ADVANCED
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STORMWATER MEMO

Date: October 27, 2022
Re: Dublin Astra at AWS Data Center Campus
Attn: City of Dublin Stormwater
From: James Whitacre, P.E.

Amazon Data Services proposes to construct two new antenna sites on the existing data center campus at Crosby Court. The overall stormwater management plan for the site was approved with the first building 2015. Based on this overall report the project was assigned a post-developed curve number of 88. The total onsite drainage area going to the existing stormwater basins was 67.5 acres. Based on the calculation below the proposed impervious area for the project as 39.5 acres or 1,720,620 square feet.

Cn = (39.5*98 + 28.0*74) / 67.5 = 88

The campus is currently built out with 5 buildings, two existing Astra units and a substation. The exiting impervious area onsite is 1,639,203 SF (37.631 Ac.)

This new proposal will construct 7,707 SF of impervious area with the access road and 2,808 SF of impervious with the Astra units. The total new impervious area on the site will be 1,649,718 SF (37.872 Ac.).

The additional imperious are proposed with this project still falls under the overall impervious area permitted with the master Stormwater Plan approved with Building #1.

Additionally, a small amount of volume in Pond 2 is being filled with this proposal. 7,467 CF of the original 1,023,505 CF storage is being removed from Pond 2. This small reduction has no effect on the peak flows leaving the site. The table below shows the peak flows approved in the original stormwater report. The hydrograph reports attached to this letter show the updated calculations with the small amount of basin fill taken into account.

Stormwater Management Table							
	1 year	2 year	5 year	10 year	25 year	50 year	100 year
Pre-dev Q (onsite)	20.48	32.18	50.78	67.25	91.54	112.52	135.15
Pre-dev Q (offsite)	7.39	10.62	15.55	19.8	25.94	31.13	36.66
Total Pre-Dev Q	**27.87**	**42.8**	**66.33**	**87.05**	**117.48**	**143.65**	**171.81**
Post-dev Q (Pond 1)	48.18	63.69	86.24	105.04	131.42	153.3	176.28
Post-dev Q (Pond 2)	47.75	63.13	85.47	104.11	130.25	151.94	174.72
Post-dev Q(offsite)	7.39	10.62	15.55	19.8	25.94	31.13	36.66
Total Post-dev Q	**103.32**	**137.44**	**187.26**	**228.95**	**287.61**	**336.37**	**387.66**
Allowable Release	28.11	31.34	36.27	40.52	46.66	102.48	125.79
Actual Release	**3.12**	**4.96**	**8.22**	**11.35**	**16.22**	**19.07**	**25.27**
Pond Elev.	939.98	940.2	940.52	940.78	941.14	941.44	941.73

Stage-Area-Storage for Pond 5P: Pond #2

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
939.20	166,971	0
939.25	168,043	8,375
939.30	169,115	16,804
939.35	170,187	25,287
939.40	171,259	33,823
939.45	172,330	42,413
939.50	173,402	51,056
939.55	174,474	59,753
939.60	175,546	68,503
939.65	176,618	77,307
939.70	177,690	86,165
939.75	178,762	95,076
939.80	179,834	104,041
939.85	180,905	113,060
939.90	181,977	122,132
939.95	183,049	131,258
940.00	184,121	140,437
940.05	185,071	149,667
940.10	186,020	158,944
940.15	186,970	168,269
940.20	187,920	177,641
940.25	188,869	187,061
940.30	189,819	196,528
940.35	190,769	206,042
940.40	191,718	215,605
940.45	192,668	225,214
940.50	193,618	234,871
940.55	194,567	244,576
940.60	195,517	254,328
940.65	196,466	264,128
940.70	197,416	273,975
940.75	198,366	283,869
940.80	199,315	293,811
940.85	200,265	303,801
940.90	201,215	313,838
940.95	202,164	323,922
941.00	203,114	334,054
941.05	204,028	344,233
941.10	204,942	354,457
941.15	205,856	364,727
941.20	206,770	375,043
941.25	207,684	385,404
941.30	208,598	395,811
941.35	209,512	406,264
941.40	210,426	416,762
941.45	211,340	427,306
941.50	212,254	437,896
941.55	213,167	448,532
941.60	214,081	459,213
941.65	214,995	469,940
941.70	215,909	480,712
941.75	216,823	491,531
941.80	217,737	502,395
941.85	218,651	513,304
941.90	219,565	524,260
941.95	220,479	535,261
942.00	221,393	546,308
942.05	222,095	557,395
942.10	222,797	568,517
942.15	223,499	579,675
942.20	224,201	590,867
942.25	224,903	602,095
942.30	225,605	613,358
942.35	226,307	624,655
942.40	227,009	635,988
942.45	227,711	647,356
942.50	228,413	658,759
942.55	229,115	670,198
942.60	229,817	681,671
942.65	230,519	693,179
942.70	231,221	704,723
942.75	231,923	716,301
942.80	232,625	727,915
942.85	233,327	739,564
942.90	234,029	751,248
942.95	234,731	762,967
943.00	235,433	774,721
943.05	236,021	786,507
943.10	236,610	798,323
943.15	237,198	810,168
943.20	237,787	822,043
943.25	238,375	833,947
943.30	238,963	845,880
943.35	239,552	857,843
943.40	240,140	869,835
943.45	240,729	881,857
943.50	241,317	893,908
943.55	241,905	905,989
943.60	242,494	918,099
943.65	243,082	930,238
943.70	243,671	942,407
943.75	244,259	954,605
943.80	244,847	966,833
943.85	245,436	979,090
943.90	246,024	991,377
943.95	246,613	1,003,692
944.00	**247,201**	**1,016,038**

Summary for Pond 5P: Pond #2

Inflow Area = 33.600 ac, 0.00% Impervious, Inflow Depth = 1.13" for Dublin 001 event
Inflow = 47.75 cfs @ 12.08 hrs, Volume= 3.160 af
Outflow = 1.77 cfs @ 18.72 hrs, Volume= 2.237 af, Atten= 96%, Lag= 398.4 min
Primary = 1.77 cfs @ 18.72 hrs, Volume= 2.237 af

Routing by Dyn-Stor-Ind method, Time Span= 5.00-80.00 hrs, dt= 0.05 hrs
Peak Elev= 939.90' @ 18.69 hrs Surf.Area= 181,949 sf Storage= 121,890 cf

Plug-Flow detention time= 1,455.8 min calculated for 2.236 af (71% of inflow)
Center-of-Mass det. time= 1,354.8 min (2,191.9 - 837.2)

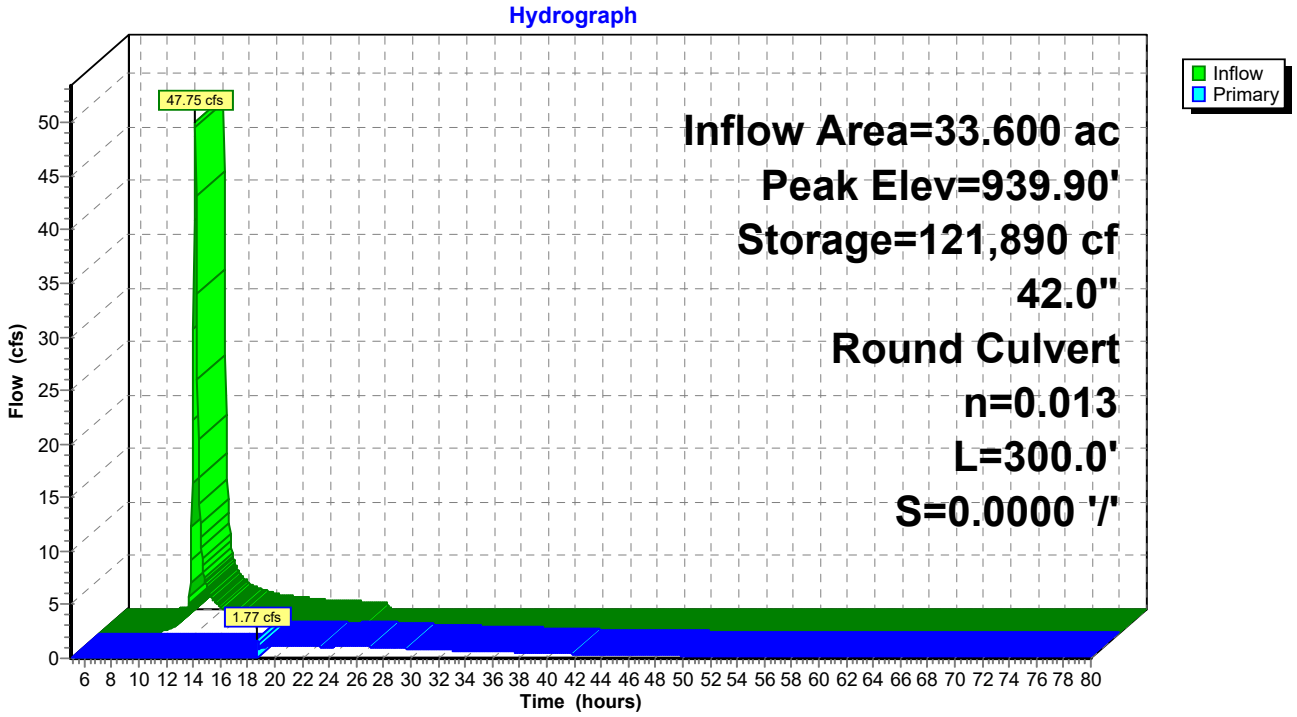
Volume	Invert	Avail.Storage	Storage Description
#1	939.20'	1,016,038 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
939.20	166,971	0	0
940.00	184,121	140,437	140,437
941.00	203,114	193,618	334,054
942.00	221,393	212,254	546,308
943.00	235,433	228,413	774,721
944.00	247,201	241,317	1,016,038

Device	Routing	Invert	Outlet Devices
#1	Primary	933.70'	**42.0" Round Culvert** L= 300.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 933.70' / 933.70' S= 0.0000 '/' Cc= 0.900 n= 0.013 Concrete sewer w/manholes & inlets, Flow Area= 9.62 sf

Primary OutFlow Max=1.52 cfs @ 18.72 hrs HW=939.90' TW=939.90' (Dynamic Tailwater)
↑—**1=Culvert** (Outlet Controls 1.52 cfs @ 0.16 fps)

Pond 5P: Pond #2



Summary for Pond 5P: Pond #2

Inflow Area = 33.600 ac, 0.00% Impervious, Inflow Depth = 1.49" for Dublin 002 event
Inflow = 63.13 cfs @ 12.08 hrs, Volume= 4.181 af
Outflow = 2.14 cfs @ 17.53 hrs, Volume= 3.204 af, Atten= 97%, Lag= 327.3 min
Primary = 2.14 cfs @ 17.53 hrs, Volume= 3.204 af

Routing by Dyn-Stor-Ind method, Time Span= 5.00-80.00 hrs, dt= 0.05 hrs
Peak Elev= 940.09' @ 17.49 hrs Surf.Area= 185,757 sf Storage= 156,363 cf

Plug-Flow detention time= 1,318.4 min calculated for 3.204 af (77% of inflow)
Center-of-Mass det. time= 1,227.9 min (2,057.1 - 829.2)

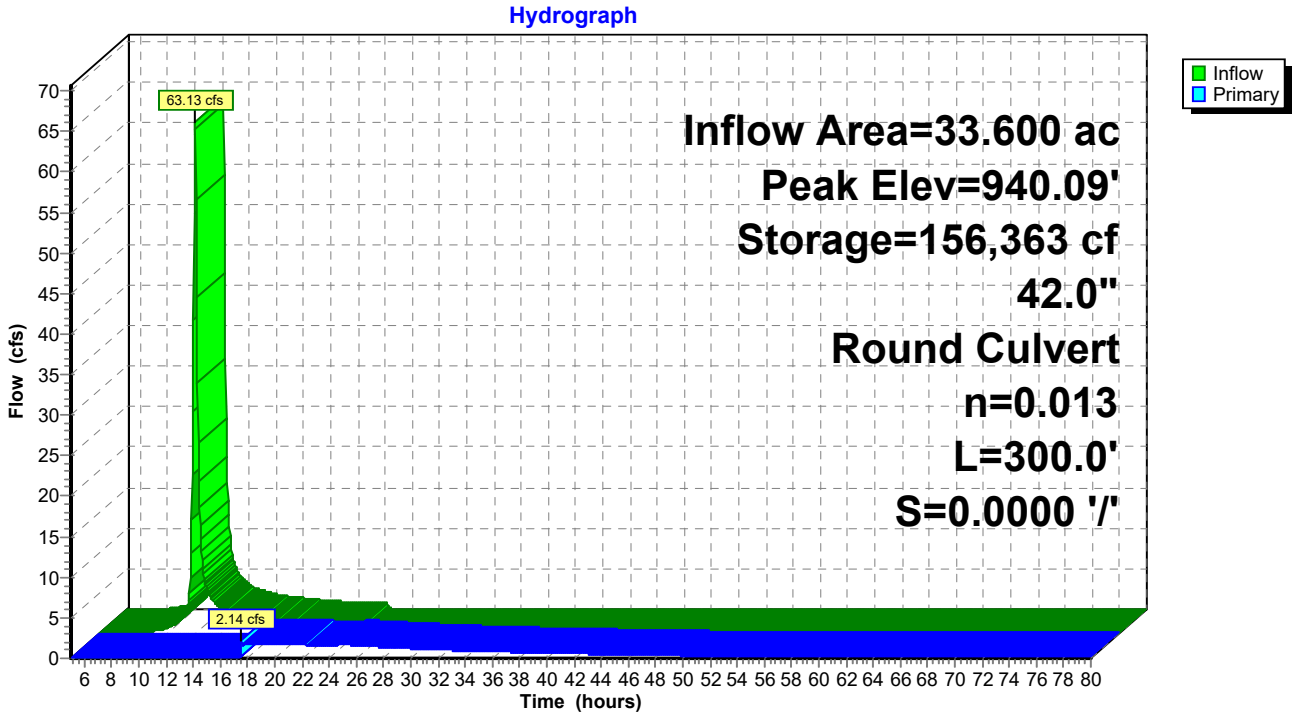
Volume	Invert	Avail.Storage	Storage Description
#1	939.20'	1,016,038 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
939.20	166,971	0	0
940.00	184,121	140,437	140,437
941.00	203,114	193,618	334,054
942.00	221,393	212,254	546,308
943.00	235,433	228,413	774,721
944.00	247,201	241,317	1,016,038

Device	Routing	Invert	Outlet Devices
#1	Primary	933.70'	**42.0" Round Culvert** L= 300.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 933.70' / 933.70' S= 0.0000 '/' Cc= 0.900 n= 0.013 Concrete sewer w/manholes & inlets, Flow Area= 9.62 sf

Primary OutFlow Max=2.10 cfs @ 17.53 hrs HW=940.09' TW=940.08' (Dynamic Tailwater)
↑—**1=Culvert** (Outlet Controls 2.10 cfs @ 0.22 fps)

Pond 5P: Pond #2



Summary for Pond 5P: Pond #2

Inflow Area = 33.600 ac, 0.00% Impervious, Inflow Depth = 2.03" for Dublin 005 event
Inflow = 85.47 cfs @ 12.08 hrs, Volume= 5.692 af
Outflow = 2.91 cfs @ 16.55 hrs, Volume= 4.664 af, Atten= 97%, Lag= 268.5 min
Primary = 2.91 cfs @ 16.55 hrs, Volume= 4.664 af

Routing by Dyn-Stor-Ind method, Time Span= 5.00-80.00 hrs, dt= 0.05 hrs
Peak Elev= 940.36' @ 16.47 hrs Surf.Area= 190,883 sf Storage= 207,191 cf

Plug-Flow detention time= 1,186.3 min calculated for 4.664 af (82% of inflow)
Center-of-Mass det. time= 1,109.1 min (1,929.5 - 820.4)

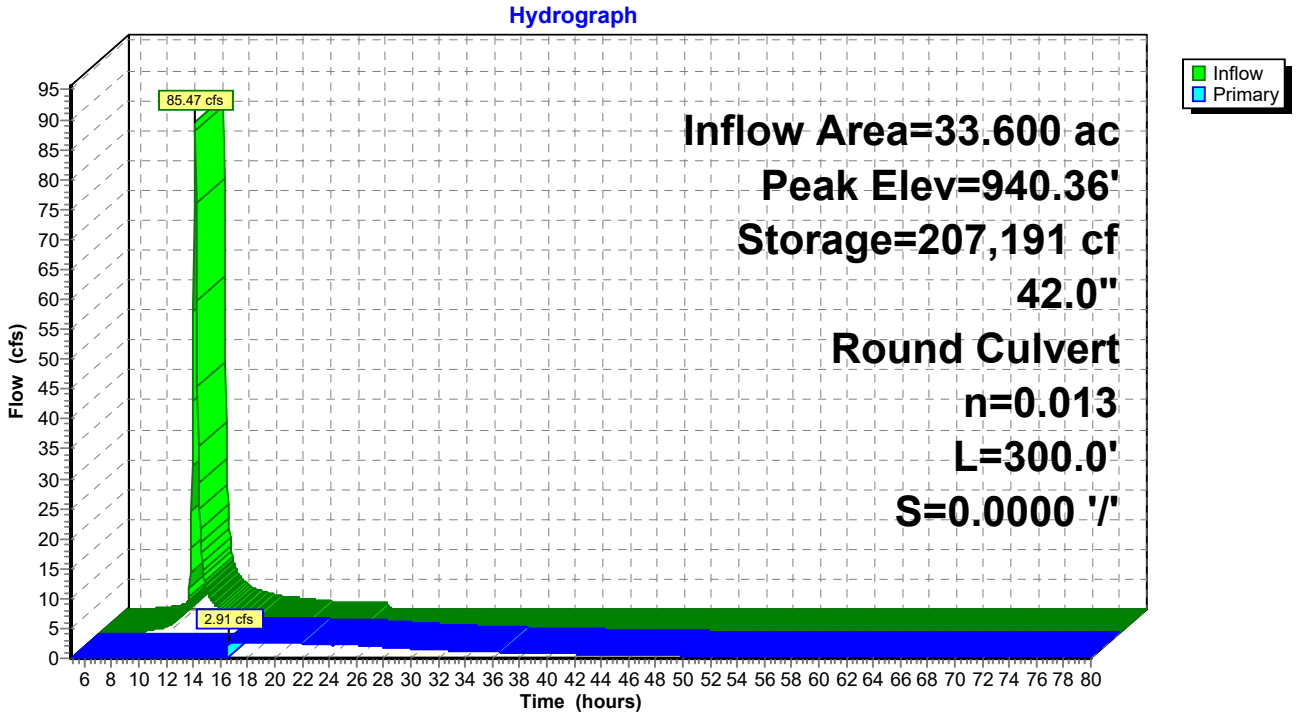
Volume	Invert	Avail.Storage	Storage Description
#1	939.20'	1,016,038 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
939.20	166,971	0	0
940.00	184,121	140,437	140,437
941.00	203,114	193,618	334,054
942.00	221,393	212,254	546,308
943.00	235,433	228,413	774,721
944.00	247,201	241,317	1,016,038

Device	Routing	Invert	Outlet Devices
#1	Primary	933.70'	**42.0" Round Culvert** L= 300.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 933.70' / 933.70' S= 0.0000 '/' Cc= 0.900 n= 0.013 Concrete sewer w/manholes & inlets, Flow Area= 9.62 sf

Primary OutFlow Max=3.03 cfs @ 16.55 hrs HW=940.36' TW=940.35' (Dynamic Tailwater)
↑—**1=Culvert** (Outlet Controls 3.03 cfs @ 0.32 fps)

Pond 5P: Pond #2



Summary for Pond 5P: Pond #2

Inflow Area = 33.600 ac, 0.00% Impervious, Inflow Depth = 2.49" for Dublin 010 event
Inflow = 104.11 cfs @ 12.07 hrs, Volume= 6.968 af
Outflow = 3.81 cfs @ 16.78 hrs, Volume= 5.910 af, Atten= 96%, Lag= 282.4 min
Primary = 3.81 cfs @ 16.78 hrs, Volume= 5.910 af

Routing by Dyn-Stor-Ind method, Time Span= 5.00-80.00 hrs, dt= 0.05 hrs
Peak Elev= 940.58' @ 15.95 hrs Surf.Area= 195,116 sf Storage= 250,210 cf

Plug-Flow detention time= 1,108.3 min calculated for 5.910 af (85% of inflow)
Center-of-Mass det. time= 1,039.6 min (1,854.2 - 814.6)

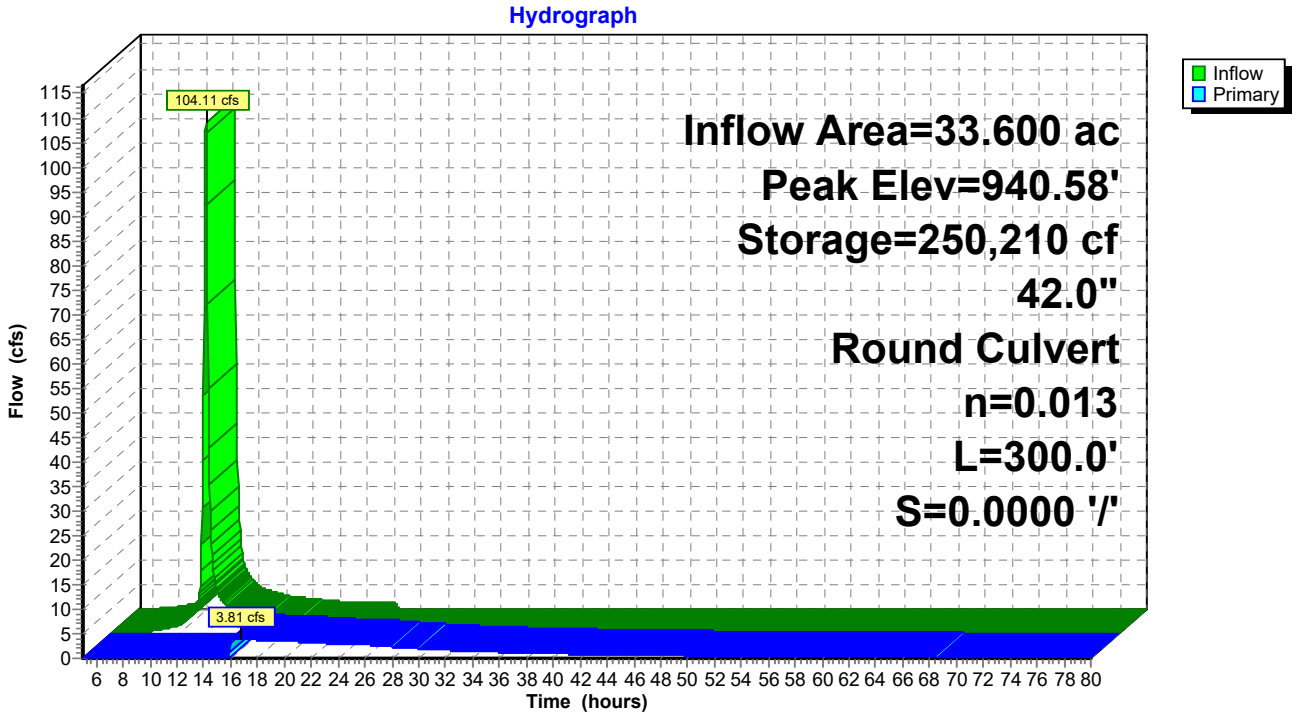
Volume	Invert	Avail.Storage	Storage Description
#1	939.20'	1,016,038 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
939.20	166,971	0	0
940.00	184,121	140,437	140,437
941.00	203,114	193,618	334,054
942.00	221,393	212,254	546,308
943.00	235,433	228,413	774,721
944.00	247,201	241,317	1,016,038

Device	Routing	Invert	Outlet Devices
#1	Primary	933.70'	**42.0" Round Culvert** L= 300.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 933.70' / 933.70' S= 0.0000 '/' Cc= 0.900 n= 0.013 Concrete sewer w/manholes & inlets, Flow Area= 9.62 sf

Primary OutFlow Max=4.10 cfs @ 16.78 hrs HW=940.56' TW=940.55' (Dynamic Tailwater)
↑—**1=Culvert** (Outlet Controls 4.10 cfs @ 0.43 fps)

Pond 5P: Pond #2



Summary for Pond 5P: Pond #2

Inflow Area = 33.600 ac, 0.00% Impervious, Inflow Depth = 3.14" for Dublin 025 event
Inflow = 130.25 cfs @ 12.07 hrs, Volume= 8.792 af
Outflow = 5.46 cfs @ 16.49 hrs, Volume= 7.703 af, Atten= 96%, Lag= 264.9 min
Primary = 5.46 cfs @ 16.49 hrs, Volume= 7.703 af

Routing by Dyn-Stor-Ind method, Time Span= 5.00-80.00 hrs, dt= 0.05 hrs
Peak Elev= 940.89' @ 15.46 hrs Surf.Area= 201,004 sf Storage= 311,602 cf

Plug-Flow detention time= 1,024.8 min calculated for 7.698 af (88% of inflow)
Center-of-Mass det. time= 967.0 min (1,775.1 - 808.0)

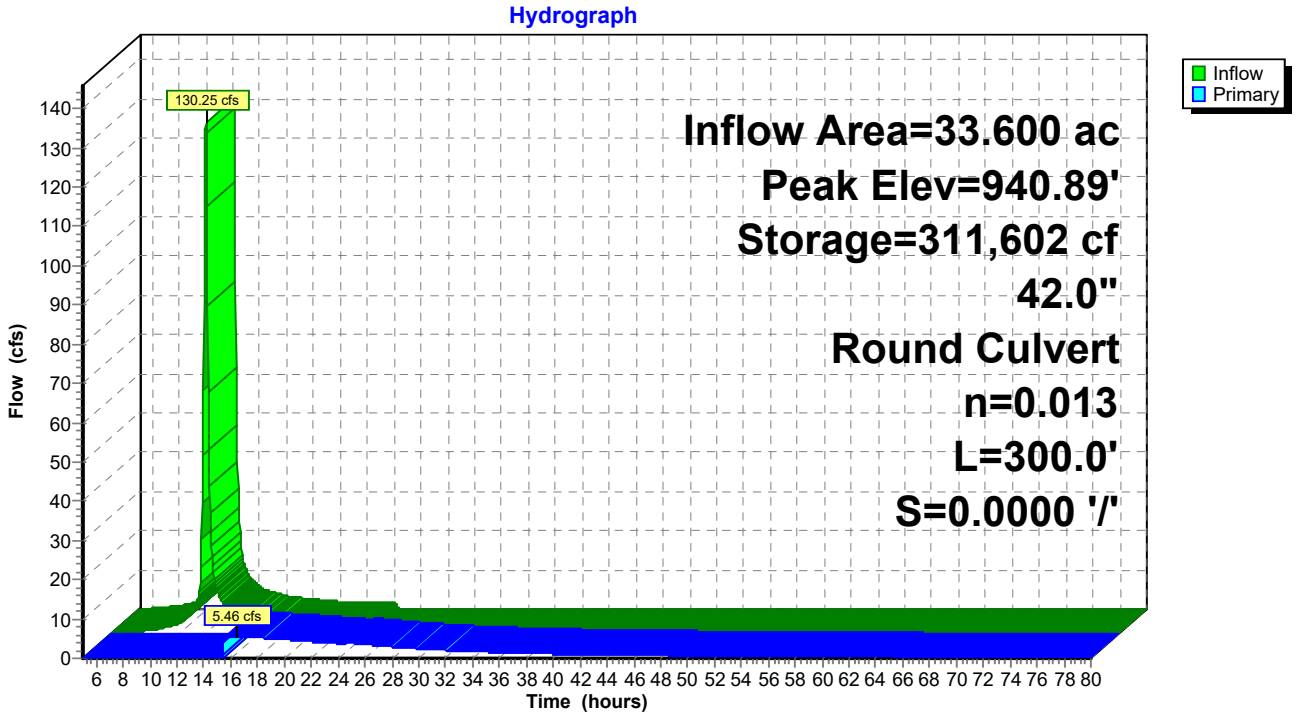
Volume	Invert	Avail.Storage	Storage Description
#1	939.20'	1,016,038 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
939.20	166,971	0	0
940.00	184,121	140,437	140,437
941.00	203,114	193,618	334,054
942.00	221,393	212,254	546,308
943.00	235,433	228,413	774,721
944.00	247,201	241,317	1,016,038

Device	Routing	Invert	Outlet Devices
#1	Primary	933.70'	**42.0" Round Culvert** L= 300.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 933.70' / 933.70' S= 0.0000 '/' Cc= 0.900 n= 0.013 Concrete sewer w/manholes & inlets, Flow Area= 9.62 sf

Primary OutFlow Max=5.80 cfs @ 16.49 hrs HW=940.85' TW=940.84' (Dynamic Tailwater)
↑—**1=Culvert** (Outlet Controls 5.80 cfs @ 0.60 fps)

Pond 5P: Pond #2



Summary for Pond 5P: Pond #2

Inflow Area = 33.600 ac, 0.00% Impervious, Inflow Depth > 3.69" for Dublin 050 event
Inflow = 151.94 cfs @ 12.07 hrs, Volume= 10.325 af
Outflow = 7.01 cfs @ 16.17 hrs, Volume= 9.217 af, Atten= 95%, Lag= 246.1 min
Primary = 7.01 cfs @ 16.17 hrs, Volume= 9.217 af

Routing by Dyn-Stor-Ind method, Time Span= 5.00-80.00 hrs, dt= 0.05 hrs
Peak Elev= 941.15' @ 15.29 hrs Surf.Area= 205,883 sf Storage= 365,033 cf

Plug-Flow detention time= 978.8 min calculated for 9.216 af (89% of inflow)
Center-of-Mass det. time= 925.0 min (1,728.6 - 803.6)

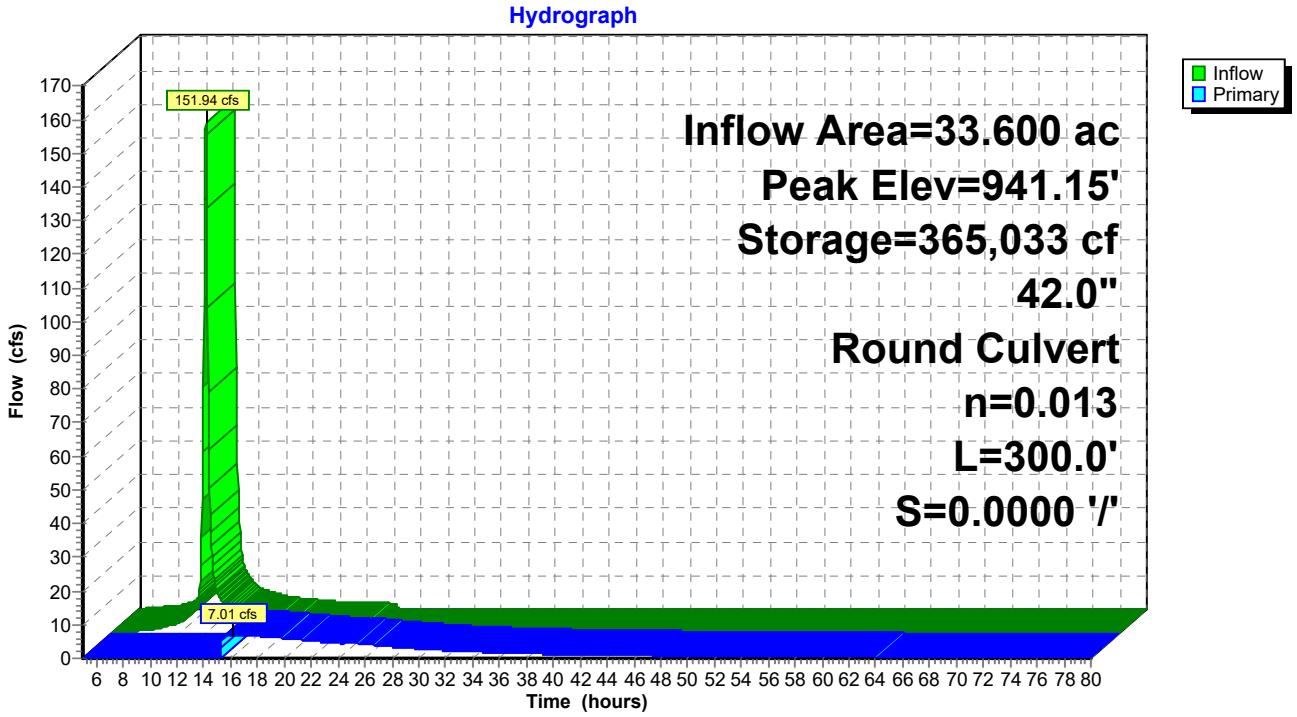
Volume	Invert	Avail.Storage	Storage Description
#1	939.20'	1,016,038 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
939.20	166,971	0	0
940.00	184,121	140,437	140,437
941.00	203,114	193,618	334,054
942.00	221,393	212,254	546,308
943.00	235,433	228,413	774,721
944.00	247,201	241,317	1,016,038

Device	Routing	Invert	Outlet Devices
#1	Primary	933.70'	**42.0" Round Culvert** L= 300.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 933.70' / 933.70' S= 0.0000 '/' Cc= 0.900 n= 0.013 Concrete sewer w/manholes & inlets, Flow Area= 9.62 sf

Primary OutFlow Max=7.37 cfs @ 16.17 hrs HW=941.11' TW=941.08' (Dynamic Tailwater)
↑—**1=Culvert** (Outlet Controls 7.37 cfs @ 0.77 fps)

Pond 5P: Pond #2



Summary for Pond 5P: Pond #2

Inflow Area = 33.600 ac, 0.00% Impervious, Inflow Depth > 4.27" for Dublin 100 event
Inflow = 174.72 cfs @ 12.07 hrs, Volume= 11.950 af
Outflow = 8.40 cfs @ 16.95 hrs, Volume= 10.824 af, Atten= 95%, Lag= 292.7 min
Primary = 8.40 cfs @ 16.95 hrs, Volume= 10.824 af

Routing by Dyn-Stor-Ind method, Time Span= 5.00-80.00 hrs, dt= 0.05 hrs
Peak Elev= 941.41' @ 15.08 hrs Surf.Area= 210,699 sf Storage= 419,912 cf

Plug-Flow detention time= 936.4 min calculated for 10.817 af (91% of inflow)
Center-of-Mass det. time= 889.4 min (1,689.1 - 799.7)

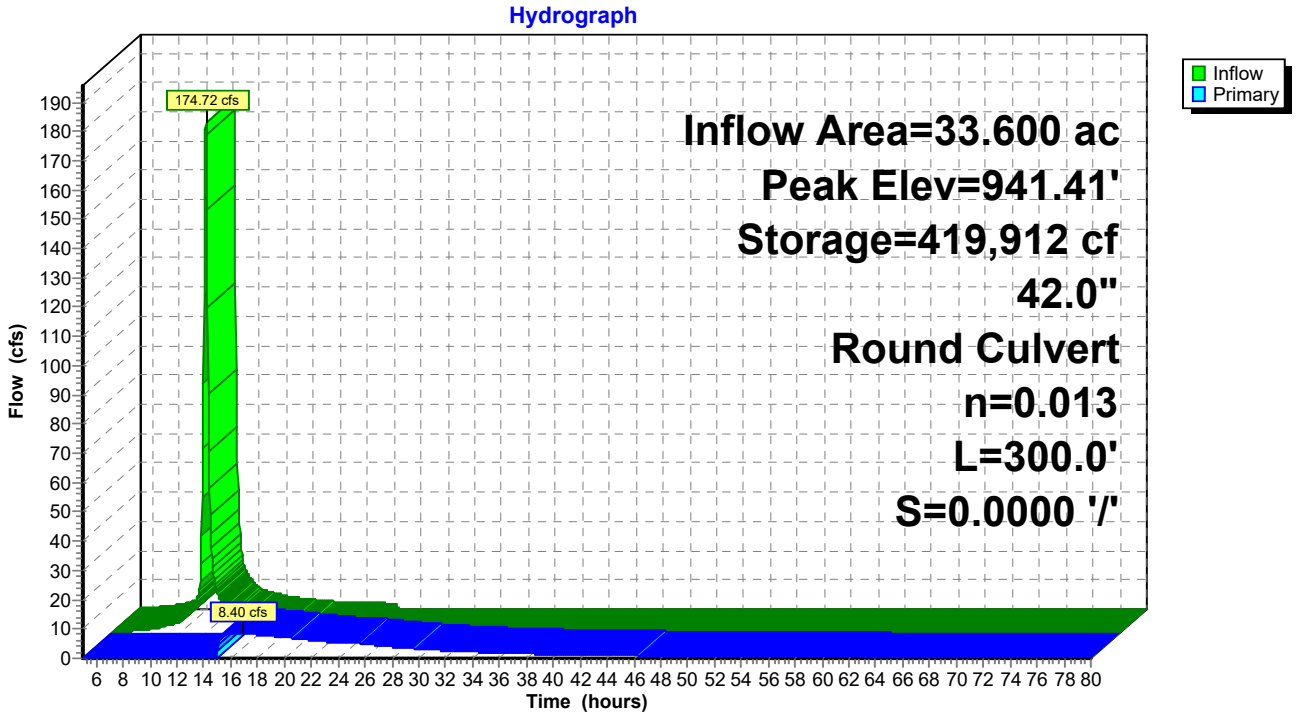
Volume	Invert	Avail.Storage	Storage Description
#1	939.20'	1,016,038 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
939.20	166,971	0	0
940.00	184,121	140,437	140,437
941.00	203,114	193,618	334,054
942.00	221,393	212,254	546,308
943.00	235,433	228,413	774,721
944.00	247,201	241,317	1,016,038

Device	Routing	Invert	Outlet Devices
#1	Primary	933.70'	**42.0" Round Culvert** L= 300.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 933.70' / 933.70' S= 0.0000 '/' Cc= 0.900 n= 0.013 Concrete sewer w/manholes & inlets, Flow Area= 9.62 sf

Primary OutFlow Max=8.81 cfs @ 16.95 hrs HW=941.30' TW=941.26' (Dynamic Tailwater)
↑—**1=Culvert** (Outlet Controls 8.81 cfs @ 0.92 fps)

Pond 5P: Pond #2



Summary for Pond 3P: Pond #1

Inflow Area = 83.500 ac, 0.00% Impervious, Inflow Depth > 0.93" for Dublin 001 event
Inflow = 50.42 cfs @ 12.09 hrs, Volume= 6.471 af
Outflow = 3.12 cfs @ 14.40 hrs, Volume= 5.769 af, Atten= 94%, Lag= 138.8 min
Primary = 3.12 cfs @ 14.40 hrs, Volume= 5.769 af
Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 5.00-80.00 hrs, dt= 0.05 hrs
Peak Elev= 939.98' @ 14.40 hrs Surf.Area= 153,842 sf Storage= 108,392 cf

Plug-Flow detention time= 750.9 min calculated for 5.765 af (89% of inflow)
Center-of-Mass det. time= 505.5 min (1,819.9 - 1,314.4)

Volume	Invert	Avail.Storage	Storage Description
#1	939.20'	748,322 cf	**Custom Stage Data (Conic)** Listed below (Recalc)

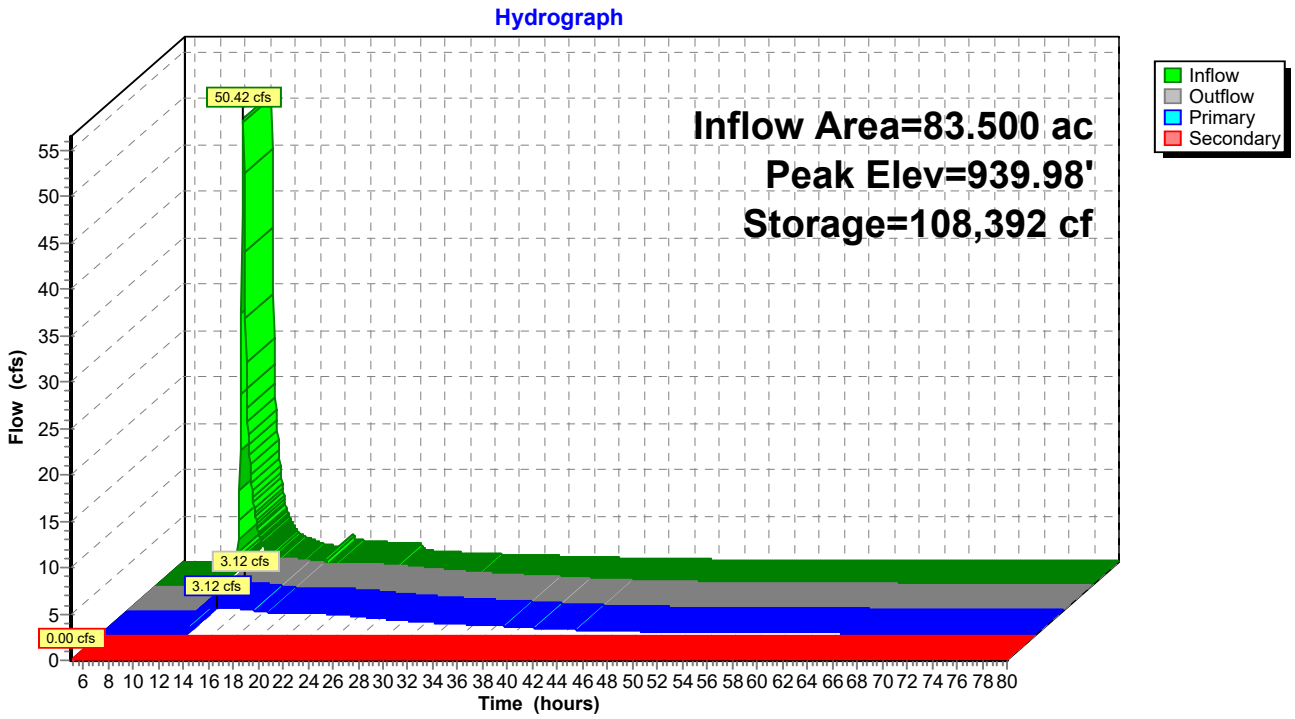
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
939.20	124,751	0	0	124,751
940.00	154,646	111,545	111,545	154,665
941.00	170,179	162,351	273,896	170,263
942.00	185,821	177,943	451,838	185,977
943.00	200,632	193,179	645,017	200,869
943.50	212,643	103,304	748,322	212,907

Device	Routing	Invert	Outlet Devices
#1	Primary	939.16'	**36.0" Round Culvert** L= 60.5' Ke= 0.500 Inlet / Outlet Invert= 939.16' / 939.00' S= 0.0026 '/' Cc= 0.900 n= 0.013, Flow Area= 7.07 sf
#2	Device 1	939.20'	**3.0" Vert. wq X 3.00** C= 0.600
#3	Device 1	939.50'	**24.0" W x 9.0" H Vert. window X 2.00** C= 0.600
#4	Device 1	941.50'	**2.4" x 2.4" Horiz. grate X 8.00 columns** X 8 rows C= 0.600 Limited to weir flow at low heads
#5	Secondary	943.00'	**15.0' 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=3.12 cfs @ 14.40 hrs HW=939.98' (Free Discharge)
└**1=Culvert** (Barrel Controls 3.12 cfs @ 2.99 fps)
  ├**2=wq** (Passes < 0.57 cfs potential flow)
  ├**3=window** (Passes < 4.26 cfs potential flow)
  └**4=grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=939.20' (Free Discharge)
└**5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 3P: Pond #1



Summary for Pond 3P: Pond #1

Inflow Area = 83.500 ac, 0.00% Impervious, Inflow Depth > 1.28" for Dublin 002 event
Inflow = 67.20 cfs @ 12.08 hrs, Volume= 8.882 af
Outflow = 4.96 cfs @ 13.94 hrs, Volume= 8.138 af, Atten= 93%, Lag= 111.2 min
Primary = 4.96 cfs @ 13.94 hrs, Volume= 8.138 af
Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 5.00-80.00 hrs, dt= 0.05 hrs
Peak Elev= 940.20' @ 13.94 hrs Surf.Area= 157,710 sf Storage= 142,951 cf

Plug-Flow detention time= 643.8 min calculated for 8.133 af (92% of inflow)
Center-of-Mass det. time= 451.6 min (1,732.4 - 1,280.8)

Volume	Invert	Avail.Storage	Storage Description
#1	939.20'	748,322 cf	**Custom Stage Data (Conic)** Listed below (Recalc)

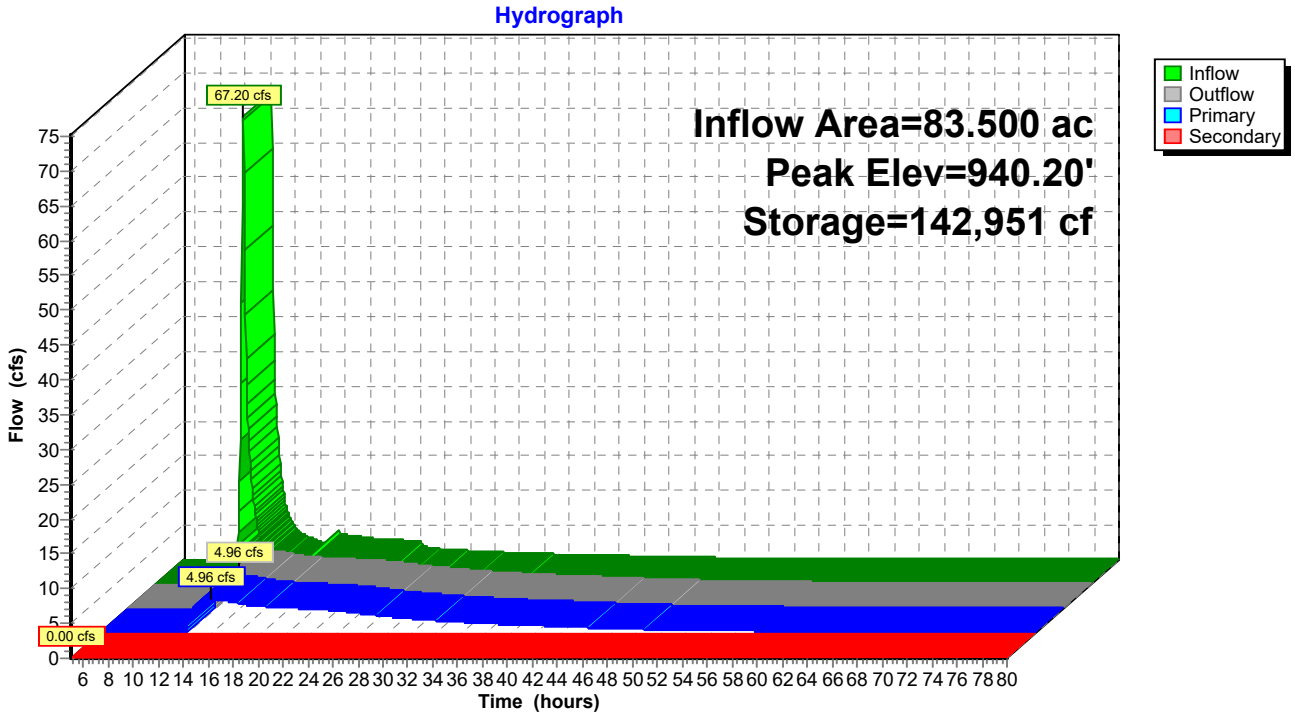
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
939.20	124,751	0	0	124,751
940.00	154,646	111,545	111,545	154,665
941.00	170,179	162,351	273,896	170,263
942.00	185,821	177,943	451,838	185,977
943.00	200,632	193,179	645,017	200,869
943.50	212,643	103,304	748,322	212,907

Device	Routing	Invert	Outlet Devices
#1	Primary	939.16'	**36.0" Round Culvert** L= 60.5' Ke= 0.500 Inlet / Outlet Invert= 939.16' / 939.00' S= 0.0026 '/' Cc= 0.900 n= 0.013, Flow Area= 7.07 sf
#2	Device 1	939.20'	**3.0" Vert. wq X 3.00** C= 0.600
#3	Device 1	939.50'	**24.0" W x 9.0" H Vert. window X 2.00** C= 0.600
#4	Device 1	941.50'	**2.4" x 2.4" Horiz. grate X 8.00 columns** X 8 rows C= 0.600 Limited to weir flow at low heads
#5	Secondary	943.00'	**15.0' 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=4.96 cfs @ 13.94 hrs HW=940.20' (Free Discharge)
└**1=Culvert** (Barrel Controls 4.96 cfs @ 3.39 fps)
  ├**2=wq** (Passes < 0.66 cfs potential flow)
  ├**3=window** (Passes < 7.54 cfs potential flow)
  └**4=grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=939.20' (Free Discharge)
└**5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 3P: Pond #1



Summary for Pond 3P: Pond #1

Inflow Area = 83.500 ac, 0.00% Impervious, Inflow Depth > 1.80" for Dublin 005 event
Inflow = 91.74 cfs @ 12.08 hrs, Volume= 12.501 af
Outflow = 8.22 cfs @ 13.59 hrs, Volume= 11.717 af, Atten= 91%, Lag= 90.4 min
Primary = 8.22 cfs @ 13.59 hrs, Volume= 11.717 af
Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 5.00-80.00 hrs, dt= 0.05 hrs
Peak Elev= 940.52' @ 13.59 hrs Surf.Area= 162,621 sf Storage= 193,925 cf

Plug-Flow detention time= 550.8 min calculated for 11.717 af (94% of inflow)
Center-of-Mass det. time= 402.4 min (1,645.2 - 1,242.7)

Volume	Invert	Avail.Storage	Storage Description
#1	939.20'	748,322 cf	**Custom Stage Data (Conic)** Listed below (Recalc)

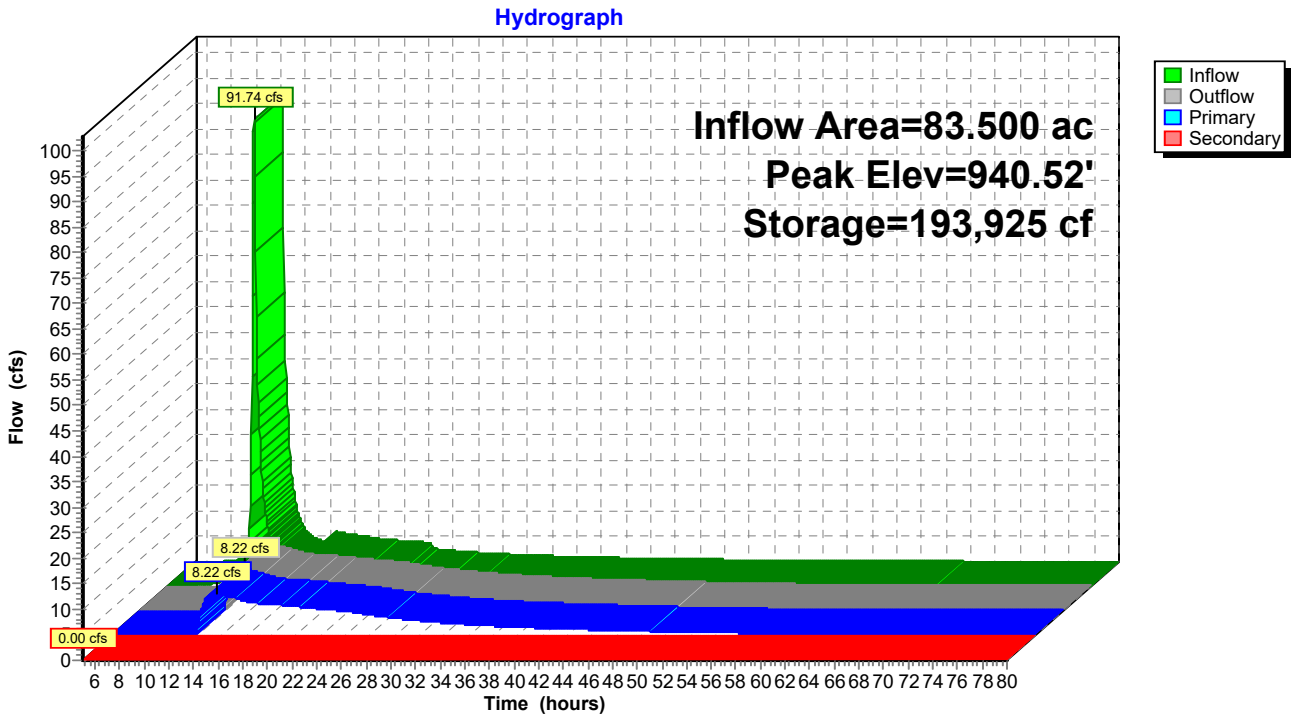
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
939.20	124,751	0	0	124,751
940.00	154,646	111,545	111,545	154,665
941.00	170,179	162,351	273,896	170,263
942.00	185,821	177,943	451,838	185,977
943.00	200,632	193,179	645,017	200,869
943.50	212,643	103,304	748,322	212,907

Device	Routing	Invert	Outlet Devices
#1	Primary	939.16'	**36.0" Round Culvert** L= 60.5' Ke= 0.500 Inlet / Outlet Invert= 939.16' / 939.00' S= 0.0026 '/' Cc= 0.900 n= 0.013, Flow Area= 7.07 sf
#2	Device 1	939.20'	**3.0" Vert. wq X 3.00** C= 0.600
#3	Device 1	939.50'	**24.0" W x 9.0" H Vert. window X 2.00** C= 0.600
#4	Device 1	941.50'	**2.4" x 2.4" Horiz. grate X 8.00 columns** X 8 rows C= 0.600 Limited to weir flow at low heads
#5	Secondary	943.00'	**15.0' 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=8.22 cfs @ 13.59 hrs HW=940.52' (Free Discharge)
└**1=Culvert** (Barrel Controls 8.22 cfs @ 3.88 fps)
  ├**2=wq** (Passes < 0.77 cfs potential flow)
  ├**3=window** (Passes < 11.42 cfs potential flow)
  └**4=grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=939.20' (Free Discharge)
└**5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 3P: Pond #1



Summary for Pond 3P: Pond #1

Inflow Area = 83.500 ac, 0.00% Impervious, Inflow Depth > 2.24" for Dublin 010 event
Inflow = 112.21 cfs @ 12.08 hrs, Volume= 15.584 af
Outflow = 11.35 cfs @ 13.42 hrs, Volume= 14.777 af, Atten= 90%, Lag= 80.3 min
Primary = 11.35 cfs @ 13.42 hrs, Volume= 14.777 af
Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 5.00-80.00 hrs, dt= 0.05 hrs
Peak Elev= 940.78' @ 13.42 hrs Surf.Area= 166,687 sf Storage= 236,720 cf

Plug-Flow detention time= 497.9 min calculated for 14.768 af (95% of inflow)
Center-of-Mass det. time= 374.2 min (1,591.6 - 1,217.4)

Volume	Invert	Avail.Storage	Storage Description
#1	939.20'	748,322 cf	**Custom Stage Data (Conic)** Listed below (Recalc)

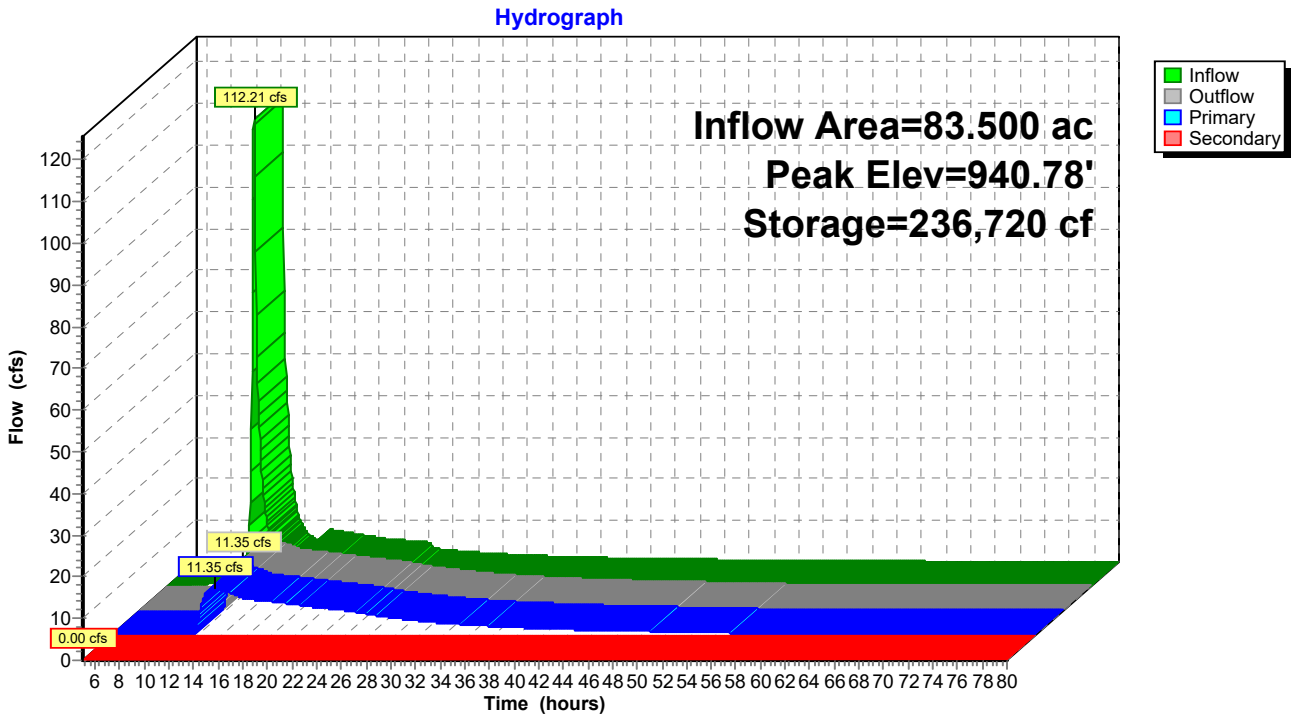
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
939.20	124,751	0	0	124,751
940.00	154,646	111,545	111,545	154,665
941.00	170,179	162,351	273,896	170,263
942.00	185,821	177,943	451,838	185,977
943.00	200,632	193,179	645,017	200,869
943.50	212,643	103,304	748,322	212,907

Device	Routing	Invert	Outlet Devices
#1	Primary	939.16'	**36.0" Round Culvert** L= 60.5' Ke= 0.500 Inlet / Outlet Invert= 939.16' / 939.00' S= 0.0026 '/' Cc= 0.900 n= 0.013, Flow Area= 7.07 sf
#2	Device 1	939.20'	**3.0" Vert. wq X 3.00** C= 0.600
#3	Device 1	939.50'	**24.0" W x 9.0" H Vert. window X 2.00** C= 0.600
#4	Device 1	941.50'	**2.4" x 2.4" Horiz. grate X 8.00 columns** X 8 rows C= 0.600 Limited to weir flow at low heads
#5	Secondary	943.00'	**15.0' 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=11.35 cfs @ 13.42 hrs HW=940.78' (Free Discharge)
└**1=Culvert** (Barrel Controls 11.35 cfs @ 4.23 fps)
  ├**2=wq** (Passes < 0.86 cfs potential flow)
  ├**3=window** (Passes < 13.63 cfs potential flow)
  └**4=grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=939.20' (Free Discharge)
└**5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 3P: Pond #1



Summary for Pond 3P: Pond #1

Inflow Area = 83.500 ac, 0.00% Impervious, Inflow Depth > 2.88" for Dublin 025 event
Inflow = 141.13 cfs @ 12.08 hrs, Volume= 20.018 af
Outflow = 16.22 cfs @ 13.27 hrs, Volume= 19.188 af, Atten= 89%, Lag= 71.4 min
Primary = 16.22 cfs @ 13.27 hrs, Volume= 19.188 af
Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 5.00-80.00 hrs, dt= 0.05 hrs
Peak Elev= 941.14' @ 13.27 hrs Surf.Area= 172,288 sf Storage= 297,428 cf

Plug-Flow detention time= 447.4 min calculated for 19.188 af (96% of inflow)
Center-of-Mass det. time= 345.1 min (1,533.7 - 1,188.6)

Volume	Invert	Avail.Storage	Storage Description
#1	939.20'	748,322 cf	**Custom Stage Data (Conic)** Listed below (Recalc)

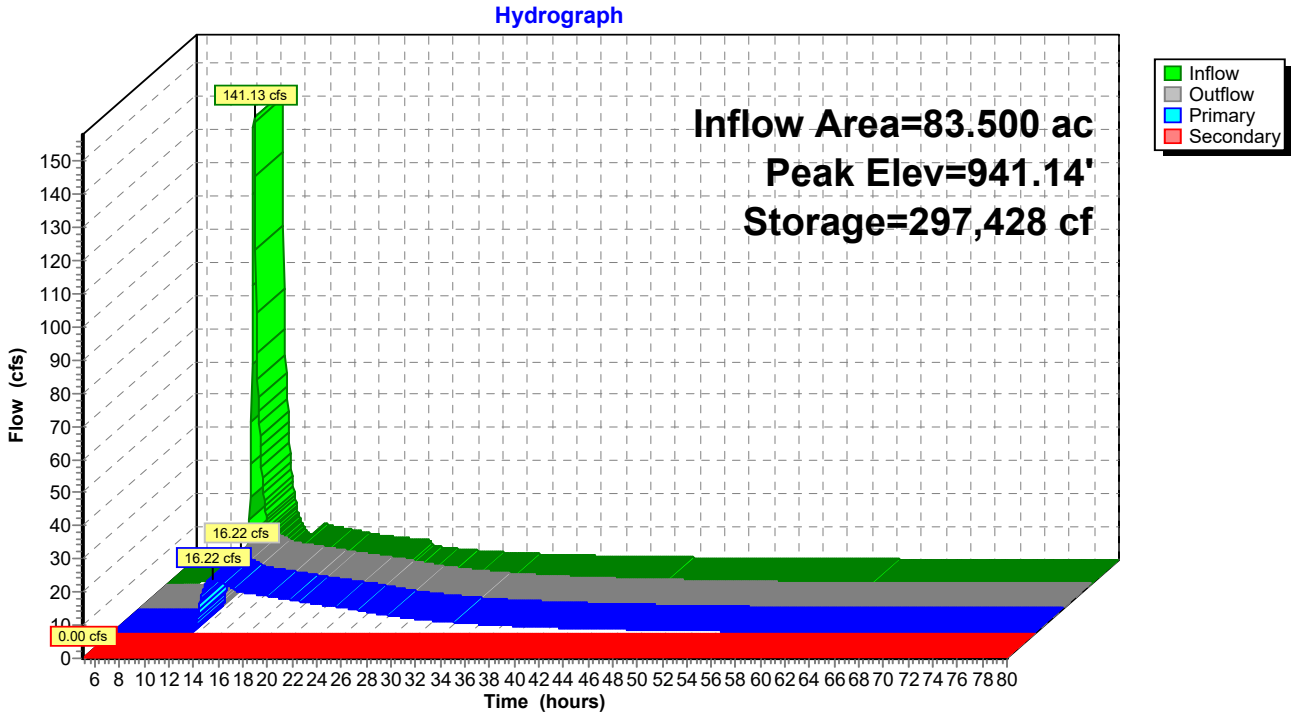
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
939.20	124,751	0	0	124,751
940.00	154,646	111,545	111,545	154,665
941.00	170,179	162,351	273,896	170,263
942.00	185,821	177,943	451,838	185,977
943.00	200,632	193,179	645,017	200,869
943.50	212,643	103,304	748,322	212,907

Device	Routing	Invert	Outlet Devices
#1	Primary	939.16'	**36.0" Round Culvert** L= 60.5' Ke= 0.500 Inlet / Outlet Invert= 939.16' / 939.00' S= 0.0026 '/' Cc= 0.900 n= 0.013, Flow Area= 7.07 sf
#2	Device 1	939.20'	**3.0" Vert. wq X 3.00** C= 0.600
#3	Device 1	939.50'	**24.0" W x 9.0" H Vert. window X 2.00** C= 0.600
#4	Device 1	941.50'	**2.4" x 2.4" Horiz. grate X 8.00 columns** X 8 rows C= 0.600 Limited to weir flow at low heads
#5	Secondary	943.00'	**15.0' 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=16.22 cfs @ 13.27 hrs HW=941.14' (Free Discharge)
└**1=Culvert** (Barrel Controls 16.22 cfs @ 4.66 fps)
  ├**2=wq** (Passes < 0.95 cfs potential flow)
  ├**3=window** (Passes < 16.17 cfs potential flow)
  └**4=grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=939.20' (Free Discharge)
└**5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 3P: Pond #1



Summary for Pond 3P: Pond #1

Inflow Area = 83.500 ac, 0.00% Impervious, Inflow Depth > 3.42" for Dublin 050 event
Inflow = 165.20 cfs @ 12.08 hrs, Volume= 23.763 af
Outflow = 19.07 cfs @ 13.26 hrs, Volume= 22.917 af, Atten= 88%, Lag= 71.0 min
Primary = 19.07 cfs @ 13.26 hrs, Volume= 22.917 af
Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 5.00-80.00 hrs, dt= 0.05 hrs
Peak Elev= 941.44' @ 13.26 hrs Surf.Area= 177,010 sf Storage= 350,642 cf

Plug-Flow detention time= 417.0 min calculated for 22.901 af (96% of inflow)
Center-of-Mass det. time= 328.8 min (1,499.5 - 1,170.7)

Volume	Invert	Avail.Storage	Storage Description
#1	939.20'	748,322 cf	**Custom Stage Data (Conic)** Listed below (Recalc)

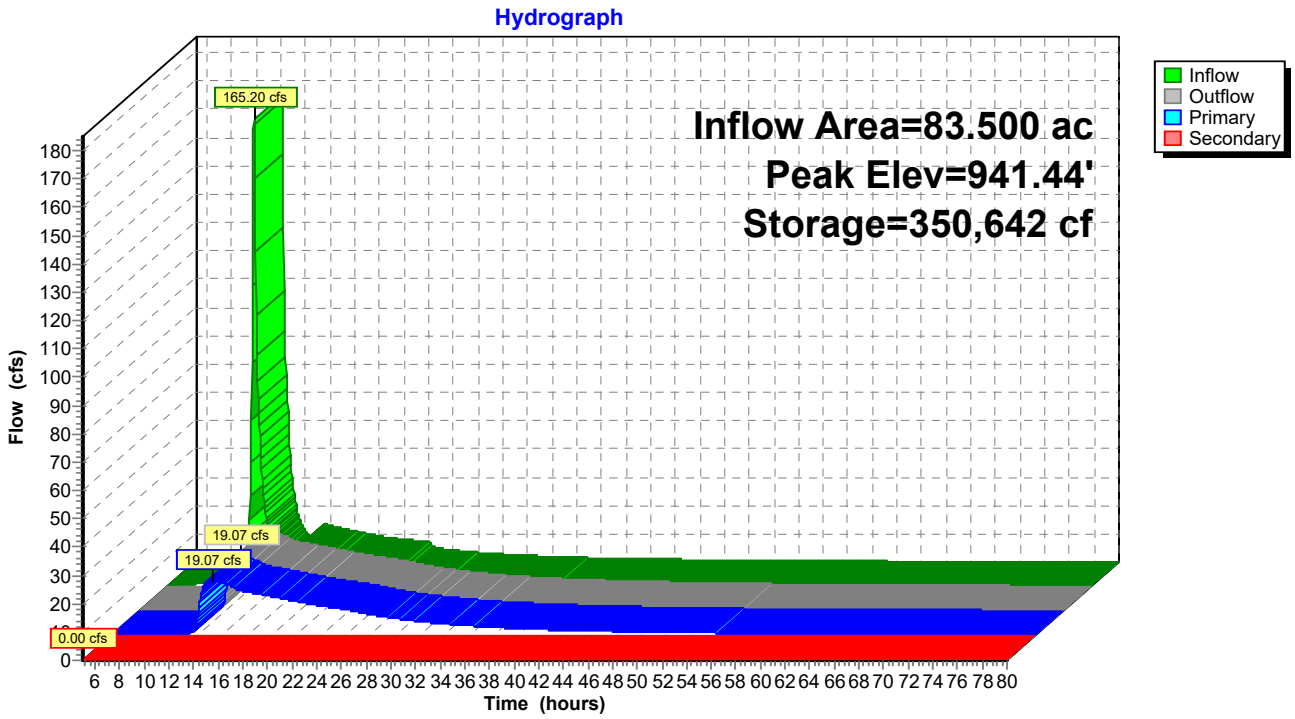
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
939.20	124,751	0	0	124,751
940.00	154,646	111,545	111,545	154,665
941.00	170,179	162,351	273,896	170,263
942.00	185,821	177,943	451,838	185,977
943.00	200,632	193,179	645,017	200,869
943.50	212,643	103,304	748,322	212,907

Device	Routing	Invert	Outlet Devices
#1	Primary	939.16'	**36.0" Round Culvert** L= 60.5' Ke= 0.500 Inlet / Outlet Invert= 939.16' / 939.00' S= 0.0026 '/' Cc= 0.900 n= 0.013, Flow Area= 7.07 sf
#2	Device 1	939.20'	**3.0" Vert. wq X 3.00** C= 0.600
#3	Device 1	939.50'	**24.0" W x 9.0" H Vert. window X 2.00** C= 0.600
#4	Device 1	941.50'	**2.4" x 2.4" Horiz. grate X 8.00 columns** X 8 rows C= 0.600 Limited to weir flow at low heads
#5	Secondary	943.00'	**15.0' 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=19.07 cfs @ 13.26 hrs HW=941.44' (Free Discharge)
└**1=Culvert** (Passes 19.07 cfs of 20.76 cfs potential flow)
  ├**2=wq** (Orifice Controls 1.03 cfs @ 7.01 fps)
  ├**3=window** (Orifice Controls 18.04 cfs @ 6.01 fps)
  └**4=grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=939.20' (Free Discharge)
└**5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 3P: Pond #1



Summary for Pond 3P: Pond #1

Inflow Area = 83.500 ac, 0.00% Impervious, Inflow Depth > 3.99" for Dublin 100 event
Inflow = 190.54 cfs @ 12.08 hrs, Volume= 27.745 af
Outflow = 25.27 cfs @ 13.14 hrs, Volume= 26.885 af, Atten= 87%, Lag= 63.5 min
Primary = 25.27 cfs @ 13.14 hrs, Volume= 26.885 af
Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 5.00-80.00 hrs, dt= 0.05 hrs
Peak Elev= 941.73' @ 13.14 hrs Surf.Area= 181,540 sf Storage= 402,361 cf

Plug-Flow detention time= 392.8 min calculated for 26.884 af (97% of inflow)
Center-of-Mass det. time= 314.0 min (1,469.1 - 1,155.0)

Volume	Invert	Avail.Storage	Storage Description
#1	939.20'	748,322 cf	**Custom Stage Data (Conic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
939.20	124,751	0	0	124,751
940.00	154,646	111,545	111,545	154,665
941.00	170,179	162,351	273,896	170,263
942.00	185,821	177,943	451,838	185,977
943.00	200,632	193,179	645,017	200,869
943.50	212,643	103,304	748,322	212,907

Device	Routing	Invert	Outlet Devices
#1	Primary	939.16'	**36.0" Round Culvert** L= 60.5' Ke= 0.500 Inlet / Outlet Invert= 939.16' / 939.00' S= 0.0026 '/' Cc= 0.900 n= 0.013, Flow Area= 7.07 sf
#2	Device 1	939.20'	**3.0" Vert. wq X 3.00** C= 0.600
#3	Device 1	939.50'	**24.0" W x 9.0" H Vert. window X 2.00** C= 0.600
#4	Device 1	941.50'	**2.4" x 2.4" Horiz. grate X 8.00 columns** X 8 rows C= 0.600 Limited to weir flow at low heads
#5	Secondary	943.00'	**15.0' 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=25.27 cfs @ 13.14 hrs HW=941.73' (Free Discharge)
└**1=Culvert** (Barrel Controls 25.27 cfs @ 5.26 fps)
  ├**2=wq** (Passes < 1.10 cfs potential flow)
  ├**3=window** (Passes < 19.64 cfs potential flow)
  └**4=grate** (Passes < 5.92 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=939.20' (Free Discharge)
└**5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 3P: Pond #1