

CEQA PRELIMINARY HYDROLOGY AND HYDRAULIC CALCULATIONS

Evergreen Nursery

9708 Flinn Springs Road, El Cajon, California

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1. INTRODUCTION

This study is prepared to determine the influence of precipitation on the Evergreen Nursery property in Lakeside, California and compare the flow conditions before and after the project.

1.1. Project Site Description

The project is located at 9708 Flinn Springs Road in Lakeside, California (See Figure 1 – Vicinity Map from USGS – Alpine 1997), and is approximately 36.39 acres in size. Its geographic coordinates are 32° 54' 19" N, 116° 56' 15" W.

The on-site elevations range from 808 MSL to 938 MSL.

1.2. Topographic Source

The topography used for this study is derived from Mercator Associates Inc. aerial topography dated 4/25/2011.

1.3. Proposed Project

The project proposes construction of a nursery facility with greenhouse structures, an office trailer, and a restroom/storage building. There is an existing entry drive along Flinn Springs Road which will be used. The majority of the roads constructed through the site will be recycled roadway aggregate, and will also act as pervious drainage swales. The roads anticipated to be the most heavily travelled, will be made of concrete.

Approximately 2 acres of the eastern portion of the site will be used for nursery soil production and green waste recycling.

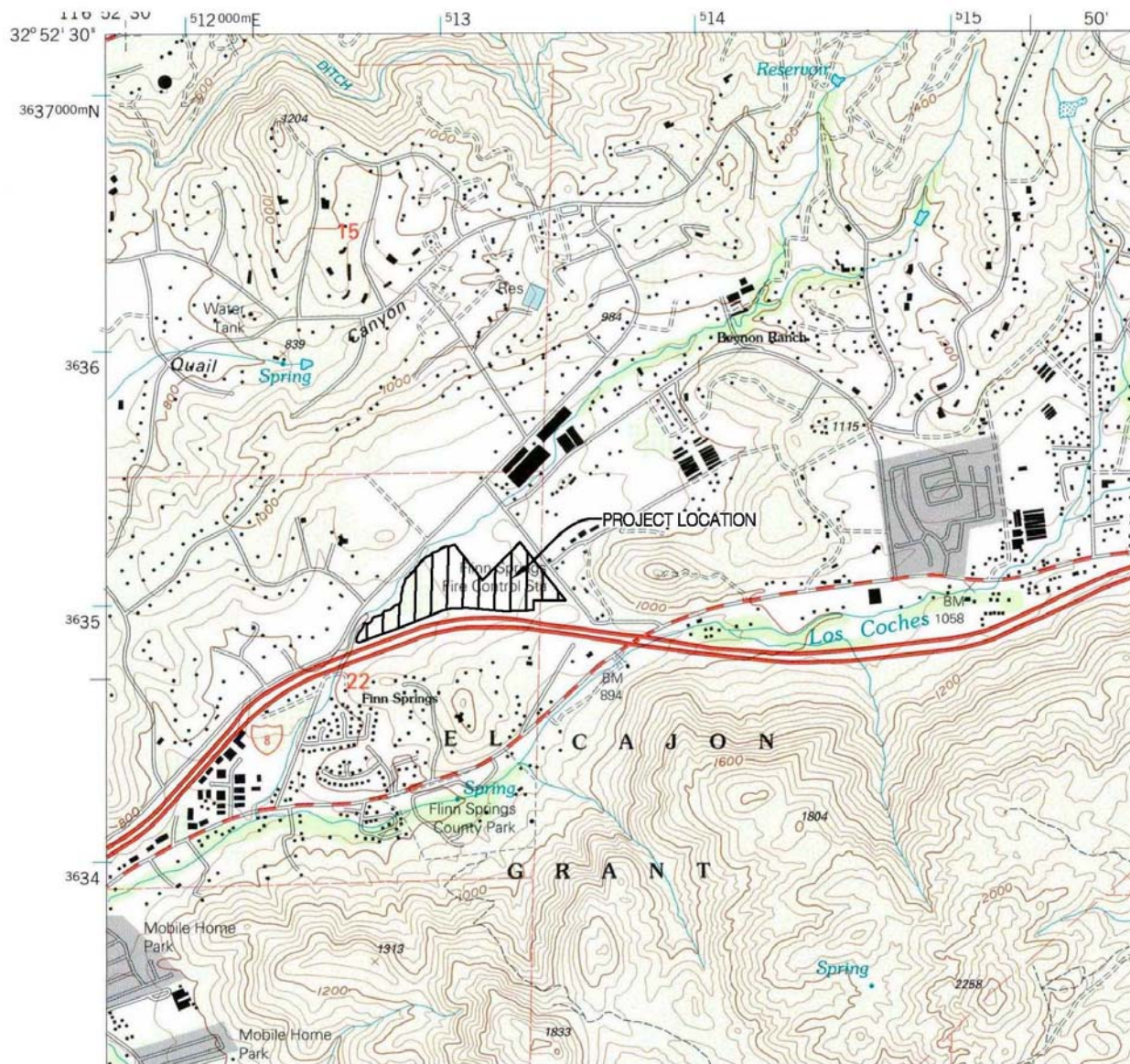


Figure 1 – Vicinity Map

2. RATIONAL METHOD

The watershed is less than 1 square mile; therefore the rational method (RM) is selected to calculate runoff.

$$Q = CIA$$

Where,

Q = Peak Rate of Flow (cfs)

C = Runoff Coefficient

I = Average rainfall intensity (in/hr)

A = Drainage Area (acres)

The soil runoff potential for this site is determined by overlaying the site on the Soil Type Map, shown in the San Diego BMP Sizing Calculator (provided by the website www.projectcleanwater.org/html/wq_susmp.html). A screen shot of the Soil Type Map is shown in Figure 2. The map shows soil group 'A' as the predominant soil type throughout the site which is therefore chosen for these calculations.

The storm frequency chosen for design purposes of this study has a 100-year recurrence interval. The six-hour anticipated precipitation for the project site subject to the design storm frequency, P_6 , is shown in Figure 3. The twenty-four hour anticipated precipitation for the project site subjected to the design storm frequency; P_{24} is shown in Figure 4.

$$P_6 = 2.9 \text{ inches}$$

$$P_{24} = 6.3 \text{ inches}$$

P_6 is in the range of 45% to 65% (46%) of P_{24} and therefore needs no adjustment.

The time of concentration for on-site basin, T_c , is determined from the following formula [1].

$$T_c = \frac{1.8(1.1 - C)\sqrt{D}}{\sqrt[3]{S}}$$

Where,

T_c = Time of Concentration in hours ($T_c \geq 5 \text{ min.}$)

D = Watercourse Distance (ft.)

S = Slope (%)

C = Runoff Coefficient

The average rainfall intensity is calculated from the following equation (San Diego County Hydrology Manual, June 2003).

$$I = 7.44 \times P_6 \times D^{-0.645}$$

Where,

I = Rainfall Intensity (in/hr)

P_6 = Six hour precipitation (inches)

D = Duration (min.)

Time of concentration (T_c) is composed of two components: The initial time of concentration (T_i), and the travel time (T_t).

T_i can be interpolated from Table 1 below using the maximum overland flow length (L_M), runoff coefficient and land slope. The source for this table is Reference [1].

Table 1 – Runoff Coefficients, Maximum Overland Flow Lengths and Initial Time of Concentration

% Impervious	Soil Type				Element	DU/ Acre	0.50%		1%		2%		3%		5%		10%	
	A	B	C	D			L_M	T_i	L_M	T_i	L_M	T_i	L_M	T_i	L_M	T_i	L_M	T_i
0	0.2	0.3	0.3	0.35	Natural		50	13.2	70	13	85	11	100	10	100	9	100	6.9
10	0.3	0.3	0.4	0.41	LDR	1	50	12.2	70	12	85	10	100	9.5	100	8	100	6.4
20	0.3	0.4	0.4	0.46	LDR	2	50	11.3	70	11	85	9.2	100	8.8	100	7	100	5.8
25	0.4	0.4	0.5	0.49	LDR	2.9	50	10.3	70	10	85	8.8	95	8.1	100	7	100	5.6
30	0.4	0.5	0.5	0.52	MDR	4.3	50	10.2	70	9.6	80	8.1	95	7.8	100	7	100	5.3
40	0.5	0.5	0.5	0.57	MDR	7.3	50	9.2	65	8.4	80	7.4	95	7	100	6	100	4.8
45	0.5	0.5	0.6	0.6	MDR	10.9	50	8.7	65	7.9	80	6.9	90	6.4	100	6	100	4.5
50	0.6	0.6	0.6	0.63	MDR	14.5	50	8.2	65	7.4	80	6.5	90	6	100	5	100	4.3
65	0.7	0.7	0.7	0.71	HDR	24	50	6.7	65	6.1	75	5.1	90	4.9	95	4	100	3.5
80	0.8	0.8	0.8	0.79	HDR	43	50	5.3	65	4.7	75	4	85	3.8	95	3	100	2.7
80	0.8	0.8	0.8	0.79	N. Com.		50	5.3	60	4.5	75	4	85	3.8	95	3	100	2.7
85	0.8	0.8	0.8	0.82	G. Com.		50	4.7	60	4.1	75	3.6	85	3.4	90	3	100	2.4
90	0.8	0.8	0.8	0.85	O.P./Com.		50	4.1	60	3.7	70	3.1	80	2.9	90	3	100	2.2
90	0.8	0.8	0.8	0.85	Limited I.		50	4.2	60	3.7	70	3.1	80	2.9	90	3	100	2.2
95	1	0.9	0.9	0.87	General I.		50	3.7	60	3.2	70	2.7	80	2.6	90	2	100	1.9

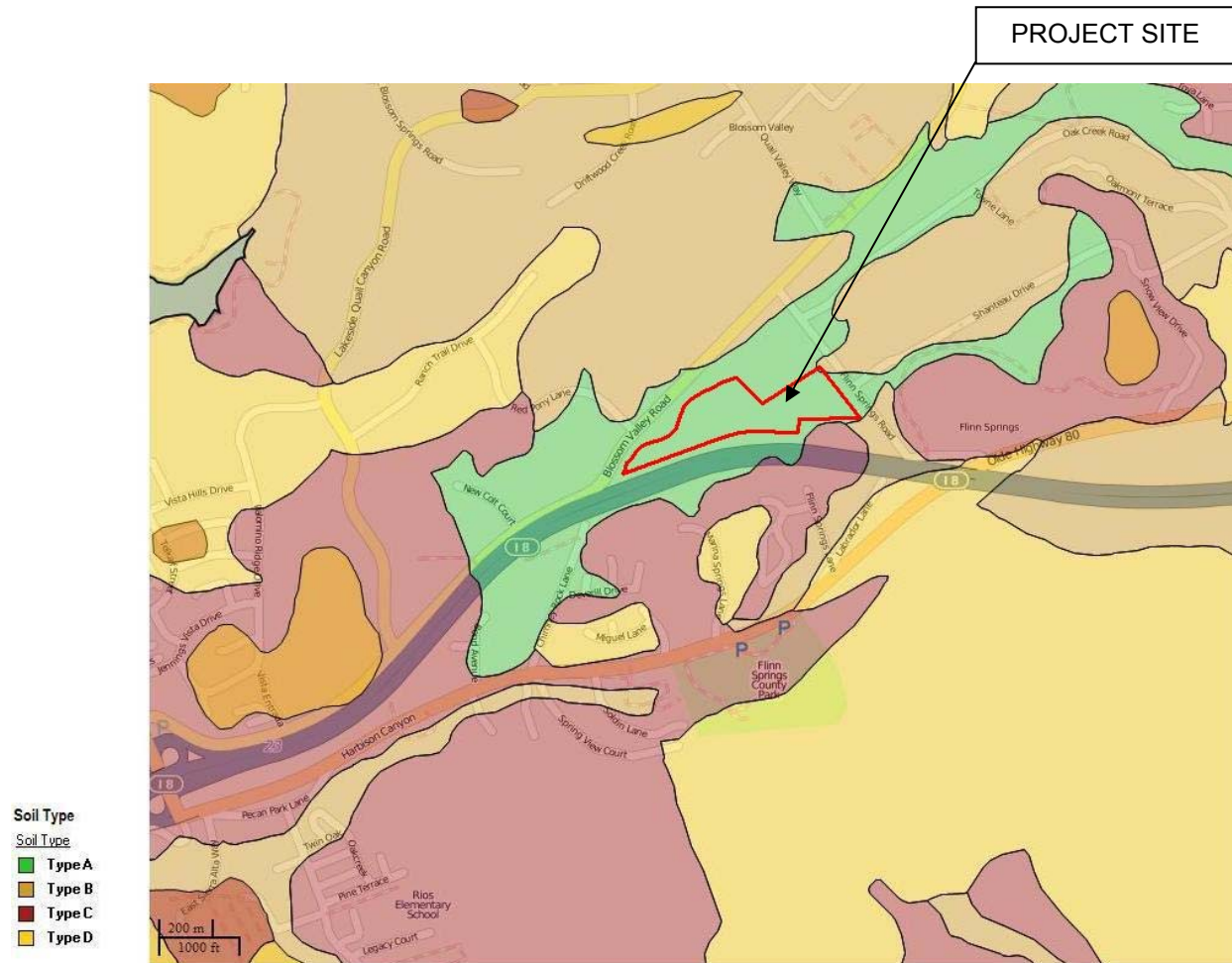
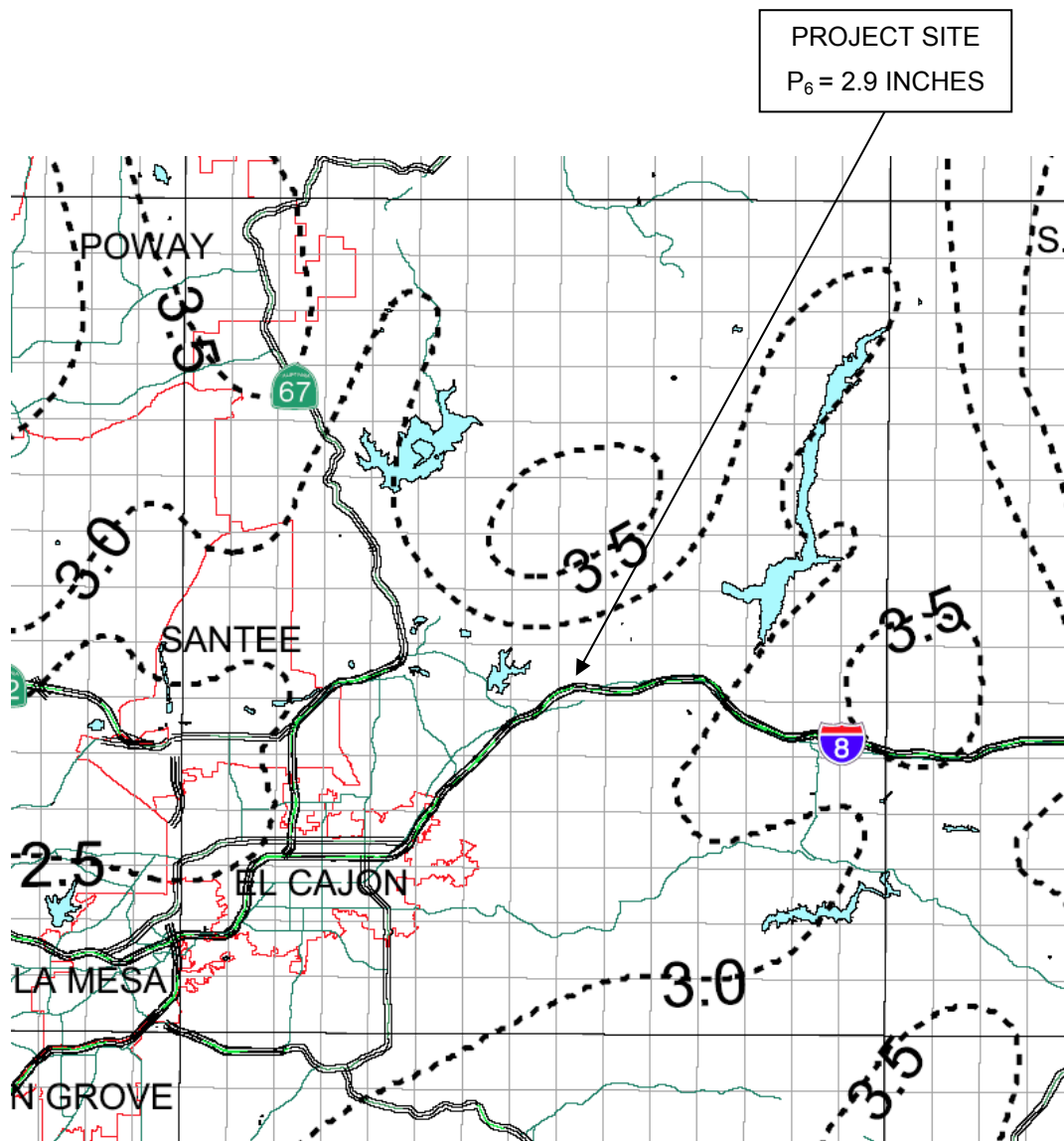


Figure 2 – Soil Type Map

(Source: www.projectcleanwater.org/html/wg_susmp.html)



County of San Diego
Hydrology Manual



Rainfall Isoplethials

100 Year Rainfall Event - 6 Hours

..... Isoplethial (inches)

Figure 3 - Six-Hour Precipitation for 100-Year Storm Frequency

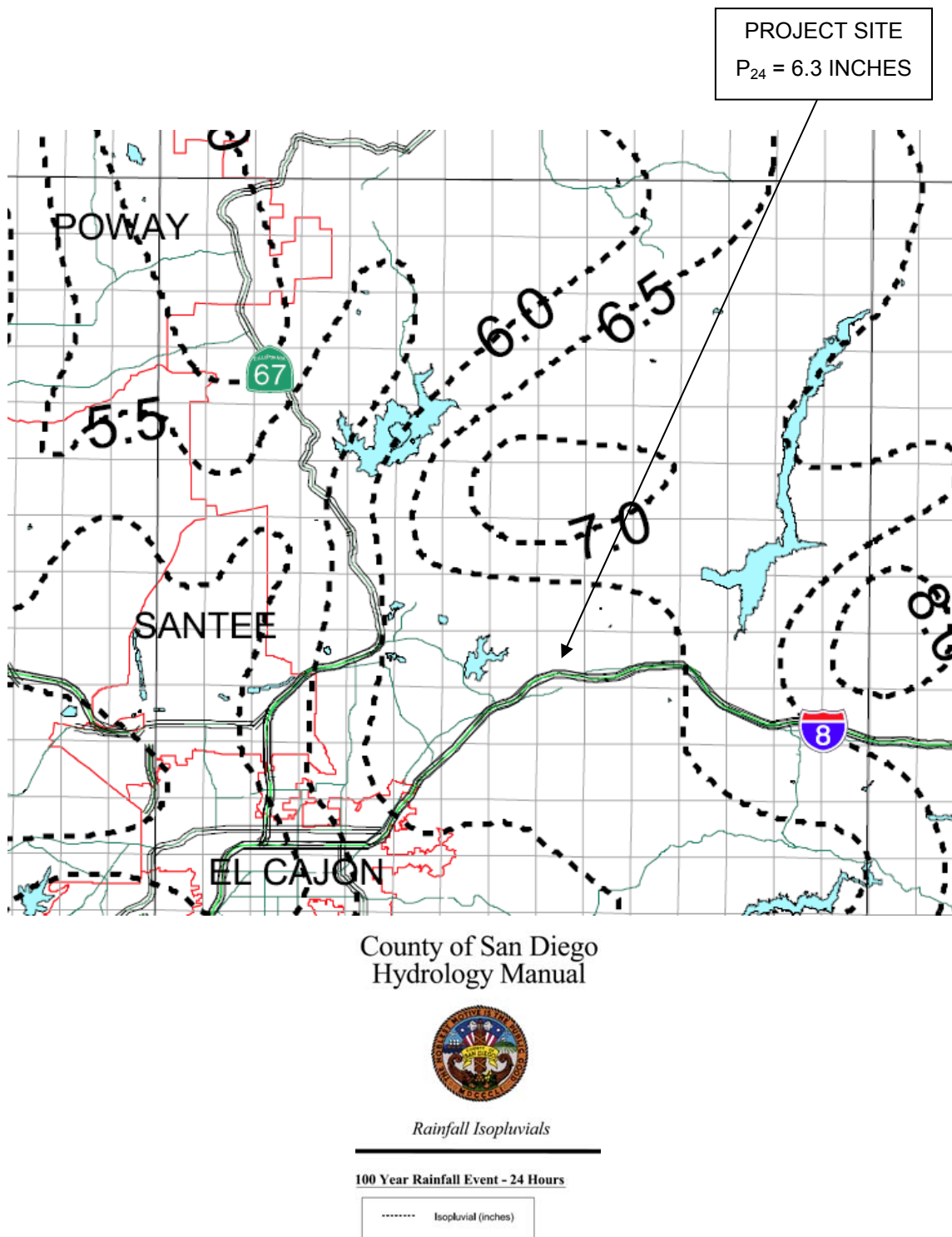


Figure 4 - Twenty-Four Hour Precipitation for 100-Year Storm Frequency

3. ON-SITE DRAINAGE AND HYDROLOGY

This project is located within the Coches Hydrologic Sub Area (907.14), in Lower San Diego Hydrologic Area, in San Diego Hydrologic Unit, in San Diego Region (Region 9). The pre-project site is assumed to be entirely pervious and generally drains from the east to the west where the runoff flows into Los Coches Creek.

The majority of the site slope is low (3% or less) but roughly 6.7 acres of the eastern end of the site has average slopes of 13.5%.

Post-project, only 2.71 acres of impervious area will be added to the 36.39 acre site. The majority of the roads that will be built for the nursery will be constructed of recycled roadway aggregate which will also act as swales to treat the runoff from the impervious areas. The roadway swales will channelize the runoff and direct it to one of the two 2-stage detention/desiltation basins.

The site is broken into two sub-areas, A and B, based on the basin locations (please see the Drainage Area Maps in Appendices A and B for details). There is also a third basin which will treat runoff from the green waste recycling area. This runoff will then be treated again by the basin in Area 'B' before flowing to Los Coches Creek. The area flowing to the third basin is defined as Area 'B₁' in Attachment B. See Table 2 below for impervious area percentages pre and post-project.

Table 2 – Impervious Percentage

Condition	Drainage Area	Aggregate Road (ac)	Detention Basin (ac)	Other Pervious Area (ac)	Total Pervious (ac)	Total Impervious (ac)	Total Area (ac)	Impervious (%)	Pervious (%)
Pre-Project	A			16.97	16.97		16.97		100%
	B			19.42	19.42		19.42		100%
	Total			36.39	36.39		36.39		100%
Post-Project	A	2.57	0.11	13.24	15.92	1.05	16.97	6%	94%
	B	1.87	0.17	13.94	15.98	1.52	17.50	9%	91%
	B ₁	0	0.04	1.74	1.78	0.14	1.92	7%	93%
	Total	4.44	0.32	28.92	33.68	2.71	36.39	7%	93%

3.1. Pre-Project Condition

As described above, the pre-project site is assumed entirely pervious. For the purposes of these runoff calculations a C-value of 0.20 is assigned to represent the value of pervious ground as the assumed soil group is 'A'. Table 3 below shows the runoff rate for the site. See Attachment A for details.

Notice the time of concentration for Area 'A' was generated from the T_i of 10.48 minutes, interpolated from Table 1 for the maximum 100 ft, and T_t based on a calculated velocity (Manning's equations) of 5.2 ft/sec for the remaining length of flow through Area 'A'.

Using modified rational method and the rates from Table 3 the total pre-project discharge is calculated to be 25.1 cfs (Table 4).

Table 3 - Summary of Pre-Project Rational Method Calculations

Drainage Area	A (ac)	C	S (%)	P_6 (in)	L_M (ft)	T_i (min)	T_t (min)	T_c (min)	I (in/hr)	Q (cfs)
A	16.97	0.20	2.7	2.9	100	10.48	4.43	14.91	3.8	12.82
B	19.42	0.20	4.0		100	9.50	7.66	17.16	3.4	13.40

Table 4 – Summary of Pre-Project MRM Calculations

System	Q (cfs)	T_c (min)	I (in/hr)	A (ac)	$\Sigma C \cdot A$ (ac)	Q_T (cfs)
A	12.82	14.91	3.8	16.97	3.39	24.46
B	13.40	17.16	3.4	19.42	3.88	25.10
Total	25.10	17.16	3.4	36.39	7.28	

3.2. Post-Project Condition

For the post-project condition, Area 'B' is shown to have a sub-area 'B₁' as described above. Area 'B₁' has its own desiltation basin and will be analyzed separately to size its basin but must also be analyzed for its effect on the overall release rate from the desiltation basin in Area 'B'. Runoff from both areas A and B eventually makes its way into the roadway swales before entering the basins and discharging to Los Coches Creek.

C value used to represent the pervious areas is 0.20, and a C value of 0.50 is used to represent the recycled roadway aggregate, and a C value of 0.90 is used to represent buildings and concrete areas. Table 5 below shows the post-project rational method

calculations for each sub-area.

For Area 'A' the time of concentration was based on a T_t of 19.3. Table 1 gives a T_t of 9.65 (interpolated) for Area 'A' and C value of 0.22 (interpolated) with slope of 2.7% and impervious area of 6%. However, the great majority of the pervious portion of the site is mulched (6" depth of landscape cuttings). Mulch has been proven to reduce runoff velocities by as much as 78% over bare ground alone, thereby extending the initial time of concentration. Attachment E shows a chart provided by the EPA's NPDES website that confirms the reduction of velocity from mulch. Because the County Hydrology Manual does not allow reductions in time of concentration, C values have been adjusted using good engineering judgment. T_t for Area 'A' was calculated by the remaining length of flow through the swale (1500 ft) using a velocity of 2.61 fps through the swale based on the Manning's Equation calculations shown in Worksheet 1.

C value for Area 'B' is adjusted similarly, and T_t is calculated based on the velocity (3.02 fps) provided by Worksheet 2. Swale in Area 'B' has a steeper slope (2.84%) than that of Area 'A' but the swale itself is longer (3170 ft) which explains the longer T_t .

Similarly C value for Area 'B₁' includes a reduction because the mulch will be produced and stored in piles in Area 'B₁' before getting dispersed throughout the rest of the site. The travel time through the aggregate swale along the backside of the retaining wall produces the T_t . See Worksheet 3 for details.

Modified rational method and rates from Table 5 are used in Table 6 to calculate the overall post-project site run-off. Note that as a conservative approach the travel times between discharge points of each area are ignored.

Notice that the post-project runoff of areas A, B and 'B₁' (10.12 cfs) is less than the pre-project runoff (25.20 cfs). Despite the fact that more impervious area has been added to the site, the runoff has been reduced because of the longer times of concentration due to mulch and the travel times through the aggregate swales.

Furthermore, the runoff will be further reduced by the fact that the site will have at any given time roughly 500,000 pots whose plants and soil will soak up a lot of the rain as it falls, and the runoff as it flows beneath them. The reduction due to the pots is ignored for these calculations but certainly will have an effect on the overall site discharge.

Table 5 - Summary of Post-Project Rational Method Calculations

Drainage Area	A (ac)	C	% Imp.	S (%)	P ₆ (in)	L _M (ft)	T _i (min)	T _t (min)	T _c (min)	I (in/hr)	Q (cfs)
A	16.97	0.19	6%	2.7	2.9	100.00	9.65	9.58	19.23	3.2	10.12
B	17.50	0.22	9%	4.0		100.00	8.75	17.49	26.24	2.6	10.03
B ₁	1.92	0.18	7%	7.5		100.00	8.32	3.04	11.36	4.5	1.51

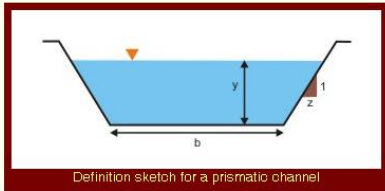
Table 6 – Summary of Post-Project Modified Rational Method Calculations

System	Q (cfs)	T _c (min)	I (in/hr)	A (ac)	Σ C*A (ac)	Q _T (cfs)
B ₁	1.51	11.36	4.5	1.92	0.34	1.51
A	10.12	19.23	3.2	16.97	3.16	10.12
B	10.03	26.24	2.6	17.50	3.83	10.03
Total	10.12	19.23	3.2	36.39	7.32	

3.2.1. On-Site Runoff Drainage System

As described above, the drainage system will consist of a series of roadway swales and detention/desiltation basins. There are no on-site catch basins or inlets as all runoff travels either overland or through the swales. The total flow capacities of the roadway swales are shown in Worksheet 1 through Worksheet 3 below. The worksheets shows that each swale has enough capacity to carry the entire amount of 100-yr flow from their respective drainage basins (e.g. Area 'A' runoff is 10.12 cfs and its swale has a capacity of 17.58 cfs). Notice that the slopes of the swales shown on the worksheets vary slightly from the overall drainage area slopes given in Table 5. The average swale slope in Area 'A' for example is 2.13% based on a 1500 foot travel path and a change in elevation of 32 feet. The overall average area slope is 2.7%.

Worksheet 1 - Recycled Roadway Aggregate Swale 'A' Capacity



Definition sketch for a prismatic channel

Formulas:

$$P = b + 2y(1 + z^2)^{1/2}$$

$$T = b + 2zy$$

$$A = y(b + zy)$$

$$R = A/P$$

$$D = A/T$$

$$Q = (C/n) AR^{2/3}S^{1/2}$$

$$V = Q/A$$

$$F = V/(gD)^{1/2}$$

INPUT DATA:

Select: SI units (metric) U.S. Customary units

Bottom width b: ft

Flow depth y: ft

Side slope z:

Manning's n:

Bottom slope S:

INTERMEDIATE CALCS:

Units selected: U.S. Customary

Gravitational acceleration g: 32.17 ft/s²

Constant C: 1.486

Wetted perimeter P: 20.14 ft

Top width T: 20.1 ft

Flow area A: 6.733 ft²

Hydraulic radius R: 0.334 ft

Hydraulic depth D: 0.335 ft

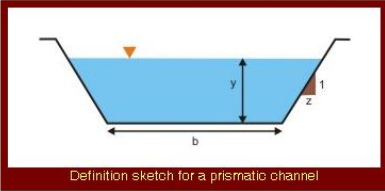
OUTPUT:

Discharge Q: 17.58 cfs

Flow velocity V: 2.611 fps

Froude number F: 0.795

Worksheet 2 - Recycled Roadway Aggregate Swale 'B' Capacity



Definition sketch for a prismatic channel

Formulas:

$$P = b + 2y(1 + z^2)^{1/2}$$

$$T = b + 2zy$$

$$A = y(b + zy)$$

$$R = A/P$$

$$D = A/T$$

$$Q = (C/n) AR^{2/3}S^{1/2}$$

$$V = Q/A$$

$$F = V/(gD)^{1/2}$$

INPUT DATA:

Select: SI units (metric) U.S. Customary units

Bottom width b: ft

Flow depth y: ft

Side slope z:

Manning's n:

Bottom slope S:

INTERMEDIATE CALCS:

Units selected: U.S. Customary

Gravitational acceleration g: 32.17 ft/s²

Constant C: 1.486

Wetted perimeter P: 20.14 ft

Top width T: 20.1 ft

Flow area A: 6.733 ft²

Hydraulic radius R: 0.334 ft

Hydraulic depth D: 0.335 ft

OUTPUT:

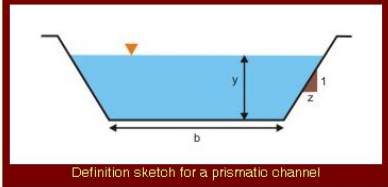
Discharge Q: 20.30 cfs

Flow velocity V: 3.015 fps

Froude number F: 0.918

Worksheet 3 - Recycled Roadway Aggregate Swale 'B₁' Capacity

Formulas:	
$P = b + 2y(1 + z^2)^{1/2}$	
$T = b + 2zy$	
$A = y(b + zy)$	
$R = A/P$	
$D = A/T$	
$Q = (C/n) AR^{2/3} S^{1/2}$	
$V = Q/A$	
$F = V/(gD)^{1/2}$	



Definition sketch for a prismatic channel

INPUT DATA:	INTERMEDIATE CALCS:	OUTPUT:
Select: SI units (metric) U.S. Customary units Bottom width b: 0 ft Flow depth y: 0.5 ft Side slope z: 1.2 Manning's n: 0.04 Bottom slope S: 0.023	Units selected: U.S. Customary Gravitational acceleration g: 32.17 ft/s ² Constant C: 1.486 Wetted perimeter P: 12.04 ft Top width T: 12 ft Flow area A: 3 ft ² Hydraulic radius R: 0.249 ft Hydraulic depth D: 0.25 ft	Discharge Q: 6.692 cfs Flow velocity V: 2.230 fps Froude number F: 0.786

3.2.2. Detention Requirements

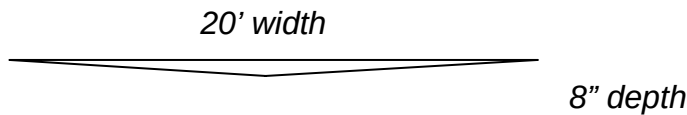
The detention requirements are based on the hydromodification BMP sizing calculator found on the San Diego regional website www.projectcleanwater.org. Because the project does not include LID's designed specifically per the hydromodification standards, the calculator was used as a means of comparison to prove that the aggregate swales will be adequate to meet the volume requirements. Also because the project has not undergone a channel susceptibility study, the assumed susceptibility is HIGH.

For these calculations, the volume requirements were generated assuming the use of infiltration facilities. Because the soil type is group 'A', runoff will infiltrate along the length of the swales. The calculator gave total required storage volume for Area 'A' as 13,444 cf and a minimum area of 5,171 sf. For Area 'B' the calculator generated a total volume of 16,502 cf and a total area of 6,347 sf. See Attachment C – Hydromodification Information for details.

The provided volume within the swales alone for areas A and B is given by the equation

below:

Roadway swale cross-section:



Cross-sectional area	= $\frac{1}{2} \times 20 \times (8/12) = 6.67$ sf
----------------------	---

Total aggregate roadway length in Area 'A'	= 6,910 ft
--	------------

Total aggregate roadway area in Area 'A'	= 138,200 sf
--	--------------

Total swale volume for Area 'A'	= 46,090 cf
---------------------------------	-------------

Total aggregate roadway length in Area 'B'	= 6,315 ft
--	------------

Total aggregate roadway area in Area 'B'	= 126,300 sf
--	--------------

Total swale volume for Area 'B'	= 42,121 cf
---------------------------------	-------------

Over 88,000 cf of volume is provided in the swales alone while the required volume from the calculator was less than 30,000 cf. and the provided area is more than sufficient for hydromodification as well.

Furthermore, like a bioretention area, the swales will treat the runoff along their entire length and allow for infiltration because the aggregate surface is pervious. The percolation rate generated by the soils report for areas A and B averages 1 inch per 25 minutes which converts to 5.56×10^{-5} ft/sec (the percolation rate varies at testing sites throughout the site but this represents a conservative average). Multiplying that number by the area of the aggregate swales:

Area 'A':	$2.57 \text{ ac (swale area)} \times 43,560 \text{ sf/ac} \times 5.56 \times 10^{-5} \text{ fps} = 6.22 \text{ cfs}$
-----------	--

Area 'B':	$1.87 \text{ ac (swale area)} \times 43,560 \text{ sf/ac} \times 5.56 \times 10^{-5} \text{ fps} = 4.53 \text{ cfs}$
-----------	--

From the swales the runoff flows into the 2 two-stage desiltation basins as described above. Runoff from Area 'B₁' will first be treated by its own desiltation basin before being discharged to the aggregate swale with the rest of the runoff from Area 'B'.

The flow rate into the desiltation basins is calculated by subtracting the runoff rates in Table 5 by the infiltration rates above. So for each area the flow rate into their respective

basins is:

$$\text{Area 'A': } 10.12 - 6.22 = 3.90 \text{ cfs}$$

$$\text{Area 'B': } 10.03 + 1.51 - 4.53 = 7.01 \text{ cfs}$$

In order to generate the final release rate to Los Coches Creek, the parameters of each drainage area was entered into the RickRat Hydro software to generate a hydrograph for each area. The data from the hydrographs was then entered into HydroCAD stormwater modeling software version 10.00 (build 7) which was used to model the release rates from the desiltation basins. The RickRat Hydro hydrographs and the HydroCAD reports are included in Attachment E. The basin in Area 'B₁' is analyzed separately.

Initially the basins for Areas A and B were analyzed without the runoff from Area 'B₁', in order to determine if the basins are sized properly for treating just Areas A and B. In a second report the basins were analyzed for their capacity to handle the run-on flow and the flow from Area 'B₁' to ensure they will not overflow. A third report analyzes just Area 'B₁'.

For areas A and B, runoff enters the first stage of each basin and discharges to stage 2 through several 2" x 2.5" pipes which run beneath a 20' section of k-rail acting as an overflow spillway. The second stage of each basin also uses k-rail for an overflow spillway with the primary outlet being a perforated 12" culvert pipe which runs beneath the k-rail and discharges to Los Coches Creek. Sections of each of the basins are included in Attachment F.

For Area 'B₁', the basin is just one stage and discharges through a 4" culvert where it joins the rest of the on-site flow in Area 'B'.

From the first HydroCAD report (areas A and B without run-on flow), the total detention volume of Basin A is approximately 8,799 cf while the volume of Basin B is approximately 7,444 cf. The report shows that none of the 4 spillways are overtopped and the basin volumes are more than adequate to handle the flow. Final release rates of Areas A and B are 3.92 cfs and 4.24 cfs respectively.

From the second report (with area 'B₁'), the flow rate to basin B is increased by area 'B₁'. According to this report the basins are actually oversized and the run-on will not overtop the spillways but will in fact be released through the 12" culverts with the on-site runoff.

Final release rates from basins A and B are 4.68 cfs and 4.57 cfs respectively.

The report for Area 'B₁' shows that the basin has a total volume of 1,371 cf and has a final release rate from the basin of 0.48 cfs

See the sections in Attachment F which show the inverts and elevations of the basins and the high water mark for the 100-year storm.

The detention/desiltation basins will provide additional treatment as they are vegetated, and will filter out any sediments and pollutants not captured by the swale before discharging to Los Coches Creek.

See Table 7 below for a summary of the final release rates from the proposed basins.

Table 8 shows a summary of the three detention/desiltation basins.

Table 7 - Summary of Post-Project Final Discharge to Los Coches Creek

Drainage Area	Discharge (cfs)
A	3.92
B	4.24
B ₁	0.48
A with run-on	4.68*
B with run-on	4.57*

**Actual discharge rates from basins A and B to Los Coches Creek*

Table 8 - Summary of Detention Basins

Detention/Desiltation Basin	Area (sf)	Maximum Depth (ft)	Volume (cf)	Emergency Release Rates (cfs)
A	4791.6	3.92	8,799	4.68
B	7565	4.01	7,444	4.57
B ₁	1560	2.75	1,371	0.48

4. SUMMARY AND CONCLUSION

Table 9 represents a comparison between pre-project and post-project discharges to Los Coches Creek from areas A and B.

Table 9 – Pre-Project/Post-Project Comparison

Condition	Q (cfs)
Pre-Project A +B	25.10
Post-Project A + B + B ₁	10.12

This proposed construction is decreasing the overall runoff and also meets the requirements for hydromodification. The existing drainage pattern is maintained as is the existing course of Los Coches Creek. Since the runoff is greatly reduced, erosion and siltation will decrease as compared to the pre-project condition. Therefore the proposed project does not substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, and it does not result in substantial erosion, siltation on- or off-site. Similarly the project does not substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, and it does not substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site.

The site does not connect to any existing storm water drainage systems. It does not create or contribute runoff water which would exceed the capacity of existing or planned storm water drainage systems.

The proposed project does not place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map, including County Floodplain Maps. No part of the site is within the 100-year flood zone and any potential for future flooding should be greatly reduced by the reduction in site runoff and the addition of the oversized drainage basins.

Per County Floodway Map panel 250-1809 for Upper Los Coches Creek a county floodway crosses the property; however it does not affect the project site since the work is done outside of the floodway boundaries as shown in Attachment B.

5. REFERENCES AND ABBREVIATIONS

5.1. References

- [1] San Diego County Hydrology Manual by Department of Public Works, June 2003.
[2] San Diego County Drainage Design Manual, July 2005.

5.2. Abbreviations

Table 10 is a list of abbreviations used in this report and explains their meanings.

Table 10 - Abbreviations

Abbreviation	Meaning
A	Area
ac	acres
C	Runoff coefficient
cfs	cubic feet per second
fps	feet per second
ft	feet
I	Rainfall Intensity
in/hr	inches per hour
L	Length
MRM	Modified Rational Method
MSL	Mean Sea Level
P ₂₄	24-hour precipitation
P ₆	6-hour precipitation
Q	Discharge
RM	Rational Method
S	Slope
sf	square feet
T _c	Time of Concentration

6. DECLARATION OF RESPONSIBLE CHARGE

I, hereby declare that I am the engineer of work for this study. That I have exercised responsible charge over the design of the project with respect to this study as defined in section 6703 of the Business and Professions Code, and that the design is consistent with current standards.

I understand that the check of project drawings specifications, studies and reports by the County of San Diego is confined to a review only and does not relieve me, as engineer in responsible charge, of my responsibilities for project design.



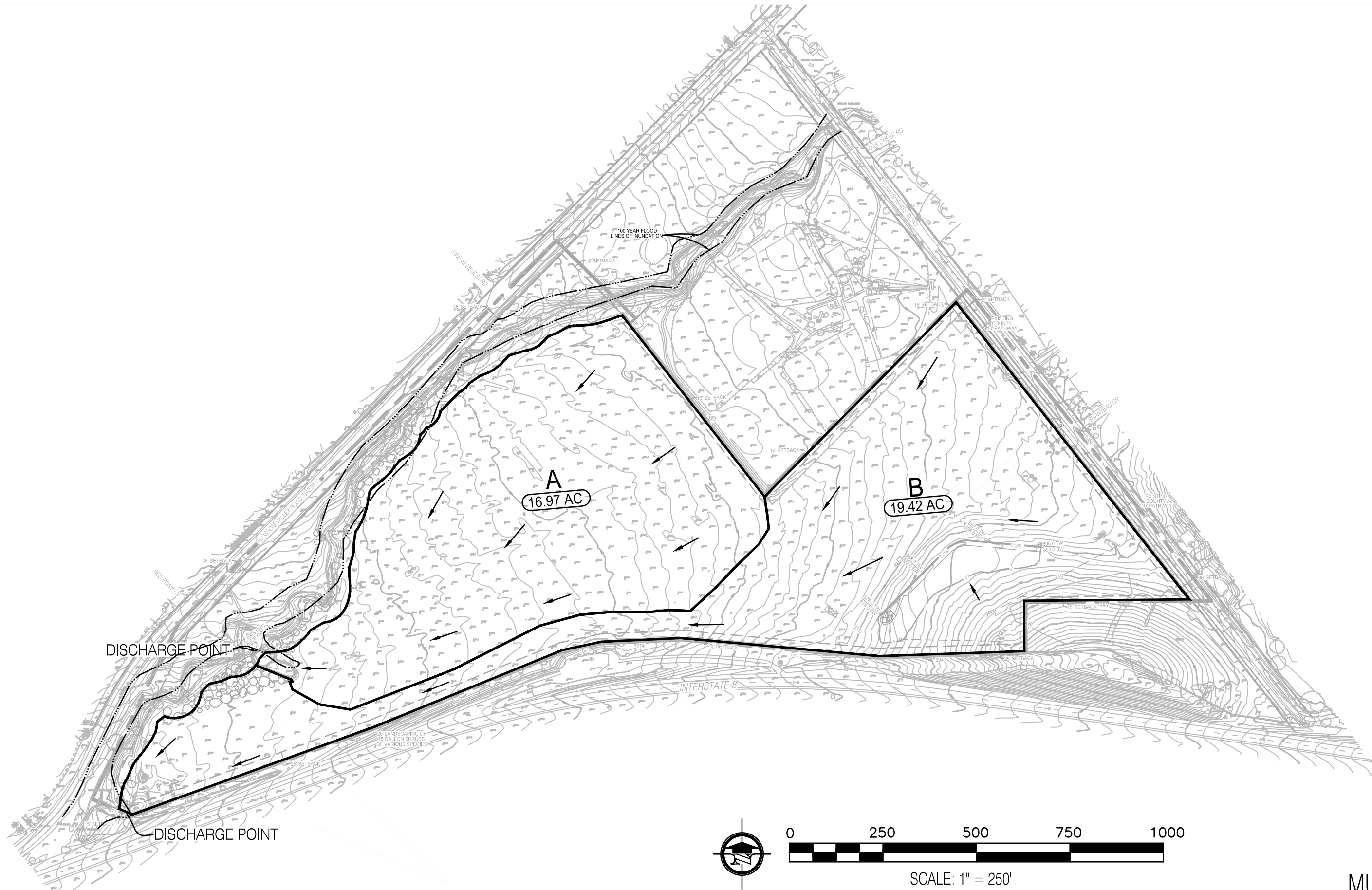
Kenneth J. Discenza RCE 29930 Expires 06/30/13

04/26/2013

Date

Attachment A – Pre-Project Drainage Map

F:\1873 Blossom Valley Rd-Evergreen Nursery\1873 Grading.dwg, 5/1/2013 4:09:06 PM



MUP 12-009



SITE DESIGN ASSOCIATES, INC.
1016 BROADWAY SUITE "A"
EL CAJON, CALIFORNIA 92021
(619) 442-8467

DWG:1873 Grading.dwg

**PRE-PROJECT
DRAINAGE MANAGEMENT AREAS**

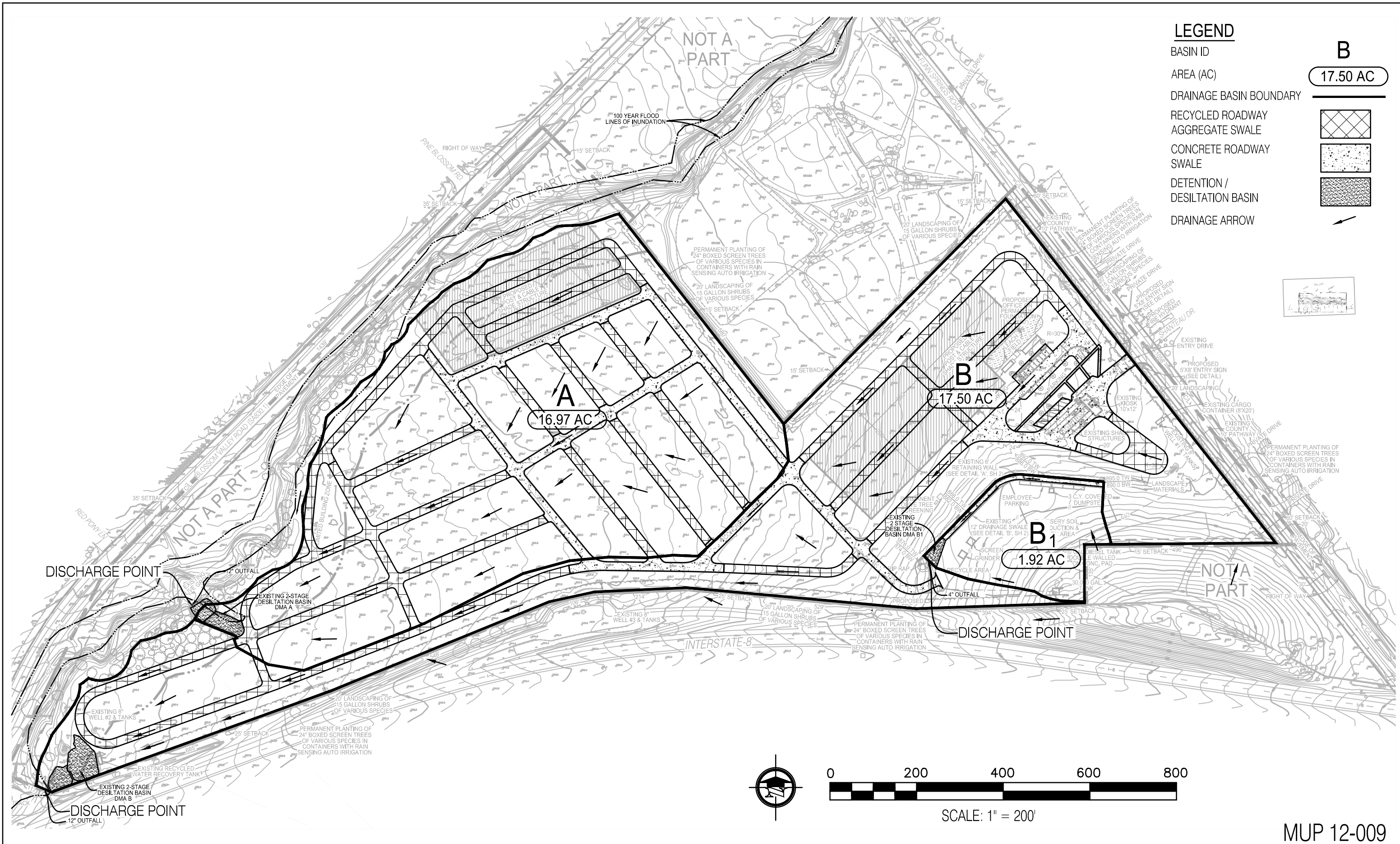
**EVERGREEN NURSERY
BLOSSOM VALLEY ROAD, EL CAJON, CA**

No.	Date	By	Revision

JOB NO.	J-1873
DATE:	4/26/13

Attachment B – Post-Project Drainage Map

F:\1873 Blossom Valley Rd-Evergreen Nursery\1873 Grading.dwg, 5/1/2013 4:09:29 PM



LEGEND

BASIN ID

AREA (AC)

DRAINAGE BASIN BOUNDARY

RECYCLED ROADWAY

AGGREGATE SWALE

CONCRETE ROADWAY

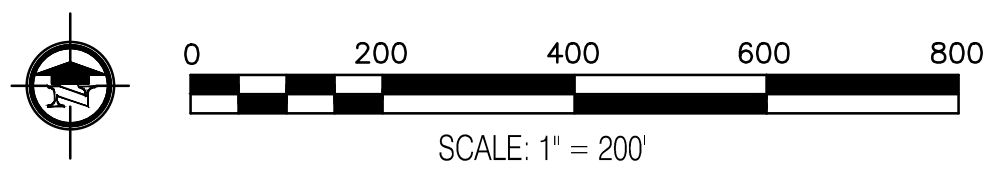
SWALE

DETENTION / DESILTATION BASIN

DRAINAGE ARROW

B

17.50 AC



Attachment C – Hydromodification Information

Project Summary

Project Name	Evergreen Nursery
Project Applicant	Mark Collins
Jurisdiction	
Parcel (APN)	396-070-07
Hydrologic Unit	

Compliance Basin Summary

Basin Name:	Los Coches Creek
Receiving Water:	
Rainfall Basin	Lake Wohlford
Mean Annual Precipitation (inches)	20.0
Project Basin Area (acres):	53.35
Watershed Area (acres):	0.00
SCCWRP Lateral Channel Susceptiblity (H, M, L):	
SCCWRP Vertifical Channel Susceptiblity (H, M, L):	
Overall Channel Susceptibility (H, M, L):	HIGH
Lower Flow Threshold (% of 2-Year Flow):	0.1

Drainage Management Area Summary

ID	Type	BMP ID	Description	Area (ac)	Pre-Project Cover	Post Surface Type	Drainage Soil	Slope
26159	Drains to LID	BMP 1	DMA A - Impervious	1.05	Pervious (Pre)	Concrete or asphalt	Type A (low runoff - sandy soi...	Flat - slope (less ...
26160	Drains to LID	BMP 1	DMA A - Pervious	13.24	Pervious (Pre)	Amended, mulched soil	Type A (low runoff - sandy soi...	Flat - slope (less ...
26161	Self-Treating	BMP 1	DMA A - Recycled Roadway Aggregate	2.57	Pervious (Pre)	Crushed aggregate	Type A (low runoff - sandy soi...	Flat - slope (less ...
26162	Drains to LID	BMP 2	DMA B - Impervious	1.52	Pervious (Pre)	Concrete or asphalt	Type A (low runoff - sandy soi...	Moderate (5 - 10%)
26163	Drains to LID	BMP 2	DMA B - Pervious	13.94	Pervious (Pre)	Amended, mulched soil	Type A (low runoff - sandy soi...	Flat - slope (less ...
26164	Self-Treating	BMP 2	DMA B - Recycled Roadway Aggregate	1.87	Pervious (Pre)	Crushed aggregate	Type A (low runoff - sandy soi...	Flat - slope (less ...
26165	Drains to LID	BMP 3	DMA B1 - Impervious	0.14	Pervious (Pre)	Concrete or asphalt	Type A (low runoff - sandy soi...	Steep (greater 10%)
26166	Drains to LID	BMP 3	DMA B1 - Pervious	1.78	Pervious (Pre)	Amended, mulched soil	Type A (low runoff - sandy soi...	Steep (greater 10%)

LID Facility Summary

BMP ID	Type	Description	Plan Area (sqft)	Volume 1(cft)	Volume 2(cft)	Orifice Flow (cfs)	Orifice Size (inch)
BMP 1	Infiltration Facility	Recycled Roadway Aggregate Swale A	5170	13443	0.00	0.193	0.00
BMP 2	Infiltration Facility	Recycled Roadway Aggregate Swale B	6346	16501	0.00	0.220	0.00

Manage Basins

San Diego County - HMP

Manage Map Layers

Rain Gauges

Mean Annual Rainfall

Rain Basins

Soil Type

Select a Tool

Toolkit:

HydroMod Tools

Tool:

LID Sizer

Result View

Size LID Facility

Basin:

Los Coches Creek

Project:

Evergreen Nursery

Start

DMA

LID

Report

Export

Manage Your DMA's

Create a new DMA by clicking the New button and scroll down to view entry. Alternatively, select an existing DMA from table and view properties below. Click Edit button to change DMA properties then press Save to commit changes.

New

Edit

Save

Delete

DMA ID	Description
26159	DMA A - Impervious
26160	DMA A - Pervious
26161	DMA A - Recycled Roadway Aggregate
26162	DMA B - Impervious

Define DMA Properties

DMA Type:

Drains to LID

Drainage Area (ac):

1.05

BMP ID:

BMP 1

Drain To DMA ID:

N/A

Drainage Soil:

Type A (low runoff - sandy soils)

Pre-Project Cover:

Pervious (Pre)

Post Surface:

Concrete or asphalt

Pre-Project Slope:

Flat - slope (less 5%)

Messages:

DMA Layout

Large View

blossom valley road, lakeside, ca 92040

Find

Map data provided by OpenStreetMap

Location Raingauge Rain Contours

Map Details

Manage Basins

☒ San Diego County - HMP

Manage Map Layers

- ☒ Rain Gauges
- ☒ Mean Annual Rainfall
- ☒ Rain Basins
- ☒ Soil Type

Select a Tool

Toolkit:

Tool:

Result View



Size LID Facility

Basin: **Los Coches Creek**

Project: **Evergreen Nursery**

Start

DMA

LID

Report

Export

Manage Your DMA's

Create a new DMA by clicking the New button and scroll down to view entry. Alternatively, select an existing DMA from table and view properties below. Click Edit button to change DMA properties then press Save to commit changes.

New

Edit

Save

Delete

DMA ID	Description
26159	DMA A - Impervious
26160	DMA A - Pervious
26161	DMA A - Recycled Roadway Aggregate
26162	DMA B - Impervious

Define DMA Properties

DMA Type:

Drainage Area (ac):

BMP ID:

Drain To DMA ID:

Drainage Soil:

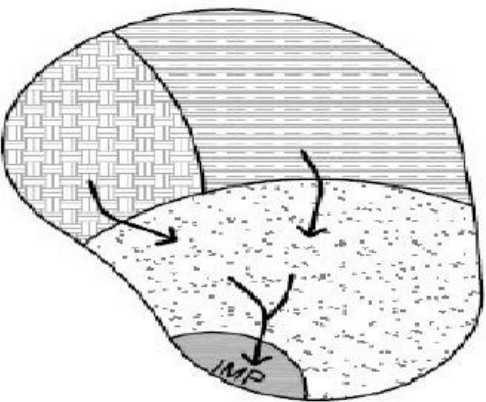
Pre-Project Cover:

Post Surface:

Pre-Project Slope:

Messages:

DMA Layout Large View



blossom valley road, lakeside, ca 92040

Find

Map data provided by OpenStreetMap

Location

Raingauge

Rain Contours

Map

Details

Manage Basins

San Diego County - HMP

Manage Map Layers

Rain Gauges

Mean Annual Rainfall

Rain Basins

Soil Type

Select a Tool

Toolkit:

HydroMod Tools

Tool:

LID Sizer

Result View

Size LID Facility

Basin: Los Coches Creek

Project: Evergreen Nursery

Start

DMA

LID

Report

Export

Manage Your DMA's

Create a new DMA by clicking the New button and scroll down to view entry. Alternatively, select an existing DMA from table and view properties below. Click Edit button to change DMA properties then press Save to commit changes.

New

Edit

Save

Delete

DMA ID	Description
26159	DMA A - Impervious
26160	DMA A - Pervious
26161	DMA A - Recycled Roadway Aggregate
26162	DMA B - Impervious

Define DMA Properties

DMA Type: Self-Treating

Drainage Area (ac): 2.57

BMP ID: BMP 1

Drain To DMA ID: N/A

Drainage Soil: Type A (low runoff - sandy soils)

Pre-Project Cover: Pervious (Pre)

Post Surface: Crushed aggregate

Pre-Project Slope: Flat - slope (less 5%)

Messages:

DMA Layout

Large View

blossom valley road, lakeside, ca 92040

Find

Map data provided by OpenStreetMap

Location Raingauge Rain Contours

Map Details

Manage Basins

☒ San Diego County - HMP

Manage Map Layers

- ☒ Rain Gauges
- ☒ Mean Annual Rainfall
- ☒ Rain Basins
- ☒ Soil Type

Select a Tool

Toolkit:

Tool:

Result View



Size LID Facility

Basin: **Los Coches Creek**

Project: **Evergreen Nursery**

Start

DMA

LID

Report

Export

Manage Your DMA's

Create a new DMA by clicking the New button and scroll down to view entry. Alternatively, select an existing DMA from table and view properties below. Click Edit button to change DMA properties then press Save to commit changes.

New

Edit

Save

Delete

DMA ID	Description
26161	DMA A - Recycled Roadway Aggregate
26162	DMA B - Impervious
26163	DMA B - Pervious
26164	DMA B - Recycled Roadway Aggregate
26165	DMA B - Recycled Roadway Aggregate

Define DMA Properties

DMA Type:

Drainage Area (ac):

BMP ID:

Drain To DMA ID:

Drainage Soil:

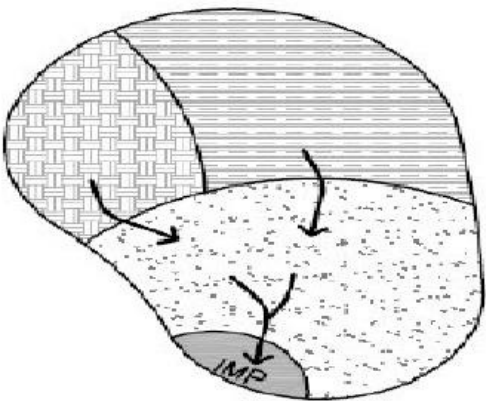
Pre-Project Cover:

Post Surface:

Pre-Project Slope:

Messages:

DMA Layout Large View



blossom valley road, lakeside, ca 92040

Find

Map data provided by OpenStreetMap

LocationRaingaugeRain Contours

MapDetails

Manage Basins

San Diego County - HMP

Manage Map Layers

Rain Gauges

Mean Annual Rainfall

Rain Basins

Soil Type

Select a Tool

Toolkit:

HydroMod Tools

Tool:

LID Sizer

Result View

Size LID Facility

Basin: Los Coches Creek

Project: Evergreen Nursery

Start

DMA

LID

Report

Export

Manage Your DMA's

Create a new DMA by clicking the New button and scroll down to view entry. Alternatively, select an existing DMA from table and view properties below. Click Edit button to change DMA properties then press Save to commit changes.

New

Edit

Save

Delete

DMA ID	Description
26162	DMA B - Impervious
26163	DMA B - Pervious
26164	DMA B - Recycled Roadway Aggregate
26165	DMA B1 - Impervious

Define DMA Properties

DMA Type: Drains to LID

Drainage Area (ac): 13.94

BMP ID: BMP 2

Drain To DMA ID: N/A

Drainage Soil: Type A (low runoff - sandy soils)

Pre-Project Cover: Pervious (Pre)

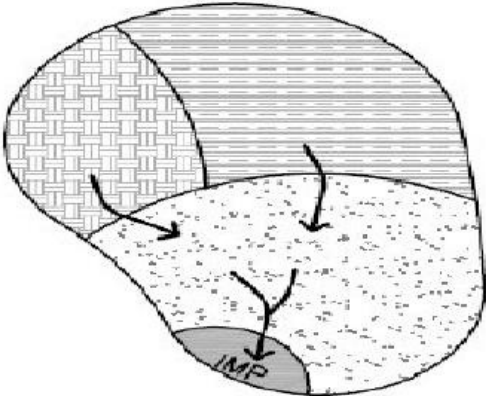
Post Surface: Amended, mulched soil

Pre-Project Slope: Flat - slope (less 5%)

Messages:

DMA Layout

Large View



blossom valley road, lakeside, ca 92040

Find

Map data provided by OpenStreetMap

Location Raingauge Rain Contours

Map Details

Manage Basins

San Diego County - HMP

Manage Map Layers

- Rain Gauges
- Mean Annual Rainfall
- Rain Basins
- Soil Type

Select a Tool

Toolkit: HydroMod Tools

Tool: LID Sizer

Result View



Size LID Facility

Basin: Los Coches Creek

Project: Evergreen Nursery

Start

DMA

LID

Report

Export

Manage Your DMA's

Create a new DMA by clicking the New button and scroll down to view entry. Alternatively, select an existing DMA from table and view properties below. Click Edit button to change DMA properties then press Save to commit changes.

New

Edit

Save

Delete

DMA ID	Description
26163	DMA B - Pervious
26164	DMA B - Recycled Roadway Aggregate
26165	DMA B1 - Impervious
26166	DMA B1 - Pervious

Define DMA Properties

DMA Type: Self-Treating

Drainage Area (ac): 1.87

BMP ID: BMP 2

Drain To DMA ID: N/A

Drainage Soil: Type A (low runoff - sandy soils)

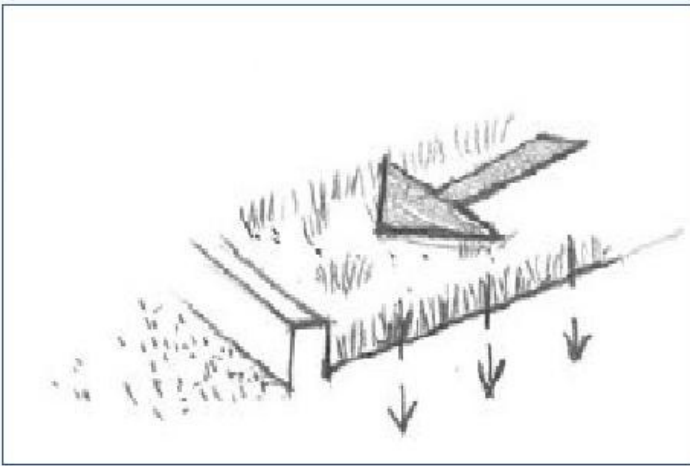
Pre-Project Cover: Pervious (Pre)

Post Surface: Crushed aggregate

Pre-Project Slope: Flat - slope (less 5%)

Messages:

DMA Layout Large View



blossom valley road, lakeside, ca 92040

Find

Map data provided by OpenStreetMap

Location Raingauge Rain Contours

Map Details

Manage Basins

☐ San Diego County - HMP

Manage Map Layers

- ☐ Rain Gauges
- ☐ Mean Annual Rainfall
- ☐ Rain Basins
- ☐ Soil Type

Select a Tool

Toolkit:

Tool:

Result View



Size LID Facility

Basin: Los Coches Creek

Project: Evergreen Nursery

Start

DMA

LID

Report

Export

Manage Your DMA's

Create a new DMA by clicking the New button and scroll down to view entry. Alternatively, select an existing DMA from table and view properties below. Click Edit button to change DMA properties then press Save to commit changes.

New

Edit

Save

Delete

DMA ID	Description
26163	DMA B - Pervious
26164	DMA B - Recycled Roadway Aggregate
26165	DMA B1 - Impervious
26166	DMA B1 - Pervious

Define DMA Properties

DMA Type:

Drainage Area (ac):

BMP ID:

Drain To DMA ID:

Drainage Soil:

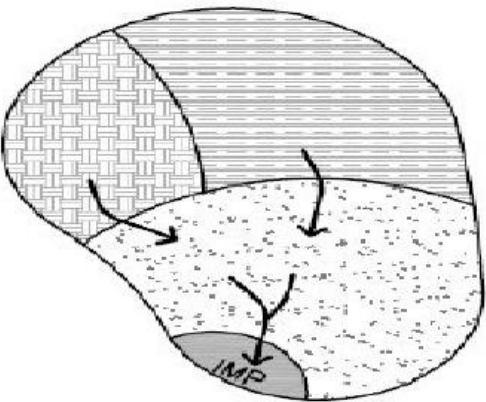
Pre-Project Cover:

Post Surface:

Pre-Project Slope:

Messages:

DMA Layout Large View



blossom valley road, lakeside, ca 92040

Find

Map data provided by OpenStreetMap

Location Raingauge Rain Contours

Map Details

Manage Basins

☐ San Diego County - HMP

Manage Map Layers

☐ Rain Gauges

☐ Mean Annual Rainfall

☐ Rain Basins

☐ Soil Type

Select a Tool

Toolkit:

HydroMod Tools

Tool:

LID Sizer

Result View

 **Size LID Facility**

Basin: **Los Coches Creek**

Project: **Evergreen Nursery**

Start

DMA

LID

Report

Export

Manage Your DMA's

Create a new DMA by clicking the New button and scroll down to view entry. Alternatively, select an existing DMA from table and view properties below. Click Edit button to change DMA properties then press Save to commit changes.

New

Edit

Save

Delete

DMA ID	Description
26163	DMA B - Pervious
26164	DMA B - Recycled Roadway Aggregate
26165	DMA B1 - Impervious
26166	DMA B1 - Pervious

Define DMA Properties

DMA Type:

Drains to LID

Drainage Area (ac):

1.78

BMP ID:

BMP 3

Drain To DMA ID:

N/A

Drainage Soil:

Type A (low runoff - sandy soils)

Pre-Project Cover:

Pervious (Pre)

Post Surface:

Amended, mulched soil

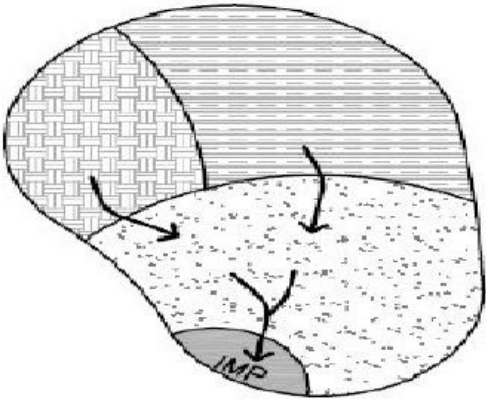
Pre-Project Slope:

Steep (greater 10%)

Messages:

DMA Layout

Large View



blossom valley road, lakeside, ca 92040

Find

Map data provided by OpenStreetMap

Location Raingauge Rain Contours

Map Details

Manage Basins

San Diego County - HMP

Manage Map Layers

- ☐ Rain Gauges
- ☐ Mean Annual Rainfall
- ☐ Rain Basins
- ☐ Soil Type

Select a Tool

Toolkit: HydroMod Tools
Tool: LID Sizer

Result View



Size LID Facility

Basin: Los Coches Creek

Project: Evergreen Nursery

Start

DMA

LID

Report

Export

Manage Your LID's

Create a new LID by clicking the New button and scroll down to view new entry. Alternatively select an existing LID from the table and view properties below. Click the Edit button to change LID properties and press SAVE to update the calculations.

New

Edit

Save

Delete

BMP ID	Description
BMP 1	Recycled Roadway Aggregate Swale A
BMP 2	Recycled Roadway Aggregate Swale B

LID Sizing

LID Type: Infiltration Facility

Flow Threshold (cfs): 0.193

Drainage Area (ac): 14.29

Minimum Area (sqft): 5170.7

Proposed Area (sqft): 111949.0

Minimum Volume V1 (cft): 13443.9

Proposed Volume V1 (cft): 46090.0

Minimum Volume V2 (cft): N/A

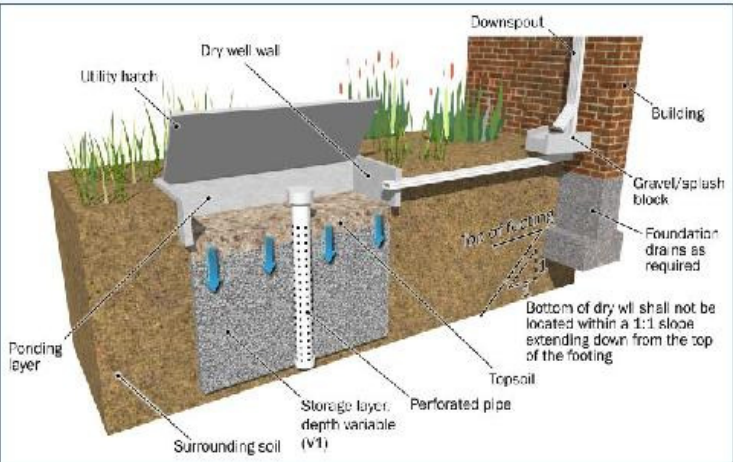
Proposed Volume V2 (cft): 0.0

Maximum Orifice Size (in): 0.0

Proposed Orifice Size (in): 0.0

Messages:

LID Layout Large View



[Find](#)

Map data provided by OpenStreetMap

[Location](#) [Raingauge](#) [Rain Contours](#)[Map](#) [Details](#)

Manage Basins

☐ San Diego County - HMP

Manage Map Layers

- ☐ Rain Gauges
- ☐ Mean Annual Rainfall
- ☐ Rain Basins
- ☐ Soil Type

Select a Tool

Toolkit: Tool:

Result View



Size LID Facility

Basin: **Los Coches Creek**Project: **Evergreen Nursery**[Start](#)[DMA](#)[LID](#)[Report](#)[Export](#)

Manage Your LID's

Create a new LID by clicking the New button and scroll down to view new entry. Alternatively select an existing LID from the table and view properties below. Click the Edit button to change LID properties and press SAVE to update the calculations.

[New](#)[Edit](#)[Save](#)[Delete](#)

BMP ID	Description
BMP 1	Recycled Roadway Aggregate Swale A
BMP 2	Recycled Roadway Aggregate Swale B

LID Sizing

LID Type: Flow Threshold (cfs): Drainage Area (ac): Minimum Area (sqft): Proposed Area (sqft): Minimum Volume V1 (cft): Proposed Volume V1 (cft): Minimum Volume V2 (cft): Proposed Volume V2 (cft): Maximum Orifice Size (in): Proposed Orifice Size (in):

Messages:

LID Layout Large View

Attachment D – EPA Mulch Table

Table 2. Measured reductions in soil loss for different mulch treatments
(Source: Harding, 1990, as cited in USEPA, 1993)

Mulch characteristics	Soil loss reduction (%)	Water velocity reduction (% relative to bare soil)
100% wheat straw/top net	97.5	73
100% wheat straw/two nets	98.6	56
70% wheat straw/30% coconut fiber	98.7	71
70% wheat straw/30% coconut fiber	99.5	78
100% coconut fiber	98.4	77
Nylon monofilament/two nets	99.8	74
Nylon monofilament/rigid/bonded	53.0	24
Vinyl monofilament/flexible/bonded	89.6	32
Curled wood fibers/top net	90.4	47
Curled wood fibers/two nets	93.5	59
Antiwash netting(jute)	91.8	59
Interwoven paper and thread	93.0	53
Uncrimped wheat straw, 2,242 kg/ha	84.0	45
Uncrimped wheat straw, 4,484 kg/ha	89.3	59

**From EPA BMP Fact Sheet "Mulching"*

http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=factsheet_results&view=specific&bmp=41

Attachment E – Rick Rat Hydro Hydrographs and HydroCAD Reports

RUN DATE 4/24/2013
HYDROGRAPH FILE NAME Text1
TIME OF CONCENTRATION 29 MIN.
6 HOUR RAINFALL 2.9 INCHES
BASIN AREA 16.97 ACRES
RUNOFF COEFFICIENT 0.24
PEAK DISCHARGE 10.12 CFS

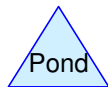
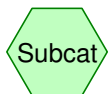
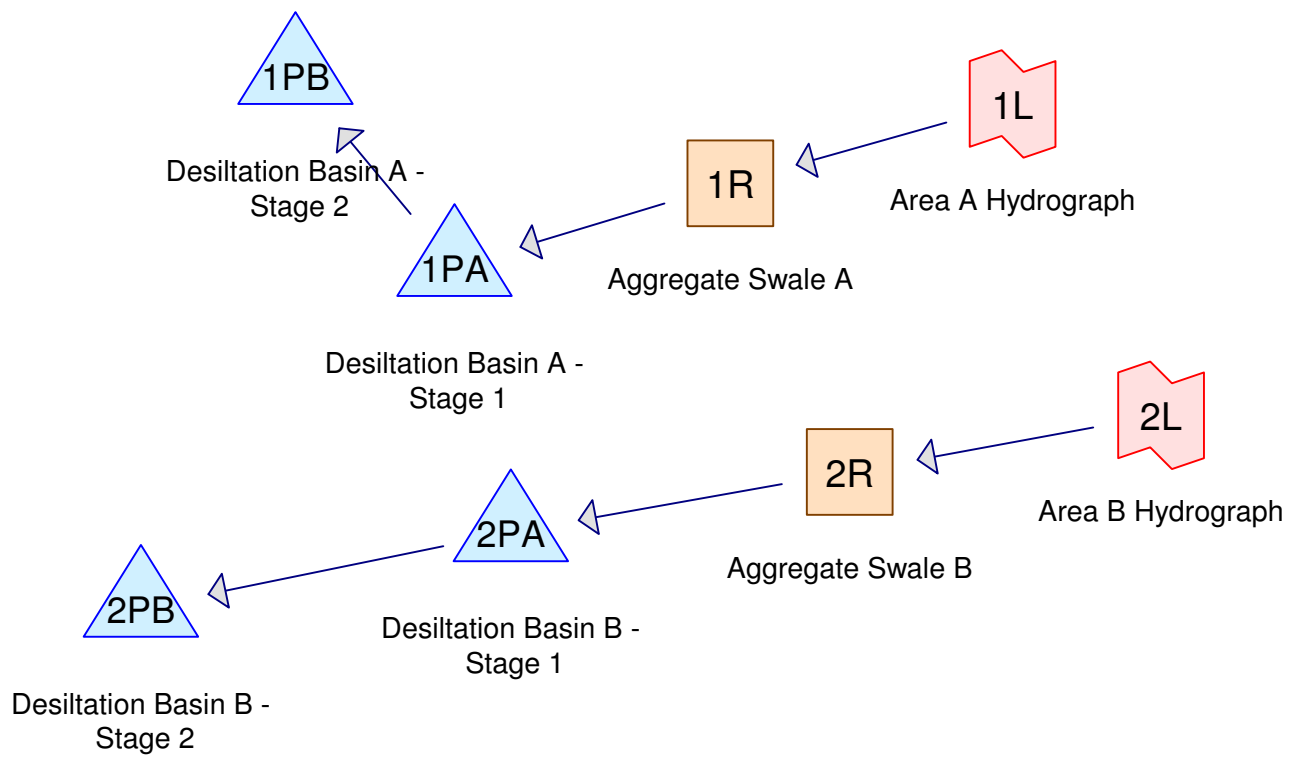
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TIME (MIN) = 29	DISCHARGE (CFS) = 0.7
TIME (MIN) = 58	DISCHARGE (CFS) = 0.8
TIME (MIN) = 87	DISCHARGE (CFS) = 0.9
TIME (MIN) = 116	DISCHARGE (CFS) = 1
TIME (MIN) = 145	DISCHARGE (CFS) = 1.2
TIME (MIN) = 174	DISCHARGE (CFS) = 1.4
TIME (MIN) = 203	DISCHARGE (CFS) = 2
TIME (MIN) = 232	DISCHARGE (CFS) = 2.7
TIME (MIN) = 261	DISCHARGE (CFS) = 10.12
TIME (MIN) = 290	DISCHARGE (CFS) = 1.6
TIME (MIN) = 319	DISCHARGE (CFS) = 1.1
TIME (MIN) = 348	DISCHARGE (CFS) = 0.8
TIME (MIN) = 377	DISCHARGE (CFS) = 0

RUN DATE 4/24/2013
HYDROGRAPH FILE NAME Text1
TIME OF CONCENTRATION 35 MIN.
6 HOUR RAINFALL 2.9 INCHES
BASIN AREA 17.5 ACRES
RUNOFF COEFFICIENT 0.26
PEAK DISCHARGE 10.03 CFS

TIME (MIN) = 0	DISCHARGE (CFS) = 0
TIME (MIN) = 35	DISCHARGE (CFS) = 0.1
TIME (MIN) = 70	DISCHARGE (CFS) = 0.9
TIME (MIN) = 105	DISCHARGE (CFS) = 1
TIME (MIN) = 140	DISCHARGE (CFS) = 1.2
TIME (MIN) = 175	DISCHARGE (CFS) = 1.3
TIME (MIN) = 210	DISCHARGE (CFS) = 2
TIME (MIN) = 245	DISCHARGE (CFS) = 2.6
TIME (MIN) = 280	DISCHARGE (CFS) = 10.03
TIME (MIN) = 315	DISCHARGE (CFS) = 1.6
TIME (MIN) = 350	DISCHARGE (CFS) = 1.1
TIME (MIN) = 385	DISCHARGE (CFS) = 0

RUN DATE 4/24/2013
HYDROGRAPH FILE NAME Text1
TIME OF CONCENTRATION 20 MIN.
6 HOUR RAINFALL 2.9 INCHES
BASIN AREA 1.92 ACRES
RUNOFF COEFFICIENT 0.25
PEAK DISCHARGE 1.51 CFS

TIME (MIN) = 0	DISCHARGE (CFS) = 0
TIME (MIN) = 20	DISCHARGE (CFS) = 0.1
TIME (MIN) = 40	DISCHARGE (CFS) = 0.1
TIME (MIN) = 60	DISCHARGE (CFS) = 0.1
TIME (MIN) = 80	DISCHARGE (CFS) = 0.1
TIME (MIN) = 100	DISCHARGE (CFS) = 0.1
TIME (MIN) = 120	DISCHARGE (CFS) = 0.1
TIME (MIN) = 140	DISCHARGE (CFS) = 0.1
TIME (MIN) = 160	DISCHARGE (CFS) = 0.1
TIME (MIN) = 180	DISCHARGE (CFS) = 0.2
TIME (MIN) = 200	DISCHARGE (CFS) = 0.2
TIME (MIN) = 220	DISCHARGE (CFS) = 0.3
TIME (MIN) = 240	DISCHARGE (CFS) = 0.4
TIME (MIN) = 260	DISCHARGE (CFS) = 1.51
TIME (MIN) = 280	DISCHARGE (CFS) = 0.2
TIME (MIN) = 300	DISCHARGE (CFS) = 0.2
TIME (MIN) = 320	DISCHARGE (CFS) = 0.1
TIME (MIN) = 340	DISCHARGE (CFS) = 0.1
TIME (MIN) = 360	DISCHARGE (CFS) = 0.1
TIME (MIN) = 380	DISCHARGE (CFS) = 0



Routing Diagram for Evergreen

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Summary for Reach 1R: Aggregate Swale A

Inflow Area = 16.970 ac, 6.00% Impervious, Inflow Depth = 0.09"
 Inflow = 5.03 cfs @ 4.32 hrs, Volume= 0.127 af, Incl. 5.09 cfs Inflow Loss
 Outflow = 2.98 cfs @ 4.68 hrs, Volume= 0.127 af, Atten= 41%, Lag= 21.9 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Max. Velocity= 1.68 fps, Min. Travel Time= 14.9 min

Avg. Velocity= 0.29 fps, Avg. Travel Time= 86.2 min

Peak Storage= 2,667 cf @ 4.44 hrs

Average Depth at Peak Storage= 0.34'

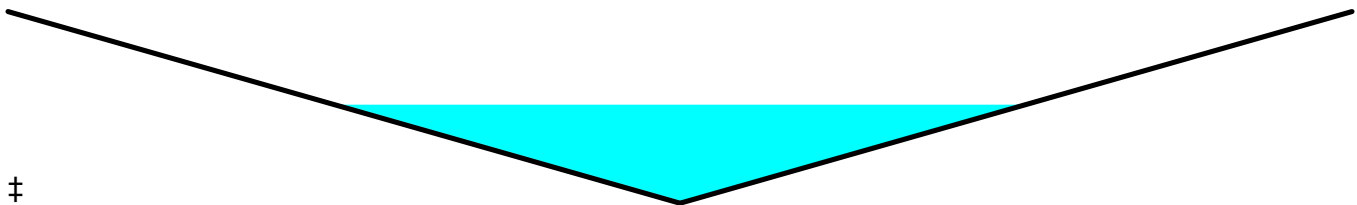
Bank-Full Depth= 0.67' Flow Area= 6.7 sf, Capacity= 17.60 cfs

0.00' x 0.67' deep channel, n= 0.040

Side Slope Z-value= 15.0 '/' Top Width= 20.10'

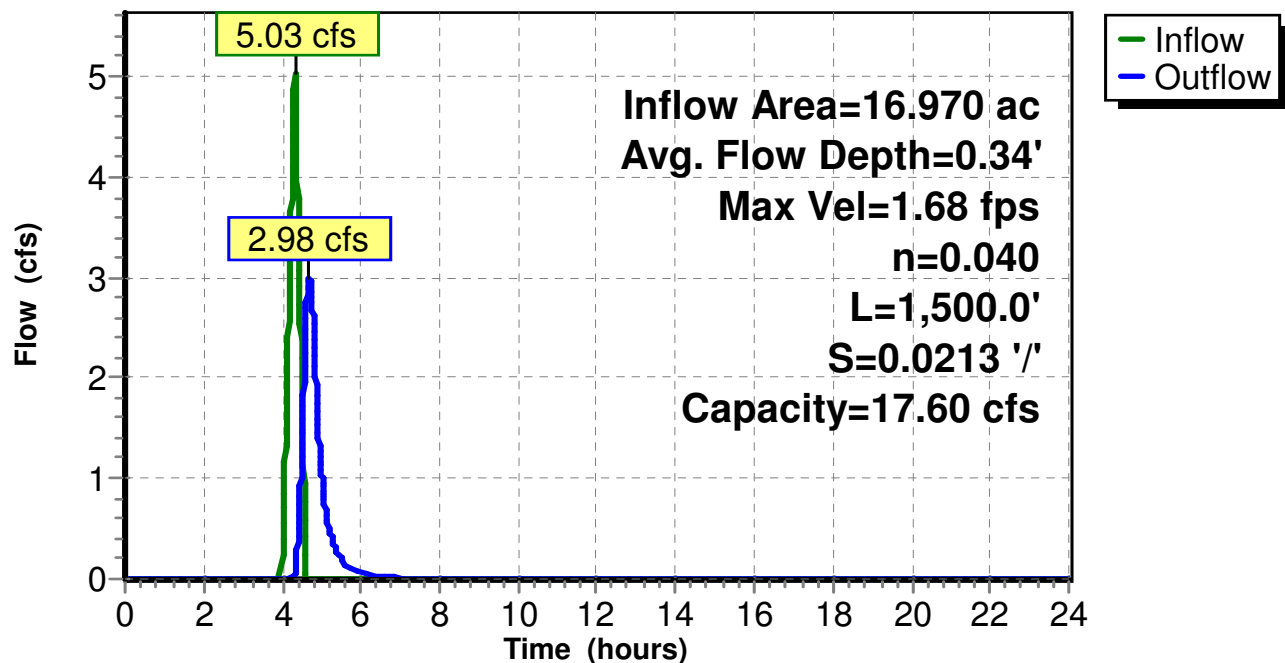
Length= 1,500.0' Slope= 0.0213 '/'

Inlet Invert= 852.00', Outlet Invert= 820.00'



Reach 1R: Aggregate Swale A

Hydrograph



Evergreen

Rainfall Duration=18 min, Inten=2.47 in/hr

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Hydrograph for Reach 1R: Aggregate Swale A

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)
0.00	0.00	0	852.00	0.00
0.50	0.00	0	852.00	0.00
1.00	0.00	0	852.00	0.00
1.50	0.00	0	852.00	0.00
2.00	0.00	0	852.00	0.00
2.50	0.00	0	852.00	0.00
3.00	0.00	0	852.00	0.00
3.50	0.00	0	852.00	0.00
4.00	0.08	1	852.01	0.00
4.50	1.83	2,548	852.34	1.34
5.00	0.00	609	852.16	1.03
5.50	0.00	217	852.10	0.20
6.00	0.00	101	852.07	0.06
6.50	0.00	55	852.05	0.02
7.00	0.00	33	852.04	0.01
7.50	0.00	21	852.03	0.01
8.00	0.00	15	852.03	0.00
8.50	0.00	10	852.02	0.00
9.00	0.00	8	852.02	0.00
9.50	0.00	6	852.02	0.00
10.00	0.00	4	852.01	0.00
10.50	0.00	4	852.01	0.00
11.00	0.00	3	852.01	0.00
11.50	0.00	2	852.01	0.00
12.00	0.00	2	852.01	0.00
12.50	0.00	2	852.01	0.00
13.00	0.00	1	852.01	0.00
13.50	0.00	1	852.01	0.00
14.00	0.00	1	852.01	0.00
14.50	0.00	1	852.01	0.00
15.00	0.00	1	852.00	0.00
15.50	0.00	1	852.00	0.00
16.00	0.00	1	852.00	0.00
16.50	0.00	0	852.00	0.00
17.00	0.00	0	852.00	0.00
17.50	0.00	0	852.00	0.00
18.00	0.00	0	852.00	0.00
18.50	0.00	0	852.00	0.00
19.00	0.00	0	852.00	0.00
19.50	0.00	0	852.00	0.00
20.00	0.00	0	852.00	0.00
20.50	0.00	0	852.00	0.00
21.00	0.00	0	852.00	0.00
21.50	0.00	0	852.00	0.00
22.00	0.00	0	852.00	0.00
22.50	0.00	0	852.00	0.00
23.00	0.00	0	852.00	0.00
23.50	0.00	0	852.00	0.00
24.00	0.00	0	852.00	0.00

Summary for Reach 2R: Aggregate Swale B

Inflow Area = 17.500 ac, 9.00% Impervious, Inflow Depth = 0.18"
 Inflow = 6.56 cfs @ 4.64 hrs, Volume= 0.267 af, Incl. 3.47 cfs Inflow Loss
 Outflow = 3.70 cfs @ 5.28 hrs, Volume= 0.267 af, Atten= 44%, Lag= 38.7 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Max. Velocity= 1.97 fps, Min. Travel Time= 26.8 min

Avg. Velocity= 0.43 fps, Avg. Travel Time= 123.3 min

Peak Storage= 5,950 cf @ 4.84 hrs

Average Depth at Peak Storage= 0.35'

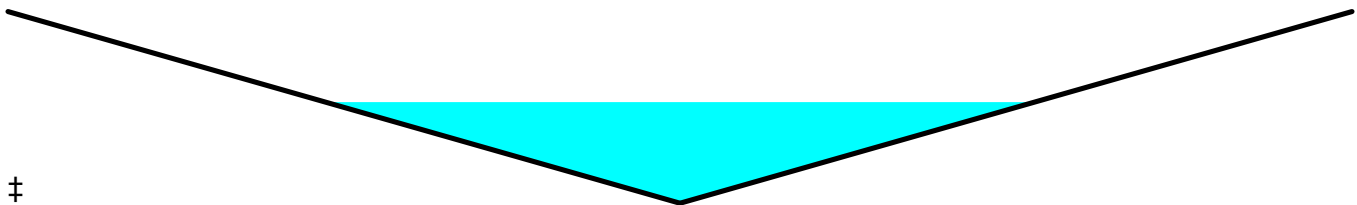
Bank-Full Depth= 0.67' Flow Area= 6.7 sf, Capacity= 20.30 cfs

0.00' x 0.67' deep channel, n= 0.040

Side Slope Z-value= 15.0 ' ' Top Width= 20.10'

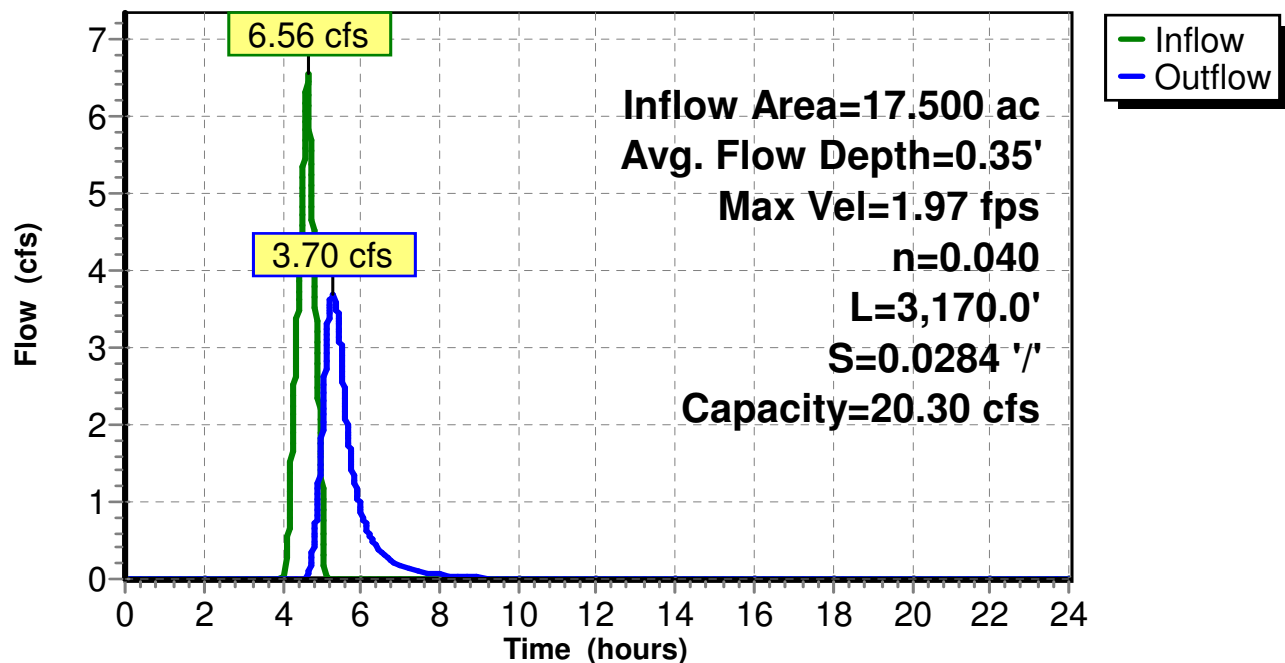
Length= 3,170.0' Slope= 0.0284 ' '

Inlet Invert= 905.00', Outlet Invert= 815.00'



Reach 2R: Aggregate Swale B

Hydrograph



Evergreen*Rainfall Duration=18 min, Inten=2.47 in/hr*

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Hydrograph for Reach 2R: Aggregate Swale B

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)
0.00	0.00	0	905.00	0.00
0.50	0.00	0	905.00	0.00
1.00	0.00	0	905.00	0.00
1.50	0.00	0	905.00	0.00
2.00	0.00	0	905.00	0.00
2.50	0.00	0	905.00	0.00
3.00	0.00	0	905.00	0.00
3.50	0.00	0	905.00	0.00
4.00	0.00	0	905.00	0.00
4.50	4.84	2,851	905.24	0.00
5.00	1.33	5,354	905.34	1.84
5.50	0.00	2,198	905.21	2.89
6.00	0.00	1,079	905.15	0.88
6.50	0.00	608	905.11	0.35
7.00	0.00	375	905.09	0.16
7.50	0.00	248	905.07	0.09
8.00	0.00	172	905.06	0.05
8.50	0.00	124	905.05	0.03
9.00	0.00	93	905.04	0.02
9.50	0.00	71	905.04	0.01
10.00	0.00	55	905.03	0.01
10.50	0.00	44	905.03	0.01
11.00	0.00	36	905.03	0.01
11.50	0.00	29	905.02	0.00
12.00	0.00	24	905.02	0.00
12.50	0.00	20	905.02	0.00
13.00	0.00	17	905.02	0.00
13.50	0.00	15	905.02	0.00
14.00	0.00	13	905.02	0.00
14.50	0.00	11	905.01	0.00
15.00	0.00	10	905.01	0.00
15.50	0.00	8	905.01	0.00
16.00	0.00	7	905.01	0.00
16.50	0.00	7	905.01	0.00
17.00	0.00	6	905.01	0.00
17.50	0.00	5	905.01	0.00
18.00	0.00	5	905.01	0.00
18.50	0.00	4	905.01	0.00
19.00	0.00	4	905.01	0.00
19.50	0.00	3	905.01	0.00
20.00	0.00	3	905.01	0.00
20.50	0.00	3	905.01	0.00
21.00	0.00	3	905.01	0.00
21.50	0.00	2	905.01	0.00
22.00	0.00	2	905.01	0.00
22.50	0.00	2	905.01	0.00
23.00	0.00	2	905.01	0.00
23.50	0.00	2	905.01	0.00
24.00	0.00	2	905.00	0.00

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Rainfall Duration=18 min, Inten=2.47 in/hr

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Summary for Pond 1PA: Desiltation Basin A - Stage 1

Inflow Area = 16.970 ac, 6.00% Impervious, Inflow Depth = 0.09"
 Inflow = 2.98 cfs @ 4.68 hrs, Volume= 0.127 af
 Outflow = 2.66 cfs @ 4.77 hrs, Volume= 0.127 af, Atten= 11%, Lag= 5.4 min
 Primary = 2.66 cfs @ 4.77 hrs, Volume= 0.127 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 818.54' @ 4.77 hrs Surf.Area= 951 sf Storage= 329 cf

Plug-Flow detention time= 0.9 min calculated for 0.127 af (100% of inflow)
 Center-of-Mass det. time= 0.9 min (293.4 - 292.5)

Volume	Invert	Avail.Storage	Storage Description		
#1	818.00'	4,875 cf	Custom Stage Data (Irregular) Listed below (Recalc)		
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
818.00	323	74.0	0	0	323
819.00	1,751	175.0	942	942	2,328
820.00	2,252	196.0	1,996	2,938	2,975
820.74	3,000	250.0	1,937	4,875	4,899

Device	Routing	Invert	Outlet Devices	
#1	Primary	820.73'	20.0' long x 0.5' breadth Broad-Crested Rectangular Weir	
			Head (feet) 0.20 0.40 0.60 0.80 1.00	
			Coef. (English) 2.80 2.92 3.08 3.30 3.32	
#2	Primary	817.58'	2.5" W x 2.0" H Vert. Orifice/Grate X 17.00 C= 0.600	

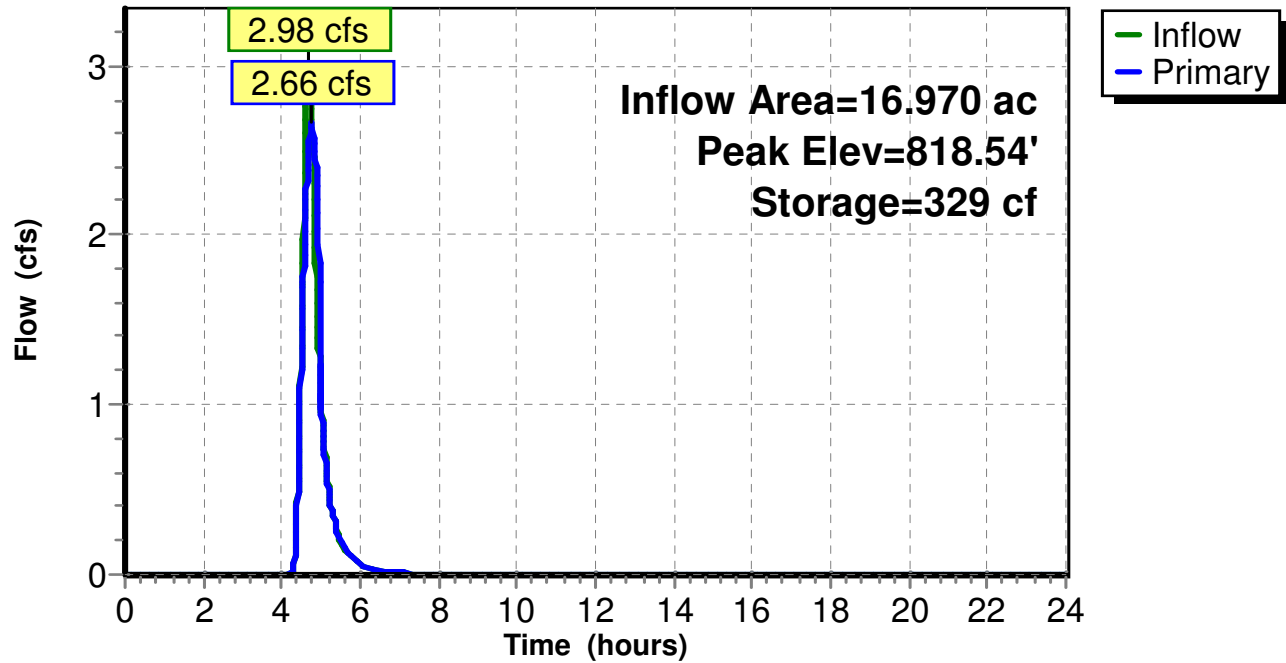
Primary OutFlow Max=2.66 cfs @ 4.77 hrs HW=818.54' (Free Discharge)

1=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

2=Orifice/Grate (Orifice Controls 2.66 cfs @ 4.50 fps)

Pond 1PA: Desiltation Basin A - Stage 1

Hydrograph



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Rainfall Duration=18 min, Inten=2.47 in/hr

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Hydrograph for Pond 1PA: Desiltation Basin A - Stage 1

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Primary (cfs)
0.00	0.00	0	818.00	0.00
0.50	0.00	0	818.00	0.00
1.00	0.00	0	818.00	0.00
1.50	0.00	0	818.00	0.00
2.00	0.00	0	818.00	0.00
2.50	0.00	0	818.00	0.00
3.00	0.00	0	818.00	0.00
3.50	0.00	0	818.00	0.00
4.00	0.00	0	818.00	0.00
4.50	1.34	7	818.02	1.32
5.00	1.03	6	818.02	1.07
5.50	0.20	1	818.00	0.20
6.00	0.06	0	818.00	0.06
6.50	0.02	0	818.00	0.02
7.00	0.01	0	818.00	0.01
7.50	0.01	0	818.00	0.01
8.00	0.00	0	818.00	0.00
8.50	0.00	0	818.00	0.00
9.00	0.00	0	818.00	0.00
9.50	0.00	0	818.00	0.00
10.00	0.00	0	818.00	0.00
10.50	0.00	0	818.00	0.00
11.00	0.00	0	818.00	0.00
11.50	0.00	0	818.00	0.00
12.00	0.00	0	818.00	0.00
12.50	0.00	0	818.00	0.00
13.00	0.00	0	818.00	0.00
13.50	0.00	0	818.00	0.00
14.00	0.00	0	818.00	0.00
14.50	0.00	0	818.00	0.00
15.00	0.00	0	818.00	0.00
15.50	0.00	0	818.00	0.00
16.00	0.00	0	818.00	0.00
16.50	0.00	0	818.00	0.00
17.00	0.00	0	818.00	0.00
17.50	0.00	0	818.00	0.00
18.00	0.00	0	818.00	0.00
18.50	0.00	0	818.00	0.00
19.00	0.00	0	818.00	0.00
19.50	0.00	0	818.00	0.00
20.00	0.00	0	818.00	0.00
20.50	0.00	0	818.00	0.00
21.00	0.00	0	818.00	0.00
21.50	0.00	0	818.00	0.00
22.00	0.00	0	818.00	0.00
22.50	0.00	0	818.00	0.00
23.00	0.00	0	818.00	0.00
23.50	0.00	0	818.00	0.00
24.00	0.00	0	818.00	0.00

Summary for Pond 1PB: Desiltation Basin A - Stage 2

Inflow Area = 16.970 ac, 6.00% Impervious, Inflow Depth = 0.09"
 Inflow = 2.66 cfs @ 4.77 hrs, Volume= 0.127 af
 Outflow = 2.64 cfs @ 4.80 hrs, Volume= 0.127 af, Atten= 1%, Lag= 1.7 min
 Primary = 2.64 cfs @ 4.80 hrs, Volume= 0.127 af
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 817.41' @ 4.80 hrs Surf.Area= 363 sf Storage= 72 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
 Center-of-Mass det. time= 0.2 min (293.6 - 293.4)

Volume	Invert	Avail.Storage	Storage Description		
#1	817.00'	3,924 cf	Custom Stage Data (Irregular) Listed below (Recalc)		
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
817.00	41	46.0	0	0	41
818.00	1,393	138.0	558	558	1,391
819.00	1,795	161.0	1,590	2,147	1,959
819.90	2,158	182.0	1,776	3,924	2,552

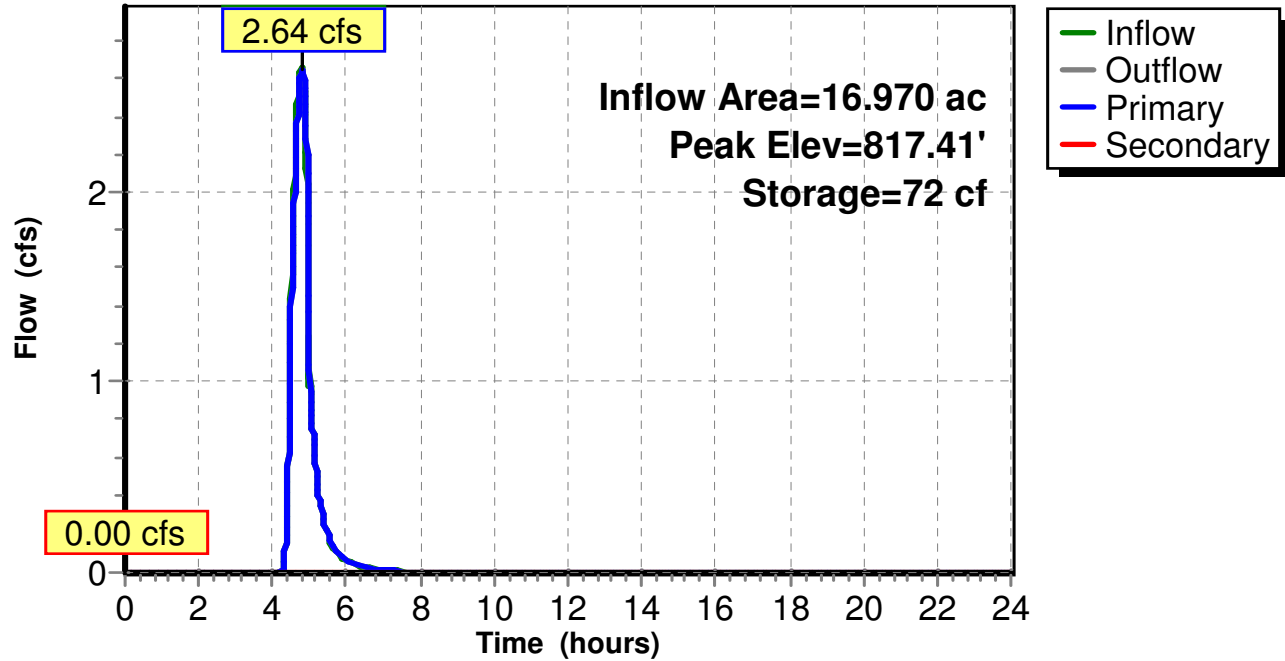
Device	Routing	Invert	Outlet Devices
#1	Primary	816.37'	12.0" Round Culvert L= 28.3' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 816.37' / 816.08' S= 0.0102 '/' Cc= 0.900 n= 0.013 Concrete pipe, straight & clean, Flow Area= 0.79 sf
#2	Secondary	819.50'	30.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=2.64 cfs @ 4.80 hrs HW=817.41' (Free Discharge)
 ↑ **1=Culvert** (Barrel Controls 2.64 cfs @ 4.02 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=817.00' (Free Discharge)
 ↑ **2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1PB: Desiltation Basin A - Stage 2

Hydrograph



Evergreen

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Rainfall Duration=18 min, Inten=2.47 in/hr

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Hydrograph for Pond 1PB: Desiltation Basin A - Stage 2

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Primary (cfs)	Secondary (cfs)
0.00	0.00	0	817.00	0.00	0.00	0.00
0.50	0.00	0	817.00	0.00	0.00	0.00
1.00	0.00	0	817.00	0.00	0.00	0.00
1.50	0.00	0	817.00	0.00	0.00	0.00
2.00	0.00	0	817.00	0.00	0.00	0.00
2.50	0.00	0	817.00	0.00	0.00	0.00
3.00	0.00	0	817.00	0.00	0.00	0.00
3.50	0.00	0	817.00	0.00	0.00	0.00
4.00	0.00	0	817.00	0.00	0.00	0.00
4.50	1.32	1	817.03	1.32	1.32	0.00
5.00	1.07	1	817.02	1.11	1.11	0.00
5.50	0.20	0	817.00	0.20	0.20	0.00
6.00	0.06	0	817.00	0.06	0.06	0.00
6.50	0.02	0	817.00	0.02	0.02	0.00
7.00	0.01	0	817.00	0.01	0.01	0.00
7.50	0.01	0	817.00	0.01	0.01	0.00
8.00	0.00	0	817.00	0.00	0.00	0.00
8.50	0.00	0	817.00	0.00	0.00	0.00
9.00	0.00	0	817.00	0.00	0.00	0.00
9.50	0.00	0	817.00	0.00	0.00	0.00
10.00	0.00	0	817.00	0.00	0.00	0.00
10.50	0.00	0	817.00	0.00	0.00	0.00
11.00	0.00	0	817.00	0.00	0.00	0.00
11.50	0.00	0	817.00	0.00	0.00	0.00
12.00	0.00	0	817.00	0.00	0.00	0.00
12.50	0.00	0	817.00	0.00	0.00	0.00
13.00	0.00	0	817.00	0.00	0.00	0.00
13.50	0.00	0	817.00	0.00	0.00	0.00
14.00	0.00	0	817.00	0.00	0.00	0.00
14.50	0.00	0	817.00	0.00	0.00	0.00
15.00	0.00	0	817.00	0.00	0.00	0.00
15.50	0.00	0	817.00	0.00	0.00	0.00
16.00	0.00	0	817.00	0.00	0.00	0.00
16.50	0.00	0	817.00	0.00	0.00	0.00
17.00	0.00	0	817.00	0.00	0.00	0.00
17.50	0.00	0	817.00	0.00	0.00	0.00
18.00	0.00	0	817.00	0.00	0.00	0.00
18.50	0.00	0	817.00	0.00	0.00	0.00
19.00	0.00	0	817.00	0.00	0.00	0.00
19.50	0.00	0	817.00	0.00	0.00	0.00
20.00	0.00	0	817.00	0.00	0.00	0.00
20.50	0.00	0	817.00	0.00	0.00	0.00
21.00	0.00	0	817.00	0.00	0.00	0.00
21.50	0.00	0	817.00	0.00	0.00	0.00
22.00	0.00	0	817.00	0.00	0.00	0.00
22.50	0.00	0	817.00	0.00	0.00	0.00
23.00	0.00	0	817.00	0.00	0.00	0.00
23.50	0.00	0	817.00	0.00	0.00	0.00
24.00	0.00	0	817.00	0.00	0.00	0.00

Summary for Pond 2PA: Desiltation Basin B - Stage 1

Inflow Area = 17.500 ac, 9.00% Impervious, Inflow Depth = 0.18"
 Inflow = 3.70 cfs @ 5.28 hrs, Volume= 0.267 af
 Outflow = 3.24 cfs @ 5.44 hrs, Volume= 0.267 af, Atten= 12%, Lag= 9.4 min
 Primary = 3.24 cfs @ 5.44 hrs, Volume= 0.267 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 812.59' @ 5.44 hrs Surf.Area= 1,846 sf Storage= 964 cf

Plug-Flow detention time= 2.7 min calculated for 0.267 af (100% of inflow)
 Center-of-Mass det. time= 2.7 min (341.0 - 338.3)

Volume	Invert	Avail.Storage	Storage Description
#1	811.57'	4,801 cf	Custom Stage Data (Irregular) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
811.57	100	50.0	0	0	100
812.00	859	118.0	179	179	1,010
813.00	2,736	207.6	1,709	1,889	3,337
813.50	3,585	201.0	1,575	3,464	3,575
814.60	1	1.0	1,337	4,801	6,792

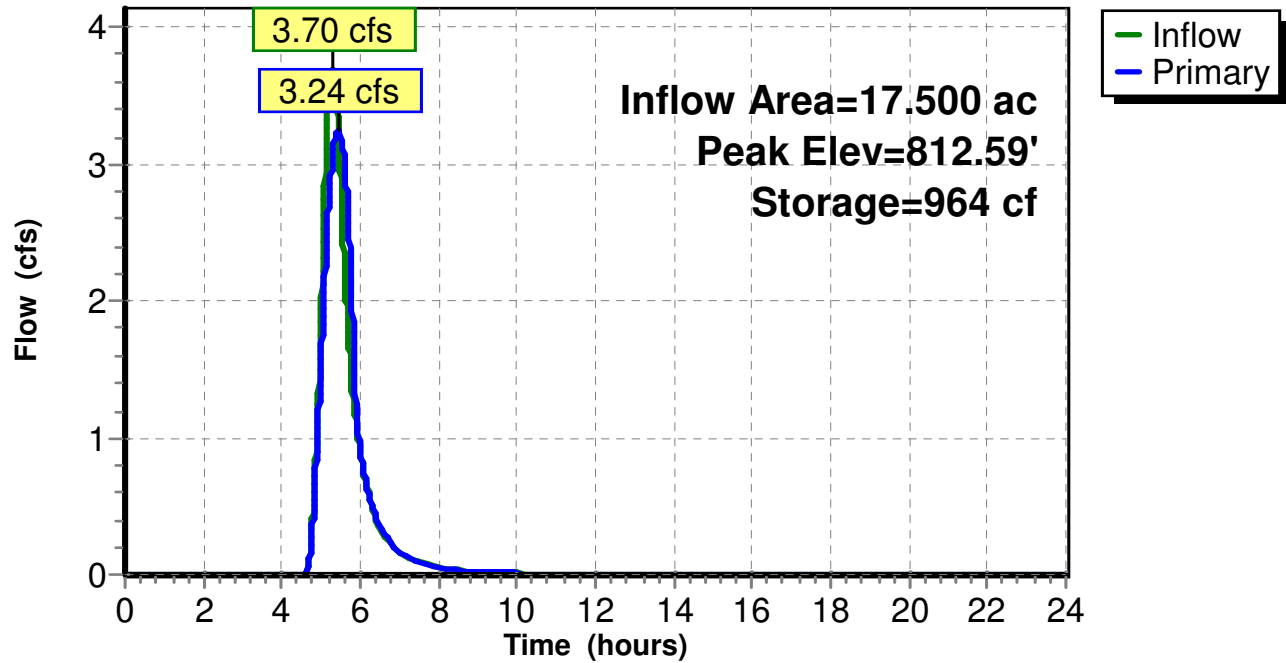
Device	Routing	Invert	Outlet Devices
#1	Primary	811.57'	2.5" W x 2.0" H Vert. Orifice/Grate X 20.00 C= 0.600
#2	Primary	814.59'	20.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=3.24 cfs @ 5.44 hrs HW=812.59' (Free Discharge)

1=Orifice/Grate (Orifice Controls 3.24 cfs @ 4.67 fps)
 2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 2PA: Desiltation Basin B - Stage 1

Hydrograph



Evergreen

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Rainfall Duration=18 min, Inten=2.47 in/hr

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Hydrograph for Pond 2PA: Desiltation Basin B - Stage 1

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Primary (cfs)
0.00	0.00	0	811.57	0.00
0.50	0.00	0	811.57	0.00
1.00	0.00	0	811.57	0.00
1.50	0.00	0	811.57	0.00
2.00	0.00	0	811.57	0.00
2.50	0.00	0	811.57	0.00
3.00	0.00	0	811.57	0.00
3.50	0.00	0	811.57	0.00
4.00	0.00	0	811.57	0.00
4.50	0.00	0	811.57	0.00
5.00	1.84	92	811.88	1.57
5.50	2.89	931	812.58	3.21
6.00	0.88	32	811.74	0.90
6.50	0.35	13	811.66	0.35
7.00	0.16	7	811.62	0.17
7.50	0.09	4	811.60	0.09
8.00	0.05	3	811.59	0.05
8.50	0.03	2	811.58	0.03
9.00	0.02	1	811.58	0.02
9.50	0.01	1	811.58	0.01
10.00	0.01	0	811.57	0.01
10.50	0.01	0	811.57	0.01
11.00	0.01	0	811.57	0.01
11.50	0.00	0	811.57	0.00
12.00	0.00	0	811.57	0.00
12.50	0.00	0	811.57	0.00
13.00	0.00	0	811.57	0.00
13.50	0.00	0	811.57	0.00
14.00	0.00	0	811.57	0.00
14.50	0.00	0	811.57	0.00
15.00	0.00	0	811.57	0.00
15.50	0.00	0	811.57	0.00
16.00	0.00	0	811.57	0.00
16.50	0.00	0	811.57	0.00
17.00	0.00	0	811.57	0.00
17.50	0.00	0	811.57	0.00
18.00	0.00	0	811.57	0.00
18.50	0.00	0	811.57	0.00
19.00	0.00	0	811.57	0.00
19.50	0.00	0	811.57	0.00
20.00	0.00	0	811.57	0.00
20.50	0.00	0	811.57	0.00
21.00	0.00	0	811.57	0.00
21.50	0.00	0	811.57	0.00
22.00	0.00	0	811.57	0.00
22.50	0.00	0	811.57	0.00
23.00	0.00	0	811.57	0.00
23.50	0.00	0	811.57	0.00
24.00	0.00	0	811.57	0.00

Summary for Pond 2PB: Desiltation Basin B - Stage 2

Inflow Area = 17.500 ac, 9.00% Impervious, Inflow Depth = 0.18"
 Inflow = 3.24 cfs @ 5.44 hrs, Volume= 0.267 af
 Outflow = 3.23 cfs @ 5.47 hrs, Volume= 0.267 af, Atten= 0%, Lag= 1.9 min
 Primary = 3.23 cfs @ 5.47 hrs, Volume= 0.267 af
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 808.53' @ 5.47 hrs Surf.Area= 279 sf Storage= 77 cf

Plug-Flow detention time= 0.2 min calculated for 0.267 af (100% of inflow)
 Center-of-Mass det. time= 0.2 min (341.1 - 341.0)

Volume	Invert	Avail.Storage	Storage Description		
#1	808.00'	2,643 cf	Custom Stage Data (Irregular) Listed below (Recalc)		
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
808.00	45	51.0	0	0	45
809.00	652	100.0	289	289	639
810.00	1,170	175.0	898	1,188	2,286
811.00	1,761	141.0	1,455	2,643	3,155

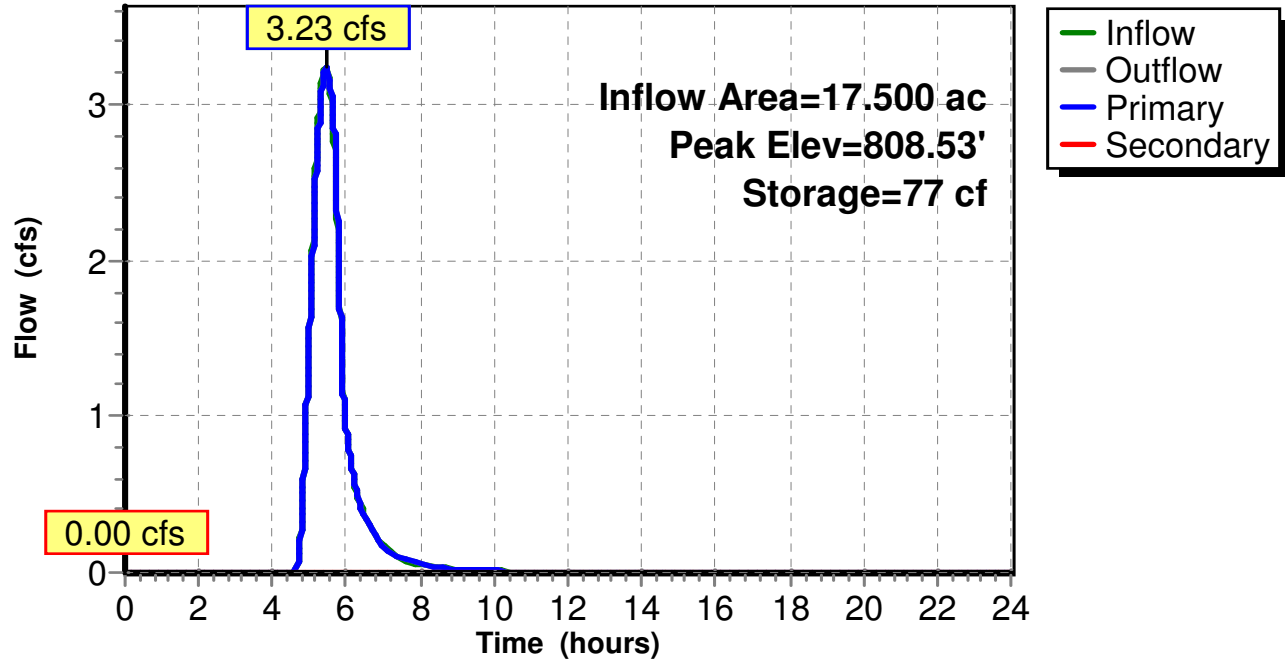
Device	Routing	Invert	Outlet Devices
#1	Primary	807.30'	12.0" Round Culvert L= 34.4' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 807.30' / 806.69' S= 0.0177 '/' Cc= 0.900 n= 0.013 Concrete pipe, straight & clean, Flow Area= 0.79 sf
#2	Secondary	810.63'	20.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=3.23 cfs @ 5.47 hrs HW=808.53' (Free Discharge)
 ↑1=Culvert (Inlet Controls 3.23 cfs @ 4.12 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=808.00' (Free Discharge)
 ↑2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 2PB: Desiltation Basin B - Stage 2

Hydrograph



Evergreen

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Rainfall Duration=18 min, Inten=2.47 in/hr

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Hydrograph for Pond 2PB: Desiltation Basin B - Stage 2

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Primary (cfs)	Secondary (cfs)
0.00	0.00	0	808.00	0.00	0.00	0.00
0.50	0.00	0	808.00	0.00	0.00	0.00
1.00	0.00	0	808.00	0.00	0.00	0.00
1.50	0.00	0	808.00	0.00	0.00	0.00
2.00	0.00	0	808.00	0.00	0.00	0.00
2.50	0.00	0	808.00	0.00	0.00	0.00
3.00	0.00	0	808.00	0.00	0.00	0.00
3.50	0.00	0	808.00	0.00	0.00	0.00
4.00	0.00	0	808.00	0.00	0.00	0.00
4.50	0.00	0	808.00	0.00	0.00	0.00
5.00	1.57	1	808.03	1.57	1.57	0.00
5.50	3.21	76	808.53	3.23	3.23	0.00
6.00	0.90	1	808.02	0.90	0.90	0.00
6.50	0.35	0	808.01	0.35	0.35	0.00
7.00	0.17	0	808.00	0.17	0.17	0.00
7.50	0.09	0	808.00	0.09	0.09	0.00
8.00	0.05	0	808.00	0.05	0.05	0.00
8.50	0.03	0	808.00	0.03	0.03	0.00
9.00	0.02	0	808.00	0.02	0.02	0.00
9.50	0.01	0	808.00	0.01	0.01	0.00
10.00	0.01	0	808.00	0.01	0.01	0.00
10.50	0.01	0	808.00	0.01	0.01	0.00
11.00	0.01	0	808.00	0.01	0.01	0.00
11.50	0.00	0	808.00	0.00	0.00	0.00
12.00	0.00	0	808.00	0.00	0.00	0.00
12.50	0.00	0	808.00	0.00	0.00	0.00
13.00	0.00	0	808.00	0.00	0.00	0.00
13.50	0.00	0	808.00	0.00	0.00	0.00
14.00	0.00	0	808.00	0.00	0.00	0.00
14.50	0.00	0	808.00	0.00	0.00	0.00
15.00	0.00	0	808.00	0.00	0.00	0.00
15.50	0.00	0	808.00	0.00	0.00	0.00
16.00	0.00	0	808.00	0.00	0.00	0.00
16.50	0.00	0	808.00	0.00	0.00	0.00
17.00	0.00	0	808.00	0.00	0.00	0.00
17.50	0.00	0	808.00	0.00	0.00	0.00
18.00	0.00	0	808.00	0.00	0.00	0.00
18.50	0.00	0	808.00	0.00	0.00	0.00
19.00	0.00	0	808.00	0.00	0.00	0.00
19.50	0.00	0	808.00	0.00	0.00	0.00
20.00	0.00	0	808.00	0.00	0.00	0.00
20.50	0.00	0	808.00	0.00	0.00	0.00
21.00	0.00	0	808.00	0.00	0.00	0.00
21.50	0.00	0	808.00	0.00	0.00	0.00
22.00	0.00	0	808.00	0.00	0.00	0.00
22.50	0.00	0	808.00	0.00	0.00	0.00
23.00	0.00	0	808.00	0.00	0.00	0.00
23.50	0.00	0	808.00	0.00	0.00	0.00
24.00	0.00	0	808.00	0.00	0.00	0.00

Summary for Link 1L: Area A Hydrograph

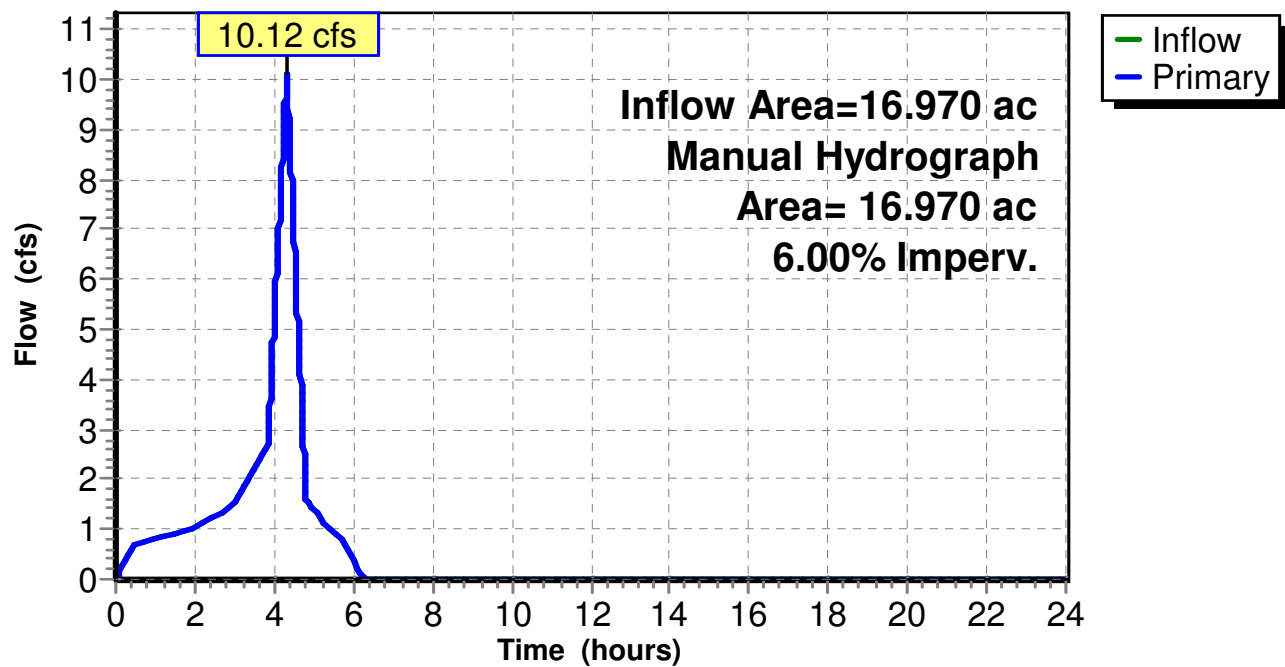
Inflow Area = 16.970 ac, 6.00% Impervious, Inflow Depth = 0.68"
 Inflow = 10.12 cfs @ 4.32 hrs, Volume= 0.965 af
 Primary = 10.12 cfs @ 4.32 hrs, Volume= 0.965 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

14 Point manual hydrograph, To= 0.00 hrs, dt= 0.48 hrs, Area= 16.970 ac, 6.00% Imp., cfs =
 0.00 0.70 0.80 0.90 1.00 1.20 1.40 2.00 2.70 10.12
 1.60 1.10 0.80 0.00

Link 1L: Area A Hydrograph

Hydrograph



Evergreen*Rainfall Duration=18 min, Inten=2.47 in/hr*

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Hydrograph for Link 1L: Area A Hydrograph

Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)
0.00	0.00	0.00	0.00
0.50	0.70	0.00	0.70
1.00	0.81	0.00	0.81
1.50	0.91	0.00	0.91
2.00	1.03	0.00	1.03
2.50	1.24	0.00	1.24
3.00	1.55	0.00	1.55
3.50	2.20	0.00	2.20
4.00	5.17	0.00	5.17
4.50	6.92	0.00	6.92
5.00	1.39	0.00	1.39
5.50	0.96	0.00	0.96
6.00	0.40	0.00	0.40
6.50	0.00	0.00	0.00
7.00	0.00	0.00	0.00
7.50	0.00	0.00	0.00
8.00	0.00	0.00	0.00
8.50	0.00	0.00	0.00
9.00	0.00	0.00	0.00
9.50	0.00	0.00	0.00
10.00	0.00	0.00	0.00
10.50	0.00	0.00	0.00
11.00	0.00	0.00	0.00
11.50	0.00	0.00	0.00
12.00	0.00	0.00	0.00
12.50	0.00	0.00	0.00
13.00	0.00	0.00	0.00
13.50	0.00	0.00	0.00
14.00	0.00	0.00	0.00
14.50	0.00	0.00	0.00
15.00	0.00	0.00	0.00
15.50	0.00	0.00	0.00
16.00	0.00	0.00	0.00
16.50	0.00	0.00	0.00
17.00	0.00	0.00	0.00
17.50	0.00	0.00	0.00
18.00	0.00	0.00	0.00
18.50	0.00	0.00	0.00
19.00	0.00	0.00	0.00
19.50	0.00	0.00	0.00
20.00	0.00	0.00	0.00
20.50	0.00	0.00	0.00
21.00	0.00	0.00	0.00
21.50	0.00	0.00	0.00
22.00	0.00	0.00	0.00
22.50	0.00	0.00	0.00
23.00	0.00	0.00	0.00
23.50	0.00	0.00	0.00
24.00	0.00	0.00	0.00

Summary for Link 2L: Area B Hydrograph

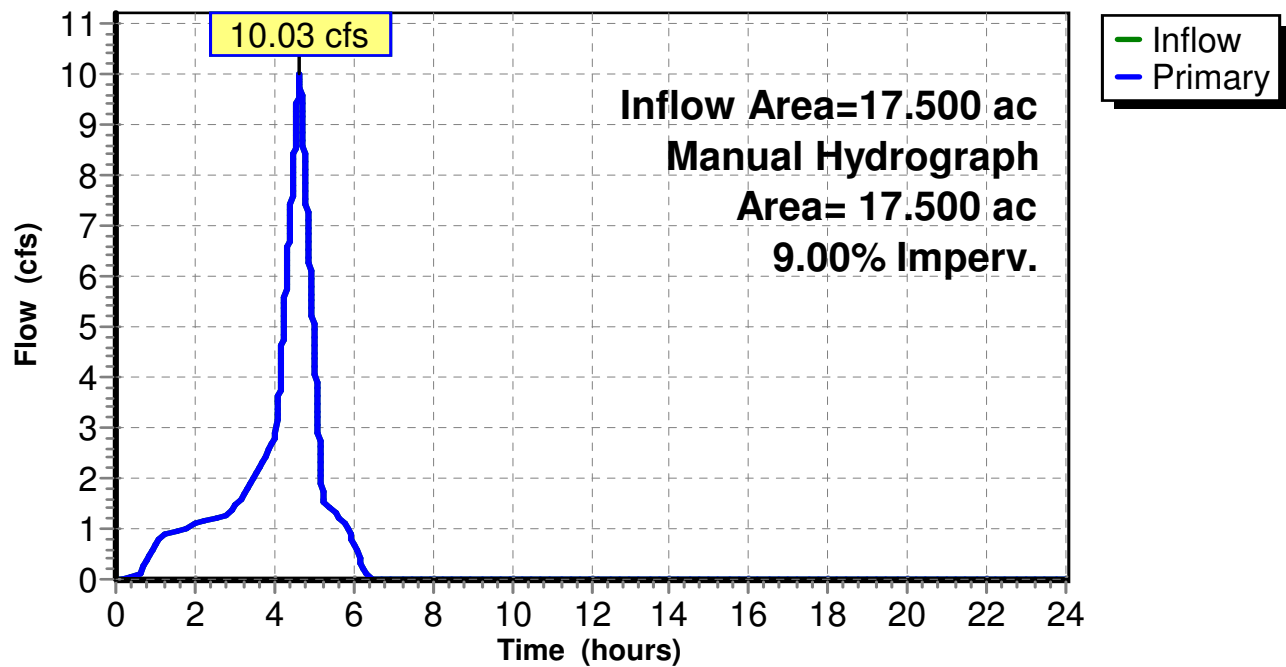
Inflow Area = 17.500 ac, 9.00% Impervious, Inflow Depth = 0.73"
 Inflow = 10.03 cfs @ 4.64 hrs, Volume= 1.061 af
 Primary = 10.03 cfs @ 4.64 hrs, Volume= 1.061 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

12 Point manual hydrograph, To= 0.00 hrs, dt= 0.58 hrs, Area= 17.500 ac, 9.00% Imp., cfs =
 0.00 0.10 0.90 1.00 1.20 1.30 2.00 2.90 10.03 1.60
 1.10 0.00

Link 2L: Area B Hydrograph

Hydrograph



Evergreen*Rainfall Duration=18 min, Inten=2.47 in/hr*

Prepared by Site Design Associates, Inc.

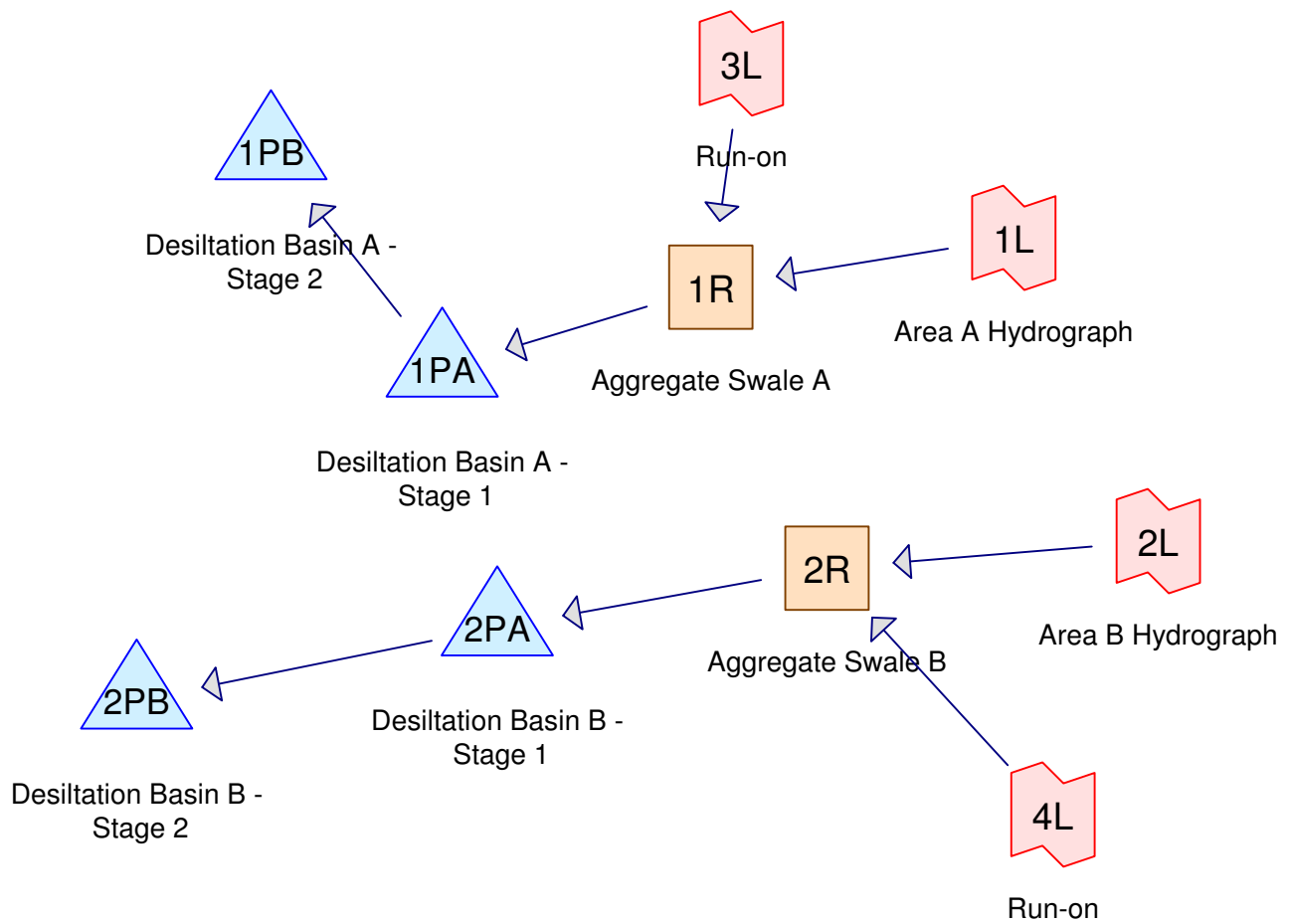
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Hydrograph for Link 2L: Area B Hydrograph

Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)
0.00	0.00	0.00	0.00
0.50	0.09	0.00	0.09
1.00	0.68	0.00	0.68
1.50	0.96	0.00	0.96
2.00	1.09	0.00	1.09
2.50	1.23	0.00	1.23
3.00	1.42	0.00	1.42
3.50	2.03	0.00	2.03
4.00	2.81	0.00	2.81
4.50	8.31	0.00	8.31
5.00	4.80	0.00	4.80
5.50	1.36	0.00	1.36
6.00	0.72	0.00	0.72
6.50	0.00	0.00	0.00
7.00	0.00	0.00	0.00
7.50	0.00	0.00	0.00
8.00	0.00	0.00	0.00
8.50	0.00	0.00	0.00
9.00	0.00	0.00	0.00
9.50	0.00	0.00	0.00
10.00	0.00	0.00	0.00
10.50	0.00	0.00	0.00
11.00	0.00	0.00	0.00
11.50	0.00	0.00	0.00
12.00	0.00	0.00	0.00
12.50	0.00	0.00	0.00
13.00	0.00	0.00	0.00
13.50	0.00	0.00	0.00
14.00	0.00	0.00	0.00
14.50	0.00	0.00	0.00
15.00	0.00	0.00	0.00
15.50	0.00	0.00	0.00
16.00	0.00	0.00	0.00
16.50	0.00	0.00	0.00
17.00	0.00	0.00	0.00
17.50	0.00	0.00	0.00
18.00	0.00	0.00	0.00
18.50	0.00	0.00	0.00
19.00	0.00	0.00	0.00
19.50	0.00	0.00	0.00
20.00	0.00	0.00	0.00
20.50	0.00	0.00	0.00
21.00	0.00	0.00	0.00
21.50	0.00	0.00	0.00
22.00	0.00	0.00	0.00
22.50	0.00	0.00	0.00
23.00	0.00	0.00	0.00
23.50	0.00	0.00	0.00
24.00	0.00	0.00	0.00



Routing Diagram for Evergreen + Run-on

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Evergreen + Run-on

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Rainfall Duration=18 min, Inten=2.47 in/hr

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Summary for Reach 1R: Aggregate Swale A

Inflow Area = 23.120 ac, 6.01% Impervious, Inflow Depth = 0.15"
Inflow = 9.38 cfs @ 4.40 hrs, Volume= 0.282 af, Incl. 5.09 cfs Inflow Loss
Outflow = 7.01 cfs @ 4.66 hrs, Volume= 0.282 af, Atten= 25%, Lag= 15.6 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Max. Velocity= 2.08 fps, Min. Travel Time= 12.0 min

Avg. Velocity= 0.32 fps, Avg. Travel Time= 78.4 min

Peak Storage= 5,064 cf @ 4.46 hrs

Average Depth at Peak Storage= 0.47'

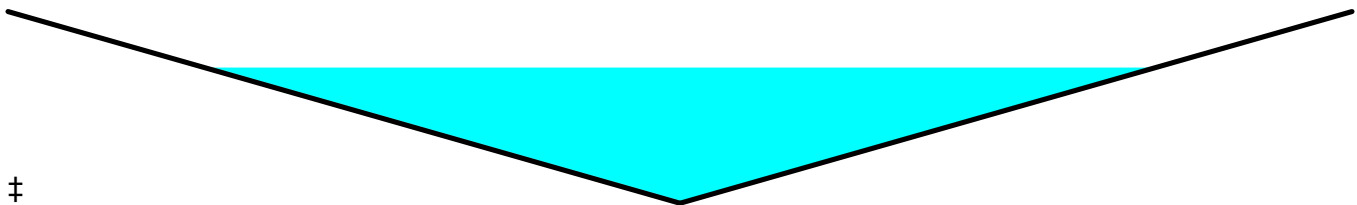
Bank-Full Depth= 0.67' Flow Area= 6.7 sf, Capacity= 17.60 cfs

0.00' x 0.67' deep channel, n= 0.040

Side Slope Z-value= 15.0 '/' Top Width= 20.10'

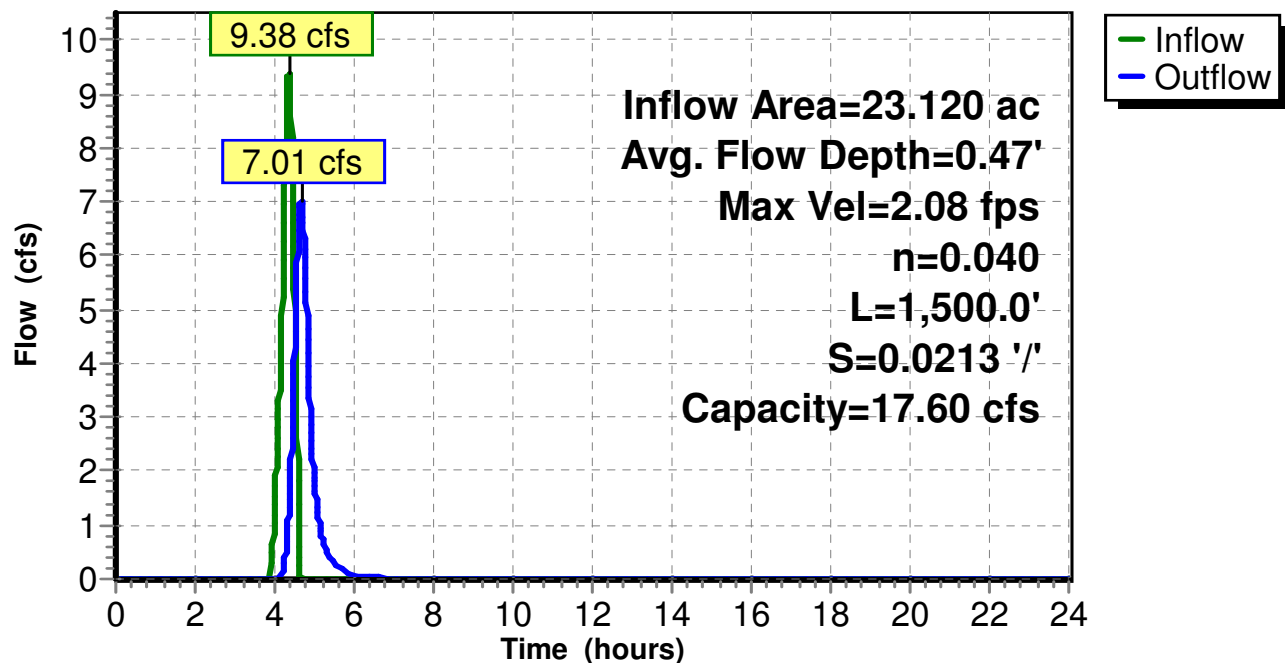
Length= 1,500.0' Slope= 0.0213 '/'

Inlet Invert= 852.00', Outlet Invert= 820.00'



Reach 1R: Aggregate Swale A

Hydrograph



Evergreen + Run-on*Rainfall Duration=18 min, Inten=2.47 in/hr*

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Hydrograph for Reach 1R: Aggregate Swale A

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)
0.00	0.00	0	852.00	0.00
0.50	0.00	0	852.00	0.00
1.00	0.00	0	852.00	0.00
1.50	0.00	0	852.00	0.00
2.00	0.00	0	852.00	0.00
2.50	0.00	0	852.00	0.00
3.00	0.00	0	852.00	0.00
3.50	0.00	0	852.00	0.00
4.00	1.37	186	852.09	0.00
4.50	5.39	4,956	852.47	4.04
5.00	0.00	967	852.21	1.81
5.50	0.00	299	852.12	0.28
6.00	0.00	129	852.08	0.08
6.50	0.00	67	852.05	0.03
7.00	0.00	39	852.04	0.01
7.50	0.00	25	852.03	0.01
8.00	0.00	17	852.03	0.00
8.50	0.00	12	852.02	0.00
9.00	0.00	9	852.02	0.00
9.50	0.00	6	852.02	0.00
10.00	0.00	5	852.01	0.00
10.50	0.00	4	852.01	0.00
11.00	0.00	3	852.01	0.00
11.50	0.00	2	852.01	0.00
12.00	0.00	2	852.01	0.00
12.50	0.00	2	852.01	0.00
13.00	0.00	1	852.01	0.00
13.50	0.00	1	852.01	0.00
14.00	0.00	1	852.01	0.00
14.50	0.00	1	852.01	0.00
15.00	0.00	1	852.00	0.00
15.50	0.00	1	852.00	0.00
16.00	0.00	1	852.00	0.00
16.50	0.00	0	852.00	0.00
17.00	0.00	0	852.00	0.00
17.50	0.00	0	852.00	0.00
18.00	0.00	0	852.00	0.00
18.50	0.00	0	852.00	0.00
19.00	0.00	0	852.00	0.00
19.50	0.00	0	852.00	0.00
20.00	0.00	0	852.00	0.00
20.50	0.00	0	852.00	0.00
21.00	0.00	0	852.00	0.00
21.50	0.00	0	852.00	0.00
22.00	0.00	0	852.00	0.00
22.50	0.00	0	852.00	0.00
23.00	0.00	0	852.00	0.00
23.50	0.00	0	852.00	0.00
24.00	0.00	0	852.00	0.00

Evergreen + Run-on

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Rainfall Duration=18 min, Inten=2.47 in/hr

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Summary for Reach 2R: Aggregate Swale B

Inflow Area = 21.460 ac, 8.57% Impervious, Inflow Depth = 0.19"
Inflow = 6.83 cfs @ 4.64 hrs, Volume= 0.334 af, Incl. 3.47 cfs Inflow Loss
Outflow = 4.35 cfs @ 5.23 hrs, Volume= 0.334 af, Atten= 36%, Lag= 35.7 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Max. Velocity= 2.05 fps, Min. Travel Time= 25.8 min

Avg. Velocity= 0.44 fps, Avg. Travel Time= 119.4 min

Peak Storage= 6,727 cf @ 4.81 hrs

Average Depth at Peak Storage= 0.38'

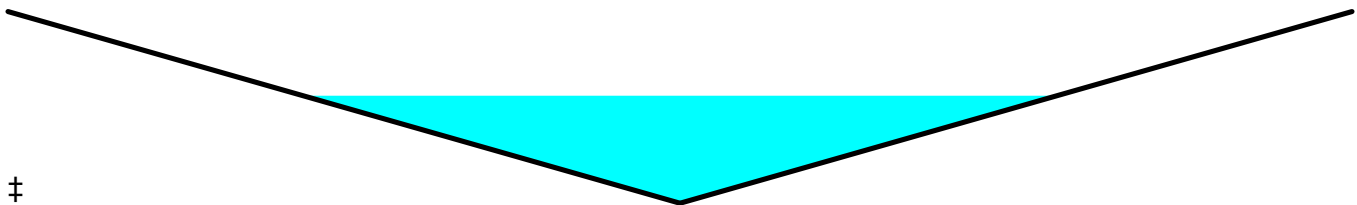
Bank-Full Depth= 0.67' Flow Area= 6.7 sf, Capacity= 20.30 cfs

0.00' x 0.67' deep channel, n= 0.040

Side Slope Z-value= 15.0 '/' Top Width= 20.10'

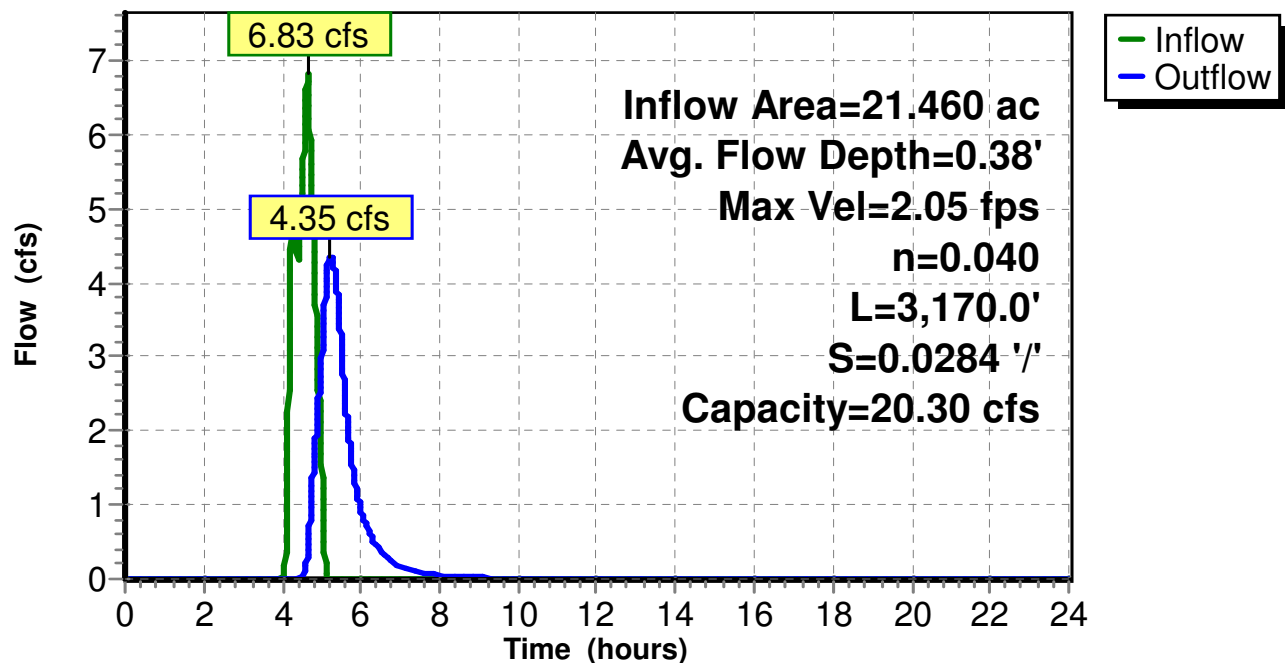
Length= 3,170.0' Slope= 0.0284 '/'

Inlet Invert= 905.00', Outlet Invert= 815.00'



Reach 2R: Aggregate Swale B

Hydrograph



Evergreen + Run-on*Rainfall Duration=18 min, Inten=2.47 in/hr*

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Hydrograph for Reach 2R: Aggregate Swale B

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)
0.00	0.00	0	905.00	0.00
0.50	0.00	0	905.00	0.00
1.00	0.00	0	905.00	0.00
1.50	0.00	0	905.00	0.00
2.00	0.00	0	905.00	0.00
2.50	0.00	0	905.00	0.00
3.00	0.00	0	905.00	0.00
3.50	0.00	0	905.00	0.00
4.00	0.00	0	905.00	0.00
4.50	5.19	4,333	905.30	0.00
5.00	1.53	5,908	905.35	2.99
5.50	0.00	2,378	905.22	3.16
6.00	0.00	1,148	905.16	0.93
6.50	0.00	639	905.12	0.37
7.00	0.00	392	905.09	0.17
7.50	0.00	257	905.07	0.09
8.00	0.00	178	905.06	0.05
8.50	0.00	128	905.05	0.03
9.00	0.00	95	905.04	0.02
9.50	0.00	73	905.04	0.01
10.00	0.00	57	905.03	0.01
10.50	0.00	45	905.03	0.01
11.00	0.00	36	905.03	0.01
11.50	0.00	30	905.02	0.00
12.00	0.00	25	905.02	0.00
12.50	0.00	21	905.02	0.00
13.00	0.00	18	905.02	0.00
13.50	0.00	15	905.02	0.00
14.00	0.00	13	905.02	0.00
14.50	0.00	11	905.01	0.00
15.00	0.00	10	905.01	0.00
15.50	0.00	8	905.01	0.00
16.00	0.00	7	905.01	0.00
16.50	0.00	7	905.01	0.00
17.00	0.00	6	905.01	0.00
17.50	0.00	5	905.01	0.00
18.00	0.00	5	905.01	0.00
18.50	0.00	4	905.01	0.00
19.00	0.00	4	905.01	0.00
19.50	0.00	3	905.01	0.00
20.00	0.00	3	905.01	0.00
20.50	0.00	3	905.01	0.00
21.00	0.00	3	905.01	0.00
21.50	0.00	2	905.01	0.00
22.00	0.00	2	905.01	0.00
22.50	0.00	2	905.01	0.00
23.00	0.00	2	905.01	0.00
23.50	0.00	2	905.01	0.00
24.00	0.00	2	905.00	0.00

Evergreen + Run-on

Rainfall Duration=18 min, Inten=2.47 in/hr

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Summary for Pond 1PA: Desiltation Basin A - Stage 1

[61] Hint: Exceeded Reach 1R outlet invert by 0.01' @ 4.83 hrs

Inflow Area = 23.120 ac, 6.01% Impervious, Inflow Depth = 0.15"
 Inflow = 7.01 cfs @ 4.66 hrs, Volume= 0.282 af
 Outflow = 4.35 cfs @ 4.83 hrs, Volume= 0.282 af, Atten= 38%, Lag= 10.3 min
 Primary = 4.35 cfs @ 4.83 hrs, Volume= 0.282 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2

Peak Elev= 820.01' @ 4.83 hrs Surf.Area= 2,262 sf Storage= 2,962 cf

Plug-Flow detention time= 6.6 min calculated for 0.282 af (100% of inflow)

Center-of-Mass det. time= 6.5 min (293.3 - 286.8)

Volume	Invert	Avail.Storage	Storage Description		
#1	818.00'	4,875 cf	Custom Stage Data (Irregular) Listed below (Recalc)		
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
818.00	323	74.0	0	0	323
819.00	1,751	175.0	942	942	2,328
820.00	2,252	196.0	1,996	2,938	2,975
820.74	3,000	250.0	1,937	4,875	4,899

Device	Routing	Invert	Outlet Devices	
#1	Primary	820.73'	20.0' long x 0.5' breadth Broad-Crested Rectangular Weir	
			Head (feet) 0.20 0.40 0.60 0.80 1.00	
			Coef. (English) 2.80 2.92 3.08 3.30 3.32	
#2	Primary	817.58'	2.5" W x 2.0" H Vert. Orifice/Grate X 17.00 C= 0.600	

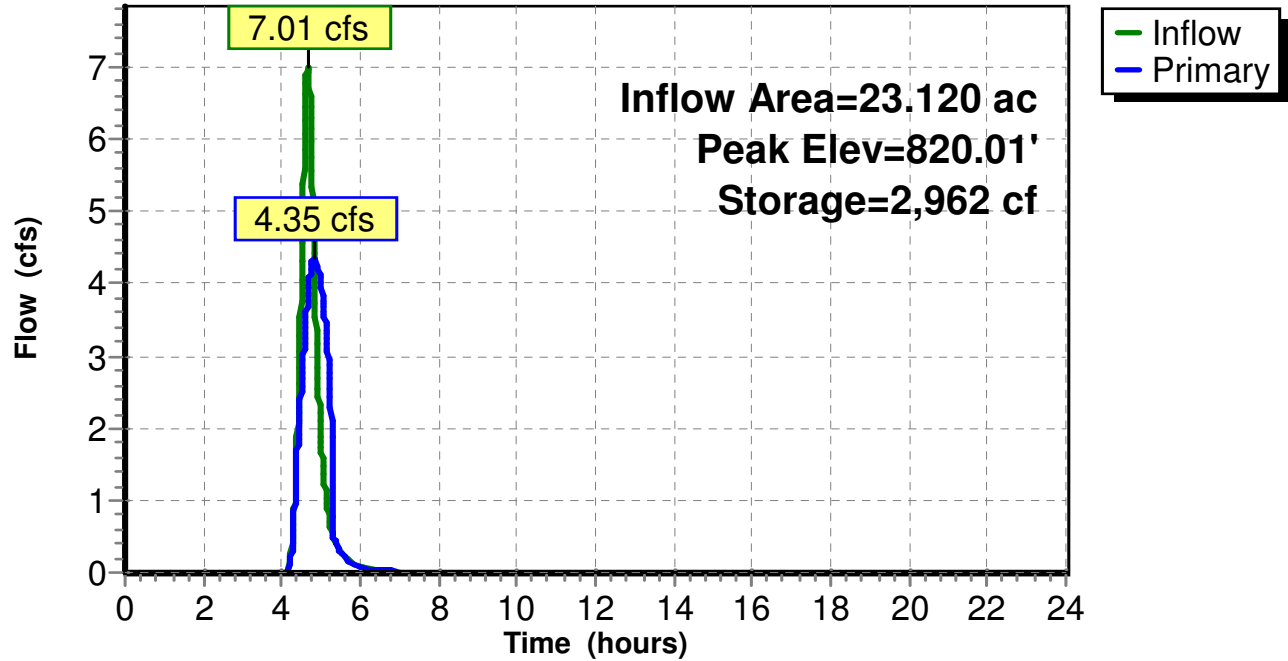
Primary OutFlow Max=4.35 cfs @ 4.83 hrs HW=820.01' (Free Discharge)

1=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

2=Orifice/Grate (Orifice Controls 4.35 cfs @ 7.38 fps)

Pond 1PA: Desiltation Basin A - Stage 1

Hydrograph



Evergreen + Run-on*Rainfall Duration=18 min, Inten=2.47 in/hr*

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Hydrograph for Pond 1PA: Desiltation Basin A - Stage 1

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Primary (cfs)
0.00	0.00	0	818.00	0.00
0.50	0.00	0	818.00	0.00
1.00	0.00	0	818.00	0.00
1.50	0.00	0	818.00	0.00
2.00	0.00	0	818.00	0.00
2.50	0.00	0	818.00	0.00
3.00	0.00	0	818.00	0.00
3.50	0.00	0	818.00	0.00
4.00	0.00	0	818.00	0.00
4.50	4.04	283	818.49	2.58
5.00	1.81	2,142	819.63	3.99
5.50	0.28	2	818.00	0.28
6.00	0.08	0	818.00	0.08
6.50	0.03	0	818.00	0.03
7.00	0.01	0	818.00	0.01
7.50	0.01	0	818.00	0.01
8.00	0.00	0	818.00	0.00
8.50	0.00	0	818.00	0.00
9.00	0.00	0	818.00	0.00
9.50	0.00	0	818.00	0.00
10.00	0.00	0	818.00	0.00
10.50	0.00	0	818.00	0.00
11.00	0.00	0	818.00	0.00
11.50	0.00	0	818.00	0.00
12.00	0.00	0	818.00	0.00
12.50	0.00	0	818.00	0.00
13.00	0.00	0	818.00	0.00
13.50	0.00	0	818.00	0.00
14.00	0.00	0	818.00	0.00
14.50	0.00	0	818.00	0.00
15.00	0.00	0	818.00	0.00
15.50	0.00	0	818.00	0.00
16.00	0.00	0	818.00	0.00
16.50	0.00	0	818.00	0.00
17.00	0.00	0	818.00	0.00
17.50	0.00	0	818.00	0.00
18.00	0.00	0	818.00	0.00
18.50	0.00	0	818.00	0.00
19.00	0.00	0	818.00	0.00
19.50	0.00	0	818.00	0.00
20.00	0.00	0	818.00	0.00
20.50	0.00	0	818.00	0.00
21.00	0.00	0	818.00	0.00
21.50	0.00	0	818.00	0.00
22.00	0.00	0	818.00	0.00
22.50	0.00	0	818.00	0.00
23.00	0.00	0	818.00	0.00
23.50	0.00	0	818.00	0.00
24.00	0.00	0	818.00	0.00

Evergreen + Run-on

Rainfall Duration=18 min, Inten=2.47 in/hr

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Summary for Pond 1PB: Desiltation Basin A - Stage 2

[79] Warning: Submerged Pond 1PA Primary device # 2 by 0.51'

Inflow Area = 23.120 ac, 6.01% Impervious, Inflow Depth = 0.15"
 Inflow = 4.35 cfs @ 4.83 hrs, Volume= 0.282 af
 Outflow = 4.09 cfs @ 4.97 hrs, Volume= 0.282 af, Atten= 6%, Lag= 8.3 min
 Primary = 4.09 cfs @ 4.97 hrs, Volume= 0.282 af
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 3

Peak Elev= 818.09' @ 4.97 hrs Surf.Area= 1,426 sf Storage= 681 cf

Plug-Flow detention time= 1.8 min calculated for 0.282 af (100% of inflow)

Center-of-Mass det. time= 1.6 min (294.9 - 293.3)

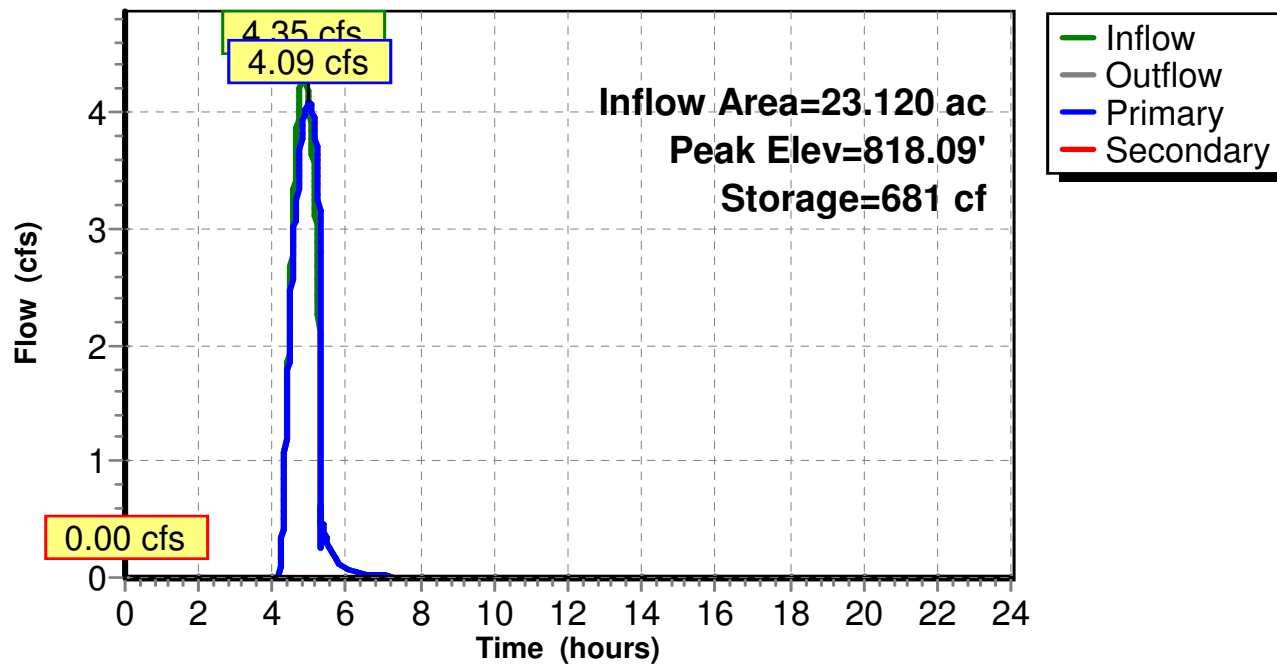
Volume	Invert	Avail.Storage	Storage Description		
#1	817.00'	3,924 cf	Custom Stage Data (Irregular) Listed below (Recalc)		
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
817.00	41	46.0	0	0	41
818.00	1,393	138.0	558	558	1,391
819.00	1,795	161.0	1,590	2,147	1,959
819.90	2,158	182.0	1,776	3,924	2,552

Device	Routing	Invert	Outlet Devices
#1	Primary	816.37'	12.0" Round Culvert L= 28.3' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 816.37' / 816.08' S= 0.0102 '/' Cc= 0.900 n= 0.013 Concrete pipe, straight & clean, Flow Area= 0.79 sf
#2	Secondary	819.50'	30.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=4.09 cfs @ 4.97 hrs HW=818.09' (Free Discharge)↑ **1=Culvert** (Barrel Controls 4.09 cfs @ 5.21 fps)**Secondary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=817.00' (Free Discharge)↑ **2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1PB: Desiltation Basin A - Stage 2

Hydrograph



Evergreen + Run-on*Rainfall Duration=18 min, Inten=2.47 in/hr*

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Hydrograph for Pond 1PB: Desiltation Basin A - Stage 2

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Primary (cfs)	Secondary (cfs)
0.00	0.00	0	817.00	0.00	0.00	0.00
0.50	0.00	0	817.00	0.00	0.00	0.00
1.00	0.00	0	817.00	0.00	0.00	0.00
1.50	0.00	0	817.00	0.00	0.00	0.00
2.00	0.00	0	817.00	0.00	0.00	0.00
2.50	0.00	0	817.00	0.00	0.00	0.00
3.00	0.00	0	817.00	0.00	0.00	0.00
3.50	0.00	0	817.00	0.00	0.00	0.00
4.00	0.00	0	817.00	0.00	0.00	0.00
4.50	2.58	48	817.33	2.40	2.40	0.00
5.00	3.99	675	818.08	4.09	4.09	0.00
5.50	0.28	0	817.01	0.28	0.28	0.00
6.00	0.08	0	817.00	0.08	0.08	0.00
6.50	0.03	0	817.00	0.03	0.03	0.00
7.00	0.01	0	817.00	0.01	0.01	0.00
7.50	0.01	0	817.00	0.01	0.01	0.00
8.00	0.00	0	817.00	0.00	0.00	0.00
8.50	0.00	0	817.00	0.00	0.00	0.00
9.00	0.00	0	817.00	0.00	0.00	0.00
9.50	0.00	0	817.00	0.00	0.00	0.00
10.00	0.00	0	817.00	0.00	0.00	0.00
10.50	0.00	0	817.00	0.00	0.00	0.00
11.00	0.00	0	817.00	0.00	0.00	0.00
11.50	0.00	0	817.00	0.00	0.00	0.00
12.00	0.00	0	817.00	0.00	0.00	0.00
12.50	0.00	0	817.00	0.00	0.00	0.00
13.00	0.00	0	817.00	0.00	0.00	0.00
13.50	0.00	0	817.00	0.00	0.00	0.00
14.00	0.00	0	817.00	0.00	0.00	0.00
14.50	0.00	0	817.00	0.00	0.00	0.00
15.00	0.00	0	817.00	0.00	0.00	0.00
15.50	0.00	0	817.00	0.00	0.00	0.00
16.00	0.00	0	817.00	0.00	0.00	0.00
16.50	0.00	0	817.00	0.00	0.00	0.00
17.00	0.00	0	817.00	0.00	0.00	0.00
17.50	0.00	0	817.00	0.00	0.00	0.00
18.00	0.00	0	817.00	0.00	0.00	0.00
18.50	0.00	0	817.00	0.00	0.00	0.00
19.00	0.00	0	817.00	0.00	0.00	0.00
19.50	0.00	0	817.00	0.00	0.00	0.00
20.00	0.00	0	817.00	0.00	0.00	0.00
20.50	0.00	0	817.00	0.00	0.00	0.00
21.00	0.00	0	817.00	0.00	0.00	0.00
21.50	0.00	0	817.00	0.00	0.00	0.00
22.00	0.00	0	817.00	0.00	0.00	0.00
22.50	0.00	0	817.00	0.00	0.00	0.00
23.00	0.00	0	817.00	0.00	0.00	0.00
23.50	0.00	0	817.00	0.00	0.00	0.00
24.00	0.00	0	817.00	0.00	0.00	0.00

Evergreen + Run-on

Rainfall Duration=18 min, Inten=2.47 in/hr

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Summary for Pond 2PA: Desiltation Basin B - Stage 1

Inflow Area = 21.460 ac, 8.57% Impervious, Inflow Depth = 0.19"
 Inflow = 4.35 cfs @ 5.23 hrs, Volume= 0.334 af
 Outflow = 3.66 cfs @ 5.43 hrs, Volume= 0.334 af, Atten= 16%, Lag= 11.7 min
 Primary = 3.66 cfs @ 5.43 hrs, Volume= 0.334 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 812.85' @ 5.43 hrs Surf.Area= 2,393 sf Storage= 1,511 cf

Plug-Flow detention time= 3.8 min calculated for 0.334 af (100% of inflow)
 Center-of-Mass det. time= 3.8 min (335.8 - 332.0)

Volume	Invert	Avail.Storage	Storage Description
#1	811.57'	4,801 cf	Custom Stage Data (Irregular) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
811.57	100	50.0	0	0	100
812.00	859	118.0	179	179	1,010
813.00	2,736	207.6	1,709	1,889	3,337
813.50	3,585	201.0	1,575	3,464	3,575
814.60	1	1.0	1,337	4,801	6,792

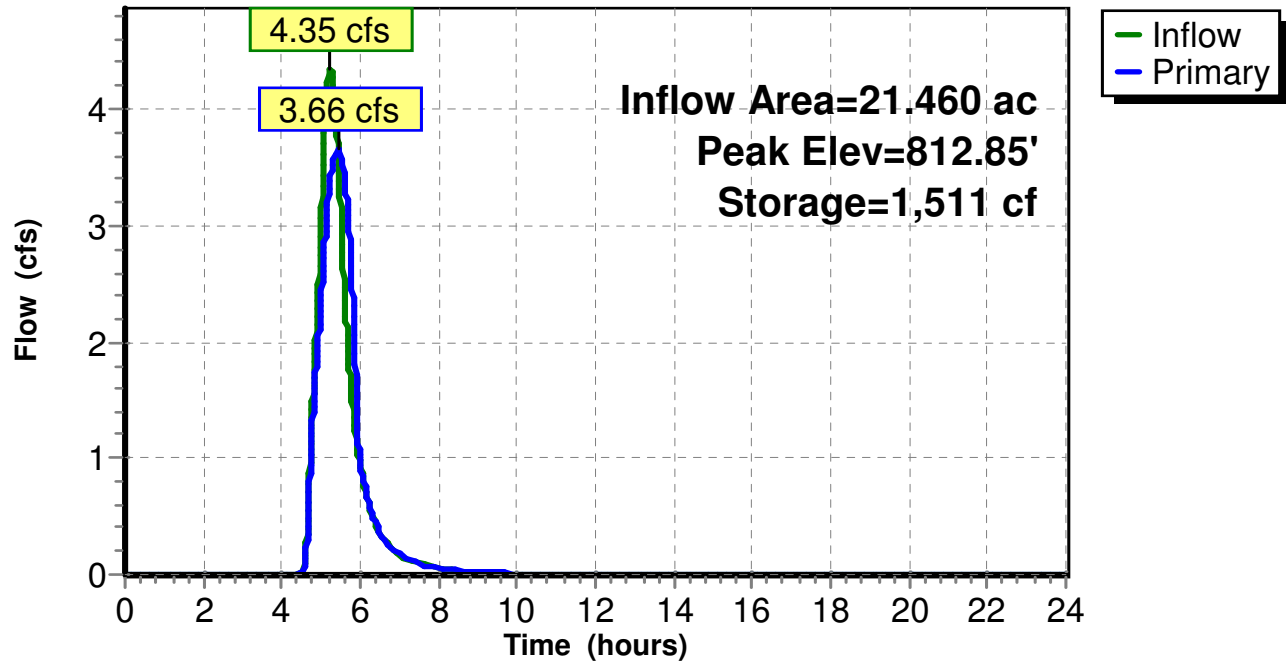
Device	Routing	Invert	Outlet Devices
#1	Primary	811.57'	2.5" W x 2.0" H Vert. Orifice/Grate X 20.00 C= 0.600
#2	Primary	814.59'	20.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=3.66 cfs @ 5.43 hrs HW=812.85' (Free Discharge)

↑ **1=Orifice/Grate** (Orifice Controls 3.66 cfs @ 5.27 fps)
 ↓ **2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 2PA: Desiltation Basin B - Stage 1

Hydrograph



Evergreen + Run-on*Rainfall Duration=18 min, Inten=2.47 in/hr*

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Hydrograph for Pond 2PA: Desiltation Basin B - Stage 1

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Primary (cfs)
0.00	0.00	0	811.57	0.00
0.50	0.00	0	811.57	0.00
1.00	0.00	0	811.57	0.00
1.50	0.00	0	811.57	0.00
2.00	0.00	0	811.57	0.00
2.50	0.00	0	811.57	0.00
3.00	0.00	0	811.57	0.00
3.50	0.00	0	811.57	0.00
4.00	0.00	0	811.57	0.00
4.50	0.00	0	811.57	0.00
5.00	2.99	327	812.15	2.36
5.50	3.16	1,453	812.83	3.62
6.00	0.93	35	811.75	0.97
6.50	0.37	13	811.66	0.37
7.00	0.17	7	811.62	0.17
7.50	0.09	4	811.61	0.09
8.00	0.05	3	811.59	0.05
8.50	0.03	2	811.58	0.03
9.00	0.02	1	811.58	0.02
9.50	0.01	1	811.58	0.01
10.00	0.01	0	811.57	0.01
10.50	0.01	0	811.57	0.01
11.00	0.01	0	811.57	0.01
11.50	0.00	0	811.57	0.00
12.00	0.00	0	811.57	0.00
12.50	0.00	0	811.57	0.00
13.00	0.00	0	811.57	0.00
13.50	0.00	0	811.57	0.00
14.00	0.00	0	811.57	0.00
14.50	0.00	0	811.57	0.00
15.00	0.00	0	811.57	0.00
15.50	0.00	0	811.57	0.00
16.00	0.00	0	811.57	0.00
16.50	0.00	0	811.57	0.00
17.00	0.00	0	811.57	0.00
17.50	0.00	0	811.57	0.00
18.00	0.00	0	811.57	0.00
18.50	0.00	0	811.57	0.00
19.00	0.00	0	811.57	0.00
19.50	0.00	0	811.57	0.00
20.00	0.00	0	811.57	0.00
20.50	0.00	0	811.57	0.00
21.00	0.00	0	811.57	0.00
21.50	0.00	0	811.57	0.00
22.00	0.00	0	811.57	0.00
22.50	0.00	0	811.57	0.00
23.00	0.00	0	811.57	0.00
23.50	0.00	0	811.57	0.00
24.00	0.00	0	811.57	0.00

Evergreen + Run-on

Rainfall Duration=18 min, Inten=2.47 in/hr

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Summary for Pond 2PB: Desiltation Basin B - Stage 2

Inflow Area = 21.460 ac, 8.57% Impervious, Inflow Depth = 0.19"
 Inflow = 3.66 cfs @ 5.43 hrs, Volume= 0.334 af
 Outflow = 3.64 cfs @ 5.48 hrs, Volume= 0.334 af, Atten= 1%, Lag= 3.1 min
 Primary = 3.64 cfs @ 5.48 hrs, Volume= 0.334 af
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 808.73' @ 5.48 hrs Surf.Area= 416 sf Storage= 145 cf

Plug-Flow detention time= 0.3 min calculated for 0.334 af (100% of inflow)
 Center-of-Mass det. time= 0.3 min (336.1 - 335.8)

Volume	Invert	Avail.Storage	Storage Description
#1	808.00'	2,643 cf	Custom Stage Data (Irregular) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
808.00	45	51.0	0	0	45
809.00	652	100.0	289	289	639
810.00	1,170	175.0	898	1,188	2,286
811.00	1,761	141.0	1,455	2,643	3,155

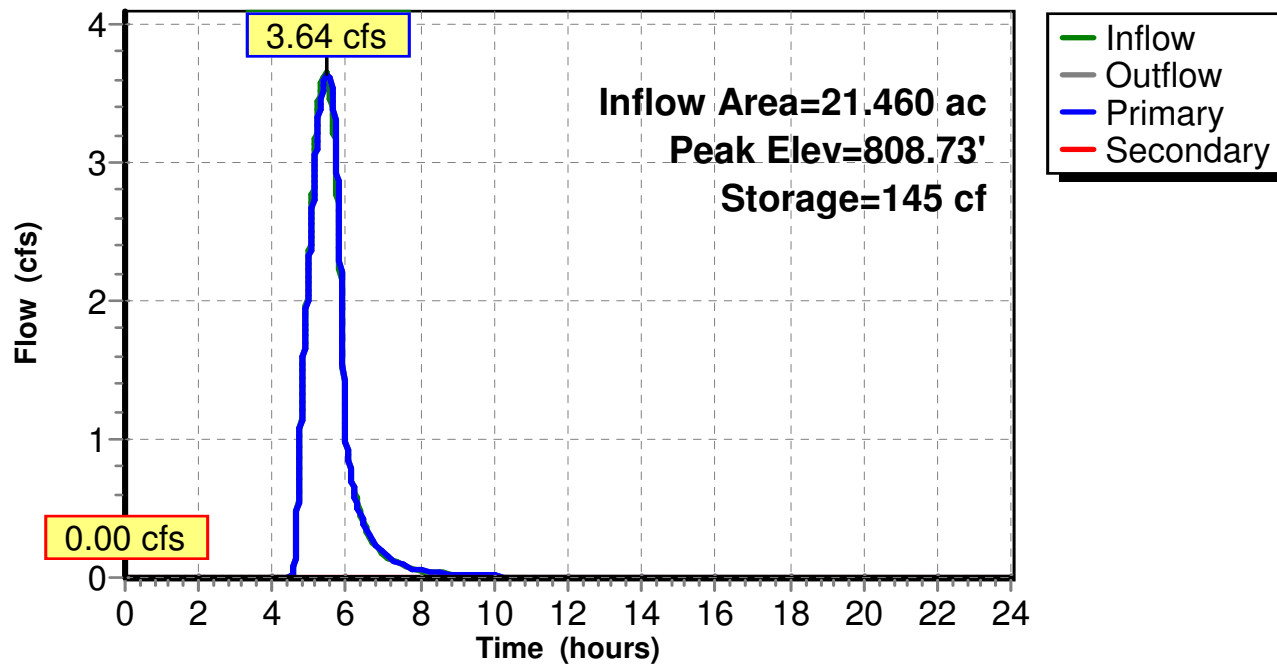
Device	Routing	Invert	Outlet Devices
#1	Primary	807.30'	12.0" Round Culvert L= 34.4' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 807.30' / 806.69' S= 0.0177 ' / Cc= 0.900 n= 0.013 Concrete pipe, straight & clean, Flow Area= 0.79 sf
#2	Secondary	810.63'	20.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=3.64 cfs @ 5.48 hrs HW=808.73' (Free Discharge)
 ↑1=Culvert (Inlet Controls 3.64 cfs @ 4.64 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=808.00' (Free Discharge)
 ↑2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 2PB: Desiltation Basin B - Stage 2

Hydrograph



Evergreen + Run-on*Rainfall Duration=18 min, Inten=2.47 in/hr*

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Hydrograph for Pond 2PB: Desiltation Basin B - Stage 2

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Primary (cfs)	Secondary (cfs)
0.00	0.00	0	808.00	0.00	0.00	0.00
0.50	0.00	0	808.00	0.00	0.00	0.00
1.00	0.00	0	808.00	0.00	0.00	0.00
1.50	0.00	0	808.00	0.00	0.00	0.00
2.00	0.00	0	808.00	0.00	0.00	0.00
2.50	0.00	0	808.00	0.00	0.00	0.00
3.00	0.00	0	808.00	0.00	0.00	0.00
3.50	0.00	0	808.00	0.00	0.00	0.00
4.00	0.00	0	808.00	0.00	0.00	0.00
4.50	0.00	0	808.00	0.00	0.00	0.00
5.00	2.36	12	808.18	2.32	2.32	0.00
5.50	3.62	144	808.73	3.64	3.64	0.00
6.00	0.97	1	808.02	0.96	0.96	0.00
6.50	0.37	0	808.01	0.37	0.37	0.00
7.00	0.17	0	808.00	0.17	0.17	0.00
7.50	0.09	0	808.00	0.09	0.09	0.00
8.00	0.05	0	808.00	0.05	0.05	0.00
8.50	0.03	0	808.00	0.03	0.03	0.00
9.00	0.02	0	808.00	0.02	0.02	0.00
9.50	0.01	0	808.00	0.01	0.01	0.00
10.00	0.01	0	808.00	0.01	0.01	0.00
10.50	0.01	0	808.00	0.01	0.01	0.00
11.00	0.01	0	808.00	0.01	0.01	0.00
11.50	0.00	0	808.00	0.00	0.00	0.00
12.00	0.00	0	808.00	0.00	0.00	0.00
12.50	0.00	0	808.00	0.00	0.00	0.00
13.00	0.00	0	808.00	0.00	0.00	0.00
13.50	0.00	0	808.00	0.00	0.00	0.00
14.00	0.00	0	808.00	0.00	0.00	0.00
14.50	0.00	0	808.00	0.00	0.00	0.00
15.00	0.00	0	808.00	0.00	0.00	0.00
15.50	0.00	0	808.00	0.00	0.00	0.00
16.00	0.00	0	808.00	0.00	0.00	0.00
16.50	0.00	0	808.00	0.00	0.00	0.00
17.00	0.00	0	808.00	0.00	0.00	0.00
17.50	0.00	0	808.00	0.00	0.00	0.00
18.00	0.00	0	808.00	0.00	0.00	0.00
18.50	0.00	0	808.00	0.00	0.00	0.00
19.00	0.00	0	808.00	0.00	0.00	0.00
19.50	0.00	0	808.00	0.00	0.00	0.00
20.00	0.00	0	808.00	0.00	0.00	0.00
20.50	0.00	0	808.00	0.00	0.00	0.00
21.00	0.00	0	808.00	0.00	0.00	0.00
21.50	0.00	0	808.00	0.00	0.00	0.00
22.00	0.00	0	808.00	0.00	0.00	0.00
22.50	0.00	0	808.00	0.00	0.00	0.00
23.00	0.00	0	808.00	0.00	0.00	0.00
23.50	0.00	0	808.00	0.00	0.00	0.00
24.00	0.00	0	808.00	0.00	0.00	0.00

Summary for Link 1L: Area A Hydrograph

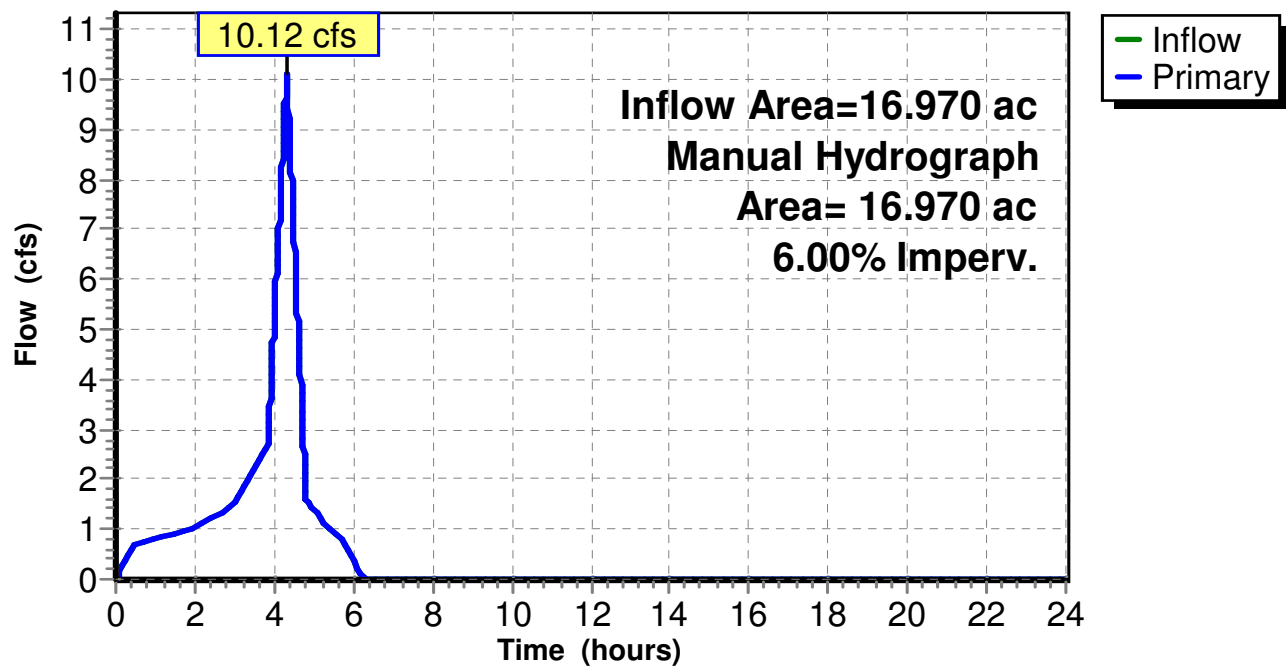
Inflow Area = 16.970 ac, 6.00% Impervious, Inflow Depth = 0.68"
 Inflow = 10.12 cfs @ 4.32 hrs, Volume= 0.965 af
 Primary = 10.12 cfs @ 4.32 hrs, Volume= 0.965 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

14 Point manual hydrograph, To= 0.00 hrs, dt= 0.48 hrs, Area= 16.970 ac, 6.00% Imp., cfs =
 0.00 0.70 0.80 0.90 1.00 1.20 1.40 2.00 2.70 10.12
 1.60 1.10 0.80 0.00

Link 1L: Area A Hydrograph

Hydrograph



Evergreen + Run-on*Rainfall Duration=18 min, Inten=2.47 in/hr*

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Hydrograph for Link 1L: Area A Hydrograph

Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)
0.00	0.00	0.00	0.00
0.50	0.70	0.00	0.70
1.00	0.81	0.00	0.81
1.50	0.91	0.00	0.91
2.00	1.03	0.00	1.03
2.50	1.24	0.00	1.24
3.00	1.55	0.00	1.55
3.50	2.20	0.00	2.20
4.00	5.17	0.00	5.17
4.50	6.92	0.00	6.92
5.00	1.39	0.00	1.39
5.50	0.96	0.00	0.96
6.00	0.40	0.00	0.40
6.50	0.00	0.00	0.00
7.00	0.00	0.00	0.00
7.50	0.00	0.00	0.00
8.00	0.00	0.00	0.00
8.50	0.00	0.00	0.00
9.00	0.00	0.00	0.00
9.50	0.00	0.00	0.00
10.00	0.00	0.00	0.00
10.50	0.00	0.00	0.00
11.00	0.00	0.00	0.00
11.50	0.00	0.00	0.00
12.00	0.00	0.00	0.00
12.50	0.00	0.00	0.00
13.00	0.00	0.00	0.00
13.50	0.00	0.00	0.00
14.00	0.00	0.00	0.00
14.50	0.00	0.00	0.00
15.00	0.00	0.00	0.00
15.50	0.00	0.00	0.00
16.00	0.00	0.00	0.00
16.50	0.00	0.00	0.00
17.00	0.00	0.00	0.00
17.50	0.00	0.00	0.00
18.00	0.00	0.00	0.00
18.50	0.00	0.00	0.00
19.00	0.00	0.00	0.00
19.50	0.00	0.00	0.00
20.00	0.00	0.00	0.00
20.50	0.00	0.00	0.00
21.00	0.00	0.00	0.00
21.50	0.00	0.00	0.00
22.00	0.00	0.00	0.00
22.50	0.00	0.00	0.00
23.00	0.00	0.00	0.00
23.50	0.00	0.00	0.00
24.00	0.00	0.00	0.00

Summary for Link 2L: Area B Hydrograph

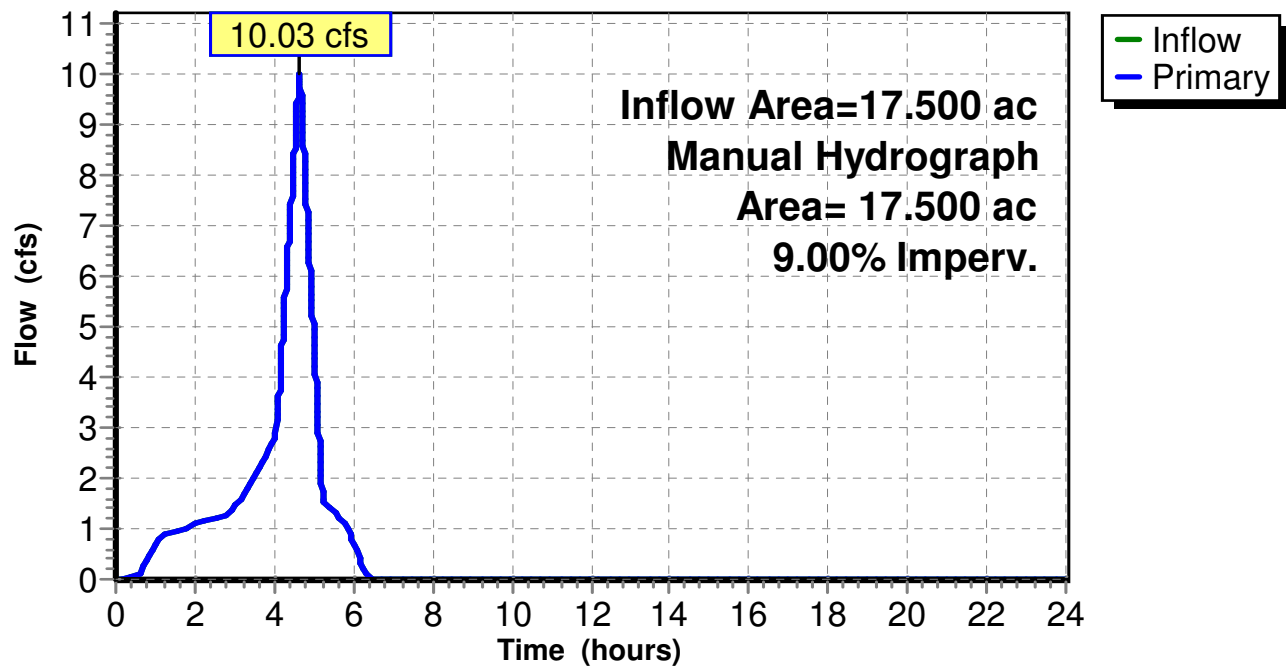
Inflow Area = 17.500 ac, 9.00% Impervious, Inflow Depth = 0.73"
 Inflow = 10.03 cfs @ 4.64 hrs, Volume= 1.061 af
 Primary = 10.03 cfs @ 4.64 hrs, Volume= 1.061 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

12 Point manual hydrograph, To= 0.00 hrs, dt= 0.58 hrs, Area= 17.500 ac, 9.00% Imp., cfs =
 0.00 0.10 0.90 1.00 1.20 1.30 2.00 2.90 10.03 1.60
 1.10 0.00

Link 2L: Area B Hydrograph

Hydrograph



Evergreen + Run-on*Rainfall Duration=18 min, Inten=2.47 in/hr*

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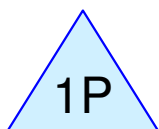
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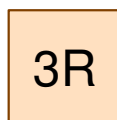
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Hydrograph for Link 2L: Area B Hydrograph

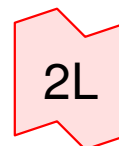
Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)
0.00	0.00	0.00	0.00
0.50	0.09	0.00	0.09
1.00	0.68	0.00	0.68
1.50	0.96	0.00	0.96
2.00	1.09	0.00	1.09
2.50	1.23	0.00	1.23
3.00	1.42	0.00	1.42
3.50	2.03	0.00	2.03
4.00	2.81	0.00	2.81
4.50	8.31	0.00	8.31
5.00	4.80	0.00	4.80
5.50	1.36	0.00	1.36
6.00	0.72	0.00	0.72
6.50	0.00	0.00	0.00
7.00	0.00	0.00	0.00
7.50	0.00	0.00	0.00
8.00	0.00	0.00	0.00
8.50	0.00	0.00	0.00
9.00	0.00	0.00	0.00
9.50	0.00	0.00	0.00
10.00	0.00	0.00	0.00
10.50	0.00	0.00	0.00
11.00	0.00	0.00	0.00
11.50	0.00	0.00	0.00
12.00	0.00	0.00	0.00
12.50	0.00	0.00	0.00
13.00	0.00	0.00	0.00
13.50	0.00	0.00	0.00
14.00	0.00	0.00	0.00
14.50	0.00	0.00	0.00
15.00	0.00	0.00	0.00
15.50	0.00	0.00	0.00
16.00	0.00	0.00	0.00
16.50	0.00	0.00	0.00
17.00	0.00	0.00	0.00
17.50	0.00	0.00	0.00
18.00	0.00	0.00	0.00
18.50	0.00	0.00	0.00
19.00	0.00	0.00	0.00
19.50	0.00	0.00	0.00
20.00	0.00	0.00	0.00
20.50	0.00	0.00	0.00
21.00	0.00	0.00	0.00
21.50	0.00	0.00	0.00
22.00	0.00	0.00	0.00
22.50	0.00	0.00	0.00
23.00	0.00	0.00	0.00
23.50	0.00	0.00	0.00
24.00	0.00	0.00	0.00



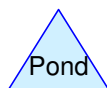
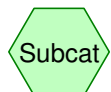
Desiltation Basin B1



Aggregate Swale B1



Area B1



Routing Diagram for Evergreen B1

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Evergreen B1

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Rainfall Duration=9 min, Inten=3.53 in/hr

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Summary for Reach 3R: Aggregate Swale B1

Inflow Area = 1.920 ac, 7.00% Impervious, Inflow Depth = 0.27"
Inflow = 1.31 cfs @ 4.29 hrs, Volume= 0.044 af, Incl. 0.20 cfs Inflow Loss
Outflow = 1.16 cfs @ 4.41 hrs, Volume= 0.044 af, Atten= 12%, Lag= 7.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-15.00 hrs, dt= 0.01 hrs

Max. Velocity= 1.44 fps, Min. Travel Time= 4.7 min

Avg. Velocity = 0.40 fps, Avg. Travel Time= 17.1 min

Peak Storage= 327 cf @ 4.33 hrs

Average Depth at Peak Storage= 0.26'

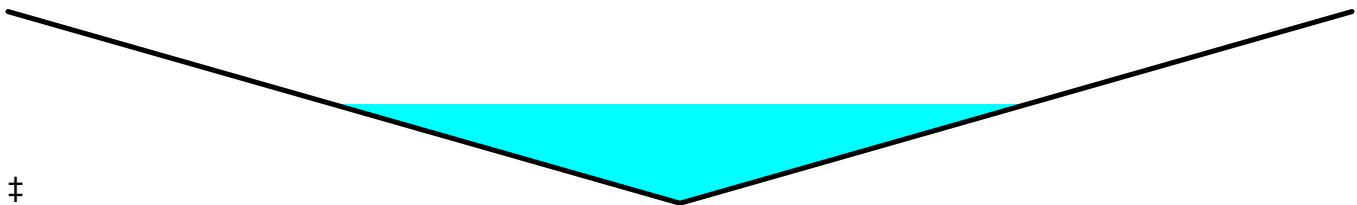
Bank-Full Depth= 0.50' Flow Area= 3.0 sf, Capacity= 6.71 cfs

0.00' x 0.50' deep channel, n= 0.040

Side Slope Z-value= 12.0 '/' Top Width= 12.00'

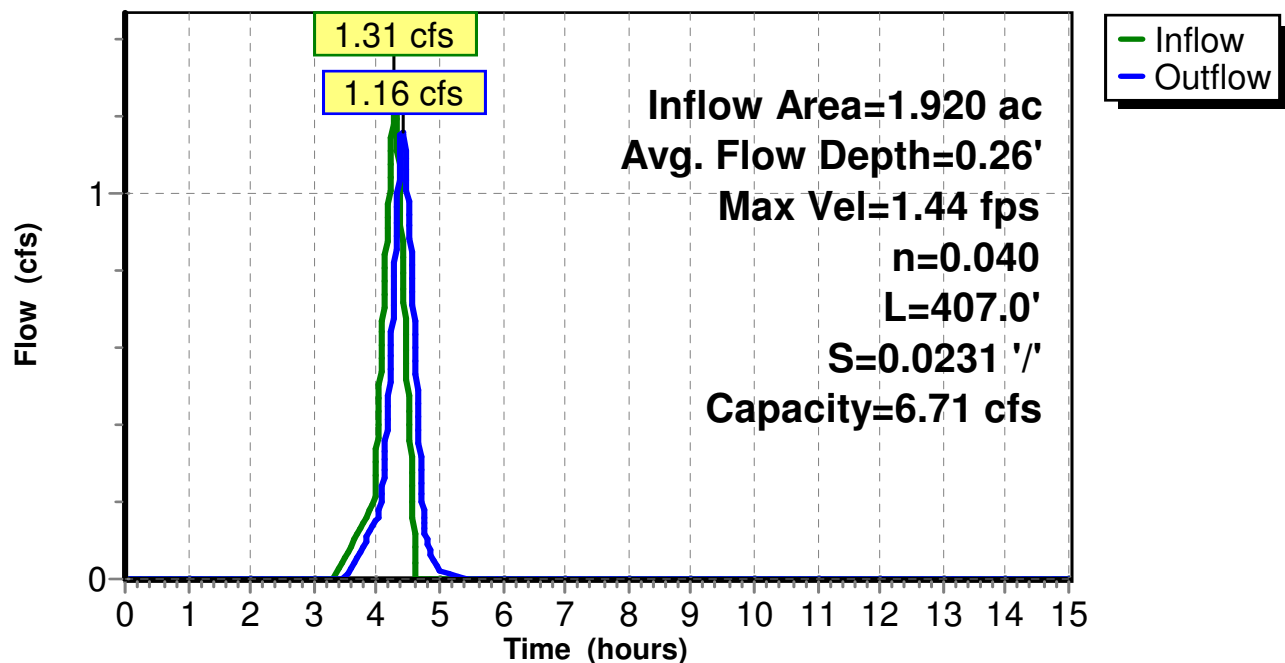
Length= 407.0' Slope= 0.0231 '/'

Inlet Invert= 894.00', Outlet Invert= 884.60'



Reach 3R: Aggregate Swale B1

Hydrograph



Evergreen B1*Rainfall Duration=9 min, Inten=3.53 in/hr*

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Hydrograph for Reach 3R: Aggregate Swale B1

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)
0.00	0.00	0	894.00	0.00
0.50	0.00	0	894.00	0.00
1.00	0.00	0	894.00	0.00
1.50	0.00	0	894.00	0.00
2.00	0.00	0	894.00	0.00
2.50	0.00	0	894.00	0.00
3.00	0.00	0	894.00	0.00
3.50	0.06	17	894.06	0.01
4.00	0.33	89	894.14	0.16
4.50	0.48	227	894.22	0.98
5.00	0.00	12	894.05	0.02
5.50	0.00	2	894.02	0.00
6.00	0.00	1	894.01	0.00
6.50	0.00	0	894.01	0.00
7.00	0.00	0	894.01	0.00
7.50	0.00	0	894.00	0.00
8.00	0.00	0	894.00	0.00
8.50	0.00	0	894.00	0.00
9.00	0.00	0	894.00	0.00
9.50	0.00	0	894.00	0.00
10.00	0.00	0	894.00	0.00
10.50	0.00	0	894.00	0.00
11.00	0.00	0	894.00	0.00
11.50	0.00	0	894.00	0.00
12.00	0.00	0	894.00	0.00
12.50	0.00	0	894.00	0.00
13.00	0.00	0	894.00	0.00
13.50	0.00	0	894.00	0.00
14.00	0.00	0	894.00	0.00
14.50	0.00	0	894.00	0.00
15.00	0.00	0	894.00	0.00

Evergreen B1

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Rainfall Duration=9 min, Inten=3.53 in/hr

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Summary for Pond 1P: Desiltation Basin B1

Inflow Area = 1.920 ac, 7.00% Impervious, Inflow Depth = 0.27"
 Inflow = 1.16 cfs @ 4.41 hrs, Volume= 0.044 af
 Outflow = 0.43 cfs @ 4.66 hrs, Volume= 0.044 af, Atten= 63%, Lag= 15.0 min
 Primary = 0.43 cfs @ 4.66 hrs, Volume= 0.044 af

Routing by Stor-Ind method, Time Span= 0.00-15.00 hrs, dt= 0.01 hrs
 Peak Elev= 883.47' @ 4.66 hrs Surf.Area= 758 sf Storage= 926 cf

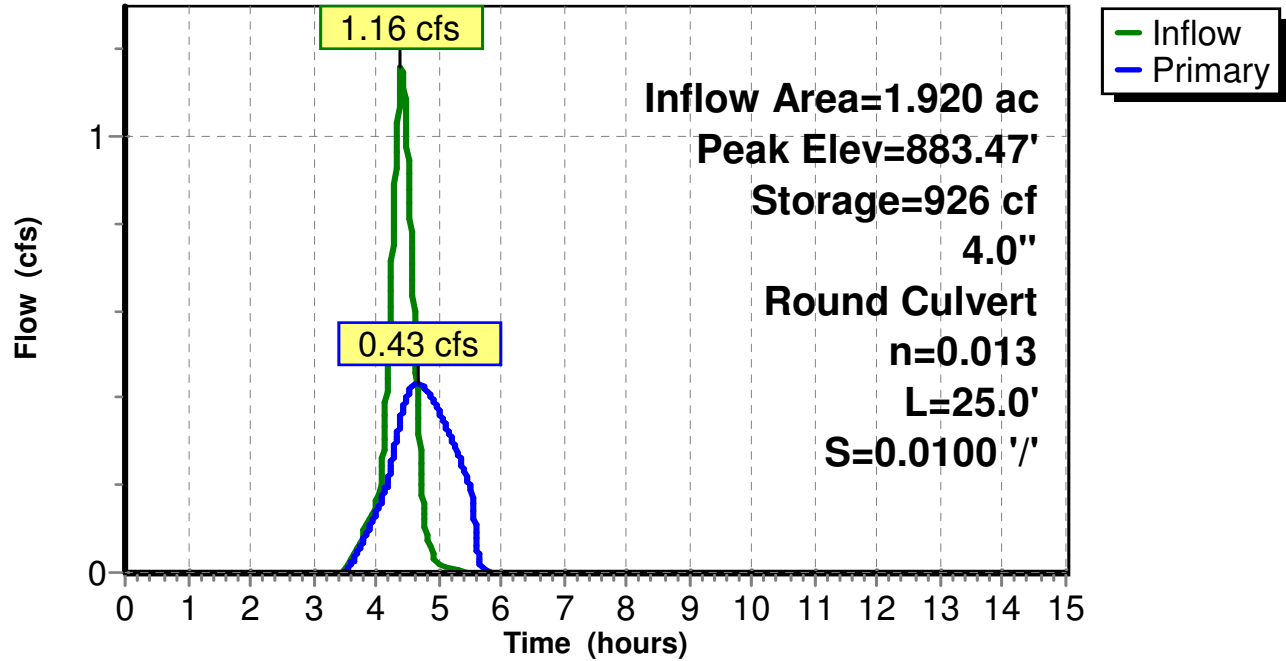
Plug-Flow detention time= 21.6 min calculated for 0.044 af (100% of inflow)
 Center-of-Mass det. time= 21.6 min (284.6 - 263.0)

Volume	Invert	Avail.Storage	Storage Description		
#1	881.50'	1,371 cf	Custom Stage Data (Irregular) Listed below (Recalc)		
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
881.50	20	30.0	0	0	20
882.00	405	107.0	86	86	860
884.00	914	145.0	1,285	1,371	1,663

Device	Routing	Invert	Outlet Devices
#1	Primary	881.50'	4.0" Round Culvert L= 25.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 881.50' / 881.25' S= 0.0100 '/' Cc= 0.900 n= 0.013 Concrete pipe, straight & clean, Flow Area= 0.09 sf

Primary OutFlow Max=0.43 cfs @ 4.66 hrs HW=883.47' (Free Discharge)

↑ **1=Culvert** (Barrel Controls 0.43 cfs @ 4.98 fps)

Pond 1P: Desiltation Basin B1**Hydrograph**

Evergreen B1*Rainfall Duration=9 min, Inten=3.53 in/hr*

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Hydrograph for Pond 1P: Desiltation Basin B1

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Primary (cfs)
0.00	0.00	0	881.50	0.00
0.50	0.00	0	881.50	0.00
1.00	0.00	0	881.50	0.00
1.50	0.00	0	881.50	0.00
2.00	0.00	0	881.50	0.00
2.50	0.00	0	881.50	0.00
3.00	0.00	0	881.50	0.00
3.50	0.01	1	881.53	0.00
4.00	0.16	26	881.79	0.13
4.50	0.98	766	883.25	0.41
5.00	0.02	572	882.95	0.37
5.50	0.00	66	881.95	0.19
6.00	0.00	0	881.52	0.00
6.50	0.00	0	881.51	0.00
7.00	0.00	0	881.50	0.00
7.50	0.00	0	881.50	0.00
8.00	0.00	0	881.50	0.00
8.50	0.00	0	881.50	0.00
9.00	0.00	0	881.50	0.00
9.50	0.00	0	881.50	0.00
10.00	0.00	0	881.50	0.00
10.50	0.00	0	881.50	0.00
11.00	0.00	0	881.50	0.00
11.50	0.00	0	881.50	0.00
12.00	0.00	0	881.50	0.00
12.50	0.00	0	881.50	0.00
13.00	0.00	0	881.50	0.00
13.50	0.00	0	881.50	0.00
14.00	0.00	0	881.50	0.00
14.50	0.00	0	881.50	0.00
15.00	0.00	0	881.50	0.00

Evergreen B1

Prepared by Site Design Associates, Inc.

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Rainfall Duration=9 min, Inten=3.53 in/hr

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Summary for Link 2L: Area B1

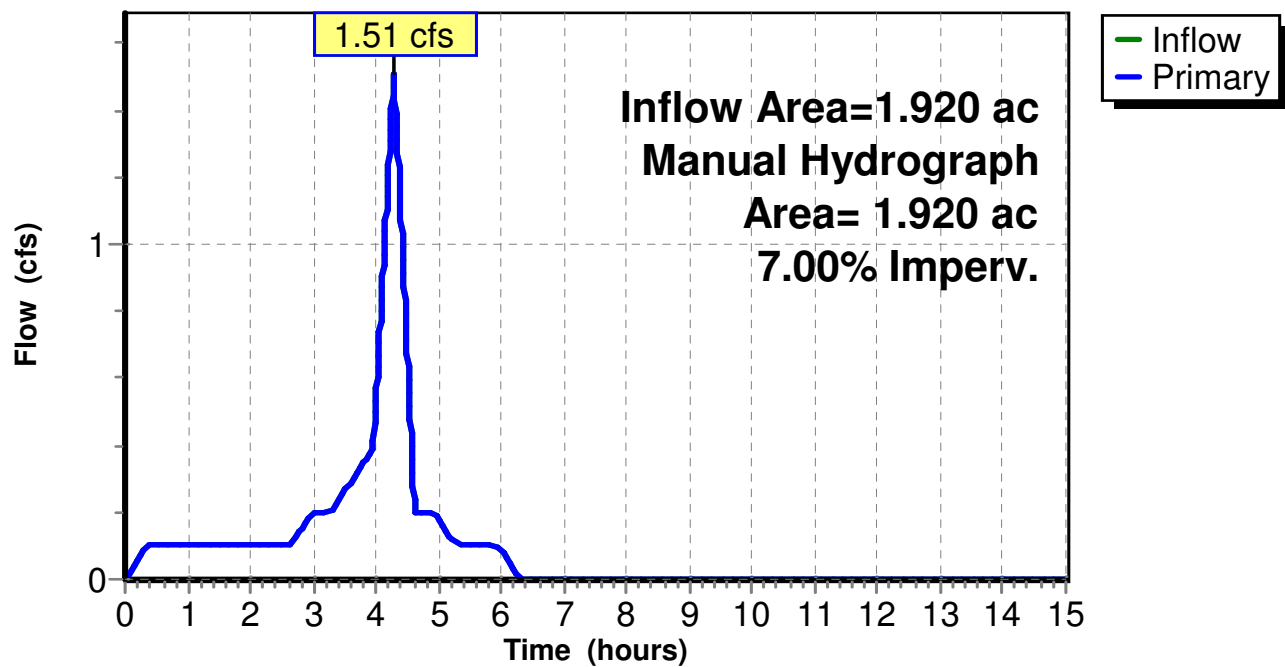
Inflow Area = 1.920 ac, 7.00% Impervious, Inflow Depth = 0.70"
Inflow = 1.51 cfs @ 4.29 hrs, Volume= 0.112 af
Primary = 1.51 cfs @ 4.29 hrs, Volume= 0.112 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-15.00 hrs, dt= 0.01 hrs

20 Point manual hydrograph, To= 0.00 hrs, dt= 0.33 hrs, Area= 1.920 ac, 7.00% Imp., cfs =
0.00 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.20
0.20 0.30 0.40 1.51 0.20 0.20 0.10 0.10 0.10 0.00

Link 2L: Area B1

Hydrograph



Evergreen B1

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Rainfall Duration=9 min, Inten=3.53 in/hr

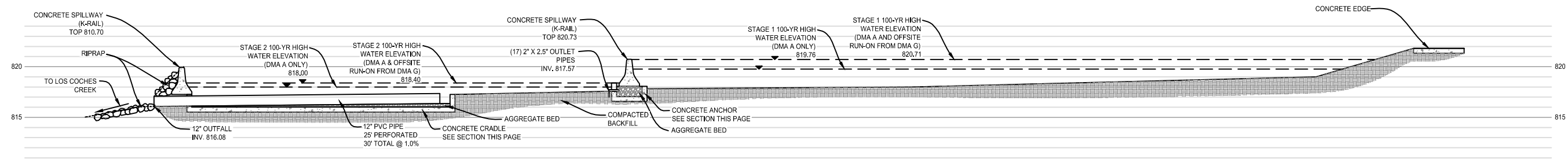
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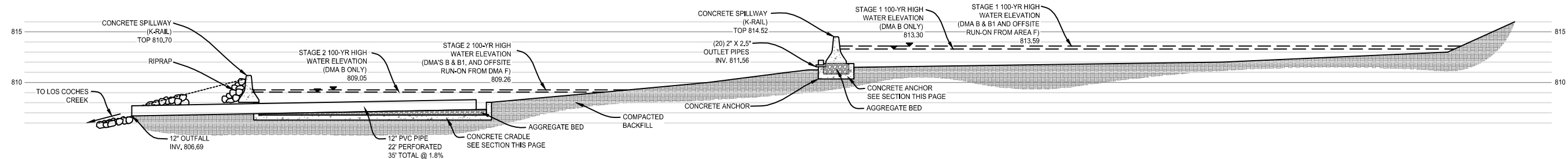
Hydrograph for Link 2L: Area B1

Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)	Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)
0.00	0.00	0.00	0.00	10.40	0.00	0.00	0.00
0.20	0.06	0.00	0.06	10.60	0.00	0.00	0.00
0.40	0.10	0.00	0.10	10.80	0.00	0.00	0.00
0.60	0.10	0.00	0.10	11.00	0.00	0.00	0.00
0.80	0.10	0.00	0.10	11.20	0.00	0.00	0.00
1.00	0.10	0.00	0.10	11.40	0.00	0.00	0.00
1.20	0.10	0.00	0.10	11.60	0.00	0.00	0.00
1.40	0.10	0.00	0.10	11.80	0.00	0.00	0.00
1.60	0.10	0.00	0.10	12.00	0.00	0.00	0.00
1.80	0.10	0.00	0.10	12.20	0.00	0.00	0.00
2.00	0.10	0.00	0.10	12.40	0.00	0.00	0.00
2.20	0.10	0.00	0.10	12.60	0.00	0.00	0.00
2.40	0.10	0.00	0.10	12.80	0.00	0.00	0.00
2.60	0.10	0.00	0.10	13.00	0.00	0.00	0.00
2.80	0.15	0.00	0.15	13.20	0.00	0.00	0.00
3.00	0.20	0.00	0.20	13.40	0.00	0.00	0.00
3.20	0.20	0.00	0.20	13.60	0.00	0.00	0.00
3.40	0.23	0.00	0.23	13.80	0.00	0.00	0.00
3.60	0.29	0.00	0.29	14.00	0.00	0.00	0.00
3.80	0.35	0.00	0.35	14.20	0.00	0.00	0.00
4.00	0.53	0.00	0.53	14.40	0.00	0.00	0.00
4.20	1.21	0.00	1.21	14.60	0.00	0.00	0.00
4.40	1.07	0.00	1.07	14.80	0.00	0.00	0.00
4.60	0.28	0.00	0.28	15.00	0.00	0.00	0.00
4.80	0.20	0.00	0.20				
5.00	0.18	0.00	0.18				
5.20	0.12	0.00	0.12				
5.40	0.10	0.00	0.10				
5.60	0.10	0.00	0.10				
5.80	0.10	0.00	0.10				
6.00	0.08	0.00	0.08				
6.20	0.02	0.00	0.02				
6.40	0.00	0.00	0.00				
6.60	0.00	0.00	0.00				
6.80	0.00	0.00	0.00				
7.00	0.00	0.00	0.00				
7.20	0.00	0.00	0.00				
7.40	0.00	0.00	0.00				
7.60	0.00	0.00	0.00				
7.80	0.00	0.00	0.00				
8.00	0.00	0.00	0.00				
8.20	0.00	0.00	0.00				
8.40	0.00	0.00	0.00				
8.60	0.00	0.00	0.00				
8.80	0.00	0.00	0.00				
9.00	0.00	0.00	0.00				
9.20	0.00	0.00	0.00				
9.40	0.00	0.00	0.00				
9.60	0.00	0.00	0.00				
9.80	0.00	0.00	0.00				
10.00	0.00	0.00	0.00				
10.20	0.00	0.00	0.00				

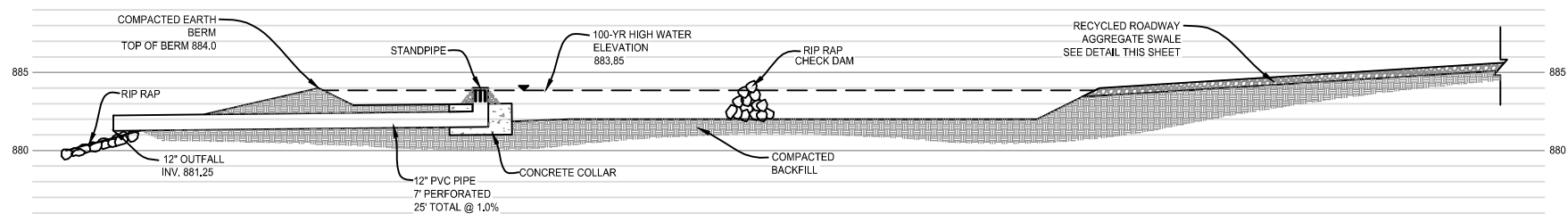
Attachment F – Desiltation Basins Details



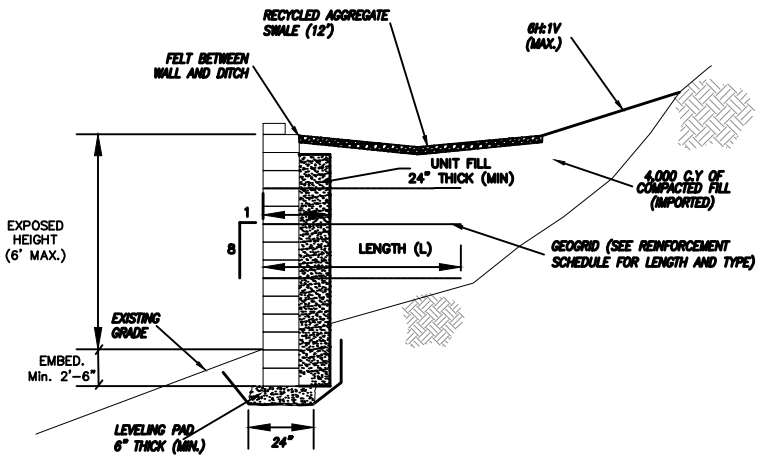
EXISTING NORTH DESILTATION BASIN SECTION (DMA A)
SCALE 1" = 5'



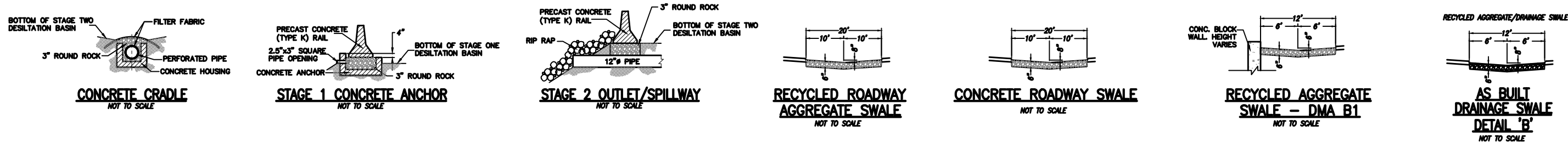
EXISTING WEST DESILTATION BASIN SECTION (DMA B)
SCALE 1" = 5'



EXISTING EAST DESILTATION BASIN SECTION (DMA B1)
SCALE 1" = 5'



AS BUILT RETAINING WALL DETAIL 'A'
NOT TO SCALE



EVERGREEN NURSERY
PRELIMINARY GRADING PLAN - DETAILS
CASE NO. 3992-11-011
KIVA PROJ. 11-0151473

SITE DESIGN ASSOCIATES, INC.
1016 BROADWAY SUITE "A"
EL CAJON, CALIFORNIA 92021
(619) 442-8467

PRELIMINARY GRADING PLAN- DETAILS
EVERGREEN NURSERY
9788 FLINN SPRINGS ROAD, EL CAJON, CA

ENGINEER OF WORK:

KENNETH J. DISCENZA, R.C.E. 29930
EXPIRATION DATE: 06/30/13



Revision	By	DATE	REVISION
1	KJD	5/30/2012	COUNTY COMMENTS
2	KJD	4/22/13	COUNTY COMMENTS