STORMWATER MANAGEMENT REPORT

THE BEACON
BRIGHT ROAD

CITY OF DUBLIN, FRANKLIN COUNTY, OHIO

Prepared By:

ADVANCED
CIVIL DESIGN

ENGINEERS & SURVEYORS
781 SCIENCE BLVD, SUITE 100
GAHANNA, OHIO 43230
Ph: 614-428-7750
Fax: 614-428-7755

Date:
October 24, 2023

TABLE OF CONTENTS

STORMWATER MANAGEMENT REVIEW:

APPENDICES:

Site Summary:

The Beacon project is located on the north side of Bright Road in the City of Dublin, Franklin County, Ohio. The project site is surrounded by existing commercial development to the southeast and north, a stream channel to the north, and Emerald Parkway to the west. The total site is approximately 17 acres and consists of a few single family houses and open field with trees. The project consists of four primary buildings with underground parking, surface parking, storm water management basins and courtyard features.

Design Methodology:

Stormwater management calculations within this report follow the guidance of the City of Dublin, Stormwater Management Design Manual (Interim Update: dated January, 2019), for the water quantity and water quality requirements. Hydrology and hydraulics were modeled with the HydroCAD software suite using TR-55 methodology and a Type-II rainfall distribution. Pond routing for the project will be performed using the storage indication method. Located in the City of Dublin, Stormwater Management Design Manual, are the precipitation frequencies for the 1, 2, 5, 10, 25, 50, and 100 year storm events used to evaluate rainfall and runoff.

Design Event (yr)	**1**	**2**	**5**	**10**	**25**	**50**	**100**
Rainfall Depth (in)	2.20	2.63	3.24	3.74	4.44	5.02	5.63

Table 1 - Design Storm Rainfall Depths

Pre-Developed Conditions:

A review of the Franklin County soil maps show that this site is underlain predominately by Celina silt loam and Miamian silty clay loam with some Crosby silt loam and Kokomo silty clay loam. These soils are classified within hydrologic group "C/D". The site predominately is located within Sub-basins 250, 260 and 270. Table 2 below is a summary of the onsite Sub-Basin areas analyzed I this report.

	Area	**CN**	**1-yr, 24 hr runoff volume**
Sub-Basin	(acres)		(ac-ft)
250	5.82	76	0.001
260	6.53	76	0.000
270	2.60	76	0.130

Table 2 – Onsite Pre-Developed Hydrology Summary

Post-Construction Conditions:

The development consists of 4 primary buildings, along with courtyard activity areas, and associated parking (surface parking and below grade garage parking). Grading will direct surface runoff into the onsite storm sewers and convey the flow into the stormwater management basin. Runoff volumes in excess of the storm sewer capacity will flood route through the site into stormwater management basin. The proposed site layout and grading allows for the majority of the development to be tributary to the storm water basin. The area located north of the proposed walking path behind the buildings will run undetained to the existing stream. This condition will match the predeveloped condition. These areas are shown on the post development tributary map located in the Appendix.

Critical Storm:

Per the City of Dublin's, Stormwater Management Design Manual, a critical storm event was computed by evaluating the increase in runoff volume created by the development. Using the scs curve number method, runoff depths from a 2.2 inch rainfall event (1-yr) were calculated.

[(1.387 – 0.709) / 0.709] * 100 = 96%

Critical Storm =10-yr storm

Allowable Release Rates:

The allowable release is based on the City of Dublin's Stormwater Master Plan Release Rates and the critical storm. Table 5 below summarizes the release rate requirements per Dublin's Master Stormwater Plan and the critical storm calculated above.

	1	**2**	**5**	**10**	**25**	**50**	**100**
	(cfs/ac)	(cfs/ac)	(cfs/ac)	(cfs/ac)	(cfs/ac)	(cfs/ac)	(cfs/ac)
Master Plan Sub-Basin 250 (Detained)	0.10	0.20	0.30	0.60	1.00	1.80	2.70
Critical Storm Sub-Basin 250 (Detained)	*0.10*	*0.10*	*0.10*	*0.10*	*0.10*	*1.80*	*2.70*
Allowable Discharge Rate 250 (Detained)	**0.58**	**0.58**	**0.58**	**0.58**	**5.82**	**10.48**	**15.71**
Master Plan Sub-Basin 260 (Detained)	0.10	0.10	0.20	0.40	0.80	1.40	2.00
Critical Storm Sub-Basin 260 (Detained)	*0.10*	*0.10*	*0.10*	*0.10*	*0.10*	*1.40*	*2.00*
Allowable Discharge Rate 260 (Detained)	**0.65**	**0.65**	**0.65**	**0.65**	**5.22**	**9.14**	**13.06**
Master Plan Sub-Basin 270 (Detained)	0.40	0.50	0.60	0.80	1.10	1.60	2.20
Critical Storm Sub-Basin 270 (Detained)	*0.40*	*0.40*	*0.40*	*0.40*	*0.40*	*1.60*	*2.20*
Allowable Discharge Rate 270 (Detained)	**1.04**	**1.04**	**1.04**	**1.04**	**2.86**	**4.16**	**5.72**

Table 4 – Allowable Release Rate Summary

Stormwater Quantity Control:

The proposed stormwater system comprises three separate basins, each of which will have water directed to them. There is a Lower Pond, Middle Pond and Upper Pond. The Lower Pond will function as the primary retention system. The Middle ponds will convey runoff to the Lower Pond by way of a window cut into a wall separating the features. The Upper Pond will retain water via a separate outlet control structure and will connect directly to the Middle Pond. I addition to the wet ponds, some pipe and surface storage will be utilized to meet the release rate requirements. Storm sewers will convey the onsite stormwater runoff through the site into the stormwater management basins. Overland flood routing will convey larger storm events through the site into the detention facility. A permanent outlet control device will be placed within the Lower Pond, designed to restrict discharges at or below the allowable peak rates of runoff and provide the required water quality treatment.

Structure #	10	15
Orifice Dia.	15"	3"

Table 5 – Orifice Plate Summary

Structure #	Volume Required (cf)	Volume Provided (cf)
10	3,577	6,314
15	3,251	3,732

Table 6 – Pipe & Surface Ponding Storage Summary

Undetained Areas

There are two areas of the development that will not be tributary to the proposed basins when the site is developed. There is an Undetained Area North and an Undetained Area East. The north area is located to the north of the fire access drive and consists mainly of grass and trees. There is a portion of a proposed pathway and the entirety of the courtyard for building 3 within this area as well. The east area is located to the east of building 3 and consists of the proposed pathway as well as grass and trees.

In order to provide detention and water quality for these areas within the basins, the release rates for these areas will be added to the release rates for the total site. This total release rate must remain below the allowable release rates for the post-developed site.

For this project, only the release rates from the impervious areas located within the undetained areas will be calculated and added to the total. The proposed on-site basins and surface ponding areas are unable to balance the entire undetained areas. Since the remainder of the undetained area is grass and trees it is anticipated that runoff over the surface will be well treated.

Proposed Control Structure (#46)-Upper Pond

- Top of Bank-897.00
- 1st stage – Window, 24”W x 6”H, invert Elev. = 895.50
- 2nd stage – Neenah grate, top of casting at 896.50
- Primary Outlet – 12” pipe @ 0.60%, invert Elev. = 894.00
- Secondary Outlet – 20’ long broad-crested earthen weir, crest Elev. = 896.50

Proposed Control Structure (Retaining Wall)-Middle Pond

- Top of Bank-896.00
- 1st stage – One (1) 2-inch X 2-inch Vertical orifice, invert Elev. = 891.50
- Primary Outlet – Window 48”W x 6”H invert Elev. = 891.50
- Secondary Outlet – 20’ long broad-crested concrete weir, crest Elev. = 895.50

Proposed Control Structure (#2)-Lower Pond Primary Outlet

- Top of Bank-889.00
- 1st stage – One (1) 4.4-inch Vertical WQ orifice, invert Elev. = 883.50
- 2nd stage – Window (1): 4”W x 8”H, Elev. 887.20
- 3rd stage – Window (3): 54”W x 6”H, elev. 887.87
- 3rd stage – Neenah grate, top of casting at 888.50
- Primary Outlet – 24” pipe @ 1.74%, invert Elev. = 883.50
- Secondary Outlet – 20’ long broad-crested earthen weir, crest Elev. = 888.5

Storm Event (yr)	Basin Peak Inflow (cfs)	Allowable Basin Peak Discharge* (A) (cfs)	Undetained Area North (B) (cfs)	Undetained Area East (C) (cfs)	Basin Peak Discharge (cfs)	Basin Peak Discharge Including Undetained Rates (cfs)	Peak Water Surface Elev. (ft)	Ponding Storage Volume (ft^3)
1	18.67	2.27	0.17	0.19	0.72	1.08	885.70	29,139
2	23.68	2.27	0.20	0.22	0.83	1.25	886.34	39,631
5	31.64	2.27	0.25	0.28	1.09	1.62	887.17	53,862
10	38.84	2.27	0.29	0.32	1.51	2.12	887.72	64,338
25	45.57	13.90	0.34	0.38	5.24	5.96	887.98	69,583
50	50.43	23.78	0.39	0.44	13.38	14.21	888.21	74,188
100	55.58	34.49	0.43	0.49	22.53	23.45	888.46	79,336

Table 6 – Ponding, Storage and Peak Discharge Rate Summary
***Sum of each Sub-basin Allowable Release Rates**

Stormwater Quality Control:

Per the Ohio EPA General Construction Permit, a stormwater best management practice (BMP) is required to treat the first flush runoff volume produced by a 0.9" rainfall event. The water quality volume was calculated using the equation below with runoff coefficients from the Ohio EPA's General Construction Permit. That water quality volume will be detained in the basin for a minimum period of 24 hours, releasing less than half of the volume in the first 8 hours. Drawdown of the water quality volumes will be accomplished utilizing the above mentioned WQ feature within the outlet structure. Detailed calculations and drawdown curves are included in Appendix I of this report. A summary of the water quality data is shown in Table 7.

$$WQv = Rv * P * A / 12$$

BMP	Tributary Area (acres)	WQv Required (ft^3)	WQv Provided (ft^3)	WQ Elevation (ft)
Lower Pond	13.82	29,172	30,611	885.80

Table 7 - Water Quality Volume Summary

Per City of Dublin's Stormwater Design Manual, each inlet into the basin shall include a forebay. The forebay was designed following the ODNR, Chapter 2, Page 31, Section 3, Forebay(s) guidance. Since the basin is design to provide 20% additional storage above normal pool for sediment storage, each forebay is sized at 10 percent of the WQv (2580 cu. ft.). A summary of the forebay volumes are listed in Table 8.

BMP	Forebay Provided	Forebay (Req'd)
Volume (cu. ft.)	2917	2917

Table 8 – Forebay Volume Summary

Erosion and Sediment Control:

The proposed basin will be utilized to meet the Ohio EPA requirements that during construction a site must provide means by which to control the sediment laden runoff from the construction site. For each acre of drainage area that is tributary to the sediment basin, a drawdown volume of 67 cu. yd. must be provided. The basin will additionally need to provide a settling volume of 37 cu. yd. for each acre of disturbed area tributary to the basin.

The basin will utilize a skimmer connected to the permanent outlet structure to provide the proper 48-hour drawdown. The permanent outlet structures will need to be temporarily modified during construction to ensure that the basin has the proper settling and water drawdown volumes as well as meet the drawdown requirement. See Appendix J for Sediment Basin Calculations and Skimmer Sizing.

BMP	**Tributary Area** (acres)	**Disturbed Area** (acres)	**Dewatering Zone Required** (cu. yd.)	**Sediment Storage Required** (cu. yd.)	**Dewatering Zone Provided** (cu. yd.)	**Sediment Storage Provided** (cu. yd.)	**Skimmer Orifice Size** (inches)
Wet Basin	13.82	13.82	926	511	1493 @ Elev. 886.40	544 @ Elev. 884.70	5.0

Table 9 – Sediment Control Summary

Conclusion:

The Beacon site improvements provides surface and subsurface stormwater conveyances to carry runoff safely through the development into the stormwater management system. The stormwater management system is controlled by an outlet structure within the basin. The proposed system provides peak flow rate control and extended drawdown of captured stormwater to comply with the City of Dublin's Stormwater Design Manual and Ohio EPA's water quality regulations.

APPENDIX A

TRIBUTARY MAPS

220

260

250

SUBBASIN 260
6.53 ACRES

SUBBASIN 270
2.60 ACRES

SUBBASIN 250
5.82 ACRES

270

170

300

LEGEND

- 929 EXISTING 1' CONTOUR
- 930 EXISTING 5' CONTOUR
- ST ST EXISTING STORM SEWER
- DUBLIN SUB-BASIN AREA
- DEVELOPMENT AREA

GRAPHIC SCALE

0 25 50 100

1 inch = 50 feet

CITY OF DUBLIN, OHIO
PRE-DEVELOPMENT TRIBUTARY MAP
FOR THE BEACON

PLAN PREPARED BY:

ADVANCED CIVIL DESIGN ENGINEERS SURVEYORS

422 Beecher Road
Gahanna, Ohio 43230
ph 614.428.7750
fax 614.428.7755

SCALE: 1" = 50'
DATE: 10/20/2022

SHEET 1 / 1

Z:\19-0039-39\HYDROCAD\Pre Trib.dwg PRE-DEVELOPMENT TRIBUTARY MAP Oct 24, 2023 - 8:27:13pm jpetchal

GRAPHIC SCALE

0 25 50 100

1 inch = 50 feet

2.32

0.97

10.23

0.27

0.27

1.92

0.48 GOES FROM PINK TO BLUE

1.40

FIX THIS AREA-SOME IS UNDISTURBED BMW

LOWER POND
NP 883.5
TB 889.0

MIDDLE POND
NP 894.5
TB 896.0

UPPER POND
NP 894.0
TB 897.0

SEE ENLARGE

LEGEND

- 929 EXISTING 1' CONTOUR
- 930 EXISTING 5' CONTOUR
- ST ST EXISTING STORM SEWER
- DUBLIN SUB-BASIN AREA
- DEVELOPMENT AREA
- TRIBUTARY TO LOWER POND
- TRIBUTARY TO MIDDLE POND
- TRIBUTARY TO UPPER POND
- UNDETAINED AREAS
- UNDISTURBED AREAS

CITY OF DUBLIN, OHIO
POST-DEVELOPMENT TRIBUTARY MAP
FOR
THE BEACON

PLAN PREPARED BY:

ADVANCED CIVIL DESIGN
ENGINEERS SURVEYORS

422 Beecher Road
Gahanna, Ohio 43230
ph 614.428.7750
fax 614.428.7755

SCALE: 1"=50'
DATE: 08/03/2023

SHEET 1 / 1

Z:\19-0039-39\HYDROCAD\Post Trib.dwg PRE-DEVELOPMENT TRIBUTARY MAP Oct 24, 2023 - 8:25:08pm jpetchal

APPENDIX B

PRE-DEVELOPMENT HYDROCAD CALCULATIONS

250

260

270

Subcat Reach Pond Link

Routing Diagram for BEACON

Prepared by {enter your company name here}, Printed 10/21/2022

Summary for Subcatchment 250: 250

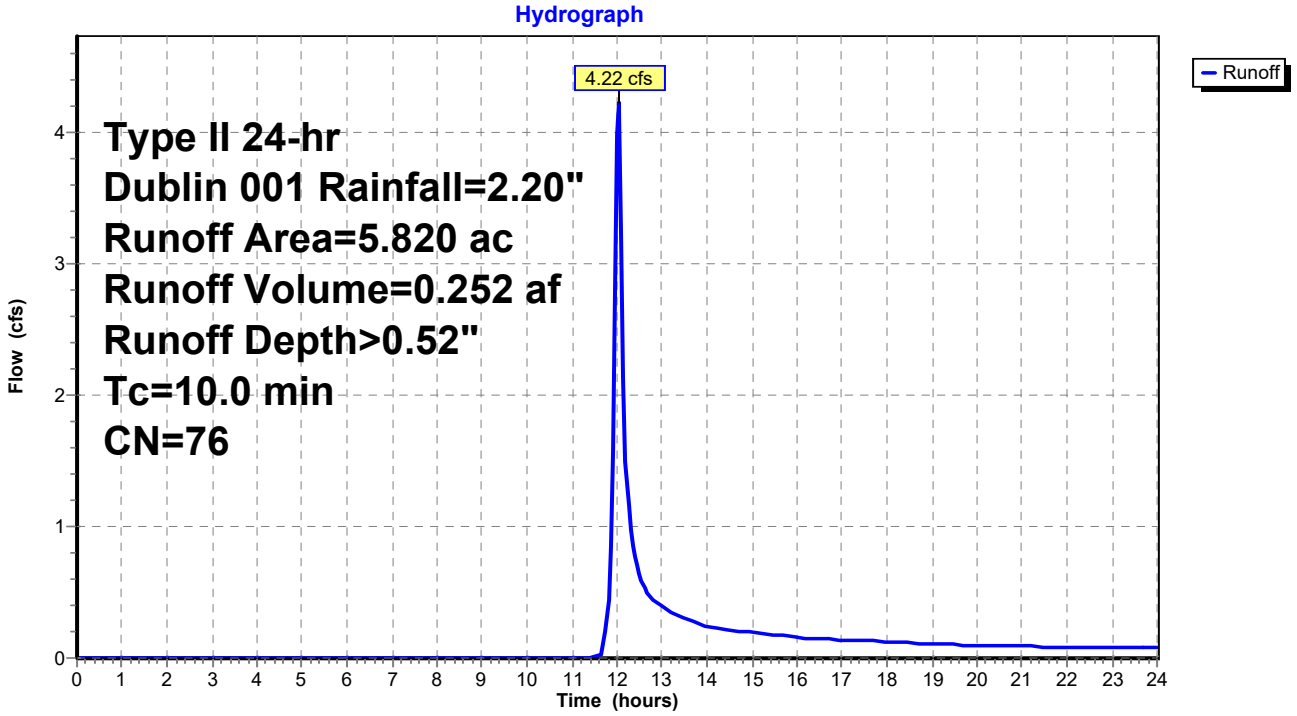
Runoff = 4.22 cfs @ 12.03 hrs, Volume= 0.252 af, Depth> 0.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Dublin 001 Rainfall=2.20"

	Area (ac)	CN	Description
*	5.820	76	
	5.820		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry,**

Subcatchment 250: 250



Summary for Subcatchment 260: 260

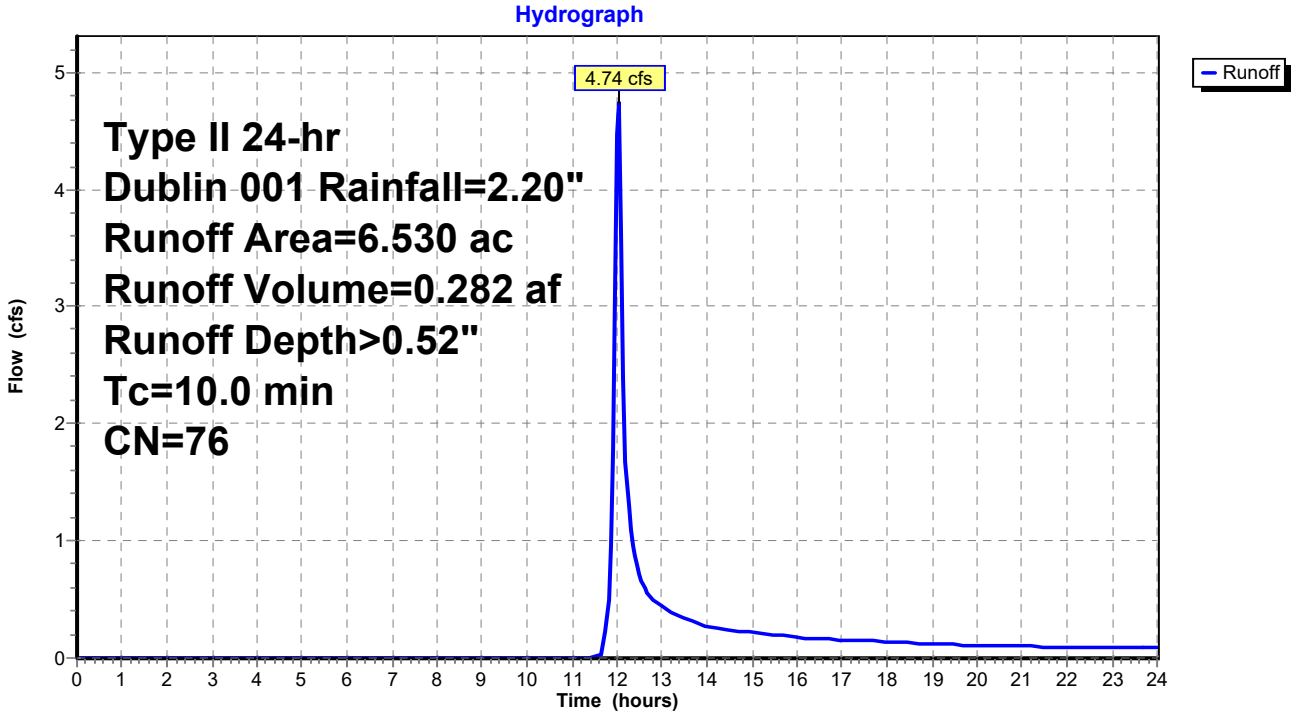
Runoff = 4.74 cfs @ 12.03 hrs, Volume= 0.282 af, Depth> 0.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Dublin 001 Rainfall=2.20"

	Area (ac)	CN	Description
*	6.530	76	
	6.530		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry,**

Subcatchment 260: 260



Summary for Subcatchment 270: 270

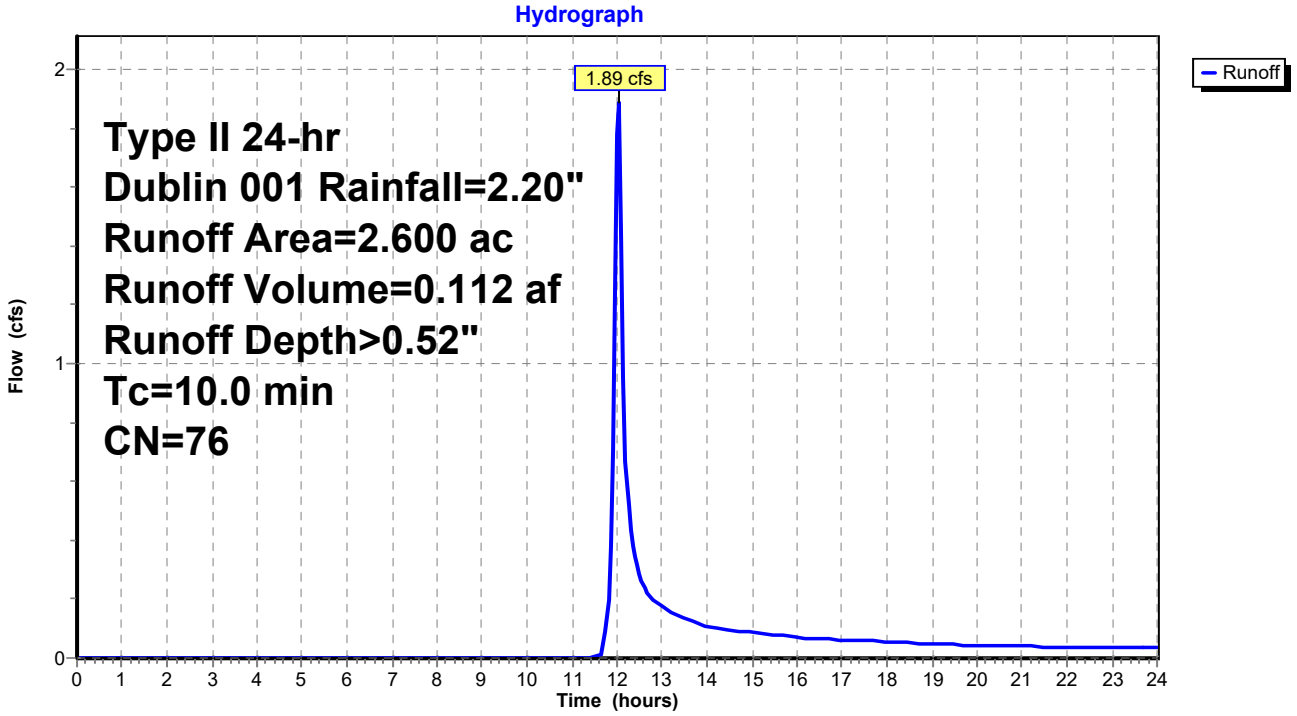
Runoff = 1.89 cfs @ 12.03 hrs, Volume= 0.112 af, Depth> 0.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Dublin 001 Rainfall=2.20"

	Area (ac)	CN	Description
*	2.600	76	
	2.600		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry,**

Subcatchment 270: 270



Summary for Subcatchment 250: 250

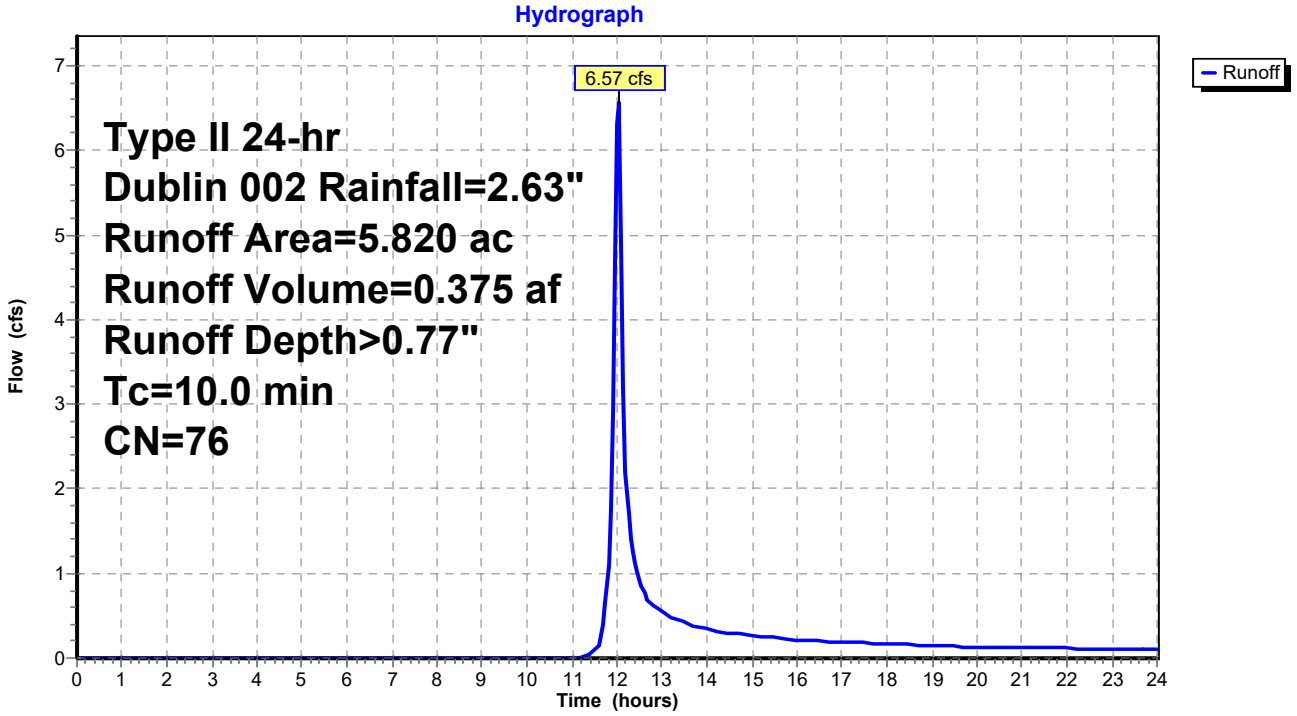
Runoff = 6.57 cfs @ 12.03 hrs, Volume= 0.375 af, Depth> 0.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Dublin 002 Rainfall=2.63"

	Area (ac)	CN	Description
*	5.820	76	
	5.820		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry,**

Subcatchment 250: 250



Summary for Subcatchment 260: 260

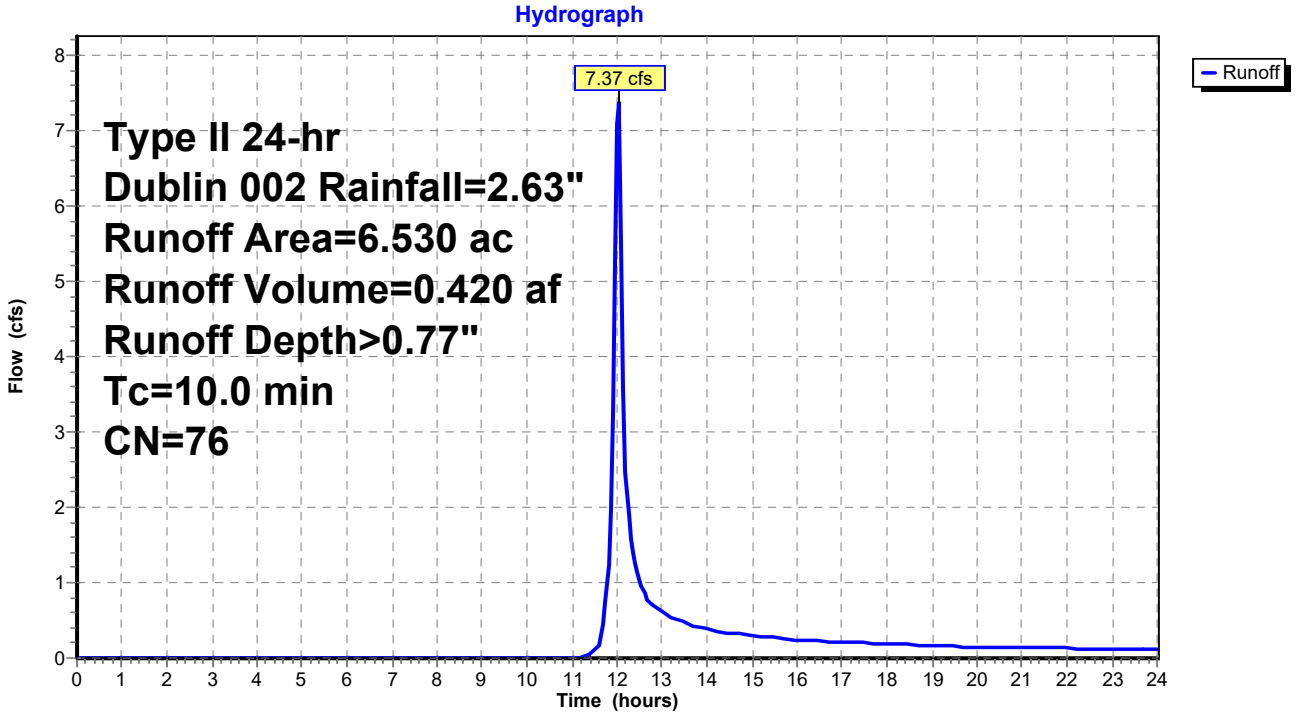
Runoff = 7.37 cfs @ 12.03 hrs, Volume= 0.420 af, Depth> 0.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Dublin 002 Rainfall=2.63"

	Area (ac)	CN	Description
*	6.530	76	
	6.530		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry,**

Subcatchment 260: 260



Summary for Subcatchment 270: 270

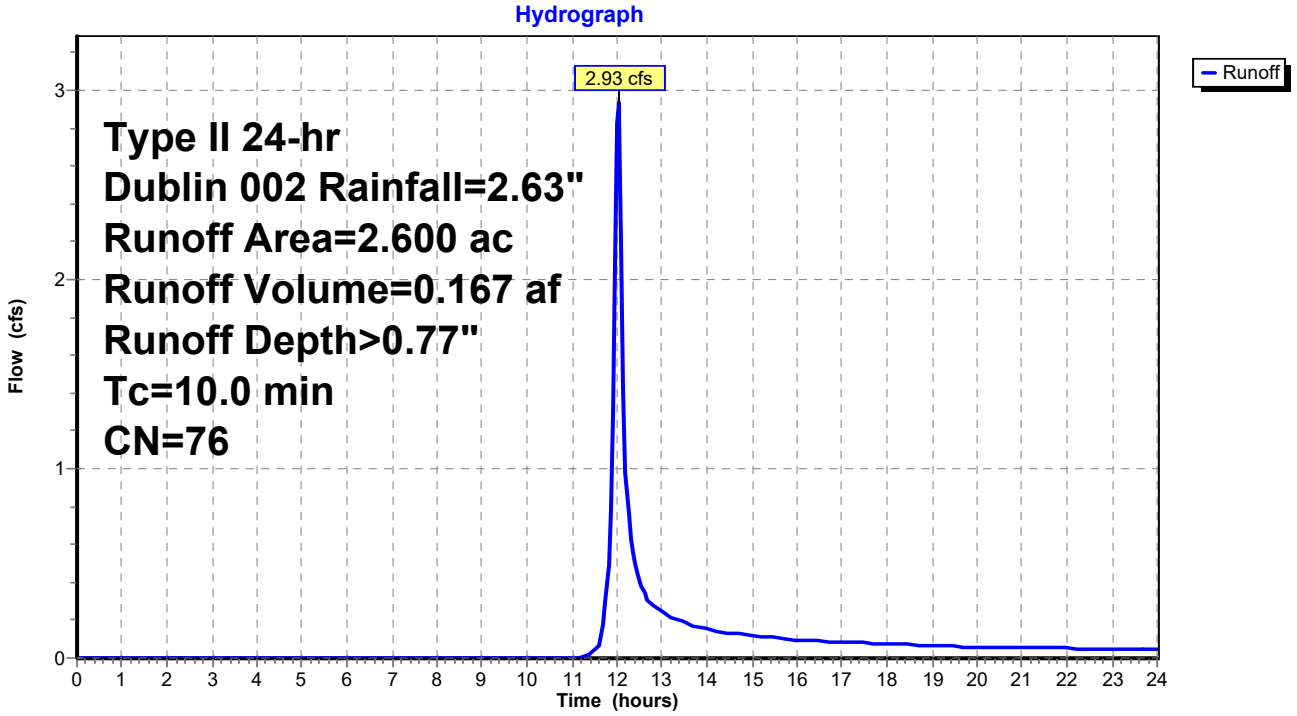
Runoff = 2.93 cfs @ 12.03 hrs, Volume= 0.167 af, Depth> 0.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Dublin 002 Rainfall=2.63"

	Area (ac)	CN	Description
*	2.600	76	
	2.600		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry,**

Subcatchment 270: 270



Summary for Subcatchment 250: 250

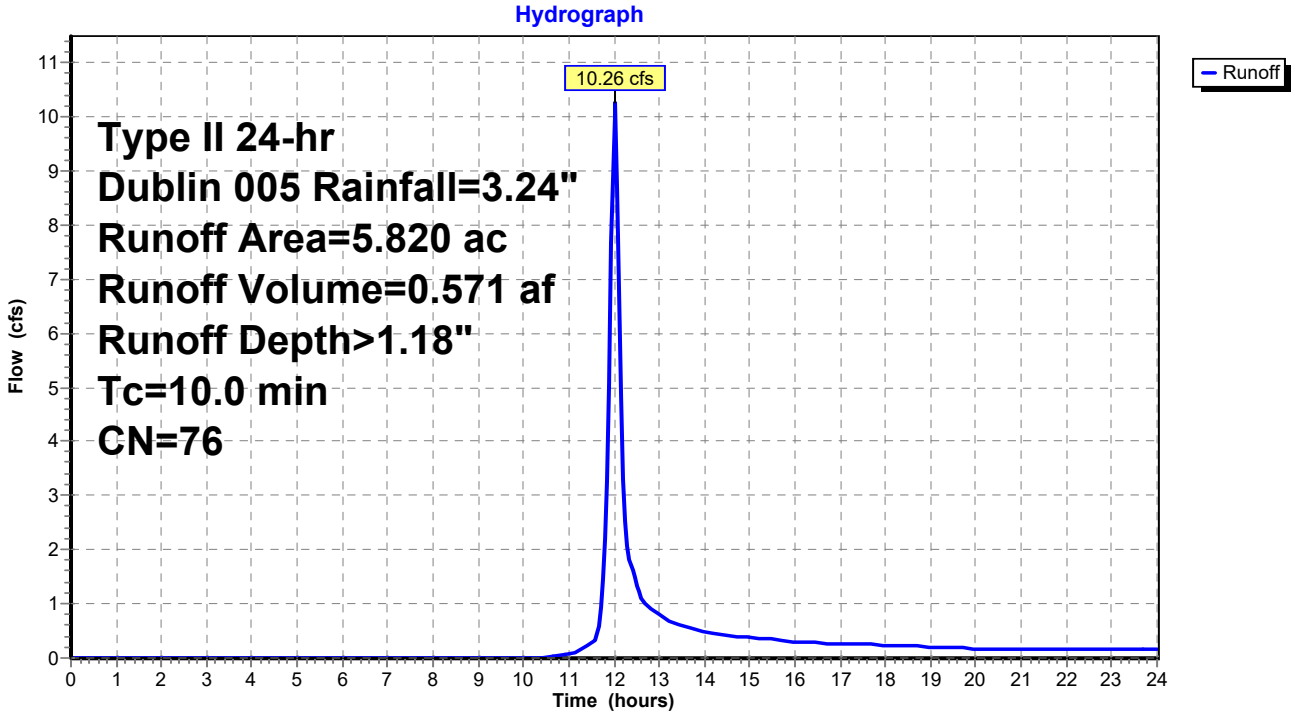
Runoff = 10.26 cfs @ 12.02 hrs, Volume= 0.571 af, Depth> 1.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Dublin 005 Rainfall=3.24"

	Area (ac)	CN	Description
*	5.820	76	
	5.820		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry,**

Subcatchment 250: 250



Summary for Subcatchment 260: 260

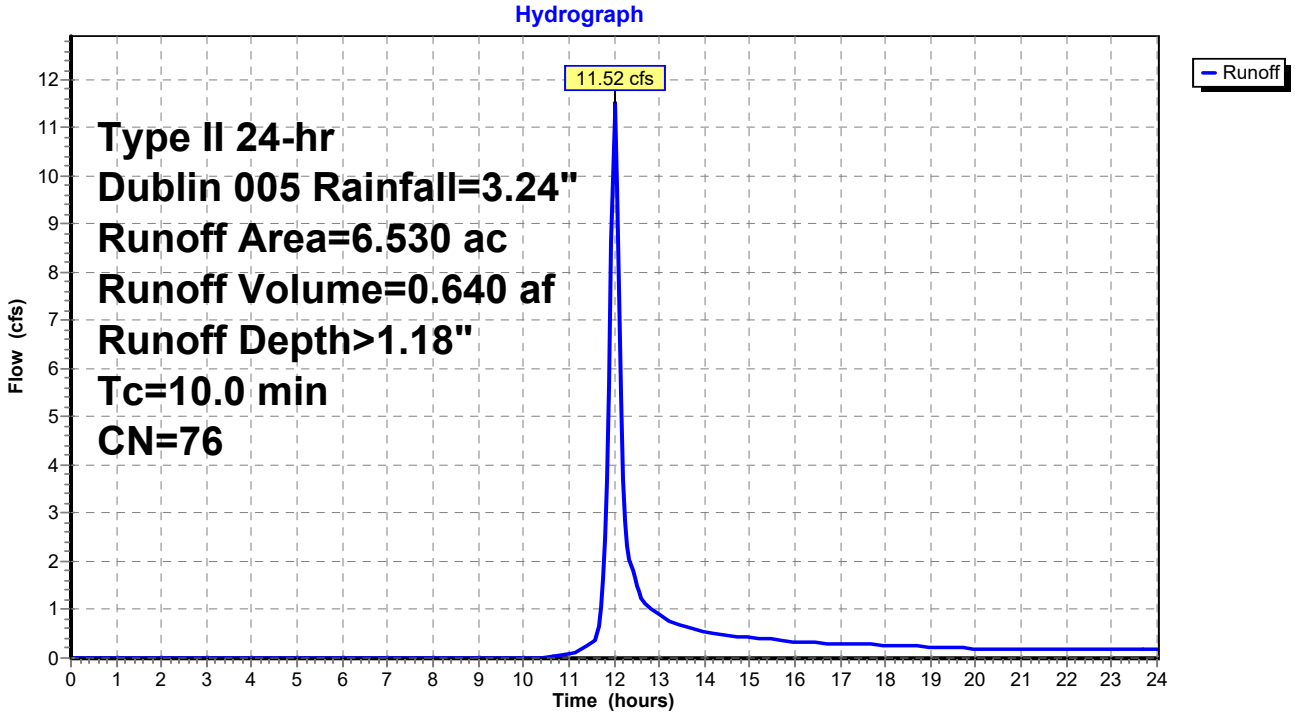
Runoff = 11.52 cfs @ 12.02 hrs, Volume= 0.640 af, Depth> 1.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Dublin 005 Rainfall=3.24"

	Area (ac)	CN	Description
*	6.530	76	
	6.530		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry,**

Subcatchment 260: 260



Summary for Subcatchment 270: 270

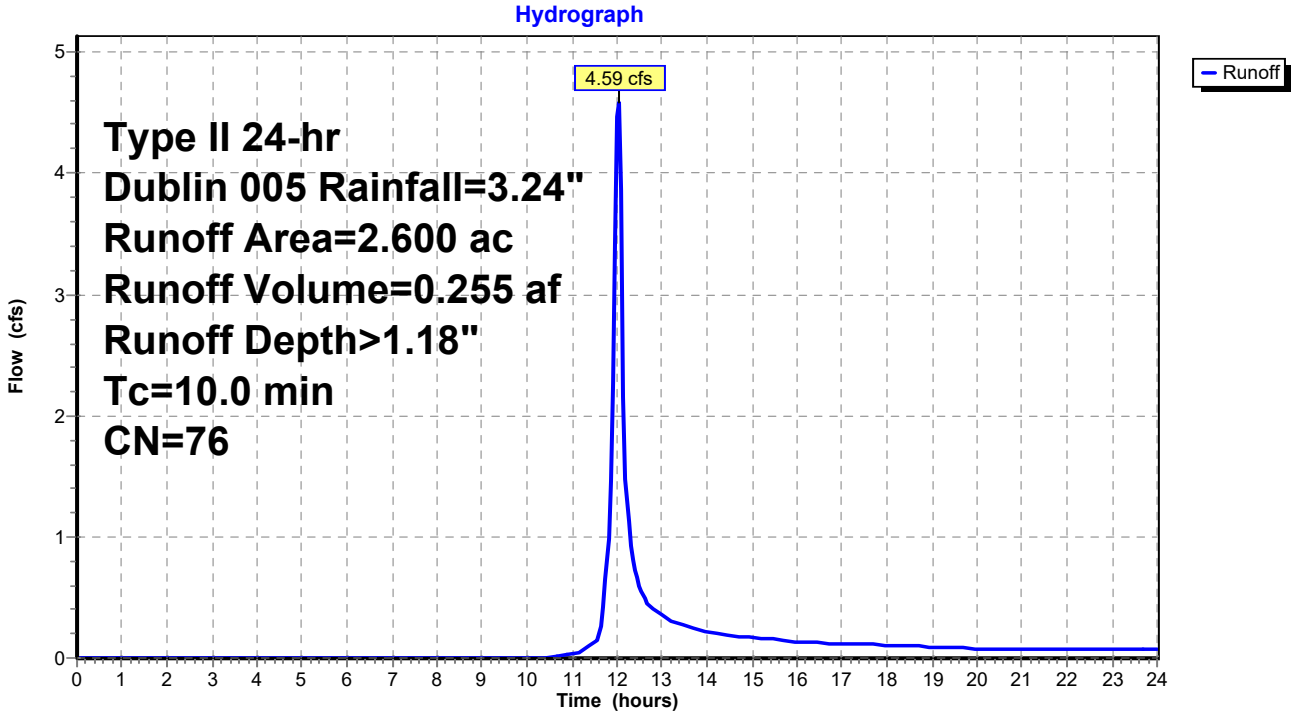
Runoff = 4.59 cfs @ 12.02 hrs, Volume= 0.255 af, Depth> 1.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Dublin 005 Rainfall=3.24"

	Area (ac)	CN	Description
*	2.600	76	
	2.600		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry,**

Subcatchment 270: 270



Summary for Subcatchment 250: 250

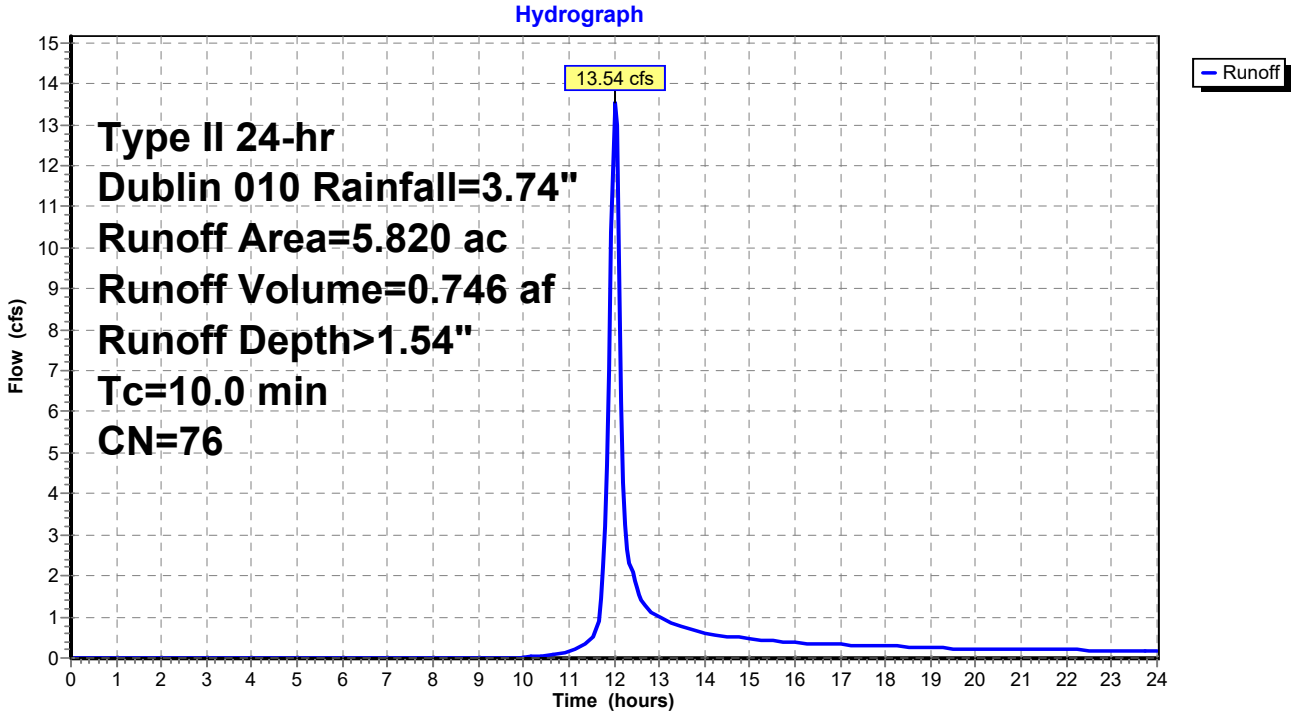
Runoff = 13.54 cfs @ 12.02 hrs, Volume= 0.746 af, Depth> 1.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Dublin 010 Rainfall=3.74"

	Area (ac)	CN	Description
*	5.820	76	
	5.820		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry,**

Subcatchment 250: 250



Summary for Subcatchment 260: 260

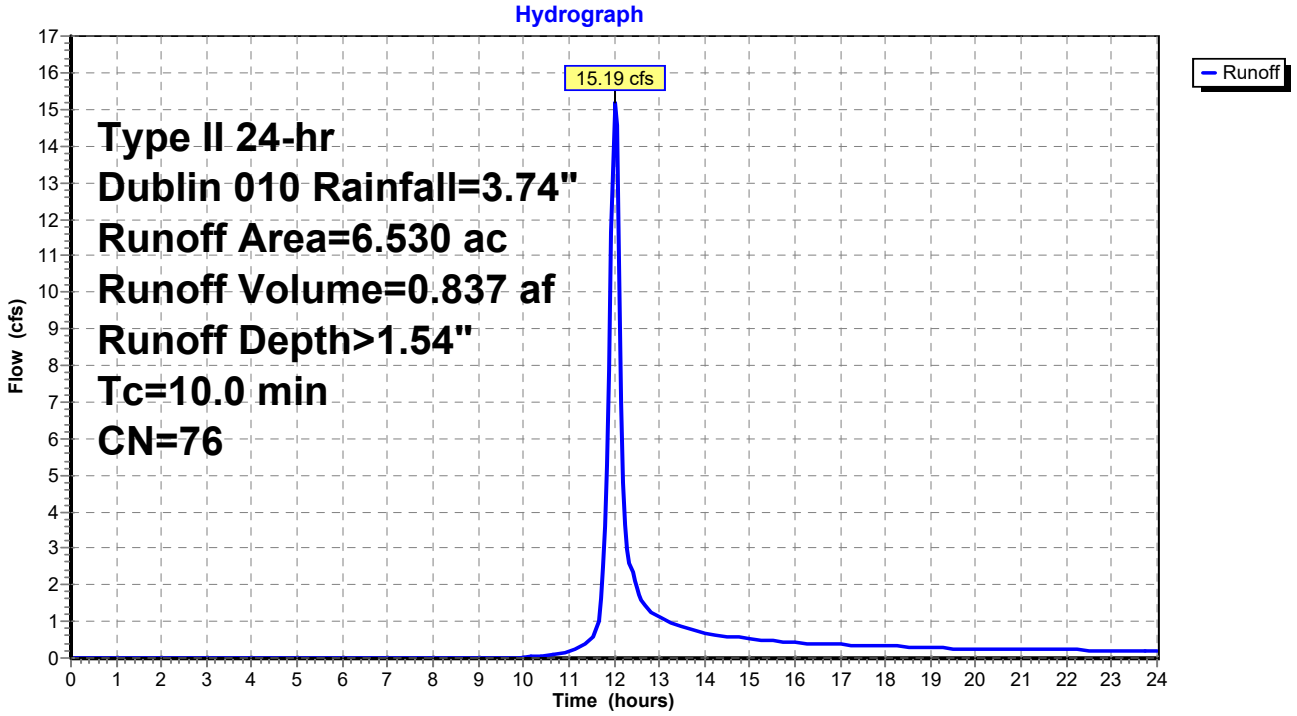
Runoff = 15.19 cfs @ 12.02 hrs, Volume= 0.837 af, Depth> 1.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Dublin 010 Rainfall=3.74"

	Area (ac)	CN	Description
*	6.530	76	
	6.530		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry,**

Subcatchment 260: 260



Summary for Subcatchment 270: 270

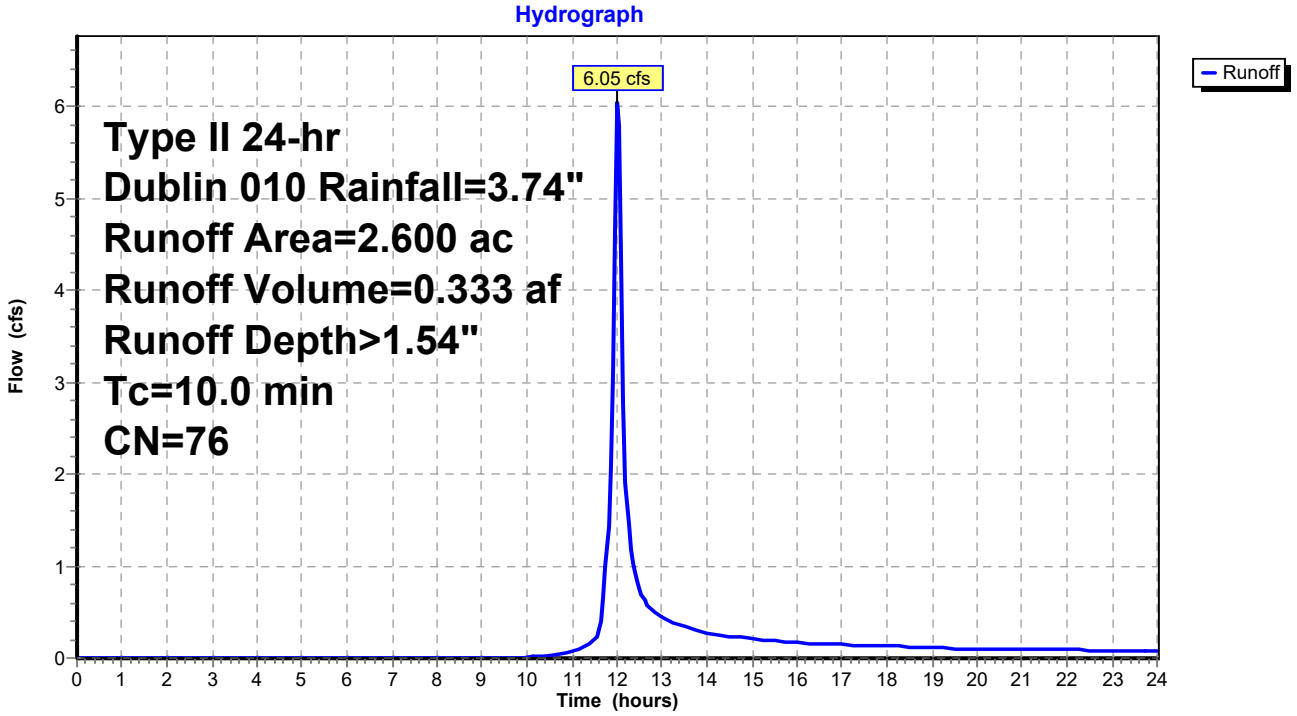
Runoff = 6.05 cfs @ 12.02 hrs, Volume= 0.333 af, Depth> 1.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Dublin 010 Rainfall=3.74"

	Area (ac)	CN	Description
*	2.600	76	
	2.600		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry,**

Subcatchment 270: 270



Summary for Subcatchment 250: 250

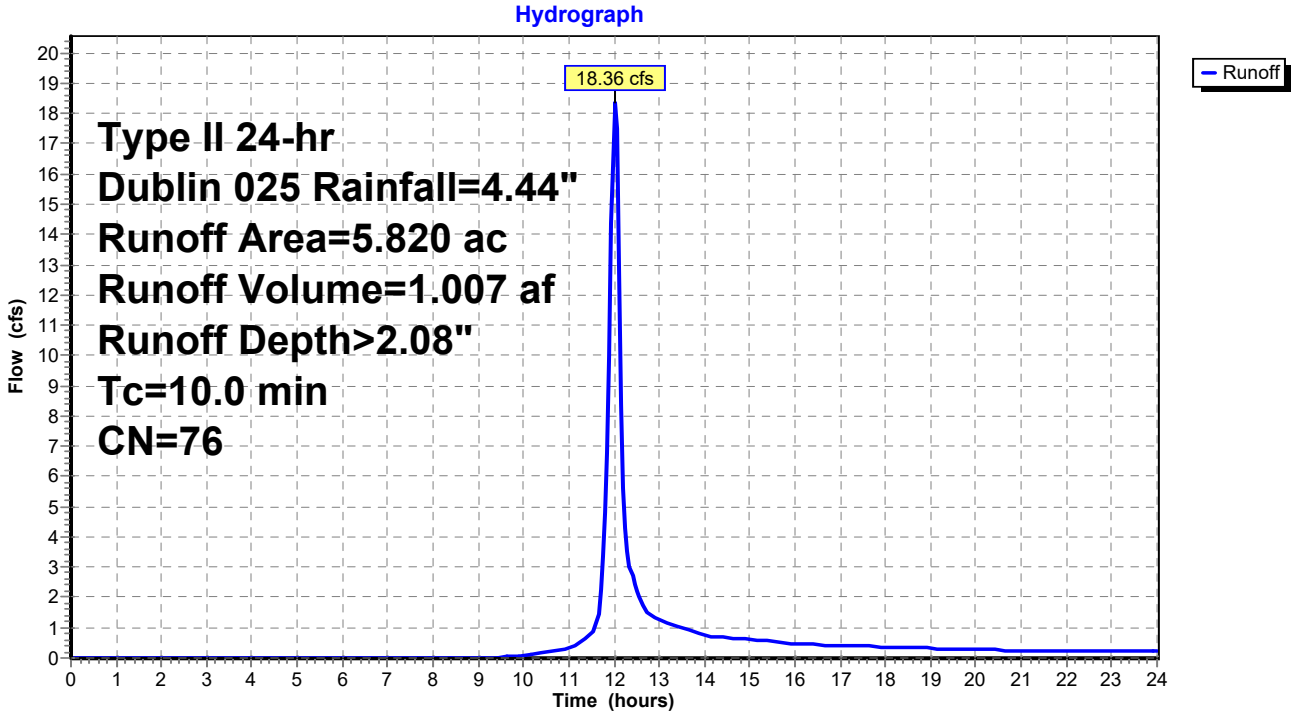
Runoff = 18.36 cfs @ 12.02 hrs, Volume= 1.007 af, Depth> 2.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Dublin 025 Rainfall=4.44"

	Area (ac)	CN	Description
*	5.820	76	
	5.820		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry,**

Subcatchment 250: 250



Summary for Subcatchment 260: 260

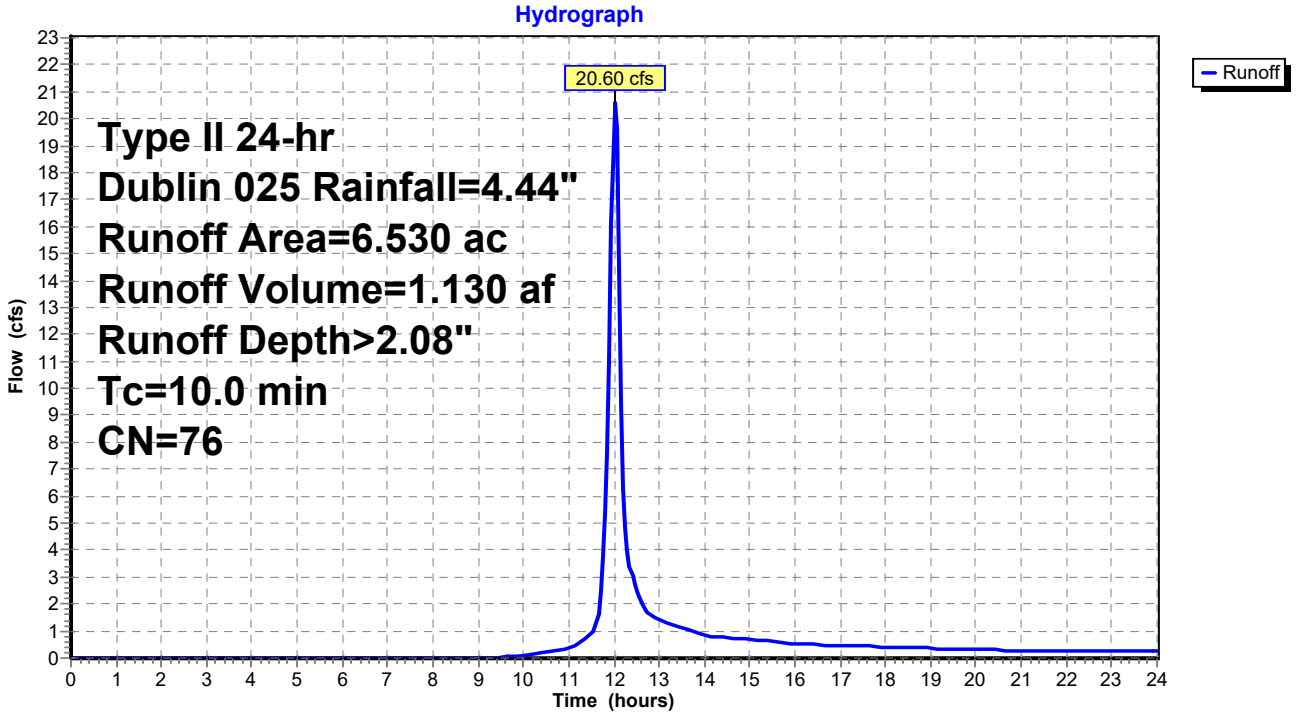
Runoff = 20.60 cfs @ 12.02 hrs, Volume= 1.130 af, Depth> 2.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Dublin 025 Rainfall=4.44"

	Area (ac)	CN	Description
*	6.530	76	
	6.530		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry,**

Subcatchment 260: 260



Summary for Subcatchment 270: 270

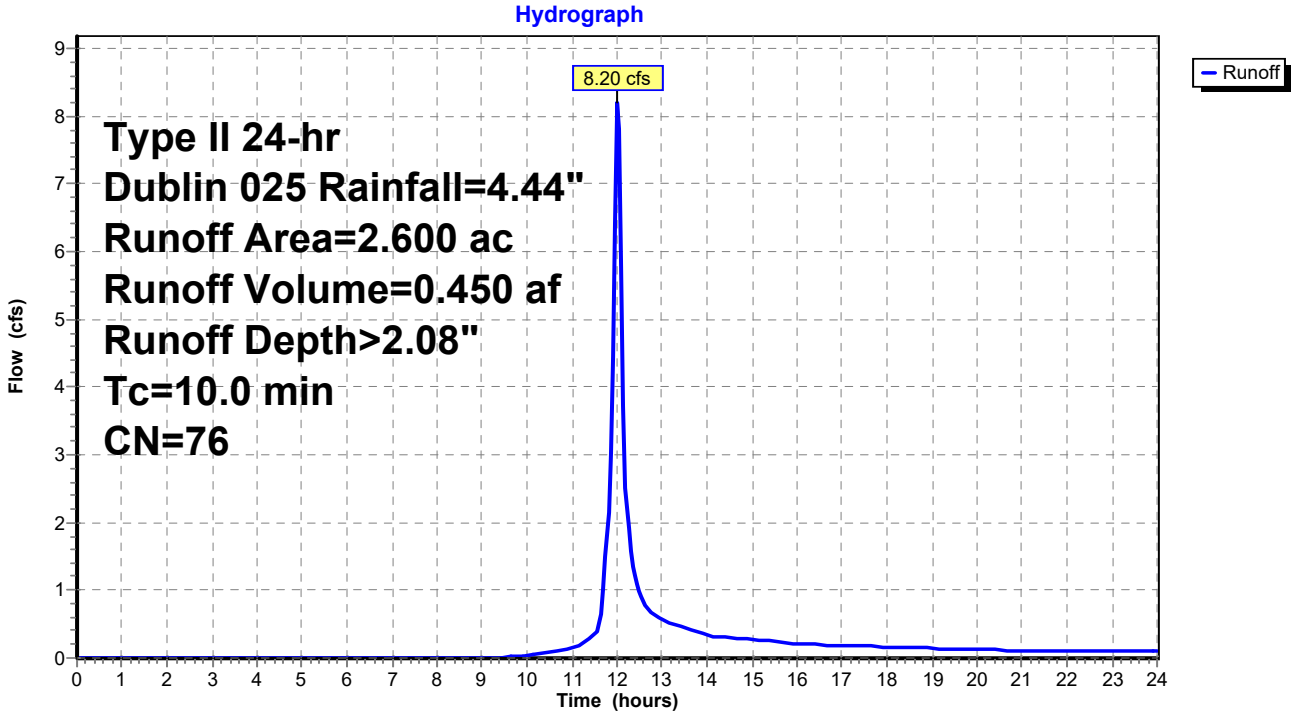
Runoff = 8.20 cfs @ 12.02 hrs, Volume= 0.450 af, Depth> 2.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Dublin 025 Rainfall=4.44"

	Area (ac)	CN	Description
*	2.600	76	
	2.600		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry,**

Subcatchment 270: 270



Summary for Subcatchment 250: 250

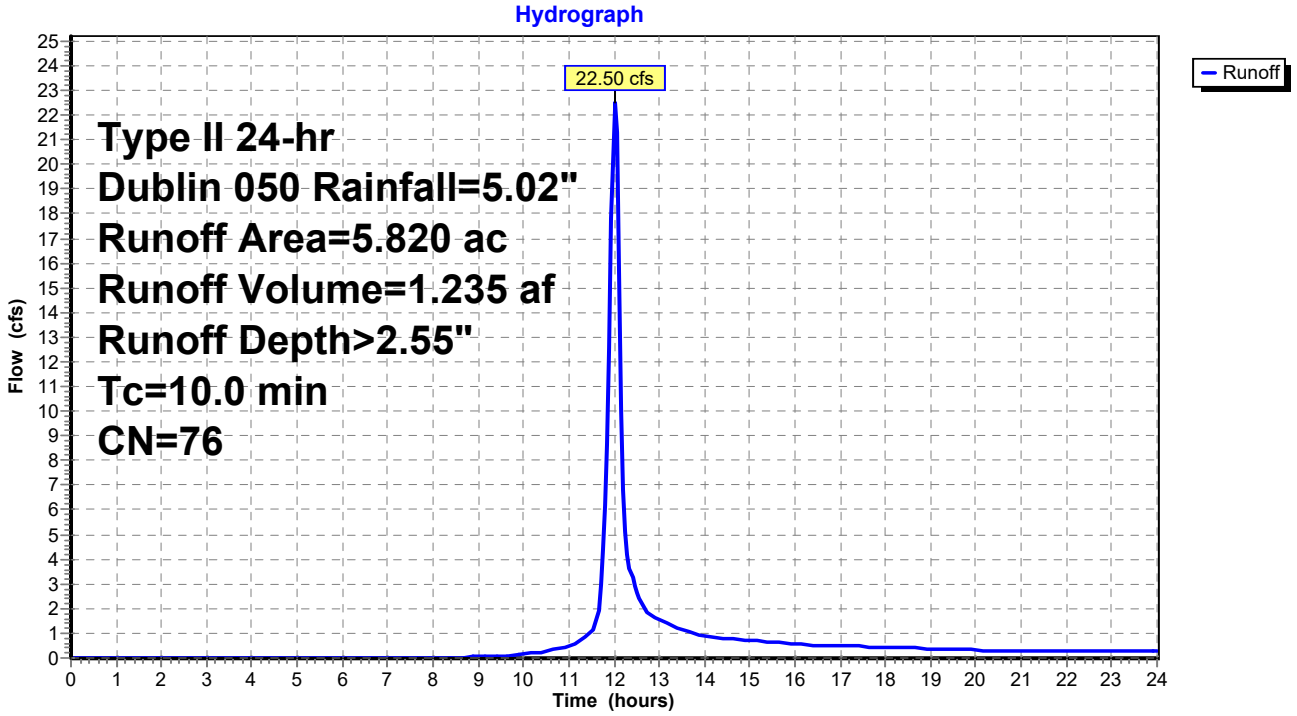
Runoff = 22.50 cfs @ 12.02 hrs, Volume= 1.235 af, Depth> 2.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Dublin 050 Rainfall=5.02"

	Area (ac)	CN	Description
*	5.820	76	
	5.820		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry,**

Subcatchment 250: 250



Summary for Subcatchment 260: 260

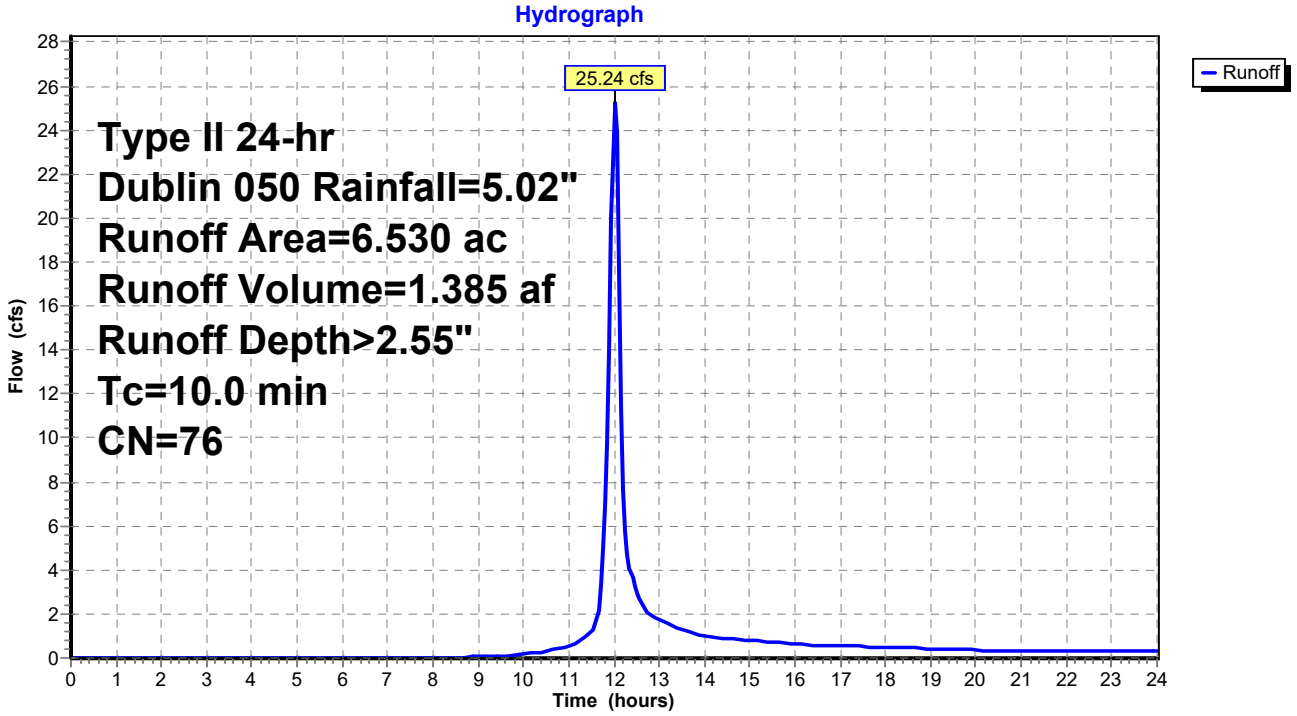
Runoff = 25.24 cfs @ 12.02 hrs, Volume= 1.385 af, Depth> 2.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Dublin 050 Rainfall=5.02"

	Area (ac)	CN	Description
*	6.530	76	
	6.530		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry,**

Subcatchment 260: 260



Summary for Subcatchment 270: 270

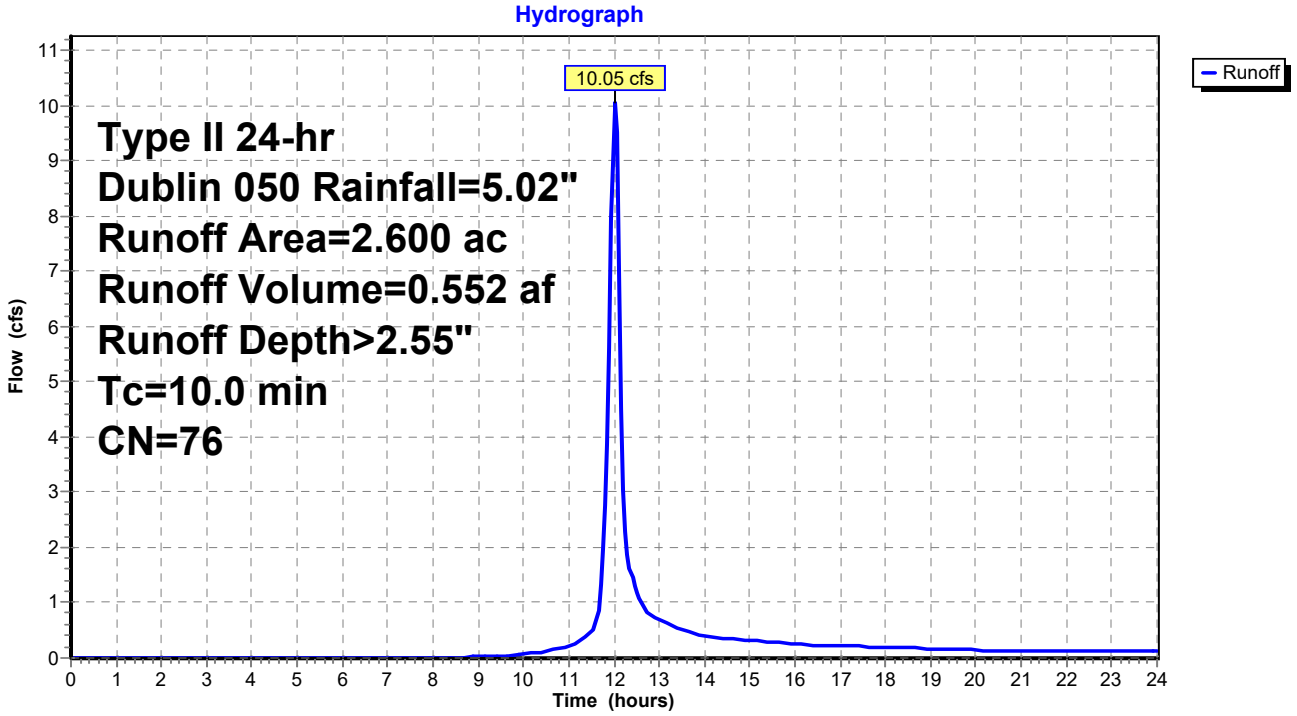
Runoff = 10.05 cfs @ 12.02 hrs, Volume= 0.552 af, Depth> 2.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Dublin 050 Rainfall=5.02"

	Area (ac)	CN	Description
*	2.600	76	
	2.600		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry,**

Subcatchment 270: 270



Summary for Subcatchment 250: 250

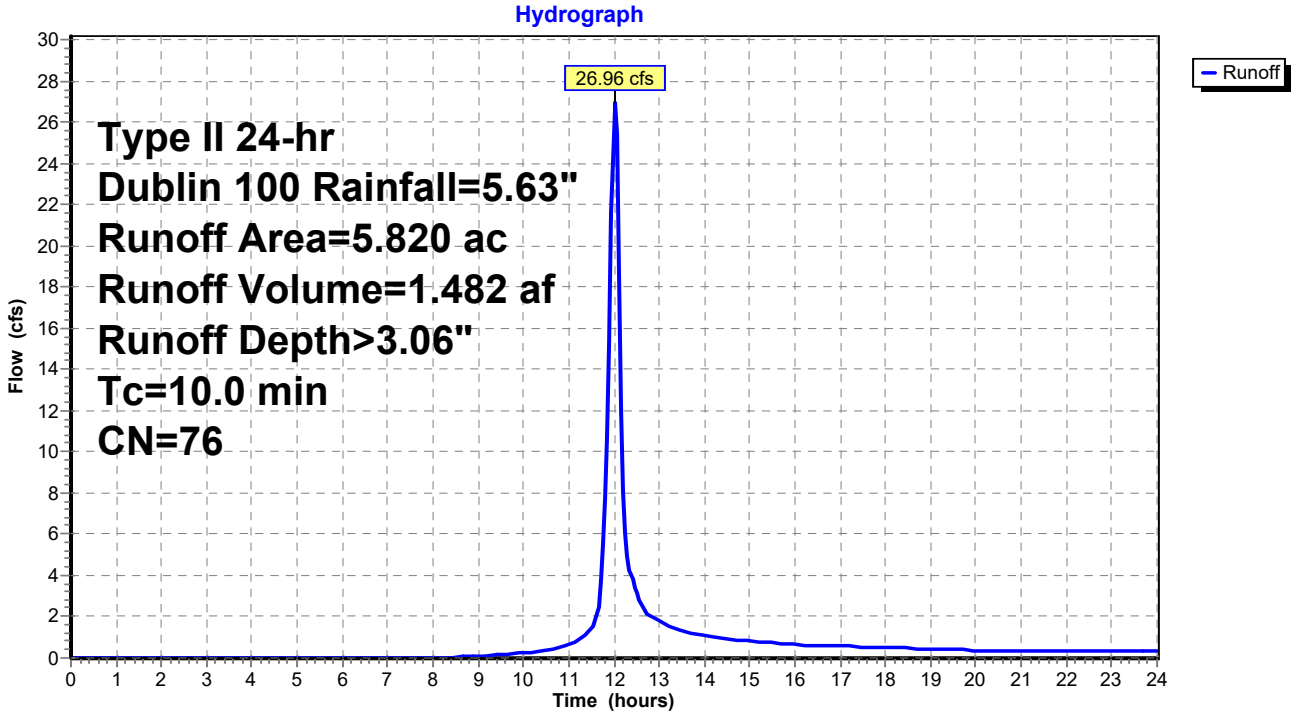
Runoff = 26.96 cfs @ 12.02 hrs, Volume= 1.482 af, Depth> 3.06"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Dublin 100 Rainfall=5.63"

	Area (ac)	CN	Description
*	5.820	76	
	5.820		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry,**

Subcatchment 250: 250



Summary for Subcatchment 260: 260

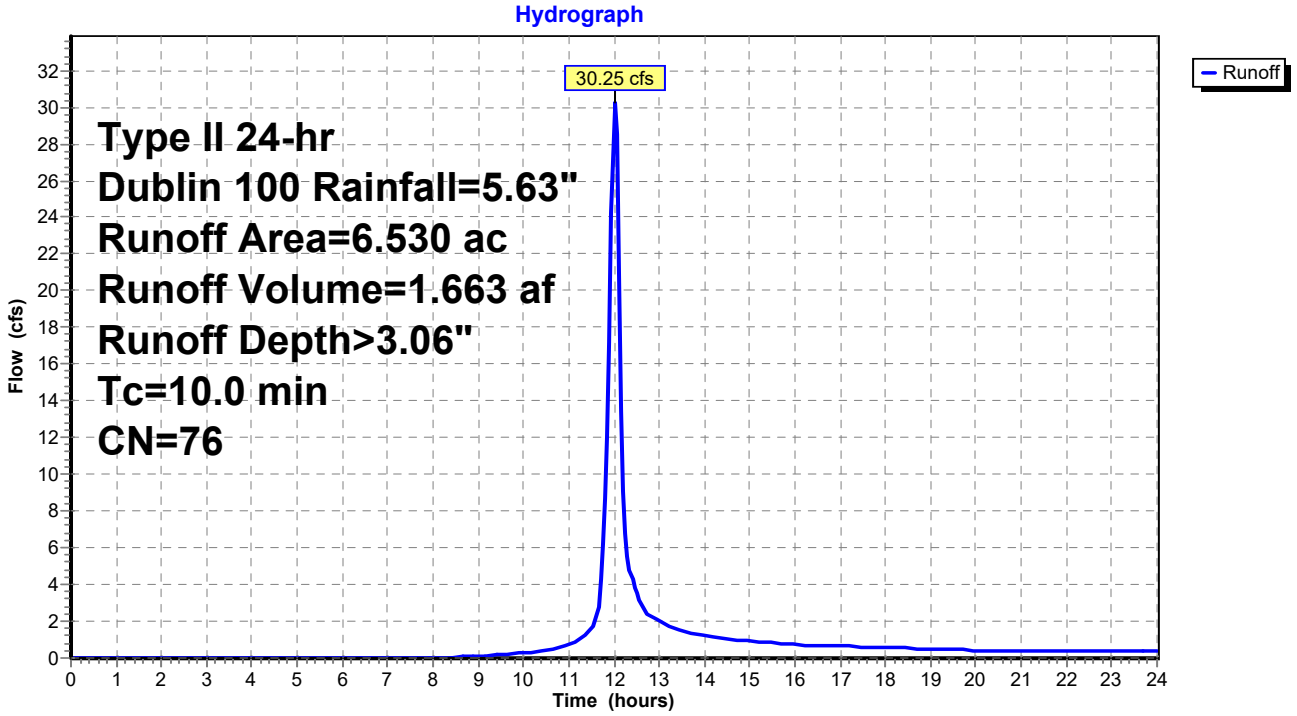
Runoff = 30.25 cfs @ 12.02 hrs, Volume= 1.663 af, Depth> 3.06"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Dublin 100 Rainfall=5.63"

	Area (ac)	CN	Description
*	6.530	76	
	6.530		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry,**

Subcatchment 260: 260



Summary for Subcatchment 270: 270

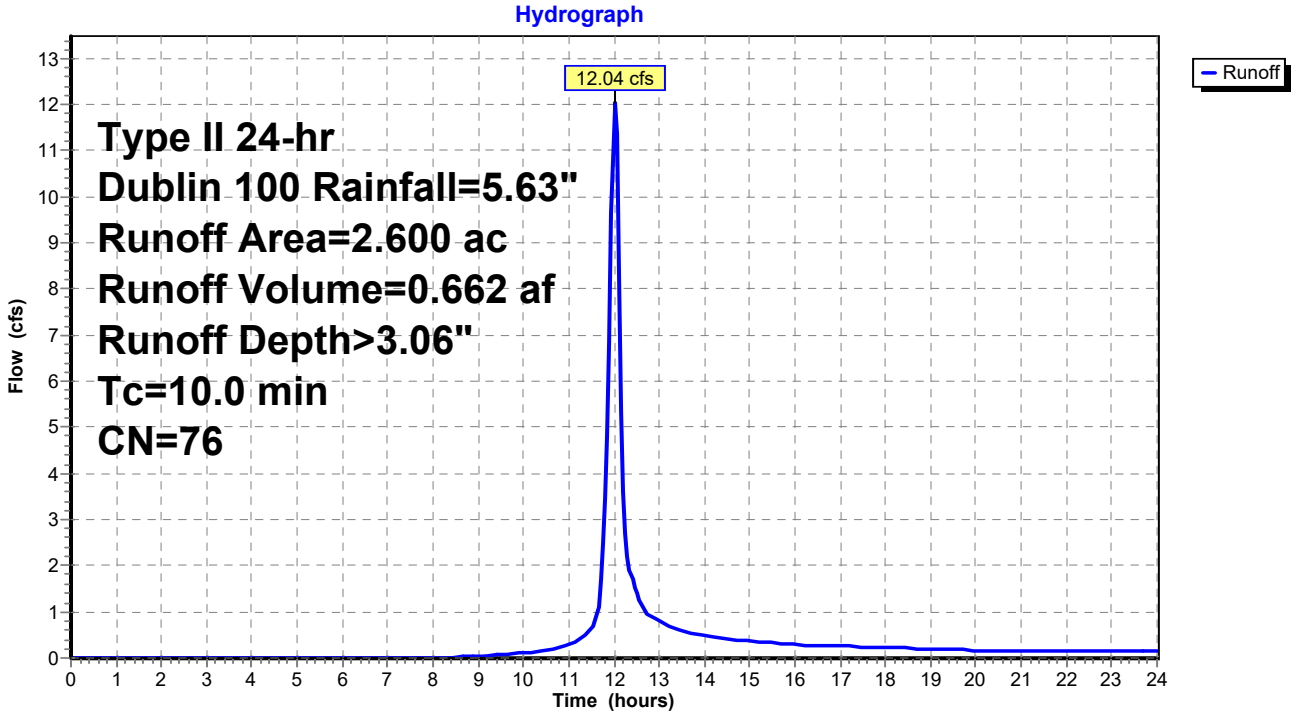
Runoff = 12.04 cfs @ 12.02 hrs, Volume= 0.662 af, Depth> 3.06"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Dublin 100 Rainfall=5.63"

	Area (ac)	CN	Description
*	2.600	76	
	2.600		100.00% Pervious Area

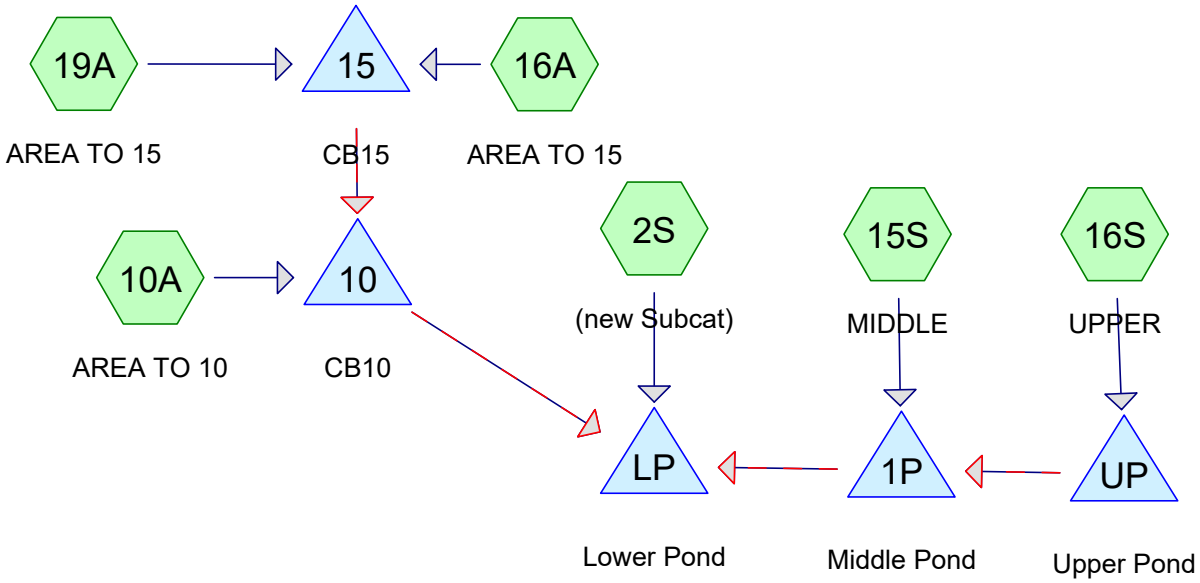
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry,**

Subcatchment 270: 270



APPENDIX C

POST-DEVELOPED HYDROCAD CALCULATIONS



Subcat Reach Pond Link

Routing Diagram for 2023-05-18
Prepared by Advanced Civil Design, Inc, Printed 10/24/2023

Summary for Subcatchment 2S: (new Subcat)

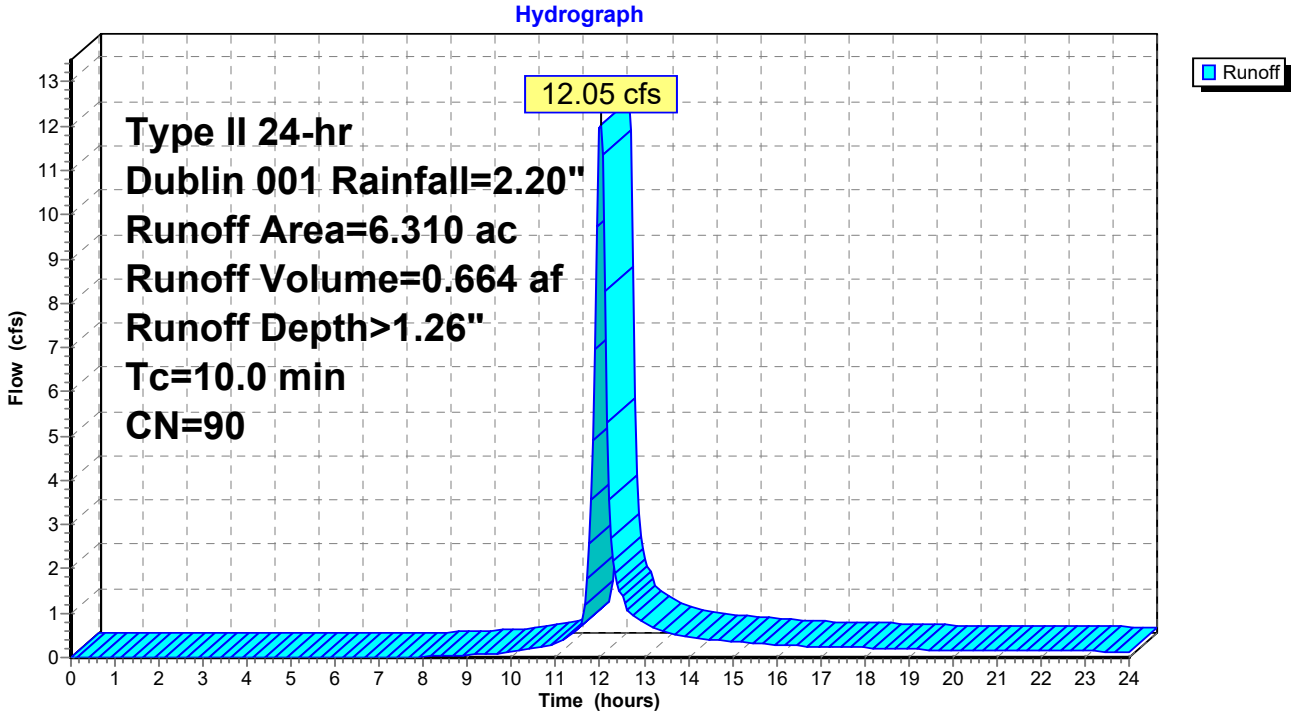
Runoff = 12.05 cfs @ 12.01 hrs, Volume= 0.664 af, Depth> 1.26"
Routed to Pond LP : Lower Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Dublin 001 Rainfall=2.20"

	Area (ac)	CN	Description
*	6.310	90	
	6.310		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry, Storm Sewer**

Subcatchment 2S: (new Subcat)



Summary for Subcatchment 10A: AREA TO 10

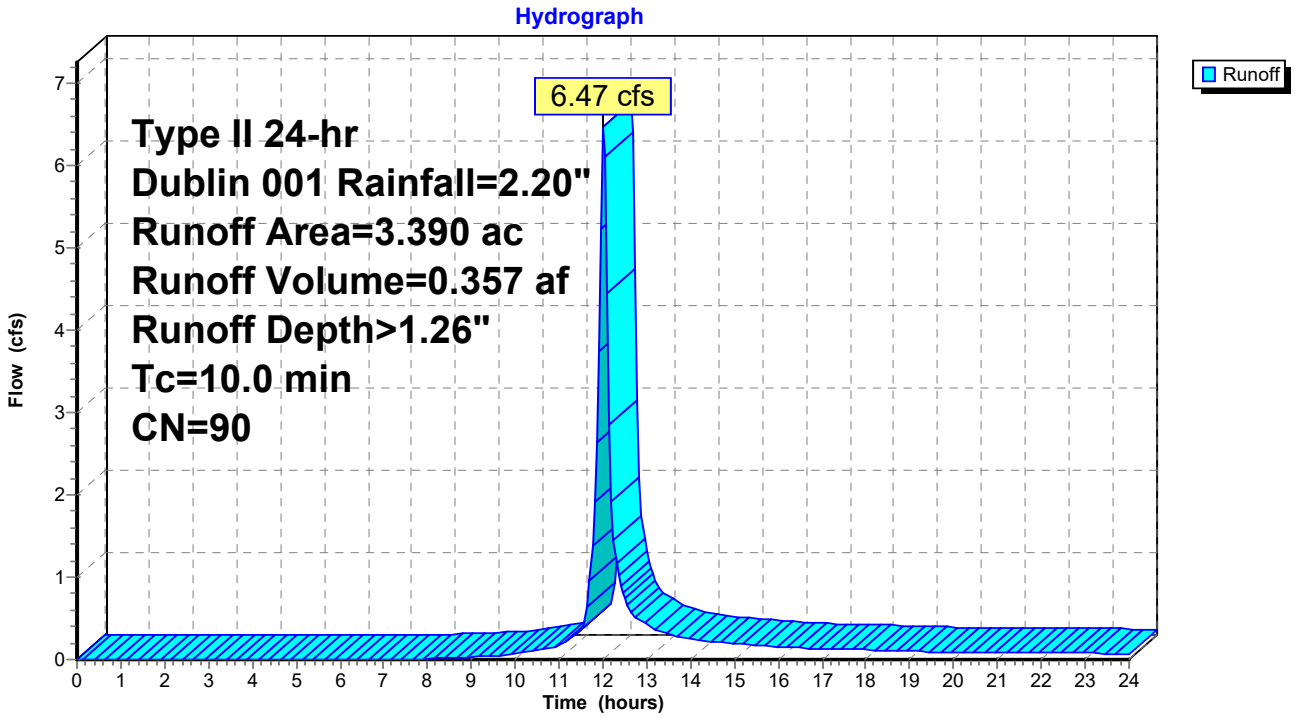
Runoff = 6.47 cfs @ 12.01 hrs, Volume= 0.357 af, Depth> 1.26"
Routed to Pond 10 : CB10

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Dublin 001 Rainfall=2.20"

	Area (ac)	CN	Description
*	3.140	90	
*	0.250	90	FROM 38
	3.390	90	Weighted Average
	3.390		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry,**

Subcatchment 10A: AREA TO 10



Summary for Subcatchment 15S: MIDDLE

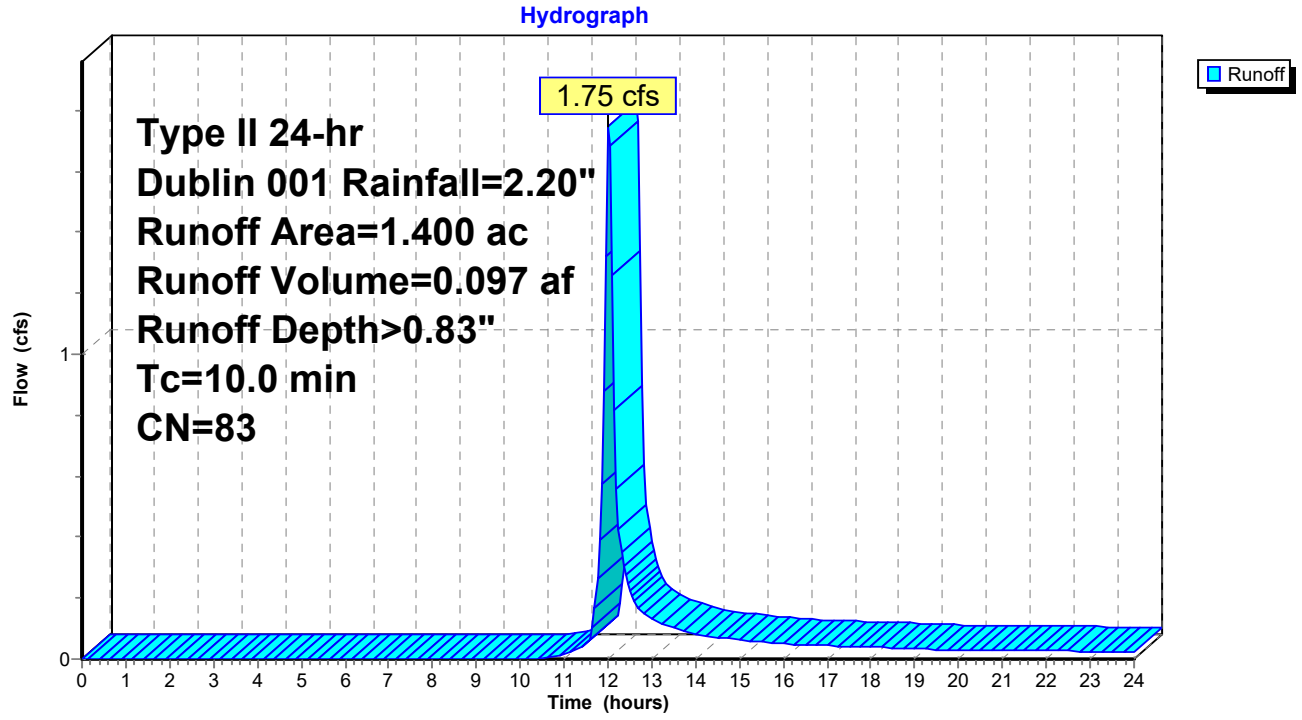
Runoff = 1.75 cfs @ 12.02 hrs, Volume= 0.097 af, Depth> 0.83"
Routed to Pond 1P : Middle Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Dublin 001 Rainfall=2.20"

	Area (ac)	CN	Description
*	0.890	74	
*	0.510	98	
	1.400	83	Weighted Average
	0.890		63.57% Pervious Area
	0.510		36.43% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry, Storm Sewer Pipe**

Subcatchment 15S: MIDDLE



Summary for Subcatchment 16A: AREA TO 15

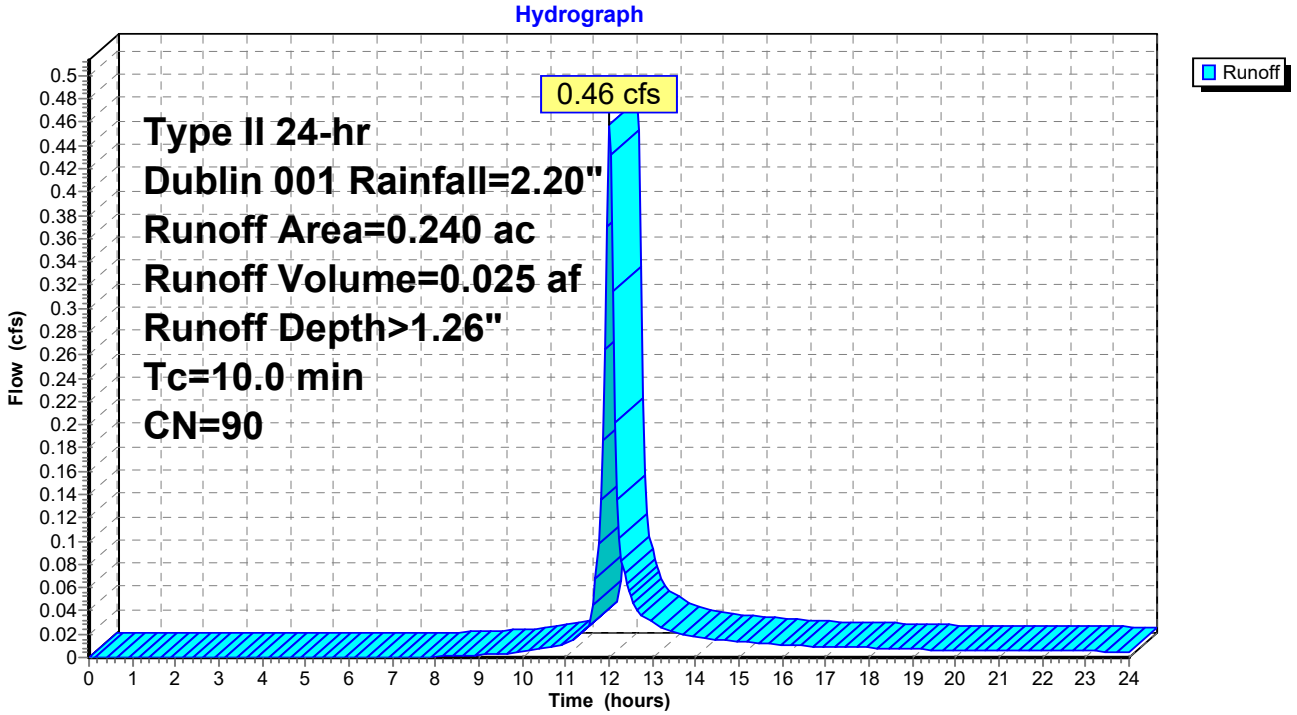
Runoff = 0.46 cfs @ 12.01 hrs, Volume= 0.025 af, Depth> 1.26"
Routed to Pond 15 : CB15

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Dublin 001 Rainfall=2.20"

	Area (ac)	CN	Description
*	0.240	90	
	0.240		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry,**

Subcatchment 16A: AREA TO 15



Summary for Subcatchment 16S: UPPER

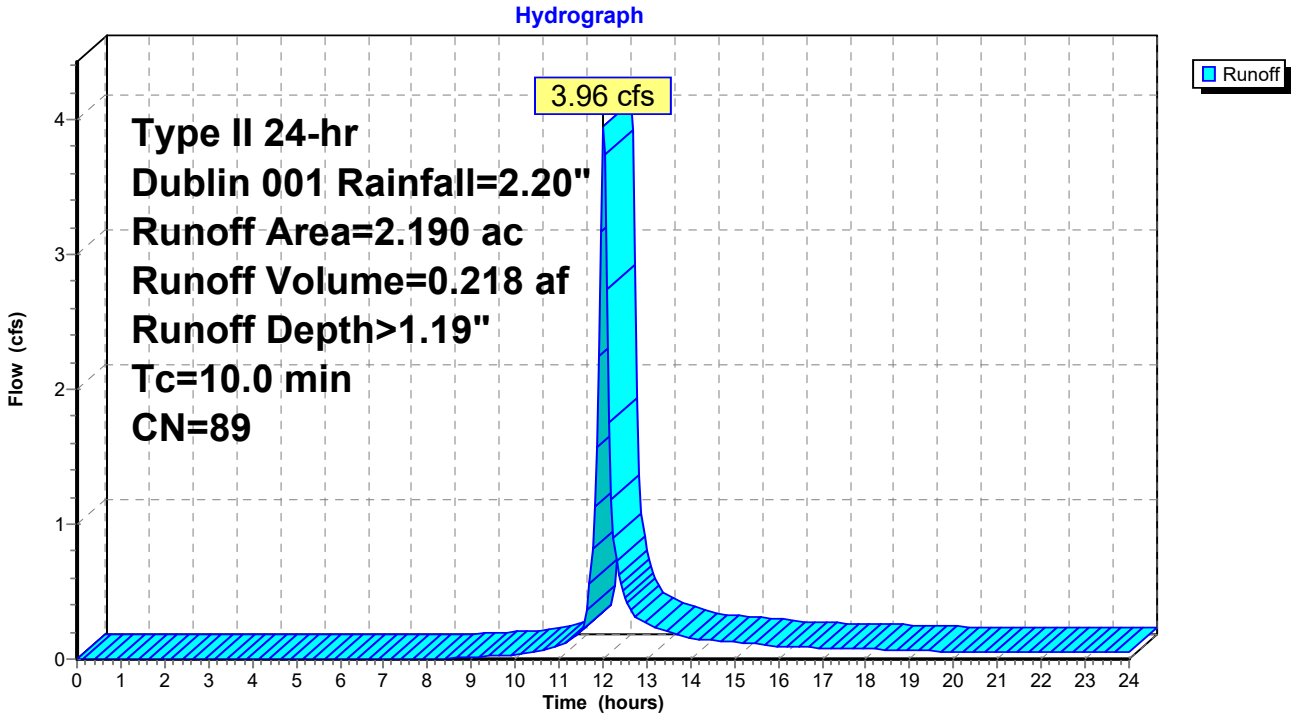
Runoff = 3.96 cfs @ 12.02 hrs, Volume= 0.218 af, Depth> 1.19"
Routed to Pond UP : Upper Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Dublin 001 Rainfall=2.20"

	Area (ac)	CN	Description
*	0.850	74	
*	1.340	98	
	2.190	89	Weighted Average
	0.850		38.81% Pervious Area
	1.340		61.19% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry, Overland**

Subcatchment 16S: UPPER



Summary for Subcatchment 19A: AREA TO 15

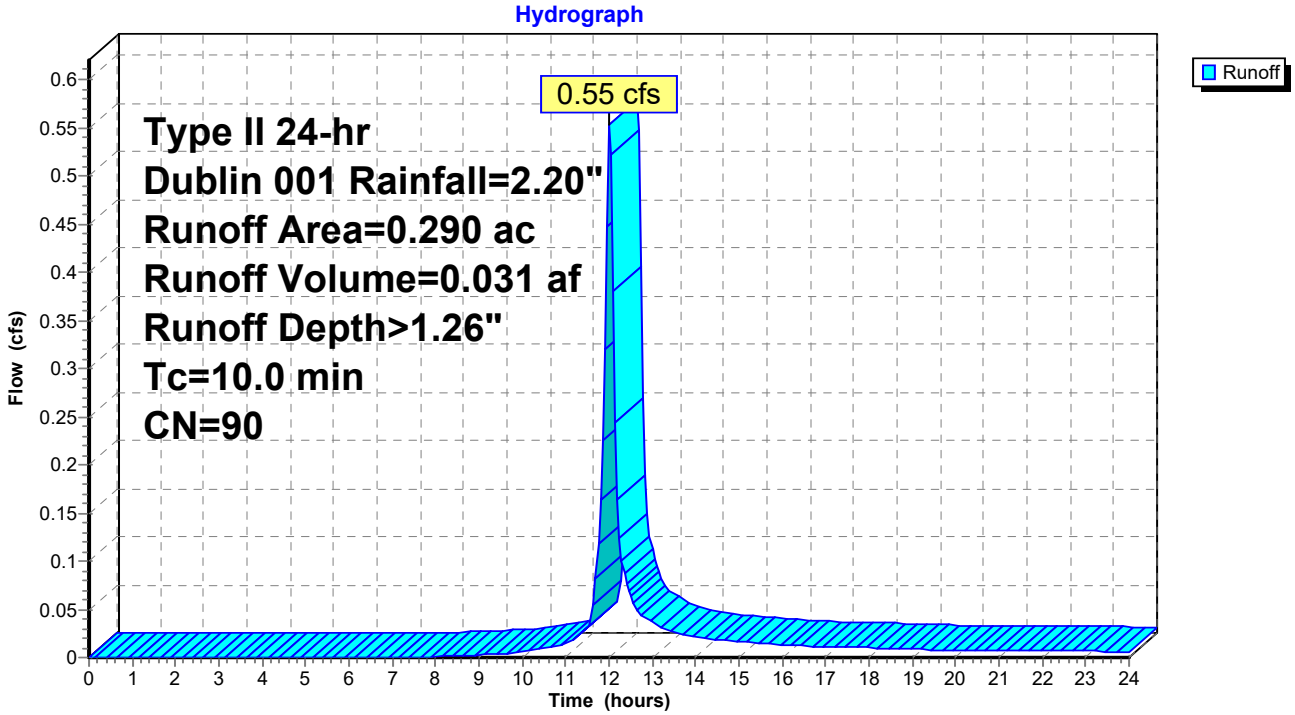
Runoff = 0.55 cfs @ 12.01 hrs, Volume= 0.031 af, Depth> 1.26"
Routed to Pond 15 : CB15

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Dublin 001 Rainfall=2.20"

	Area (ac)	CN	Description
*	0.290	90	
	0.290		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry,**

Subcatchment 19A: AREA TO 15



Summary for Pond 1P: Middle Pond

Inflow Area = 3.590 ac, 51.53% Impervious, Inflow Depth > 0.32" for Dublin 001 event
Inflow = 1.75 cfs @ 12.02 hrs, Volume= 0.097 af
Outflow = 0.10 cfs @ 13.59 hrs, Volume= 0.075 af, Atten= 94%, Lag= 93.8 min
Primary = 0.10 cfs @ 13.59 hrs, Volume= 0.075 af
Routed to Pond LP : Lower Pond
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond LP : Lower Pond

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 891.87' @ 13.59 hrs Surf.Area= 6,148 sf Storage= 2,168 cf

Plug-Flow detention time= 277.6 min calculated for 0.075 af (77% of inflow)
Center-of-Mass det. time= 185.3 min (1,036.3 - 851.0)

Volume	Invert	Avail.Storage	Storage Description
#1	891.50'	48,495 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

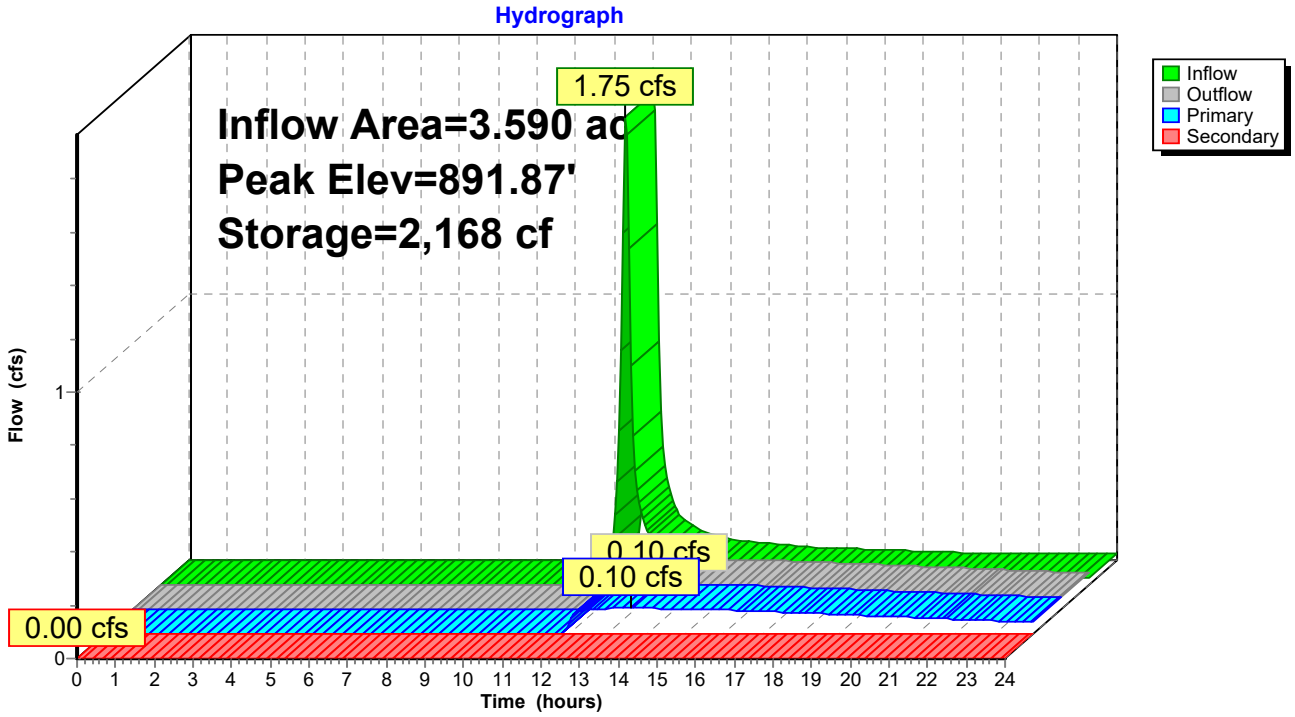
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
891.50	5,673	0	0
892.00	6,321	2,999	2,999
893.00	8,752	7,537	10,535
894.00	11,119	9,936	20,471
895.00	13,980	12,550	33,020
896.00	16,970	15,475	48,495

Device	Routing	Invert	Outlet Devices
#1	Primary	891.50'	**8.0" Round Culvert X 3.00** L= 2.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 891.50' / 891.49' S= 0.0050 '/' Cc= 0.900 n= 0.013, Flow Area= 0.35 sf
#2	Device 1	891.50'	**2.7" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#3	Secondary	895.50'	**20.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Primary OutFlow Max=0.10 cfs @ 13.59 hrs HW=891.87' TW=885.68' (Dynamic Tailwater)
1=Culvert (Passes 0.10 cfs of 0.82 cfs potential flow)
2=Orifice (Orifice Controls 0.10 cfs @ 2.43 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=891.50' TW=883.50' (Dynamic Tailwater)
3=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 1P: Middle Pond



Summary for Pond 10: CB10

Inflow Area = 3.920 ac, 0.00% Impervious, Inflow Depth > 1.26" for Dublin 001 event
Inflow = 6.85 cfs @ 12.02 hrs, Volume= 0.413 af
Outflow = 6.72 cfs @ 12.04 hrs, Volume= 0.413 af, Atten= 2%, Lag= 1.0 min
Primary = 6.72 cfs @ 12.04 hrs, Volume= 0.413 af
Routed to Pond LP : Lower Pond
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond LP : Lower Pond

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 892.71' @ 12.04 hrs Surf.Area= 244 sf Storage= 131 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.1 min (822.7 - 822.6)

Volume	Invert	Avail.Storage	Storage Description
#1	890.79'	1,036 cf	**CB10 (Prismatic)** Listed below (Recalc)
#2	891.29'	82 cf	**18.0" Round Pipe Storage 10-11** L= 46.6' S= 0.0127 '/'
#3	891.88'	1,031 cf	**CB11 (Prismatic)** Listed below (Recalc)
#4	891.88'	108 cf	**18.0" Round Pipe Storage 11-12** L= 61.3' S= 0.0075 '/'
#5	892.34'	1,030 cf	**CB12 (Prismatic)** Listed below (Recalc)
#6	892.34'	138 cf	**18.0" Round Pipe Storage 12-13** L= 78.0' S= 0.0055 '/'
#7	892.77'	1,028 cf	**CB13 (Prismatic)** Listed below (Recalc)
#8	892.77'	139 cf	**18.0" Round Pipe Storage 13-14** L= 78.9' S= 0.0055 '/'
#9	893.20'	21 cf	**CB14 (Prismatic)** Listed below (Recalc)
#10	893.70'	63 cf	**12.0" Round Pipe Storage 14-15** L= 80.2' S= 0.0046 '/'
#11	892.35'	71 cf	**12.0" Round Pipe Storage 10-38** L= 90.5' S= 0.0100 '/'
#12	893.25'	1,568 cf	**CB38 (Prismatic)** Listed below (Recalc)
		6,315 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
890.79	4	0	0
897.60	4	27	27
898.25	3,099	1,008	1,036

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
891.88	4	0	0
897.60	4	23	23
898.25	3,099	1,008	1,031

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
892.34	4	0	0
897.60	4	21	21
898.25	3,099	1,008	1,030

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
892.77	4	0	0
897.60	4	19	19
898.25	3,099	1,008	1,028

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
893.20	4	0	0
898.50	4	21	21

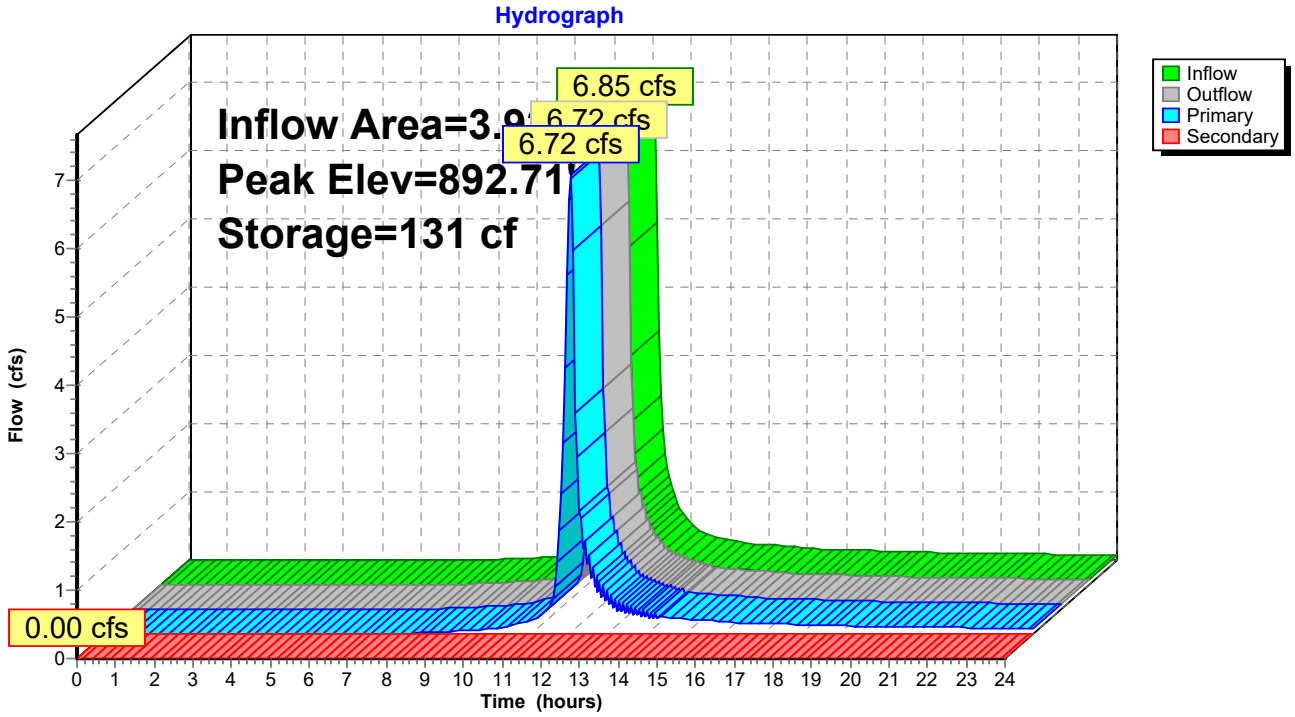
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
893.25	4	0	0
897.25	4	16	16
898.25	3,099	1,552	1,568

Device	Routing	Invert	Outlet Devices
#1	Primary	890.79'	**24.0" Round Culvert 10-9** L= 107.6' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 890.79' / 890.49' S= 0.0028 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#2	Device 1	890.79'	**15.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Secondary	898.25'	**0.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=6.59 cfs @ 12.04 hrs HW=892.66' TW=884.77' (Dynamic Tailwater)
└**1=Culvert 10-9** (Passes 6.59 cfs of 10.31 cfs potential flow)
└**2=Orifice/Grate** (Orifice Controls 6.59 cfs @ 5.37 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=890.79' TW=883.50' (Dynamic Tailwater)
└**3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 10: CB10


Hydrograph
Inflow
Outflow
Primary
Secondary
6.85 cfs
6.72 cfs
Inflow Area=3.9
Peak Elev=892.71'
Storage=131 cf
0.00 cfs
Flow (cfs)
Time (hours)
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

Summary for Pond 15: CB15

Inflow Area = 0.530 ac, 0.00% Impervious, Inflow Depth > 1.26" for Dublin 001 event
Inflow = 1.01 cfs @ 12.01 hrs, Volume= 0.056 af
Outflow = 0.51 cfs @ 12.14 hrs, Volume= 0.056 af, Atten= 50%, Lag= 7.6 min
Primary = 0.51 cfs @ 12.14 hrs, Volume= 0.056 af
Routed to Pond 10 : CB10
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond 10 : CB10

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 898.77' @ 12.14 hrs Surf.Area= 1,031 sf Storage= 506 cf

Plug-Flow detention time= 8.5 min calculated for 0.056 af (100% of inflow)
Center-of-Mass det. time= 8.0 min (829.5 - 821.5)

Volume	Invert	Avail.Storage	Storage Description
#1	894.07'	599 cf	**CB15 (Prismatic)** Listed below (Recalc)
#2	894.07'	58 cf	**12.0" Round Pipe Storage 15-16** L= 73.7' S= 0.0044 '/'
#3	894.39'	669 cf	**CB16 (Prismatic)** Listed below (Recalc)
#4	894.39'	85 cf	**12.0" Round Pipe Storage 16-17** L= 107.9' S= 0.0044 '/'
#5	894.86'	668 cf	**CB17 (Prismatic)** Listed below (Recalc)
#6	893.96'	61 cf	**12.0" Round Pipe Storage 17-18** L= 77.8' S= 0.0050 '/'
#7	895.20'	594 cf	**CB18 (Prismatic)** Listed below (Recalc)
#8	895.20'	70 cf	**12.0" Round Pipe Storage 18-19** L= 89.0' S= 0.0044 '/'
#9	895.59'	593 cf	**CB19 (Prismatic)** Listed below (Recalc)
#10	895.59'	83 cf	**12.0" Round Pipe Storage 19-20** L= 106.1' S= 0.0044 '/'
#11	896.06'	591 cf	**CB20 (Prismatic)** Listed below (Recalc)
		4,071 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
894.07	4	0	0
898.70	4	19	19
899.50	1,447	580	599

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
894.39	4	0	0
898.60	4	17	17
899.50	1,446	652	669

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
894.86	4	0	0
898.60	4	15	15
899.50	1,447	653	668

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
895.20	4	0	0
898.70	4	14	14
899.50	1,446	580	594

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
895.59	4	0	0
898.70	4	12	12
899.50	1,447	580	593

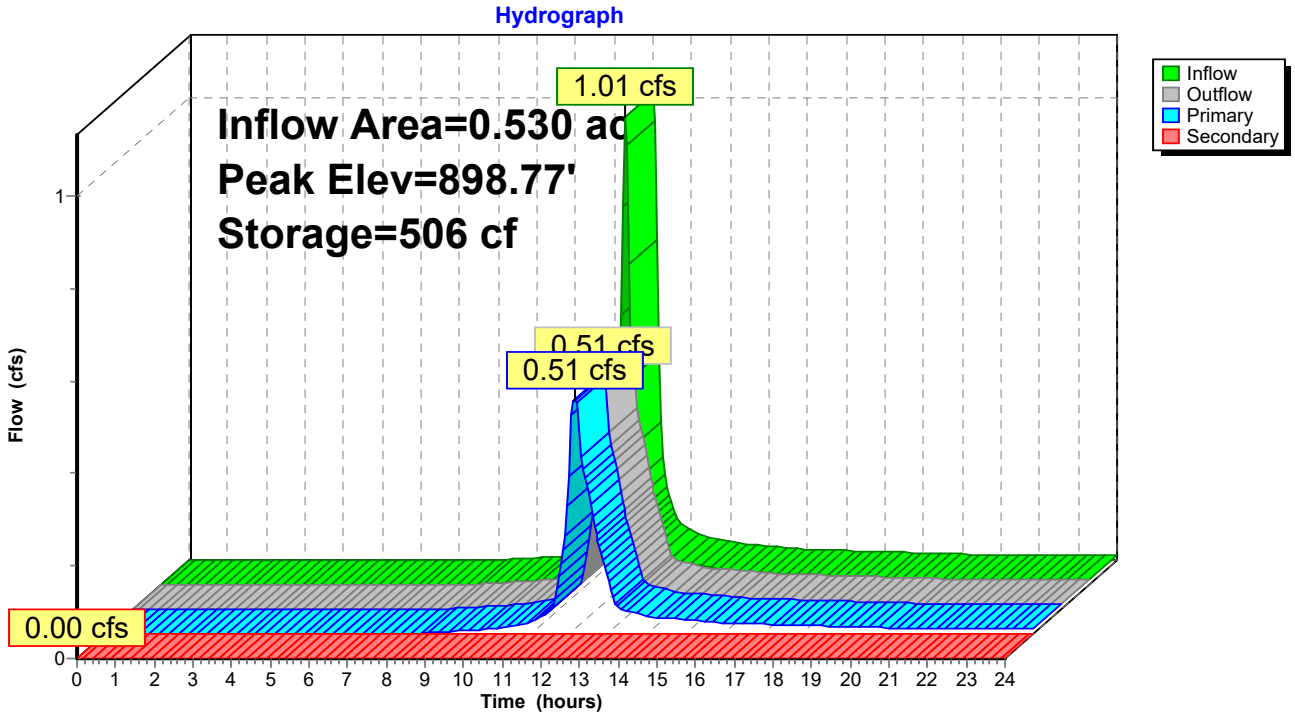
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
896.06	4	0	0
898.70	4	11	11
899.50	1,446	580	591

Device	Routing	Invert	Outlet Devices
#1	Primary	894.07'	**12.0" Round Culvert 15-14** L= 80.2' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 894.07' / 893.70' S= 0.0046 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	894.07'	**3.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#3	Secondary	899.50'	**0.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=0.51 cfs @ 12.14 hrs HW=898.76' TW=891.85' (Dynamic Tailwater)
↑—**1=Culvert 15-14** (Passes 0.51 cfs of 6.34 cfs potential flow)
↑—**2=Orifice** (Orifice Controls 0.51 cfs @ 10.29 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=893.96' TW=890.79' (Dynamic Tailwater)
↑—**3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 15: CB15


Hydrograph
Inflow Area=0.530 ac
Peak Elev=898.77'
Storage=506 cf
1.01 cfs
0.51 cfs
0.51 cfs
0.00 cfs
Inflow
Outflow
Primary
Secondary
Flow (cfs)
Time (hours)
0
1
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

Summary for Pond LP: Lower Pond

Inflow Area = 13.820 ac, 13.39% Impervious, Inflow Depth > 1.00" for Dublin 001 event
Inflow = 18.67 cfs @ 12.02 hrs, Volume= 1.152 af
Outflow = 0.72 cfs @ 14.70 hrs, Volume= 0.694 af, Atten= 96%, Lag= 160.9 min
Primary = 0.72 cfs @ 14.70 hrs, Volume= 0.694 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 885.70' @ 14.70 hrs Surf.Area= 15,387 sf Storage= 29,139 cf

Plug-Flow detention time= 346.4 min calculated for 0.693 af (60% of inflow)
Center-of-Mass det. time= 226.4 min (1,062.3 - 835.9)

Volume	Invert	Avail.Storage	Storage Description
#1	883.50'	91,149 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

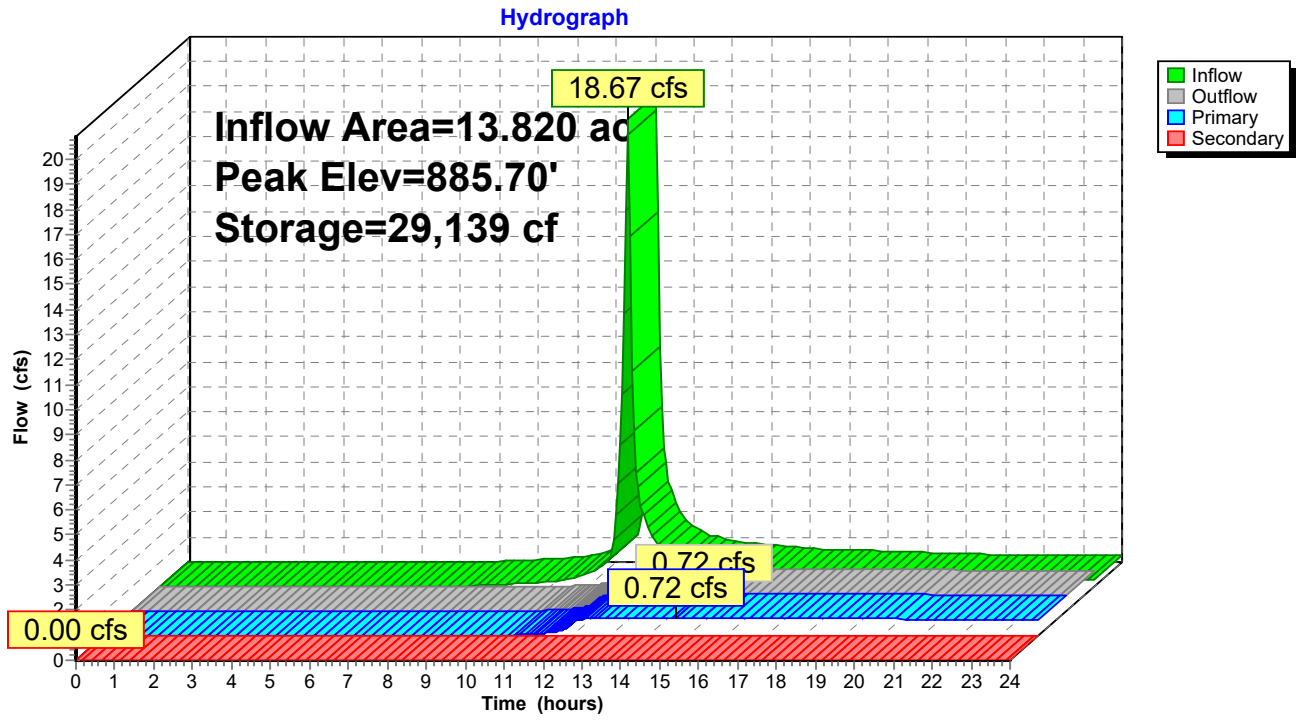
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
883.50	11,033	0	0
884.00	12,045	5,770	5,770
885.00	13,987	13,016	18,786
886.00	15,973	14,980	33,766
887.00	18,038	17,006	50,771
888.00	20,192	19,115	69,886
889.00	22,334	21,263	91,149

Device	Routing	Invert	Outlet Devices
#1	Primary	883.50'	**24.0" Round Culvert** L= 143.6' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 883.50' / 881.00' S= 0.0174 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 3.14 sf
#2	Device 1	883.50'	**4.4" Vert. WQ Orifice** C= 0.600 Limited to weir flow at low heads
#3	Device 1	886.90'	**2.0" Vert. Orifice X 3.00** C= 0.600 Limited to weir flow at low heads
#4	Device 1	887.50'	**3.0" Vert. Orifice X 3.00** C= 0.600 Limited to weir flow at low heads
#5	Device 1	887.80'	**54.0" W x 6.0" H Vert. Window X 3.00** C= 0.600 Limited to weir flow at low heads
#6	Device 1	888.90'	**1.5" x 5.0" Horiz. Grate X 9.00 columns** X 4 rows C= 0.600 Limited to weir flow at low heads
#7	Secondary	888.50'	**20.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=0.72 cfs @ 14.70 hrs HW=885.70' (Free Discharge)
└─**1=Culvert** (Passes 0.72 cfs of 16.60 cfs potential flow)
  └─**2=WQ Orifice** (Orifice Controls 0.72 cfs @ 6.85 fps)
  └─**3=Orifice** (Controls 0.00 cfs)
  └─**4=Orifice** (Controls 0.00 cfs)
  └─**5=Window** (Controls 0.00 cfs)
  └─**6=Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=883.50' (Free Discharge)
└─**7=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond LP: Lower Pond



Summary for Pond UP: Upper Pond

Inflow Area = 2.190 ac, 61.19% Impervious, Inflow Depth > 1.19" for Dublin 001 event
Inflow = 3.96 cfs @ 12.02 hrs, Volume= 0.218 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond 1P : Middle Pond
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond 1P : Middle Pond

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 895.38' @ 24.00 hrs Surf.Area= 8,228 sf Storage= 9,482 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	894.00'	26,139 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

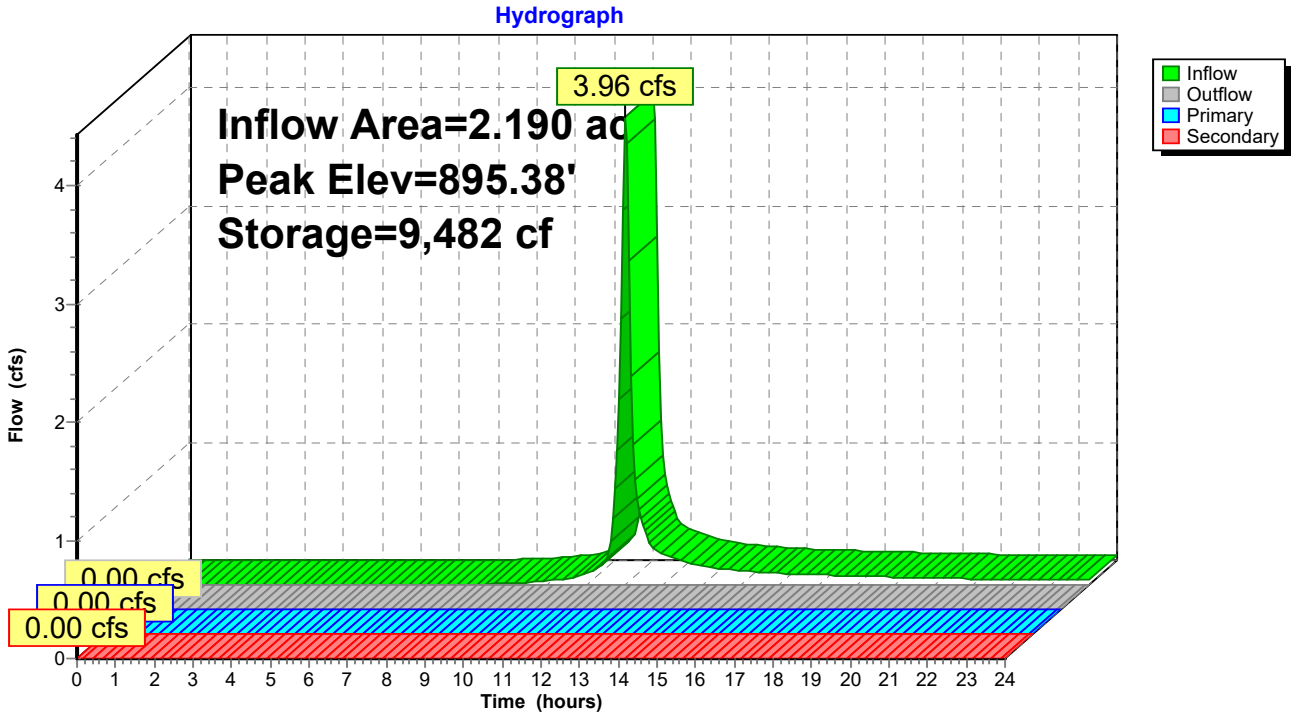
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
894.00	5,685	0	0
895.00	7,343	6,514	6,514
896.00	9,666	8,505	15,019
897.00	12,574	11,120	26,139

Device	Routing	Invert	Outlet Devices
#1	Primary	894.00'	**12.0" Round Culvert** L= 86.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 894.00' / 893.50' S= 0.0058 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	895.50'	**13.0" W x 4.0" H Vert. Window** C= 0.600 Limited to weir flow at low heads
#3	Device 1	896.50'	**1.5" x 5.0" Horiz. Grate X 9.00 columns** X 4 rows C= 0.600 Limited to weir flow at low heads
#4	Secondary	896.50'	**20.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=894.00' TW=891.50' (Dynamic Tailwater)
1=Culvert (Controls 0.00 cfs)
2=Window (Controls 0.00 cfs)
3=Grate (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=894.00' TW=891.50' (Dynamic Tailwater)
4=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond UP: Upper Pond



Summary for Subcatchment 2S: (new Subcat)

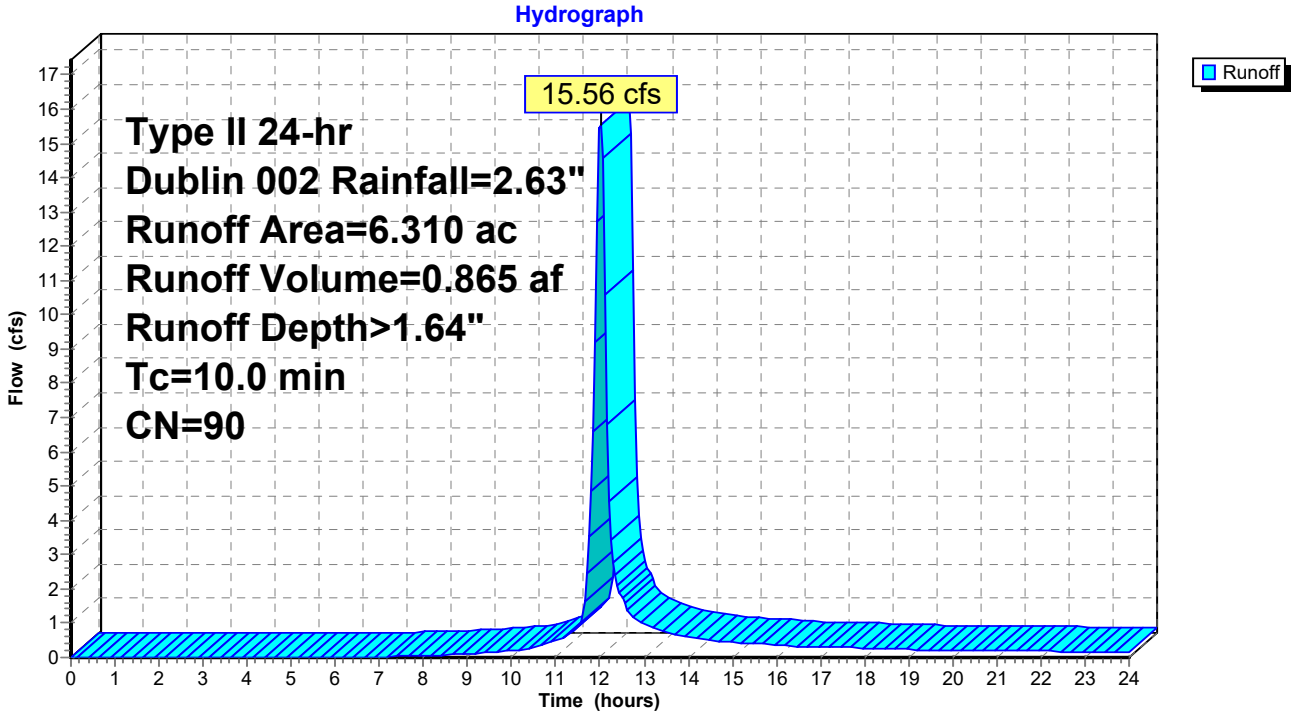
Runoff = 15.56 cfs @ 12.01 hrs, Volume= 0.865 af, Depth> 1.64"
Routed to Pond LP : Lower Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Dublin 002 Rainfall=2.63"

	Area (ac)	CN	Description
*	6.310	90	
	6.310		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry, Storm Sewer**

Subcatchment 2S: (new Subcat)



Summary for Subcatchment 10A: AREA TO 10

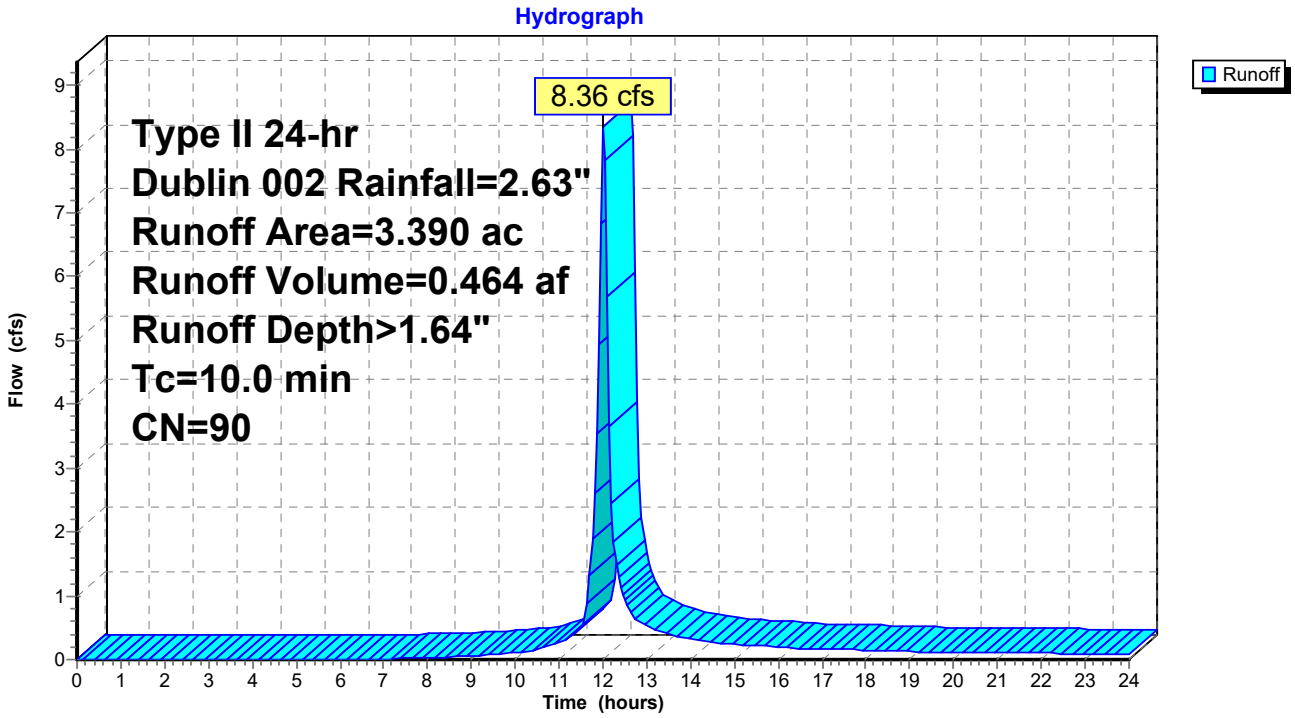
Runoff = 8.36 cfs @ 12.01 hrs, Volume= 0.464 af, Depth> 1.64"
Routed to Pond 10 : CB10

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Dublin 002 Rainfall=2.63"

	Area (ac)	CN	Description
*	3.140	90	
*	0.250	90	FROM 38
	3.390	90	Weighted Average
	3.390		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry,**

Subcatchment 10A: AREA TO 10



Summary for Subcatchment 15S: MIDDLE

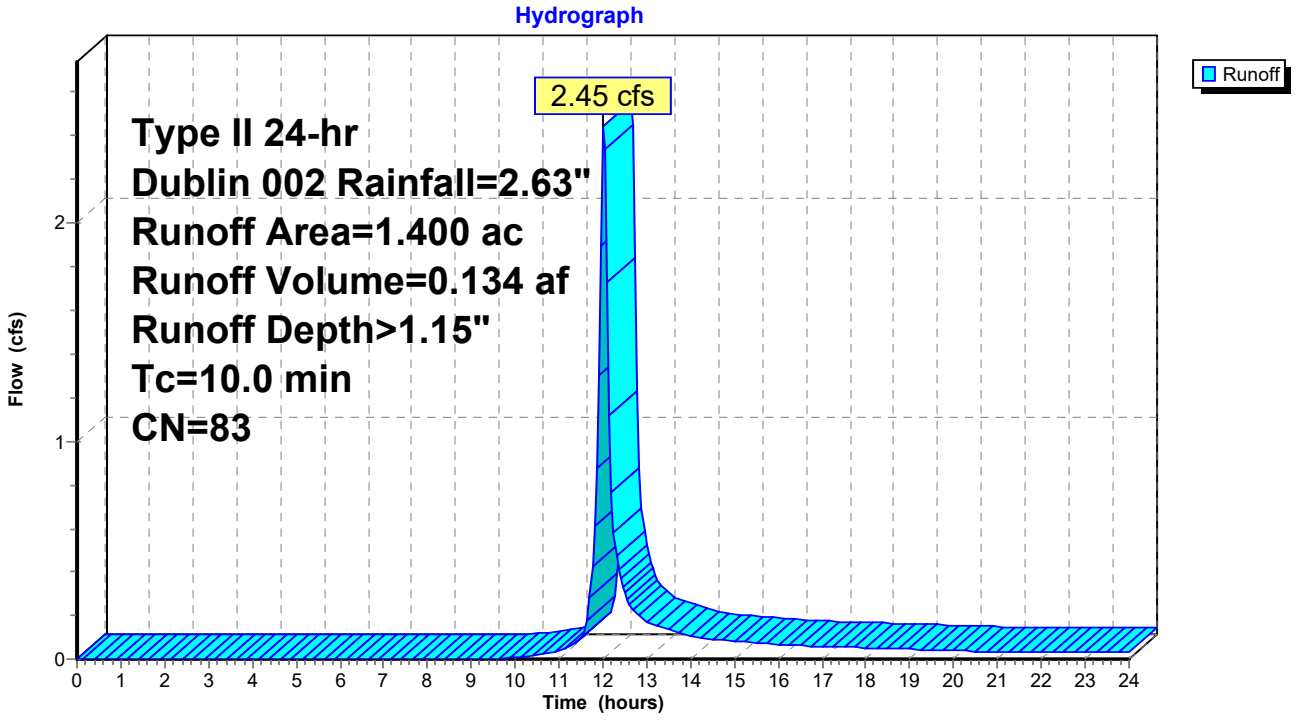
Runoff = 2.45 cfs @ 12.02 hrs, Volume= 0.134 af, Depth> 1.15"
Routed to Pond 1P : Middle Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Dublin 002 Rainfall=2.63"

	Area (ac)	CN	Description
*	0.890	74	
*	0.510	98	
	1.400	83	Weighted Average
	0.890		63.57% Pervious Area
	0.510		36.43% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry, Storm Sewer Pipe**

Subcatchment 15S: MIDDLE



Summary for Subcatchment 16A: AREA TO 15

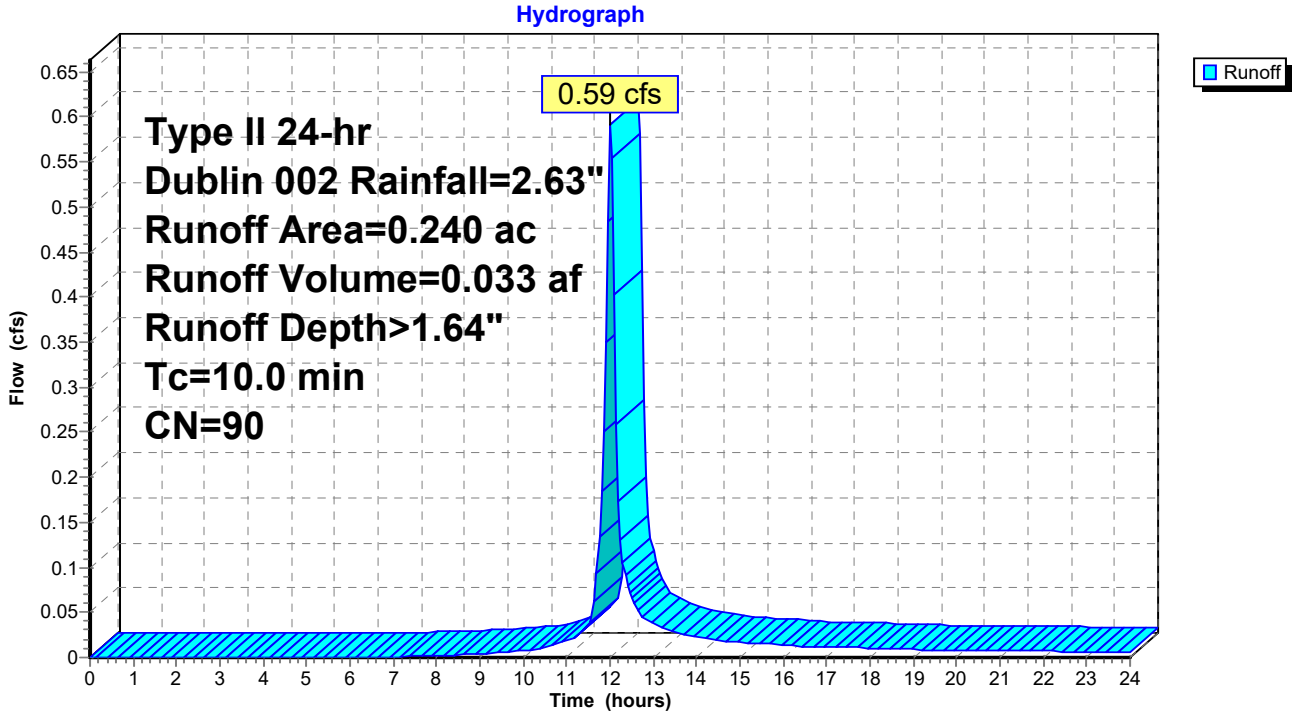
Runoff = 0.59 cfs @ 12.01 hrs, Volume= 0.033 af, Depth> 1.64"
Routed to Pond 15 : CB15

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Dublin 002 Rainfall=2.63"

	Area (ac)	CN	Description
*	0.240	90	
	0.240		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry,**

Subcatchment 16A: AREA TO 15



Summary for Subcatchment 16S: UPPER

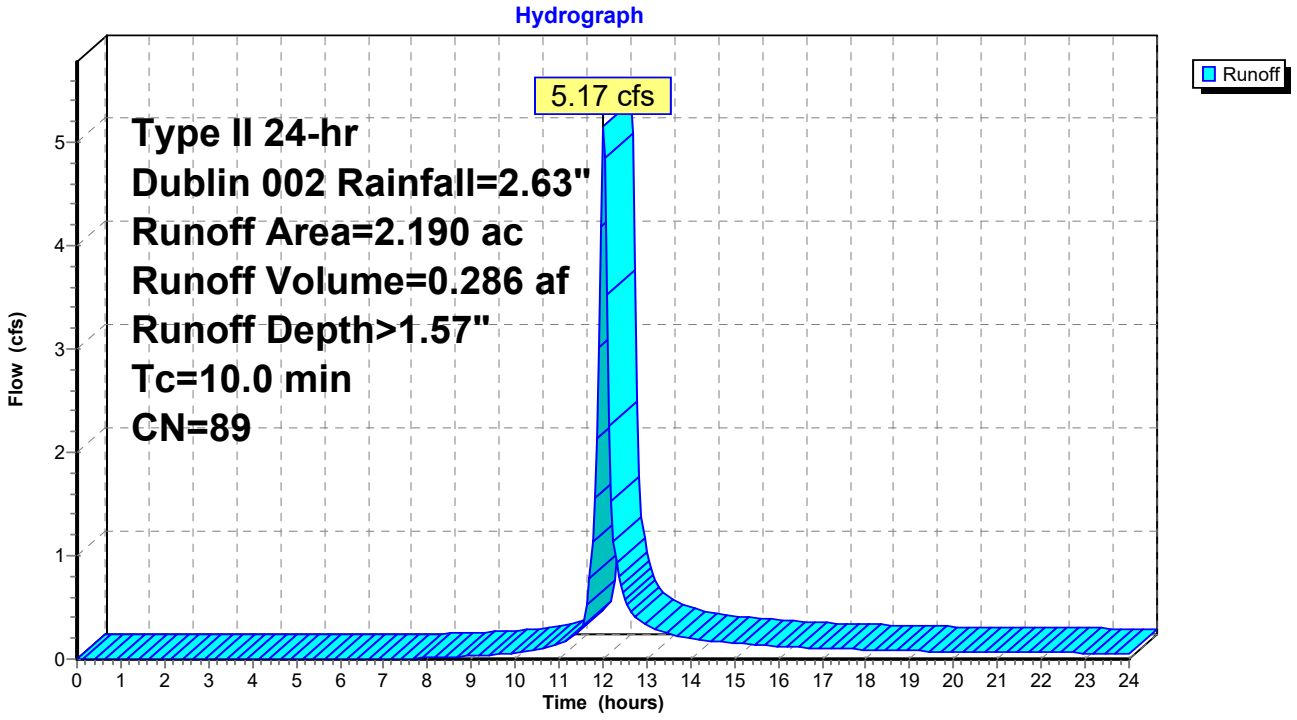
Runoff = 5.17 cfs @ 12.01 hrs, Volume= 0.286 af, Depth> 1.57"
Routed to Pond UP : Upper Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Dublin 002 Rainfall=2.63"

	Area (ac)	CN	Description
*	0.850	74	
*	1.340	98	
	2.190	89	Weighted Average
	0.850		38.81% Pervious Area
	1.340		61.19% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry, Overland**

Subcatchment 16S: UPPER



Summary for Subcatchment 19A: AREA TO 15

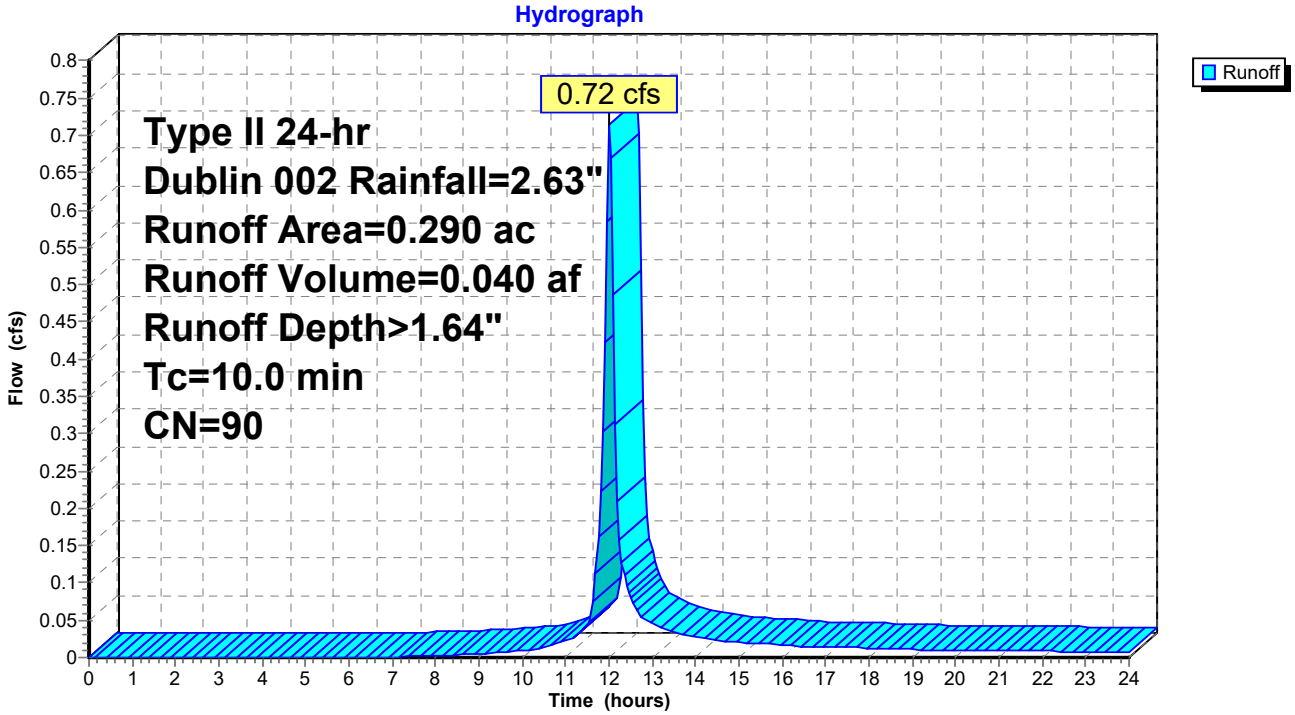
Runoff = 0.72 cfs @ 12.01 hrs, Volume= 0.040 af, Depth> 1.64"
Routed to Pond 15 : CB15

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Dublin 002 Rainfall=2.63"

	Area (ac)	CN	Description
*	0.290	90	
	0.290		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry,**

Subcatchment 19A: AREA TO 15



Summary for Pond 1P: Middle Pond

Inflow Area = 3.590 ac, 51.53% Impervious, Inflow Depth > 0.56" for Dublin 002 event
Inflow = 2.45 cfs @ 12.02 hrs, Volume= 0.166 af
Outflow = 0.12 cfs @ 13.65 hrs, Volume= 0.111 af, Atten= 95%, Lag= 97.9 min
Primary = 0.12 cfs @ 13.65 hrs, Volume= 0.111 af
Routed to Pond LP : Lower Pond
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond LP : Lower Pond

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 892.03' @ 13.65 hrs Surf.Area= 6,383 sf Storage= 3,161 cf

Plug-Flow detention time= 303.0 min calculated for 0.111 af (67% of inflow)
Center-of-Mass det. time= 147.3 min (1,068.3 - 920.9)

Volume	Invert	Avail.Storage	Storage Description
#1	891.50'	48,495 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

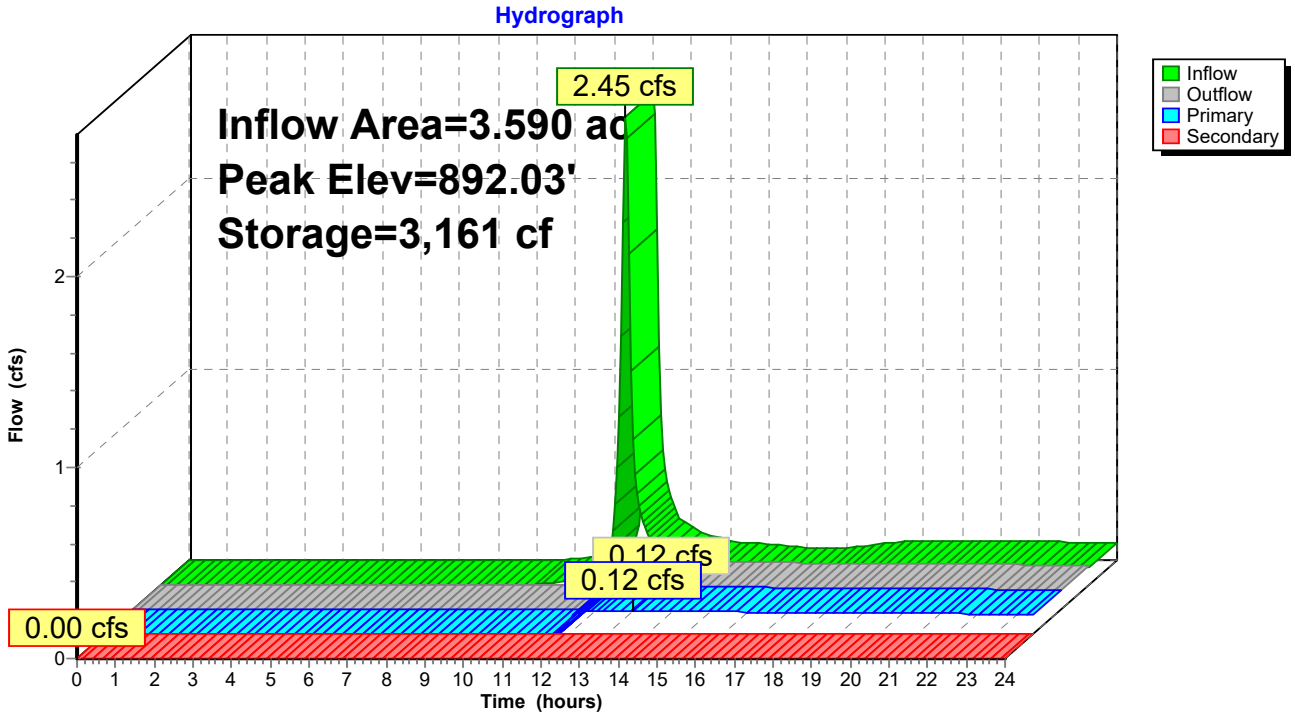
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
891.50	5,673	0	0
892.00	6,321	2,999	2,999
893.00	8,752	7,537	10,535
894.00	11,119	9,936	20,471
895.00	13,980	12,550	33,020
896.00	16,970	15,475	48,495

Device	Routing	Invert	Outlet Devices
#1	Primary	891.50'	**8.0" Round Culvert X 3.00** L= 2.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 891.50' / 891.49' S= 0.0050 '/' Cc= 0.900 n= 0.013, Flow Area= 0.35 sf
#2	Device 1	891.50'	**2.7" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#3	Secondary	895.50'	**20.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Primary OutFlow Max=0.12 cfs @ 13.65 hrs HW=892.03' TW=886.29' (Dynamic Tailwater)
1=Culvert (Passes 0.12 cfs of 1.54 cfs potential flow)
2=Orifice (Orifice Controls 0.12 cfs @ 3.09 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=891.50' TW=883.50' (Dynamic Tailwater)
3=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 1P: Middle Pond



Summary for Pond 10: CB10

Inflow Area = 3.920 ac, 0.00% Impervious, Inflow Depth > 1.64" for Dublin 002 event
Inflow = 8.88 cfs @ 12.01 hrs, Volume= 0.537 af
Outflow = 8.32 cfs @ 12.05 hrs, Volume= 0.537 af, Atten= 6%, Lag= 1.9 min
Primary = 8.32 cfs @ 12.05 hrs, Volume= 0.537 af
Routed to Pond LP : Lower Pond
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond LP : Lower Pond

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 893.40' @ 12.05 hrs Surf.Area= 371 sf Storage= 359 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.2 min (815.5 - 815.4)

Volume	Invert	Avail.Storage	Storage Description
#1	890.79'	1,036 cf	**CB10 (Prismatic)** Listed below (Recalc)
#2	891.29'	82 cf	**18.0" Round Pipe Storage 10-11** L= 46.6' S= 0.0127 '/'
#3	891.88'	1,031 cf	**CB11 (Prismatic)** Listed below (Recalc)
#4	891.88'	108 cf	**18.0" Round Pipe Storage 11-12** L= 61.3' S= 0.0075 '/'
#5	892.34'	1,030 cf	**CB12 (Prismatic)** Listed below (Recalc)
#6	892.34'	138 cf	**18.0" Round Pipe Storage 12-13** L= 78.0' S= 0.0055 '/'
#7	892.77'	1,028 cf	**CB13 (Prismatic)** Listed below (Recalc)
#8	892.77'	139 cf	**18.0" Round Pipe Storage 13-14** L= 78.9' S= 0.0055 '/'
#9	893.20'	21 cf	**CB14 (Prismatic)** Listed below (Recalc)
#10	893.70'	63 cf	**12.0" Round Pipe Storage 14-15** L= 80.2' S= 0.0046 '/'
#11	892.35'	71 cf	**12.0" Round Pipe Storage 10-38** L= 90.5' S= 0.0100 '/'
#12	893.25'	1,568 cf	**CB38 (Prismatic)** Listed below (Recalc)
		6,315 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
890.79	4	0	0
897.60	4	27	27
898.25	3,099	1,008	1,036

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
891.88	4	0	0
897.60	4	23	23
898.25	3,099	1,008	1,031

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
892.34	4	0	0
897.60	4	21	21
898.25	3,099	1,008	1,030

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
892.77	4	0	0
897.60	4	19	19
898.25	3,099	1,008	1,028

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
893.20	4	0	0
898.50	4	21	21

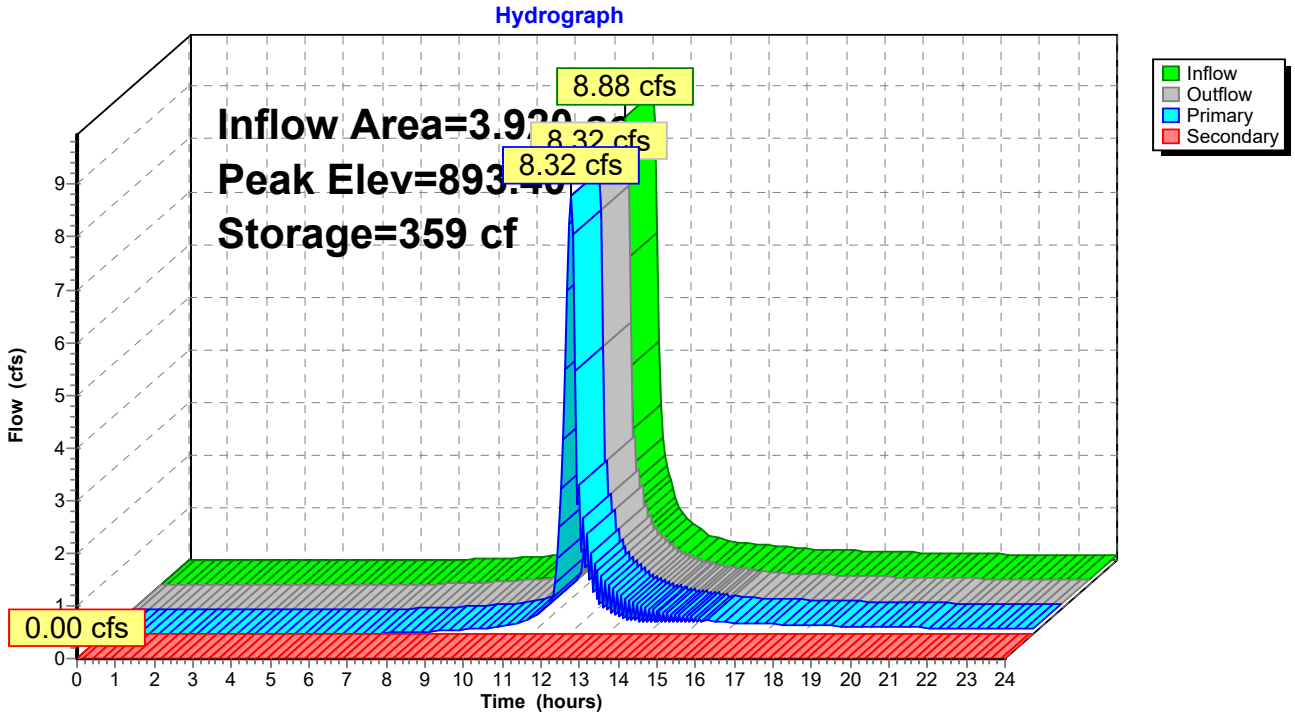
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
893.25	4	0	0
897.25	4	16	16
898.25	3,099	1,552	1,568

Device	Routing	Invert	Outlet Devices
#1	Primary	890.79'	**24.0" Round Culvert 10-9** L= 107.6' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 890.79' / 890.49' S= 0.0028 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#2	Device 1	890.79'	**15.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Secondary	898.25'	**0.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=8.28 cfs @ 12.05 hrs HW=893.38' TW=885.23' (Dynamic Tailwater)
└**1=Culvert 10-9** (Passes 8.28 cfs of 14.91 cfs potential flow)
└**2=Orifice/Grate** (Orifice Controls 8.28 cfs @ 6.75 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=890.79' TW=883.50' (Dynamic Tailwater)
└**3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 10: CB10


Hydrograph
Inflow
Outflow
Primary
Secondary
8.88 cfs
8.32 cfs
8.32 cfs
Inflow Area=3.920 ac
Peak Elev=893.40
Storage=359 cf
0.00 cfs
Flow (cfs)
Time (hours)
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

Summary for Pond 15: CB15

Inflow Area = 0.530 ac, 0.00% Impervious, Inflow Depth > 1.64" for Dublin 002 event
Inflow = 1.31 cfs @ 12.01 hrs, Volume= 0.073 af
Outflow = 0.51 cfs @ 12.17 hrs, Volume= 0.073 af, Atten= 61%, Lag= 9.3 min
Primary = 0.51 cfs @ 12.17 hrs, Volume= 0.073 af
Routed to Pond 10 : CB10
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond 10 : CB10

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 898.90' @ 12.17 hrs Surf.Area= 2,423 sf Storage= 737 cf

Plug-Flow detention time= 10.4 min calculated for 0.072 af (100% of inflow)
Center-of-Mass det. time= 9.9 min (824.0 - 814.0)

Volume	Invert	Avail.Storage	Storage Description
#1	894.07'	599 cf	**CB15 (Prismatic)** Listed below (Recalc)
#2	894.07'	58 cf	**12.0" Round Pipe Storage 15-16** L= 73.7' S= 0.0044 '/'
#3	894.39'	669 cf	**CB16 (Prismatic)** Listed below (Recalc)
#4	894.39'	85 cf	**12.0" Round Pipe Storage 16-17** L= 107.9' S= 0.0044 '/'
#5	894.86'	668 cf	**CB17 (Prismatic)** Listed below (Recalc)
#6	893.96'	61 cf	**12.0" Round Pipe Storage 17-18** L= 77.8' S= 0.0050 '/'
#7	895.20'	594 cf	**CB18 (Prismatic)** Listed below (Recalc)
#8	895.20'	70 cf	**12.0" Round Pipe Storage 18-19** L= 89.0' S= 0.0044 '/'
#9	895.59'	593 cf	**CB19 (Prismatic)** Listed below (Recalc)
#10	895.59'	83 cf	**12.0" Round Pipe Storage 19-20** L= 106.1' S= 0.0044 '/'
#11	896.06'	591 cf	**CB20 (Prismatic)** Listed below (Recalc)
		4,071 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
894.07	4	0	0
898.70	4	19	19
899.50	1,447	580	599

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
894.39	4	0	0
898.60	4	17	17
899.50	1,446	652	669

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
894.86	4	0	0
898.60	4	15	15
899.50	1,447	653	668

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
895.20	4	0	0
898.70	4	14	14
899.50	1,446	580	594

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
895.59	4	0	0
898.70	4	12	12
899.50	1,447	580	593

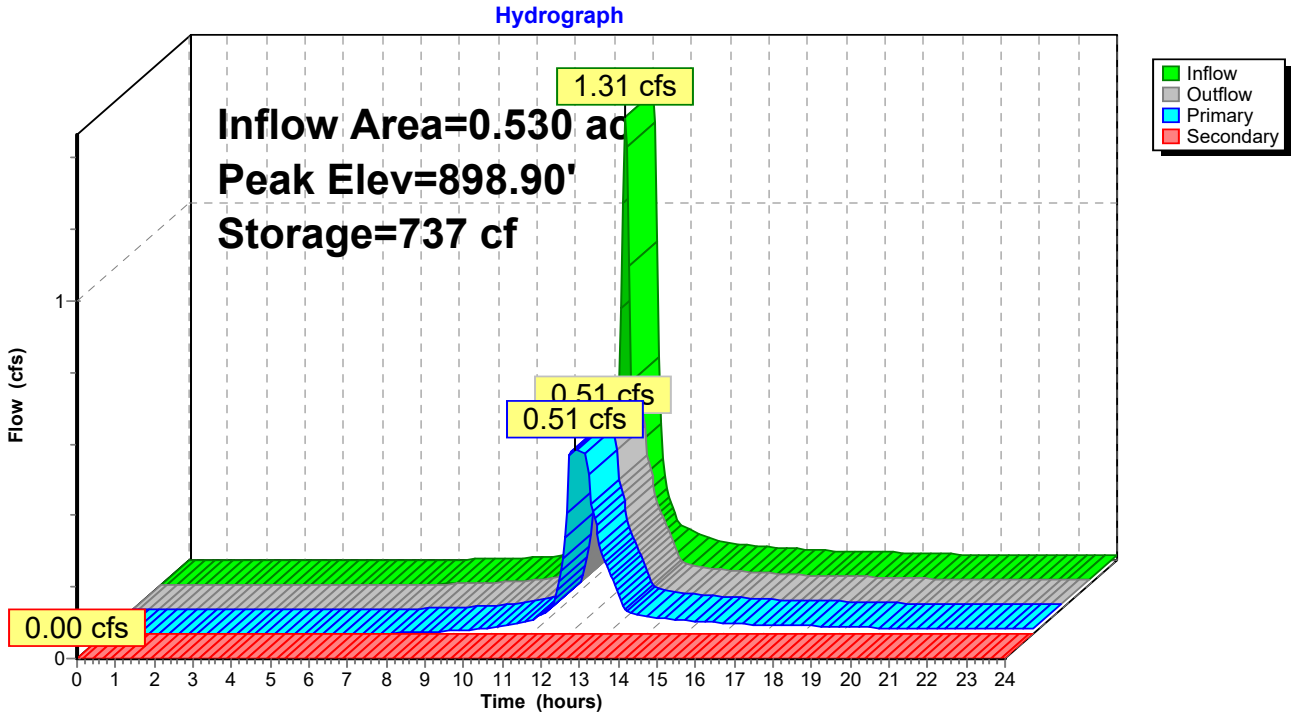
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
896.06	4	0	0
898.70	4	11	11
899.50	1,446	580	591

Device	Routing	Invert	Outlet Devices
#1	Primary	894.07'	**12.0" Round Culvert 15-14** L= 80.2' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 894.07' / 893.70' S= 0.0046 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	894.07'	**3.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#3	Secondary	899.50'	**0.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=0.51 cfs @ 12.17 hrs HW=898.90' TW=891.94' (Dynamic Tailwater)
↑—**1=Culvert 15-14** (Passes 0.51 cfs of 6.44 cfs potential flow)
↑—**2=Orifice** (Orifice Controls 0.51 cfs @ 10.44 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=893.96' TW=890.79' (Dynamic Tailwater)
↑—**3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 15: CB15


Hydrograph
Inflow
Outflow
Primary
Secondary
1.31 cfs
Inflow Area=0.530 ac
Peak Elev=898.90'
Storage=737 cf
0.51 cfs
0.51 cfs
0.00 cfs
Flow (cfs)
0
1
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
Time (hours)

Summary for Pond LP: Lower Pond

Inflow Area = 13.820 ac, 13.39% Impervious, Inflow Depth > 1.31" for Dublin 002 event
Inflow = 23.68 cfs @ 12.02 hrs, Volume= 1.513 af
Outflow = 0.83 cfs @ 15.18 hrs, Volume= 0.821 af, Atten= 96%, Lag= 189.3 min
Primary = 0.83 cfs @ 15.18 hrs, Volume= 0.821 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 886.34' @ 15.18 hrs Surf.Area= 16,681 sf Storage= 39,361 cf

Plug-Flow detention time= 354.3 min calculated for 0.819 af (54% of inflow)
Center-of-Mass det. time= 227.5 min (1,060.7 - 833.3)

Volume	Invert	Avail.Storage	Storage Description
#1	883.50'	91,149 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

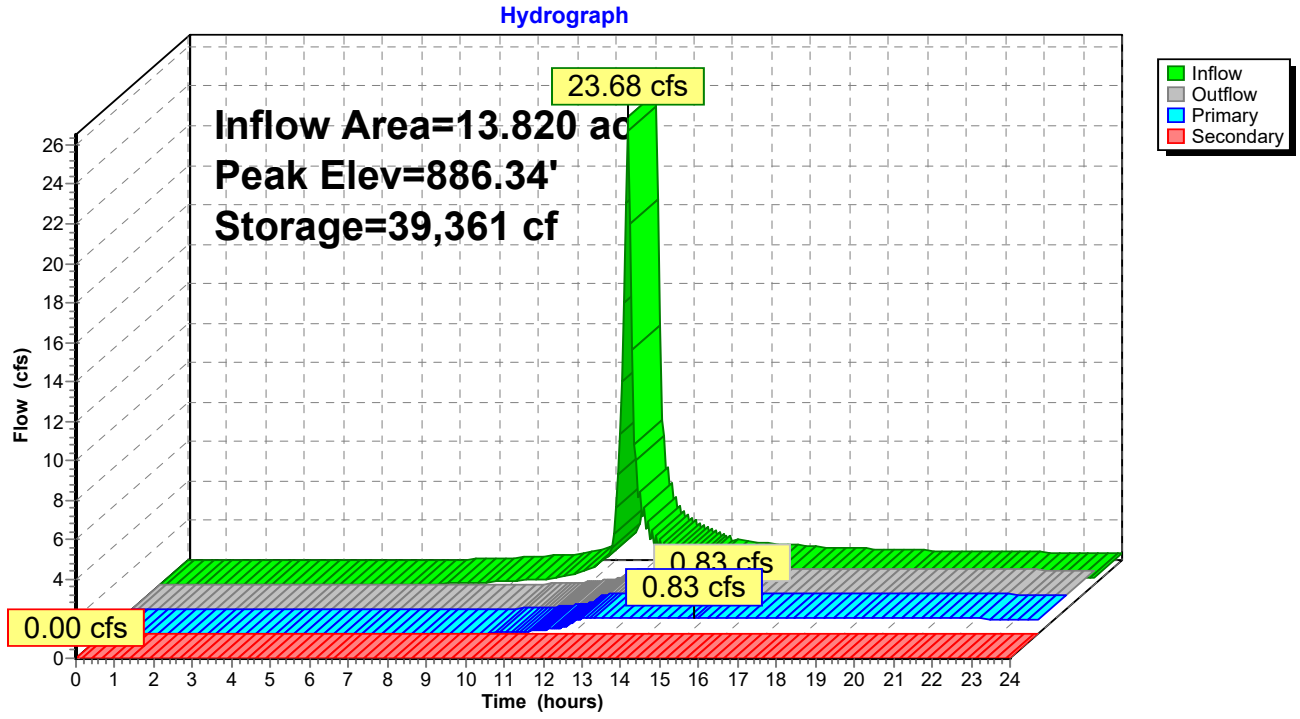
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
883.50	11,033	0	0
884.00	12,045	5,770	5,770
885.00	13,987	13,016	18,786
886.00	15,973	14,980	33,766
887.00	18,038	17,006	50,771
888.00	20,192	19,115	69,886
889.00	22,334	21,263	91,149

Device	Routing	Invert	Outlet Devices
#1	Primary	883.50'	**24.0" Round Culvert** L= 143.6' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 883.50' / 881.00' S= 0.0174 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 3.14 sf
#2	Device 1	883.50'	**4.4" Vert. WQ Orifice** C= 0.600 Limited to weir flow at low heads
#3	Device 1	886.90'	**2.0" Vert. Orifice X 3.00** C= 0.600 Limited to weir flow at low heads
#4	Device 1	887.50'	**3.0" Vert. Orifice X 3.00** C= 0.600 Limited to weir flow at low heads
#5	Device 1	887.80'	**54.0" W x 6.0" H Vert. Window X 3.00** C= 0.600 Limited to weir flow at low heads
#6	Device 1	888.90'	**1.5" x 5.0" Horiz. Grate X 9.00 columns** X 4 rows C= 0.600 Limited to weir flow at low heads
#7	Secondary	888.50'	**20.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=0.83 cfs @ 15.18 hrs HW=886.34' (Free Discharge)
└─**1=Culvert** (Passes 0.83 cfs of 20.53 cfs potential flow)
  └─**2=WQ Orifice** (Orifice Controls 0.83 cfs @ 7.85 fps)
  └─**3=Orifice** (Controls 0.00 cfs)
  └─**4=Orifice** (Controls 0.00 cfs)
  └─**5=Window** (Controls 0.00 cfs)
  └─**6=Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=883.50' (Free Discharge)
└─**7=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond LP: Lower Pond



Summary for Pond UP: Upper Pond

Inflow Area = 2.190 ac, 61.19% Impervious, Inflow Depth > 1.57" for Dublin 002 event
Inflow = 5.17 cfs @ 12.01 hrs, Volume= 0.286 af
Outflow = 0.06 cfs @ 20.76 hrs, Volume= 0.032 af, Atten= 99%, Lag= 524.5 min
Primary = 0.06 cfs @ 20.76 hrs, Volume= 0.032 af
Routed to Pond 1P : Middle Pond
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond 1P : Middle Pond

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 895.57' @ 20.76 hrs Surf.Area= 8,667 sf Storage= 11,078 cf

Plug-Flow detention time= 603.7 min calculated for 0.032 af (11% of inflow)
Center-of-Mass det. time= 435.7 min (1,254.1 - 818.4)

Volume	Invert	Avail.Storage	Storage Description
#1	894.00'	26,139 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

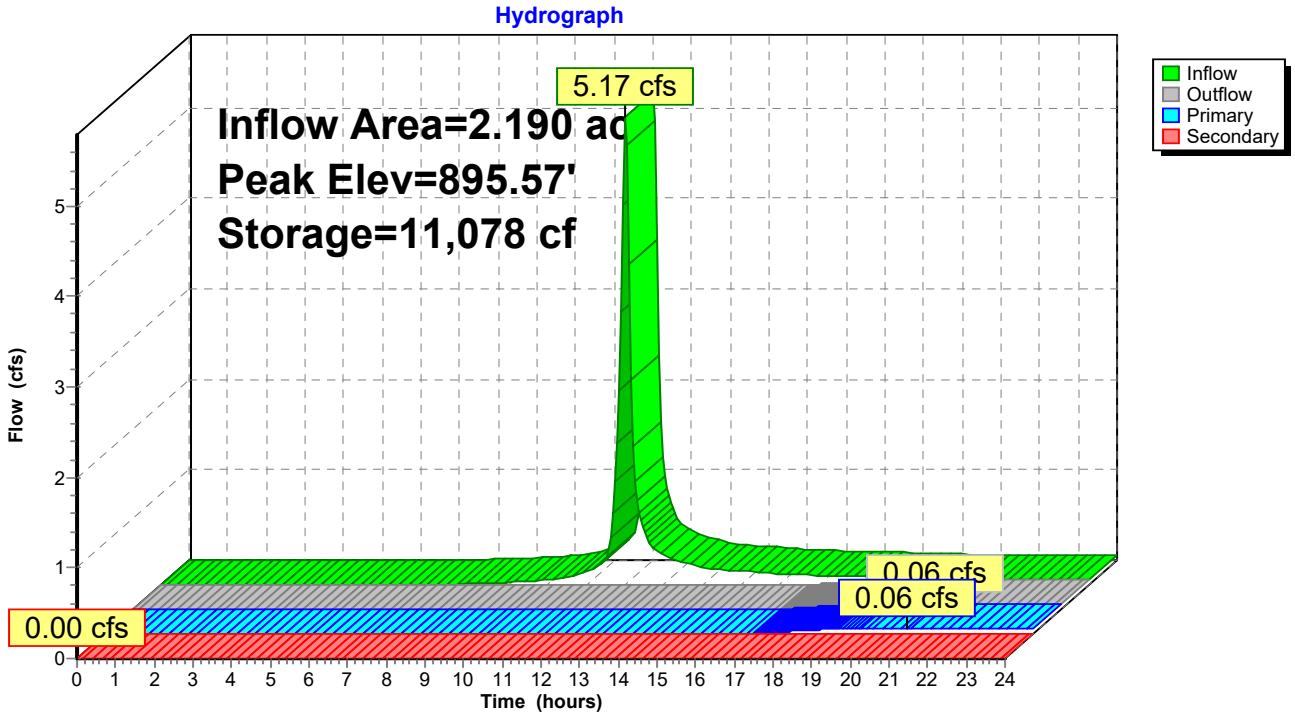
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
894.00	5,685	0	0
895.00	7,343	6,514	6,514
896.00	9,666	8,505	15,019
897.00	12,574	11,120	26,139

Device	Routing	Invert	Outlet Devices
#1	Primary	894.00'	**12.0" Round Culvert** L= 86.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 894.00' / 893.50' S= 0.0058 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	895.50'	**13.0" W x 4.0" H Vert. Window** C= 0.600 Limited to weir flow at low heads
#3	Device 1	896.50'	**1.5" x 5.0" Horiz. Grate X 9.00 columns** X 4 rows C= 0.600 Limited to weir flow at low heads
#4	Secondary	896.50'	**20.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=0.06 cfs @ 20.76 hrs HW=895.57' TW=891.92' (Dynamic Tailwater)
1=Culvert (Passes 0.06 cfs of 3.18 cfs potential flow)
2=Window (Orifice Controls 0.06 cfs @ 0.85 fps)
3=Grate (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=894.00' TW=891.50' (Dynamic Tailwater)
4=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond UP: Upper Pond



Summary for Subcatchment 2S: (new Subcat)

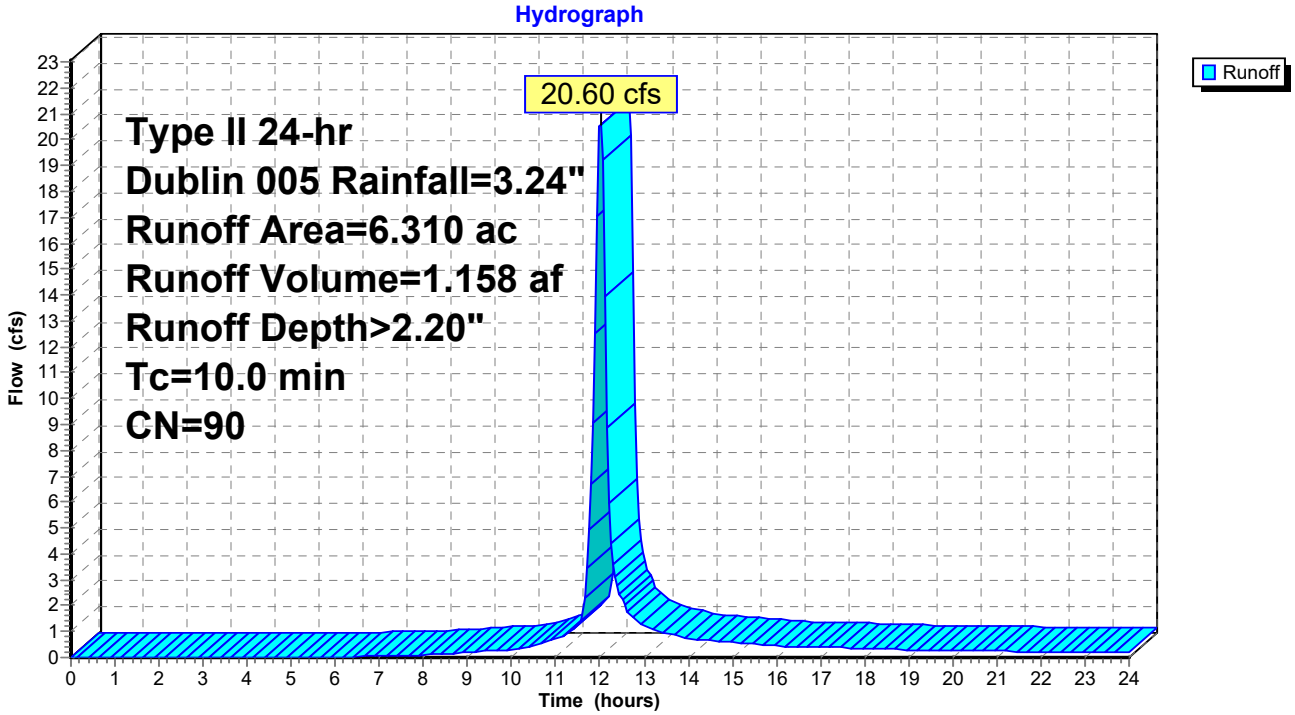
Runoff = 20.60 cfs @ 12.01 hrs, Volume= 1.158 af, Depth> 2.20"
Routed to Pond LP : Lower Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Dublin 005 Rainfall=3.24"

	Area (ac)	CN	Description
*	6.310	90	
	6.310		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry, Storm Sewer**

Subcatchment 2S: (new Subcat)



Summary for Subcatchment 10A: AREA TO 10

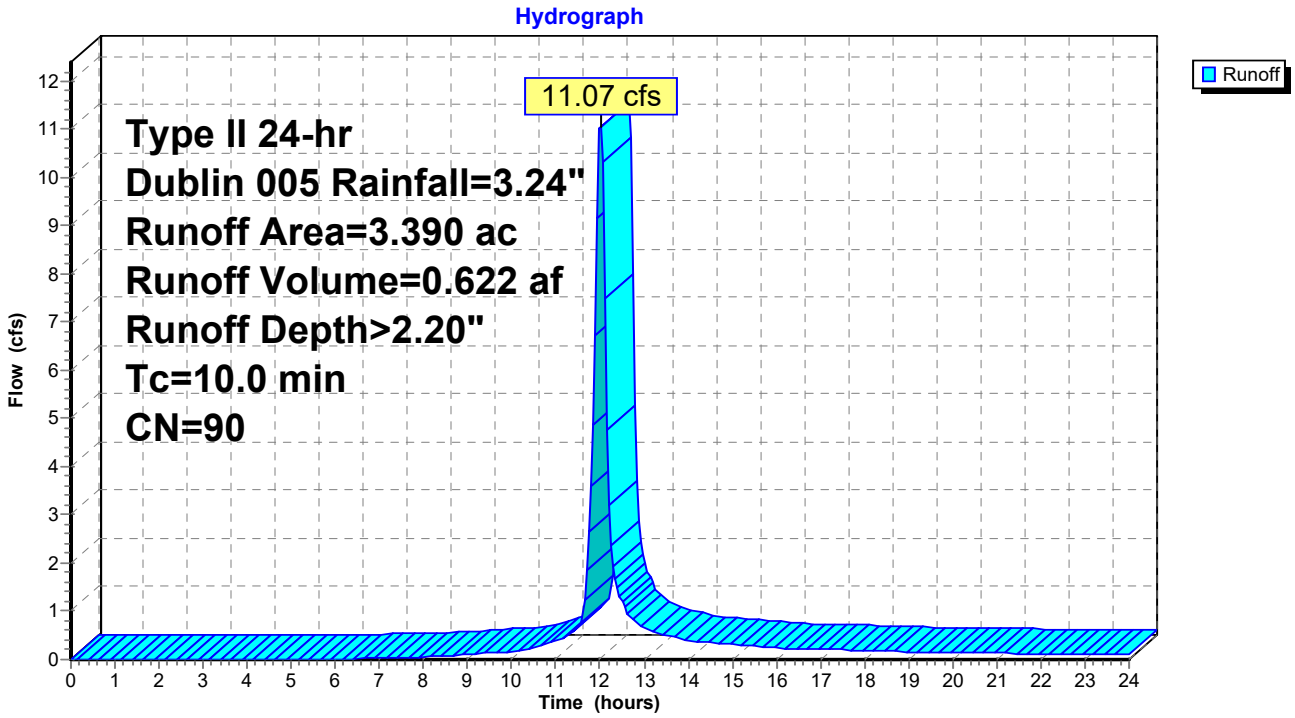
Runoff = 11.07 cfs @ 12.01 hrs, Volume= 0.622 af, Depth> 2.20"
Routed to Pond 10 : CB10

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Dublin 005 Rainfall=3.24"

	Area (ac)	CN	Description
*	3.140	90	
*	0.250	90	FROM 38
	3.390	90	Weighted Average
	3.390		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry,**

Subcatchment 10A: AREA TO 10



Summary for Subcatchment 15S: MIDDLE

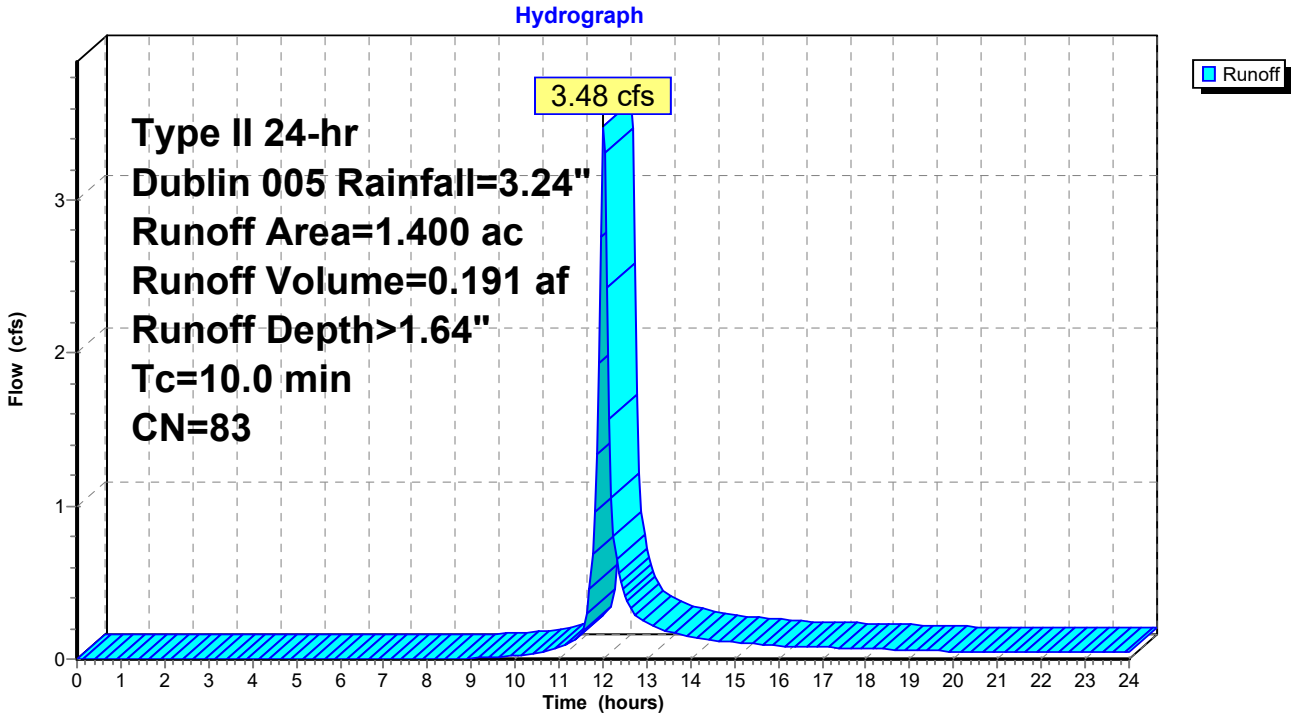
Runoff = 3.48 cfs @ 12.02 hrs, Volume= 0.191 af, Depth> 1.64"
Routed to Pond 1P : Middle Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Dublin 005 Rainfall=3.24"

	Area (ac)	CN	Description
*	0.890	74	
*	0.510	98	
	1.400	83	Weighted Average
	0.890		63.57% Pervious Area
	0.510		36.43% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry, Storm Sewer Pipe**

Subcatchment 15S: MIDDLE



Summary for Subcatchment 16A: AREA TO 15

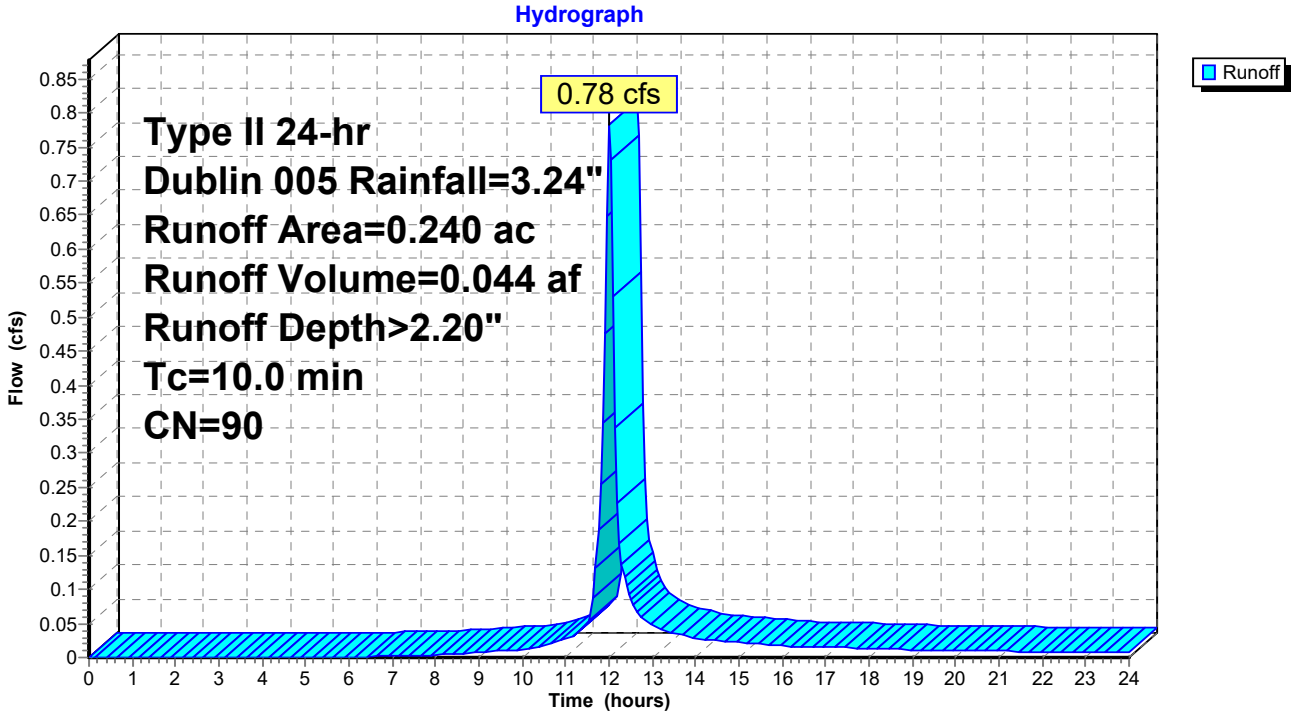
Runoff = 0.78 cfs @ 12.01 hrs, Volume= 0.044 af, Depth> 2.20"
Routed to Pond 15 : CB15

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Dublin 005 Rainfall=3.24"

	Area (ac)	CN	Description
*	0.240	90	
	0.240		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry,**

Subcatchment 16A: AREA TO 15



Summary for Subcatchment 16S: UPPER

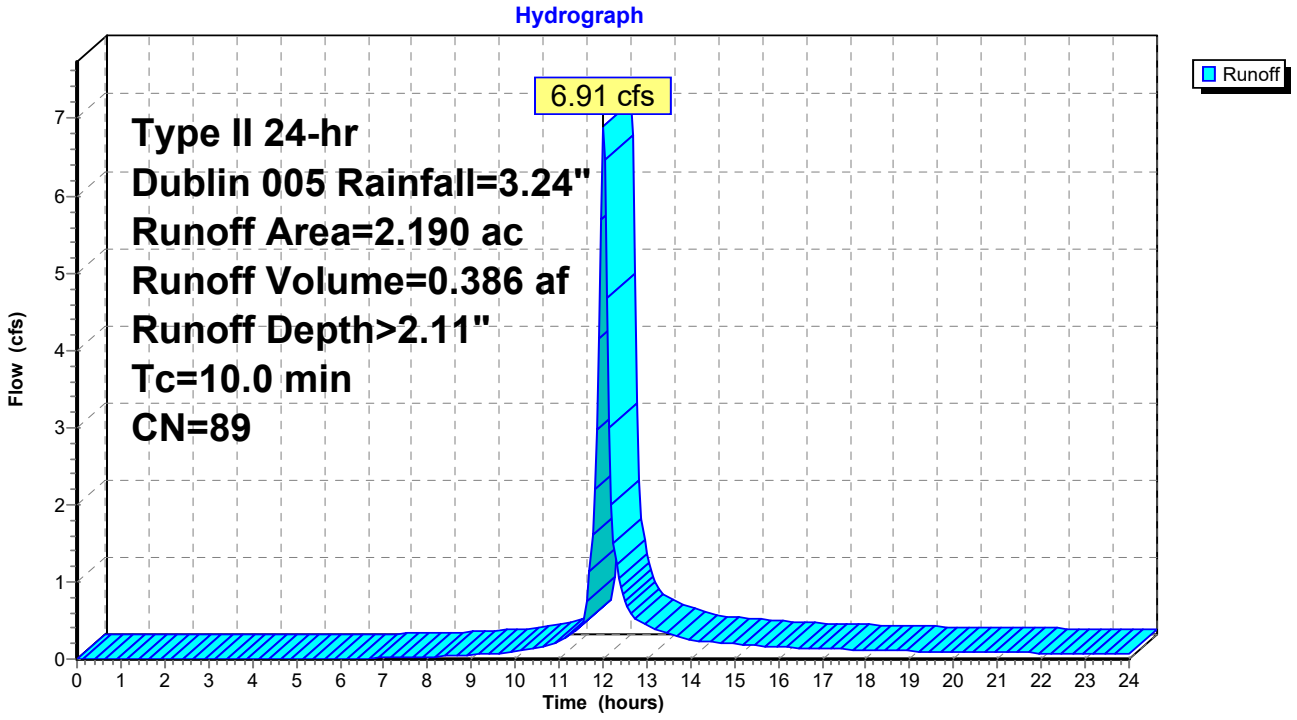
Runoff = 6.91 cfs @ 12.01 hrs, Volume= 0.386 af, Depth> 2.11"
Routed to Pond UP : Upper Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Dublin 005 Rainfall=3.24"

	Area (ac)	CN	Description
*	0.850	74	
*	1.340	98	
	2.190	89	Weighted Average
	0.850		38.81% Pervious Area
	1.340		61.19% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry, Overland**

Subcatchment 16S: UPPER



Summary for Subcatchment 19A: AREA TO 15

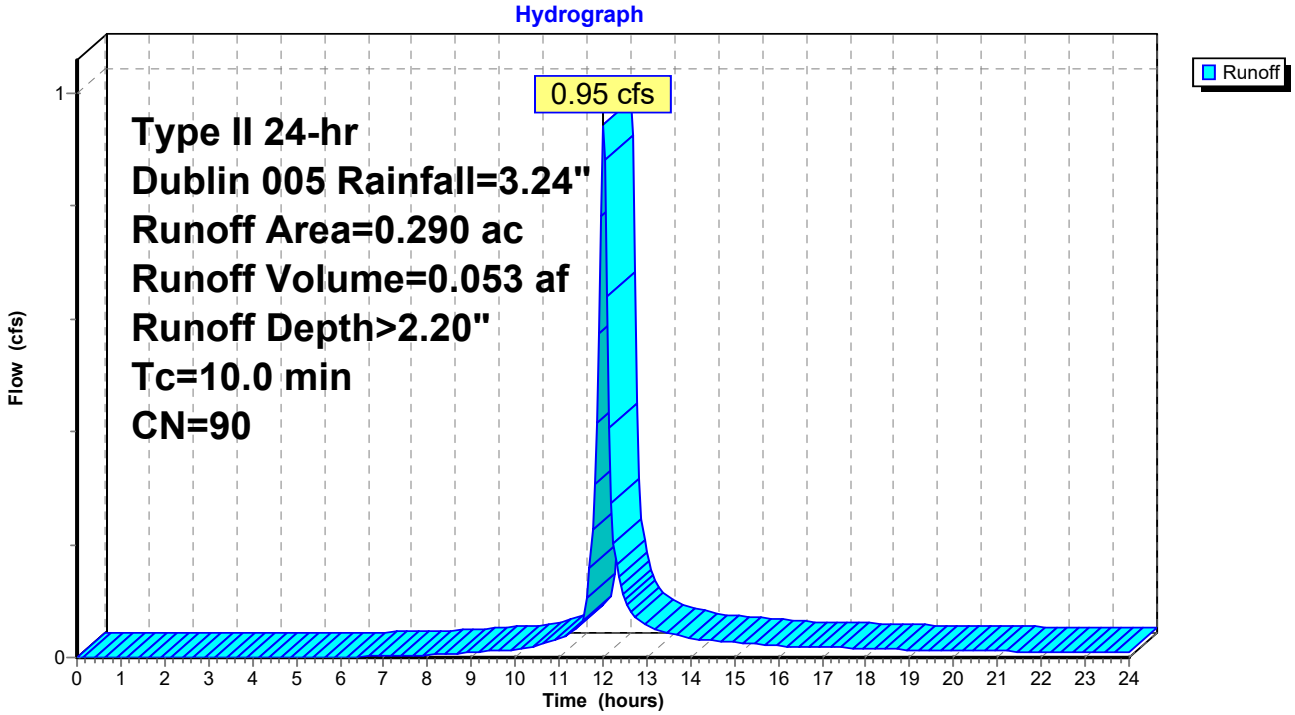
Runoff = 0.95 cfs @ 12.01 hrs, Volume= 0.053 af, Depth> 2.20"
Routed to Pond 15 : CB15

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Dublin 005 Rainfall=3.24"

	Area (ac)	CN	Description
*	0.290	90	
	0.290		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry,**

Subcatchment 19A: AREA TO 15



Summary for Pond 1P: Middle Pond

Inflow Area = 3.590 ac, 51.53% Impervious, Inflow Depth > 1.07" for Dublin 005 event
Inflow = 3.48 cfs @ 12.02 hrs, Volume= 0.321 af
Outflow = 0.19 cfs @ 18.93 hrs, Volume= 0.178 af, Atten= 95%, Lag= 415.0 min
Primary = 0.19 cfs @ 18.93 hrs, Volume= 0.178 af
Routed to Pond LP : Lower Pond
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond LP : Lower Pond

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 892.56' @ 18.93 hrs Surf.Area= 7,693 sf Storage= 6,954 cf

Plug-Flow detention time= 329.5 min calculated for 0.177 af (55% of inflow)
Center-of-Mass det. time= 168.1 min (1,087.1 - 919.0)

Volume	Invert	Avail.Storage	Storage Description
#1	891.50'	48,495 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

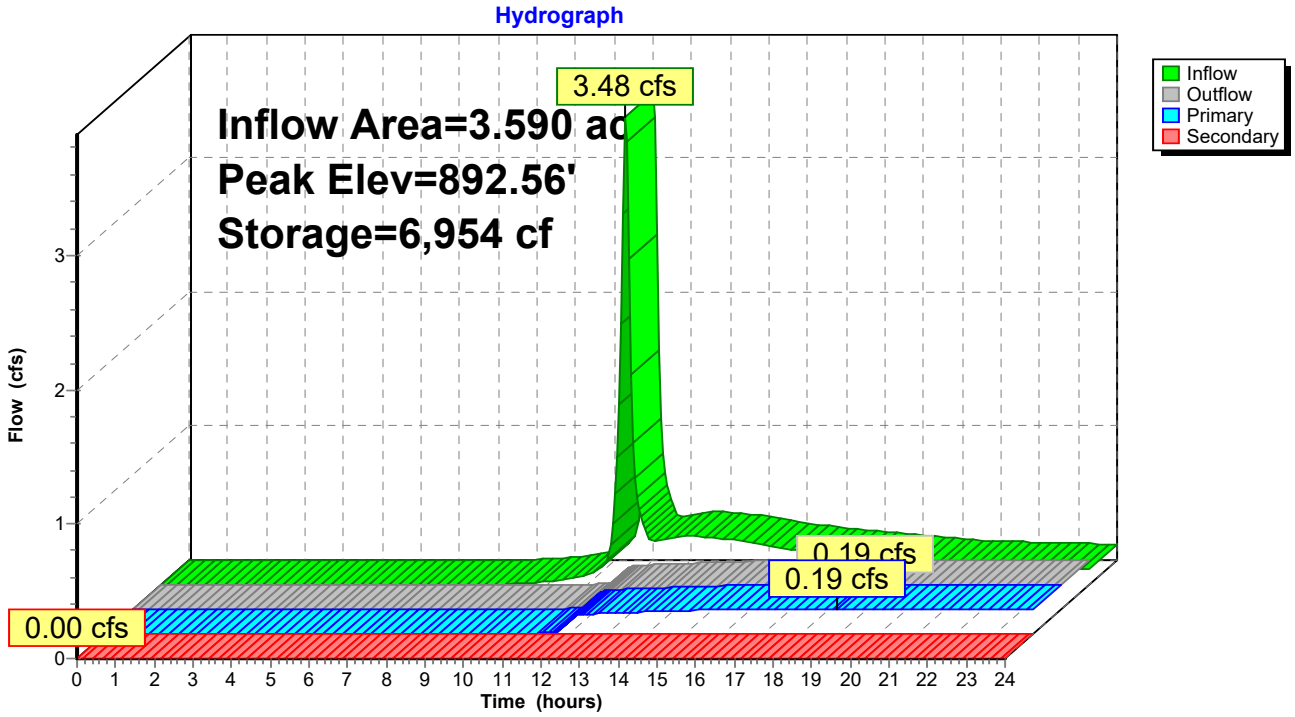
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
891.50	5,673	0	0
892.00	6,321	2,999	2,999
893.00	8,752	7,537	10,535
894.00	11,119	9,936	20,471
895.00	13,980	12,550	33,020
896.00	16,970	15,475	48,495

Device	Routing	Invert	Outlet Devices
#1	Primary	891.50'	**8.0" Round Culvert X 3.00** L= 2.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 891.50' / 891.49' S= 0.0050 '/' Cc= 0.900 n= 0.013, Flow Area= 0.35 sf
#2	Device 1	891.50'	**2.7" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#3	Secondary	895.50'	**20.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Primary OutFlow Max=0.19 cfs @ 18.93 hrs HW=892.56' TW=887.01' (Dynamic Tailwater)
↑—**1=Culvert** (Passes 0.19 cfs of 4.23 cfs potential flow)
↑—**2=Orifice** (Orifice Controls 0.19 cfs @ 4.70 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=891.50' TW=883.50' (Dynamic Tailwater)
↑—**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1P: Middle Pond



Summary for Pond 10: CB10

Inflow Area = 3.920 ac, 0.00% Impervious, Inflow Depth > 2.20" for Dublin 005 event
Inflow = 11.57 cfs @ 12.01 hrs, Volume= 0.719 af
Outflow = 11.48 cfs @ 12.04 hrs, Volume= 0.719 af, Atten= 1%, Lag= 2.0 min
Primary = 11.48 cfs @ 12.04 hrs, Volume= 0.719 af
Routed to Pond LP : Lower Pond
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond LP : Lower Pond

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 895.18' @ 12.05 hrs Surf.Area= 24 sf Storage= 670 cf

Plug-Flow detention time= 0.3 min calculated for 0.718 af (100% of inflow)
Center-of-Mass det. time= 0.3 min (807.9 - 807.7)

Volume	Invert	Avail.Storage	Storage Description
#1	890.79'	1,036 cf	**CB10 (Prismatic)** Listed below (Recalc)
#2	891.29'	82 cf	**18.0" Round Pipe Storage 10-11** L= 46.6' S= 0.0127 '/'
#3	891.88'	1,031 cf	**CB11 (Prismatic)** Listed below (Recalc)
#4	891.88'	108 cf	**18.0" Round Pipe Storage 11-12** L= 61.3' S= 0.0075 '/'
#5	892.34'	1,030 cf	**CB12 (Prismatic)** Listed below (Recalc)
#6	892.34'	138 cf	**18.0" Round Pipe Storage 12-13** L= 78.0' S= 0.0055 '/'
#7	892.77'	1,028 cf	**CB13 (Prismatic)** Listed below (Recalc)
#8	892.77'	139 cf	**18.0" Round Pipe Storage 13-14** L= 78.9' S= 0.0055 '/'
#9	893.20'	21 cf	**CB14 (Prismatic)** Listed below (Recalc)
#10	893.70'	63 cf	**12.0" Round Pipe Storage 14-15** L= 80.2' S= 0.0046 '/'
#11	892.35'	71 cf	**12.0" Round Pipe Storage 10-38** L= 90.5' S= 0.0100 '/'
#12	893.25'	1,568 cf	**CB38 (Prismatic)** Listed below (Recalc)
		6,315 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
890.79	4	0	0
897.60	4	27	27
898.25	3,099	1,008	1,036

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
891.88	4	0	0
897.60	4	23	23
898.25	3,099	1,008	1,031

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
892.34	4	0	0
897.60	4	21	21
898.25	3,099	1,008	1,030

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
892.77	4	0	0
897.60	4	19	19
898.25	3,099	1,008	1,028

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
893.20	4	0	0
898.50	4	21	21

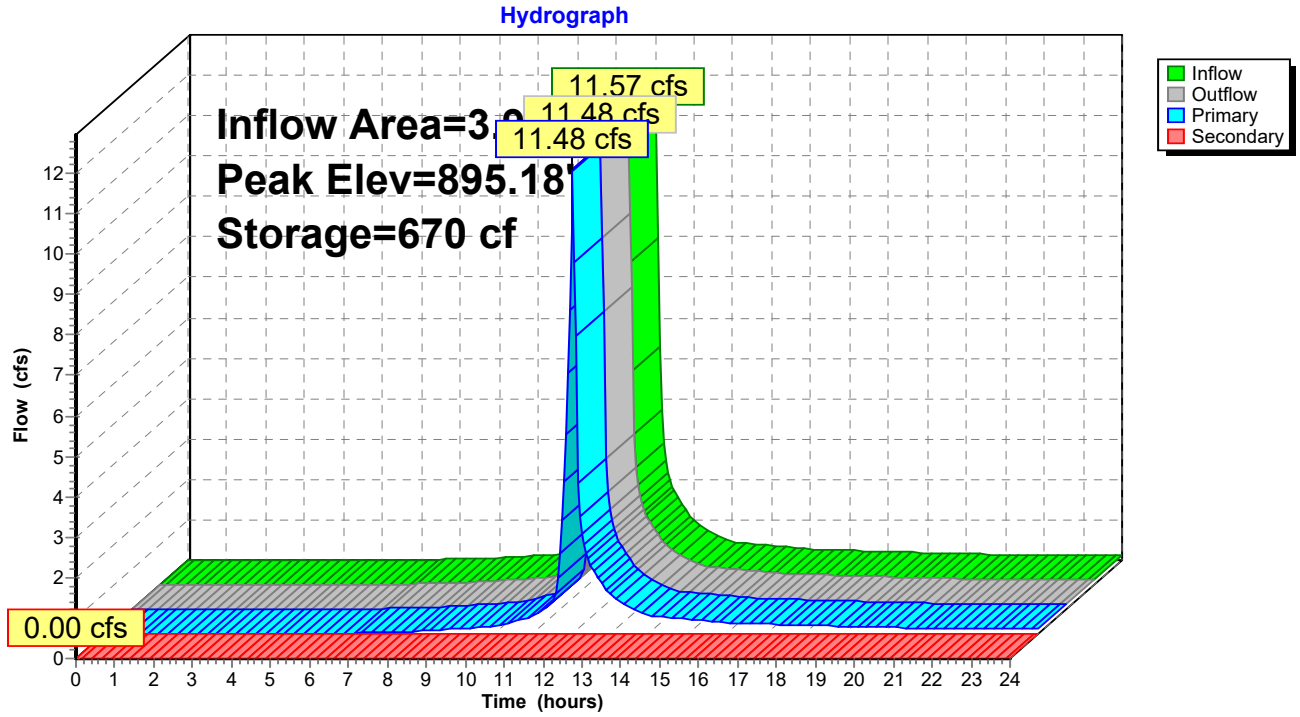
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
893.25	4	0	0
897.25	4	16	16
898.25	3,099	1,552	1,568

Device	Routing	Invert	Outlet Devices
#1	Primary	890.79'	**24.0" Round Culvert 10-9** L= 107.6' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 890.79' / 890.49' S= 0.0028 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#2	Device 1	890.79'	**15.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Secondary	898.25'	**0.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=11.31 cfs @ 12.04 hrs HW=895.08' TW=885.79' (Dynamic Tailwater)
└**1=Culvert 10-9** (Passes 11.31 cfs of 24.07 cfs potential flow)
└**2=Orifice/Grate** (Orifice Controls 11.31 cfs @ 9.22 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=890.79' TW=883.50' (Dynamic Tailwater)
└**3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 10: CB10


Hydrograph
Inflow
Outflow
Primary
Secondary
11.57 cfs
11.48 cfs
11.48 cfs
Inflow Area=3.
Peak Elev=895.18'
Storage=670 cf
0.00 cfs
Flow (cfs)
Time (hours)

Summary for Pond 15: CB15

Inflow Area = 0.530 ac, 0.00% Impervious, Inflow Depth > 2.20" for Dublin 005 event
Inflow = 1.73 cfs @ 12.01 hrs, Volume= 0.097 af
Outflow = 0.52 cfs @ 12.20 hrs, Volume= 0.097 af, Atten= 70%, Lag= 11.5 min
Primary = 0.52 cfs @ 12.20 hrs, Volume= 0.097 af
Routed to Pond 10 : CB10
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond 10 : CB10

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 899.03' @ 12.20 hrs Surf.Area= 3,762 sf Storage= 1,135 cf

Plug-Flow detention time= 14.4 min calculated for 0.097 af (100% of inflow)
Center-of-Mass det. time= 14.0 min (819.8 - 805.8)

Volume	Invert	Avail.Storage	Storage Description
#1	894.07'	599 cf	**CB15 (Prismatic)** Listed below (Recalc)
#2	894.07'	58 cf	**12.0" Round Pipe Storage 15-16** L= 73.7' S= 0.0044 '/'
#3	894.39'	669 cf	**CB16 (Prismatic)** Listed below (Recalc)
#4	894.39'	85 cf	**12.0" Round Pipe Storage 16-17** L= 107.9' S= 0.0044 '/'
#5	894.86'	668 cf	**CB17 (Prismatic)** Listed below (Recalc)
#6	893.96'	61 cf	**12.0" Round Pipe Storage 17-18** L= 77.8' S= 0.0050 '/'
#7	895.20'	594 cf	**CB18 (Prismatic)** Listed below (Recalc)
#8	895.20'	70 cf	**12.0" Round Pipe Storage 18-19** L= 89.0' S= 0.0044 '/'
#9	895.59'	593 cf	**CB19 (Prismatic)** Listed below (Recalc)
#10	895.59'	83 cf	**12.0" Round Pipe Storage 19-20** L= 106.1' S= 0.0044 '/'
#11	896.06'	591 cf	**CB20 (Prismatic)** Listed below (Recalc)
		4,071 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
894.07	4	0	0
898.70	4	19	19
899.50	1,447	580	599

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
894.39	4	0	0
898.60	4	17	17
899.50	1,446	652	669

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
894.86	4	0	0
898.60	4	15	15
899.50	1,447	653	668

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
895.20	4	0	0
898.70	4	14	14
899.50	1,446	580	594

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
895.59	4	0	0
898.70	4	12	12
899.50	1,447	580	593

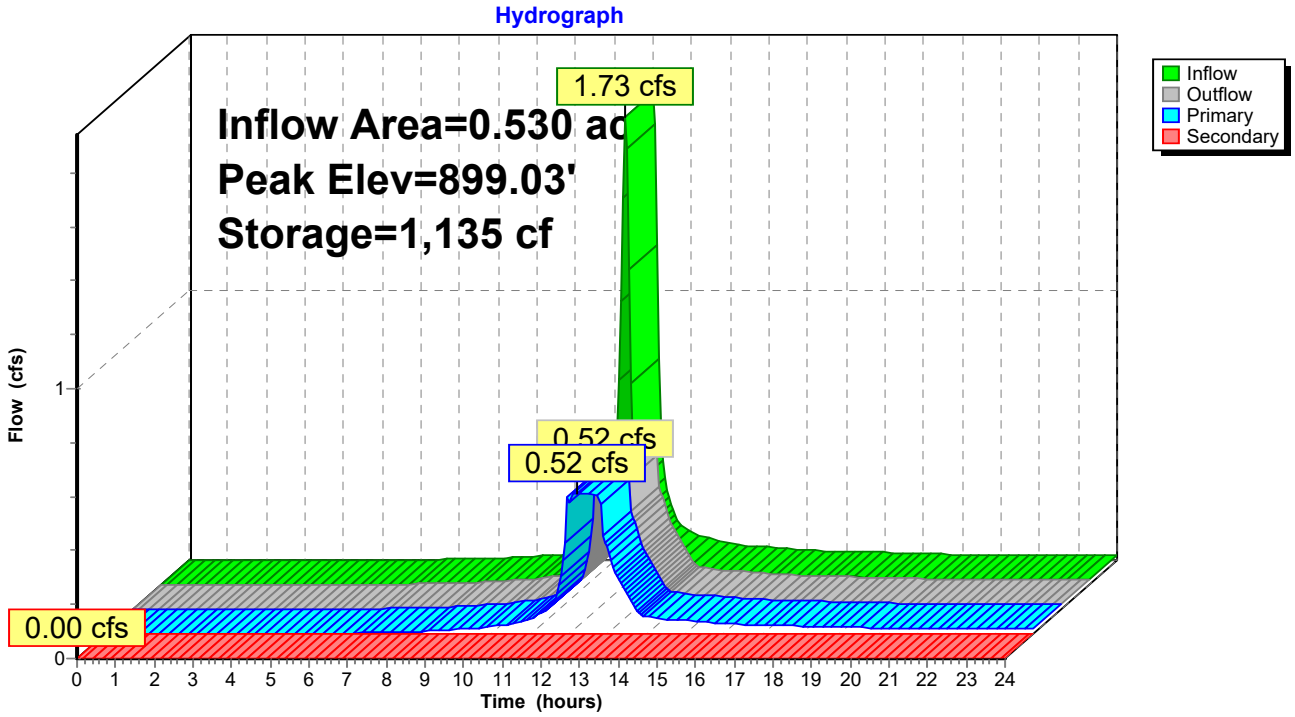
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
896.06	4	0	0
898.70	4	11	11
899.50	1,446	580	591

Device	Routing	Invert	Outlet Devices
#1	Primary	894.07'	**12.0" Round Culvert 15-14** L= 80.2' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 894.07' / 893.70' S= 0.0046 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	894.07'	**3.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#3	Secondary	899.50'	**0.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=0.52 cfs @ 12.20 hrs HW=899.03' TW=891.81' (Dynamic Tailwater)
↑—**1=Culvert 15-14** (Passes 0.52 cfs of 6.54 cfs potential flow)
↑—**2=Orifice** (Orifice Controls 0.52 cfs @ 10.59 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=893.96' TW=890.79' (Dynamic Tailwater)
↑—**3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 15: CB15


Hydrograph
Inflow
Outflow
Primary
Secondary
1.73 cfs
Inflow Area=0.530 ac
Peak Elev=899.03'
Storage=1,135 cf
0.52 cfs
0.52 cfs
0.00 cfs
Flow (cfs)
0
1
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
Time (hours)

Summary for Pond LP: Lower Pond

Inflow Area = 13.820 ac, 13.39% Impervious, Inflow Depth > 1.78" for Dublin 005 event
Inflow = 31.64 cfs @ 12.03 hrs, Volume= 2.054 af
Outflow = 1.09 cfs @ 15.16 hrs, Volume= 1.026 af, Atten= 97%, Lag= 187.9 min
Primary = 1.09 cfs @ 15.16 hrs, Volume= 1.026 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 887.17' @ 15.16 hrs Surf.Area= 18,403 sf Storage= 53,862 cf

Plug-Flow detention time= 352.6 min calculated for 1.026 af (50% of inflow)
Center-of-Mass det. time= 218.6 min (1,049.4 - 830.9)

Volume	Invert	Avail.Storage	Storage Description
#1	883.50'	91,149 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

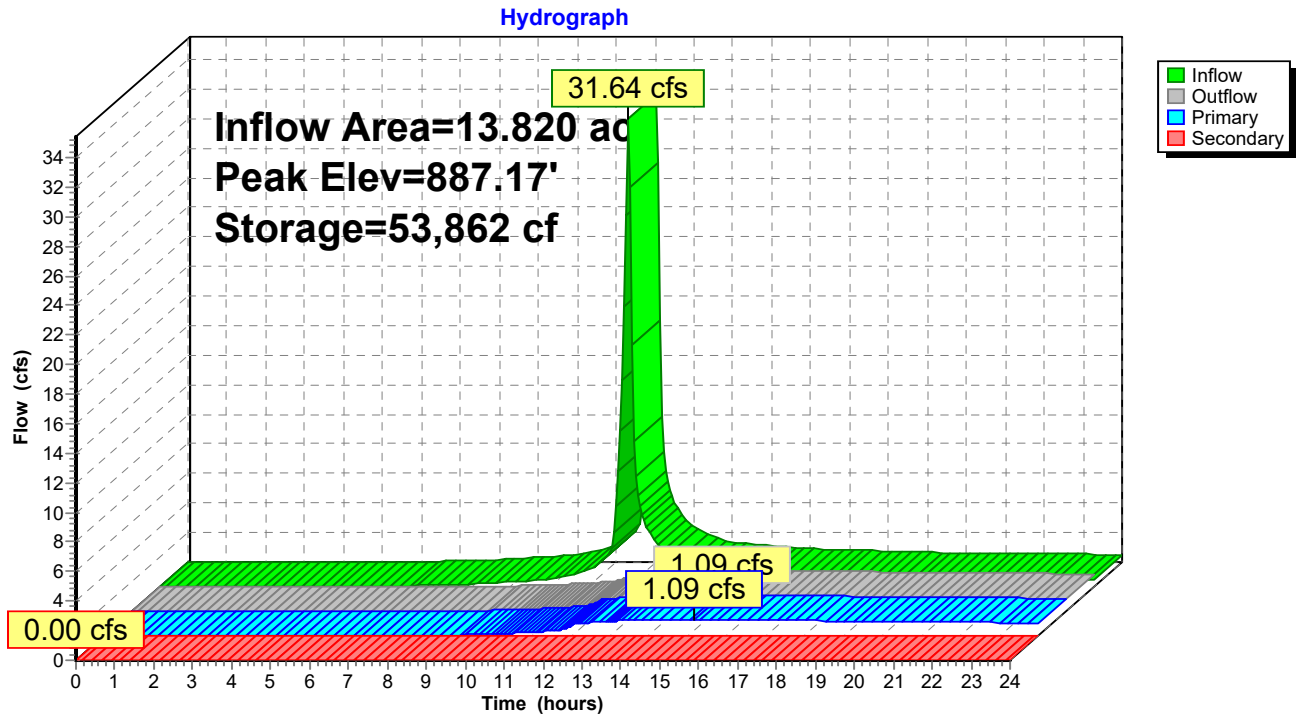
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
883.50	11,033	0	0
884.00	12,045	5,770	5,770
885.00	13,987	13,016	18,786
886.00	15,973	14,980	33,766
887.00	18,038	17,006	50,771
888.00	20,192	19,115	69,886
889.00	22,334	21,263	91,149

Device	Routing	Invert	Outlet Devices
#1	Primary	883.50'	**24.0" Round Culvert** L= 143.6' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 883.50' / 881.00' S= 0.0174 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 3.14 sf
#2	Device 1	883.50'	**4.4" Vert. WQ Orifice** C= 0.600 Limited to weir flow at low heads
#3	Device 1	886.90'	**2.0" Vert. Orifice X 3.00** C= 0.600 Limited to weir flow at low heads
#4	Device 1	887.50'	**3.0" Vert. Orifice X 3.00** C= 0.600 Limited to weir flow at low heads
#5	Device 1	887.80'	**54.0" W x 6.0" H Vert. Window X 3.00** C= 0.600 Limited to weir flow at low heads
#6	Device 1	888.90'	**1.5" x 5.0" Horiz. Grate X 9.00 columns** X 4 rows C= 0.600 Limited to weir flow at low heads
#7	Secondary	888.50'	**20.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=1.09 cfs @ 15.16 hrs HW=887.17' (Free Discharge)
└─**1=Culvert** (Passes 1.09 cfs of 24.72 cfs potential flow)
  └─**2=WQ Orifice** (Orifice Controls 0.95 cfs @ 8.99 fps)
  └─**3=Orifice** (Orifice Controls 0.14 cfs @ 2.08 fps)
  └─**4=Orifice** (Controls 0.00 cfs)
  └─**5=Window** (Controls 0.00 cfs)
  └─**6=Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=883.50' (Free Discharge)
└─**7=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond LP: Lower Pond



Summary for Pond UP: Upper Pond

Inflow Area = 2.190 ac, 61.19% Impervious, Inflow Depth > 2.11" for Dublin 005 event
Inflow = 6.91 cfs @ 12.01 hrs, Volume= 0.386 af
Outflow = 0.22 cfs @ 14.48 hrs, Volume= 0.129 af, Atten= 97%, Lag= 148.2 min
Primary = 0.22 cfs @ 14.48 hrs, Volume= 0.129 af
Routed to Pond 1P : Middle Pond
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond 1P : Middle Pond

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 895.66' @ 14.48 hrs Surf.Area= 8,874 sf Storage= 11,857 cf

Plug-Flow detention time= 364.0 min calculated for 0.129 af (34% of inflow)
Center-of-Mass det. time= 238.3 min (1,048.2 - 809.9)

Volume	Invert	Avail.Storage	Storage Description
#1	894.00'	26,139 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

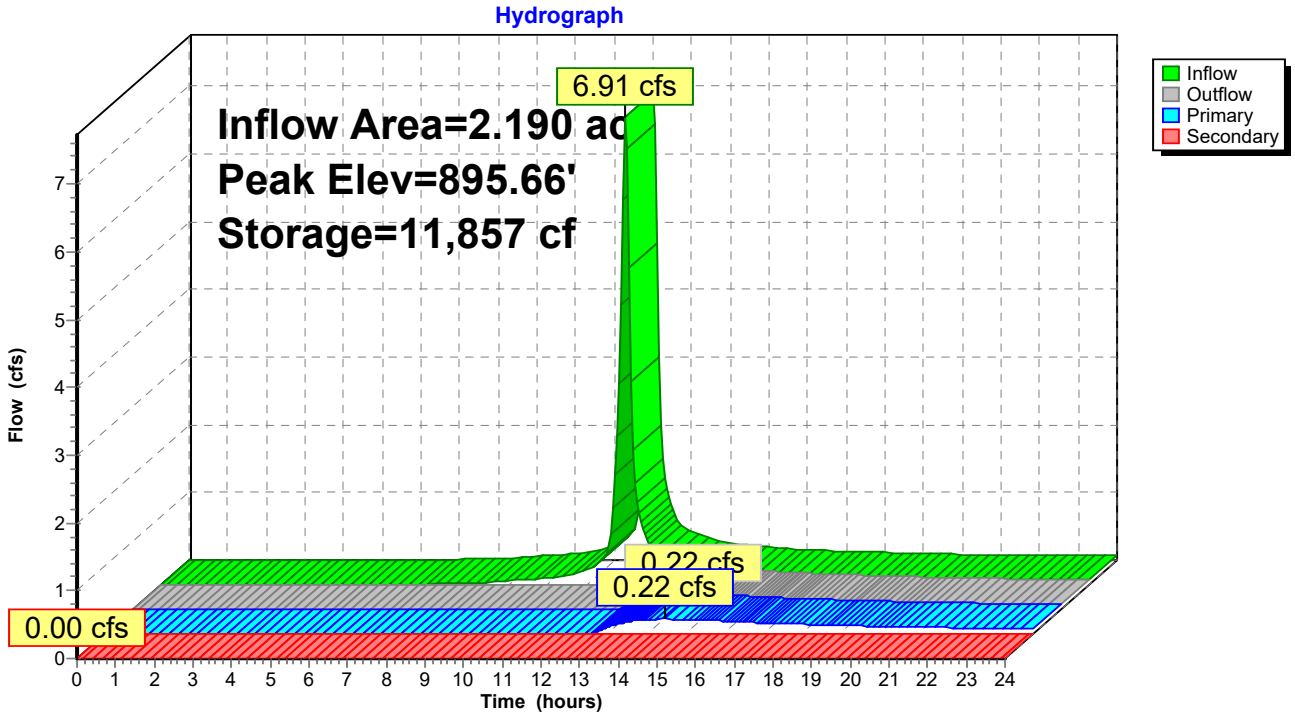
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
894.00	5,685	0	0
895.00	7,343	6,514	6,514
896.00	9,666	8,505	15,019
897.00	12,574	11,120	26,139

Device	Routing	Invert	Outlet Devices
#1	Primary	894.00'	**12.0" Round Culvert** L= 86.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 894.00' / 893.50' S= 0.0058 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	895.50'	**13.0" W x 4.0" H Vert. Window** C= 0.600 Limited to weir flow at low heads
#3	Device 1	896.50'	**1.5" x 5.0" Horiz. Grate X 9.00 columns** X 4 rows C= 0.600 Limited to weir flow at low heads
#4	Secondary	896.50'	**20.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=0.22 cfs @ 14.48 hrs HW=895.66' TW=892.40' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.22 cfs of 3.31 cfs potential flow)
├─**2=Window** (Orifice Controls 0.22 cfs @ 1.28 fps)
└─**3=Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=894.00' TW=891.50' (Dynamic Tailwater)
└─**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond UP: Upper Pond



Summary for Subcatchment 2S: (new Subcat)

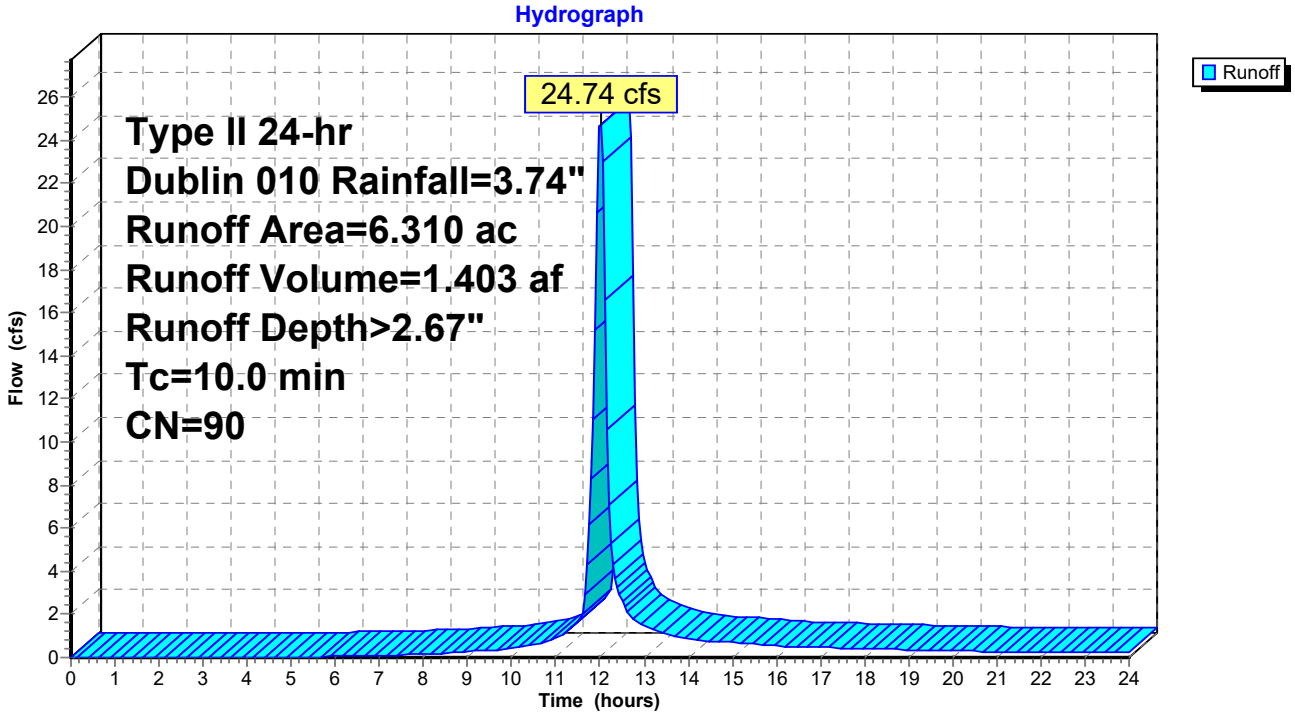
Runoff = 24.74 cfs @ 12.01 hrs, Volume= 1.403 af, Depth> 2.67"
Routed to Pond LP : Lower Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Dublin 010 Rainfall=3.74"

	Area (ac)	CN	Description
*	6.310	90	
	6.310		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry, Storm Sewer**

Subcatchment 2S: (new Subcat)



Summary for Subcatchment 10A: AREA TO 10

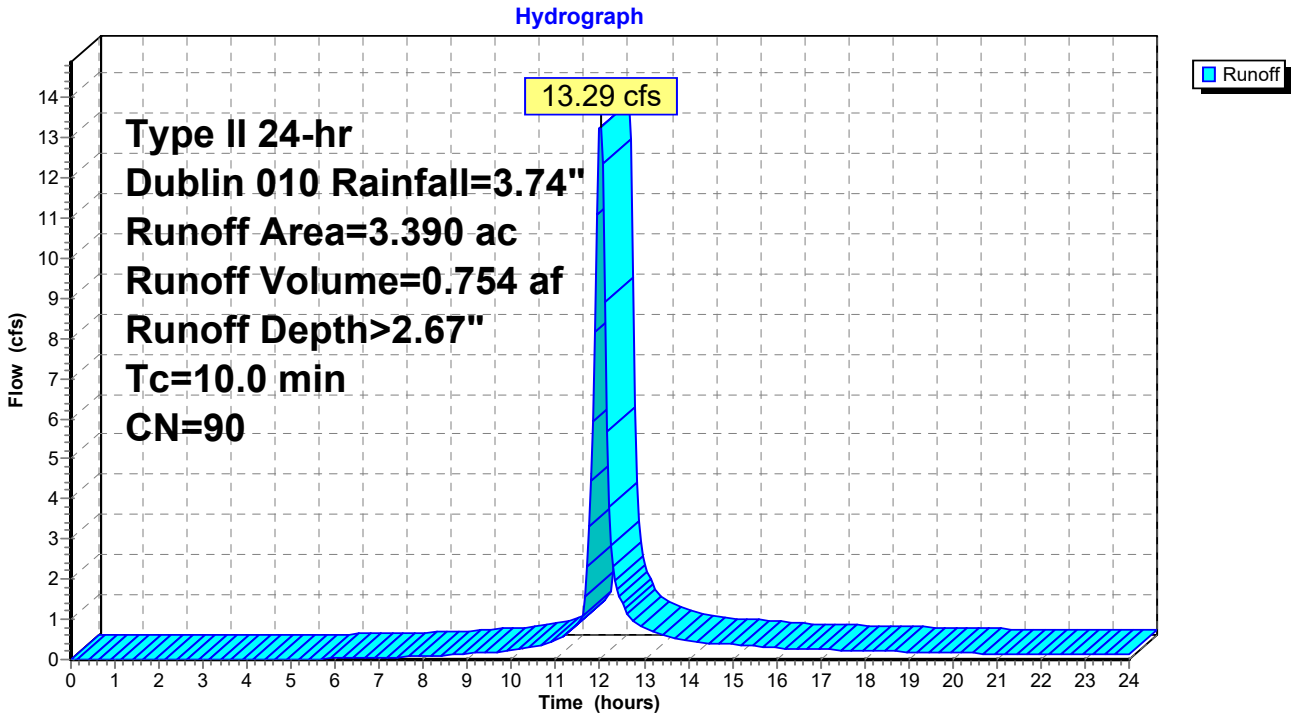
Runoff = 13.29 cfs @ 12.01 hrs, Volume= 0.754 af, Depth> 2.67"
Routed to Pond 10 : CB10

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Dublin 010 Rainfall=3.74"

	Area (ac)	CN	Description
*	3.140	90	
*	0.250	90	FROM 38
	3.390	90	Weighted Average
	3.390		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry,**

Subcatchment 10A: AREA TO 10



Summary for Subcatchment 15S: MIDDLE

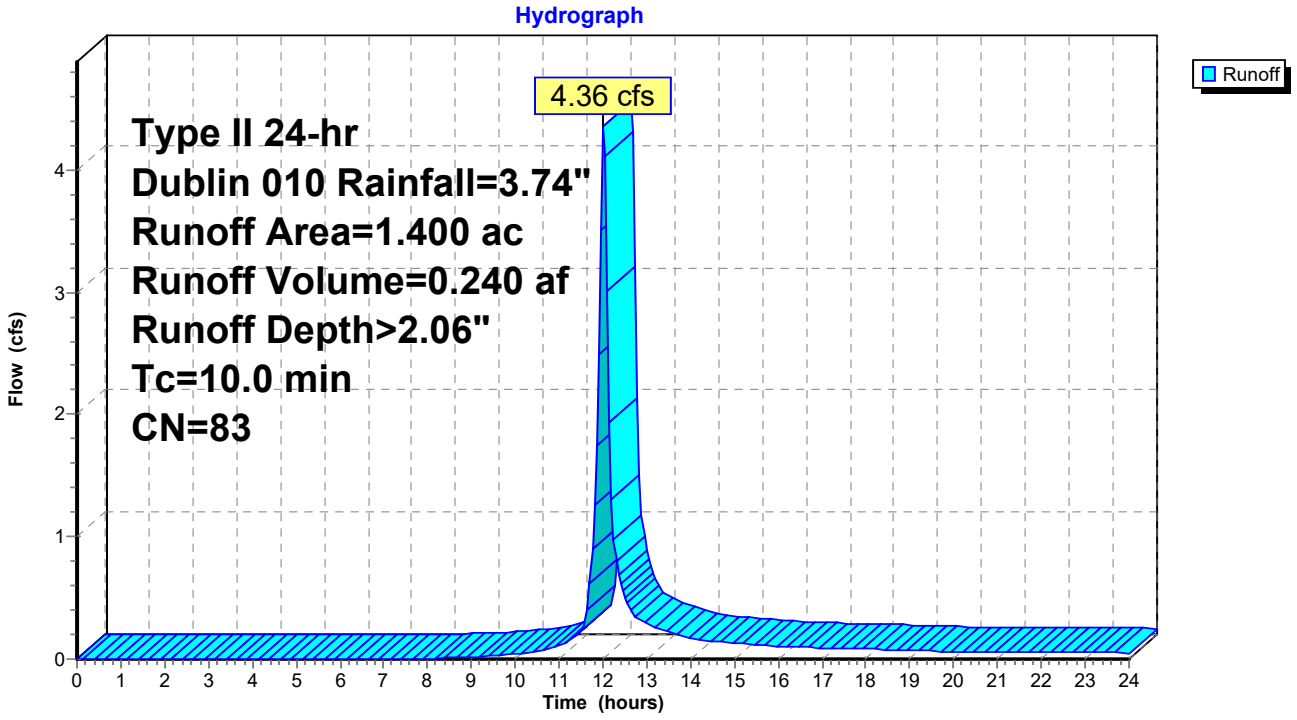
Runoff = 4.36 cfs @ 12.02 hrs, Volume= 0.240 af, Depth> 2.06"
Routed to Pond 1P : Middle Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Dublin 010 Rainfall=3.74"

	Area (ac)	CN	Description
*	0.890	74	
*	0.510	98	
	1.400	83	Weighted Average
	0.890		63.57% Pervious Area
	0.510		36.43% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry, Storm Sewer Pipe**

Subcatchment 15S: MIDDLE



Summary for Subcatchment 16A: AREA TO 15

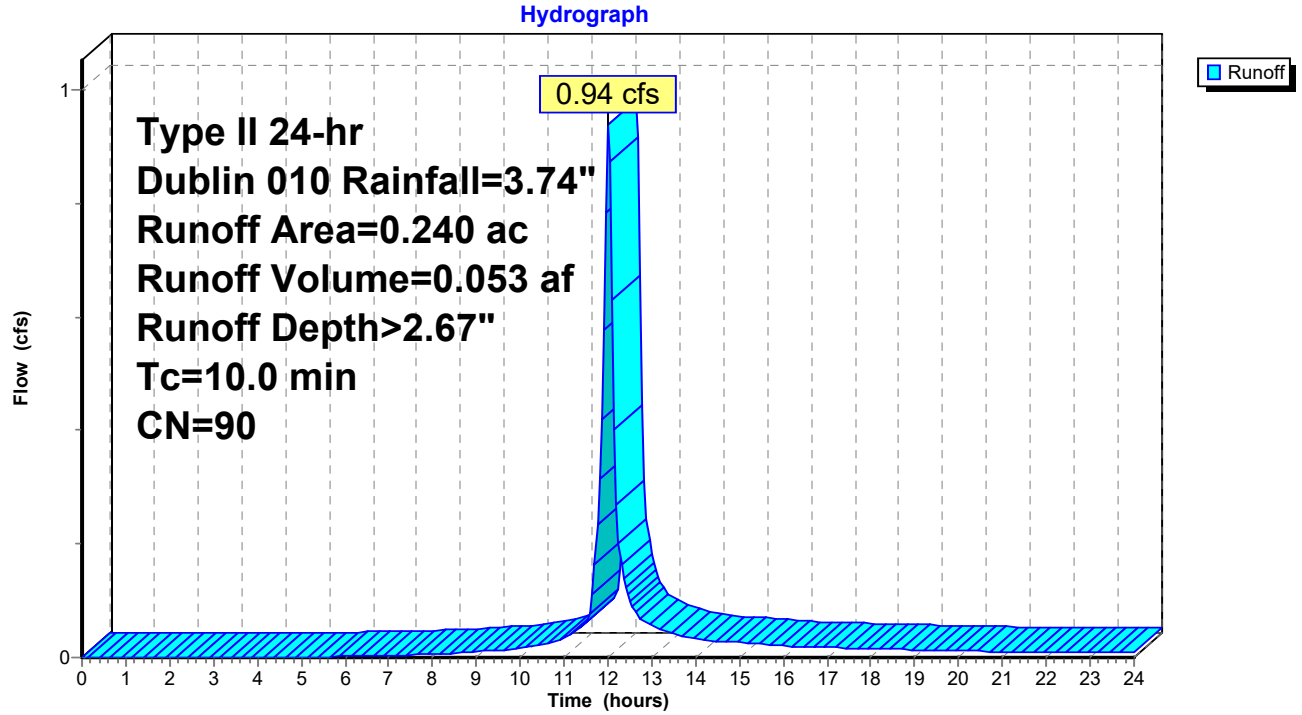
Runoff = 0.94 cfs @ 12.01 hrs, Volume= 0.053 af, Depth> 2.67"
Routed to Pond 15 : CB15

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Dublin 010 Rainfall=3.74"

	Area (ac)	CN	Description
*	0.240	90	
	0.240		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry,**

Subcatchment 16A: AREA TO 15



Summary for Subcatchment 16S: UPPER

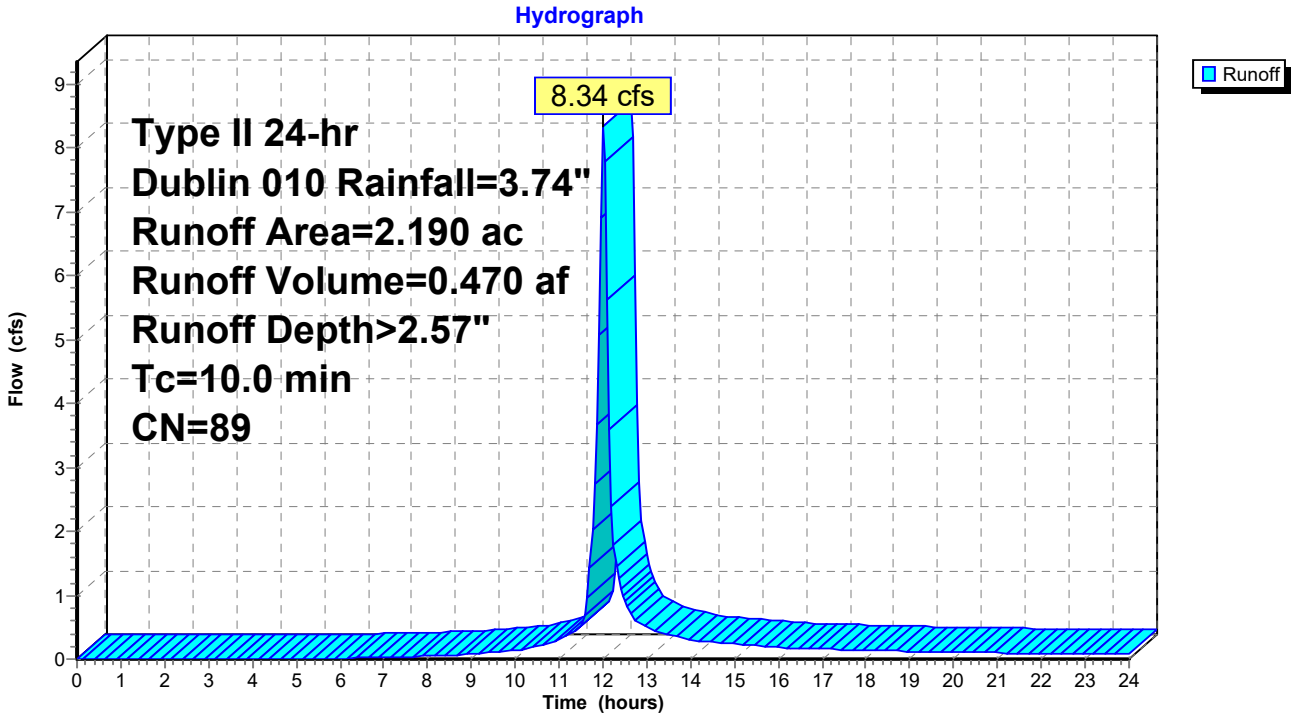
Runoff = 8.34 cfs @ 12.01 hrs, Volume= 0.470 af, Depth> 2.57"
Routed to Pond UP : Upper Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Dublin 010 Rainfall=3.74"

	Area (ac)	CN	Description
*	0.850	74	
*	1.340	98	
	2.190	89	Weighted Average
	0.850		38.81% Pervious Area
	1.340		61.19% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry, Overland**

Subcatchment 16S: UPPER



Summary for Subcatchment 19A: AREA TO 15

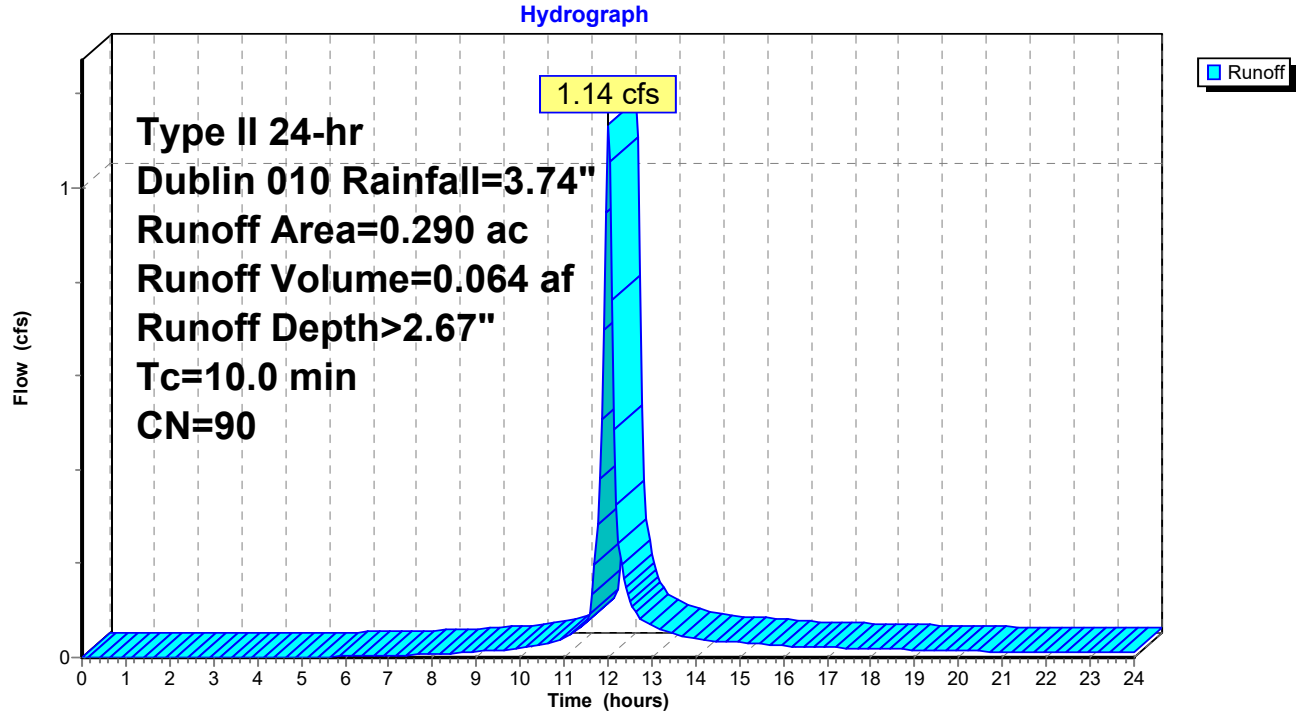
Runoff = 1.14 cfs @ 12.01 hrs, Volume= 0.064 af, Depth> 2.67"
Routed to Pond 15 : CB15

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Dublin 010 Rainfall=3.74"

	Area (ac)	CN	Description
*	0.290	90	
	0.290		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry,**

Subcatchment 19A: AREA TO 15



Summary for Pond 1P: Middle Pond

Inflow Area = 3.590 ac, 51.53% Impervious, Inflow Depth > 1.51" for Dublin 010 event
Inflow = 4.36 cfs @ 12.02 hrs, Volume= 0.452 af
Outflow = 0.23 cfs @ 18.67 hrs, Volume= 0.221 af, Atten= 95%, Lag= 399.3 min
Primary = 0.23 cfs @ 18.67 hrs, Volume= 0.221 af
Routed to Pond LP : Lower Pond
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond LP : Lower Pond

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 893.06' @ 18.67 hrs Surf.Area= 8,905 sf Storage= 11,107 cf

Plug-Flow detention time= 348.1 min calculated for 0.221 af (49% of inflow)
Center-of-Mass det. time= 188.1 min (1,085.8 - 897.7)

Volume	Invert	Avail.Storage	Storage Description
#1	891.50'	48,495 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

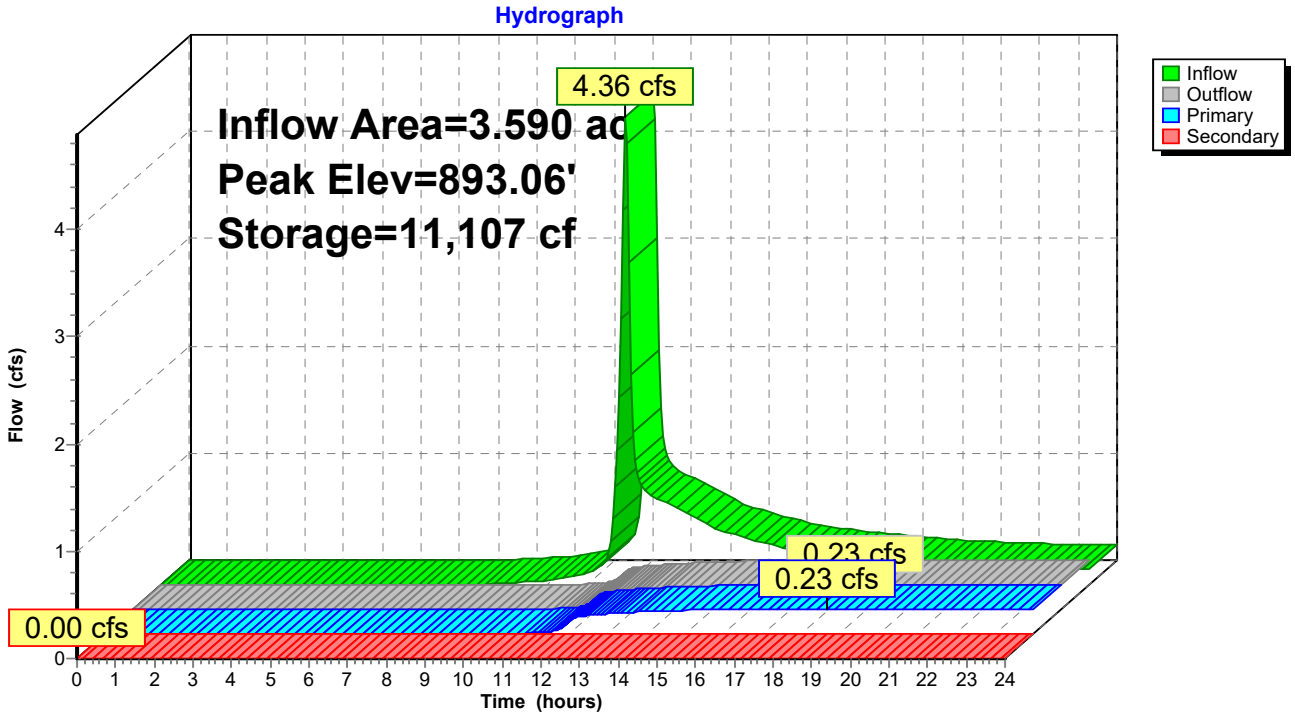
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
891.50	5,673	0	0
892.00	6,321	2,999	2,999
893.00	8,752	7,537	10,535
894.00	11,119	9,936	20,471
895.00	13,980	12,550	33,020
896.00	16,970	15,475	48,495

Device	Routing	Invert	Outlet Devices
#1	Primary	891.50'	**8.0" Round Culvert X 3.00** L= 2.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 891.50' / 891.49' S= 0.0050 '/' Cc= 0.900 n= 0.013, Flow Area= 0.35 sf
#2	Device 1	891.50'	**2.7" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#3	Secondary	895.50'	**20.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Primary OutFlow Max=0.23 cfs @ 18.67 hrs HW=893.06' TW=887.49' (Dynamic Tailwater)
1=Culvert (Passes 0.23 cfs of 5.60 cfs potential flow)
2=Orifice (Orifice Controls 0.23 cfs @ 5.80 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=891.50' TW=883.50' (Dynamic Tailwater)
3=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 1P: Middle Pond



Summary for Pond 10: CB10

Inflow Area = 3.920 ac, 0.00% Impervious, Inflow Depth > 2.67" for Dublin 010 event
Inflow = 13.63 cfs @ 12.01 hrs, Volume= 0.872 af
Outflow = 13.99 cfs @ 12.02 hrs, Volume= 0.872 af, Atten= 0%, Lag= 0.4 min
Primary = 13.99 cfs @ 12.02 hrs, Volume= 0.872 af
Routed to Pond LP : Lower Pond
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond LP : Lower Pond

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 896.96' @ 12.02 hrs Surf.Area= 24 sf Storage= 712 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.3 min (803.2 - 802.9)

Volume	Invert	Avail.Storage	Storage Description
#1	890.79'	1,036 cf	**CB10 (Prismatic)** Listed below (Recalc)
#2	891.29'	82 cf	**18.0" Round Pipe Storage 10-11** L= 46.6' S= 0.0127 '/'
#3	891.88'	1,031 cf	**CB11 (Prismatic)** Listed below (Recalc)
#4	891.88'	108 cf	**18.0" Round Pipe Storage 11-12** L= 61.3' S= 0.0075 '/'
#5	892.34'	1,030 cf	**CB12 (Prismatic)** Listed below (Recalc)
#6	892.34'	138 cf	**18.0" Round Pipe Storage 12-13** L= 78.0' S= 0.0055 '/'
#7	892.77'	1,028 cf	**CB13 (Prismatic)** Listed below (Recalc)
#8	892.77'	139 cf	**18.0" Round Pipe Storage 13-14** L= 78.9' S= 0.0055 '/'
#9	893.20'	21 cf	**CB14 (Prismatic)** Listed below (Recalc)
#10	893.70'	63 cf	**12.0" Round Pipe Storage 14-15** L= 80.2' S= 0.0046 '/'
#11	892.35'	71 cf	**12.0" Round Pipe Storage 10-38** L= 90.5' S= 0.0100 '/'
#12	893.25'	1,568 cf	**CB38 (Prismatic)** Listed below (Recalc)
		6,315 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
890.79	4	0	0
897.60	4	27	27
898.25	3,099	1,008	1,036

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
891.88	4	0	0
897.60	4	23	23
898.25	3,099	1,008	1,031

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
892.34	4	0	0
897.60	4	21	21
898.25	3,099	1,008	1,030

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
892.77	4	0	0
897.60	4	19	19
898.25	3,099	1,008	1,028

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
893.20	4	0	0
898.50	4	21	21

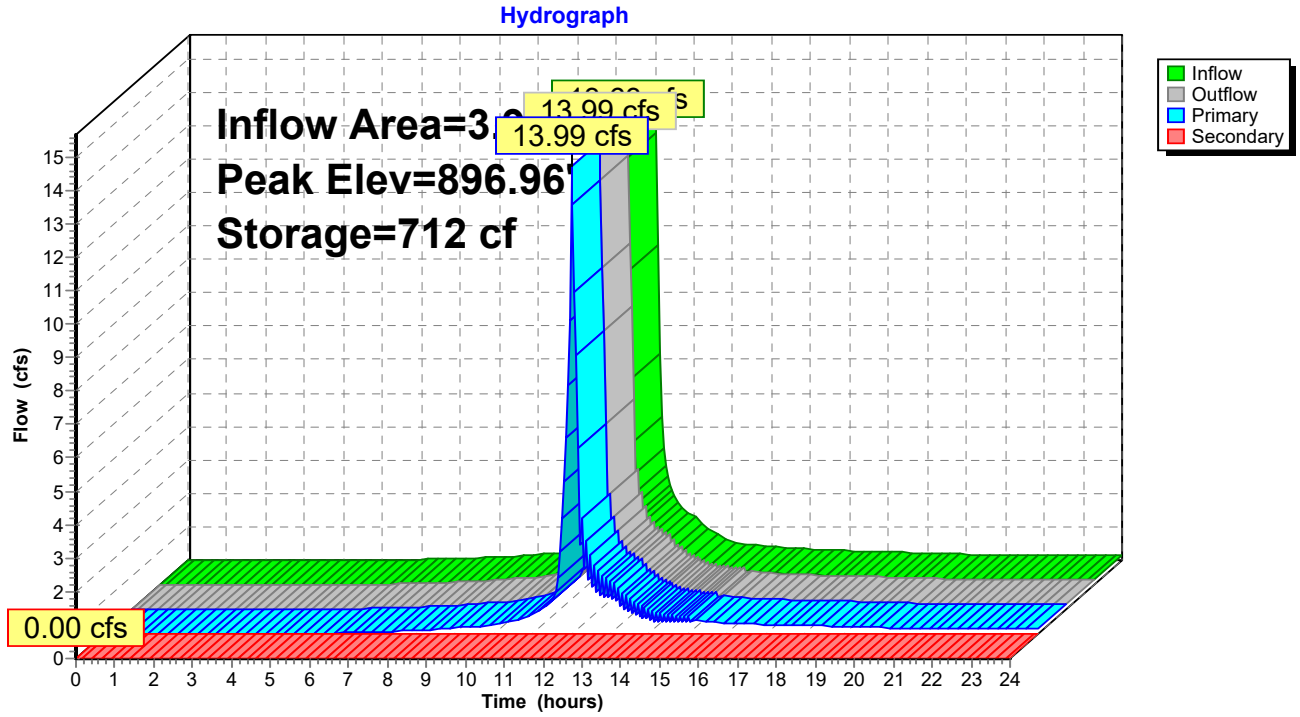
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
893.25	4	0	0
897.25	4	16	16
898.25	3,099	1,552	1,568

Device	Routing	Invert	Outlet Devices
#1	Primary	890.79'	**24.0" Round Culvert 10-9** L= 107.6' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 890.79' / 890.49' S= 0.0028 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#2	Device 1	890.79'	**15.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Secondary	898.25'	**0.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=13.41 cfs @ 12.02 hrs HW=896.57' TW=886.02' (Dynamic Tailwater)
└**1=Culvert 10-9** (Passes 13.41 cfs of 30.21 cfs potential flow)
└**2=Orifice/Grate** (Orifice Controls 13.41 cfs @ 10.93 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=890.79' TW=883.50' (Dynamic Tailwater)
└**3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 10: CB10


Hydrograph
Inflow Area=3.
Peak Elev=896.96'
Storage=712 cf
13.99 cfs
0.00 cfs
Inflow
Outflow
Primary
Secondary
Flow (cfs)
Time (hours)

Summary for Pond 15: CB15

Inflow Area = 0.530 ac, 0.00% Impervious, Inflow Depth > 2.67" for Dublin 010 event
Inflow = 2.08 cfs @ 12.01 hrs, Volume= 0.118 af
Outflow = 0.52 cfs @ 12.20 hrs, Volume= 0.118 af, Atten= 75%, Lag= 11.4 min
Primary = 0.52 cfs @ 12.20 hrs, Volume= 0.118 af
Routed to Pond 10 : CB10
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond 10 : CB10

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 899.12' @ 12.22 hrs Surf.Area= 4,737 sf Storage= 1,532 cf

Plug-Flow detention time= 19.0 min calculated for 0.118 af (100% of inflow)
Center-of-Mass det. time= 18.6 min (819.0 - 800.4)

Volume	Invert	Avail.Storage	Storage Description
#1	894.07'	599 cf	**CB15 (Prismatic)** Listed below (Recalc)
#2	894.07'	58 cf	**12.0" Round Pipe Storage 15-16** L= 73.7' S= 0.0044 '/'
#3	894.39'	669 cf	**CB16 (Prismatic)** Listed below (Recalc)
#4	894.39'	85 cf	**12.0" Round Pipe Storage 16-17** L= 107.9' S= 0.0044 '/'
#5	894.86'	668 cf	**CB17 (Prismatic)** Listed below (Recalc)
#6	893.96'	61 cf	**12.0" Round Pipe Storage 17-18** L= 77.8' S= 0.0050 '/'
#7	895.20'	594 cf	**CB18 (Prismatic)** Listed below (Recalc)
#8	895.20'	70 cf	**12.0" Round Pipe Storage 18-19** L= 89.0' S= 0.0044 '/'
#9	895.59'	593 cf	**CB19 (Prismatic)** Listed below (Recalc)
#10	895.59'	83 cf	**12.0" Round Pipe Storage 19-20** L= 106.1' S= 0.0044 '/'
#11	896.06'	591 cf	**CB20 (Prismatic)** Listed below (Recalc)
		4,071 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
894.07	4	0	0
898.70	4	19	19
899.50	1,447	580	599

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
894.39	4	0	0
898.60	4	17	17
899.50	1,446	652	669

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
894.86	4	0	0
898.60	4	15	15
899.50	1,447	653	668

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
895.20	4	0	0
898.70	4	14	14
899.50	1,446	580	594

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
895.59	4	0	0
898.70	4	12	12
899.50	1,447	580	593

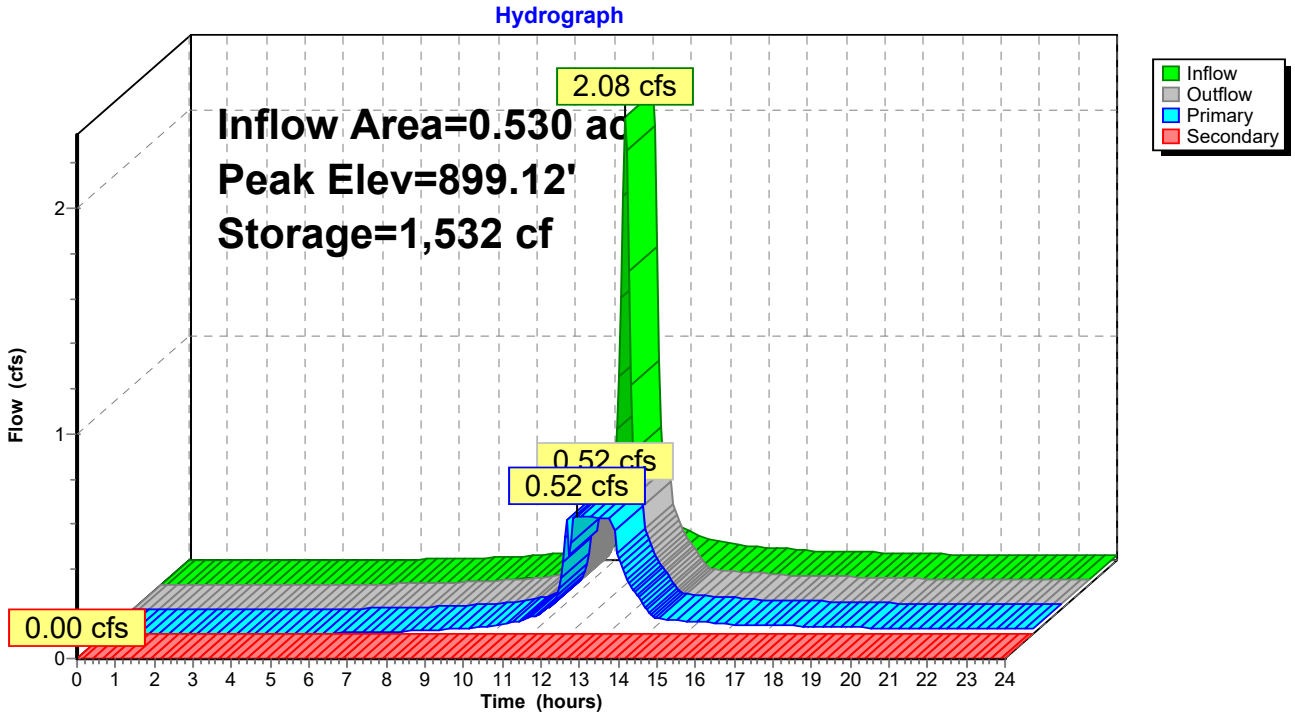
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
896.06	4	0	0
898.70	4	11	11
899.50	1,446	580	591

Device	Routing	Invert	Outlet Devices
#1	Primary	894.07'	**12.0" Round Culvert 15-14** L= 80.2' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 894.07' / 893.70' S= 0.0046 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	894.07'	**3.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#3	Secondary	899.50'	**0.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=0.52 cfs @ 12.20 hrs HW=899.12' TW=892.30' (Dynamic Tailwater)
↑—**1=Culvert 15-14** (Passes 0.52 cfs of 6.61 cfs potential flow)
↑—**2=Orifice** (Orifice Controls 0.52 cfs @ 10.69 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=893.96' TW=890.79' (Dynamic Tailwater)
↑—**3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 15: CB15


Hydrograph
Inflow
Outflow
Primary
Secondary
2.08 cfs
Inflow Area=0.530 ac
Peak Elev=899.12'
Storage=1,532 cf
0.52 cfs
0.52 cfs
0.00 cfs
Flow (cfs)
0
1
2
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
Time (hours)

Summary for Pond LP: Lower Pond

Inflow Area = 13.820 ac, 13.39% Impervious, Inflow Depth > 2.17" for Dublin 010 event
Inflow = 38.84 cfs @ 12.01 hrs, Volume= 2.496 af
Outflow = 1.51 cfs @ 14.24 hrs, Volume= 1.312 af, Atten= 96%, Lag= 133.7 min
Primary = 1.51 cfs @ 14.24 hrs, Volume= 1.312 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 887.72' @ 14.24 hrs Surf.Area= 19,591 sf Storage= 64,338 cf

Plug-Flow detention time= 345.3 min calculated for 1.312 af (53% of inflow)
Center-of-Mass det. time= 213.0 min (1,039.6 - 826.6)

Volume	Invert	Avail.Storage	Storage Description
#1	883.50'	91,149 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

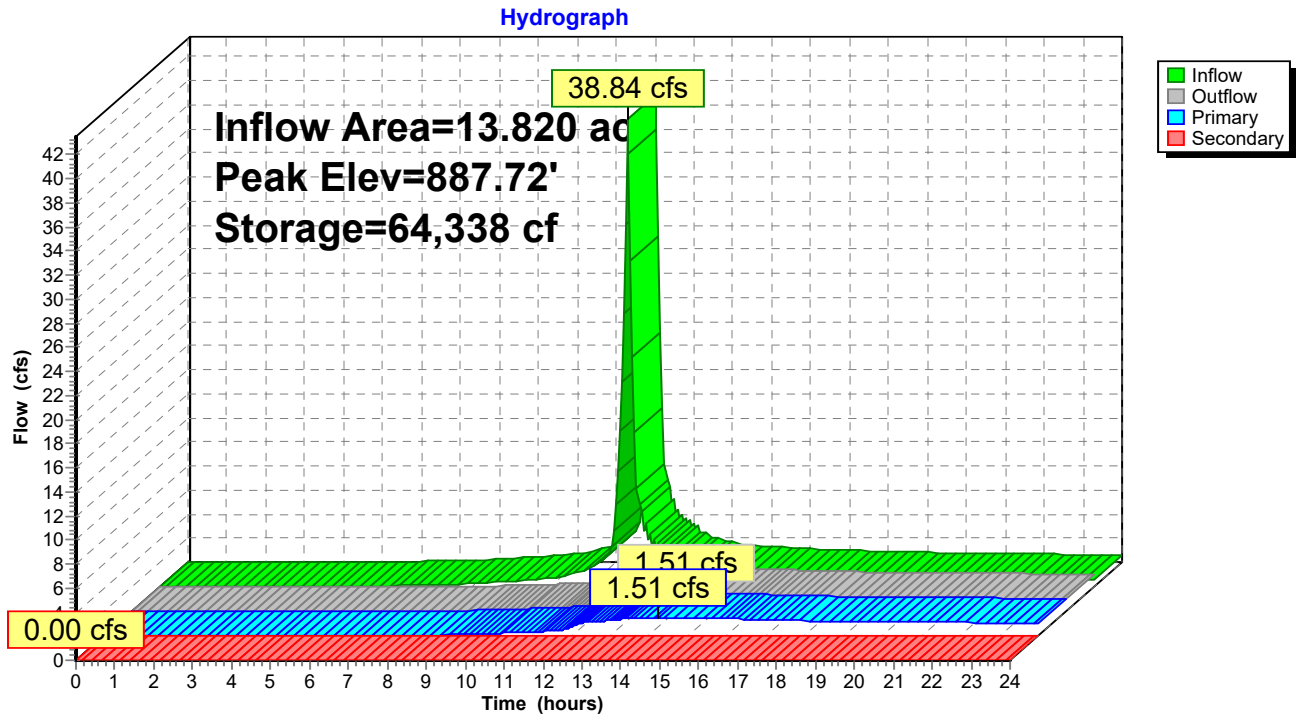
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
883.50	11,033	0	0
884.00	12,045	5,770	5,770
885.00	13,987	13,016	18,786
886.00	15,973	14,980	33,766
887.00	18,038	17,006	50,771
888.00	20,192	19,115	69,886
889.00	22,334	21,263	91,149

Device	Routing	Invert	Outlet Devices
#1	Primary	883.50'	**24.0" Round Culvert** L= 143.6' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 883.50' / 881.00' S= 0.0174 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 3.14 sf
#2	Device 1	883.50'	**4.4" Vert. WQ Orifice** C= 0.600 Limited to weir flow at low heads
#3	Device 1	886.90'	**2.0" Vert. Orifice X 3.00** C= 0.600 Limited to weir flow at low heads
#4	Device 1	887.50'	**3.0" Vert. Orifice X 3.00** C= 0.600 Limited to weir flow at low heads
#5	Device 1	887.80'	**54.0" W x 6.0" H Vert. Window X 3.00** C= 0.600 Limited to weir flow at low heads
#6	Device 1	888.90'	**1.5" x 5.0" Horiz. Grate X 9.00 columns** X 4 rows C= 0.600 Limited to weir flow at low heads
#7	Secondary	888.50'	**20.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=1.51 cfs @ 14.24 hrs HW=887.72' (Free Discharge)
└─**1=Culvert** (Passes 1.51 cfs of 27.15 cfs potential flow)
  └─**2=WQ Orifice** (Orifice Controls 1.02 cfs @ 9.68 fps)
  └─**3=Orifice** (Orifice Controls 0.27 cfs @ 4.14 fps)
  └─**4=Orifice** (Orifice Controls 0.22 cfs @ 1.60 fps)
  └─**5=Window** (Controls 0.00 cfs)
  └─**6=Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=883.50' (Free Discharge)
└─**7=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond LP: Lower Pond



Summary for Pond UP: Upper Pond

Inflow Area = 2.190 ac, 61.19% Impervious, Inflow Depth > 2.57" for Dublin 010 event
Inflow = 8.34 cfs @ 12.01 hrs, Volume= 0.470 af
Outflow = 0.49 cfs @ 13.05 hrs, Volume= 0.212 af, Atten= 94%, Lag= 62.4 min
Primary = 0.49 cfs @ 13.05 hrs, Volume= 0.212 af
Routed to Pond 1P : Middle Pond
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond 1P : Middle Pond

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 895.77' @ 13.05 hrs Surf.Area= 9,135 sf Storage= 12,871 cf

Plug-Flow detention time= 290.6 min calculated for 0.211 af (45% of inflow)
Center-of-Mass det. time= 175.8 min (980.1 - 804.4)

Volume	Invert	Avail.Storage	Storage Description
#1	894.00'	26,139 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

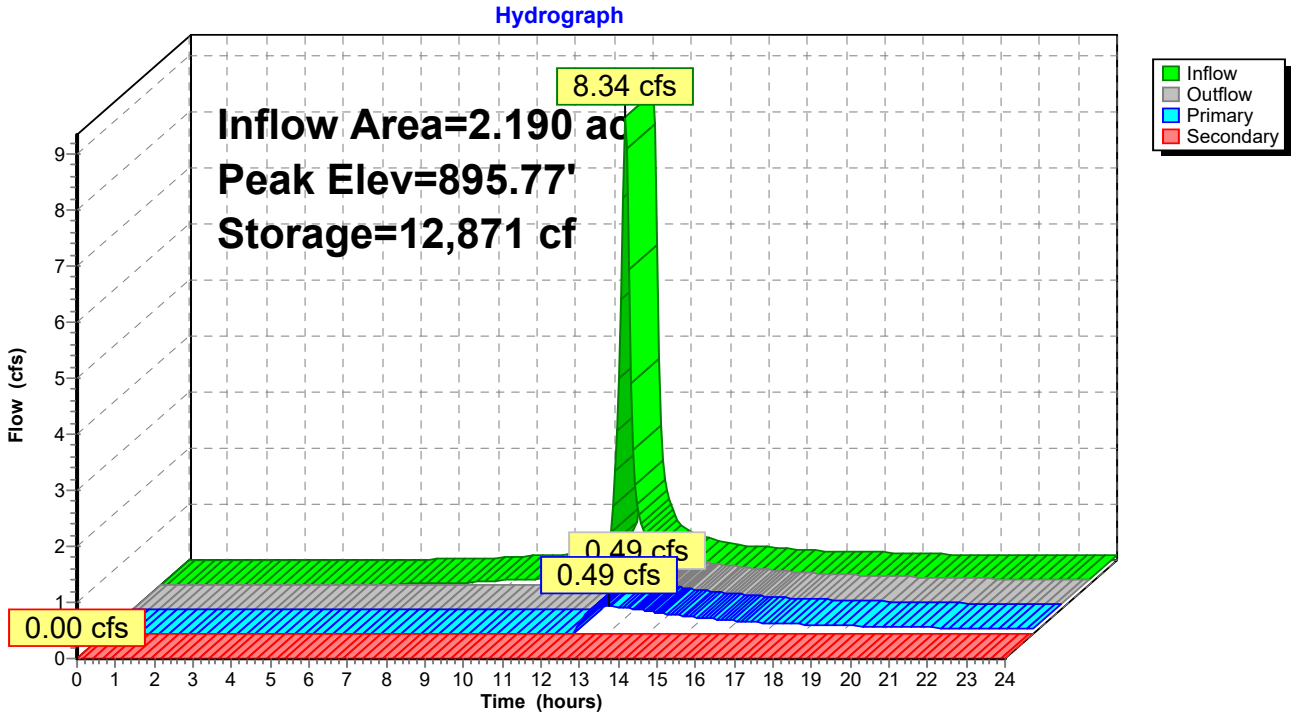
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
894.00	5,685	0	0
895.00	7,343	6,514	6,514
896.00	9,666	8,505	15,019
897.00	12,574	11,120	26,139

Device	Routing	Invert	Outlet Devices
#1	Primary	894.00'	**12.0" Round Culvert** L= 86.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 894.00' / 893.50' S= 0.0058 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	895.50'	**13.0" W x 4.0" H Vert. Window** C= 0.600 Limited to weir flow at low heads
#3	Device 1	896.50'	**1.5" x 5.0" Horiz. Grate X 9.00 columns** X 4 rows C= 0.600 Limited to weir flow at low heads
#4	Secondary	896.50'	**20.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=0.49 cfs @ 13.05 hrs HW=895.77' TW=892.60' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.49 cfs of 3.47 cfs potential flow)
├─**2=Window** (Orifice Controls 0.49 cfs @ 1.67 fps)
└─**3=Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=894.00' TW=891.50' (Dynamic Tailwater)
└─**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond UP: Upper Pond



Summary for Subcatchment 2S: (new Subcat)

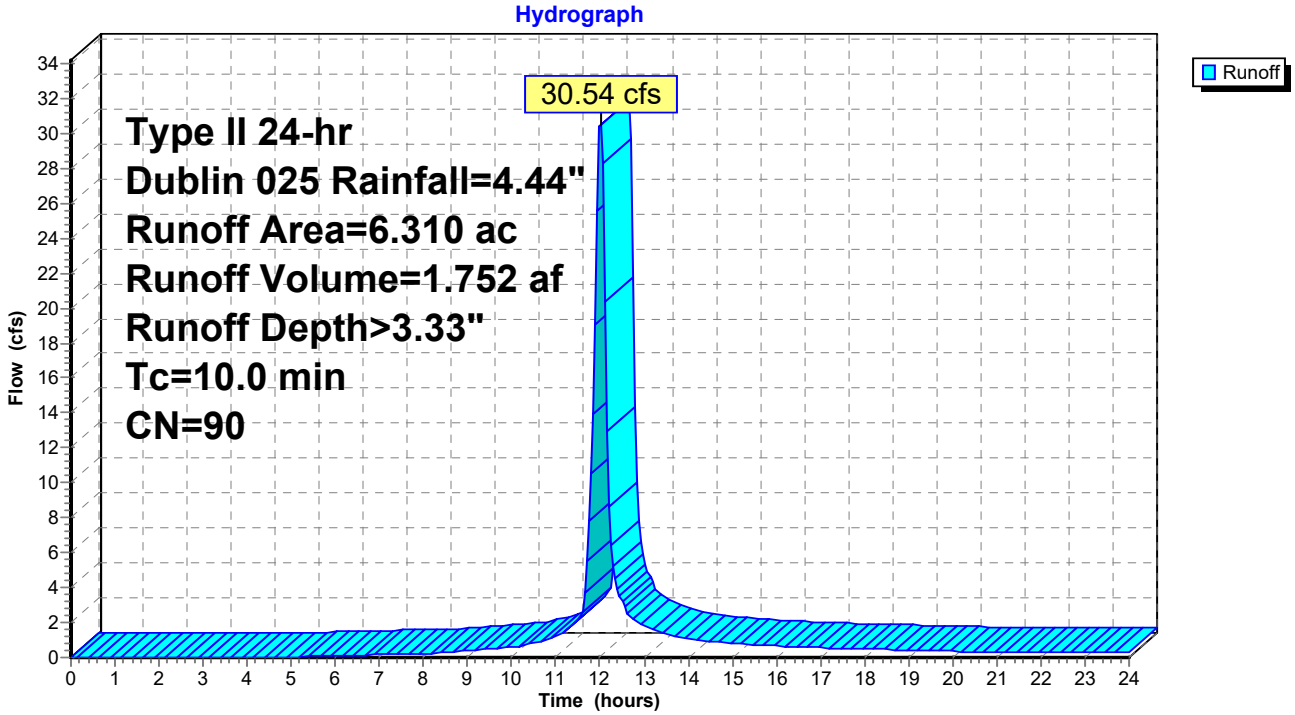
Runoff = 30.54 cfs @ 12.01 hrs, Volume= 1.752 af, Depth> 3.33"
Routed to Pond LP : Lower Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Dublin 025 Rainfall=4.44"

	Area (ac)	CN	Description
*	6.310	90	
	6.310		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry, Storm Sewer**

Subcatchment 2S: (new Subcat)



Summary for Subcatchment 10A: AREA TO 10

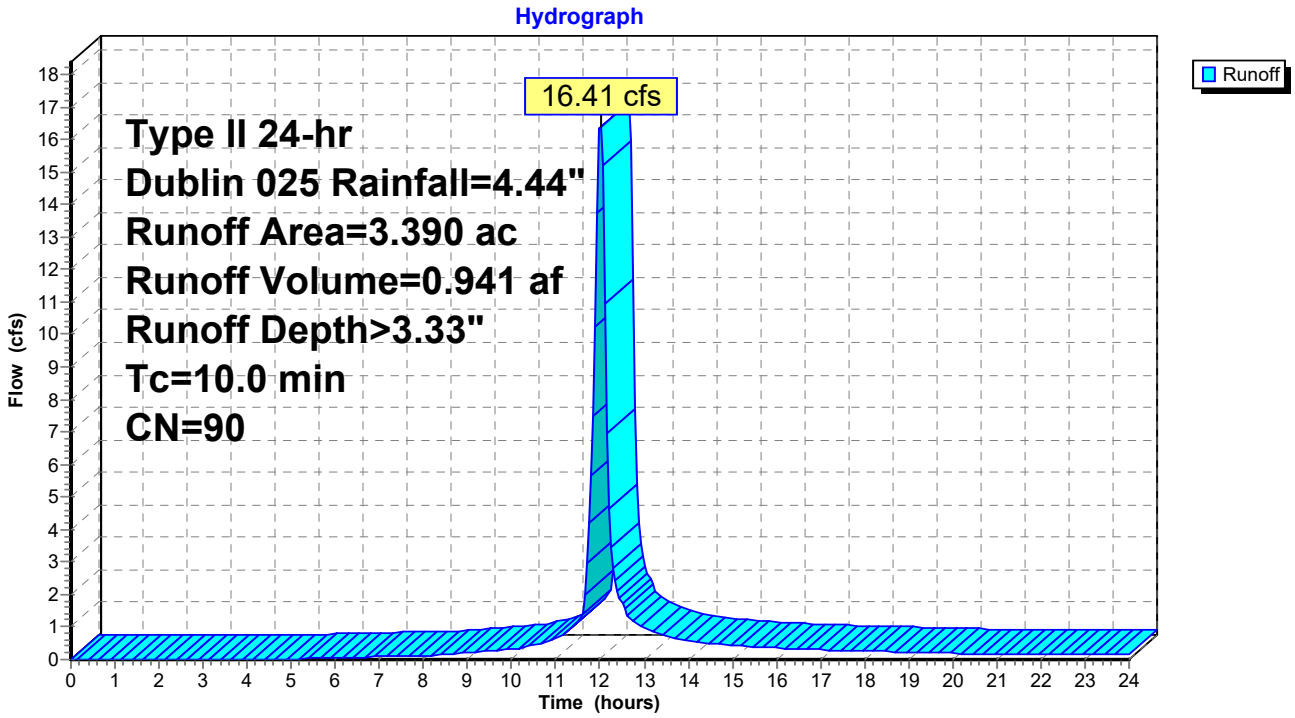
Runoff = 16.41 cfs @ 12.01 hrs, Volume= 0.941 af, Depth> 3.33"
Routed to Pond 10 : CB10

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Dublin 025 Rainfall=4.44"

	Area (ac)	CN	Description
*	3.140	90	
*	0.250	90	FROM 38
	3.390	90	Weighted Average
	3.390		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry,**

Subcatchment 10A: AREA TO 10



Summary for Subcatchment 15S: MIDDLE

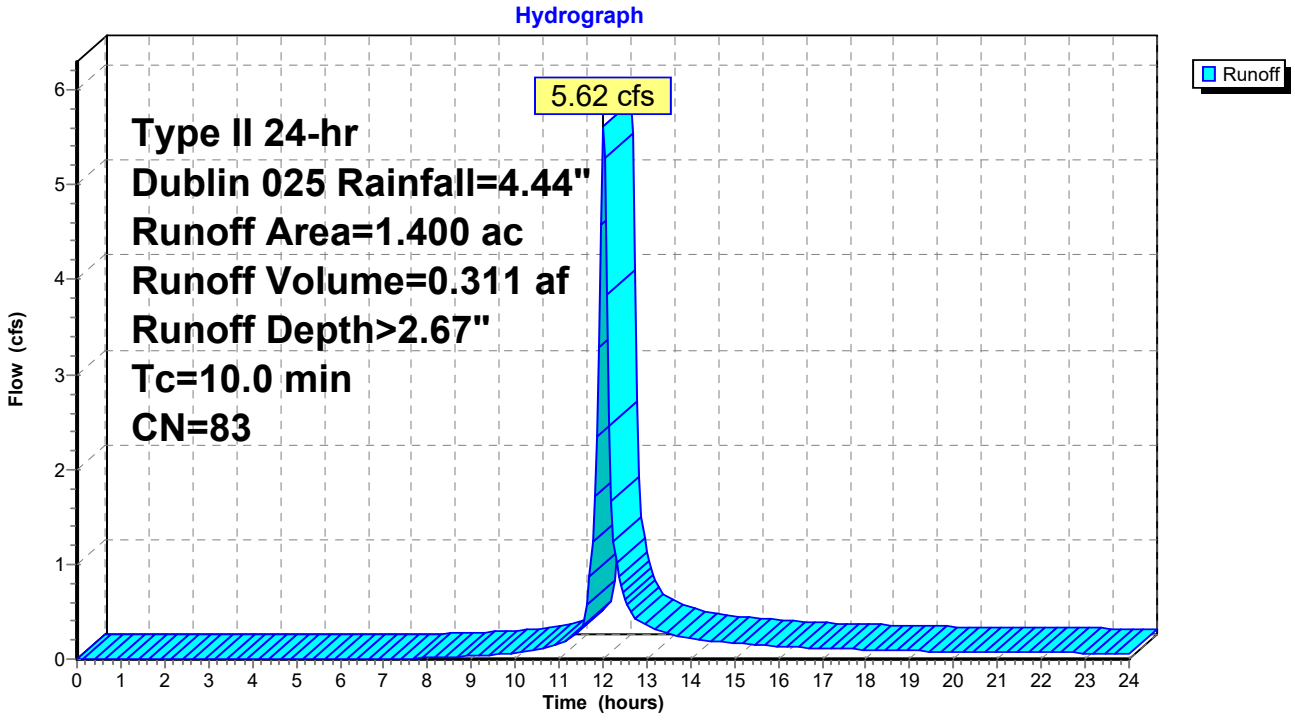
Runoff = 5.62 cfs @ 12.01 hrs, Volume= 0.311 af, Depth> 2.67"
Routed to Pond 1P : Middle Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Dublin 025 Rainfall=4.44"

	Area (ac)	CN	Description
*	0.890	74	
*	0.510	98	
	1.400	83	Weighted Average
	0.890		63.57% Pervious Area
	0.510		36.43% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry, Storm Sewer Pipe**

Subcatchment 15S: MIDDLE



Summary for Subcatchment 16A: AREA TO 15

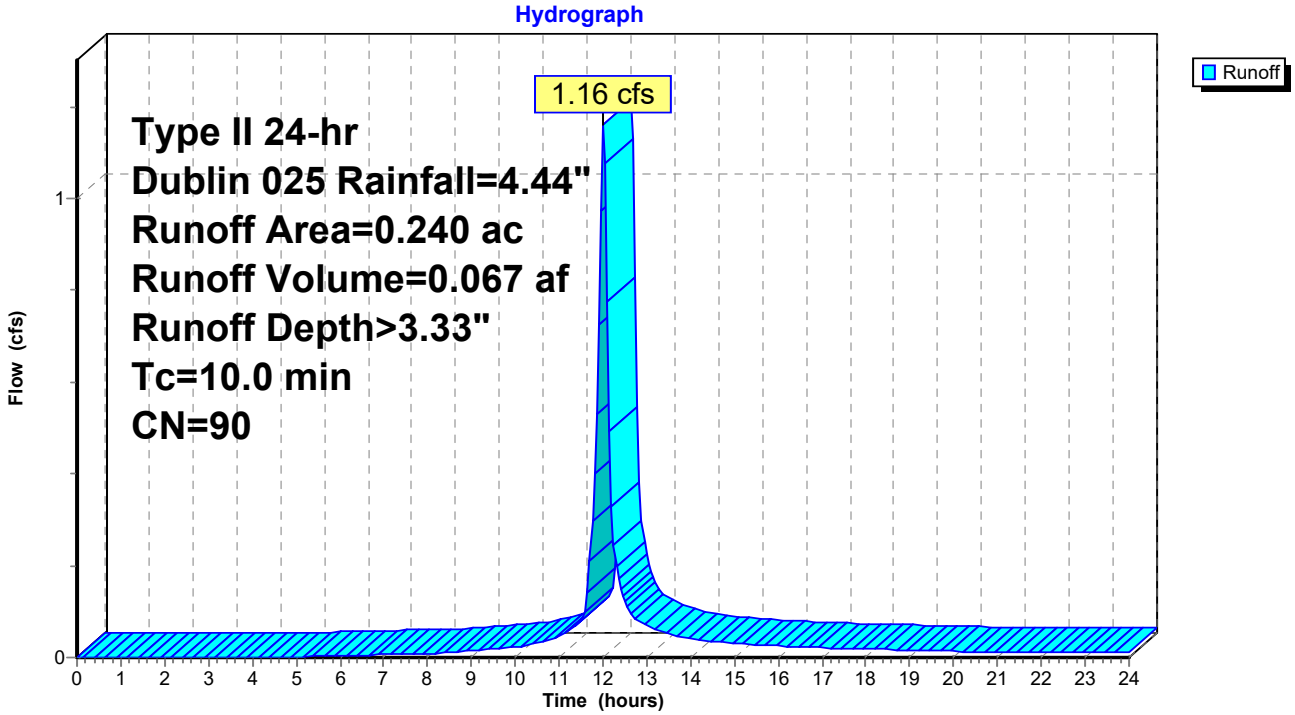
Runoff = 1.16 cfs @ 12.01 hrs, Volume= 0.067 af, Depth> 3.33"
Routed to Pond 15 : CB15

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Dublin 025 Rainfall=4.44"

	Area (ac)	CN	Description
*	0.240	90	
	0.240		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry,**

Subcatchment 16A: AREA TO 15



Summary for Subcatchment 16S: UPPER

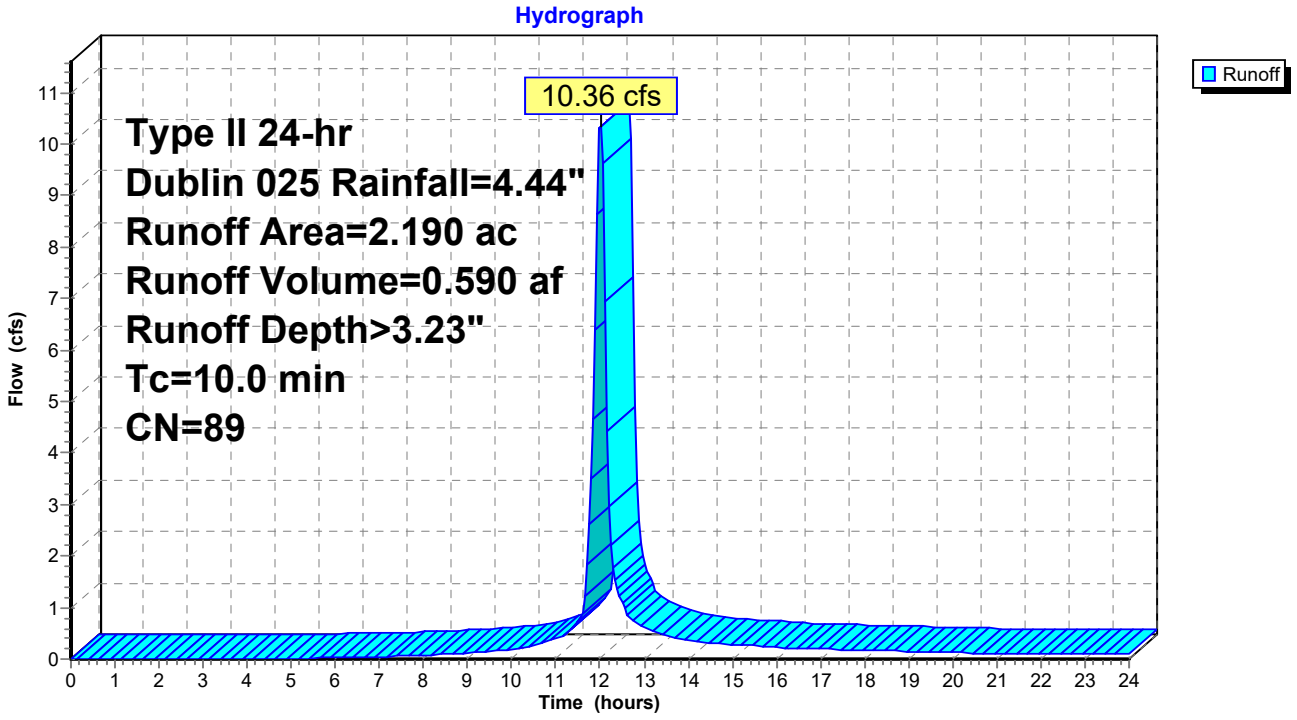
Runoff = 10.36 cfs @ 12.01 hrs, Volume= 0.590 af, Depth> 3.23"
Routed to Pond UP : Upper Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Dublin 025 Rainfall=4.44"

	Area (ac)	CN	Description
*	0.850	74	
*	1.340	98	
	2.190	89	Weighted Average
	0.850		38.81% Pervious Area
	1.340		61.19% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry, Overland**

Subcatchment 16S: UPPER



Summary for Subcatchment 19A: AREA TO 15

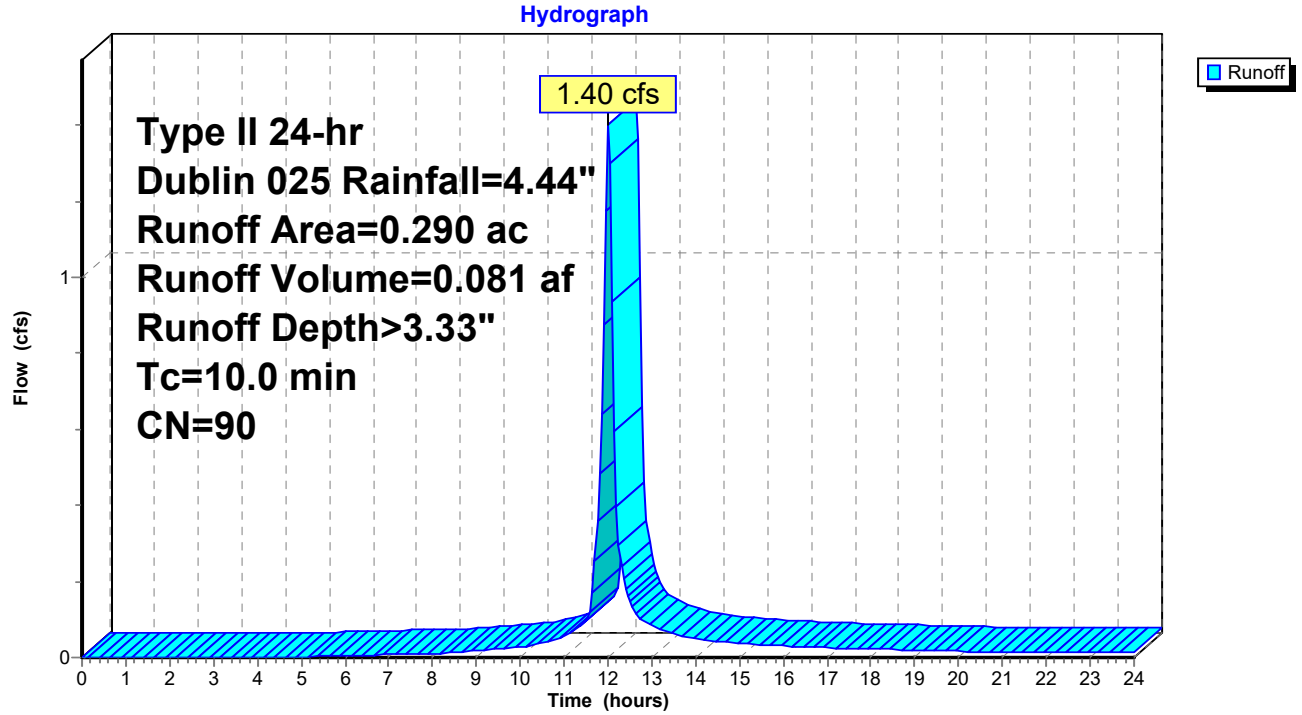
Runoff = 1.40 cfs @ 12.01 hrs, Volume= 0.081 af, Depth> 3.33"
Routed to Pond 15 : CB15

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Dublin 025 Rainfall=4.44"

	Area (ac)	CN	Description
*	0.290	90	
	0.290		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry,**

Subcatchment 19A: AREA TO 15



Summary for Pond 1P: Middle Pond

Inflow Area = 3.590 ac, 51.53% Impervious, Inflow Depth > 2.14" for Dublin 025 event
Inflow = 5.65 cfs @ 12.02 hrs, Volume= 0.641 af
Outflow = 0.28 cfs @ 18.73 hrs, Volume= 0.269 af, Atten= 95%, Lag= 402.9 min
Primary = 0.28 cfs @ 18.73 hrs, Volume= 0.269 af
Routed to Pond LP : Lower Pond
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond LP : Lower Pond

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 893.72' @ 18.73 hrs Surf.Area= 10,453 sf Storage= 17,437 cf

Plug-Flow detention time= 360.5 min calculated for 0.269 af (42% of inflow)
Center-of-Mass det. time= 204.0 min (1,082.8 - 878.9)

Volume	Invert	Avail.Storage	Storage Description
#1	891.50'	48,495 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

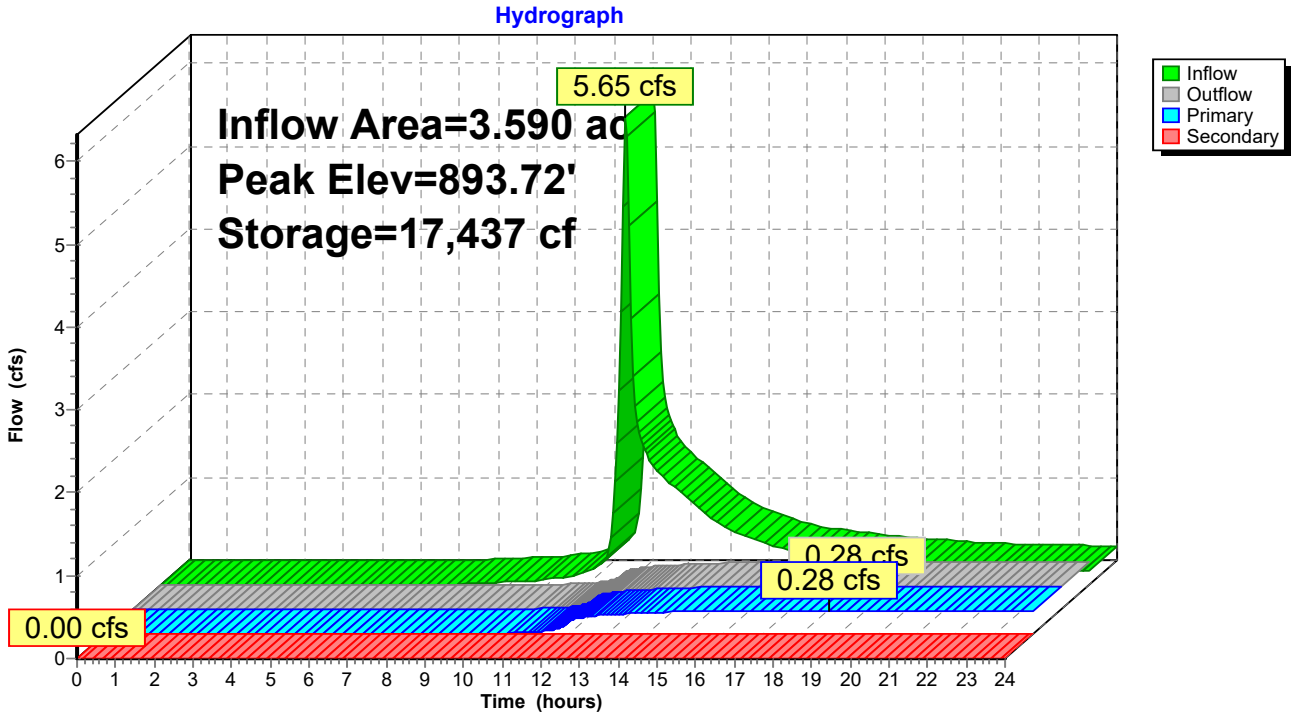
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
891.50	5,673	0	0
892.00	6,321	2,999	2,999
893.00	8,752	7,537	10,535
894.00	11,119	9,936	20,471
895.00	13,980	12,550	33,020
896.00	16,970	15,475	48,495

Device	Routing	Invert	Outlet Devices
#1	Primary	891.50'	**8.0" Round Culvert X 3.00** L= 2.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 891.50' / 891.49' S= 0.0050 '/' Cc= 0.900 n= 0.013, Flow Area= 0.35 sf
#2	Device 1	891.50'	**2.7" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#3	Secondary	895.50'	**20.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Primary OutFlow Max=0.28 cfs @ 18.73 hrs HW=893.72' TW=887.62' (Dynamic Tailwater)
1=Culvert (Passes 0.28 cfs of 6.92 cfs potential flow)
2=Orifice (Orifice Controls 0.28 cfs @ 6.99 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=891.50' TW=883.50' (Dynamic Tailwater)
3=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 1P: Middle Pond



Summary for Pond 10: CB10

Inflow Area = 3.920 ac, 0.00% Impervious, Inflow Depth > 3.33" for Dublin 025 event
Inflow = 16.68 cfs @ 12.01 hrs, Volume= 1.088 af
Outflow = 14.83 cfs @ 12.05 hrs, Volume= 1.088 af, Atten= 11%, Lag= 2.3 min
Primary = 14.83 cfs @ 12.05 hrs, Volume= 1.088 af
Routed to Pond LP : Lower Pond
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond LP : Lower Pond

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 897.71' @ 12.05 hrs Surf.Area= 3,638 sf Storage= 1,188 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.3 min (798.1 - 797.8)

Volume	Invert	Avail.Storage	Storage Description
#1	890.79'	1,036 cf	**CB10 (Prismatic)** Listed below (Recalc)
#2	891.29'	82 cf	**18.0" Round Pipe Storage 10-11** L= 46.6' S= 0.0127 '/'
#3	891.88'	1,031 cf	**CB11 (Prismatic)** Listed below (Recalc)
#4	891.88'	108 cf	**18.0" Round Pipe Storage 11-12** L= 61.3' S= 0.0075 '/'
#5	892.34'	1,030 cf	**CB12 (Prismatic)** Listed below (Recalc)
#6	892.34'	138 cf	**18.0" Round Pipe Storage 12-13** L= 78.0' S= 0.0055 '/'
#7	892.77'	1,028 cf	**CB13 (Prismatic)** Listed below (Recalc)
#8	892.77'	139 cf	**18.0" Round Pipe Storage 13-14** L= 78.9' S= 0.0055 '/'
#9	893.20'	21 cf	**CB14 (Prismatic)** Listed below (Recalc)
#10	893.70'	63 cf	**12.0" Round Pipe Storage 14-15** L= 80.2' S= 0.0046 '/'
#11	892.35'	71 cf	**12.0" Round Pipe Storage 10-38** L= 90.5' S= 0.0100 '/'
#12	893.25'	1,568 cf	**CB38 (Prismatic)** Listed below (Recalc)
		6,315 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
890.79	4	0	0
897.60	4	27	27
898.25	3,099	1,008	1,036

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
891.88	4	0	0
897.60	4	23	23
898.25	3,099	1,008	1,031

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
892.34	4	0	0
897.60	4	21	21
898.25	3,099	1,008	1,030

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
892.77	4	0	0
897.60	4	19	19
898.25	3,099	1,008	1,028

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
893.20	4	0	0
898.50	4	21	21

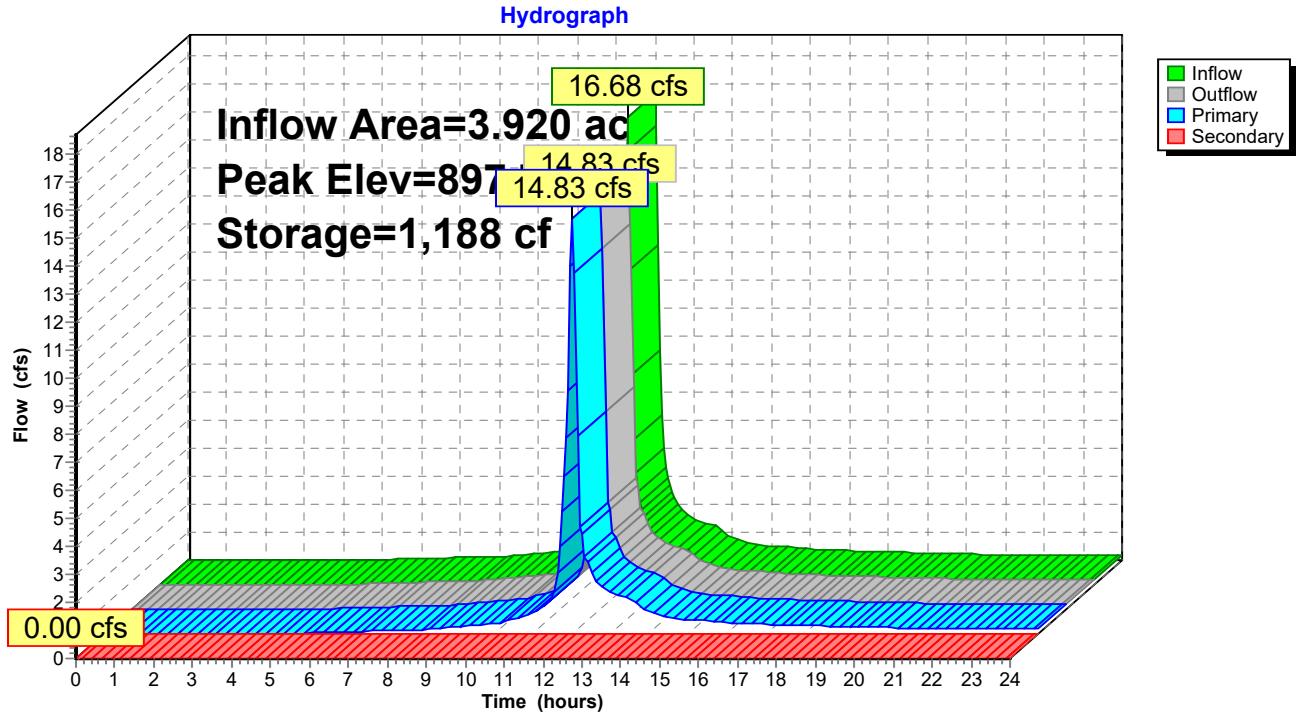
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
893.25	4	0	0
897.25	4	16	16
898.25	3,099	1,552	1,568

Device	Routing	Invert	Outlet Devices
#1	Primary	890.79'	**24.0" Round Culvert 10-9** L= 107.6' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 890.79' / 890.49' S= 0.0028 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#2	Device 1	890.79'	**15.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Secondary	898.25'	**0.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=14.83 cfs @ 12.05 hrs HW=897.71' TW=886.90' (Dynamic Tailwater)
└─**1=Culvert 10-9** (Passes 14.83 cfs of 34.18 cfs potential flow)
└─**2=Orifice/Grate** (Orifice Controls 14.83 cfs @ 12.08 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=890.79' TW=883.50' (Dynamic Tailwater)
└─**3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 10: CB10


Hydrograph
Inflow
Outflow
Primary
Secondary
16.68 cfs
14.83 cfs
14.83 cfs
Inflow Area=3.920 ac
Peak Elev=897
Storage=1,188 cf
0.00 cfs
Flow (cfs)
Time (hours)

Summary for Pond 15: CB15

Inflow Area = 0.530 ac, 0.00% Impervious, Inflow Depth > 3.33" for Dublin 025 event
Inflow = 2.57 cfs @ 12.01 hrs, Volume= 0.147 af
Outflow = 0.53 cfs @ 12.26 hrs, Volume= 0.147 af, Atten= 79%, Lag= 15.1 min
Primary = 0.53 cfs @ 12.26 hrs, Volume= 0.147 af
Routed to Pond 10 : CB10
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond 10 : CB10

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 899.24' @ 12.26 hrs Surf.Area= 5,952 sf Storage= 2,156 cf

Plug-Flow detention time= 27.0 min calculated for 0.147 af (100% of inflow)
Center-of-Mass det. time= 26.6 min (820.7 - 794.2)

Volume	Invert	Avail.Storage	Storage Description
#1	894.07'	599 cf	**CB15 (Prismatic)** Listed below (Recalc)
#2	894.07'	58 cf	**12.0" Round Pipe Storage 15-16** L= 73.7' S= 0.0044 '/'
#3	894.39'	669 cf	**CB16 (Prismatic)** Listed below (Recalc)
#4	894.39'	85 cf	**12.0" Round Pipe Storage 16-17** L= 107.9' S= 0.0044 '/'
#5	894.86'	668 cf	**CB17 (Prismatic)** Listed below (Recalc)
#6	893.96'	61 cf	**12.0" Round Pipe Storage 17-18** L= 77.8' S= 0.0050 '/'
#7	895.20'	594 cf	**CB18 (Prismatic)** Listed below (Recalc)
#8	895.20'	70 cf	**12.0" Round Pipe Storage 18-19** L= 89.0' S= 0.0044 '/'
#9	895.59'	593 cf	**CB19 (Prismatic)** Listed below (Recalc)
#10	895.59'	83 cf	**12.0" Round Pipe Storage 19-20** L= 106.1' S= 0.0044 '/'
#11	896.06'	591 cf	**CB20 (Prismatic)** Listed below (Recalc)
		4,071 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
894.07	4	0	0
898.70	4	19	19
899.50	1,447	580	599

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
894.39	4	0	0
898.60	4	17	17
899.50	1,446	652	669

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
894.86	4	0	0
898.60	4	15	15
899.50	1,447	653	668

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
895.20	4	0	0
898.70	4	14	14
899.50	1,446	580	594

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
895.59	4	0	0
898.70	4	12	12
899.50	1,447	580	593

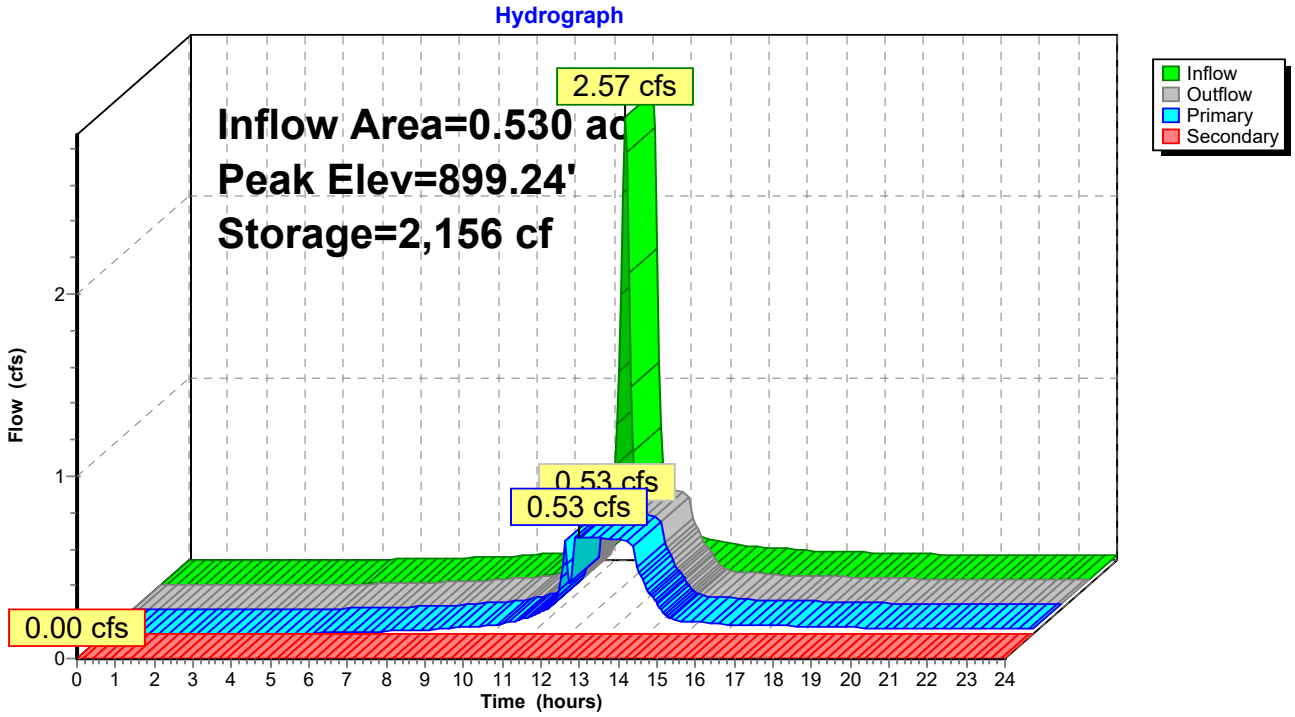
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
896.06	4	0	0
898.70	4	11	11
899.50	1,446	580	591

Device	Routing	Invert	Outlet Devices
#1	Primary	894.07'	**12.0" Round Culvert 15-14** L= 80.2' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 894.07' / 893.70' S= 0.0046 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	894.07'	**3.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#3	Secondary	899.50'	**0.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=0.53 cfs @ 12.26 hrs HW=899.24' TW=891.82' (Dynamic Tailwater)
↑—**1=Culvert 15-14** (Passes 0.53 cfs of 6.70 cfs potential flow)
↑—**2=Orifice** (Orifice Controls 0.53 cfs @ 10.81 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=893.96' TW=890.79' (Dynamic Tailwater)
↑—**3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 15: CB15


Hydrograph
Inflow
Outflow
Primary
Secondary
2.57 cfs
Inflow Area=0.530 ac
Peak Elev=899.24'
Storage=2,156 cf
0.53 cfs
0.53 cfs
0.00 cfs
Flow (cfs)
0
1
2
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
Time (hours)

Summary for Pond LP: Lower Pond

Inflow Area = 13.820 ac, 13.39% Impervious, Inflow Depth > 2.70" for Dublin 025 event
Inflow = 45.57 cfs @ 12.01 hrs, Volume= 3.110 af
Outflow = 5.24 cfs @ 12.55 hrs, Volume= 1.841 af, Atten= 88%, Lag= 32.3 min
Primary = 5.24 cfs @ 12.55 hrs, Volume= 1.841 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 887.98' @ 12.55 hrs Surf.Area= 20,160 sf Storage= 69,583 cf

Plug-Flow detention time= 284.9 min calculated for 1.838 af (59% of inflow)
Center-of-Mass det. time= 159.9 min (980.4 - 820.5)

Volume	Invert	Avail.Storage	Storage Description
#1	883.50'	91,149 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

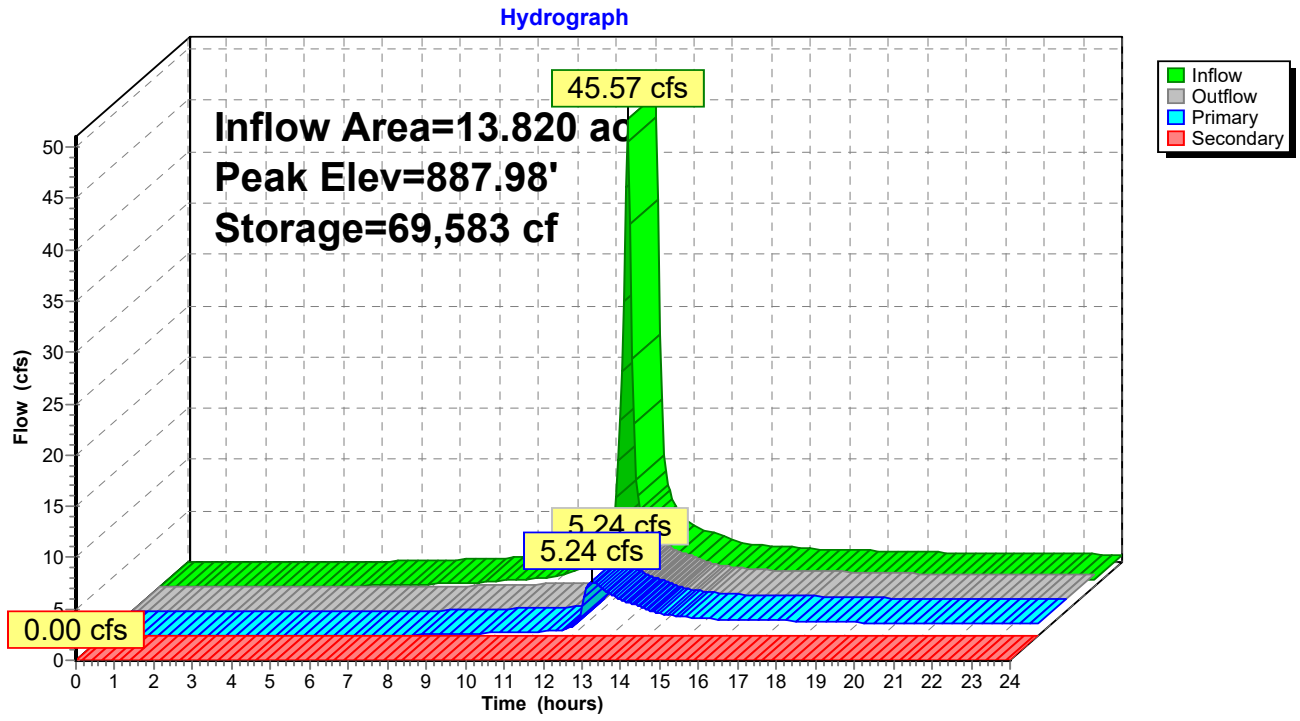
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
883.50	11,033	0	0
884.00	12,045	5,770	5,770
885.00	13,987	13,016	18,786
886.00	15,973	14,980	33,766
887.00	18,038	17,006	50,771
888.00	20,192	19,115	69,886
889.00	22,334	21,263	91,149

Device	Routing	Invert	Outlet Devices
#1	Primary	883.50'	**24.0" Round Culvert** L= 143.6' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 883.50' / 881.00' S= 0.0174 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 3.14 sf
#2	Device 1	883.50'	**4.4" Vert. WQ Orifice** C= 0.600 Limited to weir flow at low heads
#3	Device 1	886.90'	**2.0" Vert. Orifice X 3.00** C= 0.600 Limited to weir flow at low heads
#4	Device 1	887.50'	**3.0" Vert. Orifice X 3.00** C= 0.600 Limited to weir flow at low heads
#5	Device 1	887.80'	**54.0" W x 6.0" H Vert. Window X 3.00** C= 0.600 Limited to weir flow at low heads
#6	Device 1	888.90'	**1.5" x 5.0" Horiz. Grate X 9.00 columns** X 4 rows C= 0.600 Limited to weir flow at low heads
#7	Secondary	888.50'	**20.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=5.24 cfs @ 12.55 hrs HW=887.98' (Free Discharge)
└─**1=Culvert** (Passes 5.24 cfs of 28.24 cfs potential flow)
  └─**2=WQ Orifice** (Orifice Controls 1.05 cfs @ 9.99 fps)
  └─**3=Orifice** (Orifice Controls 0.32 cfs @ 4.82 fps)
  └─**4=Orifice** (Orifice Controls 0.43 cfs @ 2.89 fps)
  └─**5=Window** (Orifice Controls 3.45 cfs @ 1.38 fps)
  └─**6=Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=883.50' (Free Discharge)
└─**7=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond LP: Lower Pond



Summary for Pond UP: Upper Pond

Inflow Area = 2.190 ac, 61.19% Impervious, Inflow Depth > 3.23" for Dublin 025 event
Inflow = 10.36 cfs @ 12.01 hrs, Volume= 0.590 af
Outflow = 1.01 cfs @ 12.55 hrs, Volume= 0.329 af, Atten= 90%, Lag= 32.1 min
Primary = 1.01 cfs @ 12.55 hrs, Volume= 0.329 af
Routed to Pond 1P : Middle Pond
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond 1P : Middle Pond

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 896.01' @ 12.55 hrs Surf.Area= 9,690 sf Storage= 15,100 cf

Plug-Flow detention time= 245.1 min calculated for 0.329 af (56% of inflow)
Center-of-Mass det. time= 138.7 min (936.7 - 798.0)

Volume	Invert	Avail.Storage	Storage Description
#1	894.00'	26,139 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

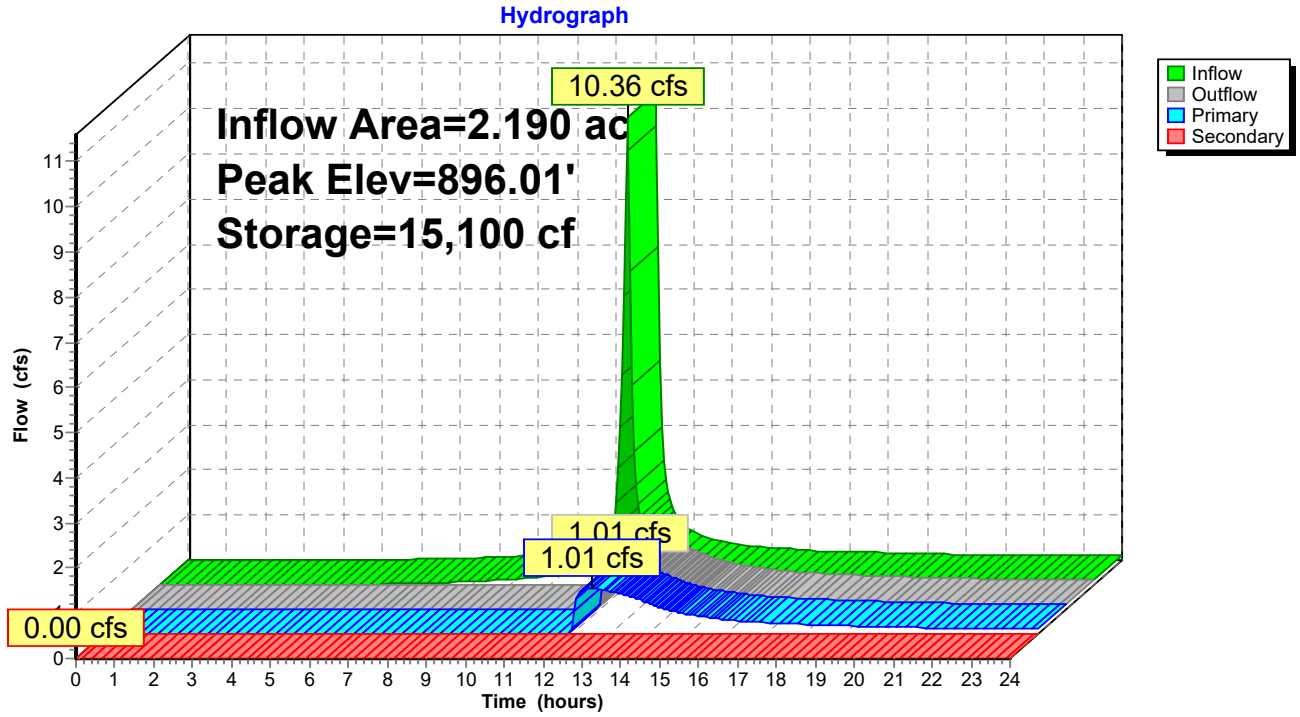
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
894.00	5,685	0	0
895.00	7,343	6,514	6,514
896.00	9,666	8,505	15,019
897.00	12,574	11,120	26,139

Device	Routing	Invert	Outlet Devices
#1	Primary	894.00'	**12.0" Round Culvert** L= 86.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 894.00' / 893.50' S= 0.0058 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	895.50'	**13.0" W x 4.0" H Vert. Window** C= 0.600 Limited to weir flow at low heads
#3	Device 1	896.50'	**1.5" x 5.0" Horiz. Grate X 9.00 columns** X 4 rows C= 0.600 Limited to weir flow at low heads
#4	Secondary	896.50'	**20.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=1.01 cfs @ 12.55 hrs HW=896.01' TW=892.84' (Dynamic Tailwater)
└**1=Culvert** (Passes 1.01 cfs of 3.78 cfs potential flow)
├**2=Window** (Orifice Controls 1.01 cfs @ 2.79 fps)
└**3=Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=894.00' TW=891.50' (Dynamic Tailwater)
└**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond UP: Upper Pond



Summary for Subcatchment 2S: (new Subcat)

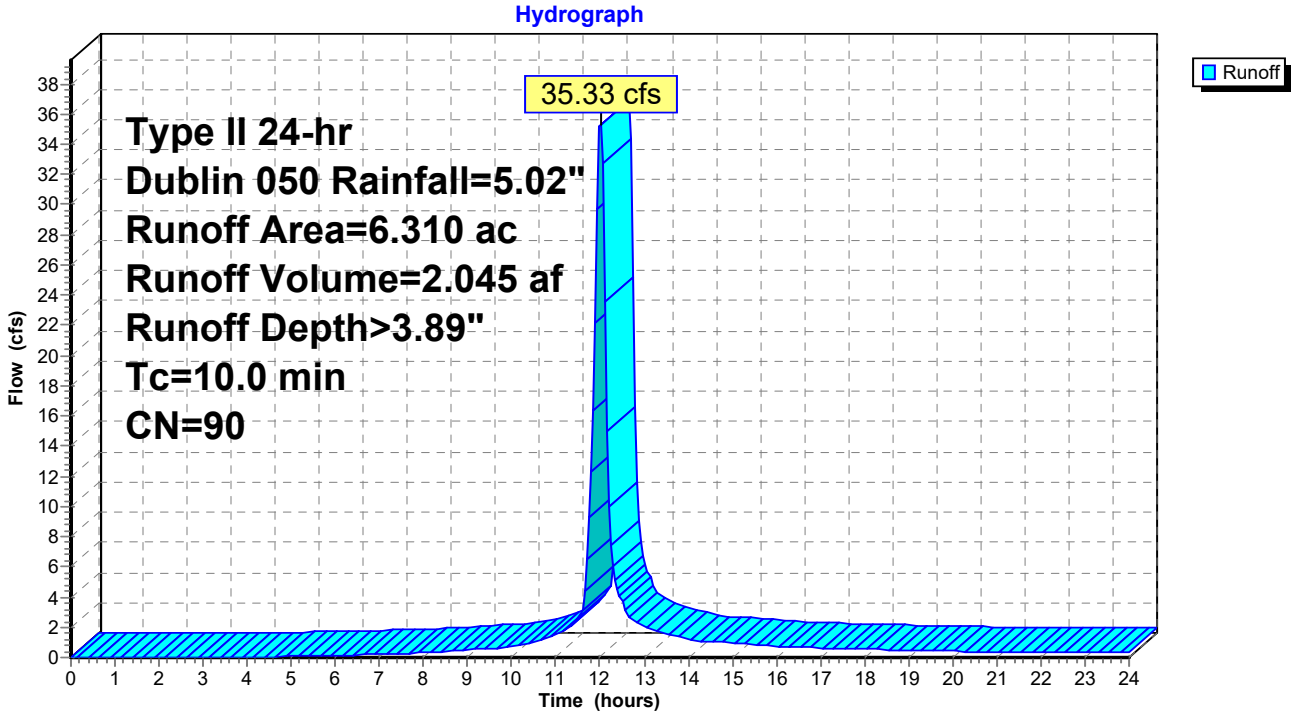
Runoff = 35.33 cfs @ 12.01 hrs, Volume= 2.045 af, Depth> 3.89"
Routed to Pond LP : Lower Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Dublin 050 Rainfall=5.02"

	Area (ac)	CN	Description
*	6.310	90	
	6.310		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry, Storm Sewer**

Subcatchment 2S: (new Subcat)



Summary for Subcatchment 10A: AREA TO 10

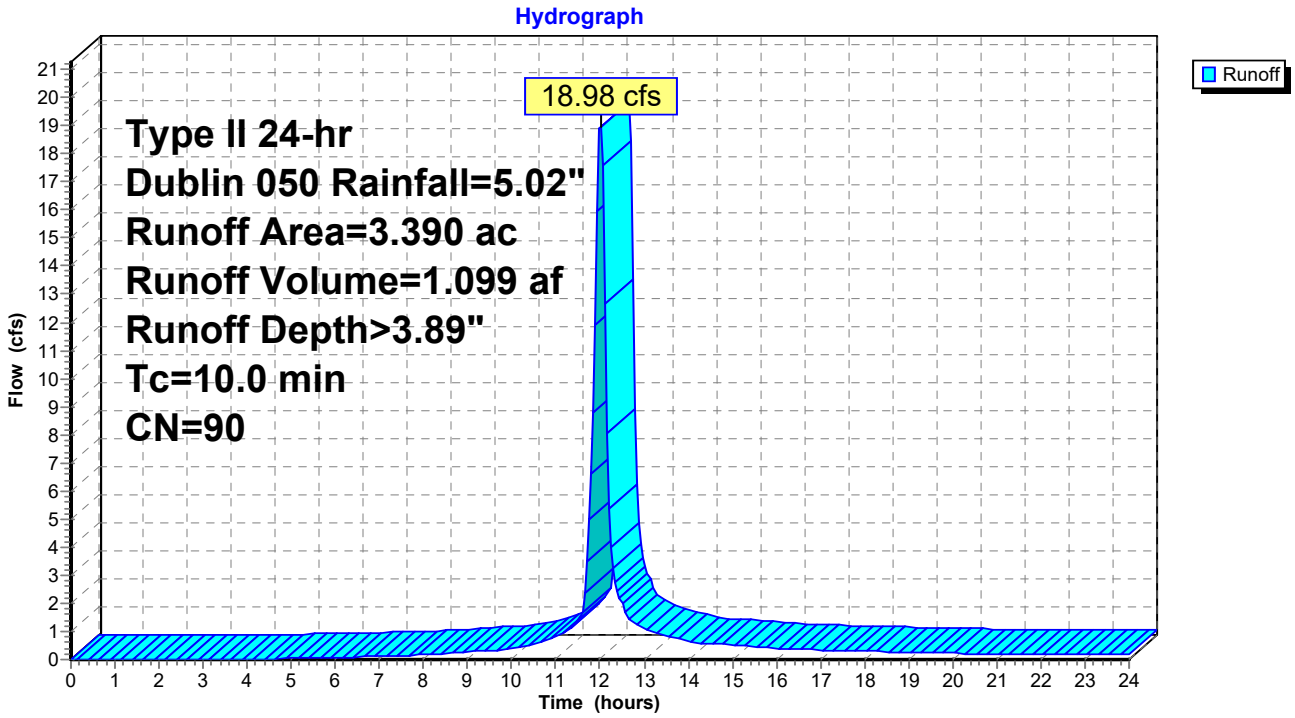
Runoff = 18.98 cfs @ 12.01 hrs, Volume= 1.099 af, Depth> 3.89"
Routed to Pond 10 : CB10

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Dublin 050 Rainfall=5.02"

	Area (ac)	CN	Description
*	3.140	90	
*	0.250	90	FROM 38
	3.390	90	Weighted Average
	3.390		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry,**

Subcatchment 10A: AREA TO 10



Summary for Subcatchment 15S: MIDDLE

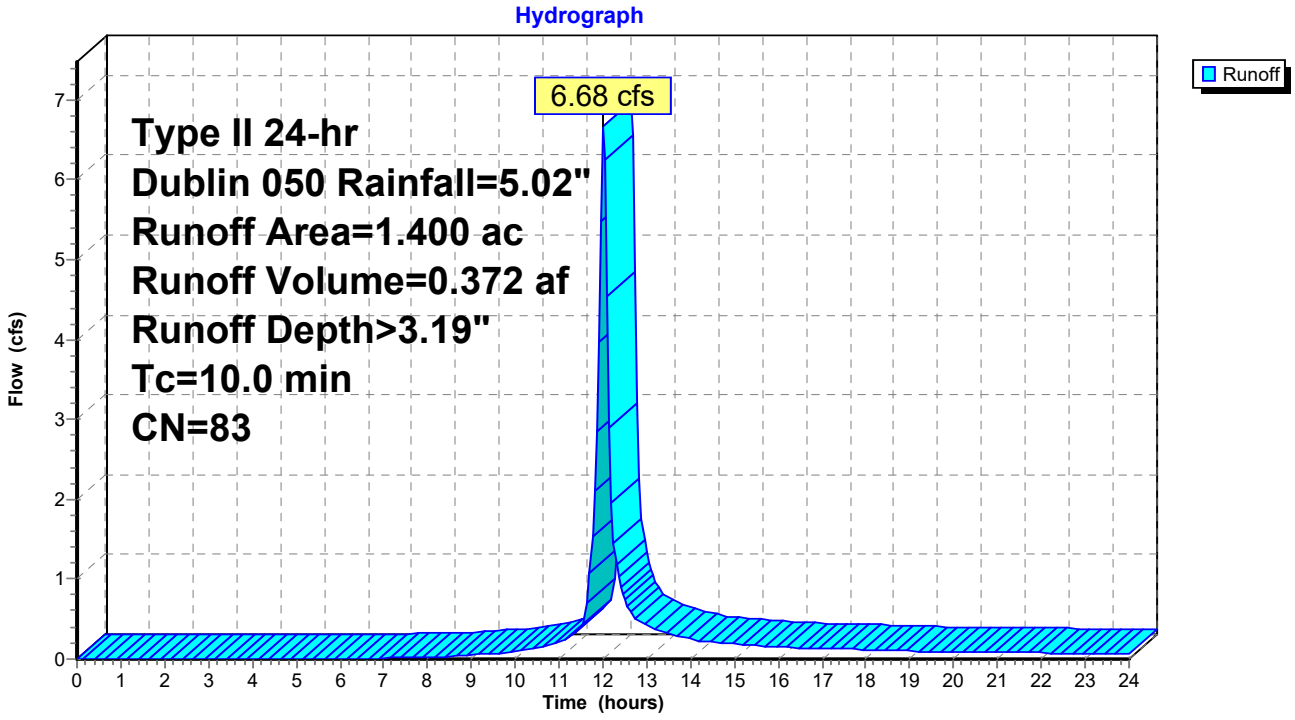
Runoff = 6.68 cfs @ 12.01 hrs, Volume= 0.372 af, Depth> 3.19"
Routed to Pond 1P : Middle Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Dublin 050 Rainfall=5.02"

	Area (ac)	CN	Description
*	0.890	74	
*	0.510	98	
	1.400	83	Weighted Average
	0.890		63.57% Pervious Area
	0.510		36.43% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry, Storm Sewer Pipe**

Subcatchment 15S: MIDDLE



Summary for Subcatchment 16A: AREA TO 15

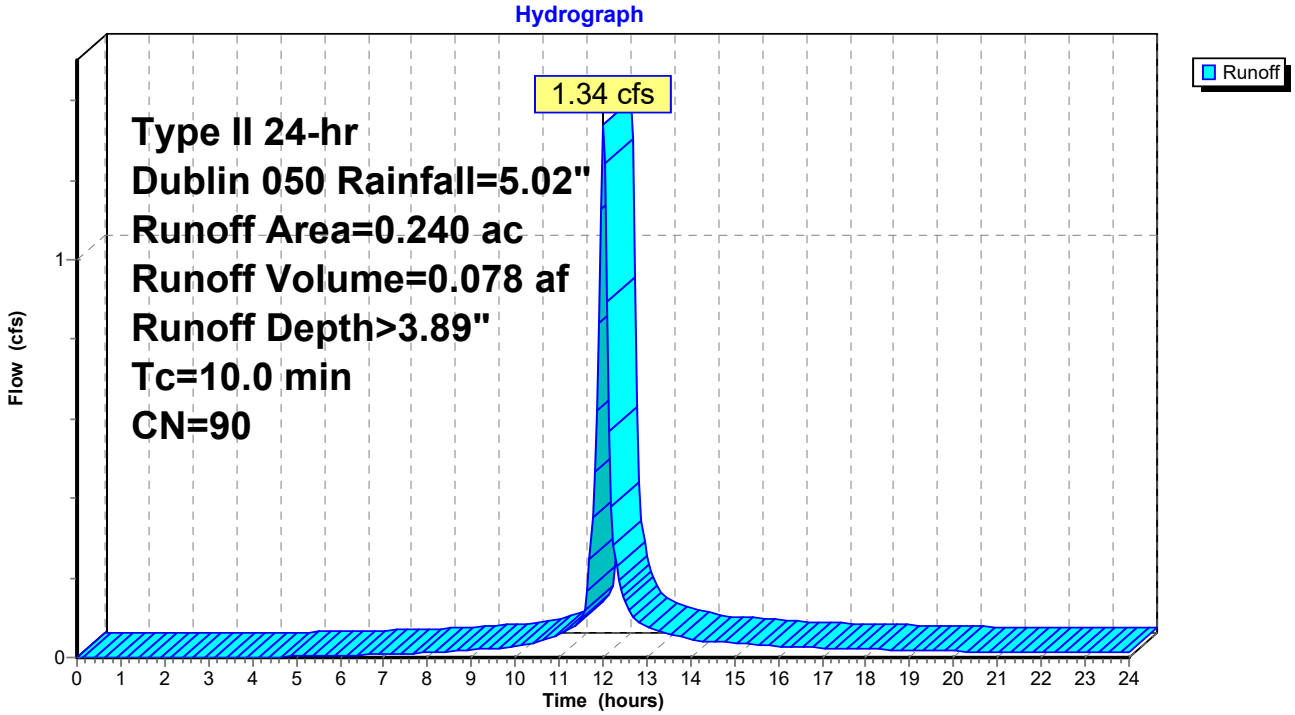
Runoff = 1.34 cfs @ 12.01 hrs, Volume= 0.078 af, Depth> 3.89"
Routed to Pond 15 : CB15

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Dublin 050 Rainfall=5.02"

	Area (ac)	CN	Description
*	0.240	90	
	0.240		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry,**

Subcatchment 16A: AREA TO 15



Summary for Subcatchment 16S: UPPER

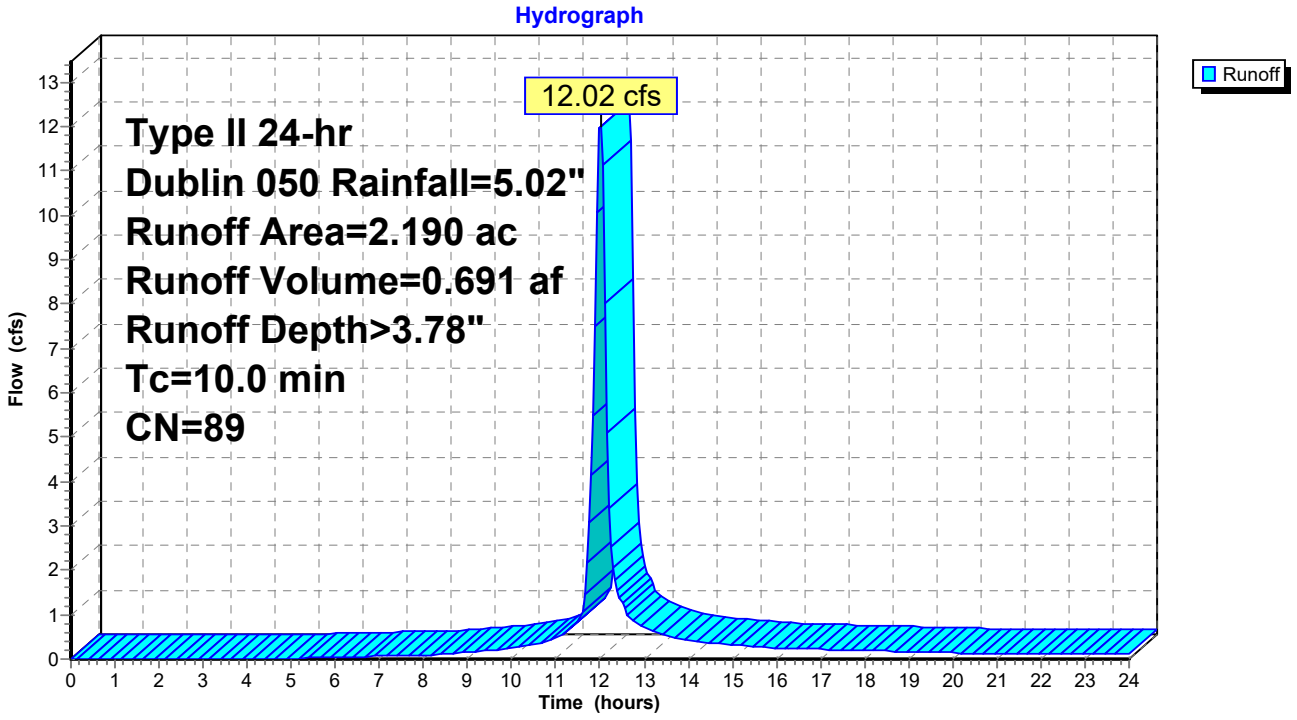
Runoff = 12.02 cfs @ 12.01 hrs, Volume= 0.691 af, Depth> 3.78"
Routed to Pond UP : Upper Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Dublin 050 Rainfall=5.02"

	Area (ac)	CN	Description
*	0.850	74	
*	1.340	98	
	2.190	89	Weighted Average
	0.850		38.81% Pervious Area
	1.340		61.19% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry, Overland**

Subcatchment 16S: UPPER



Summary for Subcatchment 19A: AREA TO 15

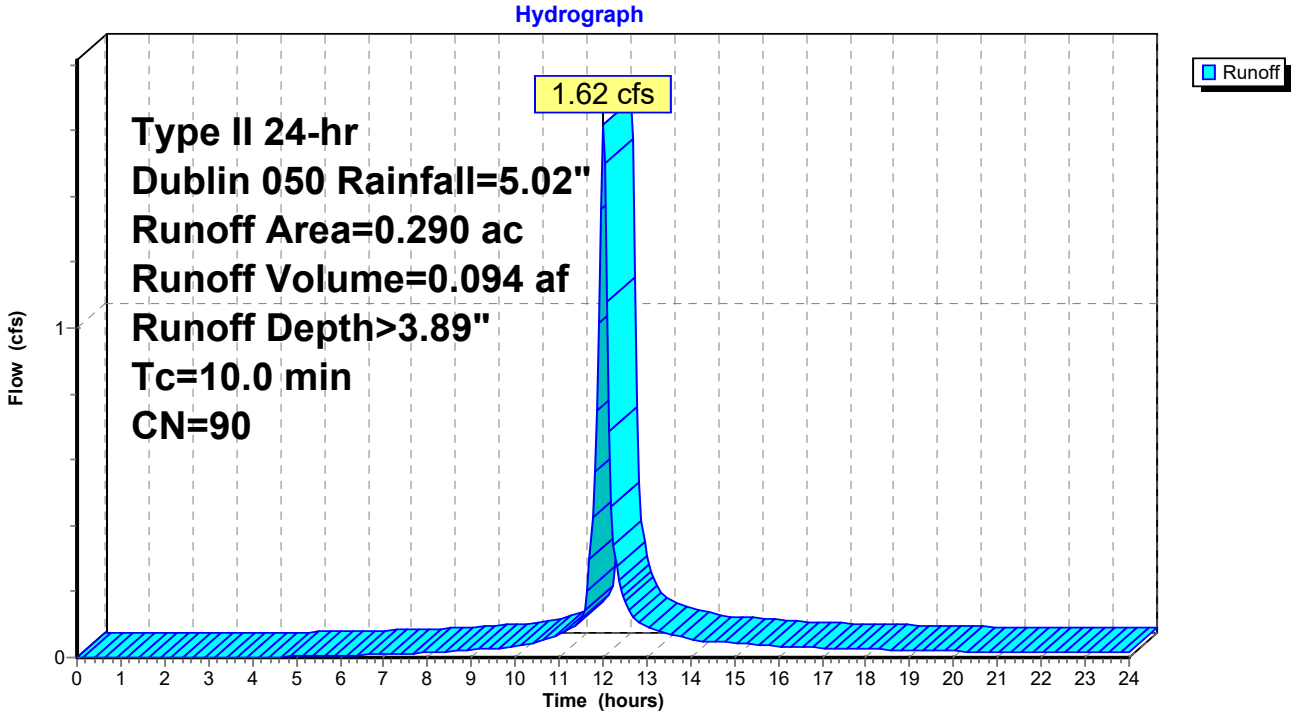
Runoff = 1.62 cfs @ 12.01 hrs, Volume= 0.094 af, Depth> 3.89"
Routed to Pond 15 : CB15

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Dublin 050 Rainfall=5.02"

	Area (ac)	CN	Description
*	0.290	90	
	0.290		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry,**

Subcatchment 19A: AREA TO 15



Summary for Pond 1P: Middle Pond

Inflow Area = 3.590 ac, 51.53% Impervious, Inflow Depth > 2.67" for Dublin 050 event
Inflow = 7.10 cfs @ 12.03 hrs, Volume= 0.800 af
Outflow = 0.31 cfs @ 18.95 hrs, Volume= 0.302 af, Atten= 96%, Lag= 414.9 min
Primary = 0.31 cfs @ 18.95 hrs, Volume= 0.302 af
Routed to Pond LP : Lower Pond
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond LP : Lower Pond

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 894.22' @ 18.95 hrs Surf.Area= 11,755 sf Storage= 23,014 cf

Plug-Flow detention time= 365.6 min calculated for 0.302 af (38% of inflow)
Center-of-Mass det. time= 209.3 min (1,080.8 - 871.4)

Volume	Invert	Avail.Storage	Storage Description
#1	891.50'	48,495 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

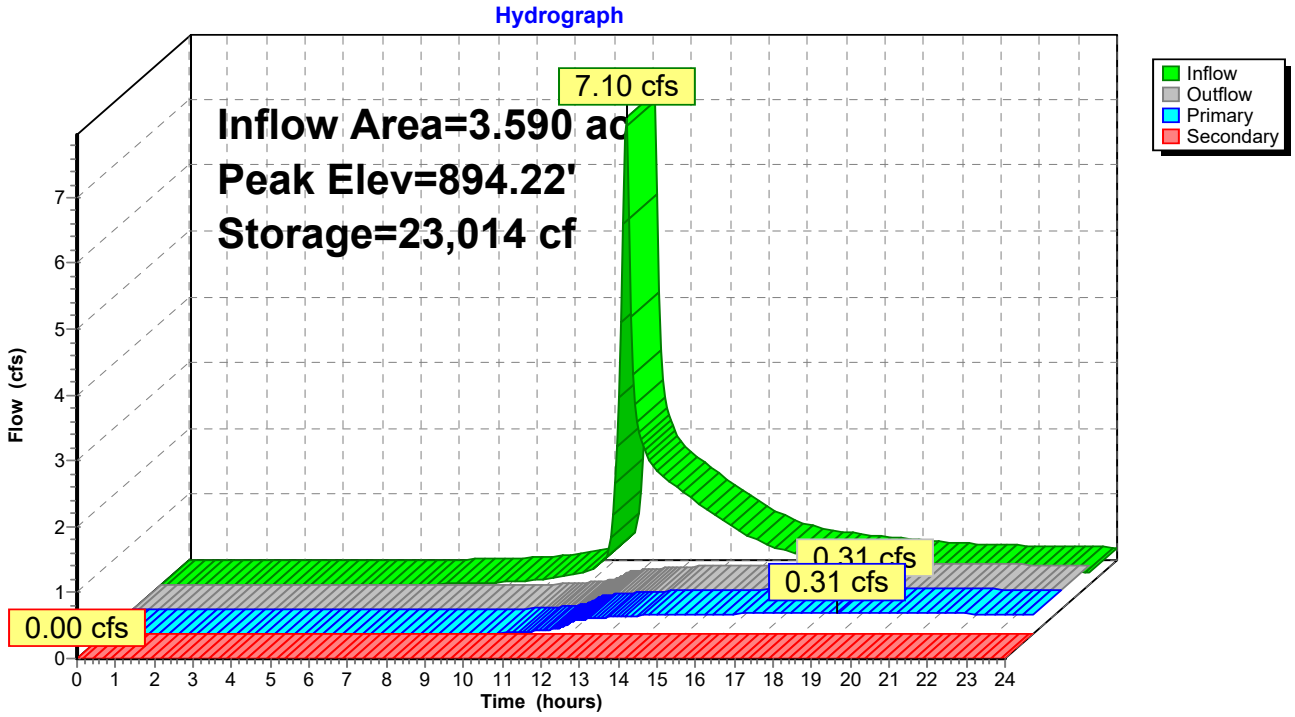
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
891.50	5,673	0	0
892.00	6,321	2,999	2,999
893.00	8,752	7,537	10,535
894.00	11,119	9,936	20,471
895.00	13,980	12,550	33,020
896.00	16,970	15,475	48,495

Device	Routing	Invert	Outlet Devices
#1	Primary	891.50'	**8.0" Round Culvert X 3.00** L= 2.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 891.50' / 891.49' S= 0.0050 '/' Cc= 0.900 n= 0.013, Flow Area= 0.35 sf
#2	Device 1	891.50'	**2.7" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#3	Secondary	895.50'	**20.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Primary OutFlow Max=0.31 cfs @ 18.95 hrs HW=894.22' TW=887.67' (Dynamic Tailwater)
└**1=Culvert** (Passes 0.31 cfs of 7.79 cfs potential flow)
└**2=Orifice** (Orifice Controls 0.31 cfs @ 7.78 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=891.50' TW=883.50' (Dynamic Tailwater)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1P: Middle Pond



Summary for Pond 10: CB10

Inflow Area = 3.920 ac, 0.00% Impervious, Inflow Depth > 3.89" for Dublin 050 event
Inflow = 19.25 cfs @ 12.01 hrs, Volume= 1.270 af
Outflow = 15.04 cfs @ 12.10 hrs, Volume= 1.270 af, Atten= 22%, Lag= 5.4 min
Primary = 15.04 cfs @ 12.10 hrs, Volume= 1.270 af
Routed to Pond LP : Lower Pond
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond LP : Lower Pond

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 897.89' @ 12.10 hrs Surf.Area= 7,535 sf Storage= 2,172 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.5 min (795.0 - 794.4)

Volume	Invert	Avail.Storage	Storage Description
#1	890.79'	1,036 cf	**CB10 (Prismatic)** Listed below (Recalc)
#2	891.29'	82 cf	**18.0" Round Pipe Storage 10-11** L= 46.6' S= 0.0127 '/'
#3	891.88'	1,031 cf	**CB11 (Prismatic)** Listed below (Recalc)
#4	891.88'	108 cf	**18.0" Round Pipe Storage 11-12** L= 61.3' S= 0.0075 '/'
#5	892.34'	1,030 cf	**CB12 (Prismatic)** Listed below (Recalc)
#6	892.34'	138 cf	**18.0" Round Pipe Storage 12-13** L= 78.0' S= 0.0055 '/'
#7	892.77'	1,028 cf	**CB13 (Prismatic)** Listed below (Recalc)
#8	892.77'	139 cf	**18.0" Round Pipe Storage 13-14** L= 78.9' S= 0.0055 '/'
#9	893.20'	21 cf	**CB14 (Prismatic)** Listed below (Recalc)
#10	893.70'	63 cf	**12.0" Round Pipe Storage 14-15** L= 80.2' S= 0.0046 '/'
#11	892.35'	71 cf	**12.0" Round Pipe Storage 10-38** L= 90.5' S= 0.0100 '/'
#12	893.25'	1,568 cf	**CB38 (Prismatic)** Listed below (Recalc)
		6,315 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
890.79	4	0	0
897.60	4	27	27
898.25	3,099	1,008	1,036

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
891.88	4	0	0
897.60	4	23	23
898.25	3,099	1,008	1,031

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
892.34	4	0	0
897.60	4	21	21
898.25	3,099	1,008	1,030

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
892.77	4	0	0
897.60	4	19	19
898.25	3,099	1,008	1,028

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
893.20	4	0	0
898.50	4	21	21

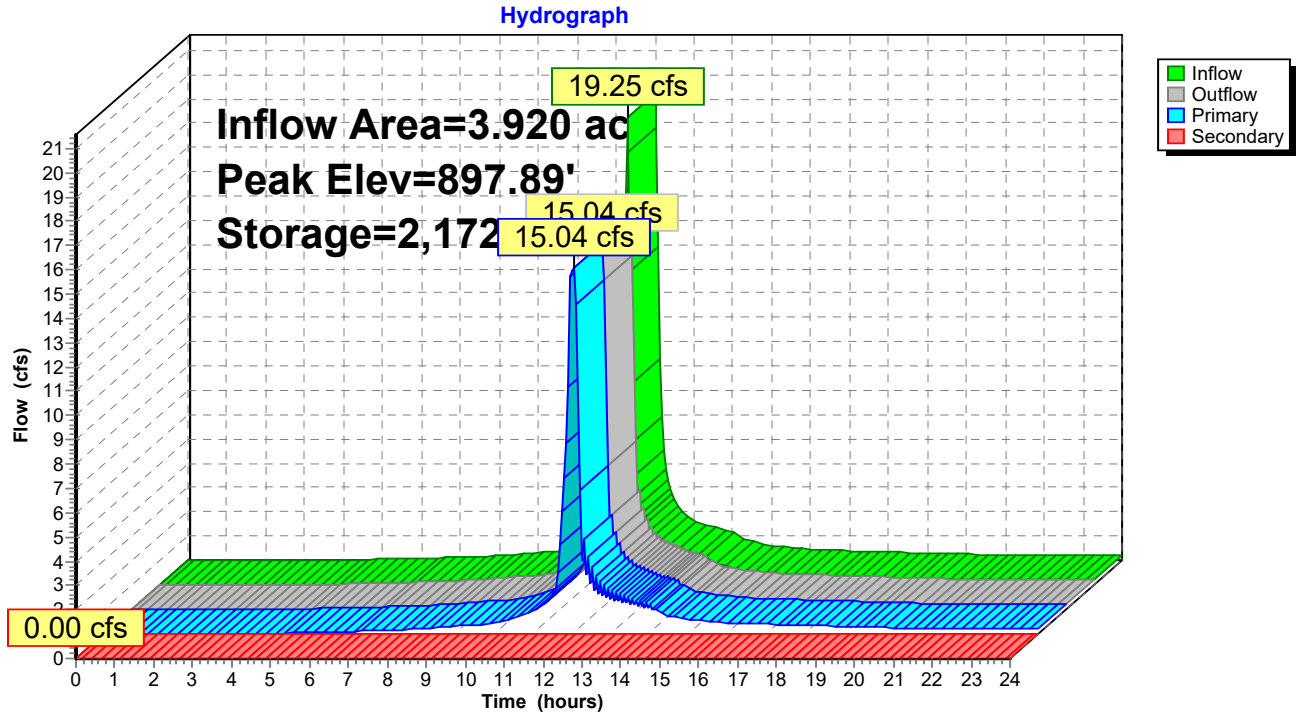
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
893.25	4	0	0
897.25	4	16	16
898.25	3,099	1,552	1,568

Device	Routing	Invert	Outlet Devices
#1	Primary	890.79'	**24.0" Round Culvert 10-9** L= 107.6' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 890.79' / 890.49' S= 0.0028 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#2	Device 1	890.79'	**15.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Secondary	898.25'	**0.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=15.04 cfs @ 12.10 hrs HW=897.89' TW=887.77' (Dynamic Tailwater)
└**1=Culvert 10-9** (Passes 15.04 cfs of 34.76 cfs potential flow)
└**2=Orifice/Grate** (Orifice Controls 15.04 cfs @ 12.25 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=890.79' TW=883.50' (Dynamic Tailwater)
└**3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 10: CB10


Hydrograph
19.25 cfs
Inflow Area=3.920 ac
Peak Elev=897.89'
Storage=2,172
15.04 cfs
15.04 cfs
0.00 cfs
Inflow
Outflow
Primary
Secondary
Flow (cfs)
Time (hours)

Summary for Pond 15: CB15

Inflow Area = 0.530 ac, 0.00% Impervious, Inflow Depth > 3.89" for Dublin 050 event
Inflow = 2.97 cfs @ 12.01 hrs, Volume= 0.172 af
Outflow = 0.54 cfs @ 12.29 hrs, Volume= 0.172 af, Atten= 82%, Lag= 16.8 min
Primary = 0.54 cfs @ 12.29 hrs, Volume= 0.172 af
Routed to Pond 10 : CB10
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond 10 : CB10

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 899.32' @ 12.29 hrs Surf.Area= 6,803 sf Storage= 2,676 cf

Plug-Flow detention time= 33.7 min calculated for 0.172 af (100% of inflow)
Center-of-Mass det. time= 33.4 min (823.3 - 789.9)

Volume	Invert	Avail.Storage	Storage Description
#1	894.07'	599 cf	**CB15 (Prismatic)** Listed below (Recalc)
#2	894.07'	58 cf	**12.0" Round Pipe Storage 15-16** L= 73.7' S= 0.0044 '/'
#3	894.39'	669 cf	**CB16 (Prismatic)** Listed below (Recalc)
#4	894.39'	85 cf	**12.0" Round Pipe Storage 16-17** L= 107.9' S= 0.0044 '/'
#5	894.86'	668 cf	**CB17 (Prismatic)** Listed below (Recalc)
#6	893.96'	61 cf	**12.0" Round Pipe Storage 17-18** L= 77.8' S= 0.0050 '/'
#7	895.20'	594 cf	**CB18 (Prismatic)** Listed below (Recalc)
#8	895.20'	70 cf	**12.0" Round Pipe Storage 18-19** L= 89.0' S= 0.0044 '/'
#9	895.59'	593 cf	**CB19 (Prismatic)** Listed below (Recalc)
#10	895.59'	83 cf	**12.0" Round Pipe Storage 19-20** L= 106.1' S= 0.0044 '/'
#11	896.06'	591 cf	**CB20 (Prismatic)** Listed below (Recalc)
		4,071 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
894.07	4	0	0
898.70	4	19	19
899.50	1,447	580	599

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
894.39	4	0	0
898.60	4	17	17
899.50	1,446	652	669

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
894.86	4	0	0
898.60	4	15	15
899.50	1,447	653	668

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
895.20	4	0	0
898.70	4	14	14
899.50	1,446	580	594

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
895.59	4	0	0
898.70	4	12	12
899.50	1,447	580	593

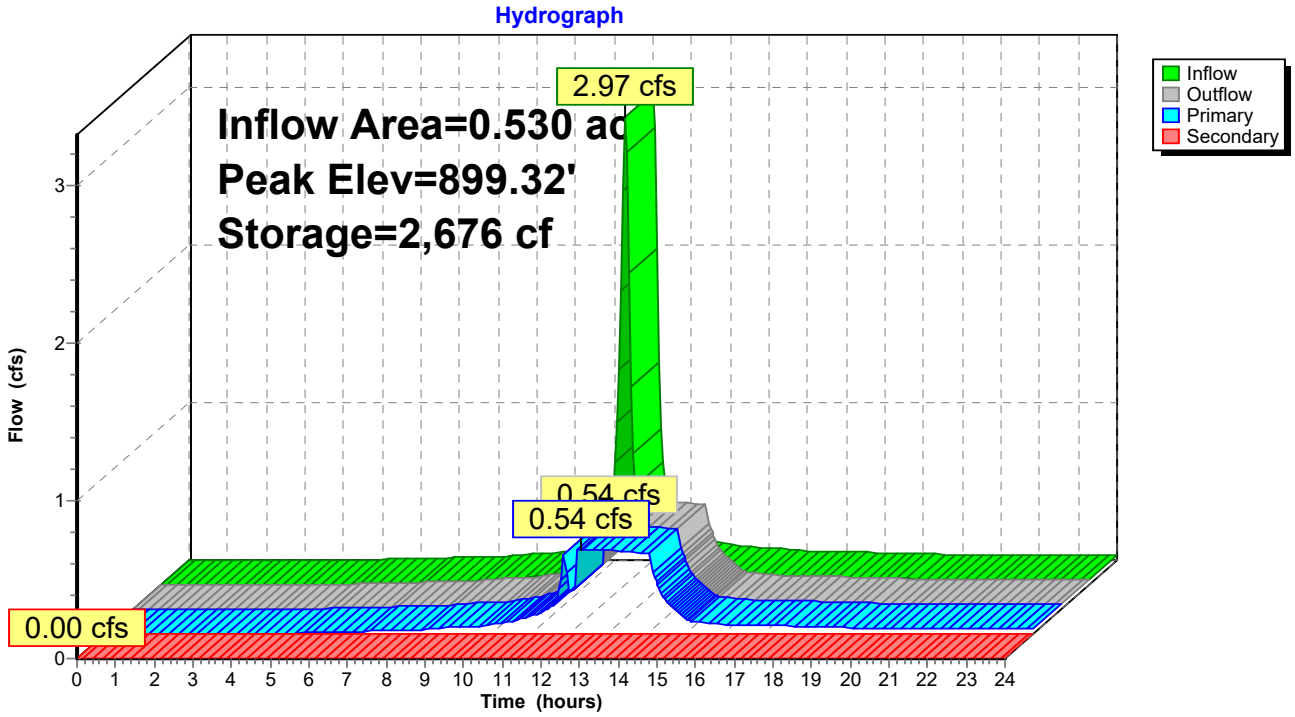
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
896.06	4	0	0
898.70	4	11	11
899.50	1,446	580	591

Device	Routing	Invert	Outlet Devices
#1	Primary	894.07'	**12.0" Round Culvert 15-14** L= 80.2' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 894.07' / 893.70' S= 0.0046 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	894.07'	**3.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#3	Secondary	899.50'	**0.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=0.54 cfs @ 12.29 hrs HW=899.32' TW=891.86' (Dynamic Tailwater)
↑—**1=Culvert 15-14** (Passes 0.54 cfs of 6.76 cfs potential flow)
↑—**2=Orifice** (Orifice Controls 0.54 cfs @ 10.90 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=893.96' TW=890.79' (Dynamic Tailwater)
↑—**3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 15: CB15


Hydrograph
Inflow
Outflow
Primary
Secondary
2.97 cfs
Inflow Area=0.530 ac
Peak Elev=899.32'
Storage=2,676 cf
0.54 cfs
0.54 cfs
0.00 cfs
Flow (cfs)
Time (hours)
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

Summary for Pond LP: Lower Pond

Inflow Area = 13.820 ac, 13.39% Impervious, Inflow Depth > 3.14" for Dublin 050 event
Inflow = 50.43 cfs @ 12.01 hrs, Volume= 3.617 af
Outflow = 13.38 cfs @ 12.26 hrs, Volume= 2.296 af, Atten= 73%, Lag= 15.0 min
Primary = 13.38 cfs @ 12.26 hrs, Volume= 2.296 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 888.21' @ 12.26 hrs Surf.Area= 20,643 sf Storage= 74,188 cf

Plug-Flow detention time= 247.6 min calculated for 2.296 af (63% of inflow)
Center-of-Mass det. time= 127.1 min (943.1 - 816.0)

Volume	Invert	Avail.Storage	Storage Description
#1	883.50'	91,149 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

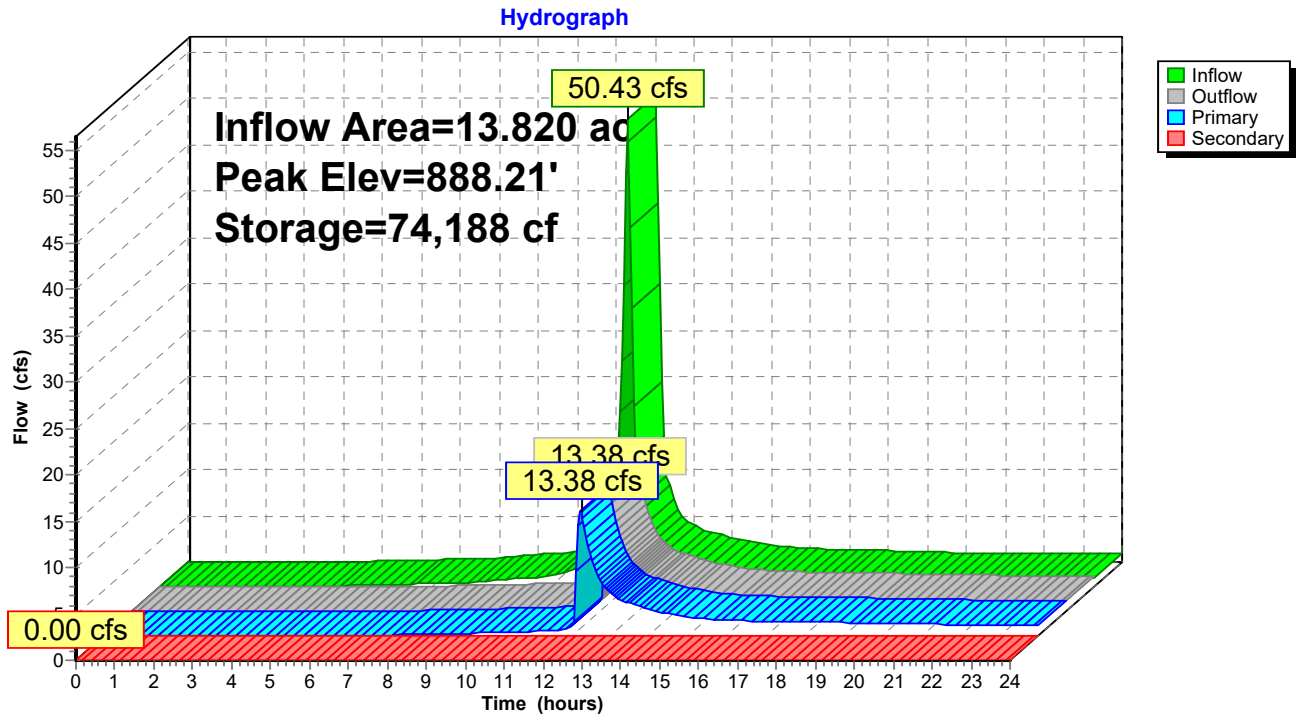
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
883.50	11,033	0	0
884.00	12,045	5,770	5,770
885.00	13,987	13,016	18,786
886.00	15,973	14,980	33,766
887.00	18,038	17,006	50,771
888.00	20,192	19,115	69,886
889.00	22,334	21,263	91,149

Device	Routing	Invert	Outlet Devices
#1	Primary	883.50'	**24.0" Round Culvert** L= 143.6' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 883.50' / 881.00' S= 0.0174 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 3.14 sf
#2	Device 1	883.50'	**4.4" Vert. WQ Orifice** C= 0.600 Limited to weir flow at low heads
#3	Device 1	886.90'	**2.0" Vert. Orifice X 3.00** C= 0.600 Limited to weir flow at low heads
#4	Device 1	887.50'	**3.0" Vert. Orifice X 3.00** C= 0.600 Limited to weir flow at low heads
#5	Device 1	887.80'	**54.0" W x 6.0" H Vert. Window X 3.00** C= 0.600 Limited to weir flow at low heads
#6	Device 1	888.90'	**1.5" x 5.0" Horiz. Grate X 9.00 columns** X 4 rows C= 0.600 Limited to weir flow at low heads
#7	Secondary	888.50'	**20.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=13.22 cfs @ 12.26 hrs HW=888.21' (Free Discharge)
└─**1=Culvert** (Passes 13.22 cfs of 29.12 cfs potential flow)
  └─**2=WQ Orifice** (Orifice Controls 1.08 cfs @ 10.24 fps)
  └─**3=Orifice** (Orifice Controls 0.35 cfs @ 5.33 fps)
  └─**4=Orifice** (Orifice Controls 0.54 cfs @ 3.67 fps)
  └─**5=Window** (Orifice Controls 11.25 cfs @ 2.05 fps)
  └─**6=Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=883.50' (Free Discharge)
└─**7=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond LP: Lower Pond



Summary for Pond UP: Upper Pond

Inflow Area = 2.190 ac, 61.19% Impervious, Inflow Depth > 3.78" for Dublin 050 event
Inflow = 12.02 cfs @ 12.01 hrs, Volume= 0.691 af
Outflow = 1.31 cfs @ 12.48 hrs, Volume= 0.428 af, Atten= 89%, Lag= 28.3 min
Primary = 1.31 cfs @ 12.48 hrs, Volume= 0.428 af
Routed to Pond 1P : Middle Pond
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond 1P : Middle Pond

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 896.24' @ 12.48 hrs Surf.Area= 10,371 sf Storage= 17,449 cf

Plug-Flow detention time= 231.2 min calculated for 0.428 af (62% of inflow)
Center-of-Mass det. time= 128.9 min (922.5 - 793.6)

Volume	Invert	Avail.Storage	Storage Description
#1	894.00'	26,139 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

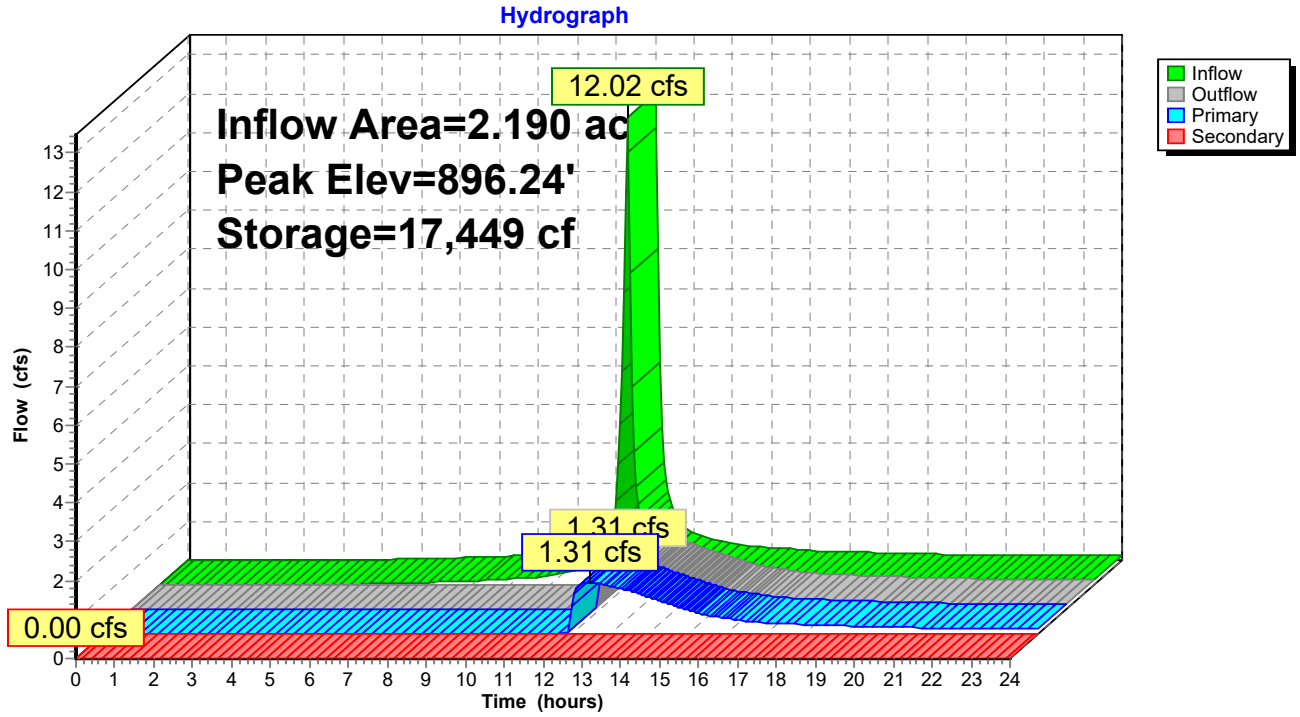
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
894.00	5,685	0	0
895.00	7,343	6,514	6,514
896.00	9,666	8,505	15,019
897.00	12,574	11,120	26,139

Device	Routing	Invert	Outlet Devices
#1	Primary	894.00'	**12.0" Round Culvert** L= 86.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 894.00' / 893.50' S= 0.0058 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	895.50'	**13.0" W x 4.0" H Vert. Window** C= 0.600 Limited to weir flow at low heads
#3	Device 1	896.50'	**1.5" x 5.0" Horiz. Grate X 9.00 columns** X 4 rows C= 0.600 Limited to weir flow at low heads
#4	Secondary	896.50'	**20.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=1.31 cfs @ 12.48 hrs HW=896.24' TW=893.06' (Dynamic Tailwater)
└**1=Culvert** (Passes 1.31 cfs of 4.06 cfs potential flow)
└**2=Window** (Orifice Controls 1.31 cfs @ 3.64 fps)
└**3=Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=894.00' TW=891.50' (Dynamic Tailwater)
└**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond UP: Upper Pond



Summary for Subcatchment 2S: (new Subcat)

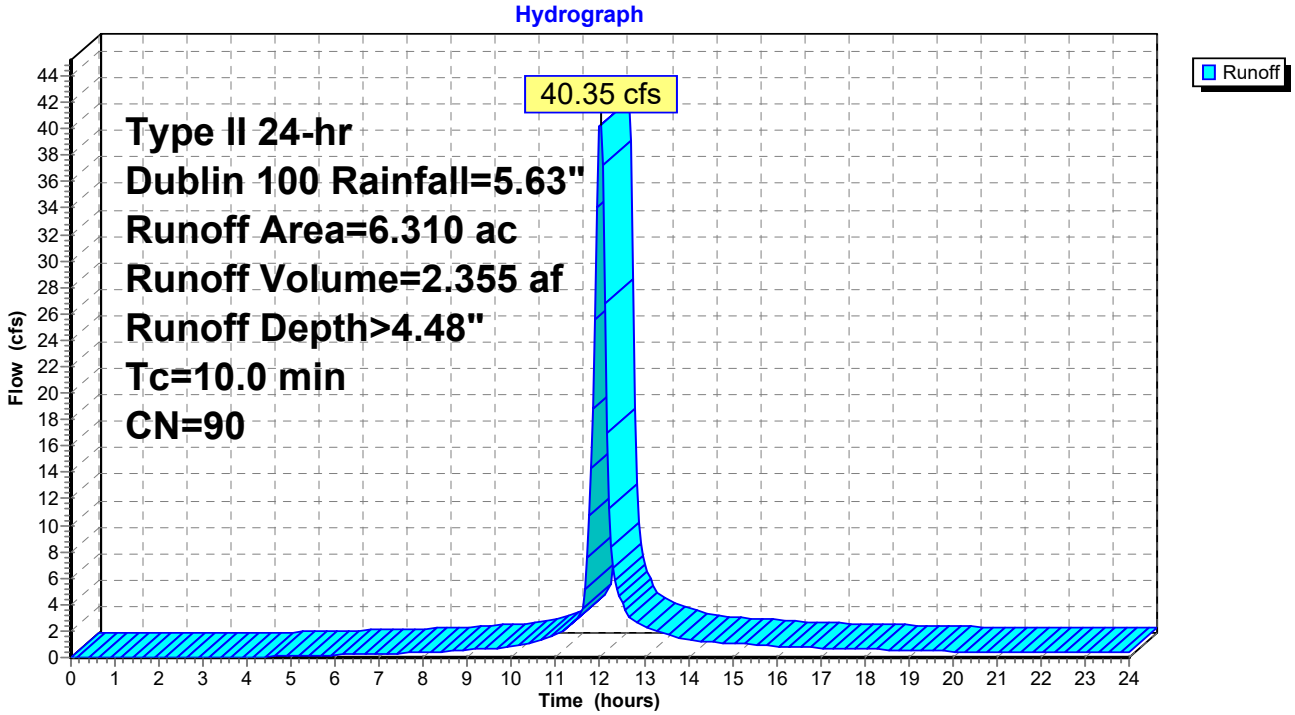
Runoff = 40.35 cfs @ 12.01 hrs, Volume= 2.355 af, Depth> 4.48"
Routed to Pond LP : Lower Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Dublin 100 Rainfall=5.63"

	Area (ac)	CN	Description
*	6.310	90	
	6.310		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry, Storm Sewer**

Subcatchment 2S: (new Subcat)



Summary for Subcatchment 10A: AREA TO 10

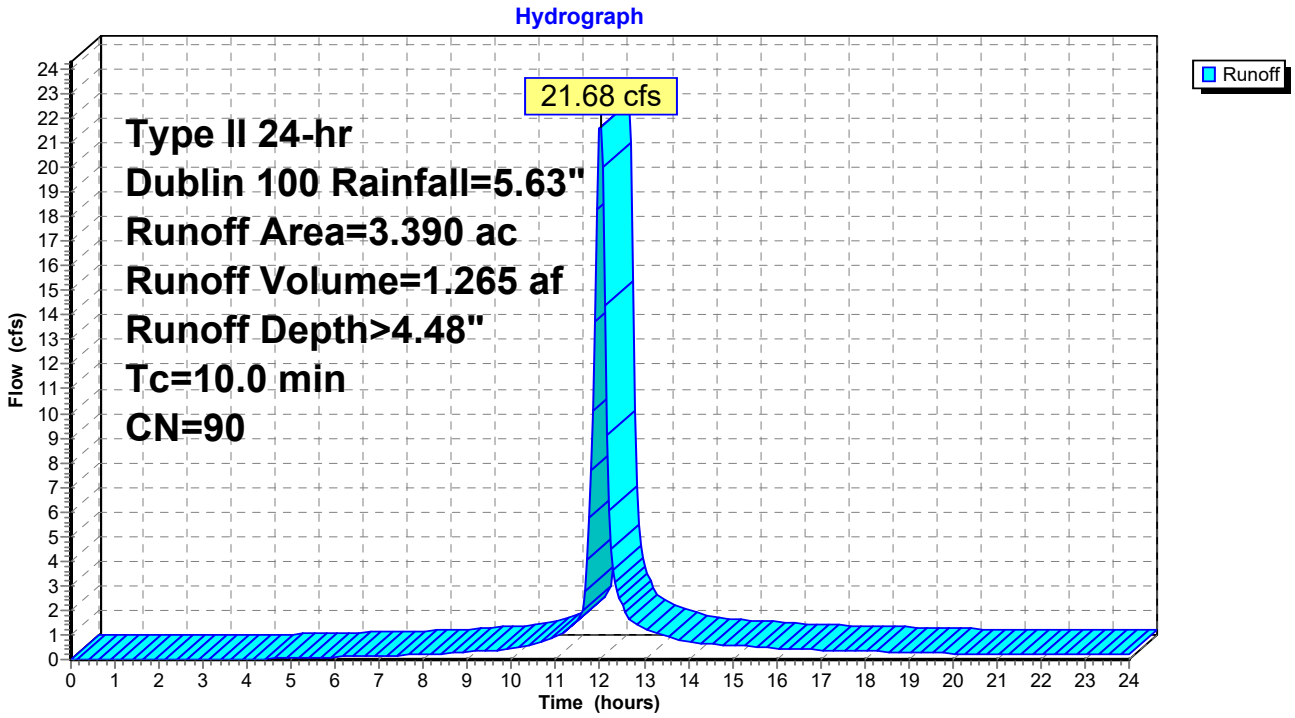
Runoff = 21.68 cfs @ 12.01 hrs, Volume= 1.265 af, Depth> 4.48"
Routed to Pond 10 : CB10

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Dublin 100 Rainfall=5.63"

	Area (ac)	CN	Description
*	3.140	90	
*	0.250	90	FROM 38
	3.390	90	Weighted Average
	3.390		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry,**

Subcatchment 10A: AREA TO 10



Summary for Subcatchment 15S: MIDDLE

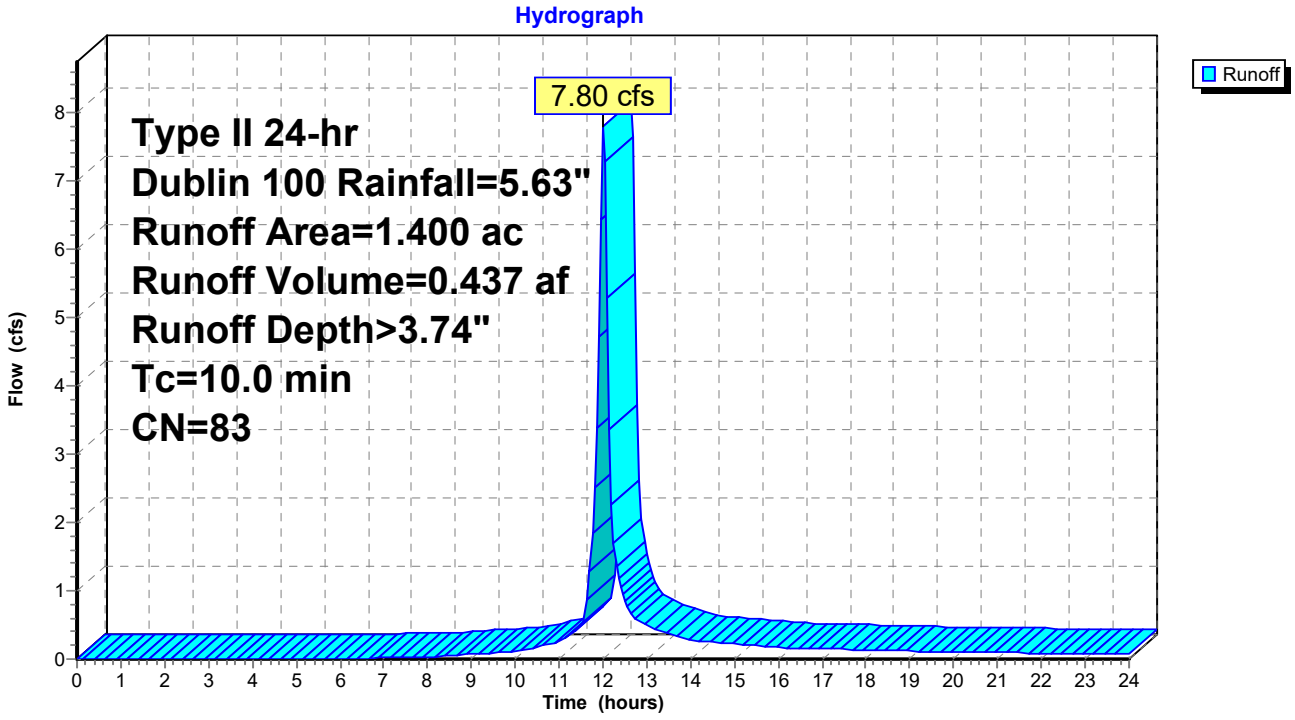
Runoff = 7.80 cfs @ 12.01 hrs, Volume= 0.437 af, Depth> 3.74"
Routed to Pond 1P : Middle Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Dublin 100 Rainfall=5.63"

	Area (ac)	CN	Description
*	0.890	74	
*	0.510	98	
	1.400	83	Weighted Average
	0.890		63.57% Pervious Area
	0.510		36.43% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry, Storm Sewer Pipe**

Subcatchment 15S: MIDDLE



Summary for Subcatchment 16A: AREA TO 15

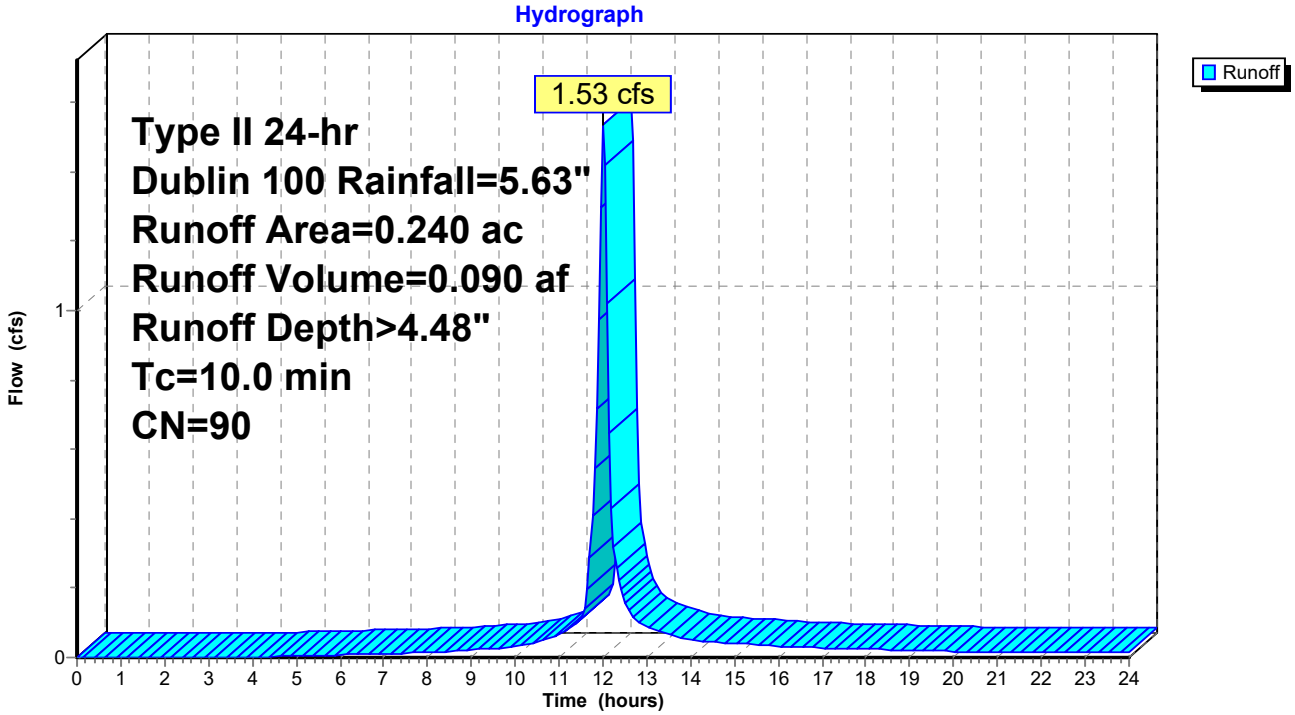
Runoff = 1.53 cfs @ 12.01 hrs, Volume= 0.090 af, Depth> 4.48"
Routed to Pond 15 : CB15

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Dublin 100 Rainfall=5.63"

	Area (ac)	CN	Description
*	0.240	90	
	0.240		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry,**

Subcatchment 16A: AREA TO 15



Summary for Subcatchment 16S: UPPER

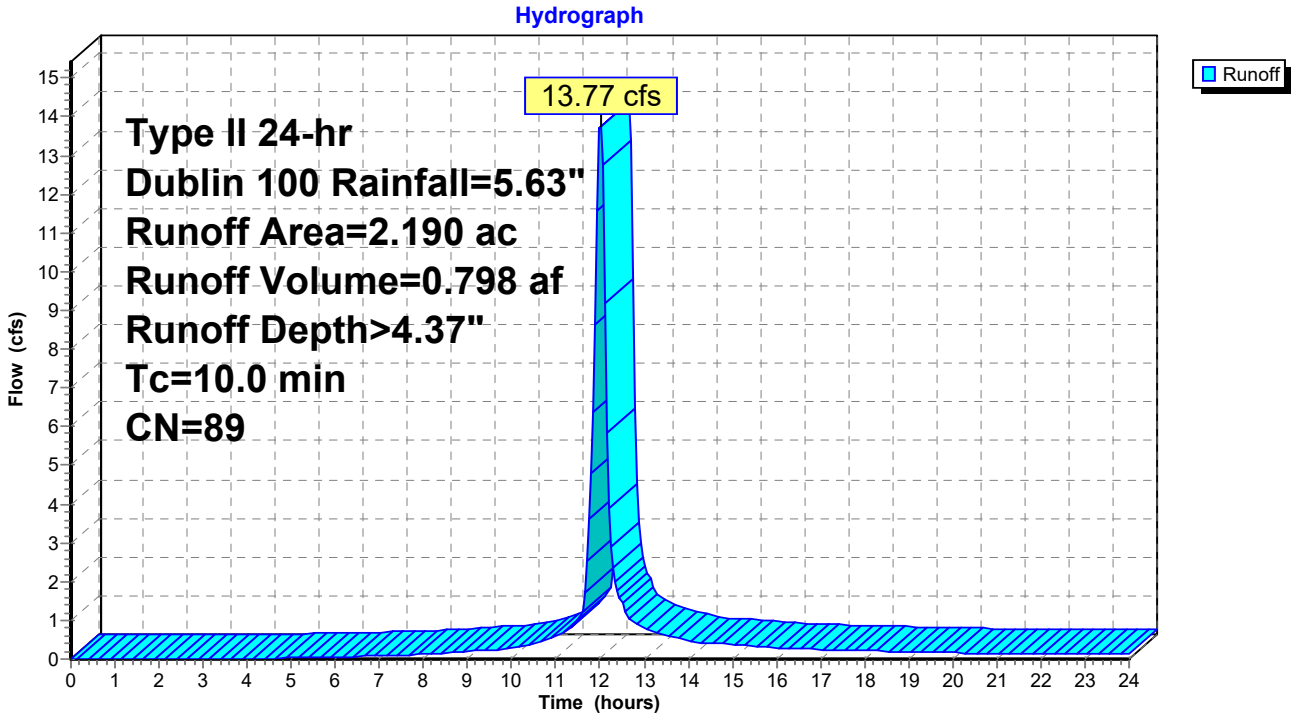
Runoff = 13.77 cfs @ 12.01 hrs, Volume= 0.798 af, Depth> 4.37"
Routed to Pond UP : Upper Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Dublin 100 Rainfall=5.63"

	Area (ac)	CN	Description
*	0.850	74	
*	1.340	98	
	2.190	89	Weighted Average
	0.850		38.81% Pervious Area
	1.340		61.19% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry, Overland**

Subcatchment 16S: UPPER



Summary for Subcatchment 19A: AREA TO 15

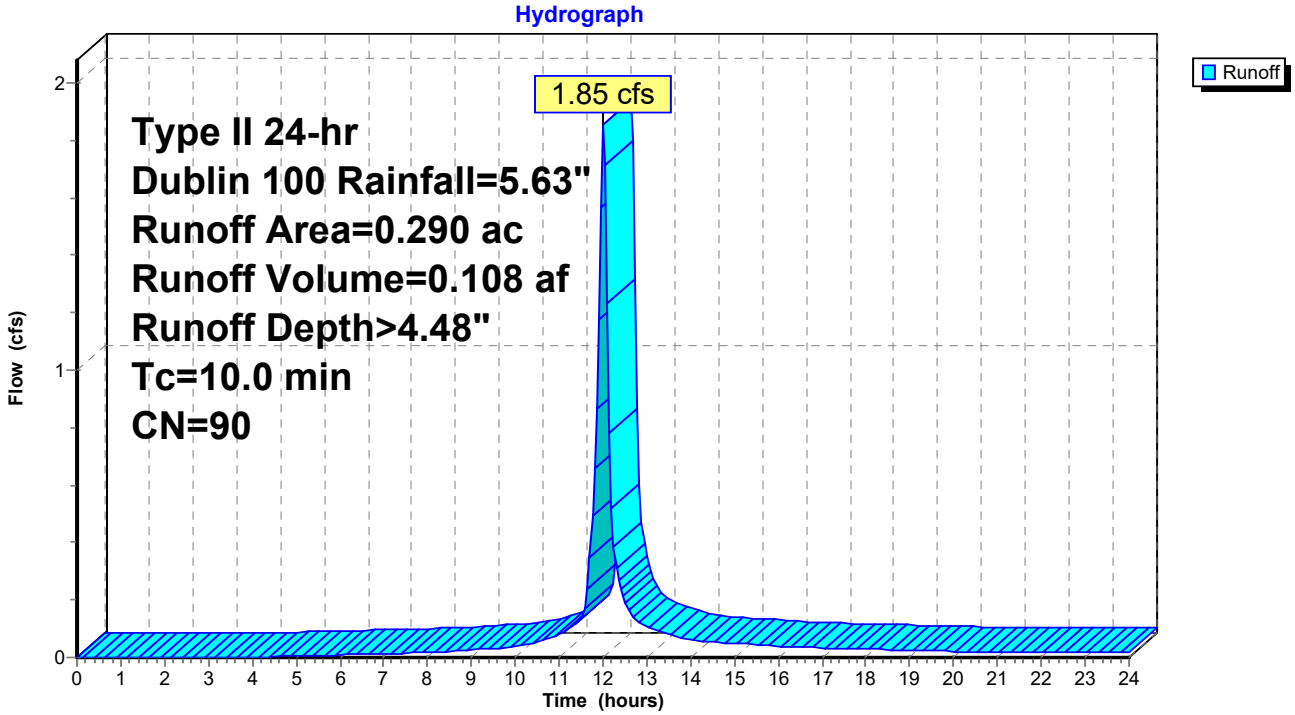
Runoff = 1.85 cfs @ 12.01 hrs, Volume= 0.108 af, Depth> 4.48"
Routed to Pond 15 : CB15

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Dublin 100 Rainfall=5.63"

	Area (ac)	CN	Description
*	0.290	90	
	0.290		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry,**

Subcatchment 19A: AREA TO 15



Summary for Pond 1P: Middle Pond

Inflow Area = 3.590 ac, 51.53% Impervious, Inflow Depth > 3.24" for Dublin 100 event
Inflow = 8.70 cfs @ 12.02 hrs, Volume= 0.970 af
Outflow = 0.34 cfs @ 19.23 hrs, Volume= 0.331 af, Atten= 96%, Lag= 432.5 min
Primary = 0.34 cfs @ 19.23 hrs, Volume= 0.331 af
Routed to Pond LP : Lower Pond
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond LP : Lower Pond

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 894.71' @ 19.23 hrs Surf.Area= 13,155 sf Storage= 29,108 cf

Plug-Flow detention time= 368.8 min calculated for 0.330 af (34% of inflow)
Center-of-Mass det. time= 210.9 min (1,078.4 - 867.5)

Volume	Invert	Avail.Storage	Storage Description
#1	891.50'	48,495 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

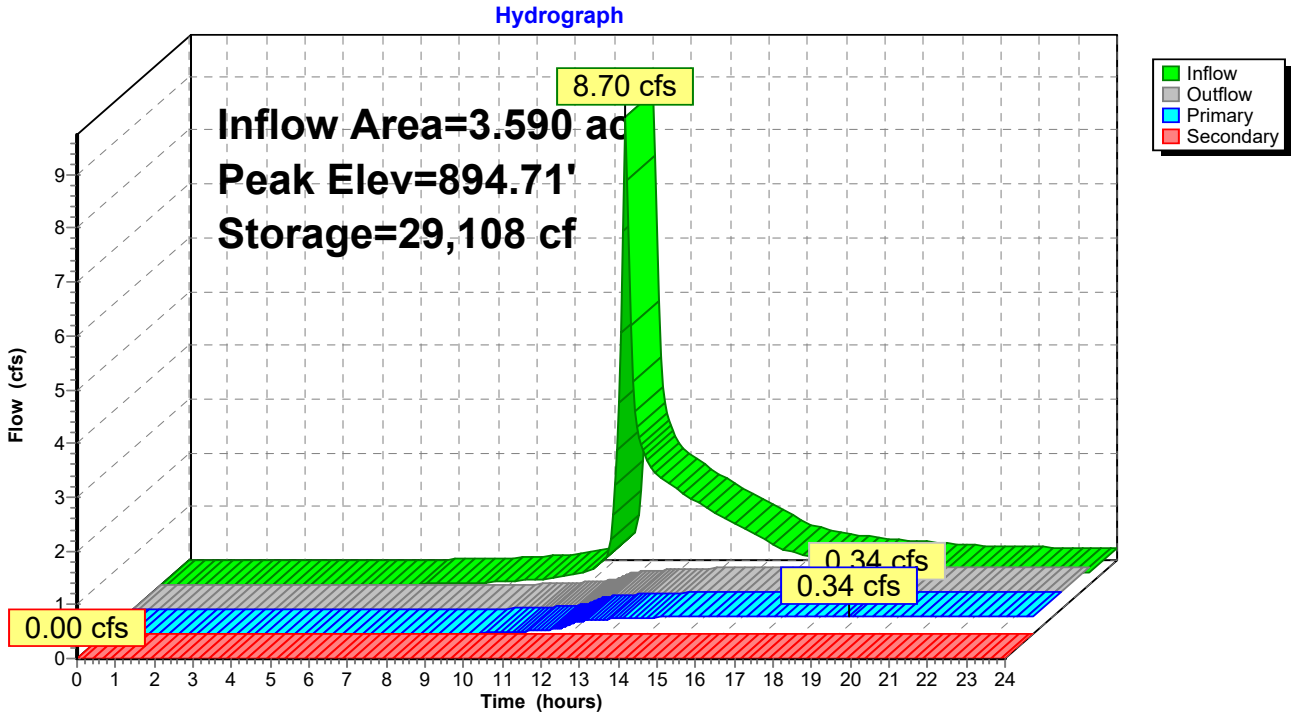
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
891.50	5,673	0	0
892.00	6,321	2,999	2,999
893.00	8,752	7,537	10,535
894.00	11,119	9,936	20,471
895.00	13,980	12,550	33,020
896.00	16,970	15,475	48,495

Device	Routing	Invert	Outlet Devices
#1	Primary	891.50'	**8.0" Round Culvert X 3.00** L= 2.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 891.50' / 891.49' S= 0.0050 '/' Cc= 0.900 n= 0.013, Flow Area= 0.35 sf
#2	Device 1	891.50'	**2.7" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#3	Secondary	895.50'	**20.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Primary OutFlow Max=0.34 cfs @ 19.23 hrs HW=894.71' TW=887.71' (Dynamic Tailwater)
1=Culvert (Passes 0.34 cfs of 8.55 cfs potential flow)
2=Orifice (Orifice Controls 0.34 cfs @ 8.48 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=891.50' TW=883.50' (Dynamic Tailwater)
3=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 1P: Middle Pond



Summary for Pond 10: CB10

Inflow Area = 3.920 ac, 0.00% Impervious, Inflow Depth > 4.48" for Dublin 100 event
Inflow = 21.94 cfs @ 12.01 hrs, Volume= 1.463 af
Outflow = 15.21 cfs @ 12.10 hrs, Volume= 1.463 af, Atten= 31%, Lag= 5.2 min
Primary = 15.21 cfs @ 12.10 hrs, Volume= 1.463 af
Routed to Pond LP : Lower Pond
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond LP : Lower Pond

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 898.04' @ 12.10 hrs Surf.Area= 10,909 sf Storage= 3,577 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.8 min (792.4 - 791.6)

Volume	Invert	Avail.Storage	Storage Description
#1	890.79'	1,036 cf	**CB10 (Prismatic)** Listed below (Recalc)
#2	891.29'	82 cf	**18.0" Round Pipe Storage 10-11** L= 46.6' S= 0.0127 '/'
#3	891.88'	1,031 cf	**CB11 (Prismatic)** Listed below (Recalc)
#4	891.88'	108 cf	**18.0" Round Pipe Storage 11-12** L= 61.3' S= 0.0075 '/'
#5	892.34'	1,030 cf	**CB12 (Prismatic)** Listed below (Recalc)
#6	892.34'	138 cf	**18.0" Round Pipe Storage 12-13** L= 78.0' S= 0.0055 '/'
#7	892.77'	1,028 cf	**CB13 (Prismatic)** Listed below (Recalc)
#8	892.77'	139 cf	**18.0" Round Pipe Storage 13-14** L= 78.9' S= 0.0055 '/'
#9	893.20'	21 cf	**CB14 (Prismatic)** Listed below (Recalc)
#10	893.70'	63 cf	**12.0" Round Pipe Storage 14-15** L= 80.2' S= 0.0046 '/'
#11	892.35'	71 cf	**12.0" Round Pipe Storage 10-38** L= 90.5' S= 0.0100 '/'
#12	893.25'	1,568 cf	**CB38 (Prismatic)** Listed below (Recalc)
		6,315 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
890.79	4	0	0
897.60	4	27	27
898.25	3,099	1,008	1,036

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
891.88	4	0	0
897.60	4	23	23
898.25	3,099	1,008	1,031

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
892.34	4	0	0
897.60	4	21	21
898.25	3,099	1,008	1,030

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
892.77	4	0	0
897.60	4	19	19
898.25	3,099	1,008	1,028

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
893.20	4	0	0
898.50	4	21	21

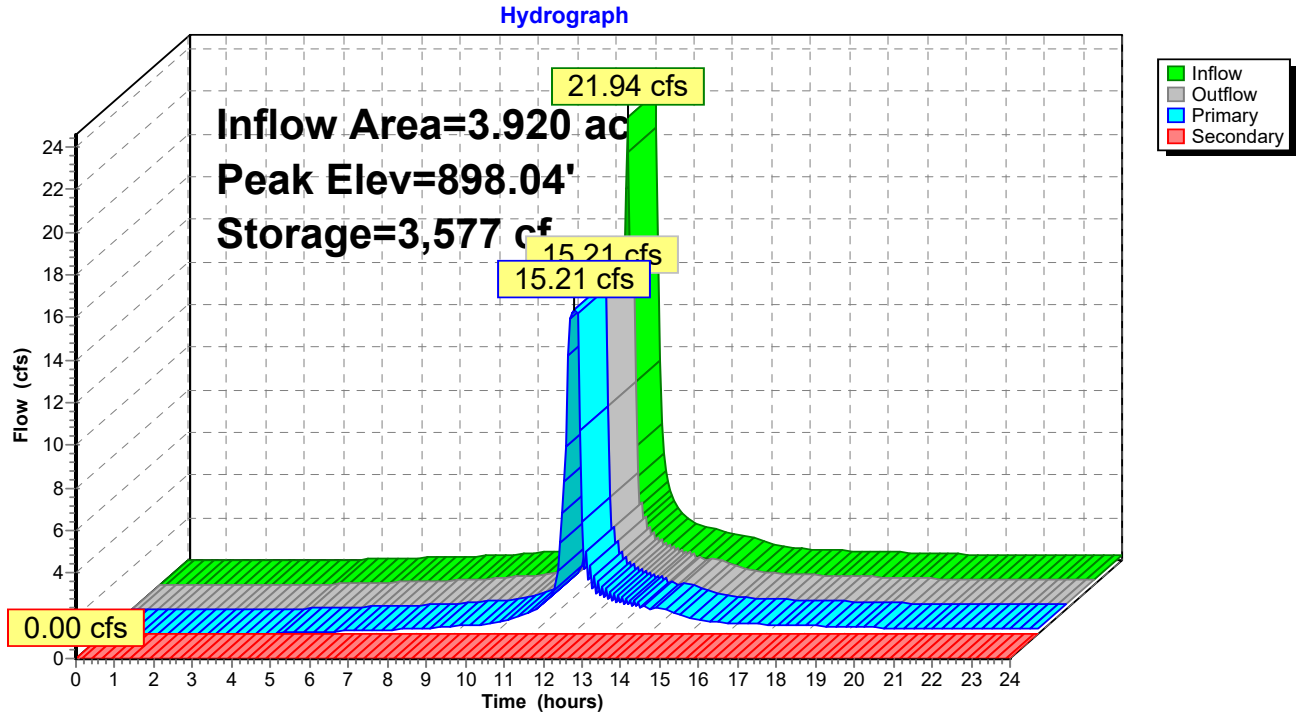
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
893.25	4	0	0
897.25	4	16	16
898.25	3,099	1,552	1,568

Device	Routing	Invert	Outlet Devices
#1	Primary	890.79'	**24.0" Round Culvert 10-9** L= 107.6' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 890.79' / 890.49' S= 0.0028 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#2	Device 1	890.79'	**15.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Secondary	898.25'	**0.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=15.21 cfs @ 12.10 hrs HW=898.04' TW=888.17' (Dynamic Tailwater)
└**1=Culvert 10-9** (Passes 15.21 cfs of 35.23 cfs potential flow)
└**2=Orifice/Grate** (Orifice Controls 15.21 cfs @ 12.39 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=890.79' TW=883.50' (Dynamic Tailwater)
└**3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 10: CB10


Hydrograph
Inflow
Outflow
Primary
Secondary
21.94 cfs
Inflow Area=3.920 ac
Peak Elev=898.04'
Storage=3,577 cf
15.21 cfs
15.21 cfs
0.00 cfs
Flow (cfs)
Time (hours)

Summary for Pond 15: CB15

Inflow Area = 0.530 ac, 0.00% Impervious, Inflow Depth > 4.48" for Dublin 100 event
Inflow = 3.39 cfs @ 12.01 hrs, Volume= 0.198 af
Outflow = 0.54 cfs @ 12.30 hrs, Volume= 0.198 af, Atten= 84%, Lag= 17.5 min
Primary = 0.54 cfs @ 12.30 hrs, Volume= 0.198 af
Routed to Pond 10 : CB10
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond 10 : CB10

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 899.40' @ 12.32 hrs Surf.Area= 7,632 sf Storage= 3,251 cf

Plug-Flow detention time= 41.6 min calculated for 0.197 af (100% of inflow)
Center-of-Mass det. time= 41.3 min (827.3 - 786.0)

Volume	Invert	Avail.Storage	Storage Description
#1	894.07'	599 cf	**CB15 (Prismatic)** Listed below (Recalc)
#2	894.07'	58 cf	**12.0" Round Pipe Storage 15-16** L= 73.7' S= 0.0044 '/'
#3	894.39'	669 cf	**CB16 (Prismatic)** Listed below (Recalc)
#4	894.39'	85 cf	**12.0" Round Pipe Storage 16-17** L= 107.9' S= 0.0044 '/'
#5	894.86'	668 cf	**CB17 (Prismatic)** Listed below (Recalc)
#6	893.96'	61 cf	**12.0" Round Pipe Storage 17-18** L= 77.8' S= 0.0050 '/'
#7	895.20'	594 cf	**CB18 (Prismatic)** Listed below (Recalc)
#8	895.20'	70 cf	**12.0" Round Pipe Storage 18-19** L= 89.0' S= 0.0044 '/'
#9	895.59'	593 cf	**CB19 (Prismatic)** Listed below (Recalc)
#10	895.59'	83 cf	**12.0" Round Pipe Storage 19-20** L= 106.1' S= 0.0044 '/'
#11	896.06'	591 cf	**CB20 (Prismatic)** Listed below (Recalc)
		4,071 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
894.07	4	0	0
898.70	4	19	19
899.50	1,447	580	599

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
894.39	4	0	0
898.60	4	17	17
899.50	1,446	652	669

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
894.86	4	0	0
898.60	4	15	15
899.50	1,447	653	668

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
895.20	4	0	0
898.70	4	14	14
899.50	1,446	580	594

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
895.59	4	0	0
898.70	4	12	12
899.50	1,447	580	593

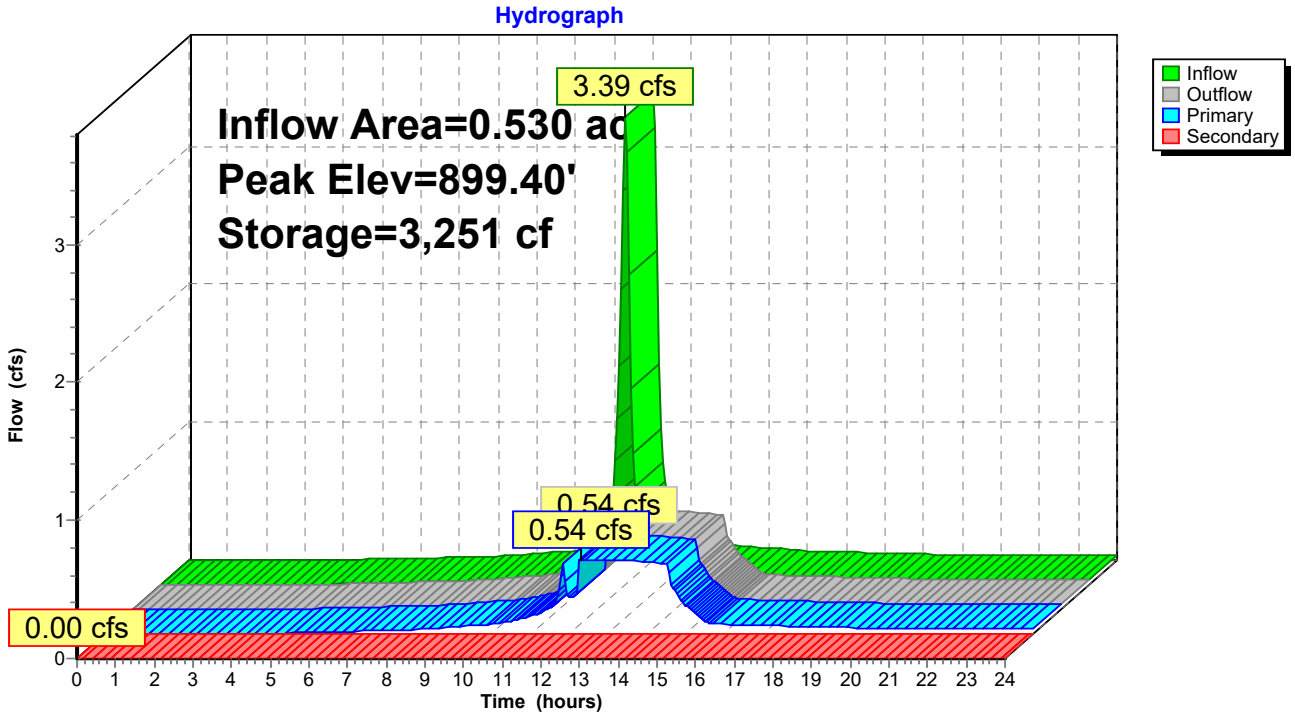
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
896.06	4	0	0
898.70	4	11	11
899.50	1,446	580	591

Device	Routing	Invert	Outlet Devices
#1	Primary	894.07'	**12.0" Round Culvert 15-14** L= 80.2' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 894.07' / 893.70' S= 0.0046 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	894.07'	**3.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#3	Secondary	899.50'	**0.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=0.54 cfs @ 12.30 hrs HW=899.40' TW=892.20' (Dynamic Tailwater)
↑—**1=Culvert 15-14** (Passes 0.54 cfs of 6.82 cfs potential flow)
↑—**2=Orifice** (Orifice Controls 0.54 cfs @ 10.98 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=893.96' TW=890.79' (Dynamic Tailwater)
↑—**3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 15: CB15


Hydrograph
Inflow Area=0.530 ac
Peak Elev=899.40'
Storage=3,251 cf
3.39 cfs
0.54 cfs
0.54 cfs
0.00 cfs
Inflow
Outflow
Primary
Secondary
Flow (cfs)
Time (hours)
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

Summary for Pond LP: Lower Pond

Inflow Area = 13.820 ac, 13.39% Impervious, Inflow Depth > 3.60" for Dublin 100 event
Inflow = 55.58 cfs @ 12.01 hrs, Volume= 4.148 af
Outflow = 22.53 cfs @ 12.23 hrs, Volume= 2.784 af, Atten= 59%, Lag= 12.9 min
Primary = 22.53 cfs @ 12.23 hrs, Volume= 2.784 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 888.46' @ 12.23 hrs Surf.Area= 21,171 sf Storage= 79,336 cf

Plug-Flow detention time= 218.9 min calculated for 2.778 af (67% of inflow)
Center-of-Mass det. time= 104.8 min (916.4 - 811.6)

Volume	Invert	Avail.Storage	Storage Description
#1	883.50'	91,149 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

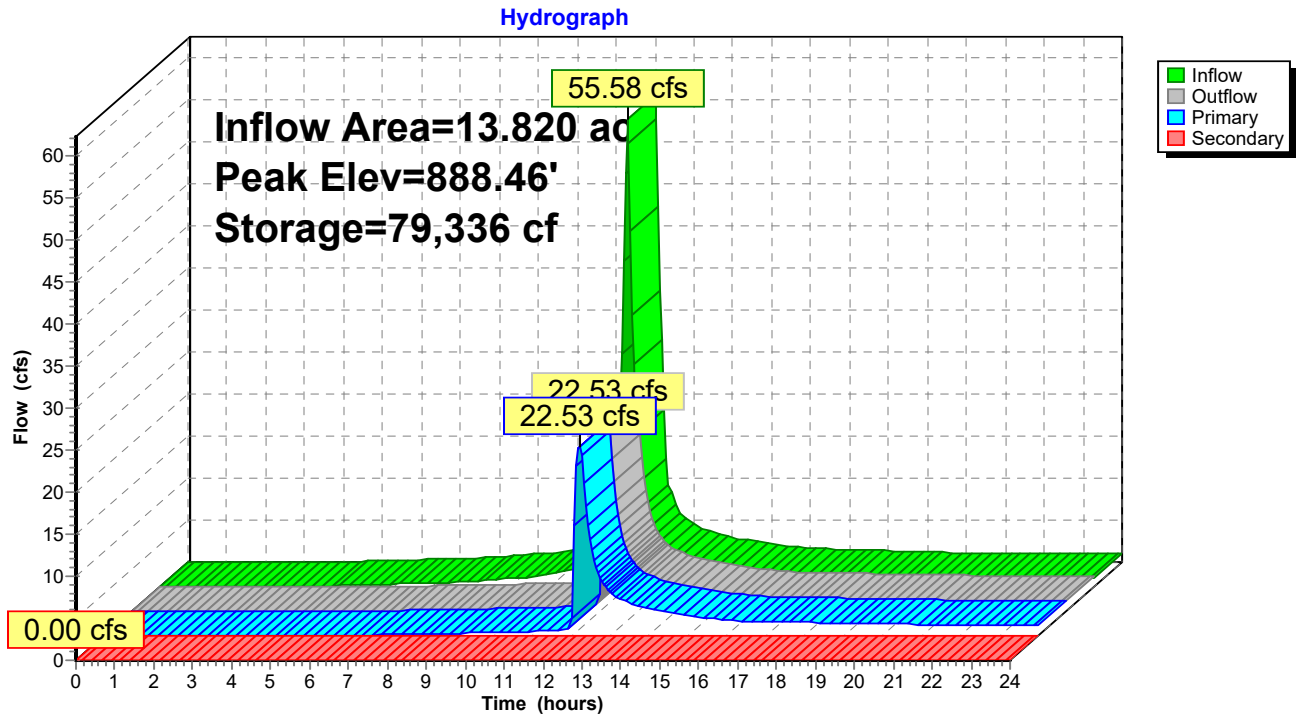
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
883.50	11,033	0	0
884.00	12,045	5,770	5,770
885.00	13,987	13,016	18,786
886.00	15,973	14,980	33,766
887.00	18,038	17,006	50,771
888.00	20,192	19,115	69,886
889.00	22,334	21,263	91,149

Device	Routing	Invert	Outlet Devices
#1	Primary	883.50'	**24.0" Round Culvert** L= 143.6' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 883.50' / 881.00' S= 0.0174 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 3.14 sf
#2	Device 1	883.50'	**4.4" Vert. WQ Orifice** C= 0.600 Limited to weir flow at low heads
#3	Device 1	886.90'	**2.0" Vert. Orifice X 3.00** C= 0.600 Limited to weir flow at low heads
#4	Device 1	887.50'	**3.0" Vert. Orifice X 3.00** C= 0.600 Limited to weir flow at low heads
#5	Device 1	887.80'	**54.0" W x 6.0" H Vert. Window X 3.00** C= 0.600 Limited to weir flow at low heads
#6	Device 1	888.90'	**1.5" x 5.0" Horiz. Grate X 9.00 columns** X 4 rows C= 0.600 Limited to weir flow at low heads
#7	Secondary	888.50'	**20.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=22.33 cfs @ 12.23 hrs HW=888.45' (Free Discharge)
└─**1=Culvert** (Passes 22.33 cfs of 30.06 cfs potential flow)
  └─**2=WQ Orifice** (Orifice Controls 1.11 cfs @ 10.51 fps)
  └─**3=Orifice** (Orifice Controls 0.38 cfs @ 5.83 fps)
  └─**4=Orifice** (Orifice Controls 0.64 cfs @ 4.37 fps)
  └─**5=Window** (Orifice Controls 20.20 cfs @ 2.99 fps)
  └─**6=Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=883.50' (Free Discharge)
└─**7=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond LP: Lower Pond



Summary for Pond UP: Upper Pond

Inflow Area = 2.190 ac, 61.19% Impervious, Inflow Depth > 4.37" for Dublin 100 event
Inflow = 13.77 cfs @ 12.01 hrs, Volume= 0.798 af
Outflow = 1.57 cfs @ 12.46 hrs, Volume= 0.533 af, Atten= 89%, Lag= 26.8 min
Primary = 1.57 cfs @ 12.46 hrs, Volume= 0.533 af
Routed to Pond 1P : Middle Pond
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond 1P : Middle Pond

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 896.49' @ 12.46 hrs Surf.Area= 11,087 sf Storage= 20,090 cf

Plug-Flow detention time= 223.2 min calculated for 0.532 af (67% of inflow)
Center-of-Mass det. time= 126.5 min (916.1 - 789.6)

Volume	Invert	Avail.Storage	Storage Description
#1	894.00'	26,139 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

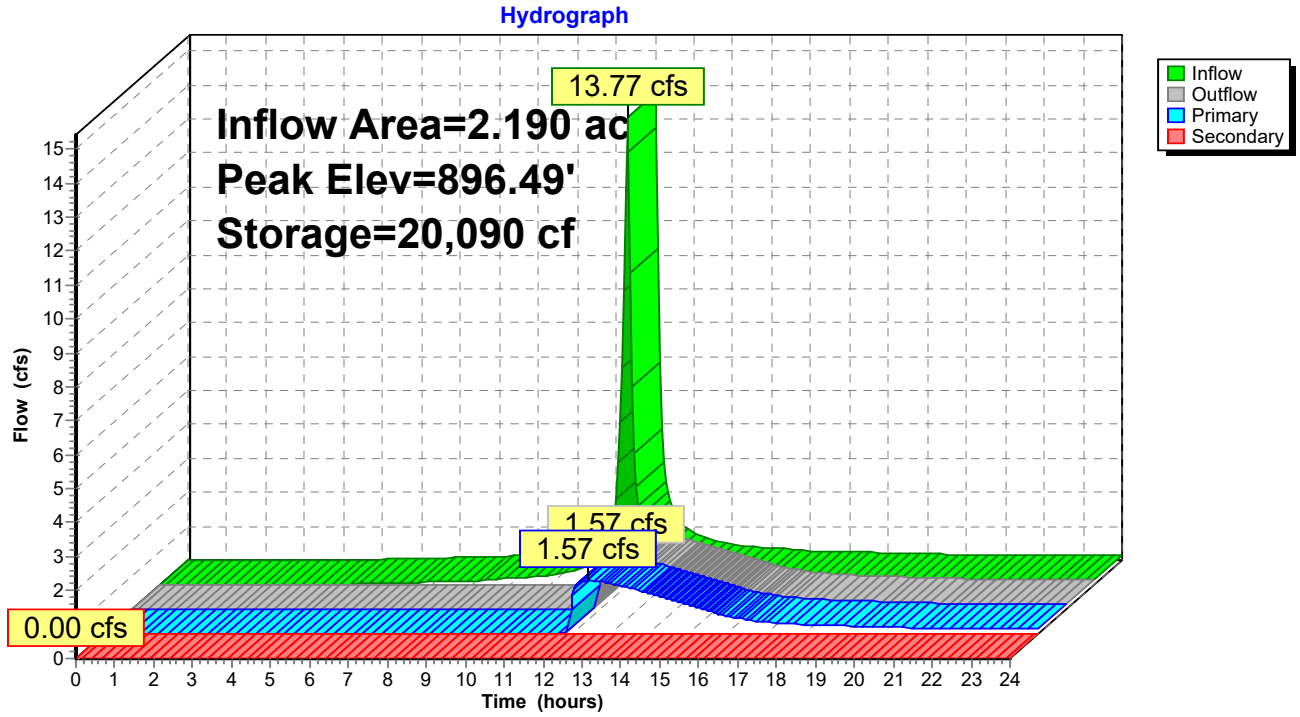
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
894.00	5,685	0	0
895.00	7,343	6,514	6,514
896.00	9,666	8,505	15,019
897.00	12,574	11,120	26,139

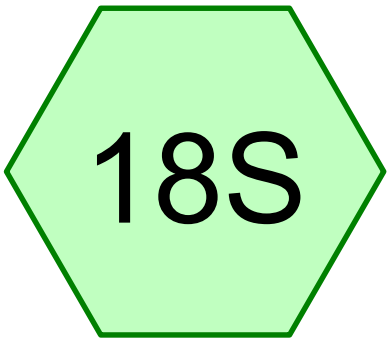
Device	Routing	Invert	Outlet Devices
#1	Primary	894.00'	**12.0" Round Culvert** L= 86.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 894.00' / 893.50' S= 0.0058 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	895.50'	**13.0" W x 4.0" H Vert. Window** C= 0.600 Limited to weir flow at low heads
#3	Device 1	896.50'	**1.5" x 5.0" Horiz. Grate X 9.00 columns** X 4 rows C= 0.600 Limited to weir flow at low heads
#4	Secondary	896.50'	**20.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=1.57 cfs @ 12.46 hrs HW=896.49' TW=893.30' (Dynamic Tailwater)
└**1=Culvert** (Passes 1.57 cfs of 4.34 cfs potential flow)
└**2=Window** (Orifice Controls 1.57 cfs @ 4.36 fps)
└**3=Grate** (Controls 0.00 cfs)

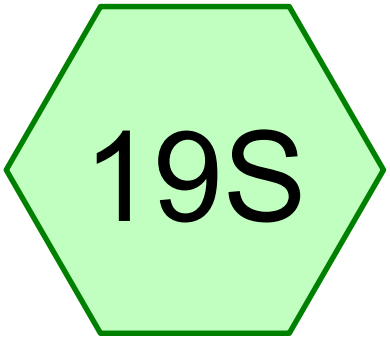
Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=894.00' TW=891.50' (Dynamic Tailwater)
└**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond UP: Upper Pond





UA-EAST-IMP



UA-NORTH-IMP

Subcat Reach Pond Link

Routing Diagram for 2023-05-18
Prepared by Advanced Civil Design, Inc, Printed 10/24/2023

Summary for Subcatchment 18S: UA-EAST-IMP

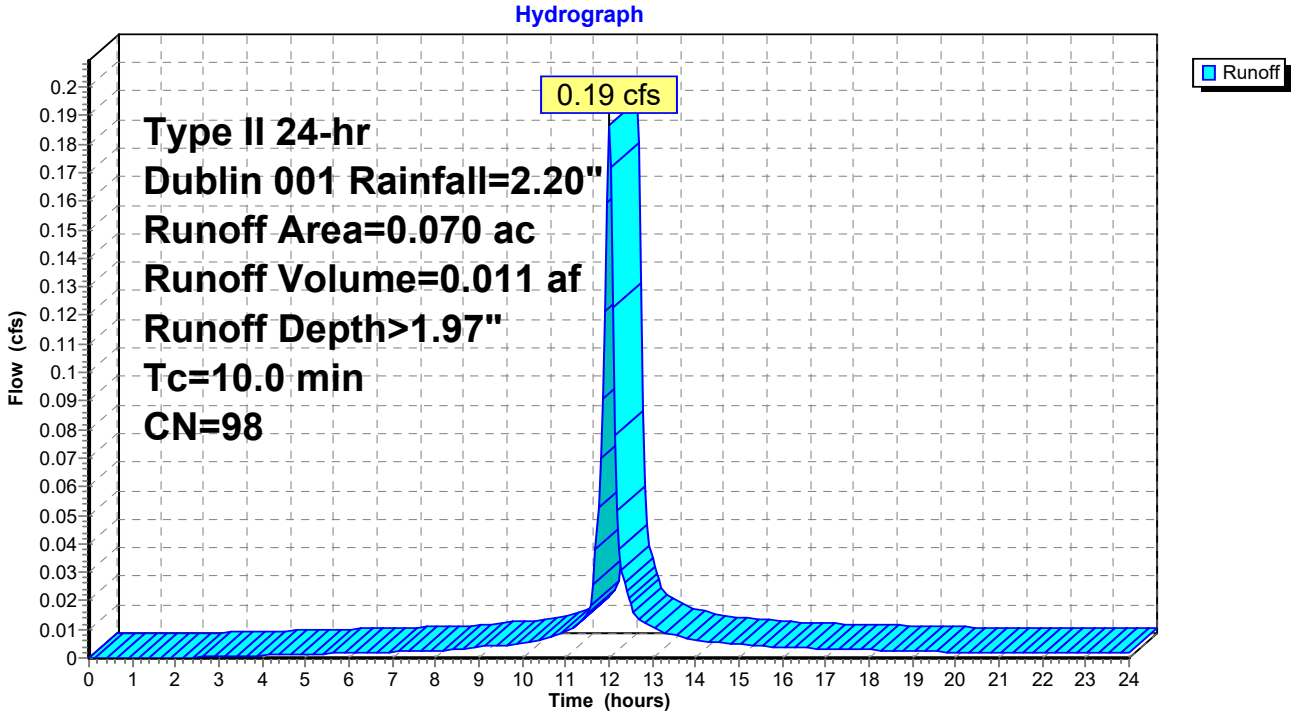
Runoff = 0.19 cfs @ 12.01 hrs, Volume= 0.011 af, Depth> 1.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Dublin 001 Rainfall=2.20"

	Area (ac)	CN	Description
*	0.070	98	
	0.070		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry, Overland**

Subcatchment 18S: UA-EAST-IMP



Summary for Subcatchment 19S: UA-NORTH-IMP

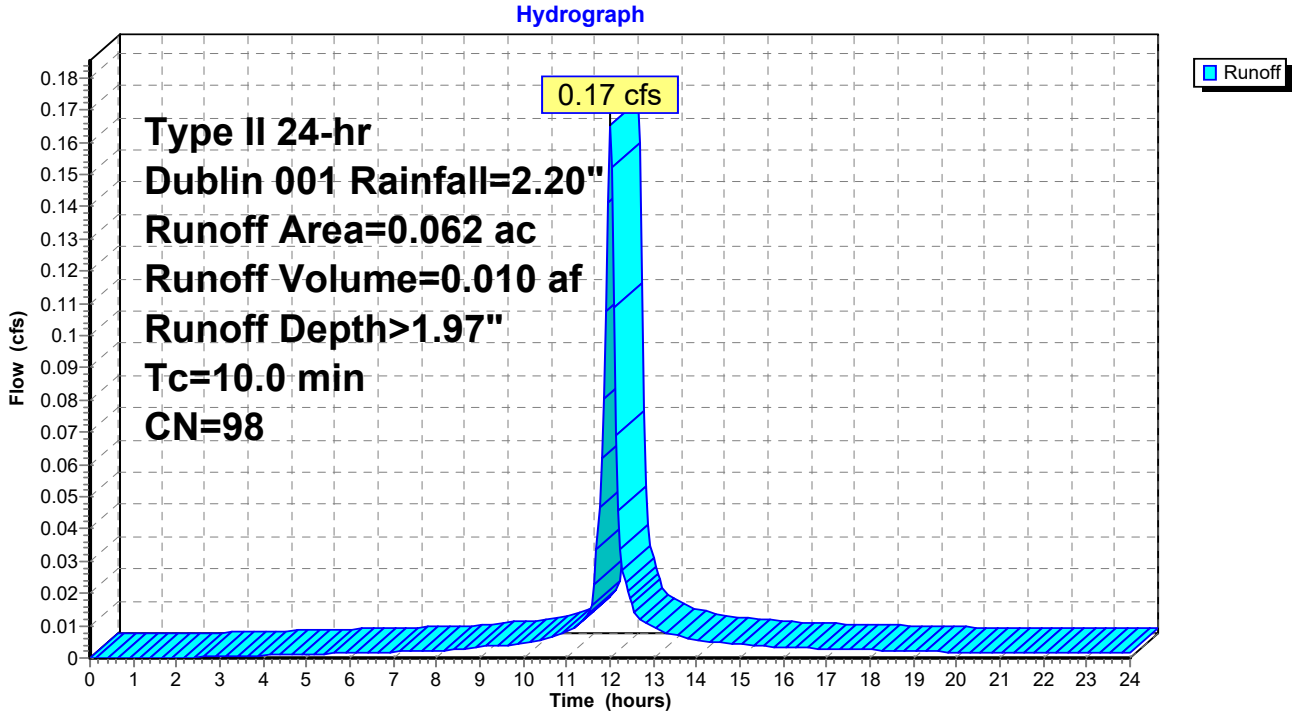
Runoff = 0.17 cfs @ 12.01 hrs, Volume= 0.010 af, Depth> 1.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Dublin 001 Rainfall=2.20"

	Area (ac)	CN	Description
*	0.062	98	
	0.062		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry, Overland**

Subcatchment 19S: UA-NORTH-IMP



Summary for Subcatchment 18S: UA-EAST-IMP

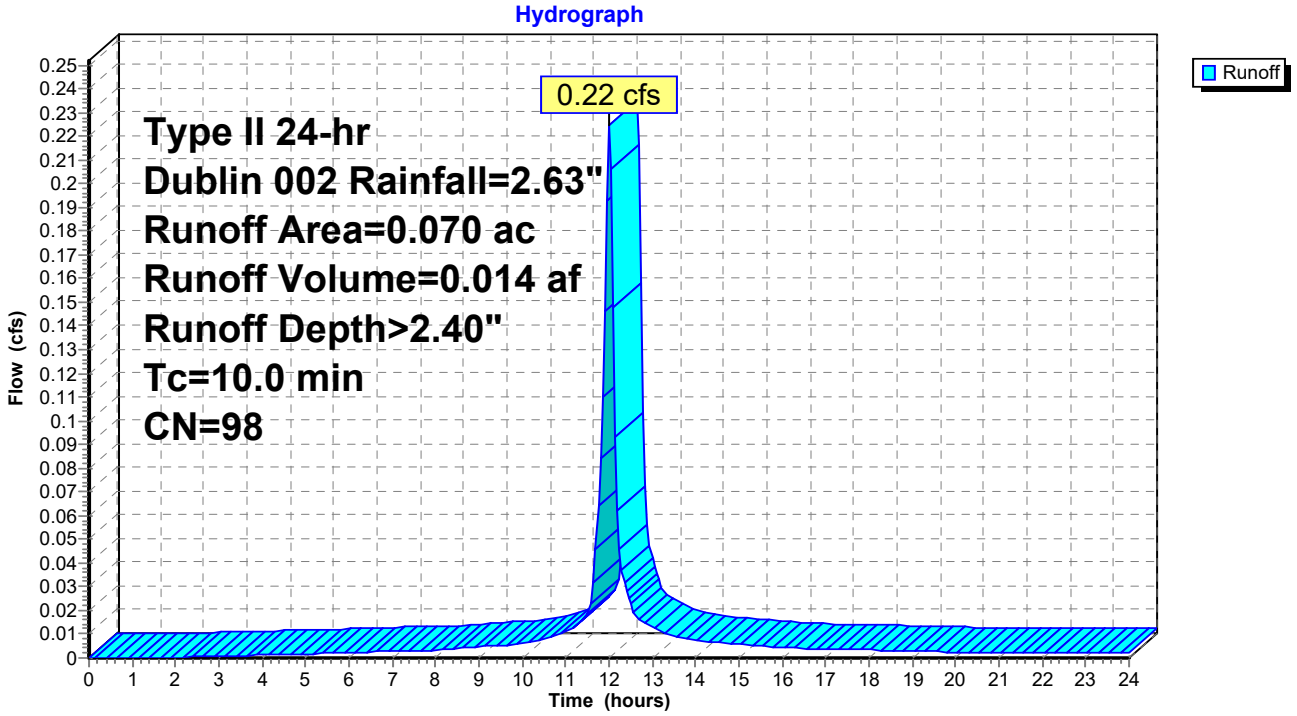
Runoff = 0.22 cfs @ 12.01 hrs, Volume= 0.014 af, Depth> 2.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Dublin 002 Rainfall=2.63"

	Area (ac)	CN	Description
*	0.070	98	
	0.070		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry, Overland**

Subcatchment 18S: UA-EAST-IMP



Summary for Subcatchment 19S: UA-NORTH-IMP

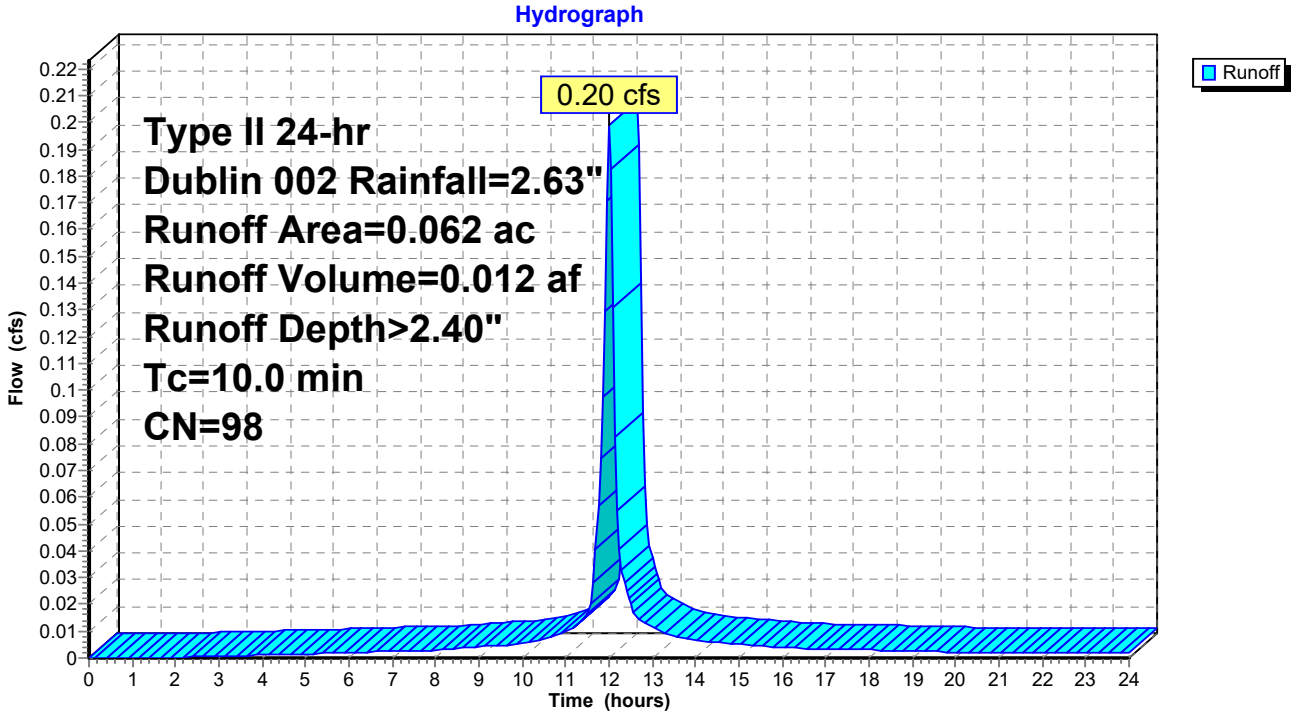
Runoff = 0.20 cfs @ 12.01 hrs, Volume= 0.012 af, Depth> 2.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Dublin 002 Rainfall=2.63"

	Area (ac)	CN	Description
*	0.062	98	
	0.062		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry, Overland**

Subcatchment 19S: UA-NORTH-IMP



Summary for Subcatchment 18S: UA-EAST-IMP

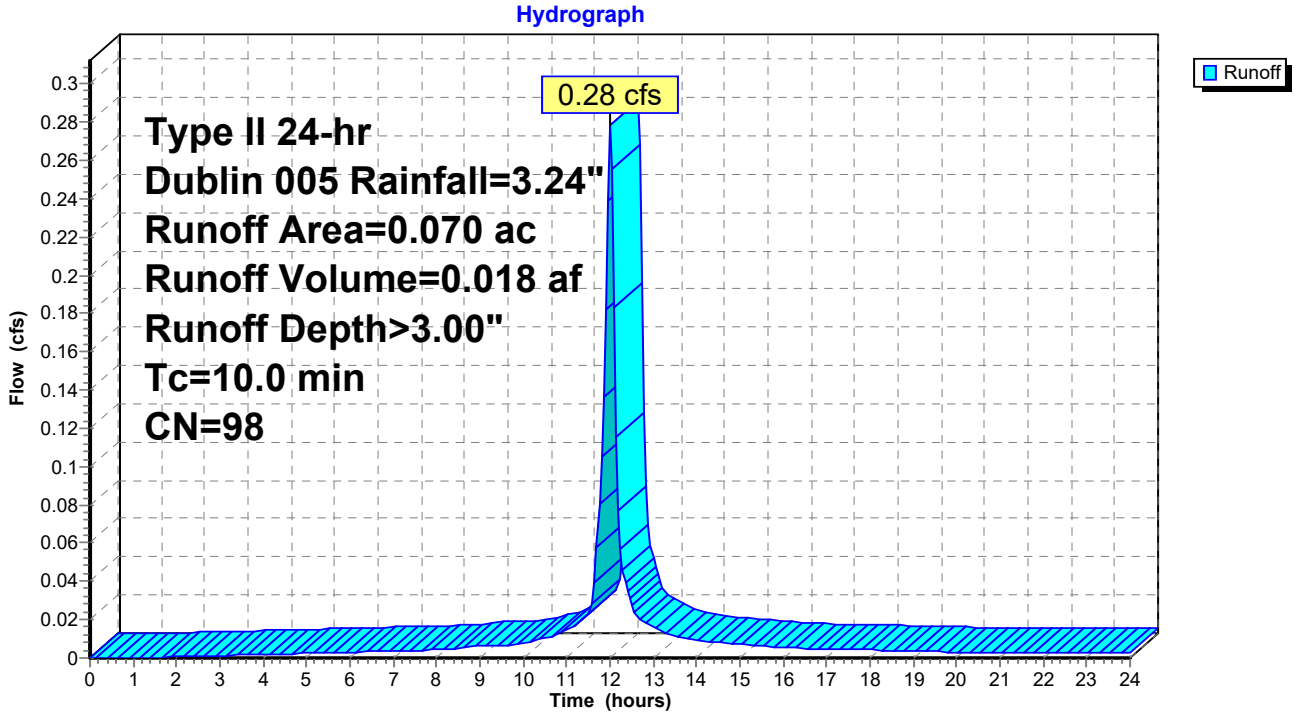
Runoff = 0.28 cfs @ 12.01 hrs, Volume= 0.018 af, Depth> 3.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Dublin 005 Rainfall=3.24"

	Area (ac)	CN	Description
*	0.070	98	
	0.070		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry, Overland**

Subcatchment 18S: UA-EAST-IMP



Summary for Subcatchment 19S: UA-NORTH-IMP

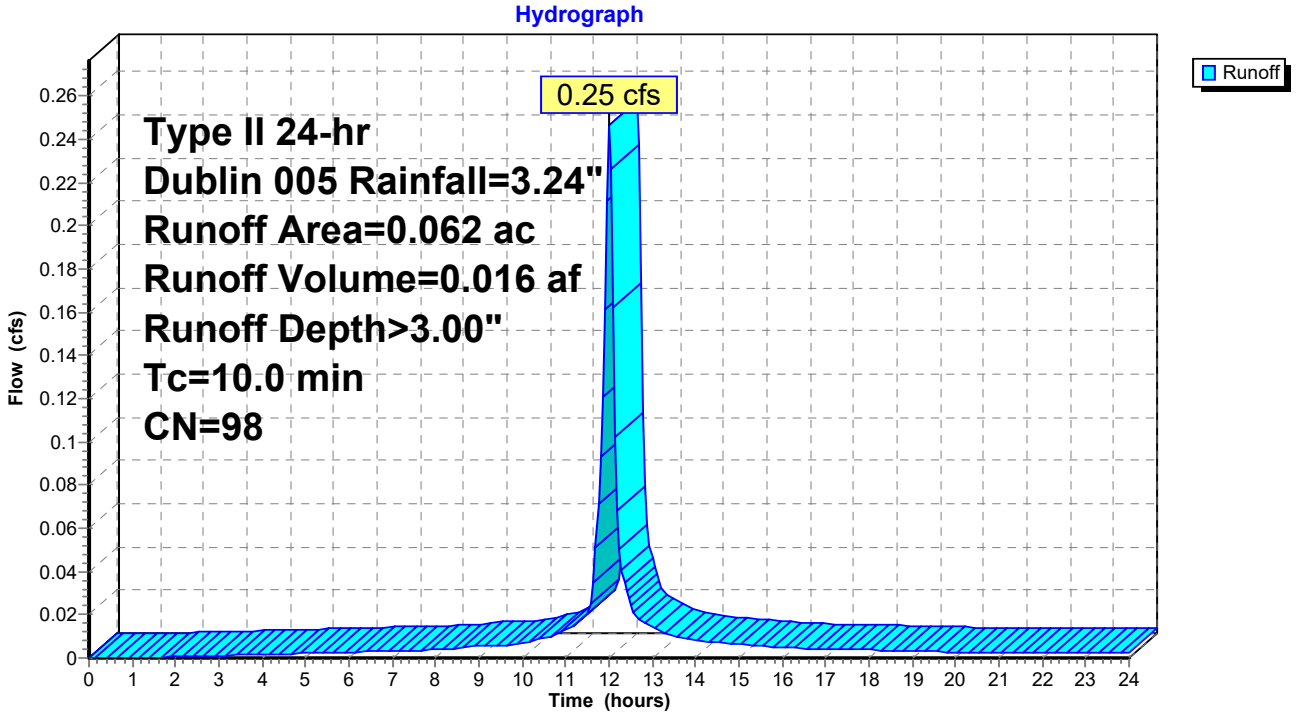
Runoff = 0.25 cfs @ 12.01 hrs, Volume= 0.016 af, Depth> 3.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Dublin 005 Rainfall=3.24"

	Area (ac)	CN	Description
*	0.062	98	
	0.062		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry, Overland**

Subcatchment 19S: UA-NORTH-IMP



Summary for Subcatchment 18S: UA-EAST-IMP

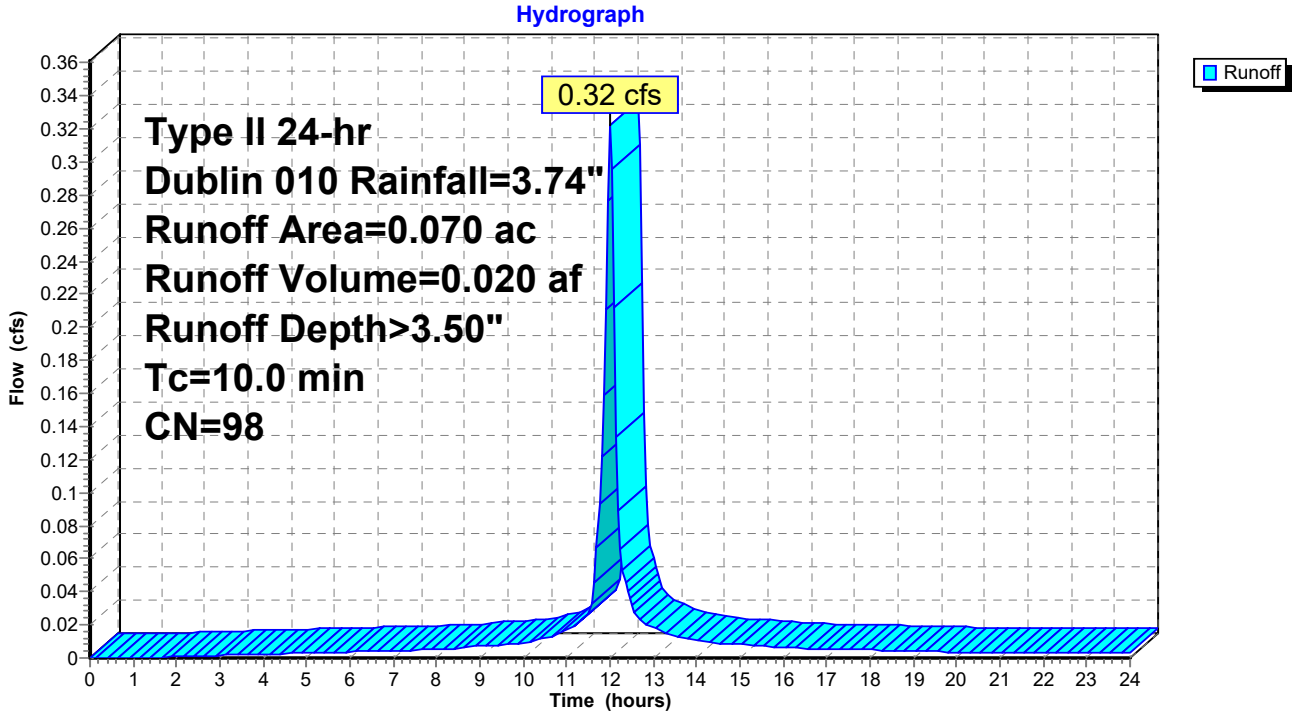
Runoff = 0.32 cfs @ 12.01 hrs, Volume= 0.020 af, Depth> 3.50"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Dublin 010 Rainfall=3.74"

	Area (ac)	CN	Description
*	0.070	98	
	0.070		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry, Overland**

Subcatchment 18S: UA-EAST-IMP



Summary for Subcatchment 19S: UA-NORTH-IMP

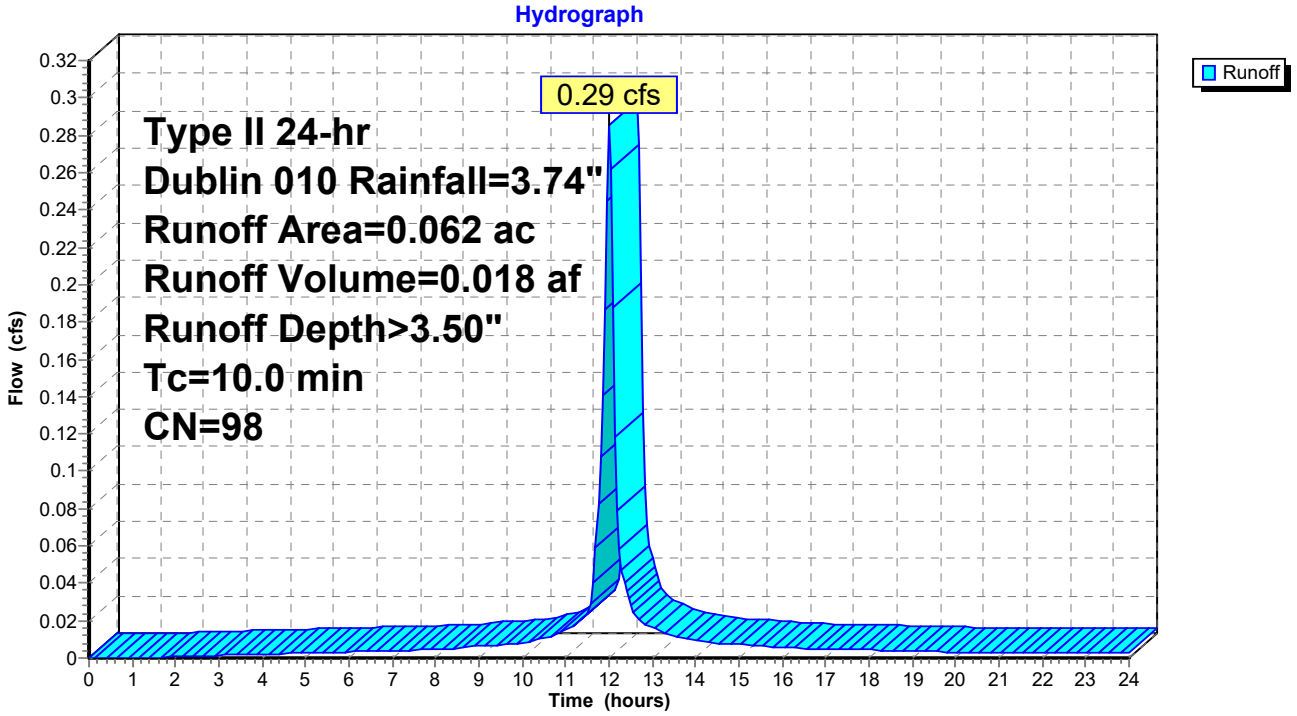
Runoff = 0.29 cfs @ 12.01 hrs, Volume= 0.018 af, Depth> 3.50"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Dublin 010 Rainfall=3.74"

	Area (ac)	CN	Description
*	0.062	98	
	0.062		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry, Overland**

Subcatchment 19S: UA-NORTH-IMP



Summary for Subcatchment 18S: UA-EAST-IMP

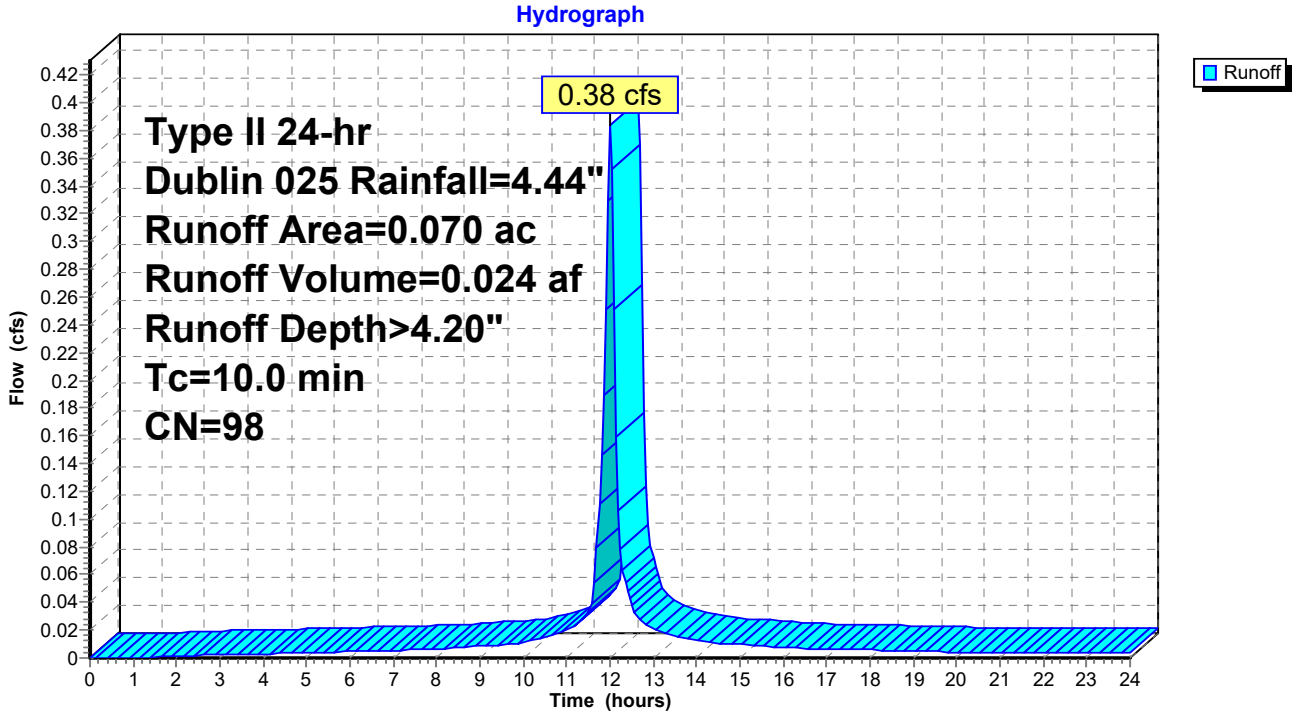
Runoff = 0.38 cfs @ 12.01 hrs, Volume= 0.024 af, Depth> 4.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Dublin 025 Rainfall=4.44"

	Area (ac)	CN	Description
*	0.070	98	
	0.070		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry, Overland**

Subcatchment 18S: UA-EAST-IMP



Summary for Subcatchment 19S: UA-NORTH-IMP

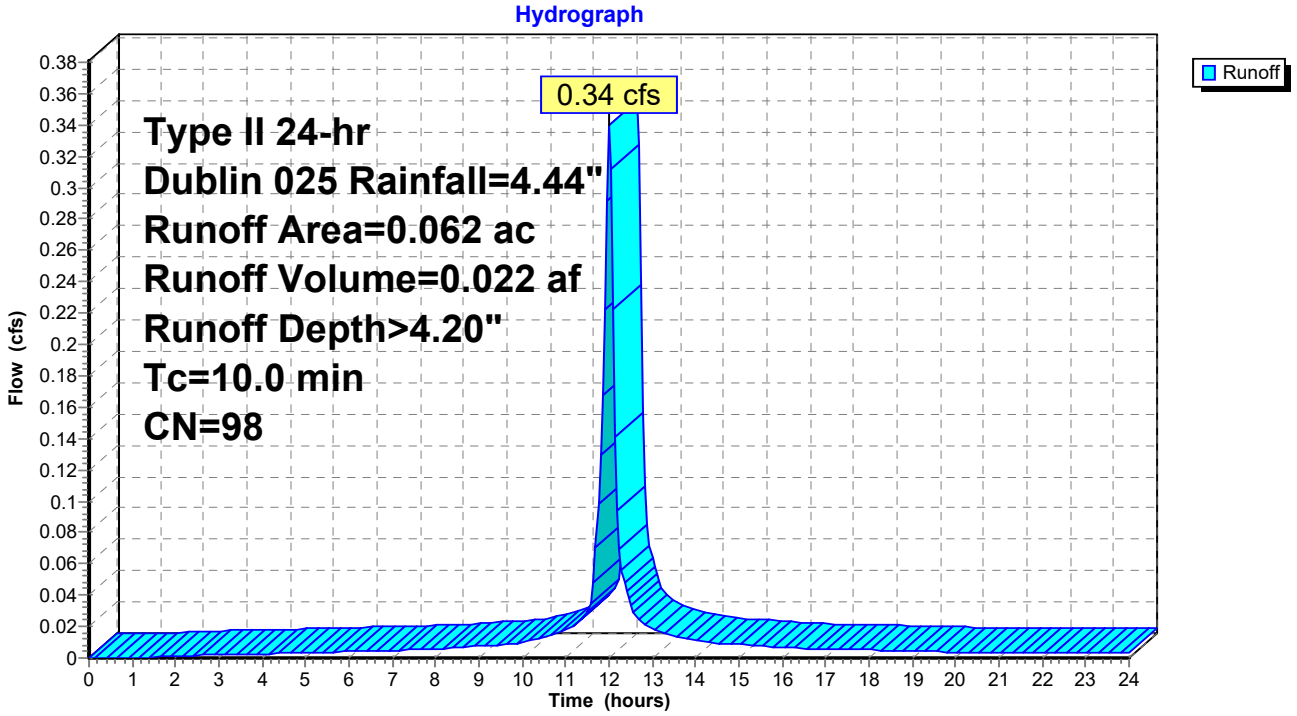
Runoff = 0.34 cfs @ 12.01 hrs, Volume= 0.022 af, Depth> 4.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Dublin 025 Rainfall=4.44"

	Area (ac)	CN	Description
*	0.062	98	
	0.062		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry, Overland**

Subcatchment 19S: UA-NORTH-IMP



Summary for Subcatchment 18S: UA-EAST-IMP

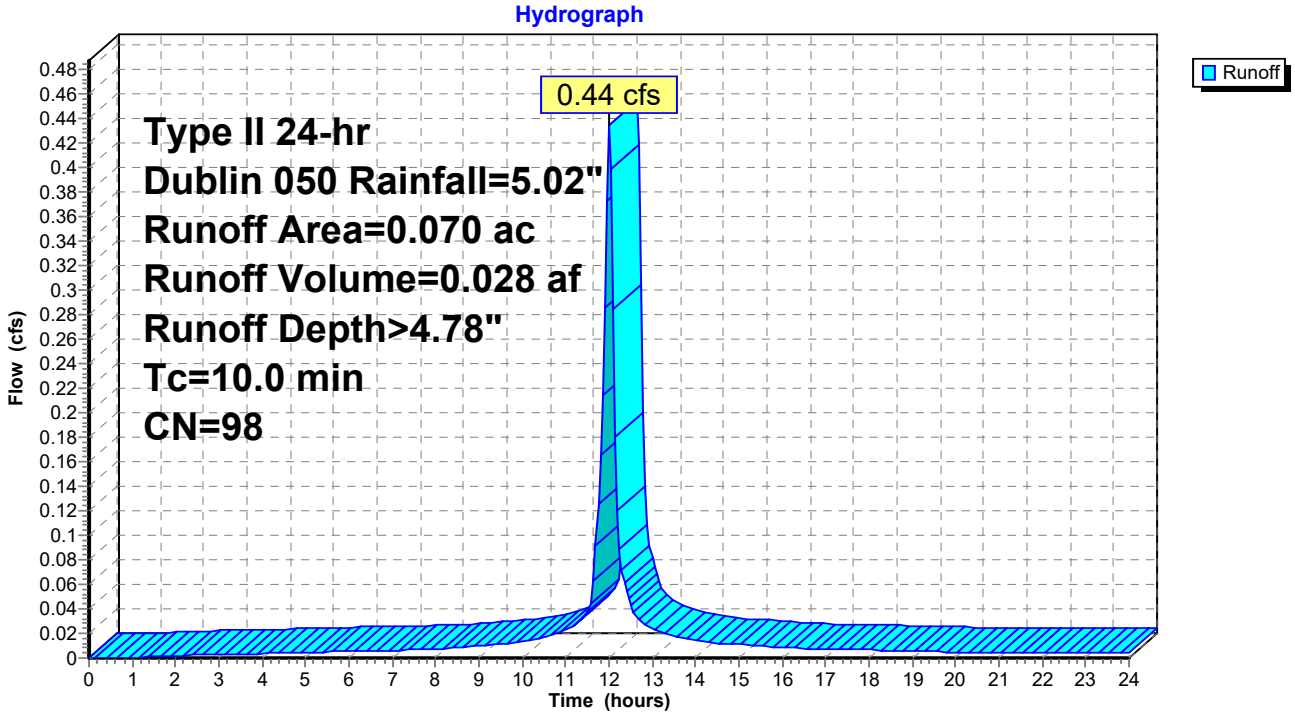
Runoff = 0.44 cfs @ 12.01 hrs, Volume= 0.028 af, Depth> 4.78"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Dublin 050 Rainfall=5.02"

	Area (ac)	CN	Description
*	0.070	98	
	0.070		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry, Overland**

Subcatchment 18S: UA-EAST-IMP



Summary for Subcatchment 19S: UA-NORTH-IMP

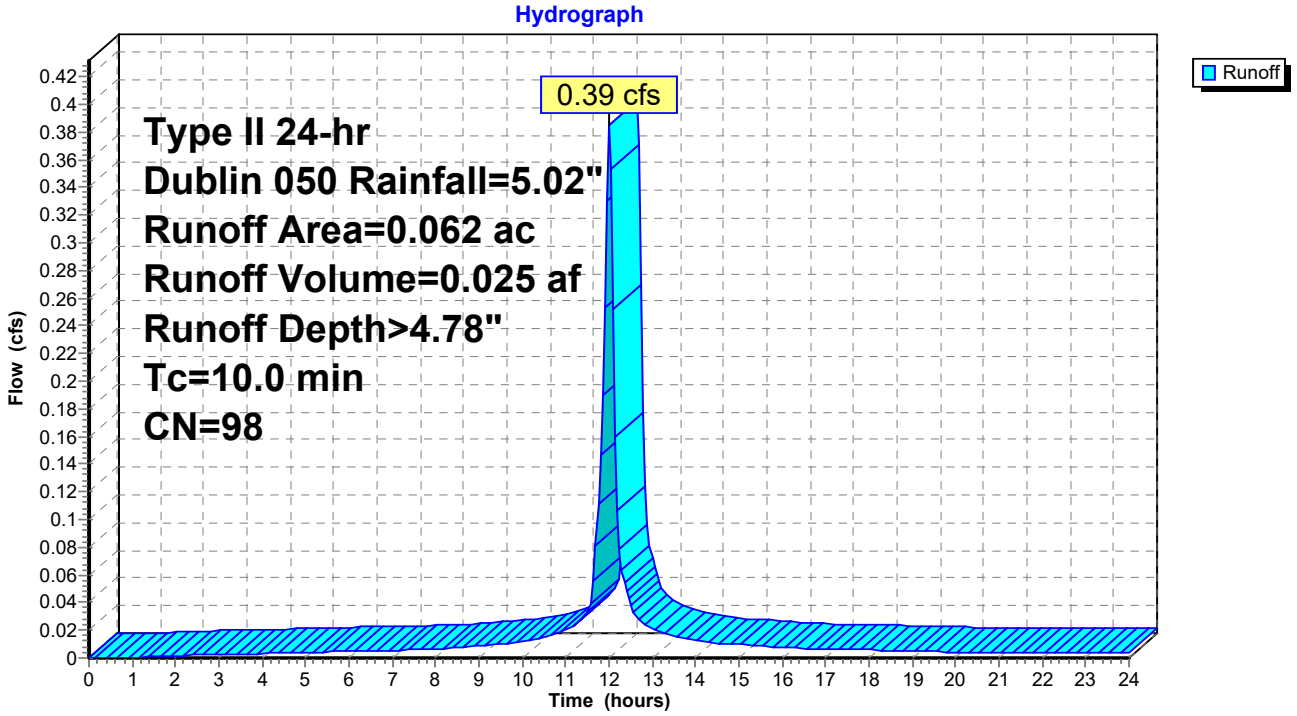
Runoff = 0.39 cfs @ 12.01 hrs, Volume= 0.025 af, Depth> 4.78"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Dublin 050 Rainfall=5.02"

	Area (ac)	CN	Description
*	0.062	98	
	0.062		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry, Overland**

Subcatchment 19S: UA-NORTH-IMP



Summary for Subcatchment 18S: UA-EAST-IMP

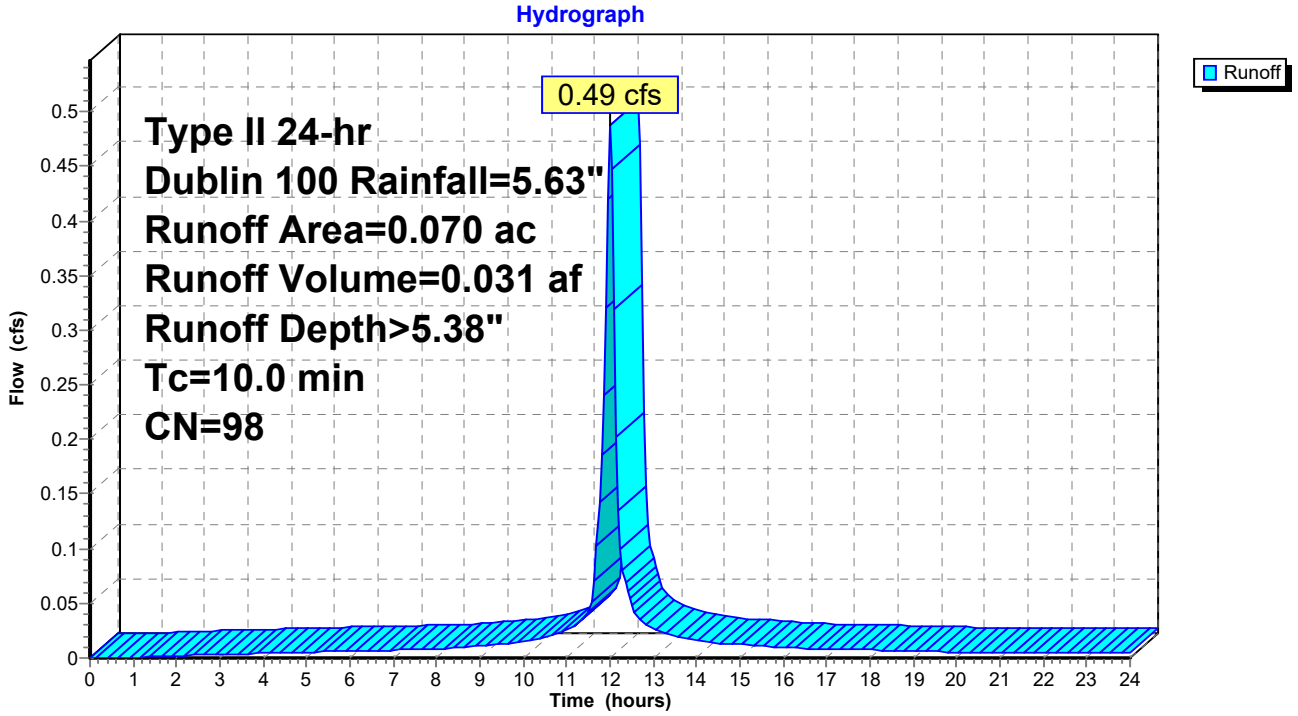
Runoff = 0.49 cfs @ 12.01 hrs, Volume= 0.031 af, Depth> 5.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Dublin 100 Rainfall=5.63"

	Area (ac)	CN	Description
*	0.070	98	
	0.070		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry, Overland**

Subcatchment 18S: UA-EAST-IMP



Summary for Subcatchment 19S: UA-NORTH-IMP

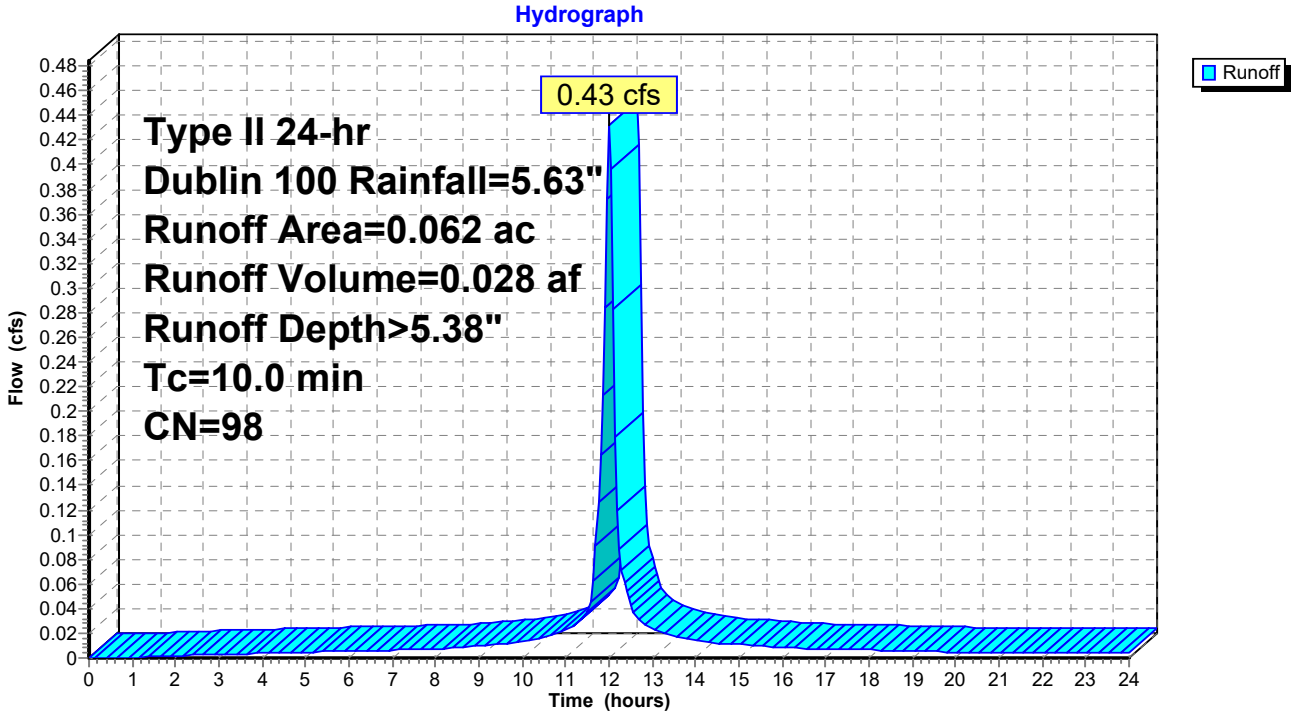
Runoff = 0.43 cfs @ 12.01 hrs, Volume= 0.028 af, Depth> 5.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Dublin 100 Rainfall=5.63"

	Area (ac)	CN	Description
*	0.062	98	
	0.062		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry, Overland**

Subcatchment 19S: UA-NORTH-IMP



APPENDIX D

CRITICAL STORM CALCULATIONS

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
9.450	74	(4S)
14.950	76	(250, 260, 270)
3.960	98	Buildings (4S)
0.170	98	Ex Road (4S)
0.540	98	Ponds (4S)
2.880	98	Roads (4S)
0.660	98	Walks (4S)

Summary for Subcatchment 4S: POST

Runoff = 25.21 cfs @ 12.02 hrs, Volume= 1.387 af, Depth> 0.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Dublin 001 Rainfall=2.20"

	Area (ac)	CN	Description
*	9.450	74	
*	3.960	98	Buildings
*	2.880	98	Roads
*	0.540	98	Ponds
*	0.660	98	Walks
*	0.170	98	Ex Road
	17.660	85	Weighted Average
	9.450		53.51% Pervious Area
	8.210		46.49% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry, Storm Sewer**

Summary for Subcatchment 250: 250

Runoff = 4.22 cfs @ 12.03 hrs, Volume= 0.252 af, Depth> 0.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Dublin 001 Rainfall=2.20"

	Area (ac)	CN	Description
*	5.820	76	
	5.820		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry,**

Summary for Subcatchment 260: 260

Runoff = 4.74 cfs @ 12.03 hrs, Volume= 0.282 af, Depth> 0.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Dublin 001 Rainfall=2.20"

	Area (ac)	CN	Description
*	6.530	76	
	6.530		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry,**

Summary for Subcatchment 270: 270

Runoff = 1.89 cfs @ 12.03 hrs, Volume= 0.112 af, Depth> 0.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Dublin 001 Rainfall=2.20"

	Area (ac)	CN	Description
*	2.600	76	
	2.600		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry,**

APPENDIX E

WATER QUALITY CALCULATIONS

BRIGHT RD
NPDES Water Quality Requirements

WQv = Rv * P * A / 12 (Equation 1)

1. Is this project New Development or Redevelopment?		
Answer:	New Development	
WQv =	Water Quality Volume (ac.ft.)	
Rv =	Volumetric Runoff Coefficient	
P =	.90-in precipitation depth (inch)	
A =	Drainage area (acres)	

2. Determine Percent Impervious		
Land Use	Acre	% Total
Impervious	7.500	54%
Pervious	6.320	46%
Total Area	13.820	

Water Quality Volume	WQv	=	Rv	x	P	x	A	/ 12
	Volume				in.		Ac.	
ac.ft.	0.5581	=	0.54	x	0.90	x	13.82	/ 12
cu. ft.	**24,310**							

3. Determine Volumetric Runoff Coefficient (Equation 2)
Rv = 0.05 + 0.9 * i

Water Quality Volume Required + 20%		
TWQv =	**29,172**	**CF**

Stage-Area-Storage for Pond LP: Lower Pond

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
883.50	11,033	0
883.60	11,235	1,113
883.70	11,438	2,247
883.80	11,640	3,401
883.90	11,843	4,575
884.00	12,045	5,770
884.10	12,239	6,984
884.20	12,433	8,217
884.30	12,628	9,470
884.40	12,822	10,743
884.50	13,016	12,035
884.60	13,210	13,346
884.70	13,404	14,677
884.80	13,599	16,027
884.90	13,793	17,397
885.00	13,987	18,786
885.10	14,186	20,194
885.20	14,384	21,623
885.30	14,583	23,071
885.40	14,781	24,539
885.50	14,980	26,027
885.60	15,179	27,535
885.70	15,377	29,063
885.80	15,576	30,611
885.90	15,774	32,178
886.00	15,973	33,766
886.10	16,180	35,373
886.20	16,386	37,001
886.30	16,592	38,650
886.40	16,799	40,320
886.50	17,006	42,010
886.60	17,212	43,721
886.70	17,419	45,453
886.80	17,625	47,205
886.90	17,831	48,978
887.00	18,038	50,771
887.10	18,253	52,586
887.20	18,469	54,422
887.30	18,684	56,279
887.40	18,900	58,159
887.50	19,115	60,059
887.60	19,330	61,982
887.70	19,546	63,925
887.80	19,761	65,891
887.90	19,977	67,878
888.00	20,192	69,886
888.10	20,406	71,916
888.20	20,620	73,967
888.30	20,835	76,040
888.40	21,049	78,134
888.50	21,263	80,250
888.60	21,477	82,387
888.70	21,691	84,545
888.80	21,906	86,725
888.90	22,120	88,926
889.00	**22,334**	**91,149**

Hydrograph for Pond LP: Lower Pond

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Primary (cfs)
0.00	**0.00**	**26,027**	**885.50**	**0.58**
0.50	0.00	24,991	885.43	0.57
1.00	0.00	23,983	885.36	0.55
1.50	0.00	23,004	885.30	0.54
2.00	0.00	22,053	885.23	0.52
2.50	0.00	21,132	885.17	0.50
3.00	0.00	20,239	885.10	0.49
3.50	0.00	19,376	885.04	0.47
4.00	0.00	18,543	884.98	0.45
4.50	0.00	17,740	884.92	0.44
5.00	0.00	16,967	884.87	0.42
5.50	0.00	16,225	884.81	0.40
6.00	0.00	15,513	884.76	0.39
6.50	0.00	14,832	884.71	0.37
7.00	0.00	14,183	884.66	0.35
7.50	0.00	13,565	884.62	0.33
8.00	0.00	12,978	884.57	0.32
8.50	0.00	12,423	884.53	0.30
9.00	0.00	11,901	884.49	0.28
9.50	0.00	11,410	884.45	0.26
10.00	0.00	10,952	884.42	0.25
10.50	0.00	10,527	884.38	0.23
11.00	0.00	10,133	884.35	0.21
11.50	0.00	9,771	884.32	0.19
12.00	0.00	9,446	884.30	0.17
12.50	0.00	9,156	884.28	0.15
13.00	0.00	8,898	884.25	0.13
13.50	0.00	8,671	884.24	0.12
14.00	0.00	8,468	884.22	0.11
14.50	0.00	8,289	884.21	0.09
15.00	0.00	8,128	884.19	0.08
15.50	0.00	7,985	884.18	0.08
16.00	0.00	7,856	884.17	0.07
16.50	0.00	7,740	884.16	0.06
17.00	0.00	7,635	884.15	0.06
17.50	0.00	7,540	884.15	0.05
18.00	0.00	7,453	884.14	0.05
18.50	0.00	7,373	884.13	0.04
19.00	0.00	7,301	884.13	0.04
19.50	0.00	7,234	884.12	0.04
20.00	0.00	7,172	884.12	0.03
20.50	0.00	7,115	884.11	0.03
21.00	0.00	7,062	884.11	0.03
21.50	0.00	7,013	884.10	0.03
22.00	0.00	6,967	884.10	0.02
22.50	0.00	6,925	884.10	0.02
23.00	0.00	6,885	884.09	0.02
23.50	0.00	6,848	884.09	0.02
24.00	0.00	6,813	884.09	0.02

APPENDIX F

SEDIMENT BASIN CALCULATIONS

Calculate Skimmer Size

Basin Volume in Cubic Feet	40,320	Cu.Ft	**Skimmer Size**	**5.0**	Inch
Days to Drain*	2	Days	Orifice Radius	**2.0**	Inch[es]
			Orifice Diameter	**4.0**	Inch[es]

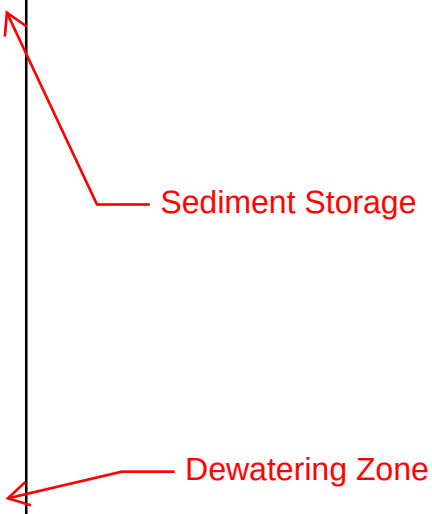
*In NC assume 3 days to drain

Estimate Volume of Basin

	Length	Width				
Top of water surface in feet			Feet	**VOLUME**	**0**	**Cu. Ft.**
Bottom dimensions in feet			Feet			
Depth in feet			Feet			

Stage-Area-Storage for Pond LP: Lower Pond

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
883.50	11,033	0
883.60	11,235	1,113
883.70	11,438	2,247
883.80	11,640	3,401
883.90	11,843	4,575
884.00	12,045	5,770
884.10	12,239	6,984
884.20	12,433	8,217
884.30	12,628	9,470
884.40	12,822	10,743
884.50	13,016	12,035
884.60	13,210	13,346
884.70	13,404	14,677
884.80	13,599	16,027
884.90	13,793	17,397
885.00	13,987	18,786
885.10	14,186	20,194
885.20	14,384	21,623
885.30	14,583	23,071
885.40	14,781	24,539
885.50	14,980	26,027
885.60	15,179	27,535
885.70	15,377	29,063
885.80	15,576	30,611
885.90	15,774	32,178
886.00	15,973	33,766
886.10	16,180	35,373
886.20	16,386	37,001
886.30	16,592	38,650
886.40	16,799	40,320
886.50	17,006	42,010
886.60	17,212	43,721
886.70	17,419	45,453
886.80	17,625	47,205
886.90	17,831	48,978
887.00	18,038	50,771
887.10	18,253	52,586
887.20	18,469	54,422
887.30	18,684	56,279
887.40	18,900	58,159
887.50	19,115	60,059
887.60	19,330	61,982
887.70	19,546	63,925
887.80	19,761	65,891
887.90	19,977	67,878
888.00	20,192	69,886
888.10	20,406	71,916
888.20	20,620	73,967
888.30	20,835	76,040
888.40	21,049	78,134
888.50	21,263	80,250
888.60	21,477	82,387
888.70	21,691	84,545
888.80	21,906	86,725
888.90	22,120	88,926
889.00	**22,334**	**91,149**



Sediment Basin Calculations

for

THE BEACON

Date: 8/1/2023

By: JAP

Checked By:

Basin	Trib Area	Disturbed Area	Dewatering Zone	Sediment Storage Zone	Dewatering Zone	Sediment Storage Zone
	(Acre)	(Acre)	(cu-ft)	(cu ft)	(cu-yd)	(cu yd)
South	13.82	13.82	**24876**	**13820**	**926**	**511**
Provided			**40320**	**14677**	**1493**	**544**
			0	**0**	**0**	**0**
			0	**0**	**0**	**0**
			0	**0**	**0**	**0**
			0	**0**	**0**	**0**
			0	**0**	**0**	**0**

APPENDIX G

STORM SEWER CALCULATIONS

ADVANCED CIVIL DESIGN

Storm Sewer Design Sheet

Project: BRIGHT ROAD | Date: 10/24/2023 | Page: 1
Job No.: 19-0039-39 | Revised:
By: JAP | Revised:
Revised:

2 Yr Design Storm n= **0.013**

Struc.	Struc. Index	Sta.	Drainage Area Trib	Cumul.	C	Cumul CA	Time Delta t Min.	Sum t Min.	Intensity in/hr	Des Q CFS	Length ft.	Dia. In	Slope%	Vel	Cap. Flowing Full	Status	Drop Default 0.1 or Match Tops	Out	In	TC	Cover
20		14+04.30	0.15	0.15	0.50		10.00	10.00	3.80	0.29										898.70	1.47
						0.08					106.08	12	0.440%	3.01	2.36	OK	0.00	896.06	896.06		
19		12+98.22	0.13	0.28	0.50		0.59	10.59	3.74	0.52										898.70	1.94
						0.14					89.05	12	0.440%	3.01	2.36	OK	0.00	895.59	895.59		
18		12+09.17	0.06	0.34	0.50		0.49	11.08	3.68	0.63										900.00	3.63
						0.17					77.78	12	0.440%	3.01	2.36	OK	0.00	895.20	895.20		
17		11+31.39	0.06	0.40	0.75		0.43	11.51	3.63	0.78										898.60	2.57
						0.22					107.87	12	0.440%	3.01	2.36	OK	0.00	894.86	894.86		
16		10+23.52	0.07	0.47	0.77		0.60	12.11	3.56	0.96										898.60	3.04
						0.27					73.74	12	0.440%	3.01	2.36	OK	0.00	894.39	894.39		
15		9+49.78	0.02	0.49	0.77		0.41	12.52	3.52	1.00										899.20	3.96
			0.00		0.90	0.28					80.16	12	0.460%	3.08	2.42	OK	0.00	894.07	894.07		
14		8+69.62	0.22	2.67	0.75		0.43	12.95	3.47	7.33										897.60	2.69
			1.96		0.85	2.12					78.90	18	0.550%	4.41	7.79	OK	0.50	893.20	893.70		
13		7+90.72	0.13	2.80	0.80		0.30	13.25	3.43	7.62										897.60	3.12
						2.22					78.00	18	0.550%	4.41	7.79	OK	0.00	892.77	892.77		
12		7+12.72	0.10	2.90	0.80		0.29	13.54	3.40	7.82										897.60	3.55
			0.00		0.80	2.30					61.27	18	0.750%	5.15	9.10	OK	0.00	892.34	892.34		
11		6+51.45	0.10	3.00	0.80		0.20	13.74	3.38	8.04										897.60	4.01
			0.00		0.90	2.38					46.56	18	1.270%	6.70	11.84	OK	0.00	891.88	891.88		
10		6+04.89	0.16	3.16	0.90		0.12	13.86	3.37	8.50										897.60	4.56
			0.00		0.85	2.52					107.59	24	0.280%	3.81	11.98	OK	0.50	890.79	891.29		
9		4+97.30	0.00	3.16	0.90		0.47	14.33	3.32	8.37										898.47	5.73
			0.00		0.85	2.52					68.29	24	0.280%	3.81	11.98	OK	0.00	890.49	890.49		
8		4+29.01	0.00	3.78	0.90		0.30	14.63	3.28	9.92										898.09	5.54
			0.62		0.80	3.02					103.93	24	0.320%	4.08	12.80	OK	0.00	890.30	890.30		
7		3+25.08	0.00	3.96	0.90		0.43	15.05	3.24	10.02										898.85	6.63
			0.18		0.40	3.09					198.86	24	0.320%	4.08	12.80	OK	1.10	888.87	889.97		
6		1+26.22	0.00	3.96	0.90		0.81	15.86	3.16	9.76										897.23	6.75
			0.00		0.90	3.09					69.38	24	0.320%	4.08	12.80	OK	2.00	886.23	888.23		
5		0+56.84	0.00	6.40	0.90		0.28	16.15	3.13	16.55										893.87	5.61
			2.44		0.90	5.29					56.84	30	0.200%	3.74	18.35	OK	2.40	883.61	886.01		

ADVANCED CIVIL DESIGN

2 Yr Design Storm n= **0.013**

Storm Sewer Design Sheet

Project: BRIGHT ROAD | Date: 10/24/2023
Job No.: 19-0039-39 | Revised:
By: JAP | Revised:
Revised:

Page: 2

Struc.	Struc. Index	Sta.	Drainage Area Trib	Cumul.	C	Cumul CA	Time Delta t Min.	Sum t Min.	Intensity in/hr	Des Q CFS	Length ft.	Dia. In	Slope%	Vel	Cap. Flowing Full	Status	Drop Default 0.1 or Match Tops	Out	In	TC	Cover
22		1+39.53	0.14	0.14	0.85		10.00	10.00	3.80	0.45										898.00	2.30
						0.12					54.00	12	0.900%	4.31	3.38	OK	0.00	894.53	894.53		
21		0+85.53	0.22	1.49	0.85		0.21	10.21	3.78	5.00										898.00	2.25
			1.13		0.90	1.32					85.53	18	0.900%	5.64	9.97	OK	0.00	894.04	894.04		
13		0+00.00																		897.60	2.62
												18					0.50	892.77	893.27		
23		0+70.18	0.08	0.82	0.40		10.00	10.00	3.80	2.65										899.20	4.77
			0.74		0.90	0.70					70.18	12	0.600%	3.52	2.76	OK	0.00	893.26	893.26		
12		0+00.00																		897.60	3.55
												18					0.50	892.34	892.84		
25		1+34.46	0.12	0.12	0.85		10.00	10.00	3.80	0.39										898.15	3.14
						0.10					85.82	12	1.000%	4.54	3.56	OK	0.00	893.84	893.84		
24		0+48.64	0.16	0.28	0.85		0.32	10.32	3.77	0.90										898.00	3.85
						0.24					48.64	12	1.000%	4.54	3.56	OK	0.00	892.98	892.98		
9		0+00.00																		898.47	4.81
												24					2.00	890.49	892.49		
26		0+30.13	0.62	0.62	0.80		10.00	10.00	3.80	1.89										898.70	4.11
			0.00		0.90	0.50					30.13	12	1.400%	5.37	4.22	OK	0.00	893.42	893.42		
8		0+00.00																		898.09	3.92
												24					2.70	890.30	893.00		
27		0+87.99	0.18	0.18	0.40		10.00	10.00	3.80	0.27										893.80	1.82
					0.90	0.07					87.99	12	0.500%	3.21	2.52	OK	0.00	890.81	890.81		
7		0+00.00																		898.85	7.31
												24					1.50	888.87	890.37		

ADVANCED CIVIL DESIGN

2 Yr Design Storm n= **0.013**

Storm Sewer Design Sheet

Project: BRIGHT ROAD | Date: 10/24/2023
Job No.: 19-0039-39 | Revised:
By: JAP | Revised:
Revised:

Page: 3

Struc.	Struc. Index	Sta.	Drainage Area Trib	Cumul.	C	Cumul CA	Time Delta t Min.	Sum t Min.	Intensity in/hr	Des Q CFS	Length ft.	Dia. In	Slope%	Vel	Cap. Flowing Full	Status	Drop Default 0.1 or Match Tops	Out	In	TC	Cover
31		2+44.67	0.12	0.12	0.85		10.00	10.00	3.80	0.39										898.20	3.09
						0.10					85.24	12	1.000%	4.54	3.56	OK	0.00	893.94	893.94		
30		1+59.43	0.13	0.25	0.85		0.31	10.31	3.77	0.80										898.10	3.84
			0.00		0.90	0.21					69.14	12	1.000%	4.54	3.56	OK	0.00	893.09	893.09		
29		0+90.29	0.11	0.36	0.85		0.25	10.57	3.74	1.14										898.00	4.43
			0.00		0.90	0.31					90.29	12	1.000%	4.54	3.56	OK	0.00	892.40	892.40		
28		0+00.00																		893.17	0.50
												12					0.00	891.50	891.50		
34		1+82.59	0.19	0.19	0.85		10.00	10.00	3.80	0.61										897.40	1.43
			0.00		0.90	0.16					61.35	12	0.440%	3.01	2.36	OK	0.00	894.80	894.80		
33		1+21.24	0.00	0.19	0.85		0.34	10.34	3.76	0.61										897.40	1.70
			0.00		0.90	0.16					121.24	12	0.440%	3.01	2.36	OK	0.00	894.53	894.53		
32		0+00.00																		895.67	0.50
												12					0.00	894.00	894.00		
40		2+75.65	0.12	0.12	0.85		10.00	10.00	3.80	0.39										897.80	1.38
			0.00		0.90	0.10					94.21	12	0.440%	3.01	2.36	OK	0.00	895.25	895.25		
39		1+81.44	0.12	0.24	0.85		0.52	10.52	3.74	0.76										899.00	2.99
			0.00		0.90	0.20					108.76	12	0.440%	3.01	2.36	OK	0.00	894.84	894.84		
38		0+72.68	0.19	0.43	0.85		0.60	11.12	3.67	1.34										897.70	2.17
			0.00		0.90	0.37					50.23	12	0.510%	3.24	2.55	OK	0.00	894.36	894.36		
37		0+22.45	0.00	0.43	0.85		0.26	11.38	3.64	1.33										899.00	3.73
			0.00		0.90	0.37					22.45	12	0.440%	3.01	2.36	OK	0.00	894.10	894.10		
36		0+00.00																		895.67	0.50
												12					0.00	894.00	894.00		

ADVANCED CIVIL DESIGN

2 Yr Design Storm n= **0.013**

Storm Sewer Design Sheet

Project: BRIGHT ROAD | Date: 5/10/2022
Job No.: 19-0039-39 | Revised:
By: JAP | Revised:
Revised:

Page: 2

Struc.	Struc. Index	Sta.	Drainage Area Trib	Cumul.	C	Cumul CA	Time Delta t Min.	Sum t Min.	Intensity in/hr	Des Q CFS	Length ft.	Dia. In	Slope%	Vel	Cap. Flowing Full	Status	Drop Default 0.1 or Match Tops	Out	In	TC	Cover
50		2+64.23	0.10	0.10	0.85		10.00	10.00	3.80	0.32										888.80	1.17
						0.09					88.67	12	1.000%	4.54	3.56	OK	0.00	886.46	886.46		
49		1+75.56	0.00	1.96	0.85		0.33	10.33	3.77	5.57										889.40	2.58
			1.86		0.75	1.48					53.48	24	0.260%	3.67	11.54	OK	1.00	884.57	885.57		
48		1+22.08	0.19	2.15	0.85		0.24	10.57	3.74	6.14										888.80	2.12
			0.00		0.90	1.64					54.29	24	0.260%	3.67	11.54	OK	0.00	884.43	884.43		
47		0+67.79	0.29	2.44	0.85		0.25	10.81	3.71	7.00										891.10	4.56
			0.00		0.90	1.89					67.79	24	0.260%	3.67	11.54	OK	0.00	884.29	884.29		
5		0+00.00																		894.40	8.04
												24					0.00	884.11	884.11		
35		0+90.50	0.29	0.29	0.85		10.00	10.00	3.80	0.94										897.50	3.08
			0.00		0.90	0.25					90.50	12	1.000%	4.54	3.56	OK	0.00	893.25	893.25		
10		0+00.00																		897.60	4.09
												24					0.00	884.11	892.35		
42		0+47.08	0.16	0.16	0.85		10.00	10.00	3.80	0.52										897.10	1.46
			0.00		0.90	0.14					47.08	12	1.000%	4.54	3.56	OK	0.00	894.47	894.47		
41		0+00.00																		897.60	2.43
												12					0.00	894.00	894.00		

APPENDIX H

SOILS REPORT

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Franklin County, Ohio

May 11, 2020

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map

Map Scale: 1:3,520 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 150 300 600 900

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 17N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Franklin County, Ohio
Survey Area Data: Version 18, Sep 16, 2019

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Aug 4, 2014—Aug 27, 2014

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
CeB	Celina silt loam, 2 to 6 percent slopes	12.2	46.7%
CrA	Crosby silt loam, Southern Ohio Till Plain, 0 to 2 percent slopes	0.3	1.3%
CrB	Crosby silt loam, Southern Ohio Till Plain, 2 to 6 percent slopes	3.9	15.0%
Ko	Kokomo silty clay loam, 0 to 2 percent slopes	0.8	3.0%
MIC2	Miamian silty clay loam, 6 to 12 percent slopes, eroded	8.9	34.0%
Totals for Area of Interest		**26.1**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it

was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Franklin County, Ohio

CeB—Celina silt loam, 2 to 6 percent slopes

Map Unit Setting

National map unit symbol: 2rwj9
Elevation: 820 to 1,180 feet
Mean annual precipitation: 37 to 46 inches
Mean annual air temperature: 48 to 55 degrees F
Frost-free period: 145 to 180 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Celina and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Celina

Setting

Landform: Till plains
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Crest
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loess derived from quartzite over loamy till derived from limestone and dolomite

Typical profile

Ap - 0 to 9 inches: silt loam
2Bt - 9 to 38 inches: clay loam
2Cd - 38 to 79 inches: loam

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: 24 to 40 inches to densic material
Natural drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Low to moderately low (0.01 to 0.06 in/hr)
Depth to water table: About 12 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 45 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Moderate (about 6.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C/D
Hydric soil rating: No

Minor Components

Brookston

Percent of map unit: 5 percent
Landform: Depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Dip
Down-slope shape: Linear
Across-slope shape: Concave
Hydric soil rating: Yes

Crosby

Percent of map unit: 5 percent
Landform: Till plains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Kokomo

Percent of map unit: 5 percent
Landform: Depressions on till plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

CrA—Crosby silt loam, Southern Ohio Till Plain, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2thy7
Elevation: 520 to 1,550 feet
Mean annual precipitation: 36 to 44 inches
Mean annual air temperature: 48 to 54 degrees F
Frost-free period: 145 to 180 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Crosby and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Crosby

Setting

Landform: Ground moraines, water-lain moraines, recessionial moraines
Landform position (two-dimensional): Summit, backslope, footslope
Landform position (three-dimensional): Interfluve, rise

Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Silty material or loess over loamy till

Typical profile

Ap - 0 to 8 inches: silt loam
BE - 8 to 11 inches: silt loam
Bt1 - 11 to 14 inches: silt loam
2Bt2 - 14 to 28 inches: silty clay loam
2BCt - 28 to 36 inches: loam
2Cd - 36 to 79 inches: loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: 24 to 40 inches to densic material
Natural drainage class: Somewhat poorly drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Low to moderately high (0.01 to 0.20 in/hr)
Depth to water table: About 6 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 50 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Low (about 5.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C/D
Hydric soil rating: No

Minor Components

Kokomo, drained

Percent of map unit: 5 percent
Landform: Swales, depressions, water-lain moraines
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Base slope, dip
Down-slope shape: Linear
Across-slope shape: Concave
Hydric soil rating: Yes

Celina, eroded

Percent of map unit: 4 percent
Landform: Ground moraines, recessionial moraines, water-lain moraines
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Crest, head slope, nose slope, side slope, rise
Down-slope shape: Convex, linear
Across-slope shape: Linear, convex
Hydric soil rating: No

Miamian, eroded

Percent of map unit: 1 percent
Landform: Ground moraines, recessionial moraines, water-lain moraines

Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Crest, head slope, nose slope, side slope, rise
Down-slope shape: Convex, linear
Across-slope shape: Linear, convex
Hydric soil rating: No

CrB—Crosby silt loam, Southern Ohio Till Plain, 2 to 6 percent slopes

Map Unit Setting

National map unit symbol: 2thy8
Elevation: 520 to 1,550 feet
Mean annual precipitation: 36 to 44 inches
Mean annual air temperature: 48 to 54 degrees F
Frost-free period: 145 to 180 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Crosby and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Crosby

Setting

Landform: Ground moraines, recessionial moraines, water-lain moraines
Landform position (two-dimensional): Summit, backslope, footslope
Landform position (three-dimensional): Interfluve, rise
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Silty material or loess over loamy till

Typical profile

Ap - 0 to 8 inches: silt loam
BE - 8 to 11 inches: silt loam
Bt1 - 11 to 14 inches: silt loam
2Bt2 - 14 to 28 inches: silty clay loam
2BCt - 28 to 36 inches: loam
2Cd - 36 to 79 inches: loam

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: 24 to 40 inches to densic material
Natural drainage class: Somewhat poorly drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Low to moderately high (0.01 to 0.20 in/hr)
Depth to water table: About 6 to 24 inches
Frequency of flooding: None
Frequency of ponding: None

Calcium carbonate, maximum in profile: 50 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Low (about 5.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C/D
Hydric soil rating: No

Minor Components

Kokomo, drained

Percent of map unit: 5 percent
Landform: Swales, depressions, water-lain moraines
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Base slope, dip
Down-slope shape: Linear
Across-slope shape: Concave
Hydric soil rating: Yes

Celina, eroded

Percent of map unit: 3 percent
Landform: Ground moraines, recessionial moraines, water-lain moraines
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Crest, head slope, nose slope, side slope, rise
Down-slope shape: Convex, linear
Across-slope shape: Linear, convex
Hydric soil rating: No

Lewisburg

Percent of map unit: 1 percent
Landform: Ground moraines, recessionial moraines, water-lain moraines
Landform position (two-dimensional): Summit, backslope, footslope
Landform position (three-dimensional): Interfluve, rise
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Miamian, eroded

Percent of map unit: 1 percent
Landform: Ground moraines, recessionial moraines, water-lain moraines
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Crest, head slope, nose slope, side slope, rise
Down-slope shape: Convex, linear
Across-slope shape: Linear, convex
Hydric soil rating: No

Ko—Kokomo silty clay loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2rwj8
Elevation: 820 to 1,140 feet
Mean annual precipitation: 37 to 46 inches
Mean annual air temperature: 48 to 55 degrees F
Frost-free period: 145 to 180 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Kokomo and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Kokomo

Setting

Landform: Depressions on till plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Loamy glaciofluvial deposits derived from sedimentary rock over loamy till derived from limestone and dolomite

Typical profile

Ap - 0 to 11 inches: silty clay loam
Btg - 11 to 41 inches: clay loam
Bt - 41 to 64 inches: clay loam
2C - 64 to 79 inches: loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Calcium carbonate, maximum in profile: 35 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: High (about 9.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w

Hydrologic Soil Group: C/D
Hydric soil rating: Yes

Minor Components

Celina

Percent of map unit: 5 percent
Landform: Till plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Rise
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Crosby

Percent of map unit: 5 percent
Landform: Till plains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

MIC2—Miamian silty clay loam, 6 to 12 percent slopes, eroded

Map Unit Setting

National map unit symbol: 5mqm
Elevation: 700 to 1,530 feet
Mean annual precipitation: 35 to 45 inches
Mean annual air temperature: 50 to 55 degrees F
Frost-free period: 151 to 180 days
Farmland classification: Not prime farmland

Map Unit Composition

Miamian and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Miamian

Setting

Landform: Till plains
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Nose slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy till

Typical profile

H1 - 0 to 9 inches: silty clay loam
H2 - 9 to 36 inches: clay loam

H3 - 36 to 70 inches: loam

Properties and qualities

Slope: 6 to 12 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 45 percent
Available water storage in profile: Moderate (about 7.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Forage suitability group: Unnamed (G111BYA-1OH)
Hydric soil rating: No

Minor Components

Crosby

Percent of map unit: 5 percent
Landform: Till plains
Down-slope shape: Linear
Across-slope shape: Convex

Kokomo

Percent of map unit: 5 percent
Landform: Drainageways
Hydric soil rating: Yes

References

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

National Research Council. 1995. Wetlands: Characteristics and boundaries.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577

Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580

Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374

United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf