

# 9R Burlake Road LLC

Hydrologic & Drainage Study

Prepared by

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#### Stormwater Analysis

### Proposed Development at 120 Gay Hill Road Montville, Connecticut June 4, 2009

The purpose of this stormwater analysis is to assist municipal officials and their agents in reviewing the effects of the proposed development with respect to current site drainage conditions.

This analysis is based on the Site Development Plans for 120 Gay Hill Road as prepared by Tarbell, Heintz, & Assoc., Inc.. The applicant is proposing the creation of forty new residential building lots. The stormwater facilities have been designed following guidance provided by the "2004 Connecticut Stormwater Quality Manual". They are intended to address the control of stormwater quantity as well as quality in an attempt to preserve the pre-development site hydrology.

Urbanization (e.i. site improvements) changes a watershed's response to precipitation. The most common effects are reduced infiltration and decreased travel time, which significantly increase peak discharges and runoff. Runoff is determined primarily by the amount of precipitation and by infiltration characteristics related to soil type, soil moisture, antecedent rainfall, cover type, impervious surface and surface retention.

Travel time is determined primarily by slope, length of flow path, depth of flow and roughness of flow surface. Peak discharges are based on the relationship of these parameters and on the total of drainage area of the watershed, the location of the development, the effect of any flood control works or other natural or manmade storage, and the time distribution or rainfall during a given storm event.

The following stormwater analysis follows the methodology of previous work by Martinez Couch and Associates, LLC. Minor changes to the pre development watershed models were made to improve the accuracy of the estimated pre development discharges.

In order to establish the impact of the proposed development, the predevelopment and post development watershed systems were estimated. These allow the differences to be evaluated and designs to the post development to accommodate acceptable changes.

The pre development watershed mapping shows that there are principally three runoff regimes with eight individual properties. These relate to the inland wetland corridor to the south of the property, to the inland wetland corridor to the east of the property, and the direct discharge toward Gay

Hill Road and to the properties of Nelson, Videll, Champion Mortgage, Fernandes, Evans, Souza, Jenson, and Marsala.

The post development watershed mapping maintains the pre development regimes with the three-runoff areas. These relate to the inland wetland corridor to the south of the property with pond 3, to the inland wetland corridor to the east of the property with pond 2 and the direct discharge toward Gay Hill Road with pond 1.

The runoff characteristics for the storm events of a 2, 10, 25, 50 and 100 year events were estimated using a hydrologic computer modeling software package "Hydraflow Hydrographs by Intelisolve". The SCS TR-55 methodology was used. The land area calculations, with soil type and Curve Number, along with the flow characteristics and results are shown in this attached report.

The existing watershed areas are labeled as E-1 (Total to Gay Hill Road) E-2 to Videll, E-3 to Champion Mortgage, E-4 to Fernandes, E-5 to Evans, E-6 to Souza, E-7 to Jenson, E-8 to Marsala property. This allows for an understanding of discharges onto individual properties. The rates are summarized at the end of this section.

The post development watershed mapping shows the individual drainage areas that generate flow and the inlet structures and conveyance methods for the stormwater to detention basins, prior to discharging off-site. The pre development watershed regimes have been maintained.

The resulting increase of stormwater runoff from the proposed roof areas will be collected in a stormwater depression located on each lot, as topography allow. This promotes the recharging of the groundwater from the surface water. The footing drains are shown to discharge to the individual stormwater depressions or to the nearest stormwater catch basin or manhole.

The main control of the rate of surface water flow is in the use of detention basins. These receive the collected and conveyed stormwater. The discharge from ponds 1, 2 and 3 will be controlled using a discharge structure. The detention ponds will also act as water quality devices and can be viewed as a level spreader with a plunge pool capacity. The outlets force the storage of water and control the post development discharges so that they are less that the pre development storms in the 2, 5, 10, 25, 50 and 100- year events.

Area to Pond I to Gay Hill Road

Period Years	Туре	Pre Develop	Post Develop	Impact
100	Rate	25.2 cfs	22.4 cfs	reduced 2.8 cfs
50	Rate	21.1 cfs	19.0 cfs	reduced 2.1 cfs
25	Rate	18.1 cfs	16.4 cfs	reduced 1.7 cfs
I O	Rate	17.1 cfs	15.5 cfs	reduced 1.6 cfs
2	Rate	7.3 cfs	6.9 cfs	reduced 0.4 cfs

## Area from Dennis Drive to Videll Property

Period Years	Туре	Pre Develop	Post Develop	Impact
100	Rate	7.0 cfs	5.7 cfs	reduced 1.3 cfs
50	Rate	5.8 cfs	4.8 cfs	reduced 1.0 cfs
25	Rate	4.9 cfs	4.2 cfs	reduced 0.7 cfs
10	Rate	4.6 cfs	3.9 cfs	reduced 0.7 cfs
2	Rate	1.8 cfs	1.7 cfs	reduced 0.1 cfs

### Area to Champion Mortgage to the Northeast ,

Period Years	Type	Pre Develop	Post Develop	Impact
100	Rate	3.0 cfs	2.9 cfs	reduced 0.1 cfs
50	Rate	2.5 cfs	2.4 cfs	reduced 0.1 cfs
25	Rate	2.1 cfs	2.1 cfs	no change
10	Rate	2.0 cfs	2.0 cfs	no change
2	Rate	0.8 cfs	0.8 cfs	no change

### Area to Fernandes Property to East

Period Years	Туре	Pre Develop	Post Develop	lmpac <del>t</del>
100	Rate	2.4 cfs	2.3 cfs	reduced 0.1 cfs
50	Rate	2.0 cfs	1.9 cfs	reduced 0.1 cfs
25	Rate	1.7 cfs	1.7 cfs	no change
10	Rate	1.6 cfs	1.6 cfs	no change
2	Rate	0.7 cfs	0.7 cfs	no change

### Area to Evans Property to East

Period Years	Туре	Pre Develop	Post Develop	Impact
100	Rate	31.7 cfs	30.1 cfs	reduced 1.6 cfs
50	Rate	26.4 cfs	25.4 cfs	reduced 1.0 cfs
25	Rate	22.5 cfs	21.9 cfs	reduced 0.6 cfs
10	Rate	21.2 cfs	20.8 cfs	reduced 0.4 cfs
2	Rate	8.6 cfs	9.2 cfs *	see note

<sup>\* —</sup> Further reduction of 1.2 cfs is achieved by inclusion of rain gardens that serve as detention basins for roof water. Net reduction for 2 year storm is 0.6 cfs.

### Area to Souza Property to East

Period Years	Type	Pre Develop	Post Develop	Impact
100	Rate	10.0 cfs	8.4 cfs	reduced 1.6 cfs
50	Rate	8.3 cfs	7.0 cfs	reduced 1.3 cfs
25	Rate	7.0 cfs	6.0 cfs	reduced 1,0 cfs
10	Rate	6.6 cfs	5.6 cfs	reduced 1.0 cfs
2	Rate	2.6 cfs	2.3 cfs	reduced 0.3 cfs

## Area to Jenson Property to Southeast

Period Years	Type	Pre Develop	Post Develop	Impact
100	Rate	7.1 cfs	7.0 cfs	reduced 0.1 cfs
50	Rate	5.9 cfs	5.9 cfs	no change
25	Rate	5.0 cfs	5.0 cfs	no change
10	Rate	4.7 cfs	4.7 cfs	no change
2.	Rate	l.9 cfs	1.9 cfs	no change

## Area of Pond 3 to Marsala Property Southeast

Period Years	Туре	Pre Develop	Post Develop	Impact
100	Rate	41.9 cfs	37.8 cfs	reduced 4.1 cfs
50	Rate	34.9 cfs	31.6 cfs	reduced 3.3 cfs
25	Rate	29.7 cfs	27.1 cfs	reduced 2,6 cfs
10	Rate	28.0 cfs	25.6 cfs	reduced 2.4 cfs
2	Rate	II.3 cfs	10.6 cfs	reduced 0.7 cfs

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# Hydrograph Return Period Recap

'vd.	Hydrograph					Hydrograph					
). 	type (origin)	Hyd(s)	1-Yr	2-Yr	3-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr	description
1	SCS Runoff			7.276		11.35	17.14	18.13	21.14	25.20	Area E1-Pre to Gay Hill Rd
2	SCS Runoff			1.816		2.965	4.637	4.926	5.806	7.002	Area E2-Pre to Videll
3	SCS Runoff			0.781		1.268	1.979	2.102	2.476	2.985	Area E3- Pre to Champion
4	SCS Runoff			0.634		1.027	1.597	1.697	2.000	2.413	Area E4-Pre to Fernandez
5	SCS Runoff			8.567		13.71	21.17	22.46	26.37	31.68	Area E8-Pre to Evans
6	SCS Runoff			2.607		4.228	6.601	7.011	8.260	9.956	Area E6-Pre to Souza
7	SCS Runoff			1.850	( <del></del> ,	3.000	4.685	4.976	5.862	7.066	Area E7-Pre to Jensen
8	SCS Runoff			11.33		18.15	27.97	29.67	34.86	41.90	Area E8-Pre to Marsala
9	SCS Runoff			2.301		3.409	4.948	5.210	6.003	7.066	Post to D-Basin1
10	Reservoir	9		1.159		1.568	2.020	2.090	2.290	2.525	Outflow D-Basin1
11	SCS Runoff			5.848		9.119	13.78	14.58	16.99	20.25	Post Bypass D-Basin1
12	Combine	10, 11		6.884		10.48	15.53	16.39	18.98	22.45	Total Post to Gay Hill Rd
13	SCS Runoff			1.756		2.668	3.951	4.169	4.828	5.715	Area E2-Post to Videll
14	SCS Runoff			0.842		1.313	1.983	2.098	2.445	2.915	Area P36-Post to Champion
15	SCS Runoff			0.692		1.060	1.589	1.679	1.952	2.320	Area P35-Post to Fernandez
	SCS Runoff			2.418		3.502	4.987	5.237	5.988	6.991	Post to D-Basin2
17	Reservoir	16		1.052	******	1.250	1.506	1.547	1.668	1.776	Outflow D-Basin2
18	SCS Runoff			8.187		12.74	19.25	20.37	23.77	28.36	Post Bypass D-Basin2
19	Combine	17, 18		9.188		13.98	20.76	21.92	25.44	30.14	Total Post to Evans
20	SCS Runoff			2.340		3.694	5.641	5.975	6.989	8.361	Area P33-Post to Souza
21	SCS Runoff			1.961		3.097	4.728	5.008	5.858	7.009	Area P32-Post to Jensen
22	SCS Runoff			11.07		16.24	23.39	24.59	28.23	33.09	Post to D-Basin3
23	Reservoir	22		1.676		2.174	2.702	2.779	3.001	3.253	Outflow D-Basin3
24	SCS Runoff			9.546		15.29	23.60	25.04	29.39	35.28	Post Bypass D-Basin3
25	Combine	23, 24		10.60		16.77	25.58	27.07	31.61	37.75	Total Post to Marsala

Proj. file: 9R Burlake Rd LLC.gpw

Friday, Jun 12 2009, 10:00 AM

# Hydrograph Summary Report

uvd.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description		
1	SCS Runoff	7.276	2	738	36,969				Area E1-Pre to Gay Hill Rd		
2	SCS Runoff	1.816	6	738	10,059				Area E2-Pre to Videll		
3 .	SCS Runoff	0.781	2	738	3,906				Area E3- Pre to Champion		
4	SCS Runoff	0.634	2	732	2,718				Area E4-Pre to Fernandez		
5	SCS Runoff	8.567	2	752	56,626				Area E8-Pre to Evans		
6	SCS Runoff	2.607	2	740	13,561				Area E6-Pre to Souza		
7	SCS Runoff	1.850	2	740	9,624				Area E7-Pre to Jensen		
8	SCS Runoff	11.33	2	748	67,809				Area E8-Pre to Marsala		
9	SCS Runoff	2.301	2	734	10,233				Post to D-Basin1		
10	Reservoir	1.159	2	752	9,578	9	316.31	3,071	Outflow D-Basin1		
11	SCS Runoff	5.848	2	738	29,714				Post Bypass D-Basin1		
12	Combine	6.884	2	740	39,291	10, 11			Total Post to Gay Hill Rd		
13	SCS Runoff	1.756	2	736	8,458				Area E2-Post to Videll		
14	SCS Runoff	0.842	2	736	4,109				Area P36-Post to Champion		
15	SCS Runoff	0.692	2	732	2,881				Area P35-Post to Fernandez		
1	SCS Runoff	2.418	2	724	7,233				Post to D-Basin2		
17	Reservoir	1.052	2	736	6,949	16	333.99	1,713	Outflow D-Basin2		
18	SCS Runoff	8.187	2	746	48,175				Post Bypass D-Basin2		
19	Combine	9.188	2	746	55,124	17, 18			Total Post to Evans		
20	SCS Runoff	2.340	2	740	11,969			*****	Area P33-Post to Souza		
21	SCS Runoff	1.961	2	740	10,033				Area P32-Post to Jensen		
22	SCS Runoff	11.07	2	736	52,631				Post to D-Basin3		
23	Reservoir	1.676	2	796	48,551	22	337.83	25,586	Outflow D-Basin3		
24	SCS Runoff	9.546	2	738	47,350				Post Bypass D-Basin3		
25	Combine	10.60	2	738	95,901	23, 24			Total Post to Marsala		
9R B	R Burlake Rd LLC.gpw					Return Period: 2 Year			Friday, Jun 12 2009, 10:00 AM		

Hydraflow Hydrographs by Intelisolve

Friday, Jun 12 2009, 10:0 AM

### Hyd. No. 1

Area E1-Pre to Gay Hill Rd

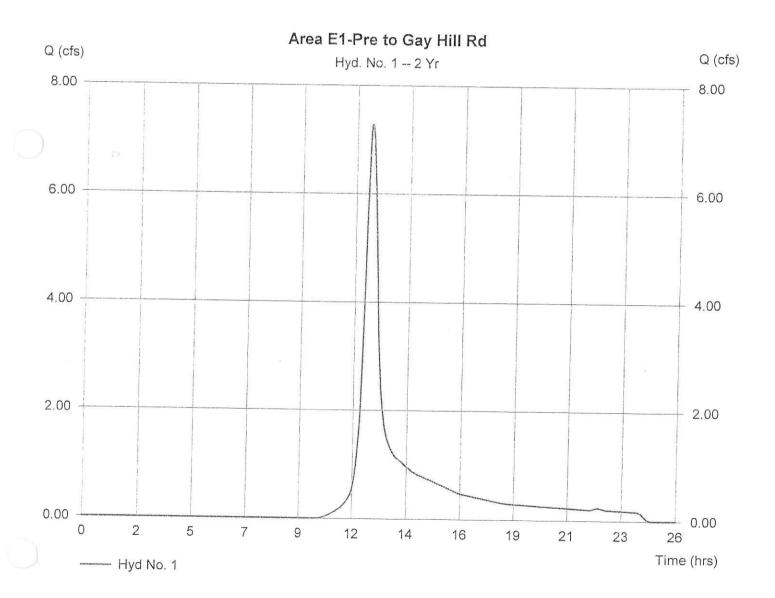
Hydrograph type = SCS Runoff

Storm frequency = 2 yrs
Drainage area = 8.000 ac
Basin Slope = 0.0 %
Tc method = USER

Total precip. = 3.40 in Storm duration = 24 hrs Peak discharge = 7.276 cfs
Time interval = 2 min
Curve number = 76
Hydraulic length = 0 ft
Time of conc. (Tc) = 25.20 min

Distribution = Type III Shape factor = 484

Hydrograph Volume = 36,969 cuft



Hydraflow Hydrographs by Intelisolve

Friday, Jun 12 2009, 10:0 AM

#### Hyd. No. 2

Area E2-Pre to Videll

Hydrograph type = SCS Runoff

= 2 yrs Storm frequency

Drainage area = 2.490 acBasin Slope = 0.0 %

Tc method = USER Total precip.

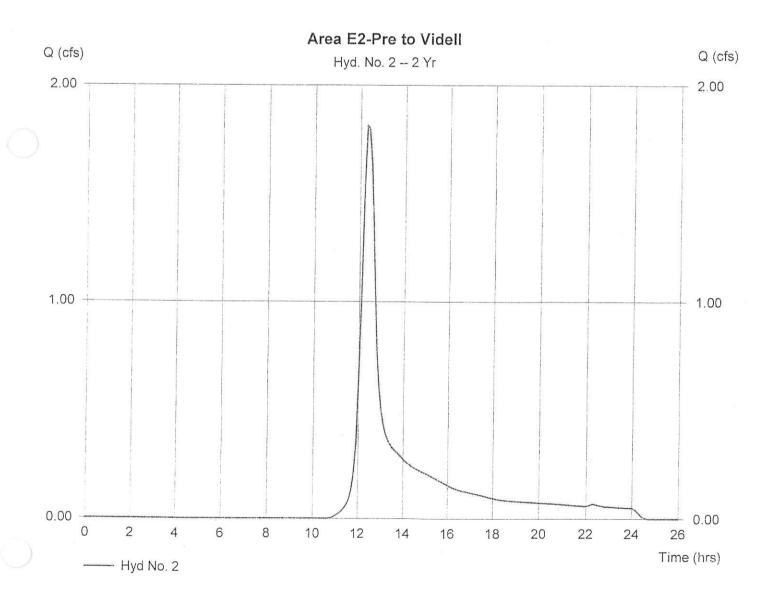
= 3.40 inStorm duration = 24 hrs

Peak discharge = 1.816 cfsTime interval = 6 min Curve number = 73Hydraulic length = 0 ft

Time of conc. (Tc) = 22.38 minDistribution = Type III

Shape factor = 484

Hydrograph Volume = 10,059 cuft



Hydraflow Hydrographs by Intelisolve

Friday, Jun 12 2009, 10:0 AM

### Hyd. No. 3

Area E3- Pre to Champion

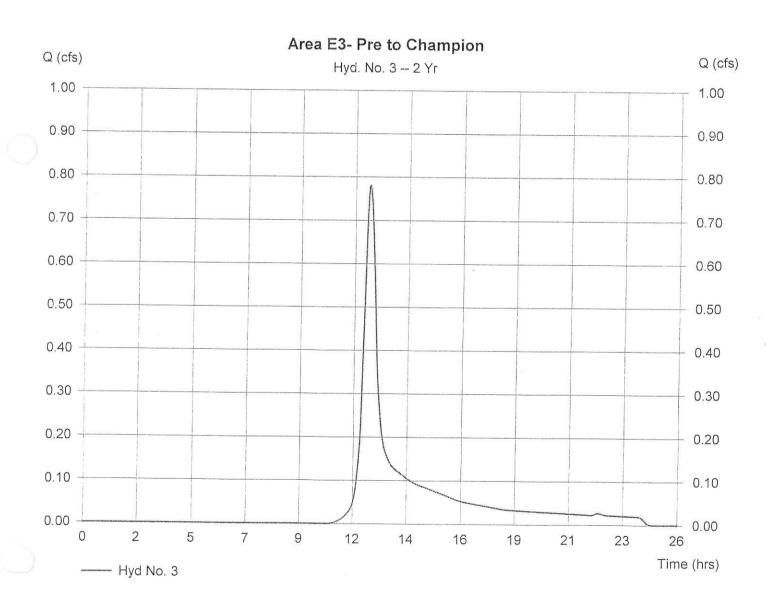
Hydrograph type = SCS Runoff Storm frequency = 2 yrs

Drainage area = 0.950 ac
Basin Slope = 0.0 %
Tc method = USFR

Tc method = USER Total precip. = 3.40 in Storm duration = 24 hrs Peak discharge = 0.781 cfs
Time interval = 2 min
Curve number = 73
Hydraulic length = 0 ft
Time of conc. (Tc) = 22.60 min

Distribution = Type III Shape factor = 484

Hydrograph Volume = 3,906 cuft



Hydraflow Hydrographs by Intelisolve

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### Hyd. No. 4

Area E4-Pre to Fernandez

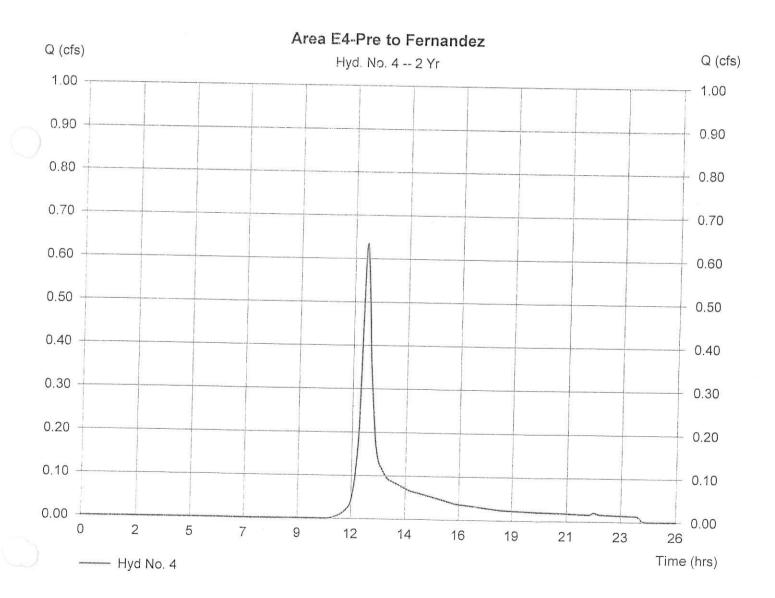
Hydrograph type = SCS Runoff Storm frequency = 2 yrs

Storm frequency = 2 yrs
Drainage area = 0.690 ac
Basin Slope = 0.0 %

Tc method = USER Total precip. = 3.40 in Storm duration = 24 hrs Peak discharge = 0.634 cfs
Time interval = 2 min
Curve number = 73
Hydraulic length = 0 ft
Time of conc. (Tc) = 14.76 min

Distribution = Type III
Shape factor = 484

Hydrograph Volume = 2,718 cuft



Hydraflow Hydrographs by Intelisolve

Friday, Jun 12 2009, 10:0 AM

### Hyd. No. 5

Area E8-Pre to Evans

Hydrograph type = SCS Runoff

Storm frequency = 2 yrs

Drainage area = 13.190 ac

Basin Slope = 0.0 %

Tc method = USER

Total precip.

= 3.40 in

Storm duration = 24 hrs Peak discharge

= 8.567 cfs

Time interval

 $= 2 \min$ 

Curve number

= 74

Hydraulic length

= 0 ft

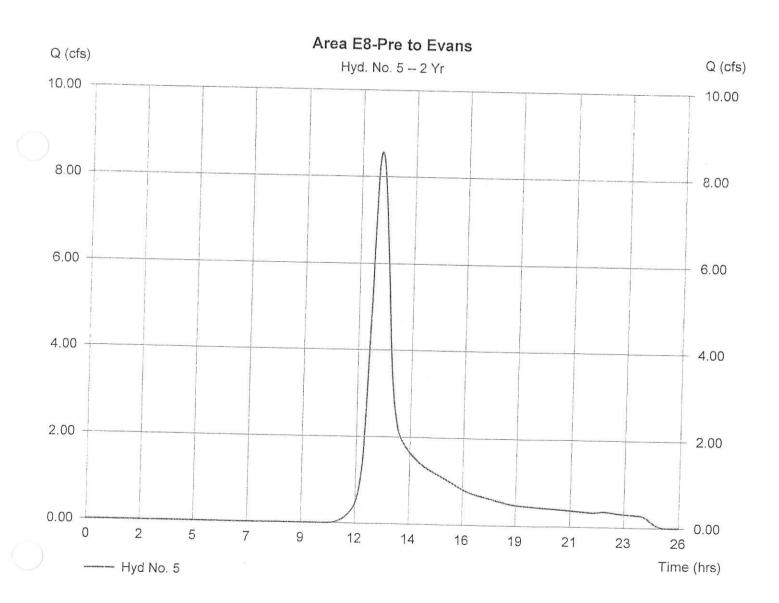
Time of conc. (Tc) = 40.80 min Distribution

= Type III

Shape factor

= 484

Hydrograph Volume = 56,626 cuft



Hydraflow Hydrographs by Intelisolve

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### Hyd. No. 6

Area E6-Pre to Souza

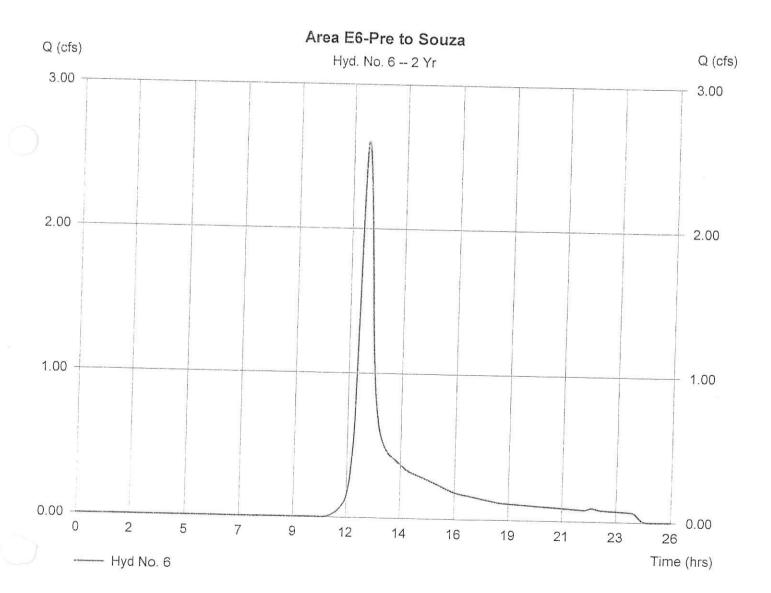
Hydrograph type = SCS Runoff

Storm frequency = 2 yrs
Drainage area = 3.410 ac
Basin Slope = 0.0 %

Tc method = USER Total precip. = 3.40 in Storm duration = 24 hrs Peak discharge = 2.607 cfs
Time interval = 2 min
Curve number = 73
Hydraulic length = 0 ft
Time of conc. (Tc) = 24.30 min
Distribution = Type III

Distribution = Type III
Shape factor = 484

Hydrograph Volume = 13,561 cuft



Hydraflow Hydrographs by Intelisolve

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### Hyd. No. 7

Area E7-Pre to Jensen

Hydrograph type = SCS Runoff

Storm frequency = 2 yrs
Drainage area = 2.420 ac
Basin Slope = 0.0 %

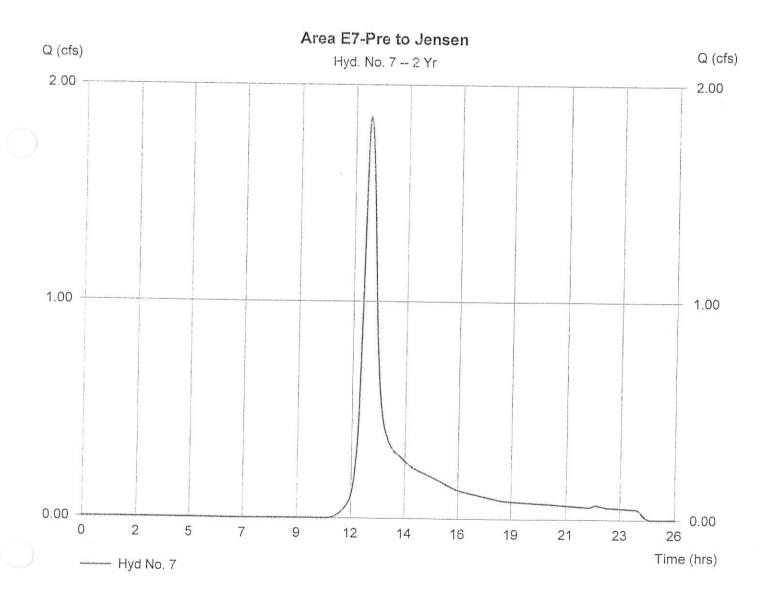
Tc method = USER Total precip. = 3.40 in

Storm duration = 24 hrs

Peak discharge = 1.850 cfs
Time interval = 2 min
Curve number = 73
Hydraulic length = 0 ft
Time of conc. (Tc) = 23.76 min

Distribution = Type III Shape factor = 484

Hydrograph Volume = 9,624 cuft



Hydraflow Hydrographs by Intelisolve

Friday, Jun 12 2009, 10:0 AM

### Hyd. No. 8

Area E8-Pre to Marsala

Hydrograph type = SCS Runoff

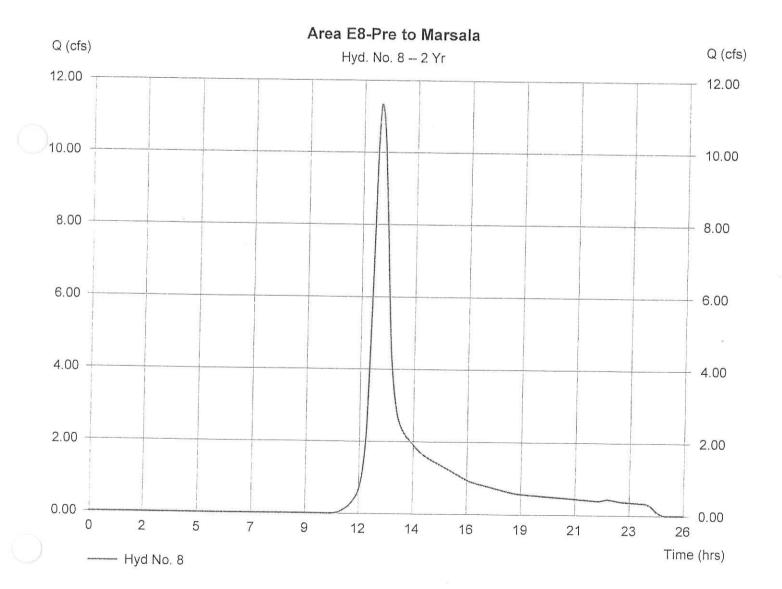
Storm frequency = 2 yrs
Drainage area = 16.130 ac

Basin Slope = 0.0 %
Tc method = USER

Total precip. = 3.40 in Storm duration = 24 hrs Peak discharge = 11.33 cfs
Time interval = 2 min
Curve number = 74
Hydraulic length = 0 ft
Time of conc. (Tc) = 34.56 min
Distribution = Type III

Distribution = Type III Shape factor = 484

Hydrograph Volume = 67,809 cuft



Hydraflow Hydrographs by Intelisolve

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### Hyd. No. 9

Post to D-Basin1

Hydrograph type = SCS Runoff

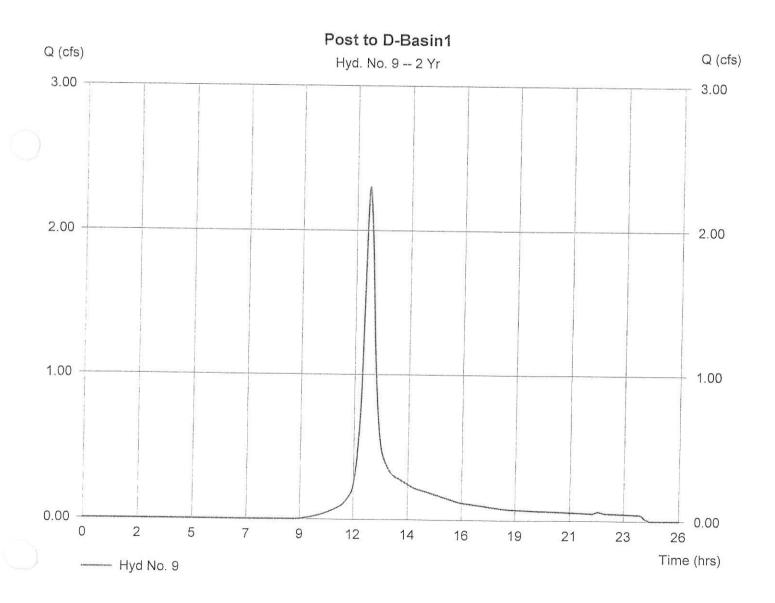
Storm frequency = 2 yrs
Drainage area = 1.810 ac
Basin Slope = 0.0 %

To method = USER
Total precip. = 3.40 in
Storm duration = 24 hrs

Peak discharge = 2.301 cfs
Time interval = 2 min
Curve number = 80
Hydraulic length = 0 ft

Time of conc. (Tc) = 18.00 min
Distribution = Type III
Shape factor = 484

Hydrograph Volume = 10,233 cuft



Hydraflow Hydrographs by Intelisolve

Friday, Jun 12 2009, 10:0 AM

### Hyd. No. 10

Outflow D-Basin1

Hydrograph type = Reservoir Storm frequency = 2 yrs Inflow hyd. No. = 9

Reservoir name = D-Basin1

Peak discharge

= 1.159 cfs

Time interval

 $= 2 \min$ 

Max. Elevation

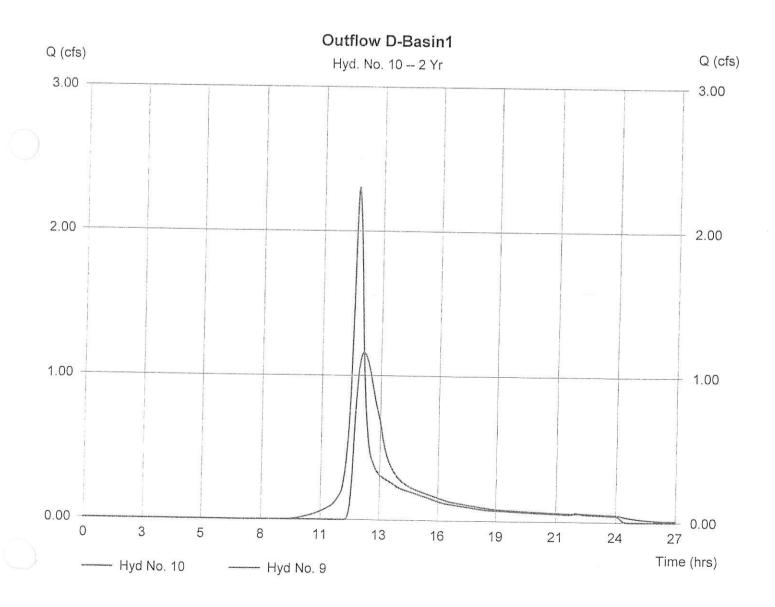
= 316.31 ft

Max. Storage

= 3,071 cuft

Storage Indication method used.

Hydrograph Volume = 9,578 cuft



## **Pond Report**

Hydraflow Hydrographs by Intelisolve

Friday, Jun 12 2009, 10:0 AM

#### Pond No. 1 - D-Basin1

#### Pond Data

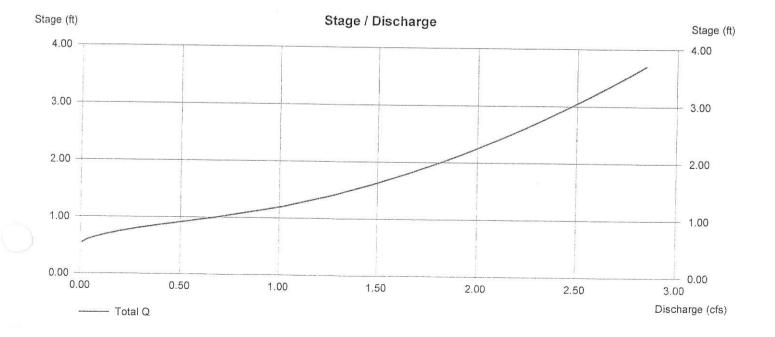
Pond storage is based on known contour areas. Average end area method used.

#### Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	315.00	725	0	0
0.50	315.50	1,843	642	642
1.00	316.00	2,960	1,201	1,843
3.00	318.00	4,850	7.810	9.653
3.70	318.70	5,630	3,668	13,321

Culvert / Or	ifice Struct		Weir Struct	Weir Structures							
	[A]	[B]	[C]	[D]		[A]	[B]	[C]	[D]		
Rise (in)	= 8.00	0.00	0.00	0.00	Crest Len (ft)	= 0.00	0.00	0.00	0.00		
Span (in)	= 8.00	0.00	0.00	0.00	Crest El. (ft)	= 0.00	0.00	0.00	0.00		
No. Barreis	= 1	0	0	0	Weir Coeff.	= 0.00	0.00	0.00	0.00		
Invert El. (ft)	= 315.50	0.00	0.00	0.00	Weir Type	=			5777		
Length (ft)	= 0.00	0.00	0.00	0.00	Multi-Stage	= No	No	No	No.		
Slope (%)	= 0.00	0.00	0.00	0.00			,,,	110	NO		
N-Value	= .013	.000	.000	.000							
Orif. Coeff.	= 0.60	0.00	0.00	0.00							
Multi-Stage	= n/a	No	No	No	Exfiltration = 0.000 in/hr (Contour) Tailwater Elev. = 0.00 ft						

Note: Culvert/Orifice outflows have been analyzed under inlet and outlet control.



Hydraflow Hydrographs by Intelisolve

Friday, Jun 12 2009, 10:0 AM

### Hyd. No. 11

Post Bypass D-Basin1

Hydrograph type = SCS Runoff

Storm frequency = 2 yrs
Drainage area = 6.430 ac
Basin Slope = 0.0 %
Tc method = USER

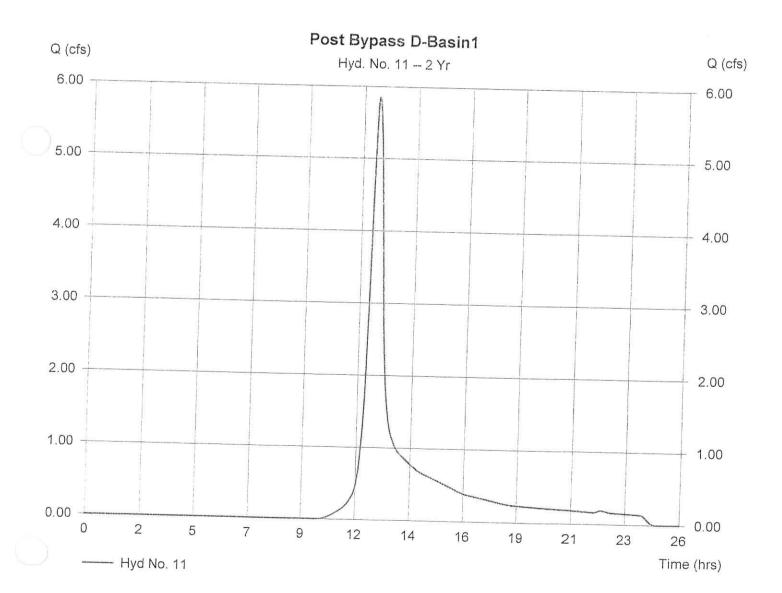
To method = USER
Total precip. = 3.40 in
Storm duration = 24 hrs

Peak discharge = 5.848 cfs
Time interval = 2 min
Curve number = 76
Hydraulic length = 0 ft
Time of conc. (Tc) = 26.16 min

Distribution = Type III

Shape factor = 484

Hydrograph Volume = 29,714 cuft



Hydraflow Hydrographs by Intelisolve

Friday, Jun 12 2009, 10:0 AM

Hyd. No. 12

Total Post to Gay Hill Rd

Hydrograph type = Combine Storm frequency = 2 yrs

Inflow hyds.

= 10, 11

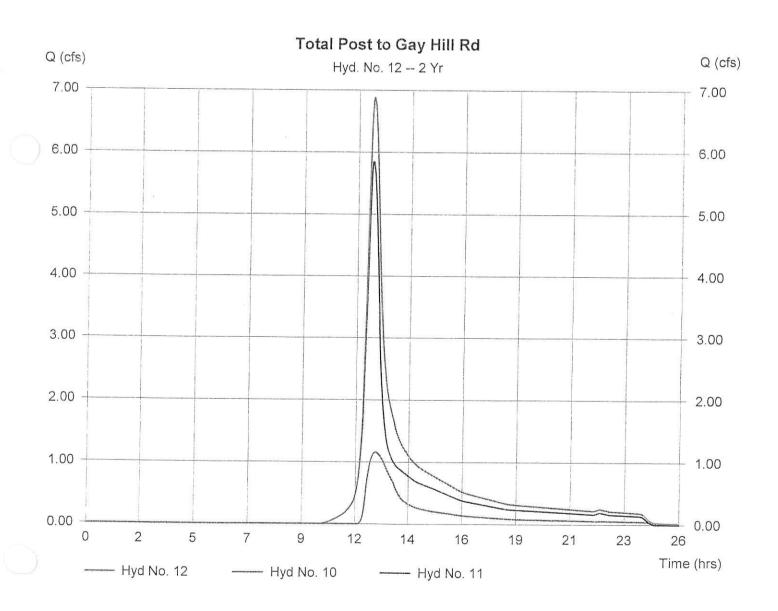
Peak discharge

= 6.884 cfs

Time interval

 $= 2 \min$ 

Hydrograph Volume = 39,291 cuft



Hydraflow Hydrographs by Intelisolve

Friday, Jun 12 2009, 10:0 AM

### Hyd. No. 13

Area E2-Post to Videll

= SCS Runoff Hydrograph type

Storm frequency = 2 yrsDrainage area = 1.610 acBasin Slope = 0.0 %Tc method = USER

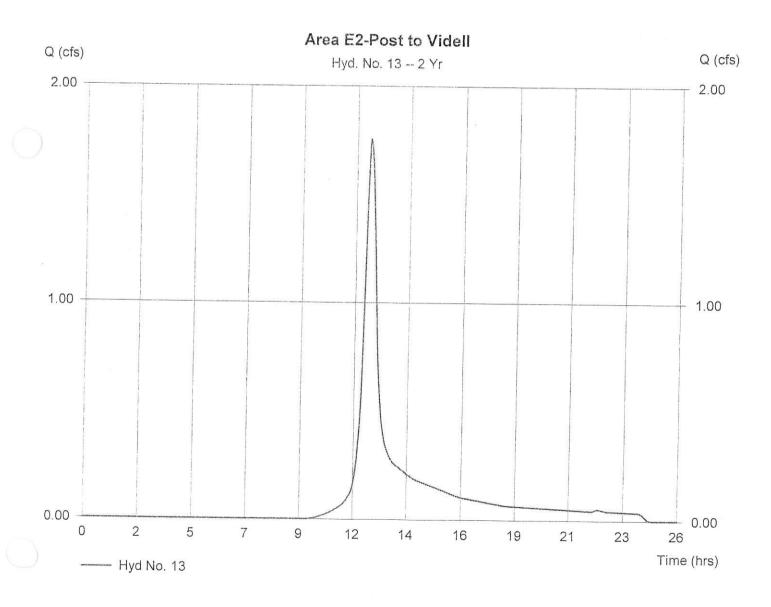
Total precip. = 3.40 in

Storm duration = 24 hrs

Peak discharge = 1.756 cfsTime interval  $= 2 \min$ Curve number = 78 Hydraulic length = 0 ftTime of conc. (Tc) = 22.38 min

Distribution = Type III Shape factor = 484

Hydrograph Volume = 8,458 cuft



Hydraflow Hydrographs by Intelisolve

Friday, Jun 12 2009, 10:0 AM

#### Hyd. No. 14

Area P36-Post to Champion

Hydrograph type = SCS Runoff

Storm frequency = 2 yrsDrainage area = 0.860 acBasin Slope = 0.0 %

Tc method = USER Total precip.

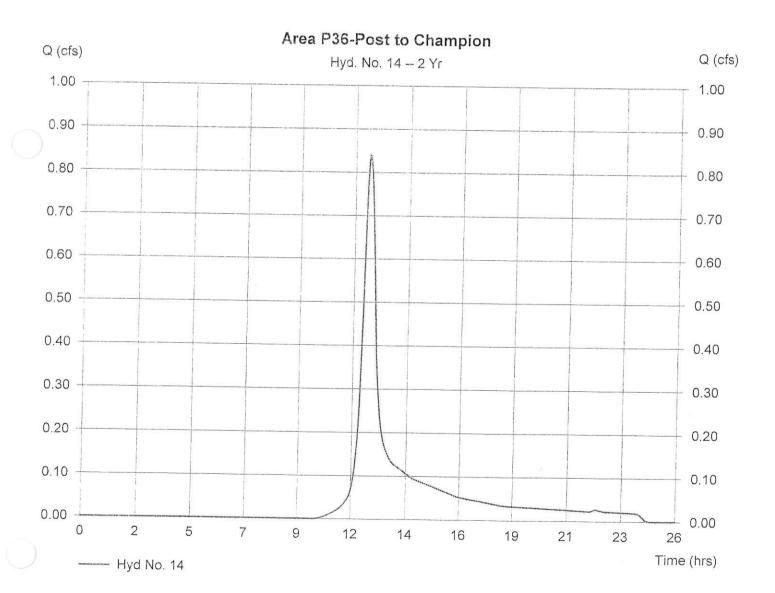
= 3.40 inStorm duration = 24 hrs

Peak discharge = 0.842 cfsTime interval = 2 min Curve number = 76Hydraulic length = 0 ft

Time of conc. (Tc) = 22.62 minDistribution = Type III

Shape factor = 484

Hydrograph Volume = 4,109 cuft



Hydraflow Hydrographs by Intelisolve

Friday, Jun 12 2009, 10:0 AM

#### Hyd. No. 15

Area P35-Post to Fernandez

Hydrograph type = SCS Runoff Storm frequency = 2 yrs Drainage area = 0.600 ac Basin Slope = 0.0 %

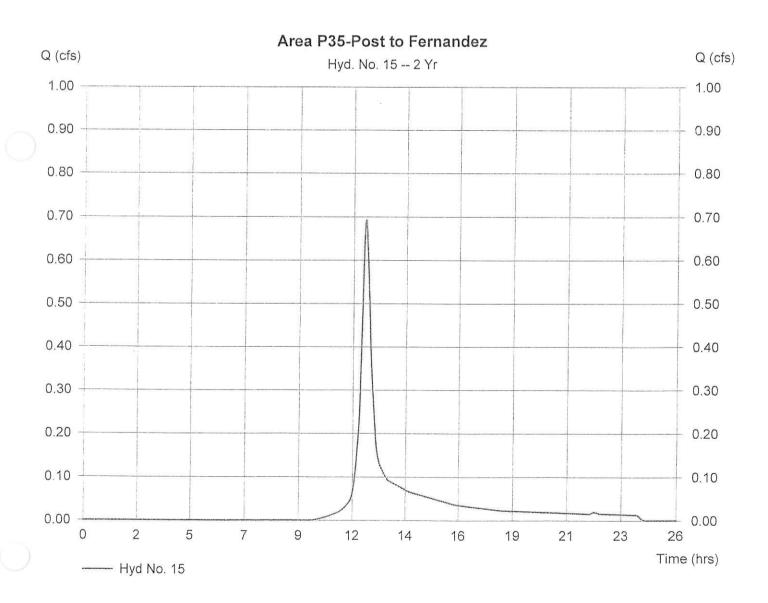
Tc method = USER Total precip. = 3.40 in

Total precip. = 3.40 ir Storm duration = 24 hrs Peak discharge = 0.692 cfs Time interval = 2 min Curve number = 77 Hydraulic length = 0 ft

Time of conc. (Tc) = 14.76 min Distribution = Type III

Shape factor = 484

Hydrograph Volume = 2,881 cuft



Hydraflow Hydrographs by Intelisolve

Friday, Jun 12 2009, 10:0 AM

### Hyd. No. 16

Post to D-Basin2

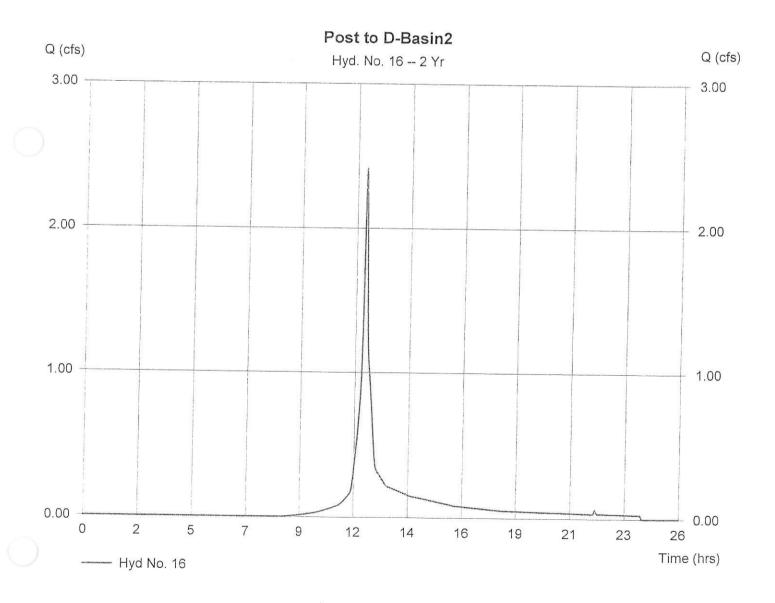
Hydrograph type = SCS Runoff

Storm frequency = 2 yrs
Drainage area = 1.250 ac
Basin Slope = 0.0 %
Tc method = USER

Total precip. = 3.40 in Storm duration = 24 hrs Peak discharge = 2.418 cfs
Time interval = 2 min
Curve number = 82
Hydraulic length = 0 ft
Time of conc. (Tc) = 6.00 min

Distribution = Type III Shape factor = 484

Hydrograph Volume = 7,233 cuft



Hydraflow Hydrographs by Intelisolve

Friday, Jun 12 2009, 10:0 AM

### Hyd. No. 17

Outflow D-Basin2

Hydrograph type = Reservoir Storm frequency = 2 yrs Inflow hyd. No. = 16

Reservoir name = D-Basin2

Peak discharge

= 1.052 cfs

Time interval

= 2 min

Max. Elevation

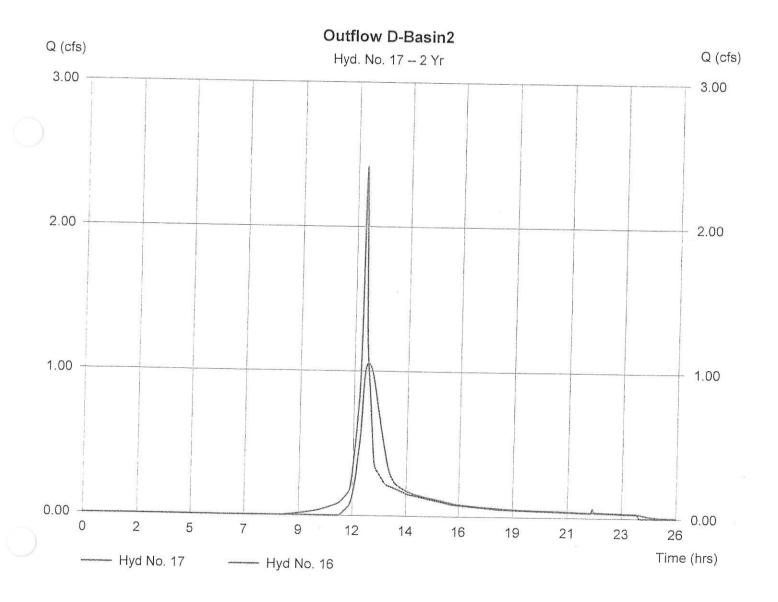
= 333.99 ft

Max. Storage

= 1,713 cuft

Storage Indication method used.

Hydrograph Volume = 6,949 cuft



# **Pond Report**

Hydraflow Hydrographs by Intelisolve

Friday, Jun 12 2009, 10:0 AM

#### Pond No. 2 - D-Basin2

#### Pond Data

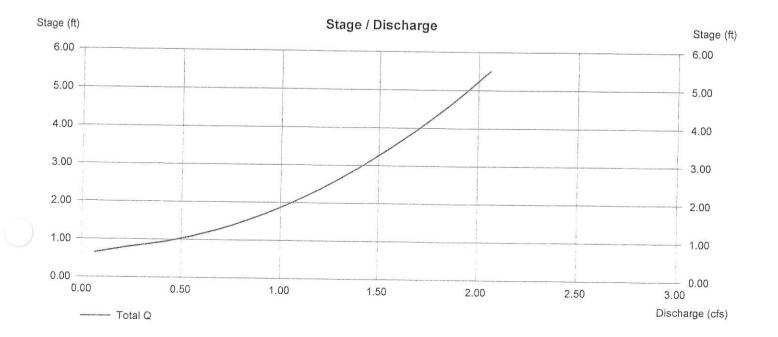
Pond storage is based on known contour areas. Average end area method used.

#### Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	332.00	465	0	0
0.50	332.50	663	282	282
2.00	334.00	1,260	1,442	1,724
4.00	336.00	2,335	3,595	5,319
5.50	337.50	3,800	4,601	9,921

Culvert / Or	ifice Struct	ures			Weir Struct	Weir Structures					
	[A]	[B]	[C]	[D]		[A]	[B]	[C]	[D]		
Rise (in)	= 6.00	0.00	0.00	0.00	Crest Len (ft)	= 0.00	0.00	0.00	0.00		
Span (in)	= 6.00	0.00	0.00	0.00	Crest El. (ft)	= 0.00	0.00	0.00	0.00		
No. Barrels	= 1	0	0	0	Weir Coeff.	= 0.00	0.00	0.00	0.00		
Invert El. (ft)	= 332.50	0.00	0.00	0.00	Weir Type	=					
Length (ft)	= 0.00	0.00	0.00	0.00	Multi-Stage	= No	No	No	No		
Slope (%)	= 0.00	0.00	0.00	0.00	maiti otago	140	NO	INO	IVO		
N-Value	= .013	.000	.000	.000							
Orif. Coeff.	= 0.60	0.00	0.00	0.00							
Multi-Stage = n/a No No No Exfiltration = 0.000 in/hr (Contour) Tailwater Elev. = 0.00 ft									ev. = 0.00 ft		

Note: Culvert/Orifice outflows have been analyzed under inlet and outlet control.



Hydraflow Hydrographs by Intelisoive

Friday, Jun 12 2009, 10:0 AM

### Hyd. No. 18

Post Bypass D-Basin2

Hydrograph type = SCS Runoff

Storm frequency = 2 yrs
Drainage area = 10.380 ac

Basin Slope = 0.0%

Tc method = USER

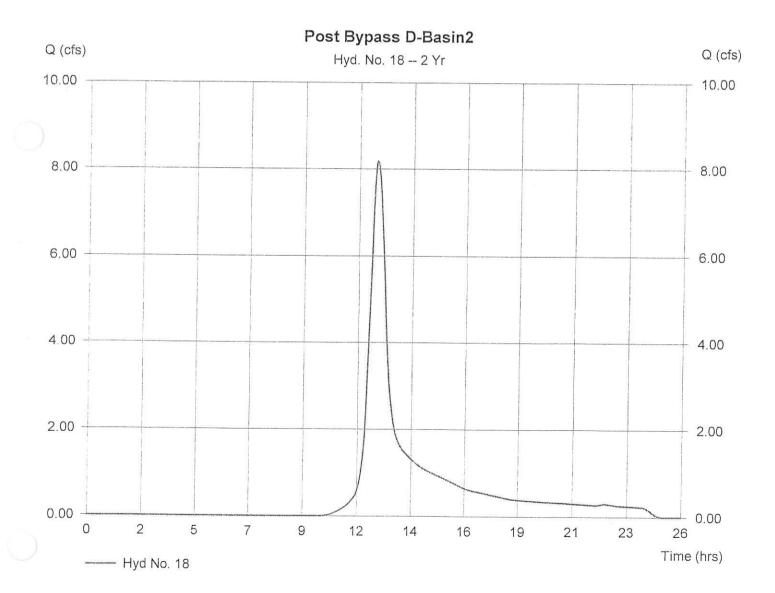
Total precip. = 3.40 in Storm duration = 24 hrs Peak discharge = 8.187 cfs
Time interval = 2 min

Curve number = 76 Hydraulic length = 0 ft

Time of conc. (Tc) = 34.62 min Distribution = Type III

Shape factor = 484

Hydrograph Volume = 48,175 cuft



Hydraflow Hydrographs by Intelisolve

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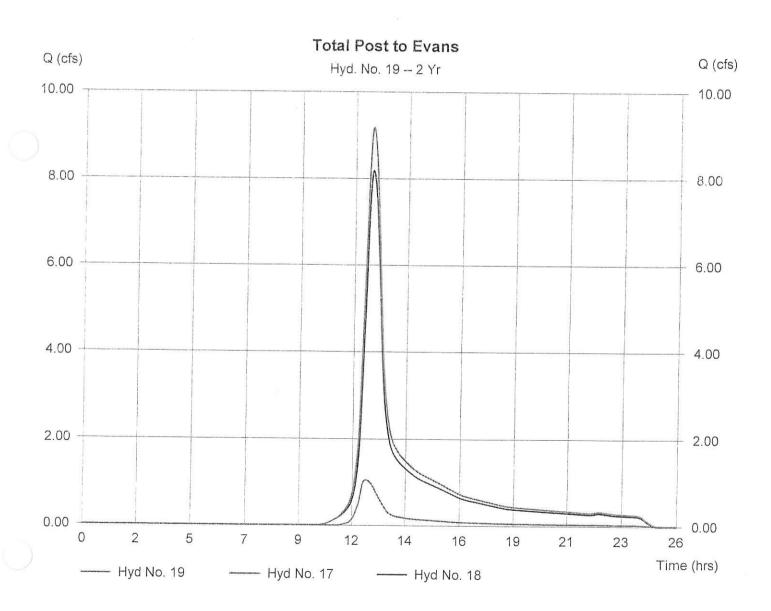
Hyd. No. 19

Total Post to Evans

Hydrograph type = Combine Storm frequency = 2 yrs Inflow hyds. = 17, 18

Peak discharge = 9.188 cfs Time interval = 2 min

Hydrograph Volume = 55,124 cuft



Hydraflow Hydrographs by Intelisolve

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#### Hyd. No. 20

Area P33-Post to Souza

Hydrograph type = SCS Runoff Storm frequency = 2 yrs

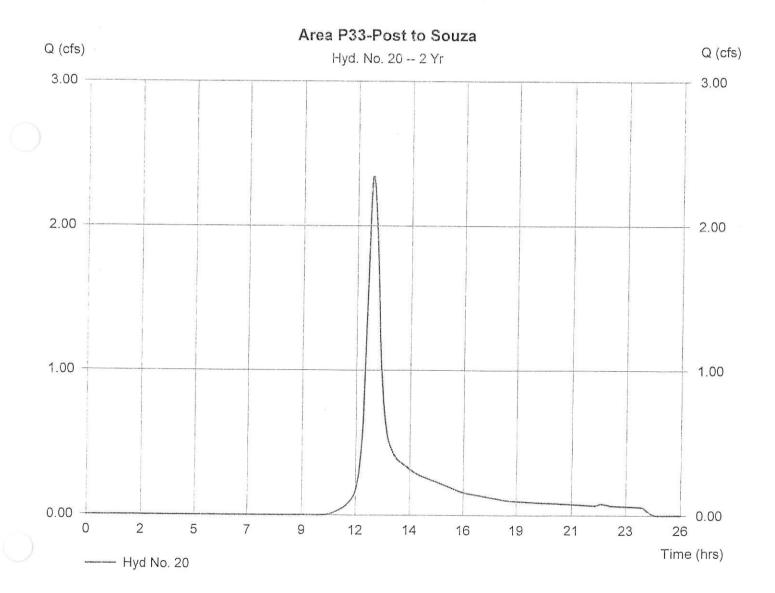
Drainage area = 2.720 ac
Basin Slope = 0.0 %

To method = USER Total precip. = 3.40 in Storm duration = 24 hrs Peak discharge = 2.340 cfs Time interval = 2 min Curve number = 75

Hydraulic length = 0 ft Time of conc. (Tc) = 24.30 min Distribution = Type III

Shape factor = 484

Hydrograph Volume = 11,969 cuft



Hydraflow Hydrographs by Intelisolve

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### Hyd. No. 21

Area P32-Post to Jensen

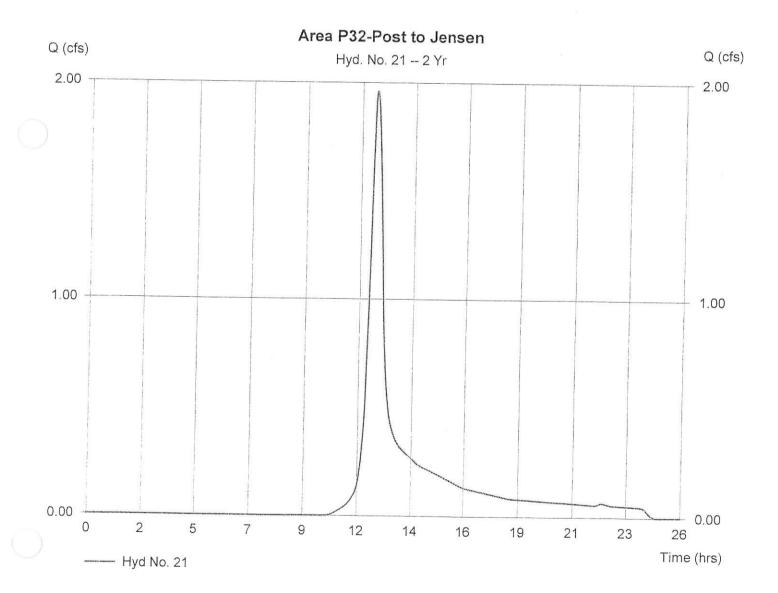
Hydrograph type = SCS Runoff Storm frequency = 2 yrs

Drainage area = 2.280 ac
Basin Slope = 0.0 %
Tc method = USER

Total precip. = 3.40 in Storm duration = 24 hrs Peak discharge = 1.961 cfs
Time interval = 2 min
Curve number = 75
Hydraulic length = 0 ft

Time of conc. (Tc) = 23.76 min
Distribution = Type III
Shape factor = 484

Hydrograph Volume = 10,033 cuft



Hydraflow Hydrographs by Intelisolve

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#### Hyd. No. 22

Post to D-Basin3

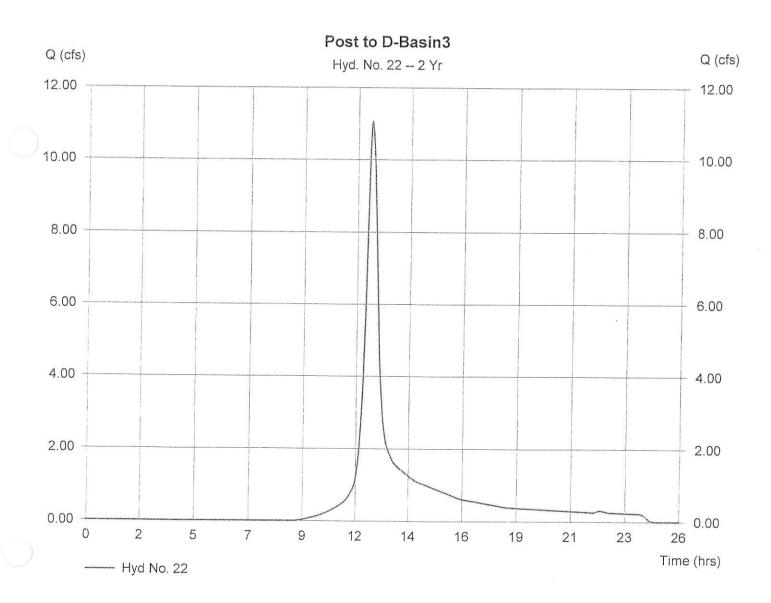
Hydrograph type = SCS Runoff

Storm frequency = 2 yrs
Drainage area = 8.750 ac
Basin Slope = 0.0 %
Tc method = USER

Total precip. = 3.40 in Storm duration = 24 hrs Peak discharge = 11.07 cfs
Time interval = 2 min
Curve number = 81
Hydraulic length = 0 ft

Time of conc. (Tc) = 20.82 min
Distribution = Type III
Shape factor = 484

Hydrograph Volume = 52,631 cuft



Hydraflow Hydrographs by Intelisolve

Friday, Jun 12 2009, 10:0 AM

### Hyd. No. 23

Outflow D-Basin3

Hydrograph type = Reservoir Storm frequency = 2 yrs Inflow hyd. No. = 22

Reservoir name = D-Basin3

Peak discharge =

= 1.676 cfs

Time interval Max. Elevation

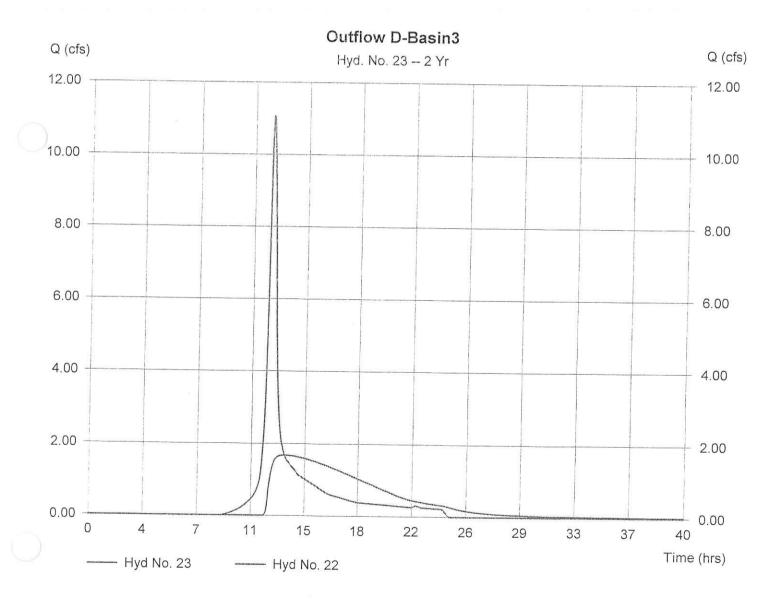
= 2 min

Max. Storage

= 337.83 ft = 25,586 cuft

Storage Indication method used.

Hydrograph Volume = 48,551 cuft



### **Pond Report**

Hydraflow Hydrographs by Intelisolve

Friday, Jun 12 2009, 10:0 AM

#### Pond No. 3 - D-Basin3

#### Pond Data

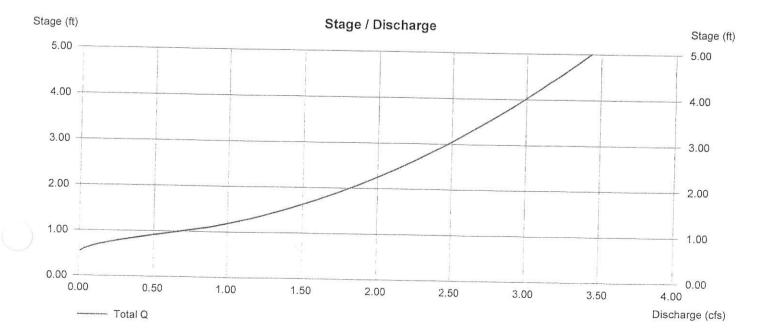
Pond storage is based on known contour areas. Average end area method used.

#### Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)	
0.00	336.00	5,355	0	0	
0.50	336.50	10,675	4,008	4,008	
1.00	337.00	15,995	6,668	10,675	
2.00	338.00	20,015	18,005	28,680	
3.00	339.00	22,085	21,050	49,730	
4.00	340.00	24,700	23,393	73,123	
5.00	341.00	28,345	26,523	99,645	

#### Culvert / Orifice Structures Weir Structures [A] [B] [C] [D] [A] [B] [C] [D] Rise (in) = 8.00 0.00 0.00 0.00 Crest Len (ft) = 0.000.00 0.00 0.00 Span (in) = 8.00 0.00 0.00 0.00 Crest El. (ft) = 0.000.00 0.00 0.00 No. Barrels = 1 0 0 0 Weir Coeff. = 0.000.00 0.00 0.00 Invert El. (ft) = 336.500.00 0.00 0.00 Weir Type Length (ft) = 0.000.00 0.00 0.00 Multi-Stage = No No No No Slope (%) = 0.000.00 0.00 0.00 N-Value .000 = .013 .000 .000 Orif. Coeff. = 0.600.00 0.00 0.00 Multi-Stage = n/aNo No No Exfiltration = 0.000 in/hr (Contour) Tailwater Elev. = 0.00 ft

Note: Culvert/Orifice outflows have been analyzed under inlet and outlet control



Hydraflow Hydrographs by Intelisolve

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#### Hyd. No. 24

Post Bypass D-Basin3

Hydrograph type = SCS Runoff

Storm frequency = 2 yrs
Drainage area = 10.940 ac

Basin Slope = 0.0 %
To method = USER

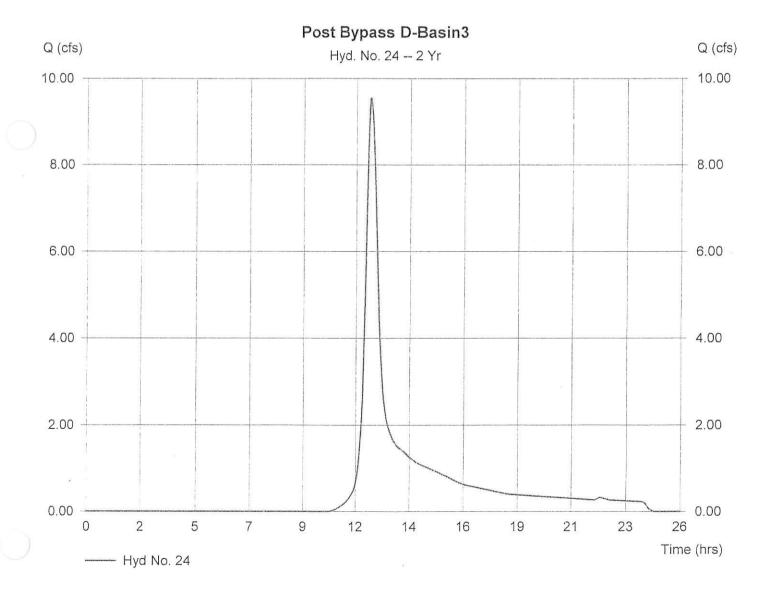
Total precip. = 3.40 in Storm duration = 24 hrs

Peak discharge = 9.546 cfs Time interval = 2 min Curve number = 74 Hydraulic length = 0 ft

Time of conc. (Tc) = 20.90 min
Distribution = Type III

Shape factor = 484

Hydrograph Volume = 47,350 cuft



Hydraflow Hydrographs by Intelisolve

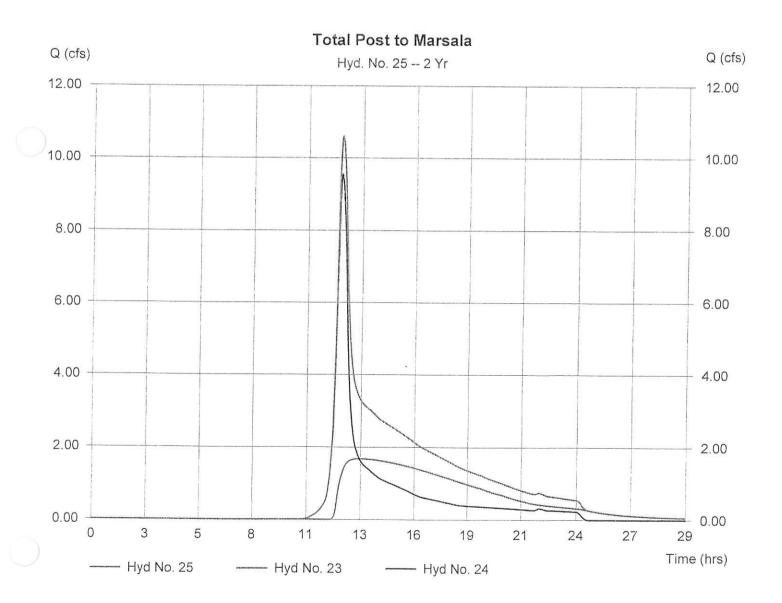
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#### Hyd. No. 25

Total Post to Marsala

Hydrograph type = Combine Storm frequency = 2 yrs Inflow hyds. = 23, 24 Peak discharge = 10.60 cfs Time interval = 2 min

Hydrograph Volume = 95,901 cuft



# **Hydrograph Summary Report**

.s.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	SCS Runoff	17.14	2	738	84,415				Area E1-Pre to Gay Hill Rd
2	SCS Runoff	4.637	6	738	24,213				Area E2-Pre to Videll
3	SCS Runoff	1.979	2	736	9,403				Area E3- Pre to Champion
4	SCS Runoff	1.597	2	730	6,542				Area E4-Pre to Fernandez
5	SCS Runoff	21.17	2	750	133,862				Area E8-Pre to Evans
6	SCS Runoff	6.601	2	738	32,642				Area E6-Pre to Souza
. 7	SCS Runoff	4.685	2	738	23,165				Area E7-Pre to Jensen
8	SCS Runoff	27.97	2	746	160,298				Area E8-Pre to Marsala
9	SCS Runoff	4.948	2	732	21,901				Post to D-Basin1
10	Reservoir	2.020	2	754	21,246	9	317.28	6,840	Outflow D-Basin1
11	SCS Runoff	13.78	2	738	67,848		******		Post Bypass D-Basin1
12	Combine	15.53	2	738	89,094	10, 11			Total Post to Gay Hill Rd
13	SCS Runoff	3.951	2	736	18,685				Area E2-Post to Videll
14	SCS Runoff	1.983	2	736	9,383				Area P36-Post to Champion
	SCS Runoff	1.589	2	730	6,469				Area P35-Post to Fernandez
16	SCS Runoff	4.987	2	724	15,016				Post to D-Basin2
17	Reservoir	1.506	2	742	14,732	16	335.29	4,042	Outflow D-Basin2
18	SCS Runoff	19.25	2	744	110,002				Post Bypass D-Basin2
19	Combine	20.76	2	744	124,734	17, 18	# 00 m to to		Total Post to Evans
20	SCS Runoff	5.641	2	738	27,803				Area P33-Post to Souza
21	SCS Runoff	4.728	2	738	23,305				Area P32-Post to Jensen
22	SCS Runoff	23.39	2	736	110,926				Post to D-Basin3
23	Reservoir	2.702	2	818	106,845	22	339.42	59,501	Outflow D-Basin3
24	SCS Runoff	23.60	2	736	111,934				Post Bypass D-Basin3
25	Combine	25.58	2	736	218,779	23, 24	00 No. 10 No.		Total Post to Marsala
OP F	urlako Dd	II C ===			Det				
9R Burlake Rd LLC.gpw					Return Period: 10 Year		rear	Friday, Jun 12 2009, 10:00 AM	

Hydraflow Hydrographs by Intelisolve

Friday, Jun 12 2009, 10:0 AM

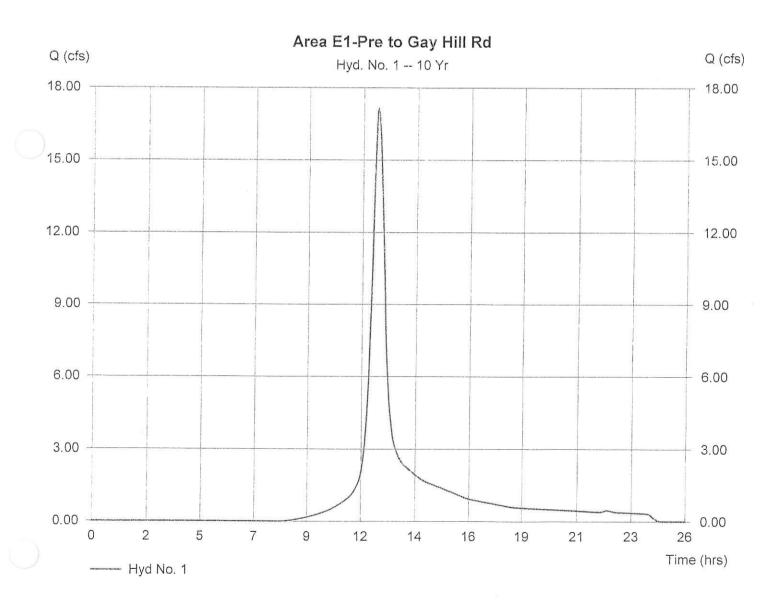
#### Hyd. No. 1

Area E1-Pre to Gay Hill Rd

Hydrograph type = SCS Runoff
Storm frequency = 10 yrs
Drainage area = 8.000 ac
Basin Slope = 0.0 %
Tc method = USER
Total precip. = 5.50 in
Storm duration = 24 hrs

Peak discharge = 17.14 cfs
Time interval = 2 min
Curve number = 76
Hydraulic length = 0 ft
Time of conc. (Tc) = 25.20 min
Distribution = Type III
Shape factor = 484

Hydrograph Volume = 84,415 cuft



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#### Hyd. No. 2

Area E2-Pre to Videll

Hydrograph type = SCS Runoff

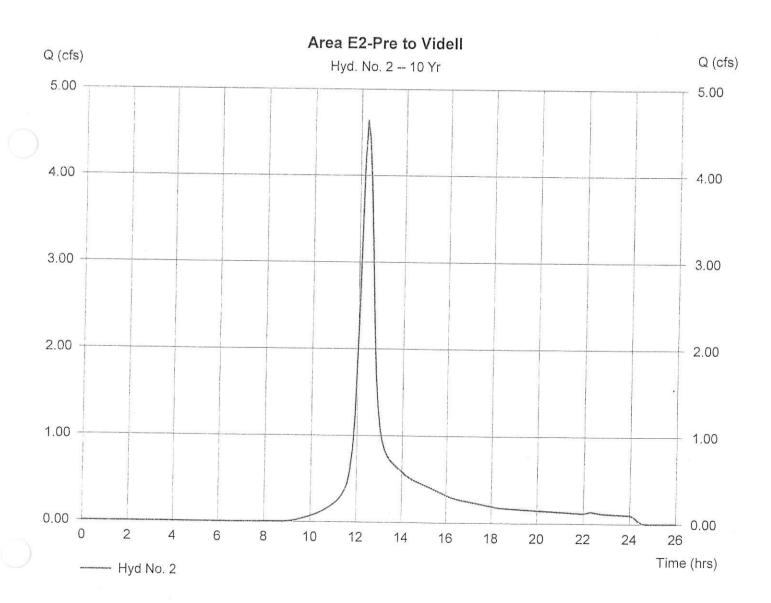
Storm frequency = 10 yrs
Drainage area = 2.490 ac
Basin Slope = 0.0 %

Tc method = USER
Total precip. = 5.50 in
Storm duration = 24 hrs

Peak discharge = 4.637 cfs
Time interval = 6 min
Curve number = 73
Hydraulic length = 0 ft
Time of conc. (Tc) = 22.38 min

Distribution = Type III Shape factor = 484

Hydrograph Volume = 24,213 cuft



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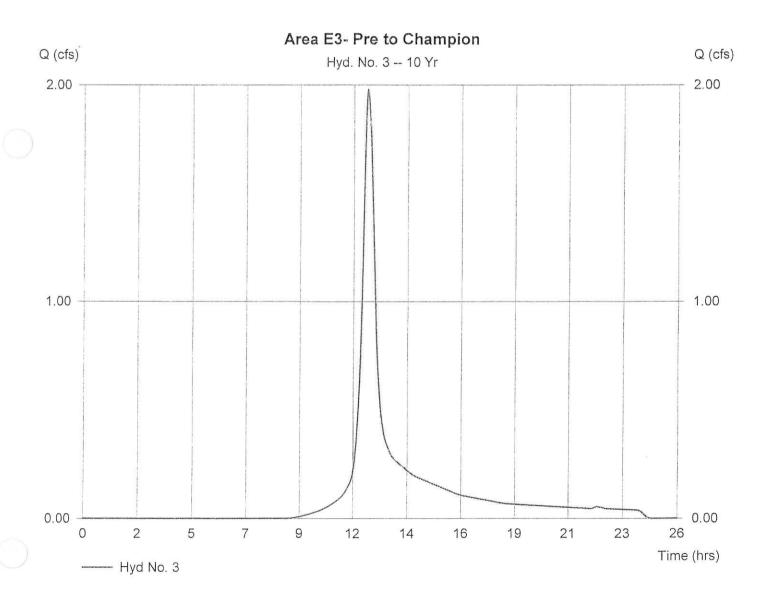
#### Hyd. No. 3

Area E3- Pre to Champion

Hydrograph type = SCS Runoff
Storm frequency = 10 yrs
Drainage area = 0.950 ac
Basin Slope = 0.0 %
Tc method = USER
Total precip. = 5.50 in
Storm duration = 24 hrs

Peak discharge = 1.979 cfs
Time interval = 2 min
Curve number = 73
Hydraulic length = 0 ft
Time of conc. (Tc) = 22.60 min
Distribution = Type III
Shape factor = 484

Hydrograph Volume = 9,403 cuft



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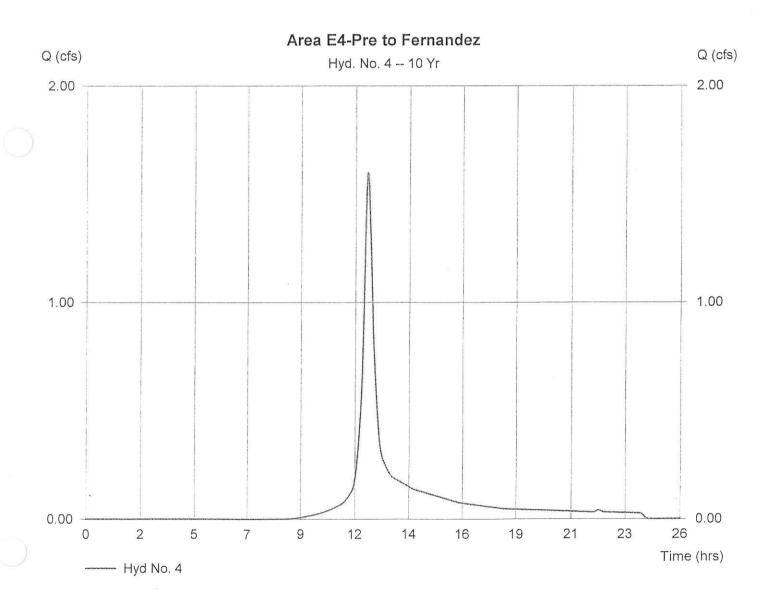
#### Hyd. No. 4

Area E4-Pre to Fernandez

Hydrograph type = SCS Runoff
Storm frequency = 10 yrs
Drainage area = 0.690 ac
Basin Slope = 0.0 %
Tc method = USER
Total precip. = 5.50 in
Storm duration = 24 hrs

Peak discharge = 1.597 cfs
Time interval = 2 min
Curve number = 73
Hydraulic length = 0 ft
Time of conc. (Tc) = 14.76 min
Distribution = Type III
Shape factor = 484

Hydrograph Volume = 6,542 cuft



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#### Hyd. No. 5

Area E8-Pre to Evans

Hydrograph type = SCS Runoff

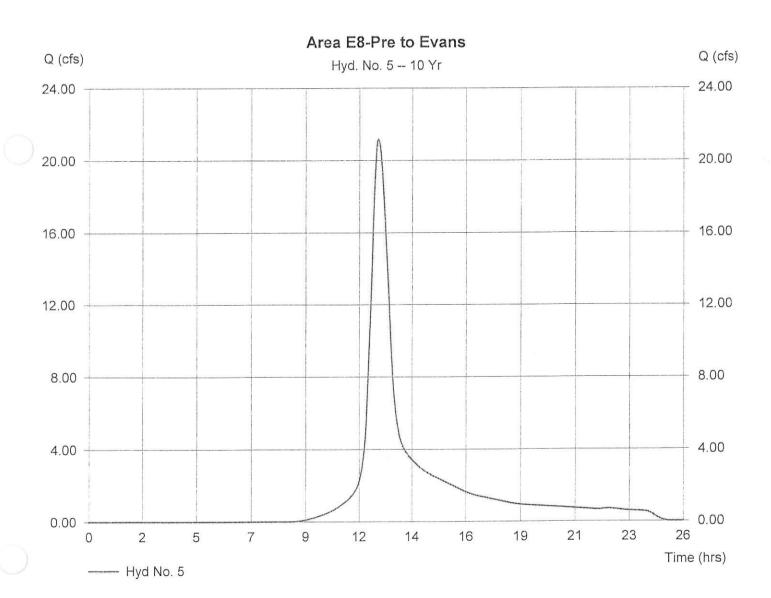
Storm frequency = 10 yrs Drainage area = 13.190 ac

Basin Slope = 0.0 %
Tc method = USER

Total precip. = 5.50 in Storm duration = 24 hrs Peak discharge = 21.17 cfs
Time interval = 2 min
Curve number = 74
Hydraulic length = 0 ft
Time of conc. (Tc) = 40.80 min

Distribution = Type III Shape factor = 484

Hydrograph Volume = 133,862 cuft



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#### Hyd. No. 6

Area E6-Pre to Souza

Hydrograph type = SCS Runoff

Storm frequency = 10 yrs
Drainage area = 3.410 ac

Basin Slope = 0.0 % Tc method = USER

Total precip. = 5.50 in Storm duration = 24 hrs

Peak discharge = 6.601 cfs Time interval = 2 min

Curve number = 73 Hydraulic length = 0 ft

Time of conc. (Tc) = 24.30 min Distribution = Type III

Shape factor = 484

Hydrograph Volume = 32,642 cuft

