#### **DRAINAGE REPORT**

<u>Proposed Subdivision</u> Silver Falls Road Montville, Connecticut

Prepared for Daniela Gjergjaj

#### <u>Narrative</u>

The proposed project is a residential subdivision located on Silver Falls Road (Map 001, Block 007, Lot 00A) in Montville Connecticut. The existing property is approximately 19-acres bounded by Silver Falls Road to the west. The location of the site in reference to the USGS Quad Map is attached as Figure 1. Existing conditions mapping is included in the subdivision plans. The existing site is generally comprised of wooded land with grass & brush. The property is divided by a ridgeline forming 2 watersheds on the property; existing ground elevations on the site range from approximately 212 to 118. Stormwater from the site currently flows via sheet flow to the from the ridgeline to the 24" HDPE on the west and to the wetlands to the east.

The proposed development includes a 4-lot residential subdivision. The proposed lots will all front along Silver Falls Road and be served by a common driveway. There is no proposed roadway or public improvements. The proposed site grading has been designed to match the existing drainage patterns as closely as possible. The lot layouts and grading are depicted in the subdivision plans. As a low impact development measure stormwater throughout the site will continue to be managed by sheet flow over and treated by riprap swales and a water quality basin near the wetlands near Silver Falls Road.

The watershed #1 draining to the existing 24" hdpe is approximately 129 acres. The proposed development will disturb approximately 4.0 acres within this watershed. The land use within the work area will change from primarily woods, brush, and grass to residential that includes approximately 2 acres of lawn within the development. Based on the magnitude of the development within the watershed and the difference in land use for the residential development, the impact to the peak stormwater runoff rates will be negligible. In our opinion the proposed development will have no negative impact to the peak flow rates to the existing pond, wetlands, 24" hdpe, and existing beyond the downstream property boundary.

The watershed #2 draining to northeasterly wetlands is approximately 257 acres. The proposed development will disturb approximately 0.9 acre within this watershed. The land use within the work area will change from primarily woods, brush, and grass to residential that includes approximately .5 acres of lawn within the development. Based on the magnitude of the



development within the watershed and the difference in land use for the residential development, the impact to the peak stormwater runoff rates will be negligible. In our opinion the proposed development will have no negative impact on the peak flow rates to the existing wetlands or existing land beyond the downstream boundary.

#### Method:

The site hydraulic analysis was performed using the SCS TR-55 method utilizing the Hydraflow Hydrographs Extension for AutoCAD. Water quality volume and groundwater recharge volume calculations were performed as outlined in the 2024 Connecticut Stormwater Quality Manual (Section 7.4.1 and Section 7.5.1 respectively).

Runoff curve numbers for the existing conditions and post development conditions were compiled from Table 2-2 of TR-55 due to the minimal changes within the watershed the composite curve numbers remained the same for both pre and post construction.

#### **Stormwater Quality**

To meet the Connecticut DEEP stormwater discharge water quality requirements low impact development measures have been designed for the site in accordance with the 2024 Connecticut Stormwater Quality Manual to treat the proposed run-off.

Stormwater run-off from each area of development will run to a water quality basin or underground chambers designed to treat water quality volumes as shown on the subdivision plans. Water quality volumes are shown on the detail sheet of the subdivision plans.

#### **Culverts/Swales Sizing**

Culvert and swale sizing information has been added to the end of this report.

#### CLA Engineers, Inc.



Robert A. DeLuca, P.E.



Civil · Structural · Survey

# Hydrograph Return Period Recap Hydrafiow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

Hyd.	Hydrograph	Inflow	Peak Outflow (cfs)					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		3.955	10.87		30.69	53.72	91.80	123.39	159.71	Existing Watershed #1
2	SCS Runoff		7.047	18.07		47.71	81.68	138.27	186.07	241.25	Existing watershed #2
3	SCS Runoff		3.955	10.87		30.69	53.72	91.80	123.39	159.71	Proposed Watershed #1
4	SCS Runoff		7.047	18.07		47.71	81.68	138.27	186.07	241.25	Proposed Watershed #2
6	SCS Runoff		0.259	0.375		0.582	0.764	1.021	1.217	1.428	Common Drive North Side Swale
7	SCS Runoff		0.006	0.024		0.112	0.251	0.522	0.760	1.053	Common Drive South Side Swale
8	SCS Runoff		0.007	0.032		0.172	0.433	0.981	1.495	2.111	To WQV Basin 2
9	Reservoir	8	0.000	0.000		0.000	0.045	0.318	0.792	1.484	WQV2 OUTFLOW
11	SCS Runoff		2.997	4.547		7.356	9.875	13.46	16.24	19.24	To Future Crossing
12	Combine	9, 11	2.997	4.547		7.356	9.875	13.46	16.24	19.24	Combined to Future Crossing
14	Reservoir	12	1.021	3.464		7.162	9.327	12.92	15.70	18.70	WQB1
Pro	j. file: 7885 H	lydrograph	ns.gpw	_	_	_	_	_	Tu	esday, 0	5 / 6 / 2025

# Hydrograph Summary Report Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	3.955	6	792	75,908				Existing Watershed #1
2	SCS Runoff	7.047	6	828	152,683				Existing watershed #2
3	SCS Runoff	3.955	6	792	75,908				Proposed Watershed #1
4	SCS Runoff	7.047	6	828	152,683				Proposed Watershed #2
6	SCS Runoff	0.259	6	732	1,154				Common Drive North Side Swale
7	SCS Runoff	0.006	6	888	186				Common Drive South Side Swale
8	SCS Runoff	0.007	6	1032	250				To WQV Basin 2
9	Reservoir	0.000	6	1260	0	8	185.31	93.5	WQV2 OUTFLOW
11	SCS Runoff	2.997	6	732	13,935				To Future Crossing
12	Combine	2.997	6	732	13,935	9, 11			Combined to Future Crossing
14	Reservoir	1.021	6	756	5,100	12	129.05	4,525	WQB1
788	5 Hydrograph	is.gpw			Return P	eriod: 1 Ye	ar	Tuesday, 0	5 / 6 / 2025

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

### Hyd. No. 1

Existing Watershed #1

Hydrograph type	= SCS Runoff	Peak discharge	= 3.955 cfs
Storm frequency	= 1 yrs	Time to peak	= 792 min
Time interval	= 6 min	Hyd. volume	= 75,908 cuft
Drainage area	= 129.000 ac	Curve number	= 55*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 46.90 min
Total precip.	= 2.89 in	Distribution	= Custom
Storm duration	= M:\NOAA Type D Dis	tribution. Is ape factor	= 484

\* Composite (Area/CN) = [(129.000 x 55)] / 129.000



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Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

## Hyd. No. 1

Existing Watershed #1

<b>Description</b>	<u>A</u>		<u>B</u>		<u>C</u>		<u>Totals</u>
Sheet Flow Manning's n-value Flow length (ft) Two-year 24-hr precip. (in) Land slope (%)	= 0.800 = 150.0 = 3.37 = 4.00		0.011 0.0 0.00 0.00	_	0.011 0.0 0.00 0.00		
Travel Time (min)	= 38.19	+	0.00	+	0.00	=	38.19
Shallow Concentrated Flow Flow length (ft) Watercourse slope (%) Surface description Average velocity (ft/s)	= 670.00 = 4.20 = Unpaved =3.31		880.00 7.00 Unpave 4.27	d	0.00 0.00 Paved 0.00		
Travel Time (min)	= 3.38	+	3.44	+	0.00	=	6.81
<b>Channel Flow</b> X sectional flow area (sqft) Wetted perimeter (ft) Channel slope (%) Manning's n-value Velocity (ft/s)	= 16.00 = 8.00 = 7.40 = 0.050 =12.90		0.00 0.00 0.00 0.015 0.00		0.00 0.00 0.00 0.015 0.00		
Flow length (ft)	({0})1430.0		0.0		0.0		
Travel Time (min)	= 1.85	+	0.00	+	0.00	=	1.85
Total Travel Time, Tc							46.90 min

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

### Hyd. No. 1

Existing Watershed #1

Storm Frequency	= 1 yrs	Time interval	= 6 min
Total precip.	= 2.8900 in	Distribution	= Custom
Storm duration	= M:\NOAA Type D Distrib	oution.cds	



Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

### Hyd. No. 2

Existing watershed #2

Hydrograph type	= SCS Runoff	Peak discharge	= 7.047 cfs
Storm frequency	= 1 yrs	Time to peak	= 828 min
Time interval	= 6 min	Hyd. volume	= 152,683 cuft
Drainage area	= 257.000 ac	Curve number	= 55
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 76.40 min
Total precip.	= 2.89 in	Distribution	= Custom
Storm duration	= M:\NOAA Type D Dis	tribution. Stape factor	= 484



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Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

## Hyd. No. 2

Existing watershed #2

<b>Description</b>	A		<u>B</u>		<u>C</u>		<u>Totals</u>
<b>Sheet Flow</b> Manning's n-value Flow length (ft) Two-year 24-hr precip. (in) Land slope (%)	= 0.800 = 150.0 = 3.37 = 5.30		0.011 0.0 0.00 0.00		0.011 0.0 0.00 0.00		
Travel Time (min)	= 34.12	+	0.00	+	0.00	=	34.12
Shallow Concentrated Flow Flow length (ft) Watercourse slope (%) Surface description Average velocity (ft/s)	= 1040.00 = 4.20 = Unpave =3.31	d	1200.00 12.70 Unpave 5.75	) d	3250.00 1.00 Unpave 1.61	0 ed	
Travel Time (min)	= 5.24	+	3.48	+	33.57	=	42.29
<b>Channel Flow</b> X sectional flow area (sqft) Wetted perimeter (ft) Channel slope (%) Manning's n-value Velocity (ft/s)	= 0.00 = 0.00 = 0.00 = 0.015 =0.00		0.00 0.00 0.00 0.015 0.00		0.00 0.00 0.00 0.015 0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	= 0.00	+	0.00	+	0.00	=	0.00
Total Travel Time, Tc							76.40 min

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

### Hyd. No. 2

Existing watershed #2

Storm Frequency	= 1 yrs	Time interval	= 6 min
Total precip.	= 2.8900 in	Distribution	= Custom
Storm duration	= M:\NOAA Type D Distrib	oution.cds	



Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

### Hyd. No. 3

Proposed Watershed #1

Hydrograph type	= SCS Runoff	Peak discharge	= 3.955 cfs
Storm frequency	= 1 yrs	Time to peak	= 792 min
Time interval	= 6 min	Hyd. volume	= 75,908 cuft
Drainage area	= 129.000 ac	Curve number	= 55*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 46.90 min
Total precip.	= 2.89 in	Distribution	= Custom
Storm duration	= M:\NOAA Type D Dis	tribution. Is ape factor	= 484

\* Composite (Area/CN) = [(1.000 x 98) + (2.400 x 61) + (125.600 x 55)] / 129.000



Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

### Hyd. No. 3

Proposed Watershed #1

Storm Frequency	= 1 yrs	Time interval	= 6 min
Total precip.	= 2.8900 in	Distribution	= Custom
Storm duration	= M:\NOAA Type D Distrib	ution.cds	



Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

### Hyd. No. 4

Proposed Watershed #2

Hydrograph type	= SCS Runoff	Peak discharge	= 7.047 cfs
Storm frequency	= 1 yrs	Time to peak	= 828 min
Time interval	= 6 min	Hyd. volume	= 152,683 cuft
Drainage area	= 257.000 ac	Curve number	= 55*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 76.40 min
Total precip.	= 2.89 in	Distribution	= Custom
Storm duration	= M:\NOAA Type D Dis	stribution. <b>3 is</b> ape factor	= 484

\* Composite (Area/CN) = [(0.850 x 61) + (1.000 x 98) + (255.150 x 55)] / 257.000



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## Hyd. No. 4

Proposed Watershed #2

<u>Description</u>	A		<u>B</u>		<u>C</u>		<u>Totals</u>
<b>Sheet Flow</b> Manning's n-value Flow length (ft) Two-year 24-hr precip. (in) Land slope (%)	$\begin{array}{l} = \ 0.000 \\ = \ 0.0 \\ = \ 0.00 \\ = \ 0.00 \end{array}$		0.000 0.0 0.00 0.00		0.000 0.0 0.00 0.00		
Travel Time (min)	= 0.00	+	0.00	+	0.00	=	0.00
Shallow Concentrated Flow Flow length (ft) Watercourse slope (%) Surface description Average velocity (ft/s)	= 0.00 = 0.00 = =0.00		0.00 0.00 0.00		0.00 0.00 0.00		
Travel Time (min)	= 0.00	+	0.00	+	0.00	=	0.00
<b>Channel Flow</b> X sectional flow area (sqft) Wetted perimeter (ft) Channel slope (%) Manning's n-value Velocity (ft/s)	$= 0.00 \\= 0.00 \\= 0.00 \\= 0.000 \\= 0.000$		0.00 0.00 0.00 0.000 0.000		0.00 0.00 0.00 0.000 0.000		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	= 0.00	+	0.00	+	0.00	=	0.00
Total Travel Time, Tc							76.40 min

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

### Hyd. No. 4

Proposed Watershed #2

Storm Frequency	= 1 yrs	Time interval	= 6 min
Total precip.	= 2.8900 in	Distribution	= Custom
Storm duration	= M:\NOAA Type D Distrib	oution.cds	



Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

### Hyd. No. 6

Common Drive North Side Swale

Hydrograph type	= SCS Runoff	Peak discharge	= 0.259 cfs
Storm frequency	= 1 yrs	Time to peak	= 732 min
Time interval	= 6 min	Hyd. volume	= 1,154 cuft
Drainage area	= 0.360 ac	Curve number	= 76*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 17.80 min
Total precip.	= 2.89 in	Distribution	= Custom
Storm duration	= M:\NOAA Type D Distribution	.collsape factor	= 484

\* Composite (Area/CN) = [(0.180 x 98) + (0.180 x 54)] / 0.360



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Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

## Hyd. No. 6

Common Drive North Side Swale

<b>Description</b>	Δ		<u>B</u>		<u>C</u>		<u>Totals</u>
Sheet Flow Manning's n-value Flow length (ft) Two-year 24-hr precip. (in) Land slope (%) Travel Time (min)	= 0.410 = 100.0 = 3.37 = 4.00 = <b>16.17</b>	+	0.011 0.0 0.00 0.00 <b>0.00</b>	+	0.011 0.0 0.00 0.00 <b>0.00</b>	=	16.17
Shallow Concentrated Flow Flow length (ft) Watercourse slope (%) Surface description Average velocity (ft/s)	= 350.00 = 8.40 = Unpaved =4.68	d	0.00 0.00 Unpave 0.00	ed	0.00 0.00 Paved 0.00		
Travel Time (min)	= 1.25	+	0.00	+	0.00	=	1.25
<b>Channel Flow</b> X sectional flow area (sqft) Wetted perimeter (ft) Channel slope (%) Manning's n-value Velocity (ft/s)	= 6.00 = 5.23 = 8.40 = 0.040 =11.84		0.00 0.00 0.00 0.015 0.00		0.00 0.00 0.00 0.015 0.00		
Flow length (ft)	({0})290.0		0.0		0.0		
Travel Time (min)	= 0.41	+	0.00	+	0.00	=	0.41
Total Travel Time, Tc							17.80 min

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### Hyd. No. 6

Common Drive North Side Swale

Storm Frequency	= 1 yrs	Time interval	= 6 min
Total precip.	= 2.8900 in	Distribution	= Custom
Storm duration	= M:\NOAA Type D	Distribution.cds	



Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

### Hyd. No. 7

**Common Drive South Side Swale** 

Hydrograph type	= SCS Runoff	Peak discharge	= 0.006 cfs
Storm frequency	= 1 yrs	Time to peak	= 888 min
Time interval	= 6 min	Hyd. volume	= 186 cuft
Drainage area	= 0.880 ac	Curve number	= 49*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 21.90 min
Total precip.	= 2.89 in	Distribution	= Custom
Storm duration	= M:\NOAA Type D Dis	tribution.c <b>3ls</b> ape factor	= 484

\* Composite (Area/CN) = [(0.170 x 98) + (0.123 x 54) + (0.590 x 34)] / 0.880



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Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

## Hyd. No. 7

Common Drive South Side Swale

<b>Description</b>	Δ		<u>B</u>		<u>C</u>		<u>Totals</u>
Sheet Flow Manning's n-value Flow length (ft) Two-year 24-hr precip. (in) Land slope (%) Travel Time (min)	= 0.410 = 150.0 = 3.37 = 5.00 = <b>20.46</b>	+	0.011 0.0 0.00 0.00 <b>0.00</b>	+	0.011 0.0 0.00 0.00 <b>0.00</b>	=	20.46
Shallow Concentrated Flow Flow length (ft) Watercourse slope (%) Surface description Average velocity (ft/s)	= 315.00 = 9.20 = Unpaved =4.89	d	0.00 0.00 Unpave 0.00	ed	0.00 0.00 Paved 0.00		
Travel Time (min)	= 1.07	+	0.00	+	0.00	=	1.07
<b>Channel Flow</b> X sectional flow area (sqft) Wetted perimeter (ft) Channel slope (%) Manning's n-value Velocity (ft/s)	= 6.00 = 5.23 = 9.40 = 0.040 =12.52		0.00 0.00 0.00 0.015 0.00		0.00 0.00 0.00 0.015 0.00		
Flow length (ft)	({0})275.0		0.0		0.0		
Travel Time (min)	= 0.37	+	0.00	+	0.00	=	0.37
Total Travel Time, Tc							21.90 min

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### Hyd. No. 7

Common Drive South Side Swale

Storm Frequency	= 1 yrs	Time interval	= 6 min
Total precip.	= 2.8900 in	Distribution	= Custom
Storm duration	= M:\NOAA Type D Distrib	oution.cds	



Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

### Hyd. No. 8

To WQV Basin 2

Hydrograph type	= SCS Runoff	Peak discharge	= 0.007 cfs
Storm frequency	= 1 yrs	Time to peak	= 1032 min
Time interval	= 6 min	Hyd. volume	= 250 cuft
Drainage area	= 2.040 ac	Curve number	= 47*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 21.70 min
Total precip.	= 2.89 in	Distribution	= Custom
Storm duration	= M:\NOAA Type D Dis	tribution.colsape factor	= 484

\* Composite (Area/CN) = [(0.240 x 98) + (0.530 x 54) + (1.270 x 34)] / 2.040



Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

## Hyd. No. 8

To WQV Basin 2

<u>Description</u>	<u>A</u>		<u>B</u>		<u>C</u>		<u>Totals</u>
Sheet Flow Manning's n-value Flow length (ft) Two-year 24-hr precip. (in) Land slope (%)	= 0.410 = 150.0 = 3.37 = 5.30 = <b>19.99</b>	+	0.011 0.0 0.00 0.00 <b>0.00</b>	+	0.011 0.0 0.00 0.00 <b>0.00</b>	=	19.99
Shallow Concentrated Flow Flow length (ft) Watercourse slope (%) Surface description Average velocity (ft/s)	= 310.00 = 3.40 = Unpaved =2.98	d	0.00 0.00 Unpave 0.00	ed	0.00 0.00 Paved 0.00		
Travel Time (min)	= 1.74	+	0.00	+	0.00	=	1.74
<b>Channel Flow</b> X sectional flow area (sqft) Wetted perimeter (ft) Channel slope (%) Manning's n-value Velocity (ft/s)	= 0.00 = 0.00 = 0.00 = 0.040 =0.00		0.00 0.00 0.00 0.015 0.00		0.00 0.00 0.00 0.015 0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	= 0.00	+	0.00	+	0.00	=	0.00
Total Travel Time, Tc							21.70 min

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

### Hyd. No. 8

To WQV Basin 2

Storm Frequency	= 1 yrs	Time interval	= 6 min
Total precip.	= 2.8900 in	Distribution	= Custom
Storm duration	= M:\NOAA Type D Distrik	oution.cds	



Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

### Hyd. No. 9

WQV2 OUTFLOW

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= 1260 min
Time interval	= 6 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 8 - To WQV Basin 2	Max. Elevation	= 185.31 ft
Reservoir name	= wqv2	Max. Storage	= 93 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Tuesday, 05 / 6 / 2025

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## **Pond Report**

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

#### Pond No. 1 - wqv2

#### Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 185.00 ft

#### Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	185.00	00	0	0
1.00	186.00	900	300	300
2.00	187.00	1,260	1,075	1,375
2.50	187.50	1,420	670	2,044
3.00	188.00	1,680	774	2,818
4.00	189.00	2,160	1,915	4,733

#### Culvert / Orifice Structures

#### Weir Structures

	[A]	[B]	[C]	[PrfRsr]		[A]	[B]	[C]	[D]
Rise (in)	= 15.00	Inactive	Inactive	Inactive	Crest Len (ft)	Inactive	Inactive	Inactive	Inactive
Span (in)	= 15.00	0.00	0.00	0.00	Crest El. (ft)	= 187.50	0.00	0.00	0.00
No. Barrels	= 1	0	0	0	Weir Coeff.	= 3.33	3.33	3.33	3.33
Invert El. (ft)	= 187.50	0.00	0.00	0.00	Weir Type	= 1			
Length (ft)	= 200.00	0.00	0.00	0.00	Multi-Stage	= Yes	No	No	No
Slope (%)	= 1.20	0.00	0.00	n/a					
N-Value	= .012	.013	.013	n/a					
Orifice Coeff.	= 0.60	0.60	0.60	0.60	Exfil.(in/hr)	= 1.000 (by	Contour)		
Multi-Stage	= n/a	No	No	No	TW Elev. (ft)	= 0.00			

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s). Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	185.00	0.00				0.00				0.000		0.000
0.10	30	185.10	0.00				0.00				0.002		0.002
0.20	60	185.20	0.00				0.00				0.004		0.004
0.30	90	185.30	0.00				0.00				0.006		0.006
0.40	120	185.40	0.00				0.00				0.008		0.008
0.50	150	185.50	0.00				0.00				0.010		0.010
0.60	180	185.60	0.00				0.00				0.012		0.012
0.70	210	185.70	0.00				0.00				0.015		0.015
0.80	240	185.80	0.00				0.00				0.017		0.017
0.90	270	185.90	0.00				0.00				0.019		0.019
1.00	300	186.00	0.00				0.00				0.021		0.021
1.10	407	186.10	0.00				0.00				0.022		0.022
1.20	515	186.20	0.00				0.00				0.022		0.022
1.30	622	186.30	0.00				0.00				0.023		0.023
1.40	730	186.40	0.00				0.00				0.024		0.024
1.50	837	186.50	0.00				0.00				0.025		0.025
1.60	945	186.60	0.00				0.00				0.026		0.026
1.70	1,052	186.70	0.00				0.00				0.027		0.027
1.80	1,160	186.80	0.00				0.00				0.027		0.027
1.90	1,267	186.90	0.00				0.00				0.028		0.028
2.00	1,375	187.00	0.00				0.00				0.029		0.029
2.05	1,442	187.05	0.00				0.00				0.030		0.030
2.10	1,509	187.10	0.00				0.00				0.030		0.030
2.15	1,576	187.15	0.00				0.00				0.030		0.030
2.20	1,643	187.20	0.00				0.00				0.031		0.031
2.25	1,710	187.25	0.00				0.00				0.031		0.031
2.30	1,777	187.30	0.00				0.00				0.031		0.031
2.35	1,844	187.35	0.00				0.00				0.032		0.032
2.40	1,910	187.40	0.00				0.00				0.032		0.032
2.45	1,977	187.45	0.00				0.00				0.032		0.032
2.50	2,044	187.50	0.00				0.00				0.033		0.033
2.55	2,122	187.55	0.01 ic				0.00				0.033		0.046
2.60	2,199	187.60	0.05 ic				0.00				0.034		0.084
2.65	2,277	187.65	0.11 ic				0.00				0.035		0.145
2.70	2,354	187.70	0.19 ic				0.00				0.035		0.228
2.75	2,431	187.75	0.30 ic				0.00				0.036		0.334
2.80	2,509	187.80	0.42 ic				0.00				0.036		0.459

Continues on next page ...

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wqv2			
Stage /	Storage /	Discharge	Table
olugo /	otorago,	Bioonargo	1 4010

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
2.85	2,586	187.85	0.57 ic				0.00				0.037		0.604
2.90	2,664	187.90	0.73 ic				0.00				0.038		0.768
2.95	2,741	187.95	0.91 ic				0.00				0.038		0.948
3.00	2,818	188.00	1.10 ic				0.00				0.039		1.143
3.10	3,010	188.10	1.54 ic				0.00				0.040		1.577
3.20	3,201	188.20	2.02 ic				0.00				0.041		2.057
3.30	3,393	188.30	2.53 ic				0.00				0.042		2.569
3.40	3,584	188.40	3.06 ic				0.00				0.043		3.102
3.50	3,776	188.50	3.58 ic				0.00				0.044		3.629
3.60	3,967	188.60	4.09 ic				0.00				0.046		4.131
3.70	4,159	188.70	4.52 ic				0.00				0.047		4.563
3.80	4,350	188.80	4.85 ic				0.00				0.048		4.902
3.90	4,542	188.90	5.20 ic				0.00				0.049		5.250
4.00	4,733	189.00	5.53 ic				0.00				0.050		5.577

...End

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

### Hyd. No. 11

**To Future Crossing** 

Hydrograph type	= SCS Runoff	Peak discharge	= 2.997 cfs
Storm frequency	= 1 yrs	Time to peak	= 732 min
Time interval	= 6 min	Hyd. volume	= 13,935 cuft
Drainage area	= 5.180 ac	Curve number	= 73*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 13.90 min
Total precip.	= 2.89 in	Distribution	= Custom
Storm duration	= M:\NOAA Type D Distribution	ഷ്ഷ്യമാല factor	= 484

\* Composite (Area/CN) = [(3.000 x 98) + (0.550 x 56) + (1.630 x 34)] / 5.180



Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

## Hyd. No. 11

To Future Crossing

<u>Description</u>	<u>A</u>	<u>B</u>		<u>C</u>		<u>Totals</u>
Sheet Flow Manning's n-value Flow length (ft) Two-year 24-hr precip. (in) Land slope (%) Travel Time (min)	= 0.240 = 75.0 = 3.45 = 4.00 = <b>8.27</b>	0.240 75.0 3.45 15.00 + <b>4.88</b>	+	0.011 0.0 0.00 0.00 <b>0.00</b>	=	13.15
Shallow Concentrated Flow Flow length (ft) Watercourse slope (%) Surface description Average velocity (ft/s)	= 130.00 = 18.00 = Unpaved =6.85	0.00 0.00 Paved 0.00		0.00 0.00 Paved 0.00		
Travel Time (min)	= 0.32	+ 0.00	+	0.00	=	0.32
<b>Channel Flow</b> X sectional flow area (sqft) Wetted perimeter (ft) Channel slope (%) Manning's n-value Velocity (ft/s)	= 6.00 = 9.00 = 1.50 = 0.015 =9.27	0.00 0.00 0.00 0.015 0.00		0.00 0.00 0.00 0.015 0.00		
Flow length (ft)	({0})265.0	0.0		0.0		
Travel Time (min)	= 0.48	+ 0.00	+	0.00	=	0.48
Total Travel Time, Tc						13.90 min

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

### Hyd. No. 11

**To Future Crossing** 

Storm Frequency	= 1 yrs	Time interval	= 6 min
Total precip.	= 2.8900 in	Distribution	= Custom
Storm duration	= M:\NOAA Type D Distril	bution.cds	



Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

### Hyd. No. 12

Combined to Future Crossing

Hydrograph type Storm frequency	= Combine = 1 yrs	Peak discharge Time to peak	= 2.997 cfs = 732 min
Time interval	= 6 min	Hyd. volume	= 13,935 cuft
Inflow hyds.	= 9, 11	Contrib. drain. area	= 5.180 ac



Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

### Hyd. No. 14

Hydrograph type	= Reservoir	Peak discharge	= 1.021 cfs
Storm frequency	= 1 yrs	Time to peak	= 756 min
Time interval	= 6 min	Hyd. volume	= 5,100 cuft
Inflow hyd. No.	= 12 - Combined to Future Cros	shintagix. Elevation	= 129.05 ft
Reservoir name	= WQB1	Max. Storage	= 4,525 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



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## **Pond Report**

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

#### Pond No. 2 - WQB1

#### Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 127.50 ft

#### Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	127.50	00	0	0
0.50	128.00	3,120	520	520
1.50	129.00	4,460	3,770	4,290
2.50	130.00	5,000	4,727	9,017

#### **Culvert / Orifice Structures**

#### Weir Structures

	[A]	[B]	[C]	[PrfRsr]		[A]	[B]	[C]	[D]
Rise (in)	= 0.00	0.00	0.00	0.00	Crest Len (ft)	= 25.00	0.00	0.00	0.00
Span (in)	= 0.00	0.00	0.00	0.00	Crest El. (ft)	= 129.00	0.00	0.00	0.00
No. Barrels	= 0	0	0	0	Weir Coeff.	= 2.60	3.33	3.33	3.33
Invert El. (ft)	= 0.00	0.00	0.00	0.00	Weir Type	= Broad			
Length (ft)	= 0.00	0.00	0.00	0.00	Multi-Stage	= No	No	No	No
Slope (%)	= 0.00	0.00	0.00	n/a					
N-Value	= .013	.013	.013	n/a					
Orifice Coeff.	= 0.60	0.60	0.60	0.60	Exfil.(in/hr)	= 1.000 (by	Contour)		
Multi-Stage	= n/a	No	No	No	TW Elev. (ft)	= 0.00			

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s). Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	127.50					0.00				0.000		0.000
0.05	52	127.55					0.00				0.007		0.007
0.10	104	127.60					0.00				0.014		0.014
0.15	156	127.65					0.00				0.022		0.022
0.20	208	127.70					0.00				0.029		0.029
0.25	260	127.75					0.00				0.036		0.036
0.30	312	127.80					0.00				0.043		0.043
0.35	364	127.85					0.00				0.051		0.051
0.40	416	127.90					0.00				0.058		0.058
0.45	468	127.95					0.00				0.065		0.065
0.50	520	128.00					0.00				0.072		0.072
0.60	897	128.10					0.00				0.075		0.075
0.70	1,274	128.20					0.00				0.078		0.078
0.80	1,651	128.30					0.00				0.082		0.082
0.90	2,028	128.40					0.00				0.085		0.085
1.00	2,405	128.50					0.00				0.088		0.088
1.10	2,782	128.60					0.00				0.091		0.091
1.20	3,159	128.70					0.00				0.094		0.094
1.30	3,536	128.80					0.00				0.097		0.097
1.40	3,913	128.90					0.00				0.100		0.100
1.50	4,290	129.00					0.00				0.103		0.103
1.60	4,762	129.10					2.06				0.104		2.160
1.70	5,235	129.20					5.81				0.106		5.920
1.80	5,708	129.30					10.68				0.107		10.79
1.90	6,180	129.40					16.45				0.108		16.55
2.00	6,653	129.50					22.98				0.109		23.09
2.10	7,126	129.60					30.21				0.111		30.32
2.20	7,599	129.70					38.07				0.112		38.18
2.30	8,071	129.80					46.51				0.113		46.63
2.40	8,544	129.90					55.50				0.114		55.62
2.50	9,017	130.00					65.00				0.116		65.12

# Hydrograph Summary Report Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	30.69	6	762	312,529				Existing Watershed #1
2	SCS Runoff	47.71	6	792	628,622				Existing watershed #2
3	SCS Runoff	30.69	6	762	312,529				Proposed Watershed #1
4	SCS Runoff	47.71	6	792	628,622				Proposed Watershed #2
6	SCS Runoff	0.582	6	732	2,483				Common Drive North Side Swale
7	SCS Runoff	0.112	6	756	1,317				Common Drive South Side Swale
8	SCS Runoff	0.172	6	762	2,455				To WQV Basin 2
9	Reservoir	0.000	6	2220	0	8	186.95	1,319	WQV2 OUTFLOW
11	SCS Runoff	7.356	6	732	31,699				To Future Crossing
12	Combine	7.356	6	732	31,699	9, 11			Combined to Future Crossing
14	Reservoir	7.162	6	732	22,476	12	129.23	5,366	WQB1
7885 Hydrographs.gpw				Return Period: 5 Year			Tuesday, 0	Tuesday, 05 / 6 / 2025	

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

### Hyd. No. 1

Existing Watershed #1

Hydrograph type	= SCS Runoff	Peak discharge	= 30.69 cfs
Storm frequency	= 5 yrs	Time to peak	= 762 min
Time interval	= 6 min	Hyd. volume	= 312,529 cuft
Drainage area	= 129.000 ac	Curve number	= 55*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 46.90 min
Total precip.	= 4.37 in	Distribution	= Custom
Storm duration	= M:\NOAA Type D Distribution	<b>ഷിട</b> ape factor	= 484

\* Composite (Area/CN) = [(129.000 x 55)] / 129.000



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Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

### Hyd. No. 1

Existing Watershed #1

Storm Frequency	= 5 yrs	Time interval	= 6 min
Total precip.	= 4.3700 in	Distribution	= Custom
Storm duration	= M:\NOAA Type D Distrib	oution.cds	


Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

#### Hyd. No. 2

Existing watershed #2

Hydrograph type	= SCS Runoff	Peak discharge	= 47.71 cfs
Storm frequency	= 5 yrs	Time to peak	= 792 min
Time interval	= 6 min	Hyd. volume	= 628,622 cuft
Drainage area	= 257.000 ac	Curve number	= 55
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 76.40 min
Total precip.	= 4.37 in	Distribution	= Custom
Storm duration	= M:\NOAA Type D Dis	tribution.colsape factor	= 484



Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

#### Hyd. No. 2

Existing watershed #2

Storm Frequency	= 5 yrs	Time interval	= 6 min
Total precip.	= 4.3700 in	Distribution	= Custom
Storm duration	= M:\NOAA Type D Distrib	ution.cds	



Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

### Hyd. No. 3

Proposed Watershed #1

Hydrograph type	= SCS Runoff	Peak discharge	= 30.69 cfs
Storm frequency	= 5 yrs	Time to peak	= 762 min
Time interval	= 6 min	Hyd. volume	= 312,529 cuft
Drainage area	= 129.000 ac	Curve number	= 55*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 46.90 min
Total precip.	= 4.37 in	Distribution	= Custom
Storm duration	= M:\NOAA Type D Dis	tribution.colsape factor	= 484

\* Composite (Area/CN) = [(1.000 x 98) + (2.400 x 61) + (125.600 x 55)] / 129.000



Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

#### Hyd. No. 3

Proposed Watershed #1

Storm Frequency	= 5 yrs	Time interval	= 6 min
Total precip.	= 4.3700 in	Distribution	= Custom
Storm duration	= M:\NOAA Type D Distrib	oution.cds	



Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

### Hyd. No. 4

Proposed Watershed #2

Hydrograph type	= SCS Runoff	Peak discharge	= 47.71 cfs
Storm frequency	= 5 yrs	Time to peak	= 792 min
Time interval	= 6 min	Hyd. volume	= 628,622 cuft
Drainage area	= 257.000 ac	Curve number	= 55*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 76.40 min
Total precip.	= 4.37 in	Distribution	= Custom
Storm duration	= M:\NOAA Type D Dis	tribution.colsape factor	= 484

\* Composite (Area/CN) = [(0.850 x 61) + (1.000 x 98) + (255.150 x 55)] / 257.000



Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

#### Hyd. No. 4

Proposed Watershed #2

Storm Frequency	= 5 yrs	Time interval	= 6 min
Total precip.	= 4.3700 in	Distribution	= Custom
Storm duration	= M:\NOAA Type D Distrib	oution.cds	



Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

#### Hyd. No. 6

Common Drive North Side Swale

Hydrograph type	= SCS Runoff	Peak discharge	= 0.582 cfs
Storm frequency	= 5 yrs	Time to peak	= 732 min
Time interval	= 6 min	Hyd. volume	= 2,483 cuft
Drainage area	= 0.360 ac	Curve number	= 76*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 17.80 min
Total precip.	= 4.37 in	Distribution	= Custom
Storm duration	= M:\NOAA Type D Distribution	. 🖾 sape factor	= 484

\* Composite (Area/CN) = [(0.180 x 98) + (0.180 x 54)] / 0.360



Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

#### Hyd. No. 6

Common Drive North Side Swale

Storm Frequency	= 5 yrs	Time interval	= 6 min
Total precip.	= 4.3700 in	Distribution	= Custom
Storm duration	= M:\NOAA Type D Distrib	ution.cds	



Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

#### Hyd. No. 7

Common Drive South Side Swale

Hydrograph type	= SCS Runoff	Peak discharge	= 0.112 cfs
Storm frequency	= 5 yrs	Time to peak	= 756 min
Time interval	= 6 min	Hyd. volume	= 1,317 cuft
Drainage area	= 0.880 ac	Curve number	= 49*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 21.90 min
Total precip.	= 4.37 in	Distribution	= Custom
Storm duration	= M:\NOAA Type D Distribution	n. <b>യിട</b> ape factor	= 484

\* Composite (Area/CN) = [(0.170 x 98) + (0.123 x 54) + (0.590 x 34)] / 0.880



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Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

#### Hyd. No. 7

Common Drive South Side Swale

Storm Frequency	= 5 yrs	Time interval	= 6 min
Total precip.	= 4.3700 in	Distribution	= Custom
Storm duration	= M:\NOAA Type D Distrib	oution.cds	



Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

#### Hyd. No. 8

To WQV Basin 2

Hydrograph type	= SCS Runoff	Peak discharge	= 0.172 cfs
Storm frequency	= 5 yrs	Time to peak	= 762 min
Time interval	= 6 min	Hyd. volume	= 2,455 cuft
Drainage area	= 2.040 ac	Curve number	= 47*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 21.70 min
Total precip.	= 4.37 in	Distribution	= Custom
Storm duration	= M:\NOAA Type D Dis	tribution.colsape factor	= 484

\* Composite (Area/CN) = [(0.240 x 98) + (0.530 x 54) + (1.270 x 34)] / 2.040



Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

#### Hyd. No. 8

To WQV Basin 2

Storm Frequency	= 5 yrs	Time interval	= 6 min
Total precip.	= 4.3700 in	Distribution	= Custom
Storm duration	= M:\NOAA Type D Distri	bution.cds	



Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

#### Hyd. No. 9

WQV2 OUTFLOW

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 5 yrs	Time to peak	= 2220 min
Time interval	= 6 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 8 - To WQV Basin 2	Max. Elevation	= 186.95 ft
Reservoir name	= wqv2	Max. Storage	= 1,319 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



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Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

#### Hyd. No. 11

**To Future Crossing** 

Hydrograph type	= SCS Runoff	Peak discharge	= 7.356 cfs
Storm frequency	= 5 yrs	Time to peak	= 732 min
Time interval	= 6 min	Hyd. volume	= 31,699 cuft
Drainage area	= 5.180 ac	Curve number	= 73*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 13.90 min
Total precip.	= 4.37 in	Distribution	= Custom
Storm duration	= M:\NOAA Type D Distribution.	ය <b>ා</b> sape factor	= 484

\* Composite (Area/CN) = [(3.000 x 98) + (0.550 x 56) + (1.630 x 34)] / 5.180



Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

#### Hyd. No. 11

**To Future Crossing** 

Storm Frequency	= 5 yrs	Time interval	= 6 min
Total precip.	= 4.3700 in	Distribution	= Custom
Storm duration	= M:\NOAA Type D Distrib	oution.cds	



Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

#### Hyd. No. 12

Combined to Future Crossing

Hydrograph type Storm frequency	= Combine = 5 vrs	Peak discharge Time to peak	= 7.356 cfs = 732 min
Time interval	= 6 min	Hyd. volume	= 31,699 cuft
Inflow hyds.	= 9, 11	Contrib. drain. area	= 5.180 ac



Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

#### Hyd. No. 14

Hydrograph type	= Reservoir	Peak discharge	= 7.162 cfs
Storm frequency	= 5 yrs	Time to peak	= 732 min
Time interval	= 6 min	Hyd. volume	= 22,476 cuft
Inflow hyd. No.	= 12 - Combined to Fi	uture Crosslingx. Elevation	= 129.23 ft
Reservoir name	= WQB1	Max. Storage	= 5,366 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



# Hydrograph Summary Report Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	53.72	6	756	479,613				Existing Watershed #1
2	SCS Runoff	81.68	6	786	964,695				Existing watershed #2
3	SCS Runoff	53.72	6	756	479,613				Proposed Watershed #1
4	SCS Runoff	81.68	6	786	964,695				Proposed Watershed #2
6	SCS Runoff	0.764	6	732	3,248				Common Drive North Side Swale
7	SCS Runoff	0.251	6	750	2,218				Common Drive South Side Swale
8	SCS Runoff	0.433	6	750	4,343				To WQV Basin 2
9	Reservoir	0.045	6	1014	828	8	187.59	2,188	WQV2 OUTFLOW
11	SCS Runoff	9.875	6	732	42,144				To Future Crossing
12	Combine	9.875	6	732	42,973	9, 11			Combined to Future Crossing
14	Reservoir	9.327	6	732	33,525	12	129.29	5,576	WQB1
788	5 Hydrograph	s.gpw			Return P	eriod: 10 Y	'ear	Tuesday, 0	5 / 6 / 2025

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### Hyd. No. 1

Existing Watershed #1

Hydrograph type	= SCS Runoff	Peak discharge	= 53.72 cfs
Storm frequency	= 10 yrs	Time to peak	= 756 min
Time interval	= 6 min	Hyd. volume	= 479,613 cuft
Drainage area	= 129.000 ac	Curve number	= 55*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 46.90 min
Total precip.	= 5.14 in	Distribution	= Custom
Storm duration	= M:\NOAA Type D Distribution	n.c <b>&amp;ls</b> ape factor	= 484

\* Composite (Area/CN) = [(129.000 x 55)] / 129.000



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#### Hyd. No. 1

Existing Watershed #1

Storm Frequency	= 1	l0 yrs	Time interval	= 6 min
Total precip.	= 5	5.1400 in	Distribution	= Custom
Storm duration	= N	/I:\NOAA Type D Distrib	ution.cds	



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#### Hyd. No. 2

Existing watershed #2

Hydrograph type	= SCS Runoff	Peak discharge	= 81.68 cfs
Storm frequency	= 10 yrs	Time to peak	= 786 min
Time interval	= 6 min	Hyd. volume	= 964,695 cuft
Drainage area	= 257.000 ac	Curve number	= 55
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 76.40 min
Total precip.	= 5.14 in	Distribution	= Custom
Storm duration	= M:\NOAA Type D Dis	stribution. <b>3 is</b> ape factor	= 484



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#### Hyd. No. 2

Existing watershed #2

Storm Frequency	= 10 yrs	Time interval	= 6 min
Total precip.	= 5.1400 in	Distribution	= Custom
Storm duration	= M:\NOAA Type D Distrib	oution.cds	



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### Hyd. No. 3

Proposed Watershed #1

Hydrograph type	= SCS Runoff	Peak discharge	= 53.72 cfs
Storm frequency	= 10 yrs	Time to peak	= 756 min
Time interval	= 6 min	Hyd. volume	= 479,613 cuft
Drainage area	= 129.000 ac	Curve number	= 55*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 46.90 min
Total precip.	= 5.14 in	Distribution	= Custom
Storm duration	= M:\NOAA Type D Dis	tribution.colsape factor	= 484

\* Composite (Area/CN) = [(1.000 x 98) + (2.400 x 61) + (125.600 x 55)] / 129.000



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#### Hyd. No. 3

Proposed Watershed #1

Storm Frequency	= 10 yrs	Time interval	= 6 min
Total precip.	= 5.1400 in	Distribution	= Custom
Storm duration	= M:\NOAA Type D Distrib	oution.cds	



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#### Hyd. No. 4

Proposed Watershed #2

Hydrograph type	= SCS Runoff	Peak discharge	= 81.68 cfs
Storm frequency	= 10 yrs	Time to peak	= 786 min
Time interval	= 6 min	Hyd. volume	= 964,695 cuft
Drainage area	= 257.000 ac	Curve number	= 55*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 76.40 min
Total precip.	= 5.14 in	Distribution	= Custom
Storm duration	= M:\NOAA Type D Dis	tribution. Construction and the sector	= 484

\* Composite (Area/CN) = [(0.850 x 61) + (1.000 x 98) + (255.150 x 55)] / 257.000



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#### Hyd. No. 4

Proposed Watershed #2

Storm Frequency	= 10 yrs	Time interval	= 6 min
Total precip.	= 5.1400 in	Distribution	= Custom
Storm duration	= M:\NOAA Type D Distrib	oution.cds	



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#### Hyd. No. 6

Common Drive North Side Swale

Hydrograph type	= SCS Runoff	Peak discharge	= 0.764 cfs
Storm frequency	= 10 yrs	Time to peak	= 732 min
Time interval	= 6 min	Hyd. volume	= 3,248 cuft
Drainage area	= 0.360 ac	Curve number	= 76*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 17.80 min
Total precip.	= 5.14 in	Distribution	= Custom
Storm duration	= M:\NOAA Type D Distribution	ഷ്ഷsape factor	= 484

\* Composite (Area/CN) = [(0.180 x 98) + (0.180 x 54)] / 0.360



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#### Hyd. No. 6

Common Drive North Side Swale

Storm Frequency	= 10 yrs	Time interval	= 6 min
Total precip.	= 5.1400 in	Distribution	= Custom
Storm duration	= M:\NOAA Type D Distrib	oution.cds	



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#### Hyd. No. 7

Common Drive South Side Swale

Hydrograph type	= SCS Runoff	Peak discharge	= 0.251 cfs
Storm frequency	= 10 yrs	Time to peak	= 750 min
Time interval	= 6 min	Hyd. volume	= 2,218 cuft
Drainage area	= 0.880 ac	Curve number	= 49*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 21.90 min
Total precip.	= 5.14 in	Distribution	= Custom
Storm duration	= M:\NOAA Type D Distribution	n.collsape factor	= 484

\* Composite (Area/CN) = [(0.170 x 98) + (0.123 x 54) + (0.590 x 34)] / 0.880



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#### Hyd. No. 7

Common Drive South Side Swale

Storm Frequency	= 10 yrs	Time interval	= 6 min
Total precip.	= 5.1400 in	Distribution	= Custom
Storm duration	= M:\NOAA Type D Distrib	oution.cds	



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#### Hyd. No. 8

To WQV Basin 2

Hydrograph type	= SCS Runoff	Peak discharge	= 0.433 cfs
Storm frequency	= 10 yrs	Time to peak	= 750 min
Time interval	= 6 min	Hyd. volume	= 4,343 cuft
Drainage area	= 2.040 ac	Curve number	= 47*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 21.70 min
Total precip.	= 5.14 in	Distribution	= Custom
Storm duration	= M:\NOAA Type D Distribution	ഷ്ണീമാല factor	= 484

\* Composite (Area/CN) = [(0.240 x 98) + (0.530 x 54) + (1.270 x 34)] / 2.040



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#### Hyd. No. 8

To WQV Basin 2

Storm Frequency	= 10 yrs	Time interval	= 6 min
Total precip.	= 5.1400 in	Distribution	= Custom
Storm duration	= M:\NOAA Type D Distrik	oution.cds	



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#### Hyd. No. 9

WQV2 OUTFLOW

Hydrograph type	= Reservoir	Peak discharge	= 0.045 cfs
Storm frequency	= 10 yrs	Time to peak	= 1014 min
Time interval	= 6 min	Hyd. volume	= 828 cuft
Inflow hyd. No.	= 8 - To WQV Basin 2	Max. Elevation	= 187.59 ft
Reservoir name	= wqv2	Max. Storage	= 2,188 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



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#### Hyd. No. 11

**To Future Crossing** 

Hydrograph type	= SCS Runoff	Peak discharge	= 9.875 cfs
Storm frequency	= 10 yrs	Time to peak	= 732 min
Time interval	= 6 min	Hyd. volume	= 42,144 cuft
Drainage area	= 5.180 ac	Curve number	= 73*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 13.90 min
Total precip.	= 5.14 in	Distribution	= Custom
Storm duration	= M:\NOAA Type D Distribution.	<b>ഷിട</b> ape factor	= 484

\* Composite (Area/CN) = [(3.000 x 98) + (0.550 x 56) + (1.630 x 34)] / 5.180



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#### Hyd. No. 11

**To Future Crossing** 

Storm Frequency	= 10	yrs	Time interval	= 6 min
Total precip.	= 5.1	400 in	Distribution	= Custom
Storm duration	= M:\	NOAA Type D Distrib	ution.cds	



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#### Hyd. No. 12

Combined to Future Crossing

Hydrograph type Storm frequency	= Combine = 10 yrs	Peak discharge Time to peak	= 9.875 cfs = 732 min
Time interval	= 6 min	Hyd. volume	= 42,973 cuft
Inflow hyds.	= 9, 11	Contrib. drain. area	= 5.180 ac



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## Hydrograph Report

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#### Hyd. No. 14

Hydrograph type	<ul> <li>Reservoir</li> <li>10 yrs</li> <li>6 min</li> </ul>	Peak discharge	= 9.327 cfs
Storm frequency		Time to peak	= 732 min
Time interval		Hyd. volume	= 33,525 cuft
Inflow hyd. No.	<ul><li>= 12 - Combined to Future Cros</li><li>= WQB1</li></ul>	stillingx. Elevation	= 129.29 ft
Reservoir name		Max. Storage	= 5,576 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



# Hydrograph Summary Report Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	91.80	6	756	743,326				Existing Watershed #1
2	SCS Runoff	138.27	6	780	1,495,130				Existing watershed #2
3	SCS Runoff	91.80	6	756	743,326				Proposed Watershed #1
4	SCS Runoff	138.27	6	780	1,495,130				Proposed Watershed #2
6	SCS Runoff	1.021	6	732	4,343				Common Drive North Side Swale
7	SCS Runoff	0.522	6	744	3,714				Common Drive South Side Swale
8	SCS Runoff	0.981	6	744	7,534				To WQV Basin 2
9	Reservoir	0.318	6	798	3,905	8	187.76	2,443	WQV2 OUTFLOW
11	SCS Runoff	13.46	6	732	57,237				To Future Crossing
12	Combine	13.46	6	732	61,142	9, 11			Combined to Future Crossing
14	Reservoir	12.92	6	732	51,389	12	129.36	5,891	WQB1
788	5 Hydrograph	s.gpw			Return P	eriod: 25 Y	ear	Tuesday, 0	5 / 6 / 2025

## Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

### Hyd. No. 1

Existing Watershed #1

Hydrograph type =	= SCS Runoff	Peak discharge	= 91.80 cfs
Storm frequency =	= 25 yrs	Time to peak	= 756 min
Time interval	= 6 min	Hyd. volume	= 743,326 cuft
Drainage area =	= 129.000 ac	Curve number	= 55*
Basin Slope =	= 0.0 %	Hydraulic length	= 0 ft
Tc method =	= TR55	Time of conc. (Tc)	= 46.90 min
Total precip.	= 6.19 in	Distribution	= Custom
Storm duration =	M:\NOAA Type D Distribution.	ය <b>ා</b> sape factor	= 484

\* Composite (Area/CN) = [(129.000 x 55)] / 129.000



Tuesday, 05 / 6 / 2025