Periodic Run-on and Run-off Control System Plan

Range Road Landfill

China Township, Michigan
Belle River Power Plant

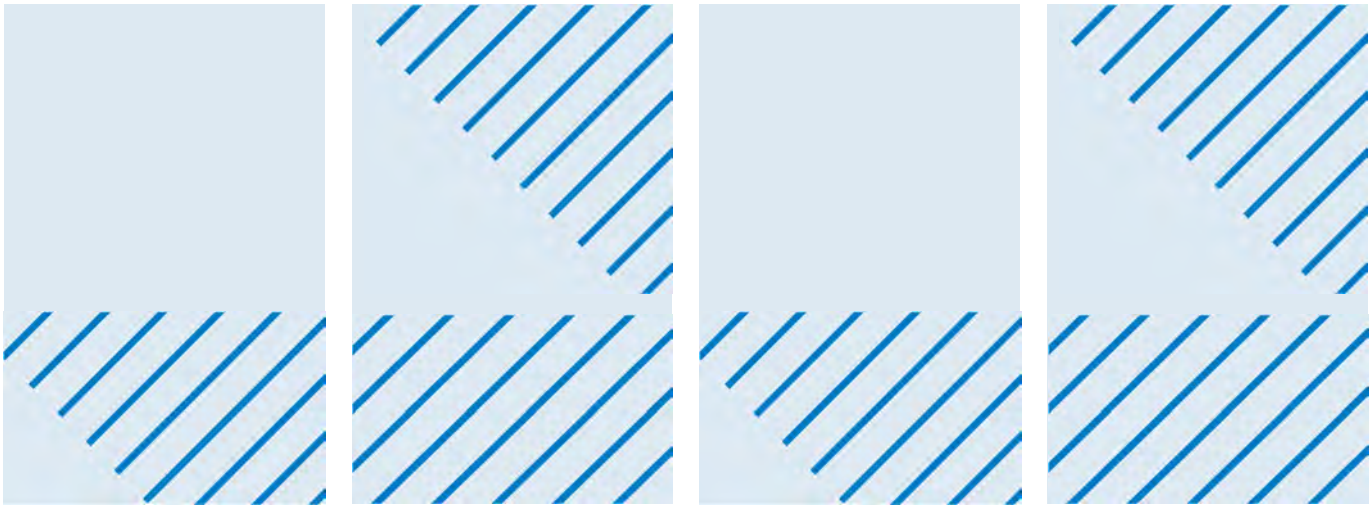
Prepared for
DTE Electric Company

Prepared by
Barr Engineering Michigan LLC

October 2026

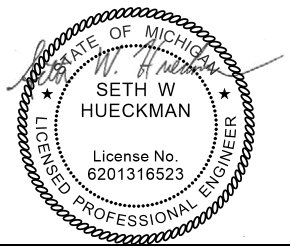
1000 Oakbrook Drive, Suite 100
Ann Arbor, MI 48104
734.922.4400

barr.com



Certification

I hereby certify that I have examined the facility and, being familiar with the provisions of 40 CFR 257 Subpart D, attest that this Coal Combustion Residuals landfill run-on and run-off control system plan has been prepared in accordance with good engineering practice, including consideration of applicable industry standards and the requirements of 40 CFR § 257.81. I certify that the plan is adequate for this facility and that procedures for recordkeeping and reporting have been established.



Seth W. Hueckman
Michigan PE #: 6201316523

10/15/2026
Date

1 Introduction

DTE Electric Company (DTE Electric) owns and operates an existing coal combustion residuals (CCR) landfill in China Township, St. Clair County, Michigan. The disposal facility is referred to as the Range Road Landfill (RRLF) and currently accepts bottom ash and fly ash generated by plant operations at Belle River Power Plant, and previously accepted bottom ash and fly ash generated at St. Clair Power Plant and Harbor Beach Power Plant prior to their retirement. This plan serves as the second five-year update to the initial plan. The most recent periodic revision was prepared by AECOM and issued on October 15, 2021. The CCR disposal facility consists of a 447 acre landfill located on 514 acres of property approximately one mile west of the St. Clair River.

CCR management is subject to Federal Standards for the Disposal of Coal Combustion Residuals in Landfills and Surface Impoundments per 40 CFR 257 Subpart D, § 257.81 of the U.S. Environmental Protection Agency (EPA) CCR Rule. This disposal facility is an existing landfill currently operating under a license approved by the Michigan Department of Environment, Great Lakes, and Energy (EGLE). The operating license was granted in accordance with Part 115 of the Natural Resources and Protection Act of 1994, as amended, which adopts § 257.81 by reference. Accordingly, run-on and run-off control system requirements for the disposal facility must meet or exceed those of the CCR Rule. This CCR run-on and run-off control system plan has been developed to satisfy the requirements described in 40 CFR § 257.81, run-on and run-off controls for CCR landfills, as they apply to DTE's RRLF.

The RRLF has been used for disposal of CCR since the 1950's. Development of the landfill has been sequential, with phased lateral expansions and partial final and temporary closures throughout its operation. The 447 acres that comprise the RRLF include 227 acres that have been closed, 173 acres of unconstructed, and 47 acres of that are active and receive waste. The entire landfill is surrounded by perimeter ditches to control stormwater run-off and direct it to the sedimentation pond southeast of the landfill. Water collected in the sedimentation pond is managed via pumps and transferred to a series of ditches and basins that ultimately discharge off-site in accordance with the Belle River Power Plant National Pollutant Discharge Elimination System (NPDES) permit (Permit Number - MI0038172).

2 Objectives

Per 40 CFR § 257.81, the owner of an existing CCR landfill is required to design, construct, operate, and maintain a run-on and run-off control system. To fulfill these objectives, the run-on and run-off control system plan must:

- provide documentation that the run-on control system adequately manages flow onto the active portion of the CCR unit during and following the peak discharge from a 25-year, 24-hour storm;
- provide documentation that the run-off control system adequately collects and controls at least the water volume from a 25-year, 24-hour storm;
- provide documentation that run-off from the active portion of the CCR landfill is handled in accordance with § 257.3-3;
- define recordkeeping requirements;
- define reporting requirements; and
- include a certification from a qualified professional engineer.

3 Run-on Control System

The purpose of a run-on control system is to prevent surface water from offsite areas flowing onto the active landfill area. The design of the landfill final cover system includes grading the finished surface at a minimum 1% slope to shed stormwater flows. Areas of the landfill that have been closed with final or temporary cover also utilize diversion berms to direct water away from active portions of the landfill and towards the perimeter ditch system. Areas outside the landfill generally drain away from the perimeter ditch system to minimize additional run-on into the ditches and sedimentation pond. The perimeter ditches and sedimentation pond are shown on Figure 1.

4 Run-off Control System

The purpose of a run-off control system is to prevent water that has come into contact with CCR from draining offsite uncontrolled. Run-off from active portions of the RRLF is contained by the perimeter ditches and routed to the sedimentation pond. The perimeter ditches were constructed with 3:1 (H:V) side slopes and a minimum slope of 0.1%. The ditches have been vegetated and areas of increased flow armored with riprap or other erosion control devices. The ditches serve as the run-off control system of the active portion and also collect run-off from most of the closed/undeveloped areas of the RRLF. Accumulated water within the sedimentation pond is discharged in accordance with the requirements of the NPDES permit (MI0038172).

5 Hydrologic and Hydraulic Model Results

Because the run-on and run-off control systems are routed to the same sedimentation pond via the same perimeter ditch system, a single model was developed to analyze the site hydrology and hydraulics. The model was developed using HydroCAD Version 10.20-9a and was utilized to estimate effects of the design storm event. The model created in the last periodic update to the run-on and run-off control system plan for the RRLF was utilized as the basis for the model developed for this periodic update. Updates were made to the watersheds modeled to reflect existing conditions and simplify the model.

All watersheds within the constructed (active and closed) areas of the landfill convey run-off into the perimeter ditches which is routed to the existing sedimentation pond. Figure 1 outlines the identified watersheds and flow directions of the perimeter ditches. Stormwater runoff settles within the sedimentation pond and as discussed ultimately discharges through the NPDES outfall in accordance with requirements of the NPDES Permit (MI0038172).

The sedimentation pond has an area of approximately 10 acres and a crest elevation of 590 feet. The existing water surface elevation was assumed to be 579 feet (normal water elevation) for the starting point of the model. The peak water surface elevation within the sedimentation pond produced from the 25-year, 24-hour storm is approximately 587.5 feet, resulting in over 2 feet of freeboard. Therefore, the sedimentation pond was found to adequately contain the 25-year, 24-hour storm event without overtopping and the run-on/run-off control systems are sufficient. The resulting output from this model can be found in Appendix A.

6 Recordkeeping and Reporting

According to 40 CFR § 257.81(c)(2), DTE Electric will amend the written run-on and run-off control system plan whenever there is a change in conditions that would substantially affect the written plan. Additionally, DTE Electric will prepare periodic updates to the plan every five years (minimum).

DTE Electric will maintain a copy of the most recent version of the run-on and run-off control system plan in the facility's operating record in accordance with 40 CFR § 257.105, Recordkeeping Requirements, and the plan will be made publicly available on the DTE Electric CCR web site in compliance with 40 CFR § 257.107, Publicly Accessible Internet Site Requirements. Notification will be sent to State Director in compliance with 40 CFR § 257.106, Notification Requirements.

7 Conclusion

This run-on and run-off control system plan meets the requirements of 40 CFR § 257.81 by:

- providing documentation that the run-on control system adequately manages flow onto the active portion of the CCR unit during and following the peak discharge from a 25-year, 24-hour storm;
- providing documentation that the run-off control system adequately collects and controls at least the water volume from a 25-year, 24-hour storm;
- providing documentation that run-off from the active portion of the CCR landfill is handled in accordance with § 257.3-3 via NPDES permit MI0038172;
- defining recordkeeping and reporting requirements; and
- being certified by a qualified professional engineer.

This plan will continue to be maintained and implemented by DTE Electric per the requirements outlined and cited herein.

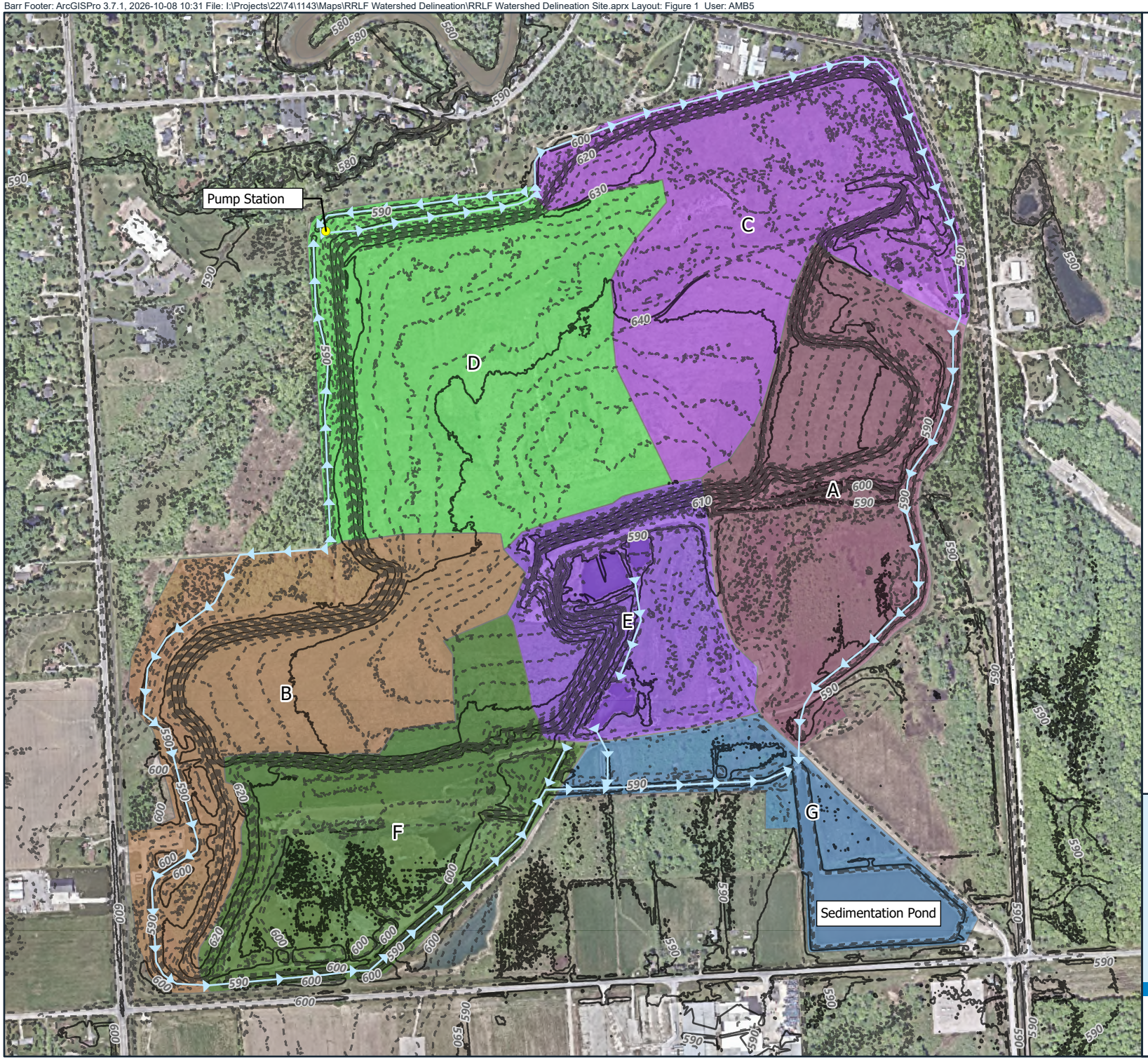
8 References

AECOM October 2021, Run-on/Run-off Control System Plan: Coal Combustion Residuals (CCR) Disposal Facility, October 15, 2021.

NOAA Atlas 14 Point Precipitation Frequency Estimates: Michigan. National Weather Service. https://hdsc.nws.noaa.gov/hdsc/pfds/pfds_map_cont.html?bkmrk=mi

Figures

Barr Footer: ArcGISPro 3.7.1, 2026-10-08 10:31 File: I:\Projects\22\74\1143\Maps\RRLF Watershed Delineation\RRLF Watershed Delineation Site.aprx Layout: Figure 1 User: AMB5



Pump Station

Perimeter Ditch/Stormwater Routing

10 Foot Contour

2 Foot Contour

Watershed ID - Acres (ac)

- A (65 ac)
- B (70 ac)
- C (77 ac)
- D (85 ac)
- E (39 ac)
- F (59 ac)
- G (28 ac)

Notes:

1. Contours were developed from publicly available LiDAR data acquired by Barr in October 2026 and are referenced to the North American Datum of 1983 (NAD 83).

N

0 400 800

Feet

Imagery: NearMap 05/26/2026

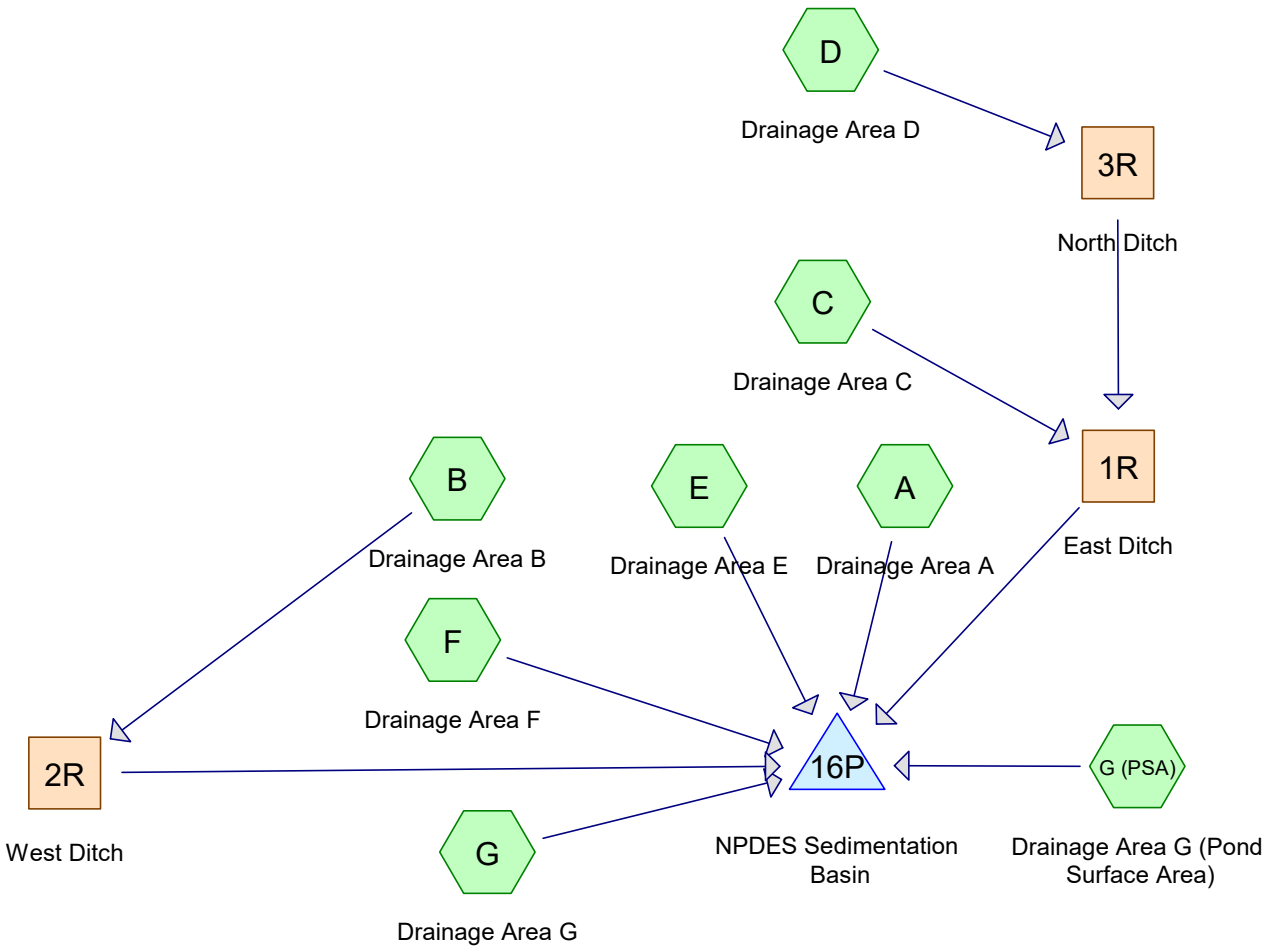
RRLF Watershed Delineation

St. Clair County, Michigan

FIGURE 1

BARR

Appendix A – HydroCAD Model



Subcat Reach Pond Link

Routing Diagram for 2026 Model_updated
Prepared by Barr Engineering, Printed 10/12/2026
HydroCAD® 10.20-9a s/n 00604 © 2026 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
47.000	90	Active landfill area (F)
33.700	70	Brush and trees (A, B, C, D, E)
210.500	85	Closed landfill areas (A, B, C, D, E, F)
8.000	98	Pond surface (G (PSA))
9.900	98	Roads and misc. impervious (A, B, C, D, F)
11.000	98	Roads, water surface, and misc. impervious (E, G)
103.400	80	Unconstructed areas (A, B, C, D, E, G)
423.500	**84**	**TOTAL AREA**

Summary for Subcatchment A: Drainage Area A

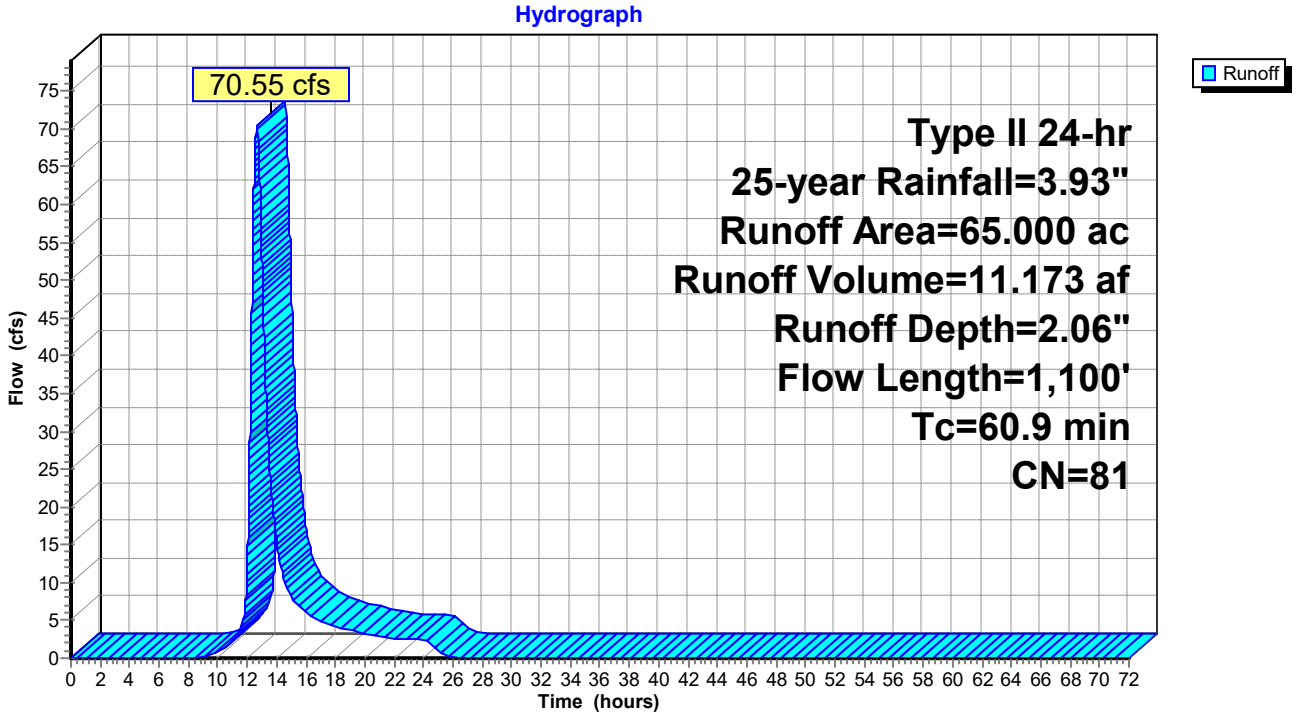
Runoff = 70.55 cfs @ 12.65 hrs, Volume= 11.173 af, Depth= 2.06"
Routed to Pond 16P : NPDES Sedimentation Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 25-year Rainfall=3.93"

	Area (ac)	CN	Description
*	21.100	85	Closed landfill areas
*	3.600	98	Roads and misc. impervious
*	9.000	70	Brush and trees
*	31.300	80	Unconstructed areas
	65.000	81	Weighted Average
	61.400		94.46% Pervious Area
	3.600		5.54% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
30.6	200	0.0500	0.11		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.30"
30.3	900	0.0050	0.49		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
60.9	1,100	Total			

Subcatchment A: Drainage Area A



Summary for Subcatchment B: Drainage Area B

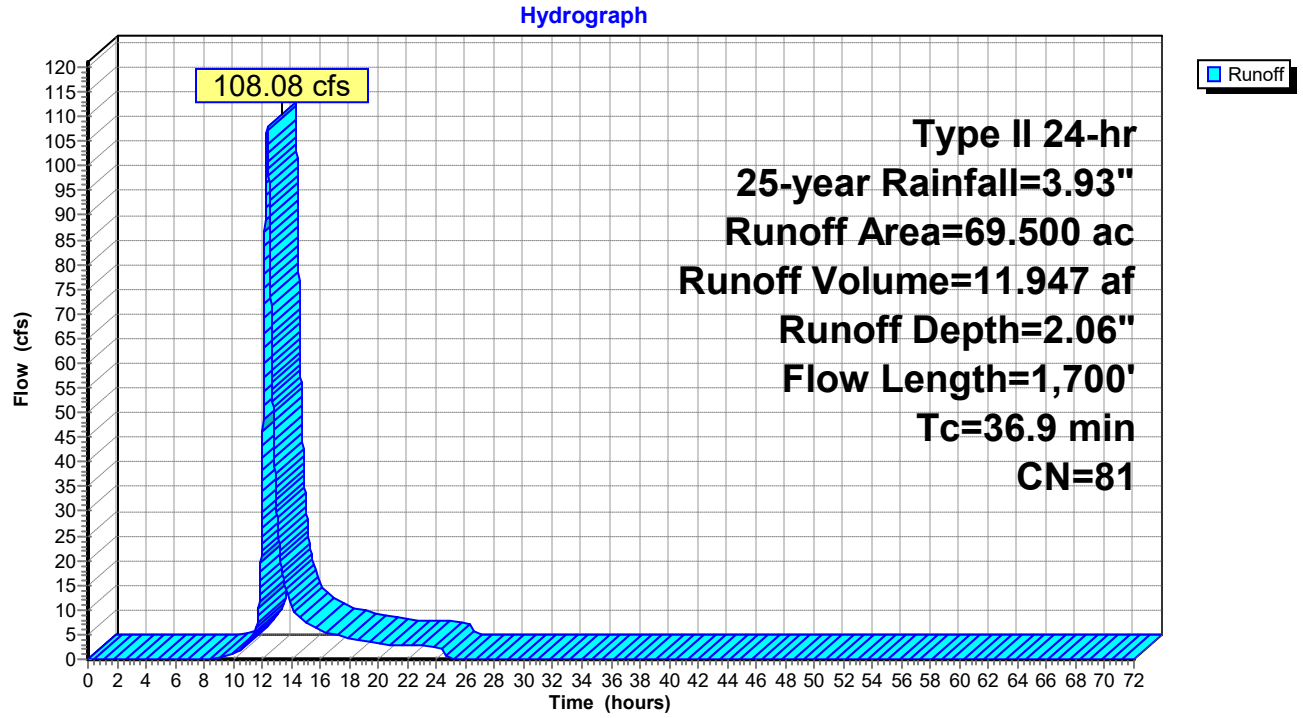
Runoff = 108.08 cfs @ 12.34 hrs, Volume= 11.947 af, Depth= 2.06"
Routed to Reach 2R : West Ditch

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 25-year Rainfall=3.93"

	Area (ac)	CN	Description
*	1.200	98	Roads and misc. impervious
*	33.800	85	Closed landfill areas
*	9.700	70	Brush and trees
*	24.800	80	Unconstructed areas
	69.500	81	Weighted Average
	68.300		98.27% Pervious Area
	1.200		1.73% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.8	200	0.0100	0.70		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
31.0	1,300	0.0100	0.70		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
1.1	200	0.2000	3.13		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
36.9	1,700	Total			

Subcatchment B: Drainage Area B



Summary for Subcatchment C: Drainage Area C

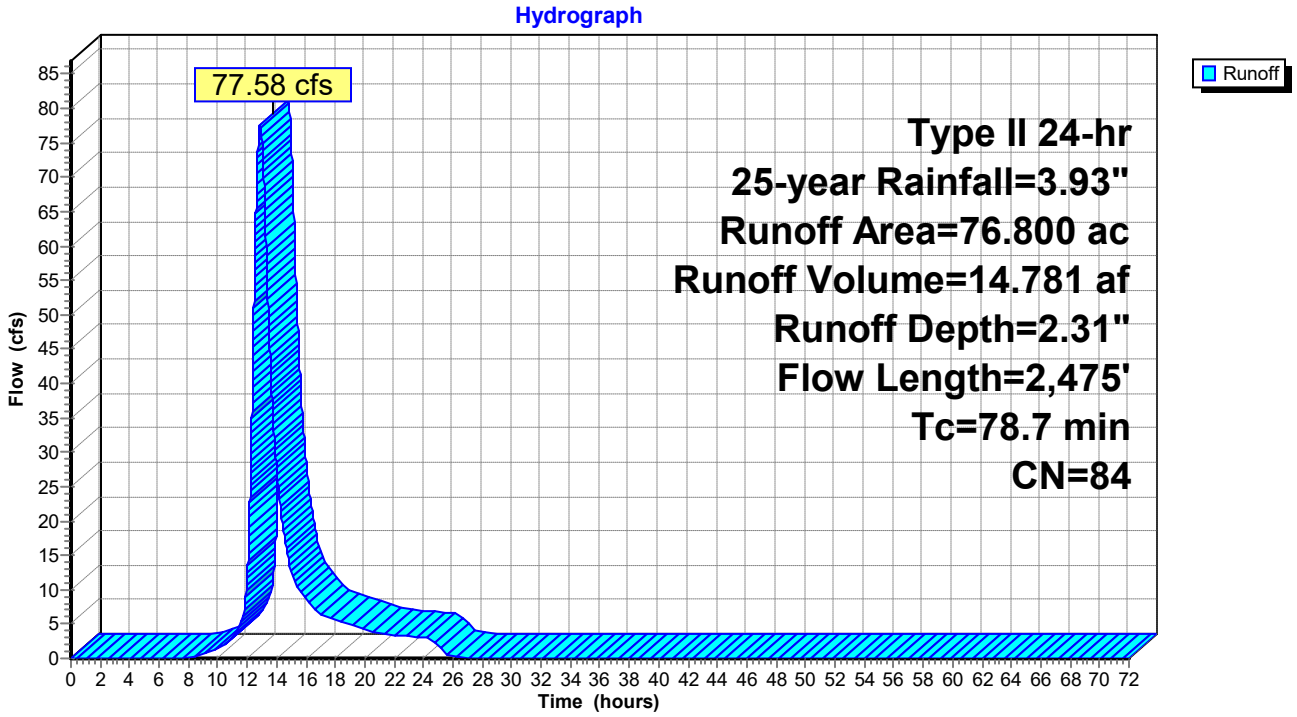
Runoff = 77.58 cfs @ 12.86 hrs, Volume= 14.781 af, Depth= 2.31"
Routed to Reach 1R : East Ditch

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 25-year Rainfall=3.93"

	Area (ac)	CN	Description
*	2.200	98	Roads and misc. impervious
*	60.800	85	Closed landfill areas
*	8.600	80	Unconstructed areas
*	5.200	70	Brush and trees
	76.800	84	Weighted Average
	74.600		97.14% Pervious Area
	2.200		2.86% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.6	200	0.0100	0.13		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.30"
32.1	1,350	0.0100	0.70		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.4	100	0.3300	4.02		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
19.6	825	0.0100	0.70		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
78.7	2,475	Total			

Subcatchment C: Drainage Area C



Summary for Subcatchment D: Drainage Area D

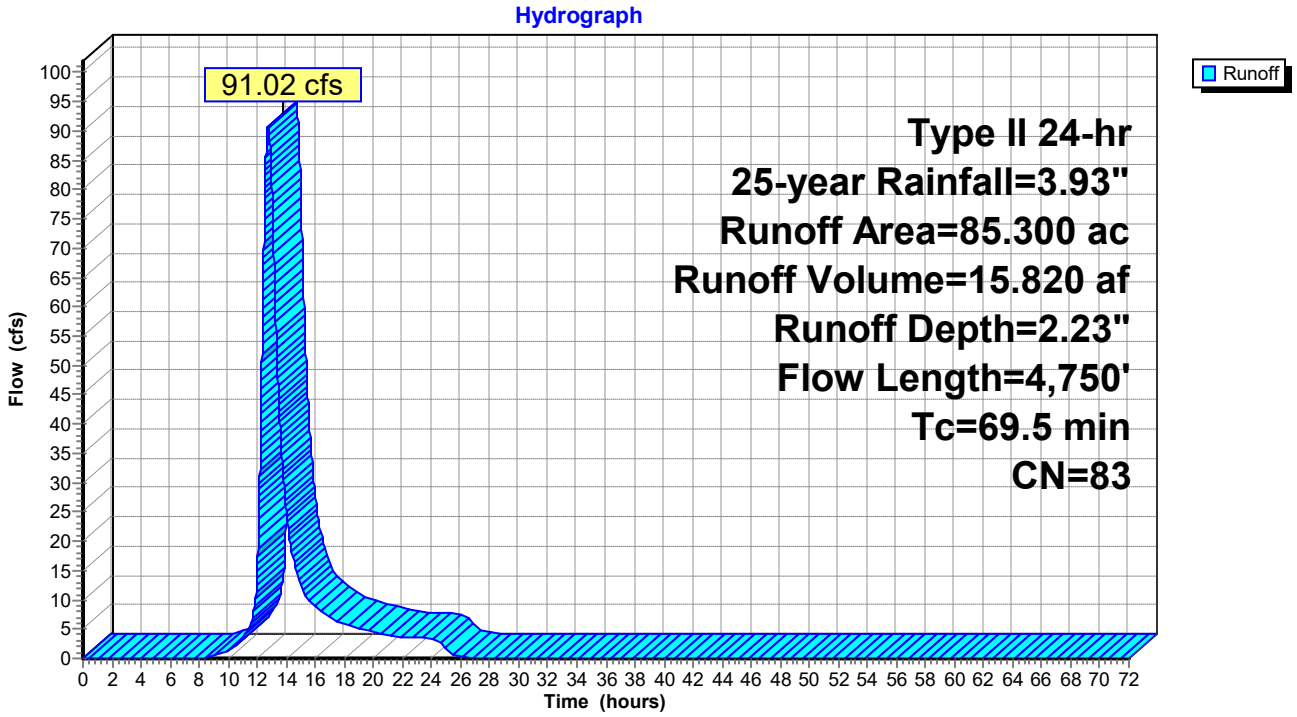
Runoff = 91.02 cfs @ 12.74 hrs, Volume= 15.820 af, Depth= 2.23"
Routed to Reach 3R : North Ditch

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 25-year Rainfall=3.93"

	Area (ac)	CN	Description
*	69.200	85	Closed landfill areas
*	0.900	98	Roads and misc. impervious
*	6.400	70	Brush and trees
*	8.800	80	Unconstructed areas
	85.300	83	Weighted Average
	84.400		98.94% Pervious Area
	0.900		1.06% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.6	200	0.0100	0.13		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.30"
36.9	1,550	0.0100	0.70		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.4	100	0.3000	3.83		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
3.3	1,700	0.0100	8.66	381.25	**Channel Flow,** Area= 44.0 sf Perim= 25.0' r= 1.76' n= 0.025 Earth, clean & winding
2.3	1,200	0.0100	8.66	381.25	**Channel Flow,** Area= 44.0 sf Perim= 25.0' r= 1.76' n= 0.025 Earth, clean & winding
69.5	4,750	Total			

Subcatchment D: Drainage Area D



Summary for Subcatchment E: Drainage Area E

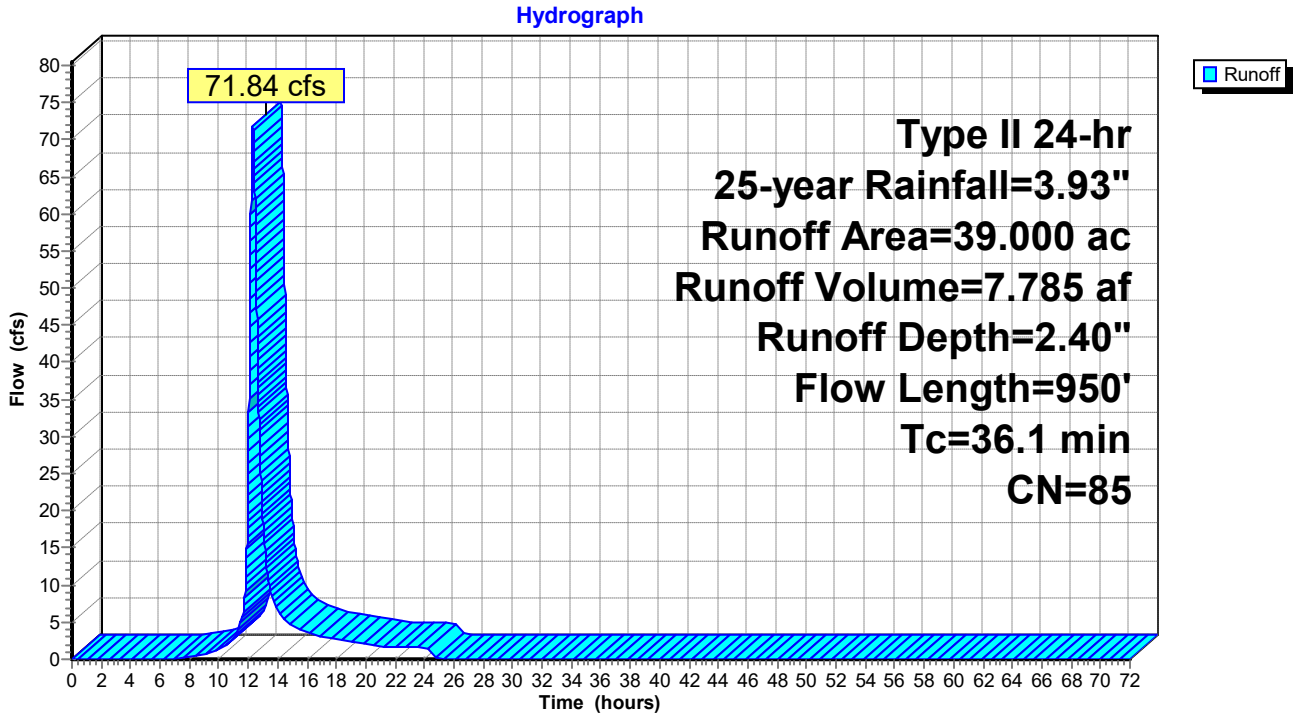
Runoff = 71.84 cfs @ 12.31 hrs, Volume= 7.785 af, Depth= 2.40"
Routed to Pond 16P : NPDES Sedimentation Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 25-year Rainfall=3.93"

	Area (ac)	CN	Description
*	9.500	98	Roads, water surface, and misc. impervious
*	3.400	70	Brush and trees
*	10.900	80	Unconstructed areas
*	15.200	85	Closed landfill areas
	39.000	85	Weighted Average
	29.500		75.64% Pervious Area
	9.500		24.36% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.6	200	0.0100	0.13		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.30"
6.8	350	0.0150	0.86		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
2.7	400	0.1250	2.47		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
36.1	950	Total			

Subcatchment E: Drainage Area E



Summary for Subcatchment F: Drainage Area F

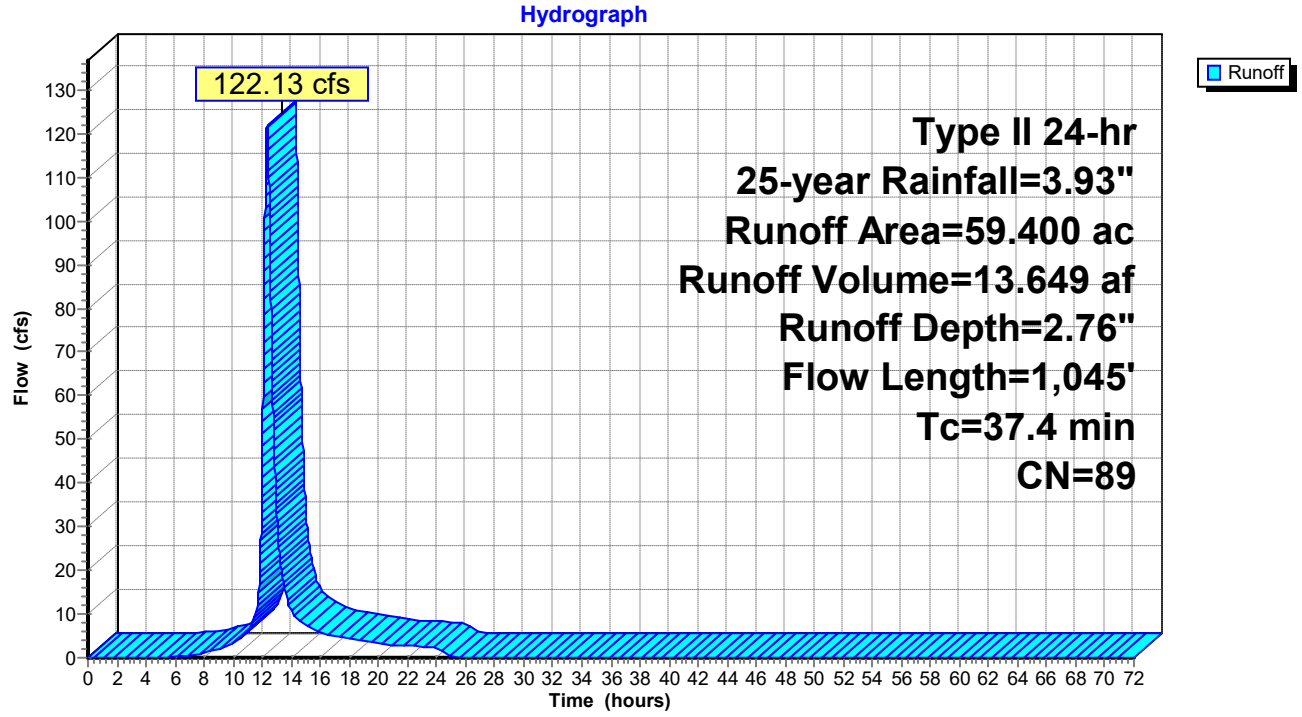
Runoff = 122.13 cfs @ 12.34 hrs, Volume= 13.649 af, Depth= 2.76"
Routed to Pond 16P : NPDES Sedimentation Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 25-year Rainfall=3.93"

	Area (ac)	CN	Description
*	47.000	90	Active landfill area
*	2.000	98	Roads and misc. impervious
*	10.400	85	Closed landfill areas
	59.400	89	Weighted Average
	57.400		96.63% Pervious Area
	2.000		3.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.6	200	0.0100	0.13		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.30"
9.2	475	0.0150	0.86		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
1.6	370	0.1400	3.74		**Shallow Concentrated Flow,** Nearly Bare & Untilled Kv= 10.0 fps
37.4	1,045	Total			

Subcatchment F: Drainage Area F



Summary for Subcatchment G: Drainage Area G

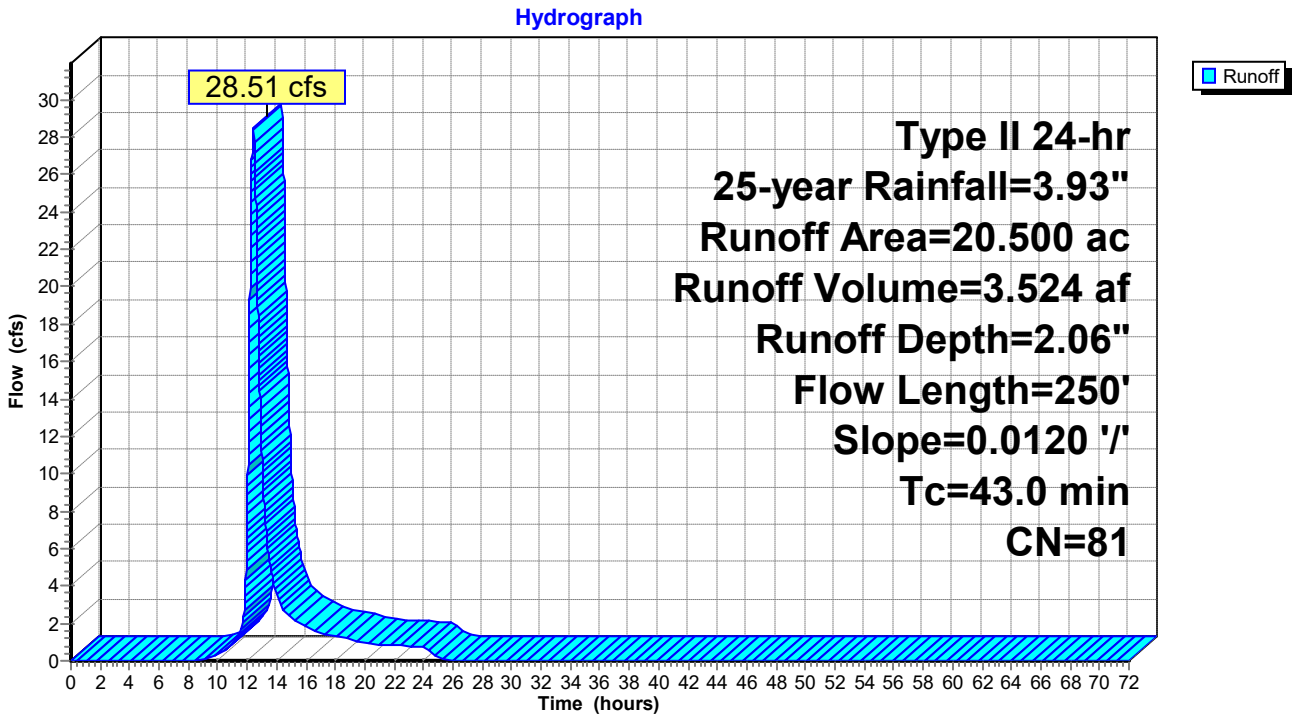
Runoff = 28.51 cfs @ 12.41 hrs, Volume= 3.524 af, Depth= 2.06"
Routed to Pond 16P : NPDES Sedimentation Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 25-year Rainfall=3.93"

	Area (ac)	CN	Description
*	1.500	98	Roads, water surface, and misc. impervious
*	19.000	80	Unconstructed areas
	20.500	81	Weighted Average
	19.000		92.68% Pervious Area
	1.500		7.32% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
43.0	250	0.0120	0.10		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.30"

Subcatchment G: Drainage Area G



Summary for Subcatchment G (PSA): Drainage Area G (Pond Surface Area)

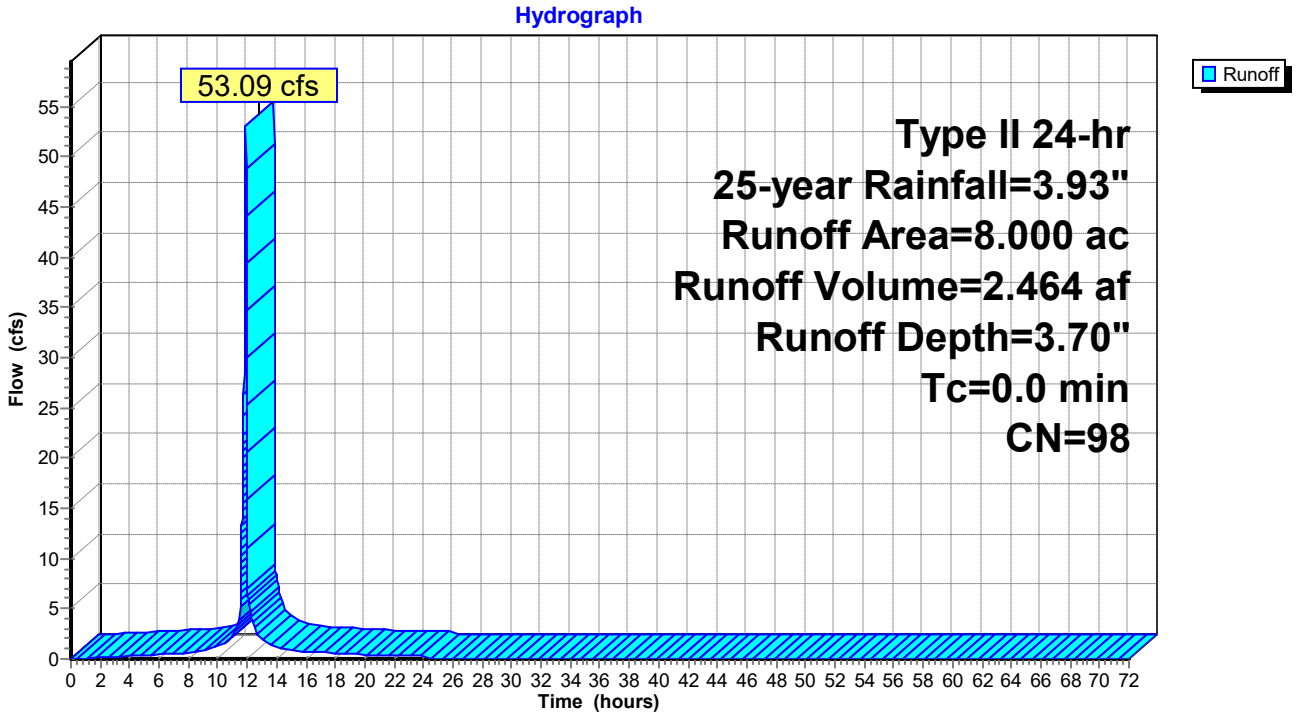
Runoff = 53.09 cfs @ 11.90 hrs, Volume= 2.464 af, Depth= 3.70"
Routed to Pond 16P : NPDES Sedimentation Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 25-year Rainfall=3.93"

	Area (ac)	CN	Description
*	8.000	98	Pond surface
	8.000		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.0					**Direct Entry, direct fall into pond**

Subcatchment G (PSA): Drainage Area G (Pond Surface Area)



Summary for Reach 1R: East Ditch

Inflow Area = 162.100 ac, 1.91% Impervious, Inflow Depth = 2.27" for 25-year event
Inflow = 156.95 cfs @ 12.94 hrs, Volume= 30.601 af
Outflow = 151.34 cfs @ 13.09 hrs, Volume= 30.601 af, Atten= 4%, Lag= 8.7 min
Routed to Pond 16P : NPDES Sedimentation Basin

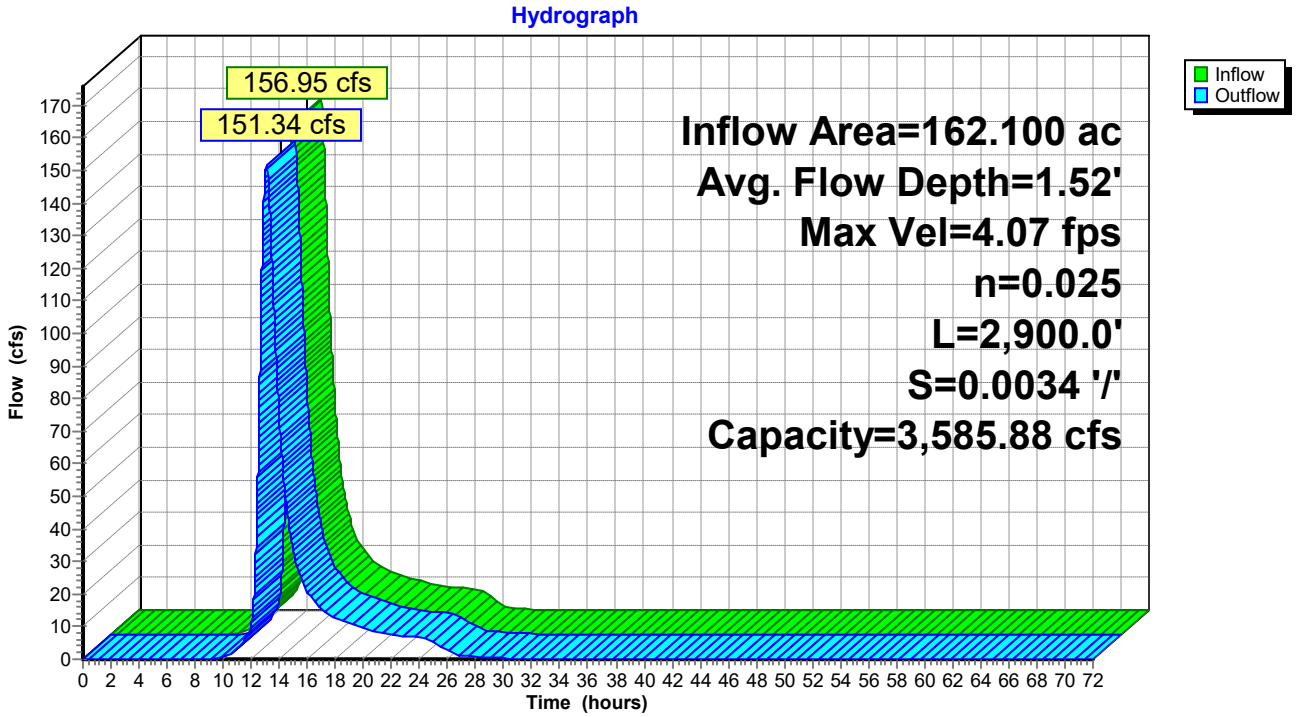
Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Max. Velocity= 4.07 fps, Min. Travel Time= 11.9 min
Avg. Velocity = 1.10 fps, Avg. Travel Time= 43.9 min

Peak Storage= 107,914 cf @ 13.09 hrs
Average Depth at Peak Storage= 1.52' , Surface Width= 29.10'
Bank-Full Depth= 8.00' Flow Area= 352.0 sf, Capacity= 3,585.88 cfs

20.00' x 8.00' deep channel, n= 0.025 Earth, clean & winding
Side Slope Z-value= 3.0 '/' Top Width= 68.00'
Length= 2,900.0' Slope= 0.0034 '/'
Inlet Invert= 589.00', Outlet Invert= 579.00'



‡



Stage-Area-Storage for Reach 1R: East Ditch

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
589.00	0.0	0
589.10	2.0	5,897
589.20	4.1	11,962
589.30	6.3	18,193
589.40	8.5	24,592
589.50	10.8	31,185
589.60	13.1	37,946
589.70	15.5	44,873
589.80	17.9	51,968
589.90	20.4	59,257
590.00	23.0	66,714
590.10	25.6	74,337
590.20	28.3	82,128
590.30	31.1	90,113
590.40	33.9	98,266
590.50	36.8	106,585
590.60	39.7	115,072
590.70	42.7	123,753
590.80	45.7	132,602
590.90	48.8	141,617
591.00	52.0	150,800
591.10	55.2	160,177
591.20	58.5	169,722
591.30	61.9	179,433
591.40	65.3	189,312
591.50	68.8	199,385
591.60	72.3	209,626
591.70	75.9	220,033
591.80	79.5	230,608
591.90	83.2	241,377
592.00	87.0	252,314
592.10	90.8	263,417
592.20	94.7	274,688
592.30	98.7	286,153
592.40	102.7	297,786
592.50	106.8	309,585
592.60	110.9	321,552
592.70	115.1	333,713
592.80	119.3	346,042
592.90	123.6	358,537
593.00	128.0	371,200
593.10	132.4	384,057
593.20	136.9	397,082
593.30	141.5	410,273
593.40	146.1	423,632
593.50	150.8	437,185
593.60	155.5	450,906
593.70	160.3	464,793
593.80	165.1	478,848
593.90	170.0	493,097
594.00	175.0	507,514
594.10	180.0	522,097
594.20	185.1	536,848
594.30	190.3	551,793
594.40	195.5	566,906
594.50	200.8	582,185
594.60	206.1	597,632
594.70	211.5	613,273
594.80	216.9	629,082
594.90	222.4	645,057
595.00	228.0	661,200
595.10	233.6	677,537
595.20	239.3	694,042
595.30	245.1	710,713
595.40	250.9	727,552
595.50	256.8	744,585
595.60	262.7	761,786
595.70	268.7	779,153
595.80	274.7	796,688
595.90	280.8	814,417
596.00	287.0	832,314
596.10	293.2	850,377
596.20	299.5	868,608
596.30	305.9	887,033
596.40	312.3	905,626
596.50	318.8	924,385
596.60	325.3	943,312
596.70	331.9	962,433
596.80	338.5	981,722
596.90	345.2	1,001,177
597.00	**352.0**	**1,020,800**

Summary for Reach 2R: West Ditch

Inflow Area = 69.500 ac, 1.73% Impervious, Inflow Depth = 2.06" for 25-year event
Inflow = 108.08 cfs @ 12.34 hrs, Volume= 11.947 af
Outflow = 76.01 cfs @ 12.58 hrs, Volume= 11.947 af, Atten= 30%, Lag= 14.3 min
Routed to Pond 16P : NPDES Sedimentation Basin

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Max. Velocity= 2.82 fps, Min. Travel Time= 24.9 min
Avg. Velocity = 0.86 fps, Avg. Travel Time= 81.7 min

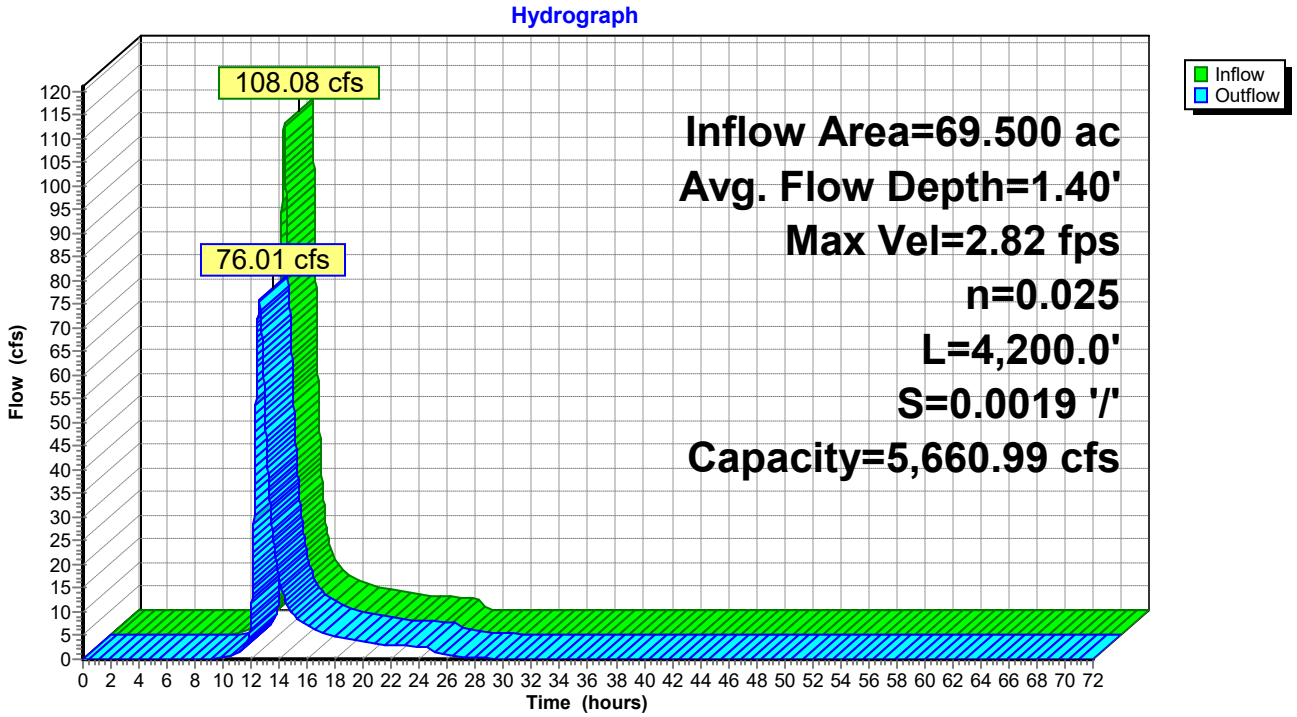
Peak Storage= 113,354 cf @ 12.58 hrs
Average Depth at Peak Storage= 1.40' , Surface Width= 23.43'
Bank-Full Depth= 12.00' Flow Area= 612.0 sf, Capacity= 5,660.99 cfs

15.00' x 12.00' deep channel, n= 0.025 Earth, clean & winding
Side Slope Z-value= 3.0 '/' Top Width= 87.00'
Length= 4,200.0' Slope= 0.0019 '/'
Inlet Invert= 590.00', Outlet Invert= 582.00'



‡

Reach 2R: West Ditch



Stage-Area-Storage for Reach 2R: West Ditch

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
590.00	0.0	0
590.20	3.1	13,144
590.40	6.5	27,256
590.60	10.1	42,336
590.80	13.9	58,504
591.00	18.0	75,640
591.20	22.3	93,744
591.40	26.9	112,936
591.60	31.7	133,096
591.80	36.7	154,224
592.00	42.0	176,440
592.20	47.5	199,624
592.40	53.3	223,776
592.60	59.3	249,016
592.80	65.5	275,224
593.00	72.0	302,400
593.20	78.7	330,664
593.40	85.7	359,896
593.60	92.9	390,096
593.80	100.3	421,384
594.00	108.0	453,640
594.20	115.9	486,864
594.40	124.1	521,176
594.60	132.5	556,456
594.80	141.1	592,704
595.00	150.0	630,040
595.20	159.1	668,344
595.40	168.5	707,616
595.60	178.1	747,976
595.80	187.9	789,304
596.00	198.0	831,600
596.20	208.3	874,984
596.40	218.9	919,336
596.60	229.7	964,656
596.80	240.7	1,011,064
597.00	252.0	1,058,440
597.20	263.5	1,106,784
597.40	275.3	1,156,216
597.60	287.3	1,206,616
597.80	299.5	1,257,984
598.00	312.0	1,310,440
598.20	324.7	1,363,864
598.40	337.7	1,418,256
598.60	350.9	1,473,736
598.80	364.3	1,530,184
599.00	378.0	1,587,600
599.20	391.9	1,646,104
599.40	406.1	1,705,576
599.60	420.5	1,766,016
599.80	435.1	1,827,544
600.00	450.0	1,890,040
600.20	465.1	1,953,504
600.40	480.5	2,018,056
600.60	496.1	2,083,576
600.80	511.9	2,150,064
601.00	528.0	2,217,640
601.20	544.3	2,286,184
601.40	560.9	2,355,696
601.60	577.7	2,426,296
601.80	594.7	2,497,864
602.00	**612.0**	**2,570,400**

Summary for Reach 3R: North Ditch

Inflow Area = 85.300 ac, 1.06% Impervious, Inflow Depth = 2.23" for 25-year event
Inflow = 91.02 cfs @ 12.74 hrs, Volume= 15.820 af
Outflow = 80.85 cfs @ 12.99 hrs, Volume= 15.820 af, Atten= 11%, Lag= 15.0 min
Routed to Reach 1R : East Ditch

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Max. Velocity= 3.46 fps, Min. Travel Time= 19.3 min
Avg. Velocity = 0.97 fps, Avg. Travel Time= 68.6 min

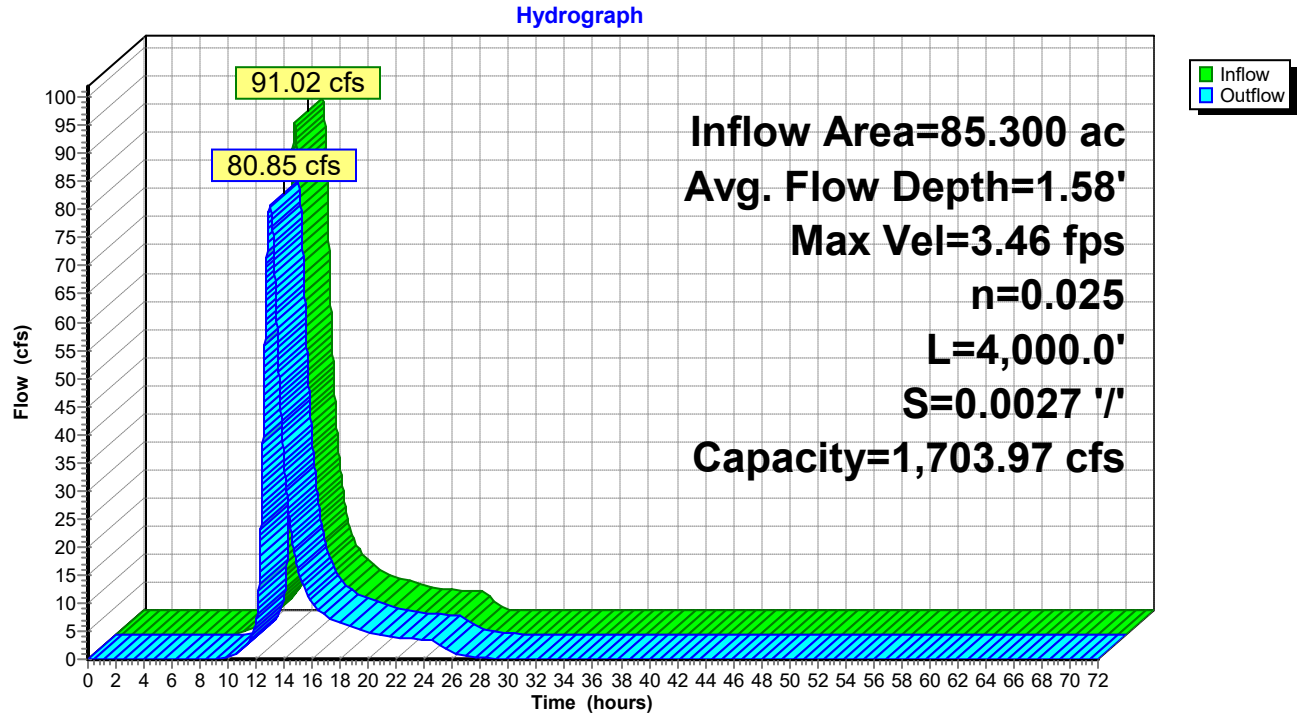
Peak Storage= 93,537 cf @ 12.99 hrs
Average Depth at Peak Storage= 1.58' , Surface Width= 19.51'
Bank-Full Depth= 7.00' Flow Area= 217.0 sf, Capacity= 1,703.97 cfs

10.00' x 7.00' deep channel, n= 0.025 Earth, clean & winding
Side Slope Z-value= 3.0 '/' Top Width= 52.00'
Length= 4,000.0' Slope= 0.0027 '/'
Inlet Invert= 600.00', Outlet Invert= 589.00'



‡

Reach 3R: North Ditch



Stage-Area-Storage for Reach 3R: North Ditch

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
600.00	0.0	0
600.10	1.0	4,134
600.20	2.1	8,487
600.30	3.3	13,092
600.40	4.5	17,932
600.50	5.8	23,007
600.60	7.1	28,334
600.70	8.5	33,880
600.80	9.9	39,694
600.90	11.4	45,727
601.00	13.0	52,012
601.10	14.6	58,532
601.20	16.3	65,287
601.30	18.1	72,294
601.40	19.9	79,520
601.50	21.8	87,014
601.60	23.7	94,727
601.70	25.7	102,692
601.80	27.7	110,892
601.90	29.8	119,327
602.00	32.0	128,014
602.10	34.2	136,920
602.20	36.5	146,094
602.30	38.9	155,487
602.40	41.3	165,132
602.50	43.8	175,012
602.60	46.3	185,127
602.70	48.9	195,494
602.80	51.5	206,080
602.90	54.2	216,934
603.00	57.0	228,007
603.10	59.8	239,332
603.20	62.7	250,892
603.30	65.7	262,687
603.40	68.7	274,734
603.50	71.8	287,000
603.60	74.9	299,534
603.70	78.1	312,287
603.80	81.3	325,292
603.90	84.6	338,532
604.00	88.0	352,007
604.10	91.4	365,734
604.20	94.9	379,680
604.30	98.5	393,894
604.40	102.1	408,327
604.50	105.8	423,012
604.60	109.5	437,932
604.70	113.3	453,087
604.80	117.1	468,494
604.90	121.0	484,120
605.00	125.0	500,014
605.10	129.0	516,127
605.20	133.1	532,492
605.30	137.3	549,092
605.40	141.5	565,927
605.50	145.8	583,014
605.60	150.1	600,320
605.70	154.5	617,894
605.80	158.9	635,687
605.90	163.4	653,732
606.00	168.0	672,012
606.10	172.6	690,527
606.20	177.3	709,294
606.30	182.1	728,280
606.40	186.9	747,534
606.50	191.8	767,007
606.60	196.7	786,732
606.70	201.7	806,692
606.80	206.7	826,887
606.90	211.8	847,334
607.00	**217.0**	**868,000**

Summary for Pond 16P: NPDES Sedimentation Basin

Inflow Area = 423.500 ac, 6.82% Impervious, Inflow Depth = 2.30" for 25-year event
Inflow = 389.45 cfs @ 12.48 hrs, Volume= 81.142 af
Outflow = 5.69 cfs @ 25.44 hrs, Volume= 27.966 af, Atten= 99%, Lag= 777.2 min
Primary = 5.69 cfs @ 25.44 hrs, Volume= 27.966 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Starting Elev= 579.00' Surf.Area= 7.816 ac Storage= 7.731 af
Peak Elev= 587.47' @ 25.44 hrs Surf.Area= 10.255 ac Storage= 82.051 af (74.319 af above start)

Plug-Flow detention time= 2,307.6 min calculated for 20.232 af (25% of inflow)
Center-of-Mass det. time= 1,647.6 min (2,527.6 - 880.0)

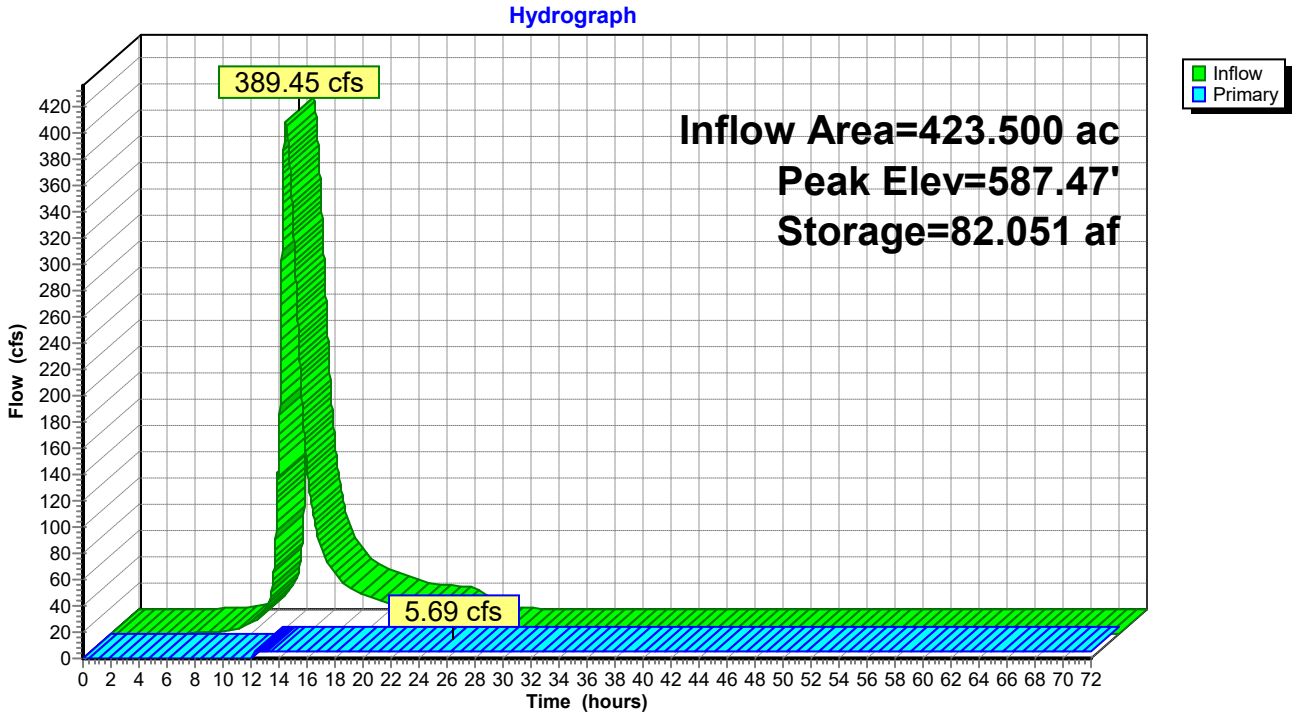
Volume	Invert	Avail.Storage	Storage Description
#1	578.00'	110.548 af	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Perim. (feet)	Inc.Store (acre-feet)	Cum.Store (acre-feet)	Wet.Area (acres)
578.00	7.647	3,684.0	0.000	0.000	7.647
580.00	7.987	3,716.0	15.633	15.633	8.112
582.00	8.330	3,763.0	16.316	31.949	8.776
584.00	8.678	3,811.0	17.007	48.955	9.463
586.00	9.731	5,828.0	18.399	67.354	44.981
588.00	10.447	5,894.0	20.174	87.528	46.420
590.00	12.607	8,185.0	23.020	110.548	105.346

Device	Routing	Invert	Outlet Devices (Turned on 1 times)
#1	Primary	580.30'	**Pump (National Pump J11MC X 3) X 3.00** Discharges@929.30' Turns Off<579.30' Flow (gpm)= 600.0 720.0 735.0 840.0 1,008.0 Head (feet)= 390.00 375.00 350.00 345.00 300.00
#2	Device 1	578.07'	**96.0" W x 48.0" H Box 96" W x 48" H Box Culvert** L= 49.2' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 578.07' / 577.09' S= 0.0199 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 32.00 sf

Primary OutFlow Max=5.69 cfs @ 25.44 hrs HW=587.47' (Free Discharge)
↑**1=Pump (National Pump J11MC X 3)** (Pump Controls 5.69 cfs)
↑**2=96" W x 48" H Box Culvert** (Passes 5.69 cfs of 400.82 cfs potential flow)

Pond 16P: NPDES Sedimentation Basin



Stage-Area-Storage for Pond 16P: NPDES Sedimentation Basin

Elevation (feet)	Surface (acres)	Storage (acre-feet)
578.00	7.647	0.000
583.00	8.503	40.365
588.00	**10.447**	**87.528**
593.00	**12.607**	**110.548**
598.00	12.607	110.548
603.00	12.607	110.548
608.00	12.607	110.548
613.00	12.607	110.548
618.00	12.607	110.548
623.00	12.607	110.548
628.00	12.607	110.548
633.00	12.607	110.548
638.00	12.607	110.548
643.00	12.607	110.548
648.00	12.607	110.548
653.00	12.607	110.548
658.00	12.607	110.548
663.00	12.607	110.548
668.00	12.607	110.548
673.00	12.607	110.548
678.00	12.607	110.548
683.00	12.607	110.548
688.00	12.607	110.548
693.00	12.607	110.548
698.00	12.607	110.548
703.00	12.607	110.548
708.00	12.607	110.548
713.00	12.607	110.548
718.00	12.607	110.548
723.00	12.607	110.548
728.00	12.607	110.548
733.00	12.607	110.548
738.00	12.607	110.548
743.00	12.607	110.548
748.00	12.607	110.548
753.00	12.607	110.548
758.00	12.607	110.548
763.00	12.607	110.548
768.00	12.607	110.548
773.00	12.607	110.548
778.00	12.607	110.548
783.00	12.607	110.548
788.00	12.607	110.548
793.00	12.607	110.548
798.00	12.607	110.548
803.00	12.607	110.548
808.00	12.607	110.548
813.00	12.607	110.548
818.00	12.607	110.548
823.00	12.607	110.548
828.00	12.607	110.548
833.00	12.607	110.548
838.00	12.607	110.548
843.00	12.607	110.548
848.00	12.607	110.548
853.00	12.607	110.548
858.00	12.607	110.548
863.00	12.607	110.548
868.00	12.607	110.548
873.00	12.607	110.548
878.00	12.607	110.548
883.00	12.607	110.548
888.00	12.607	110.548
893.00	12.607	110.548
898.00	12.607	110.548
903.00	12.607	110.548
908.00	12.607	110.548
913.00	12.607	110.548
918.00	12.607	110.548
923.00	12.607	110.548
928.00	12.607	110.548