IN ANY DIRECTION AT THE BUILDING ENTRY AND ACCESSIBLE PARKING STALLS. SLOPES EXCEEDING 2.0% WILL BE REPLACED AT THE CONTRACTOR'S EXPENSE.

10. CONTRACTOR TO ADJUST DEPTHS OF EXISTING SERVICE LINES AS NECESSARY

11. ALL CONSTRUCTION TRAFFIC, TEMPORARY TRAFFIC CONTROL DEVICES AND PAVEMENT MARKINGS SHALL CONFORM TO REQUIREMENTS OF THE LATEST MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES.

12. SITE BEING ROUGH GRADED TO 12.5" BELOW FINISHED GRADE

13. CONTRACTOR TO PLACE 8" LOW PERMEABILITY LVC FOR BUILDING PAD

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Revisions

LOTS 11 & 12 STREETS OF WEST PRYOR

LEE'S SUMMIT, MISSOURI

sheet
C3.0
Civil
GRADING PLAN
permit
26 JANUARY 2021

Appendix B

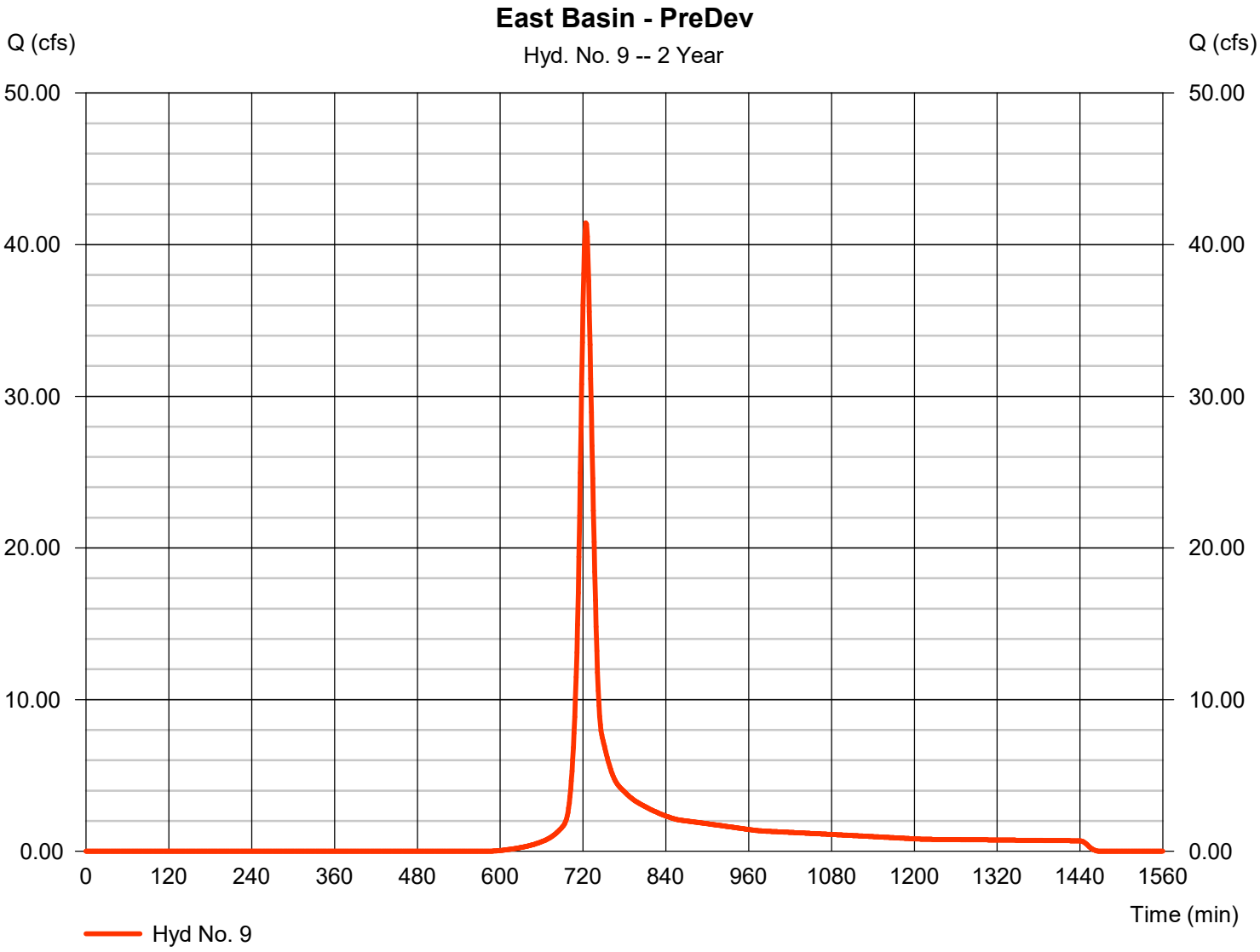
- Hydrology Printouts

Hydrograph Report

Hyd. No. 9

East Basin - PreDev

Hydrograph type	=	SCS Runoff	Peak discharge	=	41.43 cfs
Storm frequency	=	2 yrs	Time to peak	=	724 min
Time interval	=	1 min	Hyd. volume	=	124,242 cuft
Drainage area	=	23.000 ac	Curve number	=	77
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	18.00 min
Total precip.	=	3.60 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

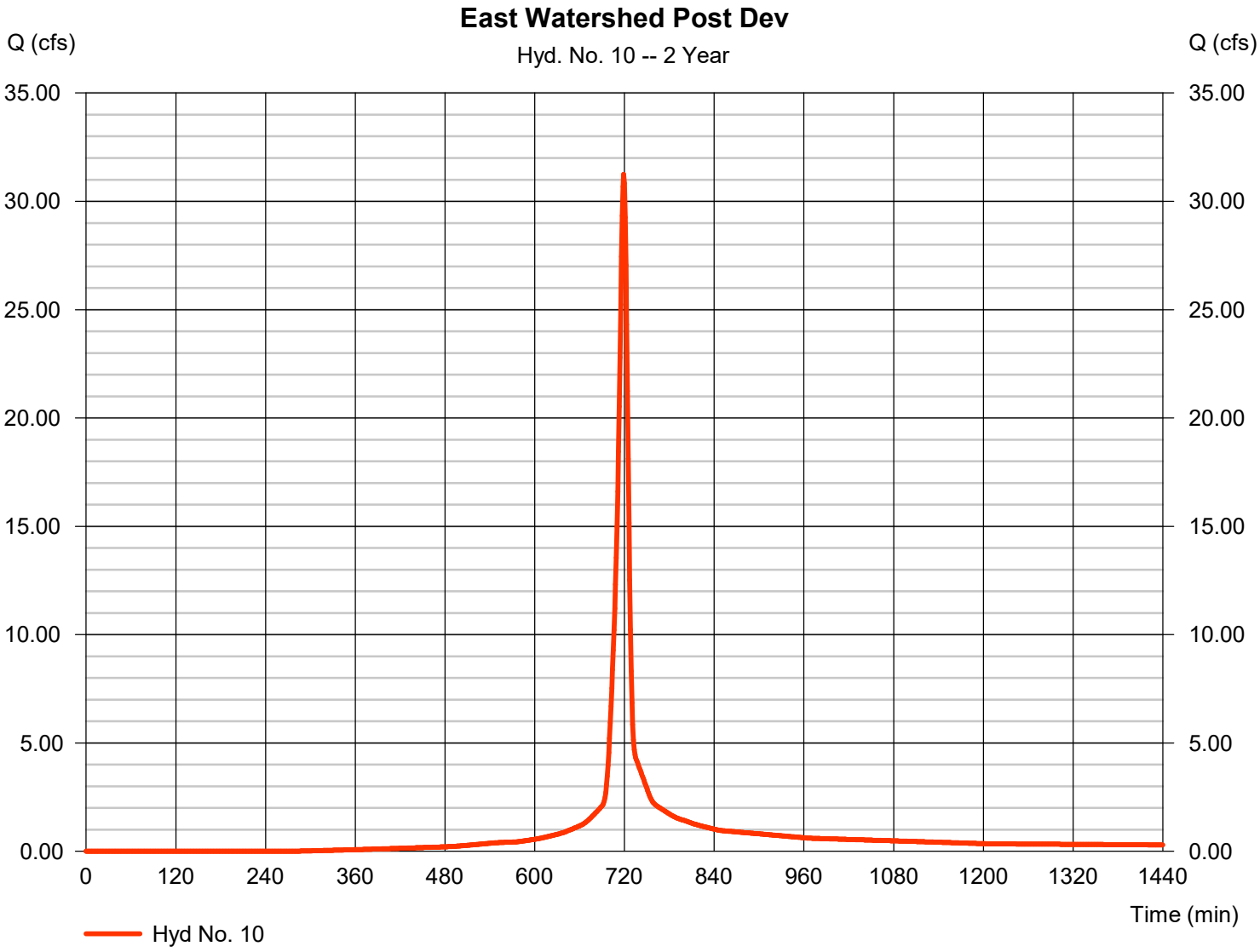


Hydrograph Report

Hyd. No. 10

East Watershed Post Dev

Hydrograph type	=	SCS Runoff	Peak discharge	=	31.25 cfs
Storm frequency	=	2 yrs	Time to peak	=	719 min
Time interval	=	1 min	Hyd. volume	=	73,677 cuft
Drainage area	=	7.700 ac	Curve number	=	91
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	10.00 min
Total precip.	=	3.60 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

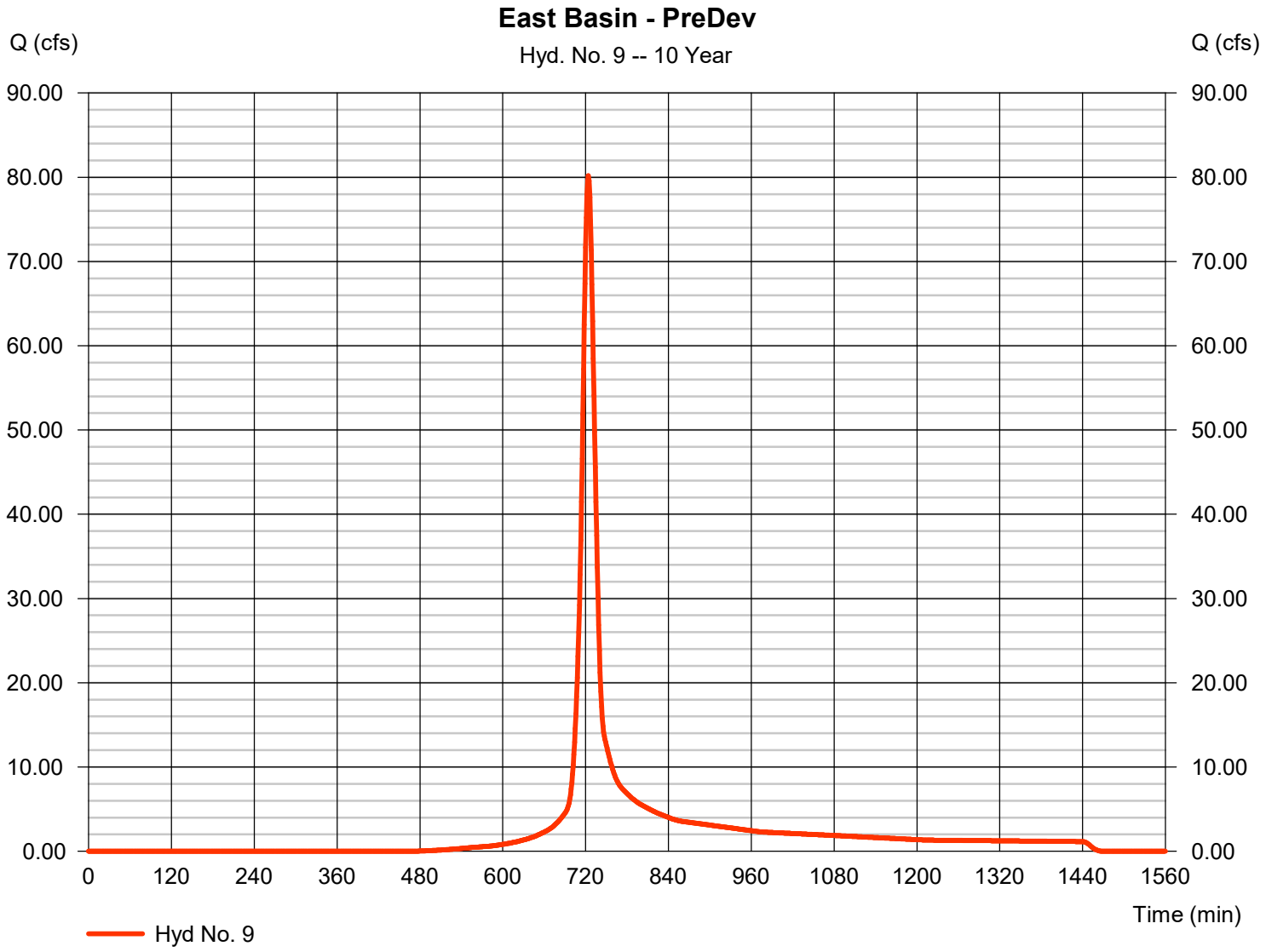


Hydrograph Report

Hyd. No. 9

East Basin - PreDev

Hydrograph type	=	SCS Runoff	Peak discharge	=	80.18 cfs
Storm frequency	=	10 yrs	Time to peak	=	724 min
Time interval	=	1 min	Hyd. volume	=	237,379 cuft
Drainage area	=	23.000 ac	Curve number	=	77
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	18.00 min
Total precip.	=	5.30 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

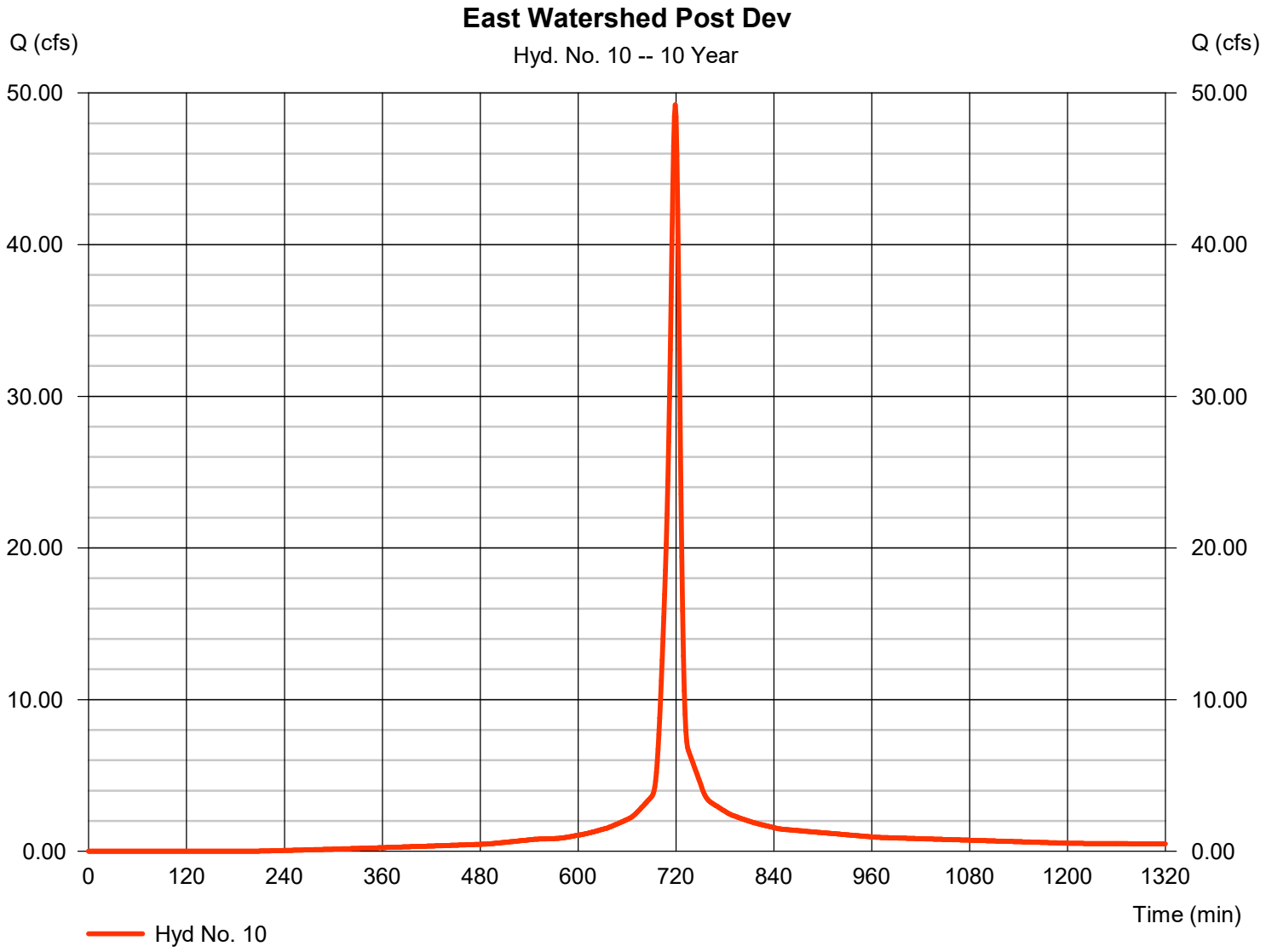


Hydrograph Report

Hyd. No. 10

East Watershed Post Dev

Hydrograph type	=	SCS Runoff	Peak discharge	=	49.21 cfs
Storm frequency	=	10 yrs	Time to peak	=	719 min
Time interval	=	1 min	Hyd. volume	=	119,456 cuft
Drainage area	=	7.700 ac	Curve number	=	91
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	10.00 min
Total precip.	=	5.30 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

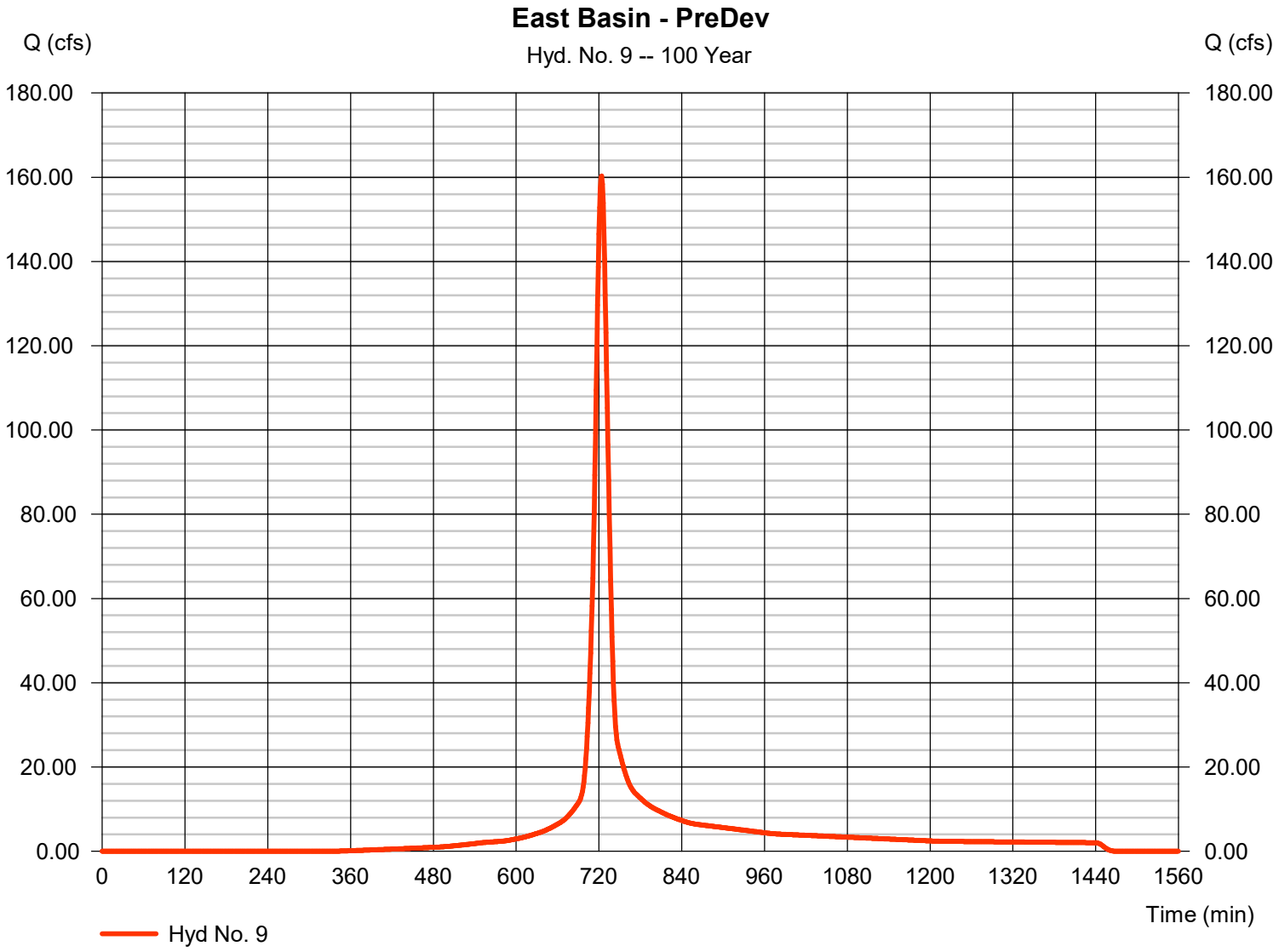


Hydrograph Report

Hyd. No. 9

East Basin - PreDev

Hydrograph type	=	SCS Runoff	Peak discharge	=	160.31 cfs
Storm frequency	=	100 yrs	Time to peak	=	724 min
Time interval	=	1 min	Hyd. volume	=	481,006 cuft
Drainage area	=	23.000 ac	Curve number	=	77
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	18.00 min
Total precip.	=	8.60 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

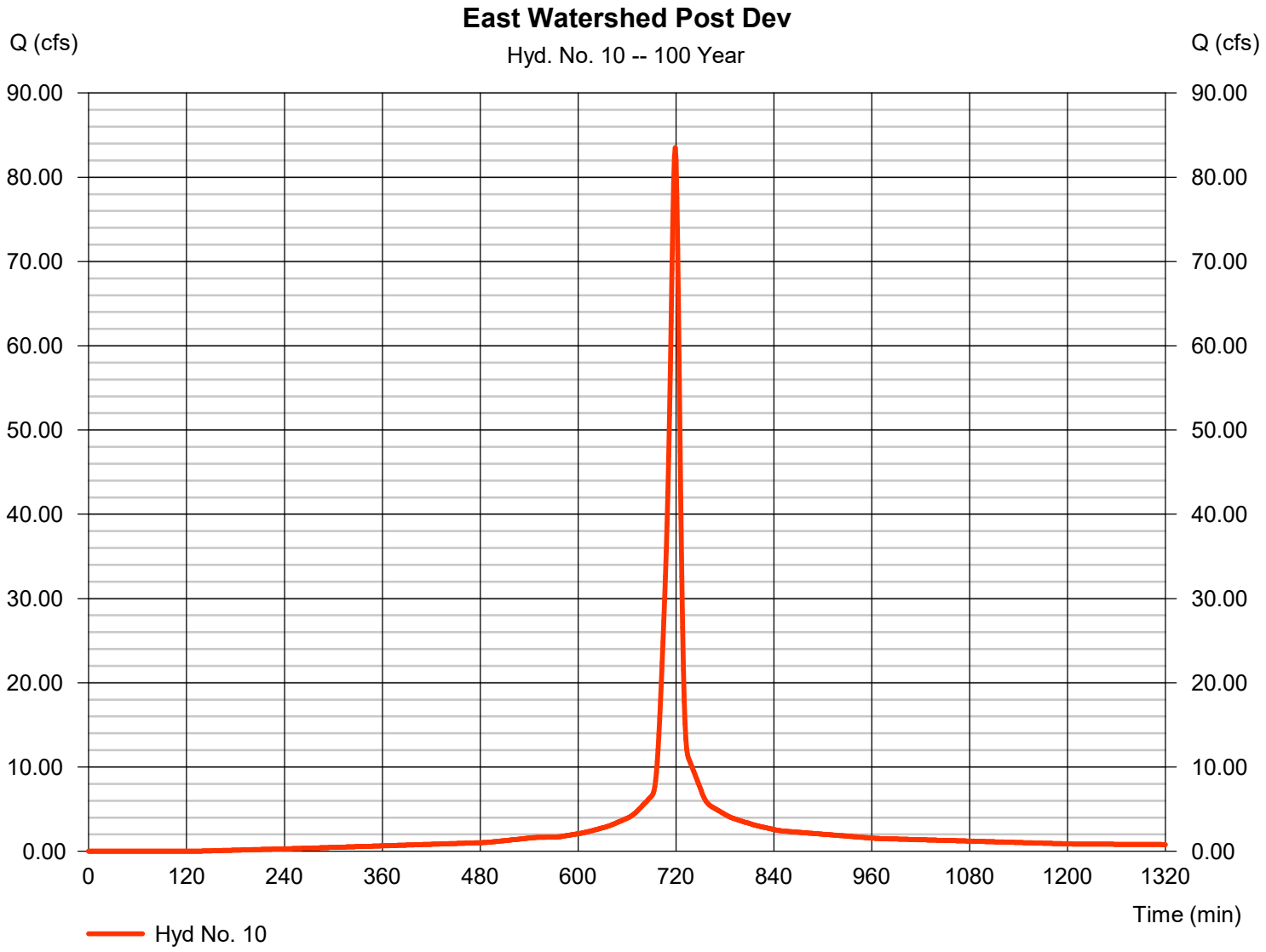


Hydrograph Report

Hyd. No. 10

East Watershed Post Dev

Hydrograph type	=	SCS Runoff	Peak discharge	=	83.53 cfs
Storm frequency	=	100 yrs	Time to peak	=	719 min
Time interval	=	1 min	Hyd. volume	=	210,117 cuft
Drainage area	=	7.700 ac	Curve number	=	91
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	10.00 min
Total precip.	=	8.60 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



Hydrograph Report

Project Name:

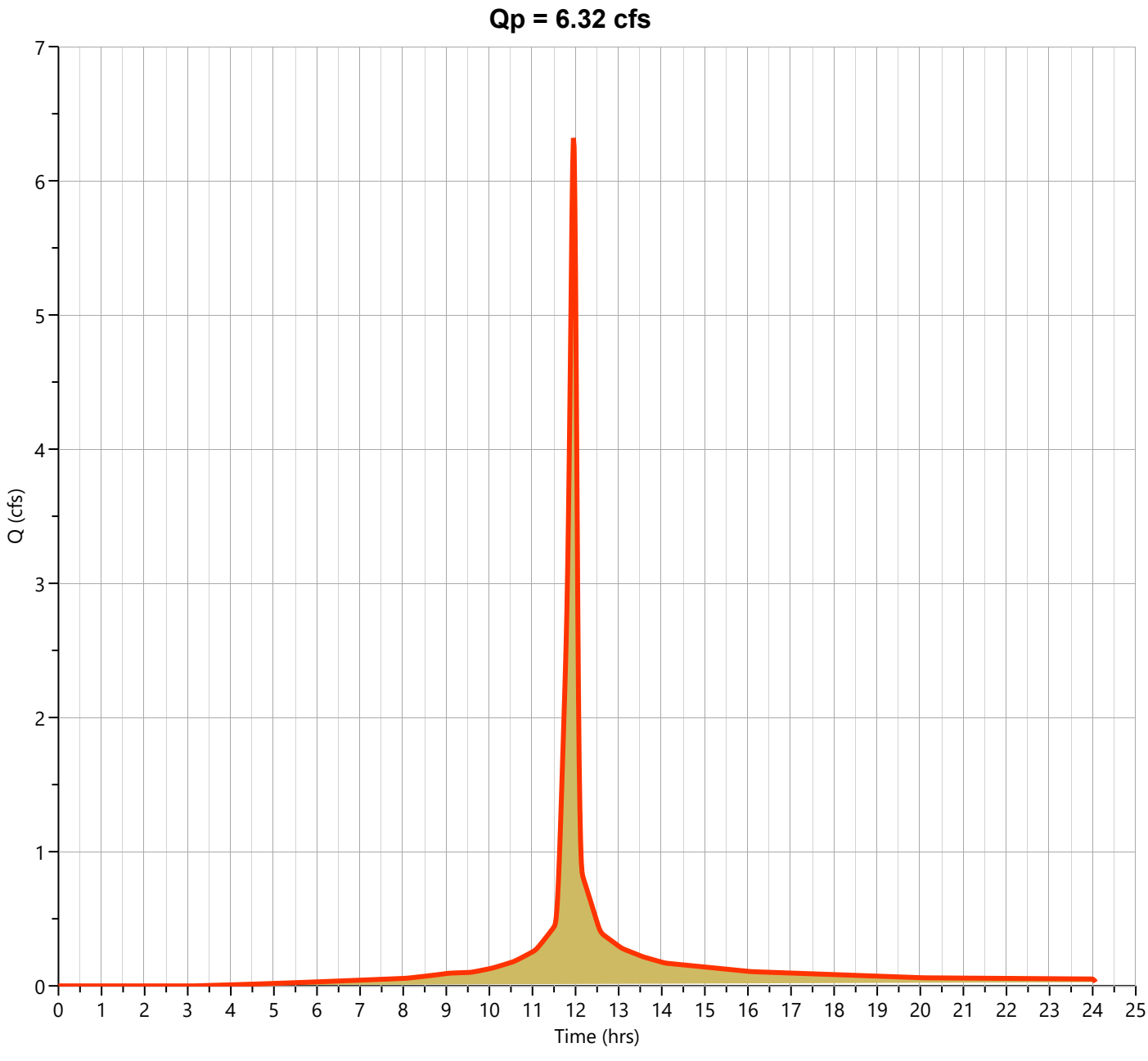
Hydrology Studio v 3.0.0.16

01-31-2021

Post Lot 11 and 12

Hyd. No. 1

Hydrograph Type	= NRCS Runoff	Peak Flow	= 6.319 cfs
Storm Frequency	= 2-yr	Time to Peak	= 11.95 hrs
Time Interval	= 1 min	Runoff Volume	= 13,945 cuft
Drainage Area	= 1.27 ac	Curve Number	= 94
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 3.60 in	Design Storm	= Type II
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

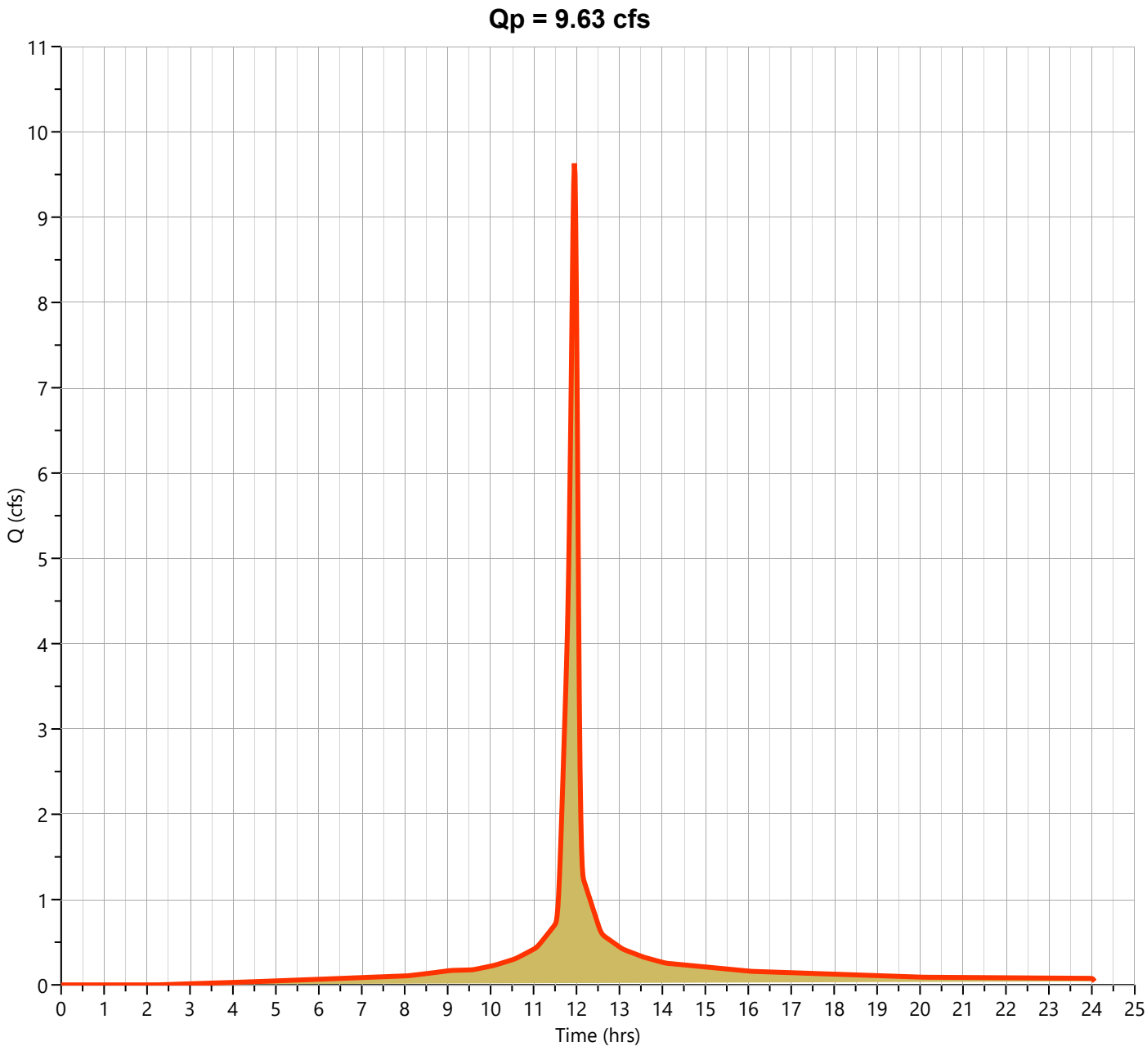
Hydrology Studio v 3.0.0.16

01-31-2021

Post Lot 11 and 12

Hyd. No. 1

Hydrograph Type	= NRCS Runoff	Peak Flow	= 9.631 cfs
Storm Frequency	= 10-yr	Time to Peak	= 11.95 hrs
Time Interval	= 1 min	Runoff Volume	= 21,889 cuft
Drainage Area	= 1.27 ac	Curve Number	= 94
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 5.30 in	Design Storm	= Type II
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.16

01-31-2021

Post Lot 11 and 12

Hyd. No. 1

Hydrograph Type	= NRCS Runoff	Peak Flow	= 15.97 cfs
Storm Frequency	= 100-yr	Time to Peak	= 11.95 hrs
Time Interval	= 1 min	Runoff Volume	= 37,457 cuft
Drainage Area	= 1.27 ac	Curve Number	= 94
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 8.60 in	Design Storm	= Type II
Storm Duration	= 24 hrs	Shape Factor	= 484