

Stormwater Management Plan

DEKALB COUNTY FIRE STATION NO.7

1712 Columbia Dr. Dekalb County, GA

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Prepared By:

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Project Description

This project consists of a 2.21 acre site located off of Columbia Drive in Dekalb County, GA. and is bounded by Columbia Drive and Peachcrest Rd. to the west, residential zoned lots to the north and east, and Dekalb County owned property to the south. The total site area is 2.21 acres and the disturbed area is 1.78 acres. The existing site is heavily wooded with a grassed area near the rear of the property. There are two large water tanks on the site as well. The majority of the post-developed stormwater from the site will drain to a proposed micropool detention pond. *The post-construction pond will be owned and maintained by the property owner.* This report represents a study of the storm water impacts due to the construction of this facility.

Procedure

The SCS method was used to compute the Pre-Development and Post-Development storm water runoff from the site. The attached spreadsheets show the detailed calculations as well as a summary of the pre and post development discharge rates. Also included are copies of the SCS hydrographs and routing hydrographs generated using the computer program *Hydraflow Hydrographs 2002* by Intelisolve.

The SCS Method of calculating storm water runoff is based on the following formulas:

Q (peak runoff) = $q(u)^*A(m)^*Q(in.)^*F(p)$

 $\begin{array}{l} q(u) = \text{unit peak discharge (csm/in)} - \text{from SCS type II peak discharge graph} \\ A(m) = \text{drainage area (sq. miles)} \\ Q(\text{in.}) = \text{Direct Runoff (inches)} \\ F(p) = \text{pond/swamp adjustment factor} \end{array}$

Direct Runoff (Q) = $(P-.2S)^2/(P+.8S)$ S = (1000/weighted CN) - 10Ia = Initial abstraction = .2S

The "TR-55 Method" was used for determining the time of concentration values for pre and post developed runoffs. This method breaks down the time of concentration path into three separate components: Sheet Flow, Shallow Concentrated Flow, and Channel Flow. A minimum time of concentration of 5 min. was used for post developed basins due to the small size of the basin. Please see following chart for all T_c calculations.

Sub-area	Sheet	Shallow	Open	Pre-	Post-
	flow,	Concentrated	channel flow,	developed Tc,	developed Tc,
	minutes	flow, minutes	minutes	minutes	minutes
Pre Dev Basin 1	9.38	1.55	0.00	10.9	
Pre Dev Basin 2	9.14	0.55	0.00	9.7	

Times of Concentration Summary:

CN = Curve Number

The following curve numbers were used based on Table 2.1.5-1 in the Georgia Storm Water Management Manual. The majority of soils found on this site are classified within hydraulic soil group B.

Wooded Area = 55 Grassed/ Landscaped Area = 61 Impervious Area = 98

Comp CN = A1(CN) + A2(CN) + A3(CN)/(A1+A2+A3)

Where: A1,A2,A3 are sub areas.

Sub-area	Pre-developed Curve Number	Post-developed Curve Number
Pre Dev Basin 1	57	
Pre Dev Basin 2	56	
Post Basin 1 to Pond		84
Post Dev Basin 1 Bypass		60
Post Dev Basin 2 Bypass		66

Curve Number Summary:

24-hr rainfall depths: (source: NOAA Atlas 14, Vol.9, Ver.2- Decatur, GA.)

1-yr = 3.27 inches 2-yr = 3.68 inches 5-yr = 4.39 inches 10-yr = 5.01 inches 25-yr = 5.92 inches 50-yr = 6.66 inches 100-yr = 7.44 inches

Pre-Developed Conditions

The existing site is heavily wooded with a grassed area near the rear of the property. There are two large water tanks on the site as well. Stormwater runoff from the site drains in two separate directions, predominately north and south. The soils located on site are classified within hydraulic soil group "B" and include the following: Cecil Urban Land Complex (2 to 10% slopes), and Urban Land.

The total pre-developed site consists of 2.21 acres and is broken into two separate drainage basins: Basin No.1 drains drains north to the adjacent property, and Basin No.2 drains south to the adjacent property. The site drains to an unnamed tributary to Cobbs Creek further downstream. Please see the attached chart for basin details.



PRE DEVELOPED SITE

Developed Conditions

As specified by Dekalb County, storm water storage facilities are required to attenuate post developed flows to pre-developed rates for the 2-yr through 25-yr storm events (and safely pass the 100-yr storm event). The total developed basin consists of 2.21 acres and is broken into three separate drainage basins. Post Basin No.1 to Pond consists of 1.16 acres (CN=84, Tc= 5 min.) draining to the proposed detention pond and includes the majority of the parking lot and the proposed building. Post Dev Basin 1 Bypass consists of 0.28 acres (CN=60, Tc= 5 min.) that bypasses the proposed detention pond and sheet flows north and east to the adjacent property. Post Dev Basin 2 Bypass consists of 0.77 acres (CN=66, Tc= 5 min.) sheet flows west to Columbia Drive and south to the adjacent property. Please see the following chart for all runoff calculations.

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Runoff Summary									
Return	Pre-	Pre-	Total Post	Total Post					
Frequency	developed	Developed	developed	developed					
	Basin 1	Basin 2	Basin 1	Basin 2					
			Runoff	Bypass					
			(routed)	Runoff					
1	0.28	0.31	0.37	0.90					
2	0.51	0.60	0.56	1.23					
5	1.00	1.22	0.87	1.87					
10	1.50	1.86	1.18	2.48					
25	2.32	2.92	2.18	3.42					
50	3.04	3.85	5.64	4.22					
100	3.85	4.89	9.21	5.08					

Storm Water Quality Analysis

The quality of stormwater runoff that is released from this site will be maintained using a micropool extended detention pond as well, a bioswale along the road frontage, and a vegetated filter strip along the property boundaries. According to the Georgia Stormwater Management Manual, "stormwater ponds" are effective in the removal of 80%, "bioslope" are effective in the removal of 85%, and vegetated filter strips are effective in the removal of 60% of the average annual post development total suspended solids (TSS) load. The undeveloped area of the site will remain wooded and be counted as a natural conservation area. The water quality treatment volume is defined as the runoff volume resulting from the first 1.2 inches of rainfall from a site, over a 24-hour period.

Water Quality Volume (WQv) = (1.2RvA)/12 = 4,049 cuft.

WQv = Water Quality Volume (in acre-feet) Rv = 0.05+.009(I) where I is percent impervious cover A = site area in acres

A permanent micropool has been designed in the bottom of the pond equal to 20% of the WQv. The outlet control structure will be constructed with 3-inch (min.) extended detention orifices to insure 24 hour drawdown of the water quality volume. Per the GSWMM 2.2.4.2: *channel protection volume control is not required for post development discharges less than 2.0 cfs for the 1-year 24-hour storm event.* Since the post developed runoff is less than 2.0 cfs for the 1-year storm, no channel protection volume will be required. Sizing the detention pond to safely handle the runoff from the 100-year, 24-hour return frequency storm event will control the extreme flooding protection volumes.

The majority of pollutants expected from this site will be oil/grease washed from the parking lot during heavy rainfall. To facilitate major cleanout activities, a rip-rap sediment forebay constructed of a rip-rap berm will be installed near the pond inlet to trap coarse sediment particles.

Downstream Impacts:

Typically, the downstream drainage impacts are analyzed to a point where the developed site equals 10% or more of the overall watershed area for the system. However, since this site is located at the crest of the hill, there is no upstream basin. Therefore, the downstream drainage impacts at the 10% point are not required.

Erosion Control Program

The property line and stream buffers will be the clearing limits of this project (or as shown on the plans). Mulch and re-vegetation will be applied to applicable areas immediately after grading is completed. Sediment control structures will be installed prior to any other activity within the drainage basin. Outlet protection will be employed at the point-of-discharge from the detention pond. Major discharge points of concentrated flow will have riprap aprons and detention basins with a retrofit to filter the runoff. An energy dissipating headwall and level spreader at the pond outlet will serve to slow down the stormwater before entering the stream buffer. Minor discharge points will have silt fencing as filters and will be used along the toes of all disturbed areas. Temporary construction exits will be employed to prevent the transport of sediment from the site by vehicular traffic. Additional erosion control measures shown on the construction plans and/or for site-specific situations may be required. <u>Sediment and erosion control measures will be inspected daily. Any damage will be repaired by the end of the day.</u>

INSPECTION AND MAINTENANCE SCHEDULE

Stormwater Pond

ACTIVITY	SCHEDULE
 Clean and remove debris from inlet and outlet structures. Mow side slopes and pond bottom. 	Monthly
 Inspect for damage, paying particular attention to the control structure. Check for signs of eutrophic conditions. Note signs of hydrocarbon build-up, and remove appropriately. Monitor for sediment accumulation in the facility and forebay. Examine to ensure that outlet device is free of debris and operational. Check all control gates, valves or other mechanical devices. 	Annual Inspection.
Repair undercut or eroded areas.	As Needed
 Monitor sediment accumulations, and remove sediment when the pool volume has become reduced significantly, or the pond becomes eutrophic. 	10 to 20 years or after 25% of the permanent pool volume has been lost







Georgia Stormwater Managem Stormwater Quality Site Developmer	ent Manual It Review Tool, v2.2
Development Name: Dekalb Co. Fire Station No.7 Drainage Basin Name: BASIN 1	data input cells calculation cells constant values
Pre-Development Runoff Volume (in) 0.36 0.54 1.89 3.04 Post Development Runoff Volume (in) with no BMPs 1.50 1.86 4.06 5.63 Post-Development Runoff Volume (in) with BMPs 1.50 1.86 4.06 5.63 Post-Development Runoff Volume (in) with BMPs 1.50 1.86 4.06 5.63 Adjusted CN 79 79 79 79 *See Stormwater Management Standards to Determine Detention Requirements. 79 79 79	
Comments	





Stormwat	Georgia S ter Qualit	Stormw y Site	ater Manaç Developr	Jement Manual nent Review Tool, v2.2
Development Name: <mark>Dekalb Co. Fire Sta</mark> Drainage Basin Name: <mark>Basin 2</mark>	ation No.7			data input cells calculation cells constant values
Pre-Development Runoff Volume (in) 0 Post Development Runoff Volume (in) with no BMPs 0 Post-Development Runoff Volume (in) with BMPs 0 Adjusted CN 4 *See Stormwater Management Standards to Determine Detention Requirements.	0.35 0.52 0.92 1.21 0.90 1.20 69 69	1.85 3.09 3.07 69	2.98 4.51 4.50 69	
			Comments	







MICROPOOL POND NO. 1

Input Values	
Area=	1.44 ac.
I= Impervious Cover (%) =	49.3%
Impervious Area (Acres)	0.71 ac.
CN=	79
P _{1,24} (in)=	3.27 in.
q _u =	1000 (From Fig.3.1.5-6)
q _o /q _i =	0.020 (From Fig.3.3.5-1)
Bottom Elevation of Pond	993

ED POND CALCULATIONS:

WQv CALCULATIONS

WQ _v (cf)= (1.2)(R _v)(43560)(Area)/12 =	3097	cf.	= EL.	<u>994.15</u>
PRE-TREATMENT CALCS. (SEDIMENT FOREBAY)		_		
Forebay Vol _{pre} = Imp. Area (0.1")(43560)/12 = (cuft.)	258	cf.		
Compute WQ,-ED orifice diameter				
25% of WQv (cuft) (Permanent Pool)	774	cf.	= EL.	<u>993.30</u>
Avg WQ, ED Release Rate				
WQ _v / (24hrs)(3600sec/hr) (cfs)	0.009	cfs.		
Average head (h) =	0.575	ft.		
Q=CA(2gh) ^{0.5}				
$A = Q/[(0.6)((2)(32.2)(h))^{0.5}] =$	0.002	sf.		
$d=((4A)/3.14)^{0.5}$ (ft)	0.050	ft	or	<u>use 3</u> in.



Pond Report

Hydraflow Hydrographs by Intelisolve

Pond No. 1 - WQ Pond

Pond Data

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

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)	
0.00	993.00	2,281	0	0	
1.00	994.00	2,871	2,576	2,576	
2.00	995.00	3,510	3,191	5,767	
3.00	996.00	4,240	3,875	9,642	
4.00	997.00	5,026	4,633	14,275	

Culvert / Orifice Structures

	[A]	[B]	[C]	[D]	
Rise (in)	= 18.00	3.00	3.00	0.00	Crest Len (ft)
Span (in)	= 18.00	3.00	3.00	0.00	Crest El. (ft)
No. Barrels	= 1	1	1	0	Weir Coeff.
Invert El. (ft)	= 993.00	993.30	994.15	0.00	Weir Type
Length (ft)	= 30.00	0.00	0.00	0.00	Multi-Stage
Slope (%)	= 0.50	0.00	0.00	0.00	
N-Value	= .013	.013	.013	.000	
Orif. Coeff.	= 0.60	0.60	0.60	0.00	
Multi-Stage	= n/a	Yes	Yes	No	Exfiltration = 0.0

[A]

= 12.06

= 3.33

= Riser

= Yes

= 995.75

xfiltration = 0.000 in/hr (Contour) Tailwater Elev. = 0.00 ft

[C]

0.00

0.00

0.00

No

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

[B]

0.50

3.33

Rect

Yes

995.00

[D]

0.00

0.00

0.00

No

Stage	/ Storage	/ Discharge	Tahle
Juage	/ Storage	Discharge	lable

J -	J .	· · · J ·										
Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Total cfs
0.00	0	993.00	0.00	0.00	0.00		0.00	0.00				0.00
1.00	2,576	994.00	0.18	0.18	0.00		0.00	0.00				0.18
2.00	5,767	995.00	0.51	0.30	0.20		0.00	0.00				0.50
3.00	9,642	996.00	7.19	0.25	0.25		5.02	1.67				7.19
4.00	14,275	997.00	15.28	0.04	0.04		14.21	1.00				15.28

Weir Structures



Soil Map—DeKalb County, Georgia

MAP L	EGEND	MAP INFORMATION
Area of Interest (AOI) Area of Interest (AOI)	Spoil Area	The soil surveys that comprise your AOI were mapped at 1:15,800.
Soll Map Unit Polygons Soll Map Unit Ines Soll Map Unit Lines Soll Map Unit Points Special Point Features Biorox Pit City Spot	Verify Space V	Warning: Soil Map may not be valid at this scale. Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale. Please rely on the bar scale on each map sheet for map measurements. Source of Map: Natural Resources Conservation Service Web Soil Surver URL:
 Cleaet Depression Gravel Pit Gravel Pit Landfill Landa Flow Marsh or swamp Miccellanocus Water O Perennial Water 	Interstate Highways US Routes Major Roads Local Roads Background Aerial Photography	Coordinate System: Web Mercator (EPSG:3857) Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction on a hanpe but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required. This product is generated from the USDA-NRCS contilied data as of the version date(s) listed below. Soil Survey Area: DeKalb County, Georgia Survey Area Data: Version 10, Sep 14, 2018 Soil map units are labeled (as space allows) for map scales 160 Mon enterverse.
Rock Outerop Satine Spot Sandy Spot Sandy Spot Severely Eroded Spot Sinkhole Sikte or Slip Side or Slip Sodic Spot		1:50,000 or ranger. Date(s) aerial images were photographed: May 4, 2014—Jun 18, 2014 The orthophoto or other base map on which the soil lines were compled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

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Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
CuC	Cecil-Urban land complex, 2 to 10 percent slopes	5.8	49.0%
Ud	Urban land	6.0	51.0%
Totals for Area of Interest		11.8	100.0%

Natural Resources Conservation Service Web Soil Survey National Cooperative Soil Survey 3/11/2019 Page 3 of 3

National Flood Hazard Layer FIRMette



Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT



Hyd. No. 1

Pre Dev Basin 1

<u>Description</u>	<u>A</u>		<u>B</u>		<u>C</u>		<u>Totals</u>
Sheet Flow Manning's n-value	= 0.3	300	0.011		0.011		
Two-year 24-hr precip. (in) Land slope (%)	= 10 = 3.6 = 7.5	50 50	0.00 0.00 0.00		0.00 0.00 0.00		
Travel Time (min)	= 9.3	38 +	0.00	+	0.00	=	9.38
Shallow Concentrated Flow Flow length (ft) Watercourse slope (%) Surface description Average velocity (ft/s)	= 23 = 2.5 = Un = 2.5	8.00 50 ipaved 55	0.00 0.00 Paved 0.00		0.00 0.00 Paved 0.00		
Travel Time (min)	= 1.	55 +	0.00	+	0.00	=	1.55
Channel Flow X sectional flow area (sqft) Wetted perimeter (ft) Channel slope (%) Manning's n-value Velocity (ft/s) Flow length (ft)	= 0.0 = 0.0 = 0.0 = 0.0 = 0.0 = 0.0)0)0)0)15)0	0.00 0.00 0.00 0.015 0.00 0.0		0.00 0.00 0.015 0.00 0.0		
Travel Time (min)	= 0.0	00 +	0.00	+	0.00	=	0.00
Total Travel Time, Tc							10.93 min

Hyd. No. 2

Pre Dev Basin 2

<u>Description</u>		<u>A</u>		<u>B</u>		<u>C</u>		<u>Totals</u>
Sheet Flow								
Manning's n-value	=	0.300		0.011		0.011		
Flow length (ft)	=	100.0		0.0		0.0		
Two-year 24-hr precip. (in)	=	3.68		0.00		0.00		
Land slope (%)	=	8.00		0.00		0.00		
Travel Time (min)	=	9.14	+	0.00	+	0.00	=	9.14
Shallow Concentrated Flow								
Flow length (ft)	=	86.00		0.00		0.00		
Watercourse slope (%)	=	2.62		0.00		0.00		
Surface description	=	Unpaved	ł	Paved		Paved		
Average velocity (ft/s)	=	2.61		0.00		0.00		
Travel Time (min)	=	0.55	+	0.00	+	0.00	=	0.55
Channel Flow								
X sectional flow area (sqft)	=	0.00		0.00		0.00		
Wetted perimeter (ft)	=	0.00		0.00		0.00		
Channel slope (%)	=	0.00		0.00		0.00		
Manning's n-value	=	0.015		0.015		0.015		
Velocity (ft/s)	=	0.00		0.00		0.00		
Flow length (ft)	=	0.0		0.0		0.0		
Travel Time (min)	=	0.00	+	0.00	+	0.00	=	0.00
Total Travel Time, Tc								9.69 min

Hydrograph Return Period Recap

Hyd.	Hydrograph	Inflow					Hydrograph				
NO.	type (origin)	Hyd(s)	1-Yr	2-Yr	3-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr	description
1	SCS Runoff		0.28	0.51		1.00	1.50	2.32	3.04	3.85	Pre Dev Basin 1
2	SCS Runoff		0.31	0.60		1.22	1.86	2.92	3.85	4.89	Pre Dev Basin 2
4	SCS Runoff		3.72	4.44		5.71	6.84	8.50	9.84	11.26	Post Dev Basin 1 to Pond
5	Reservoir	4	0.31	0.40		0.56	0.92	1.90	4.99	8.04	Pond Outflow
6	SCS Runoff		0.18	0.27		0.47	0.66	0.96	1.23	1.52	Post Dev Basin 1 Bypass
7	Combine	5, 6	0.37	0.56		0.87	1.18	2.18	5.64	9.21	Total Post Dev Basin 1
9	SCS Runoff		0.90	1.23		1.87	2.48	3.42	4.22	5.08	Post Dev Basin 2 Bypass
									<u> </u>		

Monday, Jun 10 2019, 4:05 PM

1

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description		
1	SCS Runoff	0.28	1	723	1,207				Pre Dev Basin 1		
2	SCS Runoff	0.31	1	722	1,347				Pre Dev Basin 2		
4	SCS Runoff	3.72	1	718	7,561				Post Dev Basin 1 to Pond		
5	Reservoir	0.31	1	750	6,775	4	994.39	3,830	Pond Outflow		
6	SCS Runoff	0.18	1	719	457				Post Dev Basin 1 Bypass		
7	Combine	0.37	1	720	7,232	5, 6			Total Post Dev Basin 1		
9	SCS Runoff	0.90	1	718	1,956				Post Dev Basin 2 Bypass		
Runoffs.gpw					Return	Period: 1	Year	Monday, Jun 10 2019, 4:05 PM			

2

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	SCS Runoff	0.51	1	723	1,757				Pre Dev Basin 1
2	SCS Runoff	0.60	1	722	1,992				Pre Dev Basin 2
4	SCS Runoff	4.44	1	718	9,082				Post Dev Basin 1 to Pond
5	Reservoir	0.40	1	747	8,296	4	994.64	4,614	Pond Outflow
6	SCS Runoff	0.27	1	719	640				Post Dev Basin 1 Bypass
7	Combine	0.56	1	721	8,937	5, 6			Total Post Dev Basin 1
9	SCS Runoff	1.23	1	718	2,594				Post Dev Basin 2 Bypass
Run	Runoffs.gpw					Period: 2	Year	Monday, J	lun 10 2019, 4:06 PM

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	SCS Runoff	1.00	1	722	2,883				Pre Dev Basin 1
2	SCS Runoff	1.22	1	721	3,322				Pre Dev Basin 2
4	SCS Runoff	5.71	1	717	11,802				Post Dev Basin 1 to Pond
5	Reservoir	0.56	1	744	11,016	4	995.08	6,062	Pond Outflow
6	SCS Runoff	0.47	1	718	1,007				Post Dev Basin 1 Bypass
7	Combine	0.87	1	719	12,023	5, 6			Total Post Dev Basin 1
9	SCS Runoff	1.87	1	718	3,823				Post Dev Basin 2 Bypass
Runoffs.gpw					Return	Period: 5	Year	Monday, J	lun 10 2019, 4:06 PM

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	SCS Runoff	1.50	1	721	4,019				Pre Dev Basin 1
2	SCS Runoff	1.86	1	720	4,674				Pre Dev Basin 2
4	SCS Runoff	6.84	1	717	14,241				Post Dev Basin 1 to Pond
5	Reservoir	0.92	1	731	13,456	4	995.35	7,120	Pond Outflow
6	SCS Runoff	0.66	1	718	1,370				Post Dev Basin 1 Bypass
7	Combine	1.18	1	721	14,825	5, 6			Total Post Dev Basin 1
9	SCS Runoff	2.48	1	718	5,000				Post Dev Basin 2 Bypass
Run	offs.gpw				Return	Period: 10) Year	Monday, J	lun 10 2019, 4:06 PM

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	SCS Runoff	2.32	1	721	5,894				Pre Dev Basin 1
2	SCS Runoff	2.92	1	720	6,917				Pre Dev Basin 2
4	SCS Runoff	8.50	1	717	17,898				Post Dev Basin 1 to Pond
5	Reservoir	1.90	1	726	17,112	4	995.75	8,656	Pond Outflow
6	SCS Runoff	0.96	1	718	1,959				Post Dev Basin 1 Bypass
7	Combine	2.18	1	724	19,072	5, 6			Total Post Dev Basin 1
9	SCS Runoff	3.42	1	718	6,863				Post Dev Basin 2 Bypass
Run	offs.gpw				Return	Period: 25	5 Year	Monday, J	Jun 10 2019, 4:06 PM

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description	
1	SCS Runoff	3.04	1	721	7,568				Pre Dev Basin 1	
2	SCS Runoff	3.85	1	720	8,931				Pre Dev Basin 2	
4	SCS Runoff	9.84	1	717	20,920				Post Dev Basin 1 to Pond	
5	Reservoir	4.99	1	723	20,134	4	995.92	9,346	Pond Outflow	
6	SCS Runoff	1.23	1	718	2,480				Post Dev Basin 1 Bypass	
7	Combine	5.64	1	722	22,614	5, 6			Total Post Dev Basin 1	
9	SCS Runoff	4.22	1	718	8,474				Post Dev Basin 2 Bypass	
Runoffs.gpw					Return	Period: 50) Year	Monday, Jun 10 2019, 4:06 PM		

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	SCS Runoff	3.85	1	721	9,453				Pre Dev Basin 1
2	SCS Runoff	4.89	1	720	11,203				Pre Dev Basin 2
4	SCS Runoff	11.26	1	717	24,139				Post Dev Basin 1 to Pond
5	Reservoir	8.04	1	721	23,354	4	996.03	9,765	Pond Outflow
6	SCS Runoff	1.52	1	718	3,060				Post Dev Basin 1 Bypass
7	Combine	9.21	1	721	26,414	5, 6			Total Post Dev Basin 1
9	SCS Runoff	5.08	1	718	10,243				Post Dev Basin 2 Bypass
Run	offs.gpw				Return	Period: 10	0 Year	Monday, J	lun 10 2019, 4:06 PM

Hydraflow Hydrographs by Intelisolve

Hyd. No. 1

Pre Dev Basin 1

Hydrograph type	= SCS Runoff	Peak discharge	= 0.28 cfs
Storm frequency	= 1 yrs	Time interval	= 1 min
Drainage area	= 0.980 ac	Curve number	= 57
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 10.90 min
Total precip.	= 3.27 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 1,207 cuft



1

Hydraflow Hydrographs by Intelisolve

Hyd. No. 1

Pre Dev Basin 1

Hydrograph type	= SCS Runoff	Peak discharge	= 0.51 cfs
Storm frequency	= 2 yrs	Time interval	= 1 min
Drainage area	= 0.980 ac	Curve number	= 57
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 10.90 min
Total precip.	= 3.68 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 1,757 cuft



Hydraflow Hydrographs by Intelisolve

Hyd. No. 1

Pre Dev Basin 1

Hydrograph type	= SCS Runoff	Peak discharge	= 1.00 cfs
Storm frequency	= 5 yrs	Time interval	= 1 min
Drainage area	= 0.980 ac	Curve number	= 57
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 10.90 min
Total precip.	= 4.39 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 2,883 cuft



3

Hydraflow Hydrographs by Intelisolve

Hyd. No. 1

Pre Dev Basin 1

Hydrograph type	= SCS Runoff	Peak discharge	= 1.50 cfs
Storm frequency	= 10 yrs	Time interval	= 1 min
Drainage area	= 0.980 ac	Curve number	= 57
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 10.90 min
Total precip.	= 5.01 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 4,019 cuft



4

Hydraflow Hydrographs by Intelisolve

Hyd. No. 1

Pre Dev Basin 1

Hydrograph type	= SCS Runoff	Peak discharge	= 2.32 cfs
Storm frequency	= 25 yrs	Time interval	= 1 min
Drainage area	= 0.980 ac	Curve number	= 57
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 10.90 min
Total precip.	= 5.92 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 5,894 cuft



Hydraflow Hydrographs by Intelisolve

Hyd. No. 1

Pre Dev Basin 1

Hydrograph type	= SCS Runoff	Peak discharge	= 3.04 cfs
Storm frequency	= 50 yrs	Time interval	= 1 min
Drainage area	= 0.980 ac	Curve number	= 57
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 10.90 min
Total precip.	= 6.66 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 7,568 cuft

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6

Hydraflow Hydrographs by Intelisolve

Hyd. No. 1

Pre Dev Basin 1

Hydrograph type	= SCS Runoff	Peak discharge	= 3.85 cfs
Storm frequency	= 100 yrs	Time interval	= 1 min
Drainage area	= 0.980 ac	Curve number	= 57
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 10.90 min
Total precip.	= 7.44 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 9,453 cuft



7

Hydraflow Hydrographs by Intelisolve

Hyd. No. 2

Pre Dev Basin 2

Hydrograph type	= SCS Runoff	Peak discharge	= 0.31 cfs
Storm frequency	= 1 yrs	Time interval	= 1 min
Drainage area	= 1.230 ac	Curve number	= 56
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 9.70 min
Total precip.	= 3.27 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 1,347 cuft



1

Hydraflow Hydrographs by Intelisolve

Hyd. No. 2

Pre Dev Basin 2

Hydrograph type	= SCS Runoff	Peak discharge	= 0.60 cfs
Storm frequency	= 2 yrs	Time interval	= 1 min
Drainage area	= 1.230 ac	Curve number	= 56
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 9.70 min
Total precip.	= 3.68 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 1,992 cuft



2

Hydraflow Hydrographs by Intelisolve

Hyd. No. 2

Pre Dev Basin 2

Hydrograph type	= SCS Runoff	Peak discharge	= 1.22 cfs
Storm frequency	= 5 yrs	Time interval	= 1 min
Drainage area	= 1.230 ac	Curve number	= 56
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 9.70 min
Total precip.	= 4.39 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 3,322 cuft



3

Hydraflow Hydrographs by Intelisolve

Hyd. No. 2

Pre Dev Basin 2

Hydrograph type	= SCS Runoff	Peak discharge	= 1.86 cfs
Storm frequency	= 10 yrs	Time interval	= 1 min
Drainage area	= 1.230 ac	Curve number	= 56
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 9.70 min
Total precip.	= 5.01 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 4,674 cuft



4

Hydraflow Hydrographs by Intelisolve

Hyd. No. 2

Pre Dev Basin 2

Hydrograph type	= SCS Runoff	Peak discharge	= 2.92 cfs
Storm frequency	= 25 yrs	Time interval	= 1 min
Drainage area	= 1.230 ac	Curve number	= 56
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 9.70 min
Total precip.	= 5.92 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 6,917 cuft



5

Hydraflow Hydrographs by Intelisolve

Hyd. No. 2

Pre Dev Basin 2

Hydrograph type	= SCS Runoff	Peak discharge	= 3.85 cfs
Storm frequency	= 50 yrs	Time interval	= 1 min
Drainage area	= 1.230 ac	Curve number	= 56
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 9.70 min
Total precip.	= 6.66 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 8,931 cuft

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6

Hydraflow Hydrographs by Intelisolve

Hyd. No. 2

Pre Dev Basin 2

Hydrograph type	= SCS Runoff	Peak discharge	= 4.89 cfs
Storm frequency	= 100 yrs	Time interval	= 1 min
Drainage area	= 1.230 ac	Curve number	= 56
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 9.70 min
Total precip.	= 7.44 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 11,203 cuft



Hydraflow Hydrographs by Intelisolve

Hyd. No. 7

Total Post Dev Basin 1

Hydrograph type	= Combine
Storm frequency	= 1 yrs
Inflow hyds.	= 5,6

Peak discharge = 0.37 cfs Time interval = 1 min

Hydrograph Volume = 7,232 cuft



1

Hydraflow Hydrographs by Intelisolve

Hyd. No. 7

Total Post Dev Basin 1

Hydrograph type	= Combine	Peak discharge
Storm frequency	= 2 yrs	Time interval
Inflow hyds.	= 5,6	

Hydrograph Volume = 8,937 cuft

= 0.56 cfs = 1 min



2

Hydraflow Hydrographs by Intelisolve

Hyd. No. 7

Total Post Dev Basin 1

Hydrograph type	= Combine
Storm frequency	= 5 yrs
Inflow hyds.	= 5,6

Hydrograph Volume = 12,023 cuft



Hydraflow Hydrographs by Intelisolve

Hyd. No. 7

Total Post Dev Basin 1

Hydrograph type	= Combine
Storm frequency	= 10 yrs
Inflow hyds.	= 5,6

Peak discharge = 1.18 cfs Time interval = 1 min

Hydrograph Volume = 14,825 cuft



Hydraflow Hydrographs by Intelisolve

Hyd. No. 7

Total Post Dev Basin 1

Hydrograph type	= Combine
Storm frequency	= 25 yrs
Inflow hyds.	= 5,6





Hydraflow Hydrographs by Intelisolve

Hyd. No. 7

Total Post Dev Basin 1

Hydrograph type	= Combine
Storm frequency	= 50 yrs
Inflow hyds.	= 5, 6

Peak discharge = 5.64 cfs Time interval = 1 min

Hydrograph Volume = 22,614 cuft



Hydraflow Hydrographs by Intelisolve

Hyd. No. 7

Total Post Dev Basin 1

Hydrograph type	= Combine
Storm frequency	= 100 yrs
Inflow hyds.	= 5,6

Hydrograph Volume = 26,414 cuft



7

Hydraflow Hydrographs by Intelisolve

Hyd. No. 9

Post Dev Basin 2 Bypass

Hydrograph type	= SCS Runoff	Peak discharge	= 0.90 cfs
Storm frequency	= 1 yrs	Time interval	= 1 min
Drainage area	= 0.770 ac	Curve number	= 66
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.27 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 1,956 cuft



1

Hydraflow Hydrographs by Intelisolve

Hyd. No. 9

Post Dev Basin 2 Bypass

Hydrograph type	= SCS Runoff	Peak discharge	= 1.23 cfs
Storm frequency	= 2 yrs	Time interval	= 1 min
Drainage area	= 0.770 ac	Curve number	= 66
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.68 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 2,594 cuft



Hydraflow Hydrographs by Intelisolve

Hyd. No. 9

Post Dev Basin 2 Bypass

Hydrograph type	= SCS Runoff	Peak discharge	= 1.87 cfs
Storm frequency	= 5 yrs	Time interval	= 1 min
Drainage area	= 0.770 ac	Curve number	= 66
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 5.00 min
Total precip.	= 4.39 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 3,823 cuft



Hydraflow Hydrographs by Intelisolve

Hyd. No. 9

Post Dev Basin 2 Bypass

Hydrograph type	= SCS Runoff	Peak discharge	= 2.48 cfs
Storm frequency	= 10 yrs	Time interval	= 1 min
Drainage area	= 0.770 ac	Curve number	= 66
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 5.00 min
Total precip.	= 5.01 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 5,000 cuft



4

Hydraflow Hydrographs by Intelisolve

Hyd. No. 9

Post Dev Basin 2 Bypass

Hydrograph type	= SCS Runoff	Peak discharge	= 3.42 cfs
Storm frequency	= 25 yrs	Time interval	= 1 min
Drainage area	= 0.770 ac	Curve number	= 66
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 5.00 min
Total precip.	= 5.92 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 6,863 cuft



5

Hydraflow Hydrographs by Intelisolve

Hyd. No. 9

Post Dev Basin 2 Bypass

Hydrograph type	= SCS Runoff	Peak discharge	= 4.22 cfs
Storm frequency	= 50 yrs	Time interval	= 1 min
Drainage area	= 0.770 ac	Curve number	= 66
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 5.00 min
Total precip.	= 6.66 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 8,474 cuft

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6

Hydraflow Hydrographs by Intelisolve

Hyd. No. 9

Post Dev Basin 2 Bypass

Hydrograph type	= SCS Runoff	Peak discharge	= 5.08 cfs
Storm frequency	= 100 yrs	Time interval	= 1 min
Drainage area	= 0.770 ac	Curve number	= 66
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 5.00 min
Total precip.	= 7.44 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 10,243 cuft



7