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# MEMORANDUM

**TO:** Josh Pudelko

**FROM:** Jayme Sisel

**DATE:** September 23, 2019

**SUBJECT:** Skyline Subdivision Stormwater Management

The following is a summary of preliminary stormwater assumptions and calculations for the proposed Skyline Subdivision project.

Design Requirements:
Chapter 32 of the City of Waukesha's Code of Ordinance includes criteria for peak discharge, water quality, and infiltration practices.

- The Ordinance requires post-development peak discharge rates to be no greater than pre-development discharge rates for the 1, 2, 10 and 100-year, 24-hour design storms.
- The Ordinance requires best management practices (BMPs) to be designed to control total suspended solids (TSS) carried by runoff from redevelopment sites by 40 percent and from new development sites by 80 percent, based on an average annual rainfall, as compared to no runoff management controls.
- The Ordinance requires medium density residential developments to infiltrate sufficient runoff volume so that the post-development infiltration volume is at least 75 percent of pre-development infiltration volume, based on an average annual rainfall. However, no more than 2 percent of the post-construction site is required as an effective infiltration area.

Analysis Overview:
Peak runoff rates and volumes were computed using NRCS's TR-55 and TR-20 methodologies, as implemented by HydroCAD Version 10.00 software by HydroCAD Software Solutions.

Soil types for the site were determined from soil boring logs and from the NRCS Soil Survey for Waukesha County. Soils at the site are predominantly hydrologic soil group D soils. Maximum predevelopment runoff curve numbers (CN) were taken from Chapter 32 of Waukesha's City Ordinance.

Rainfall values were taken from Table 3 of Chapter 32 of Waukesha's City Ordinance. MSE3 rainfall distributions were used for peak flow calculations.

Existing Conditions:

The project site is approximately 80-acres in size and is occupied by a farmstead and two residential properties. The site is mostly cropland with some areas of woodlands and wetlands. Peak flow rates for existing conditions are as follows:

Q(1yr) = 60.68 cfs
Q(2yr) = 76.17 cfs
Q(10yr) = 137.92 cfs
Q(100yr) = 279.59 cfs

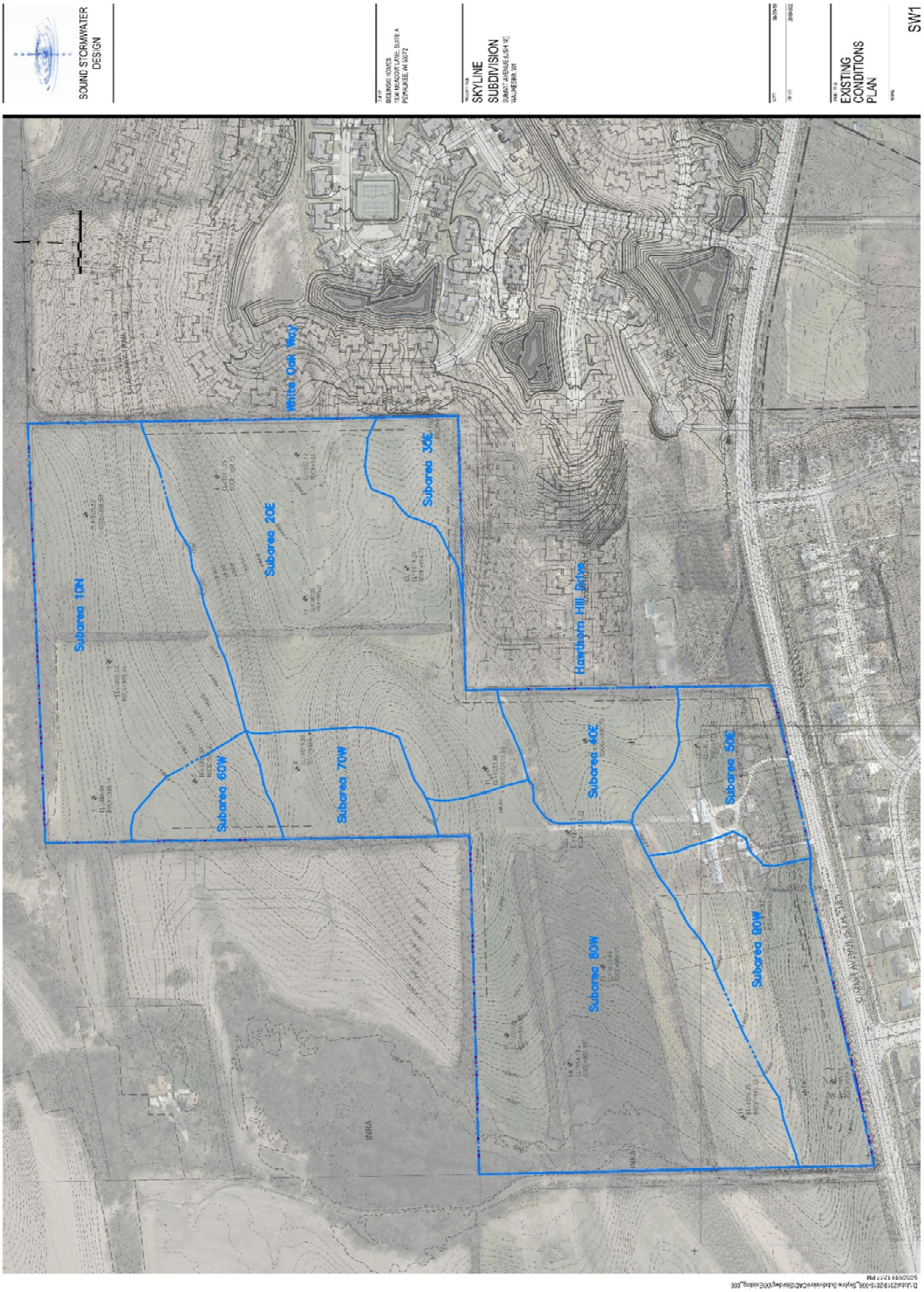



Figure 1 – Existing Conditions Plan

Proposed Conditions:
The proposed development includes the construction of a new residential subdivision including new roadways, a public park, stormwater management ponds and infiltration basins. The proposed plan will disturb approximately 75 acres and will result in a net increase in impervious area of approximately 23.6 acres. Development assumptions are as follows:

- 1/3-acre residential lots ~ assumed 30 percent impervious
- New road cross-section to match neighboring subdivision
  - 5-foot sidewalk, both sides
  - 5½-foot landscape, both sides
  - 39-foot road, curb to curb

Overall peak flow rates for proposed conditions are shown as follows:

Q(1yr) = 23.96 cfs
Q(2yr) = 31.43 cfs
Q(10yr) = 75.57 cfs
Q(100yr) = 207.45 cfs

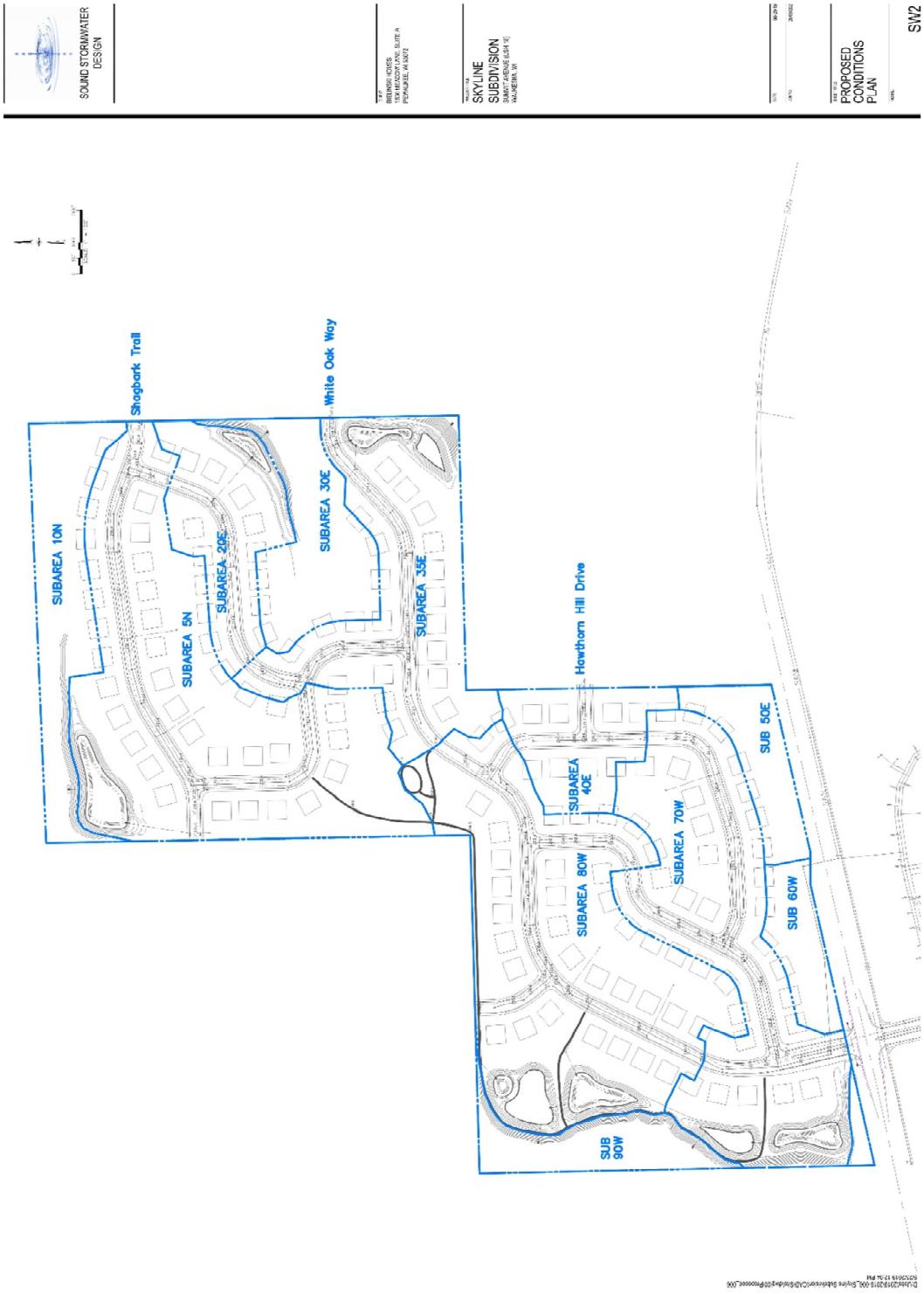



Figure 2 – Proposed Conditions Plan

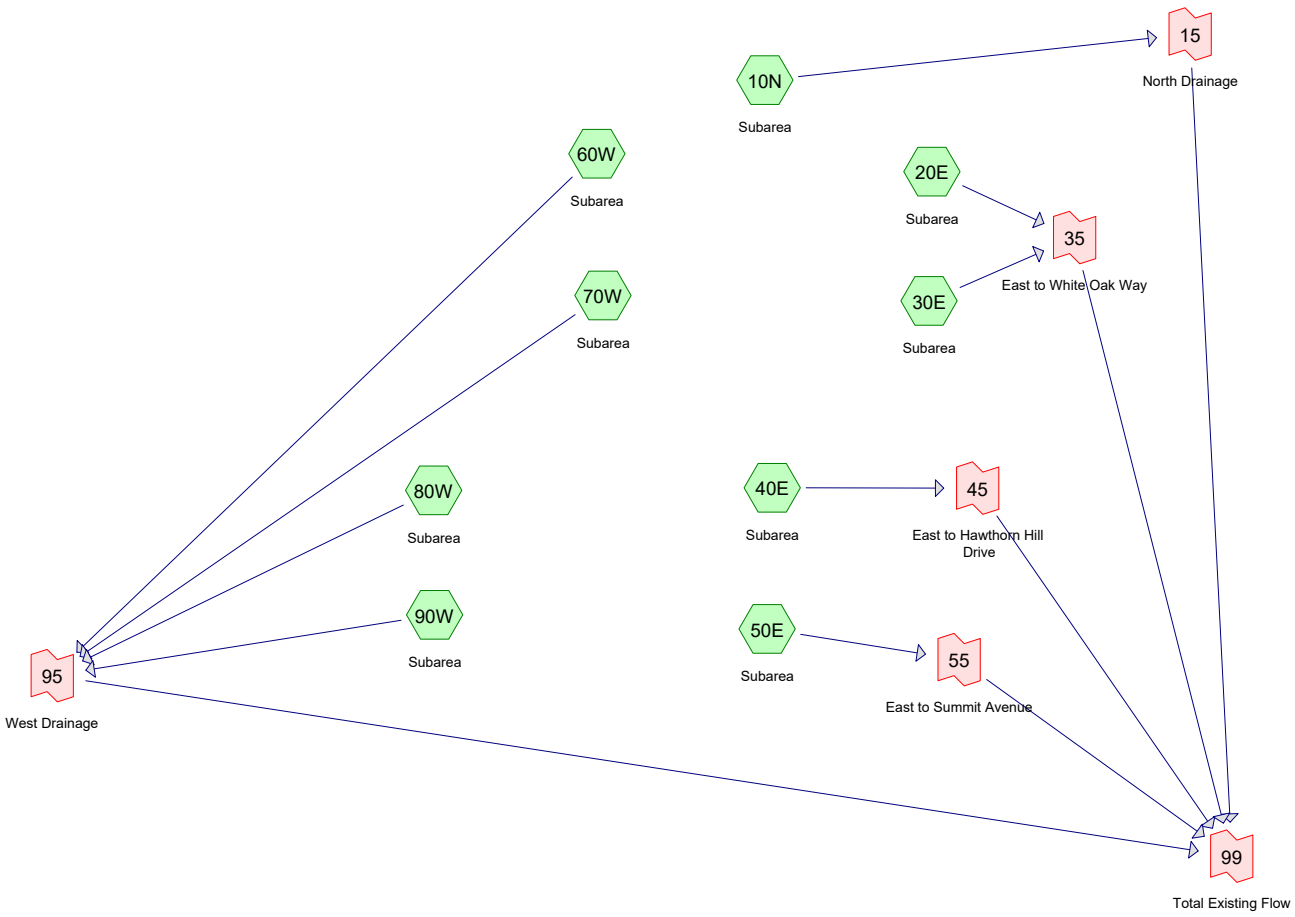
Stormwater Quality:
Stormwater quality will be accomplished by six stormwater management ponds and three infiltration basins. The stormwater management ponds and infiltration basins are designed in accordance with WDNR's Technical Standard 1001 (Wet Detention Basin) and 1003 (Infiltration Basin), respectively.

Stormwater quality was analyzed using SLAMM Version 10.4.1 software, developed by Robert Pitt and John Voorhees. The results of the SLAMM analysis indicate that approximately 80 percent of TSS will be removed from stormwater as a result of the proposed stormwater management ponds and infiltration basins. Detailed computations are included.

Infiltration:
The soil boring logs indicate soils at the site as generally 3 to 8 feet of clay underlain by silt, loam or sand with varying amounts of gravel. Based on this, infiltration will be incorporated into areas of the site where groundwater is not a limiting factor and unsuitable surficial clays can be excavated to access soils suitable for infiltration.

# HYDROLOGIC ANALYSIS

# EXISTING CONDITIONS




Subcat Reach Pond Link

**Routing Diagram for Existing_006**
Prepared by HP Inc., Printed 9/23/2019

## Area Listing (all nodes)

| Area (acres) | CN | Description (subcatchment-numbers) |
|---|---|---|
| 54.390 | 83 | cropland - D soils (10N, 20E, 30E, 40E, 50E, 60W, 70W, 80W, 90W) |
| 3.690 | 80 | grass - D soils (50E, 80W, 90W) |
| 0.250 | 96 | gravel (50E, 90W) |
| 0.470 | 98 | impervious (50E, 90W) |
| 6.600 | 78 | meadow - D soils (80W) |
| 2.080 | 78 | wetland - D soils (10N, 20E, 80W) |
| 12.420 | 77 | woodland - D soils (10N, 20E, 30E, 40E, 50E, 60W, 70W, 80W, 90W) |
| **79.900** | **82** | **TOTAL AREA** |

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment10N: Subarea** Runoff Area=14.600 ac 0.00% Impervious Runoff Depth>0.88"
Flow Length=590' Slope=0.0700 '/' Tc=19.2 min CN=82 Runoff=15.07 cfs 1.065 af

**Subcatchment20E: Subarea** Runoff Area=18.960 ac 0.00% Impervious Runoff Depth>0.87"
Flow Length=1,495' Tc=26.7 min CN=82 Runoff=16.34 cfs 1.380 af

**Subcatchment30E: Subarea** Runoff Area=2.160 ac 0.00% Impervious Runoff Depth>0.93"
Flow Length=390' Slope=0.0500 '/' Tc=20.4 min CN=83 Runoff=2.31 cfs 0.167 af

**Subcatchment40E: Subarea** Runoff Area=4.460 ac 0.00% Impervious Runoff Depth>0.93"
Flow Length=550' Slope=0.0500 '/' Tc=21.8 min CN=83 Runoff=4.59 cfs 0.345 af

**Subcatchment50E: Subarea** Runoff Area=4.910 ac 6.31% Impervious Runoff Depth>0.93"
Flow Length=545' Slope=0.0800 '/' Tc=17.2 min CN=83 Runoff=5.73 cfs 0.381 af

**Subcatchment60W: Subarea** Runoff Area=2.410 ac 0.00% Impervious Runoff Depth>0.93"
Flow Length=445' Tc=18.5 min CN=83 Runoff=2.70 cfs 0.187 af

**Subcatchment70W: Subarea** Runoff Area=3.760 ac 0.00% Impervious Runoff Depth>0.93"
Flow Length=430' Tc=16.0 min CN=83 Runoff=4.54 cfs 0.292 af

**Subcatchment80W: Subarea** Runoff Area=20.770 ac 0.00% Impervious Runoff Depth>0.72"
Flow Length=1,275' Tc=56.1 min CN=79 Runoff=9.08 cfs 1.238 af

**Subcatchment90W: Subarea** Runoff Area=7.870 ac 2.03% Impervious Runoff Depth>0.93"
Flow Length=445' Slope=0.0800 '/' Tc=17.2 min CN=83 Runoff=9.19 cfs 0.610 af

**Link 15: North Drainage** Inflow=15.07 cfs 1.065 af
Primary=15.07 cfs 1.065 af

**Link 35: East to White Oak Way** Inflow=18.41 cfs 1.547 af
Primary=18.41 cfs 1.547 af

**Link 45: East to Hawthorn Hill Drive** Inflow=4.59 cfs 0.345 af
Primary=4.59 cfs 0.345 af

**Link 55: East to Summit Avenue** Inflow=5.73 cfs 0.381 af
Primary=5.73 cfs 0.381 af

**Link 95: West Drainage** Inflow=18.47 cfs 2.327 af
Primary=18.47 cfs 2.327 af

**Link 99: Total Existing Flow** Inflow=60.68 cfs 5.664 af
Primary=60.68 cfs 5.664 af

**Total Runoff Area = 79.900 ac Runoff Volume = 5.664 af Average Runoff Depth = 0.85"**
**99.41% Pervious = 79.430 ac 0.59% Impervious = 0.470 ac**

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment10N: Subarea** Runoff Area=14.600 ac 0.00% Impervious Runoff Depth>1.09"
Flow Length=590' Slope=0.0700 '/' Tc=19.2 min CN=82 Runoff=18.87 cfs 1.324 af

**Subcatchment20E: Subarea** Runoff Area=18.960 ac 0.00% Impervious Runoff Depth>1.09"
Flow Length=1,495' Tc=26.7 min CN=82 Runoff=20.48 cfs 1.715 af

**Subcatchment30E: Subarea** Runoff Area=2.160 ac 0.00% Impervious Runoff Depth>1.15"
Flow Length=390' Slope=0.0500 '/' Tc=20.4 min CN=83 Runoff=2.87 cfs 0.207 af

**Subcatchment40E: Subarea** Runoff Area=4.460 ac 0.00% Impervious Runoff Depth>1.15"
Flow Length=550' Slope=0.0500 '/' Tc=21.8 min CN=83 Runoff=5.70 cfs 0.427 af

**Subcatchment50E: Subarea** Runoff Area=4.910 ac 6.31% Impervious Runoff Depth>1.15"
Flow Length=545' Slope=0.0800 '/' Tc=17.2 min CN=83 Runoff=7.12 cfs 0.470 af

**Subcatchment60W: Subarea** Runoff Area=2.410 ac 0.00% Impervious Runoff Depth>1.15"
Flow Length=445' Tc=18.5 min CN=83 Runoff=3.35 cfs 0.231 af

**Subcatchment70W: Subarea** Runoff Area=3.760 ac 0.00% Impervious Runoff Depth>1.15"
Flow Length=430' Tc=16.0 min CN=83 Runoff=5.64 cfs 0.360 af

**Subcatchment80W: Subarea** Runoff Area=20.770 ac 0.00% Impervious Runoff Depth>0.91"
Flow Length=1,275' Tc=56.1 min CN=79 Runoff=11.72 cfs 1.571 af

**Subcatchment90W: Subarea** Runoff Area=7.870 ac 2.03% Impervious Runoff Depth>1.15"
Flow Length=445' Slope=0.0800 '/' Tc=17.2 min CN=83 Runoff=11.41 cfs 0.754 af

**Link 15: North Drainage** Inflow=18.87 cfs 1.324 af
Primary=18.87 cfs 1.324 af

**Link 35: East to White Oak Way** Inflow=23.07 cfs 1.922 af
Primary=23.07 cfs 1.922 af

**Link 45: East to Hawthorn Hill Drive** Inflow=5.70 cfs 0.427 af
Primary=5.70 cfs 0.427 af

**Link 55: East to Summit Avenue** Inflow=7.12 cfs 0.470 af
Primary=7.12 cfs 0.470 af

**Link 95: West Drainage** Inflow=23.33 cfs 2.915 af
Primary=23.33 cfs 2.915 af

**Link 99: Total Existing Flow** Inflow=76.17 cfs 7.058 af
Primary=76.17 cfs 7.058 af

**Total Runoff Area = 79.900 ac Runoff Volume = 7.058 af Average Runoff Depth = 1.06"**
**99.41% Pervious = 79.430 ac 0.59% Impervious = 0.470 ac**

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment10N: Subarea** Runoff Area=14.600 ac 0.00% Impervious Runoff Depth>1.95"
Flow Length=590' Slope=0.0700 '/' Tc=19.2 min CN=82 Runoff=33.92 cfs 2.371 af

**Subcatchment20E: Subarea** Runoff Area=18.960 ac 0.00% Impervious Runoff Depth>1.94"
Flow Length=1,495' Tc=26.7 min CN=82 Runoff=36.96 cfs 3.072 af

**Subcatchment30E: Subarea** Runoff Area=2.160 ac 0.00% Impervious Runoff Depth>2.03"
Flow Length=390' Slope=0.0500 '/' Tc=20.4 min CN=83 Runoff=5.07 cfs 0.365 af

**Subcatchment40E: Subarea** Runoff Area=4.460 ac 0.00% Impervious Runoff Depth>2.03"
Flow Length=550' Slope=0.0500 '/' Tc=21.8 min CN=83 Runoff=10.11 cfs 0.753 af

**Subcatchment50E: Subarea** Runoff Area=4.910 ac 6.31% Impervious Runoff Depth>2.03"
Flow Length=545' Slope=0.0800 '/' Tc=17.2 min CN=83 Runoff=12.56 cfs 0.830 af

**Subcatchment60W: Subarea** Runoff Area=2.410 ac 0.00% Impervious Runoff Depth>2.03"
Flow Length=445' Tc=18.5 min CN=83 Runoff=5.92 cfs 0.407 af

**Subcatchment70W: Subarea** Runoff Area=3.760 ac 0.00% Impervious Runoff Depth>2.03"
Flow Length=430' Tc=16.0 min CN=83 Runoff=9.93 cfs 0.636 af

**Subcatchment80W: Subarea** Runoff Area=20.770 ac 0.00% Impervious Runoff Depth>1.70"
Flow Length=1,275' Tc=56.1 min CN=79 Runoff=22.57 cfs 2.946 af

**Subcatchment90W: Subarea** Runoff Area=7.870 ac 2.03% Impervious Runoff Depth>2.03"
Flow Length=445' Slope=0.0800 '/' Tc=17.2 min CN=83 Runoff=20.13 cfs 1.330 af

**Link 15: North Drainage** Inflow=33.92 cfs 2.371 af
Primary=33.92 cfs 2.371 af

**Link 35: East to White Oak Way** Inflow=41.66 cfs 3.437 af
Primary=41.66 cfs 3.437 af

**Link 45: East to Hawthorn Hill Drive** Inflow=10.11 cfs 0.753 af
Primary=10.11 cfs 0.753 af

**Link 55: East to Summit Avenue** Inflow=12.56 cfs 0.830 af
Primary=12.56 cfs 0.830 af

**Link 95: West Drainage** Inflow=42.94 cfs 5.320 af
Primary=42.94 cfs 5.320 af

**Link 99: Total Existing Flow** Inflow=137.92 cfs 12.710 af
Primary=137.92 cfs 12.710 af

**Total Runoff Area = 79.900 ac Runoff Volume = 12.710 af Average Runoff Depth = 1.91"**
**99.41% Pervious = 79.430 ac 0.59% Impervious = 0.470 ac**

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment10N: Subarea** Runoff Area=14.600 ac 0.00% Impervious Runoff Depth>3.99"
Flow Length=590' Slope=0.0700 '/' Tc=19.2 min CN=82 Runoff=68.24 cfs 4.852 af

**Subcatchment20E: Subarea** Runoff Area=18.960 ac 0.00% Impervious Runoff Depth>3.98"
Flow Length=1,495' Tc=26.7 min CN=82 Runoff=74.84 cfs 6.289 af

**Subcatchment30E: Subarea** Runoff Area=2.160 ac 0.00% Impervious Runoff Depth>4.09"
Flow Length=390' Slope=0.0500 '/' Tc=20.4 min CN=83 Runoff=10.05 cfs 0.736 af

**Subcatchment40E: Subarea** Runoff Area=4.460 ac 0.00% Impervious Runoff Depth>4.09"
Flow Length=550' Slope=0.0500 '/' Tc=21.8 min CN=83 Runoff=20.04 cfs 1.520 af

**Subcatchment50E: Subarea** Runoff Area=4.910 ac 6.31% Impervious Runoff Depth>4.09"
Flow Length=545' Slope=0.0800 '/' Tc=17.2 min CN=83 Runoff=24.83 cfs 1.675 af

**Subcatchment60W: Subarea** Runoff Area=2.410 ac 0.00% Impervious Runoff Depth>4.09"
Flow Length=445' Tc=18.5 min CN=83 Runoff=11.75 cfs 0.822 af

**Subcatchment70W: Subarea** Runoff Area=3.760 ac 0.00% Impervious Runoff Depth>4.10"
Flow Length=430' Tc=16.0 min CN=83 Runoff=19.61 cfs 1.283 af

**Subcatchment80W: Subarea** Runoff Area=20.770 ac 0.00% Impervious Runoff Depth>3.64"
Flow Length=1,275' Tc=56.1 min CN=79 Runoff=48.41 cfs 6.306 af

**Subcatchment90W: Subarea** Runoff Area=7.870 ac 2.03% Impervious Runoff Depth>4.09"
Flow Length=445' Slope=0.0800 '/' Tc=17.2 min CN=83 Runoff=39.79 cfs 2.685 af

**Link 15: North Drainage** Inflow=68.24 cfs 4.852 af
Primary=68.24 cfs 4.852 af

**Link 35: East to White Oak Way** Inflow=84.05 cfs 7.025 af
Primary=84.05 cfs 7.025 af

**Link 45: East to Hawthorn Hill Drive** Inflow=20.04 cfs 1.520 af
Primary=20.04 cfs 1.520 af

**Link 55: East to Summit Avenue** Inflow=24.83 cfs 1.675 af
Primary=24.83 cfs 1.675 af

**Link 95: West Drainage** Inflow=88.56 cfs 11.096 af
Primary=88.56 cfs 11.096 af

**Link 99: Total Existing Flow** Inflow=279.59 cfs 26.168 af
Primary=279.59 cfs 26.168 af

**Total Runoff Area = 79.900 ac Runoff Volume = 26.168 af Average Runoff Depth = 3.93"**
**99.41% Pervious = 79.430 ac 0.59% Impervious = 0.470 ac**

## Summary for Subcatchment 10N: Subarea

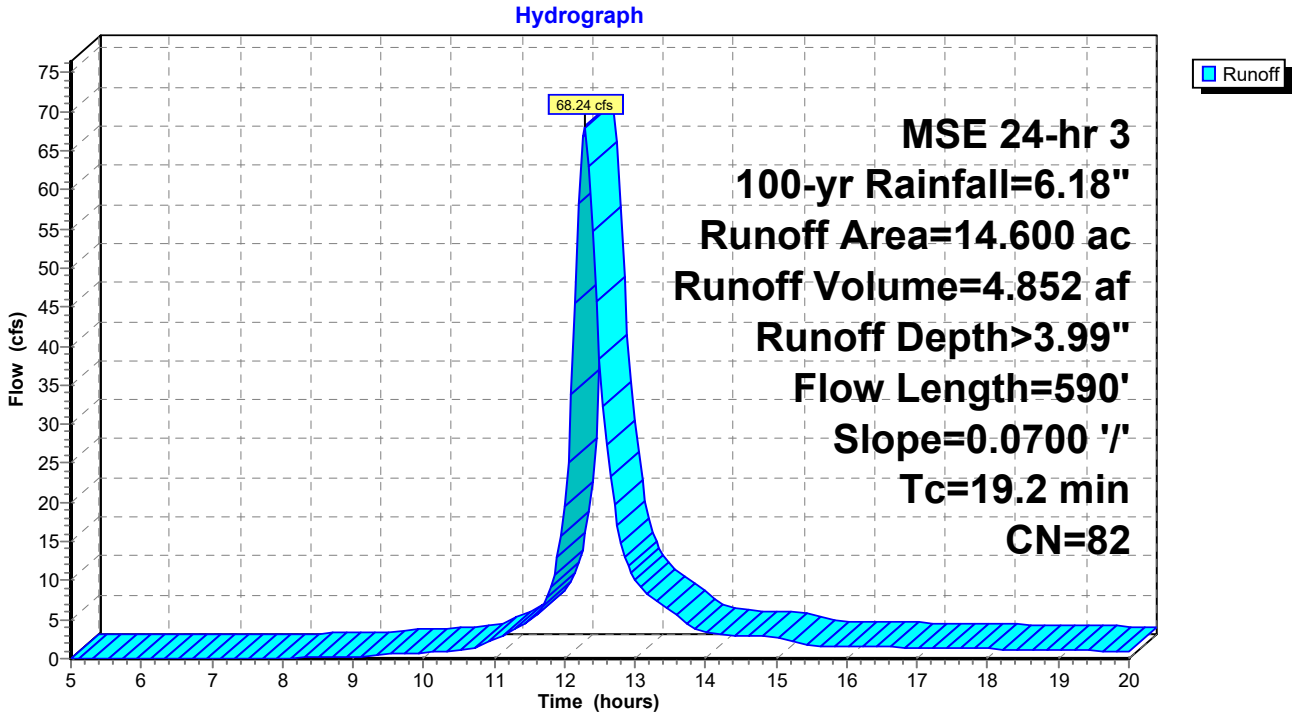
Runoff = 68.24 cfs @ 12.28 hrs, Volume= 4.852 af, Depth> 3.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-yr Rainfall=6.18"

| | Area (ac) | CN | Description |
|---|---|---|---|
| * | 12.830 | 83 | cropland - D soils |
| * | 1.200 | 77 | woodland - D soils |
| * | 0.570 | 78 | wetland - D soils |
| | 14.600 | 82 | Weighted Average |
| | 14.600 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 17.2 | 300 | 0.0700 | 0.29 | | **Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.70" |
| 2.0 | 290 | 0.0700 | 2.38 | | **Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps |
| 19.2 | 590 | Total | | | |

## Subcatchment 10N: Subarea



## Summary for Subcatchment 20E: Subarea

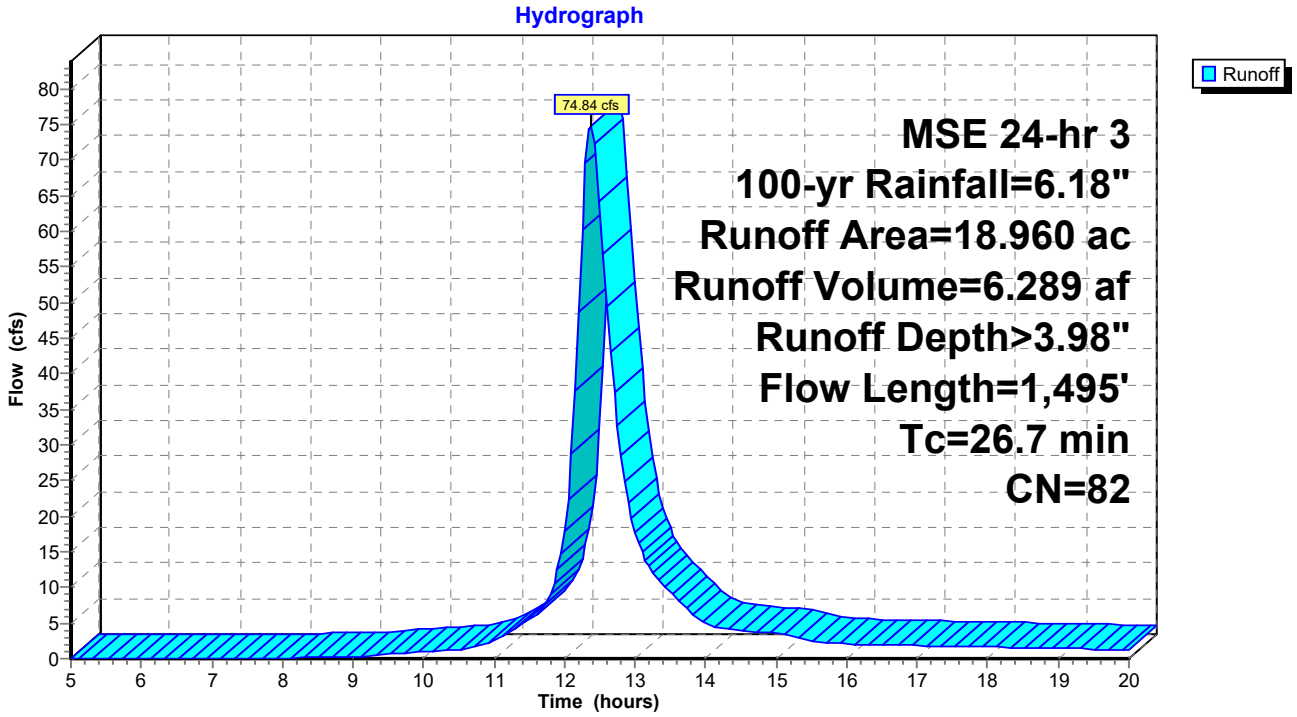
Runoff = 74.84 cfs @ 12.37 hrs, Volume= 6.289 af, Depth> 3.98"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-yr Rainfall=6.18"

| | Area (ac) | CN | Description |
|---|---|---|---|
| * | 16.870 | 83 | cropland - D soils |
| * | 0.780 | 77 | woodland - D soils |
| * | 1.310 | 78 | wetland - D soils |
| | 18.960 | 82 | Weighted Average |
| | 18.960 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 13.4 | 250 | 0.0900 | 0.31 | | **Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.70" |
| 13.3 | 1,245 | 0.0300 | 1.56 | | **Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps |
| 26.7 | 1,495 | Total | | | |

## Subcatchment 20E: Subarea



## Summary for Subcatchment 30E: Subarea

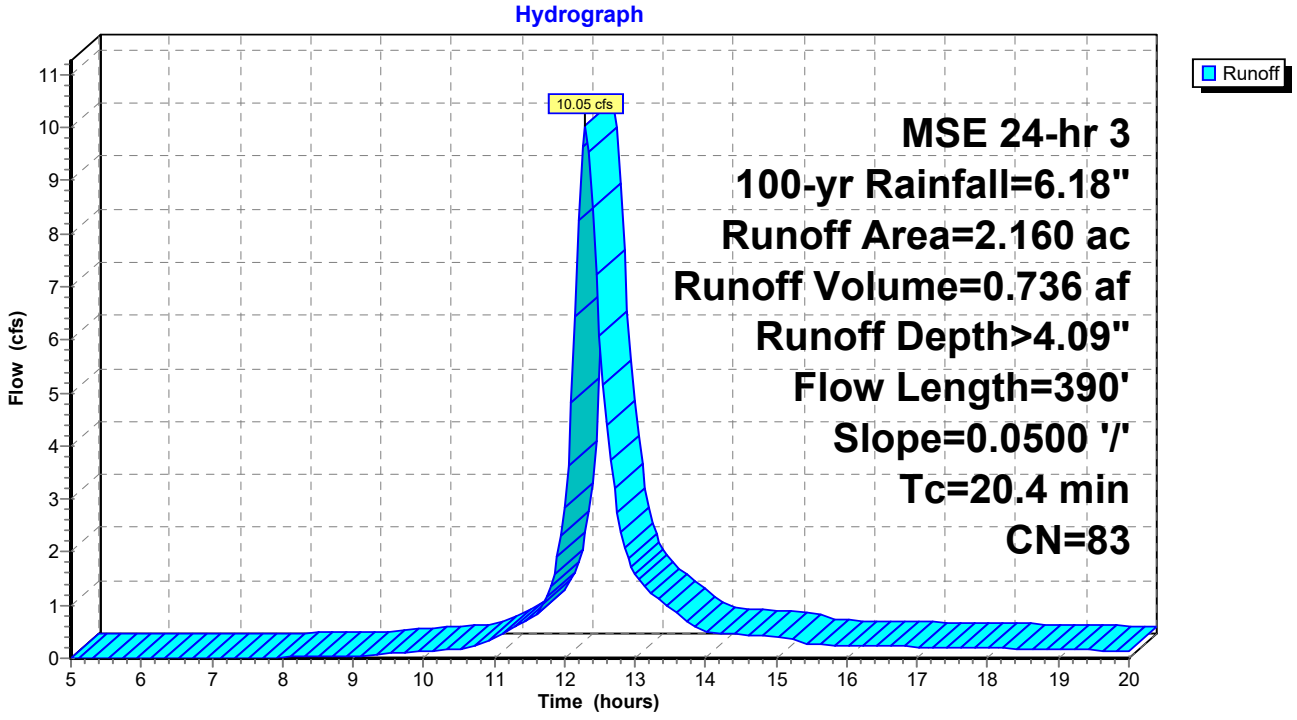
Runoff = 10.05 cfs @ 12.30 hrs, Volume= 0.736 af, Depth> 4.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-yr Rainfall=6.18"

| | Area (ac) | CN | Description |
|---|---|---|---|
| * | 1.980 | 83 | cropland - D soils |
| * | 0.180 | 77 | woodland - D soils |
| | 2.160 | 83 | Weighted Average |
| | 2.160 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 19.7 | 300 | 0.0500 | 0.25 | | **Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.70" |
| 0.7 | 90 | 0.0500 | 2.01 | | **Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps |
| 20.4 | 390 | Total | | | |

## Subcatchment 30E: Subarea



## Summary for Subcatchment 40E: Subarea

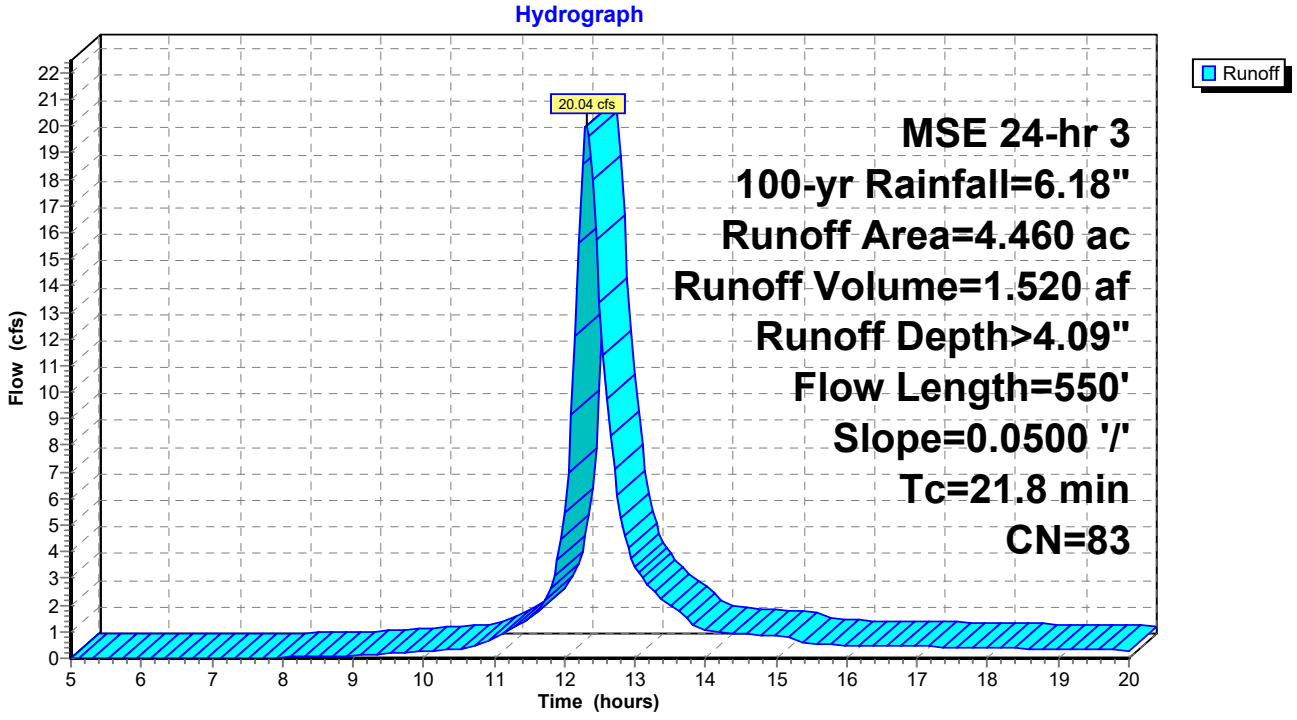
Runoff = 20.04 cfs @ 12.31 hrs, Volume= 1.520 af, Depth> 4.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-yr Rainfall=6.18"

| | Area (ac) | CN | Description |
|---|---|---|---|
| * | 4.170 | 83 | cropland - D soils |
| * | 0.290 | 77 | woodland - D soils |
| | 4.460 | 83 | Weighted Average |
| | 4.460 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 19.7 | 300 | 0.0500 | 0.25 | | **Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.70" |
| 2.1 | 250 | 0.0500 | 2.01 | | **Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps |
| 21.8 | 550 | Total | | | |

## Subcatchment 40E: Subarea



## Summary for Subcatchment 50E: Subarea

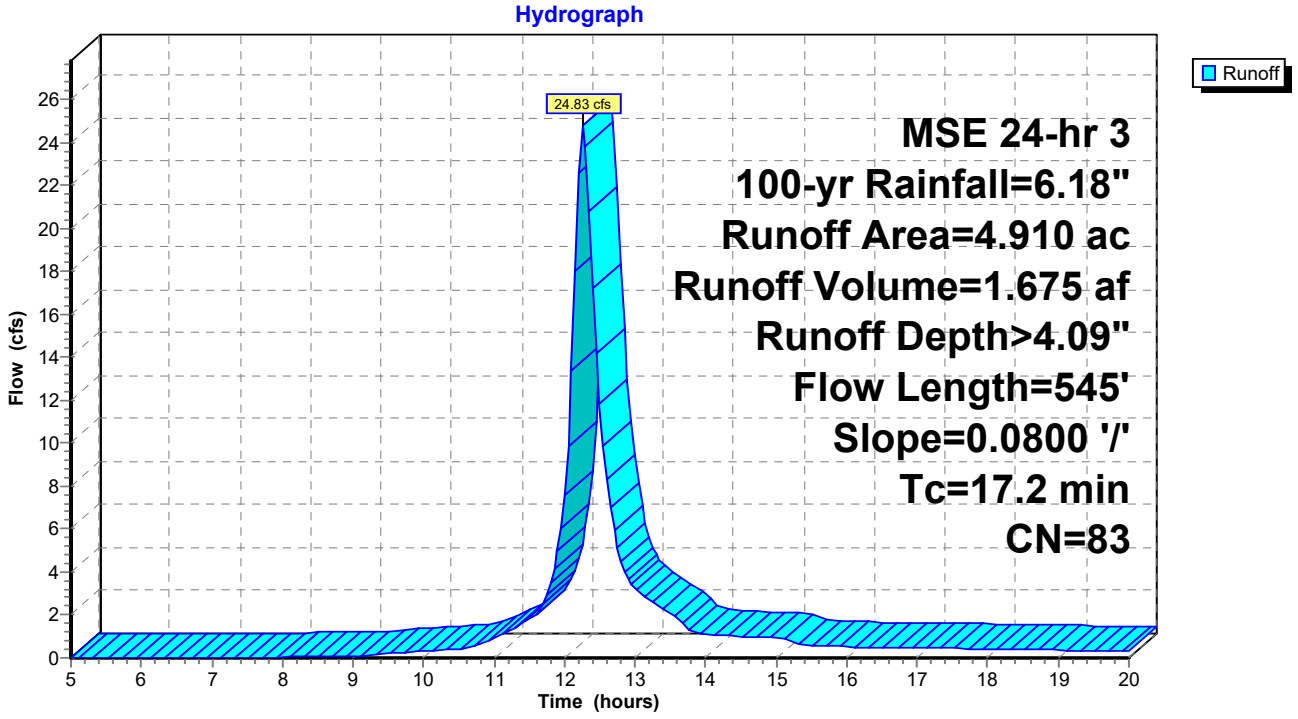
Runoff = 24.83 cfs @ 12.26 hrs, Volume= 1.675 af, Depth> 4.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-yr Rainfall=6.18"

| | Area (ac) | CN | Description |
|---|---|---|---|
| * | 1.710 | 83 | cropland - D soils |
| * | 0.470 | 77 | woodland - D soils |
| * | 2.220 | 80 | grass - D soils |
| * | 0.200 | 96 | gravel |
| * | 0.310 | 98 | impervious |
| | 4.910 | 83 | Weighted Average |
| | 4.600 | | 93.69% Pervious Area |
| | 0.310 | | 6.31% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 16.3 | 300 | 0.0800 | 0.31 | | **Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.70" |
| 0.9 | 245 | 0.0800 | 4.55 | | **Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps |
| 17.2 | 545 | Total | | | |

## Subcatchment 50E: Subarea



## Summary for Subcatchment 60W: Subarea

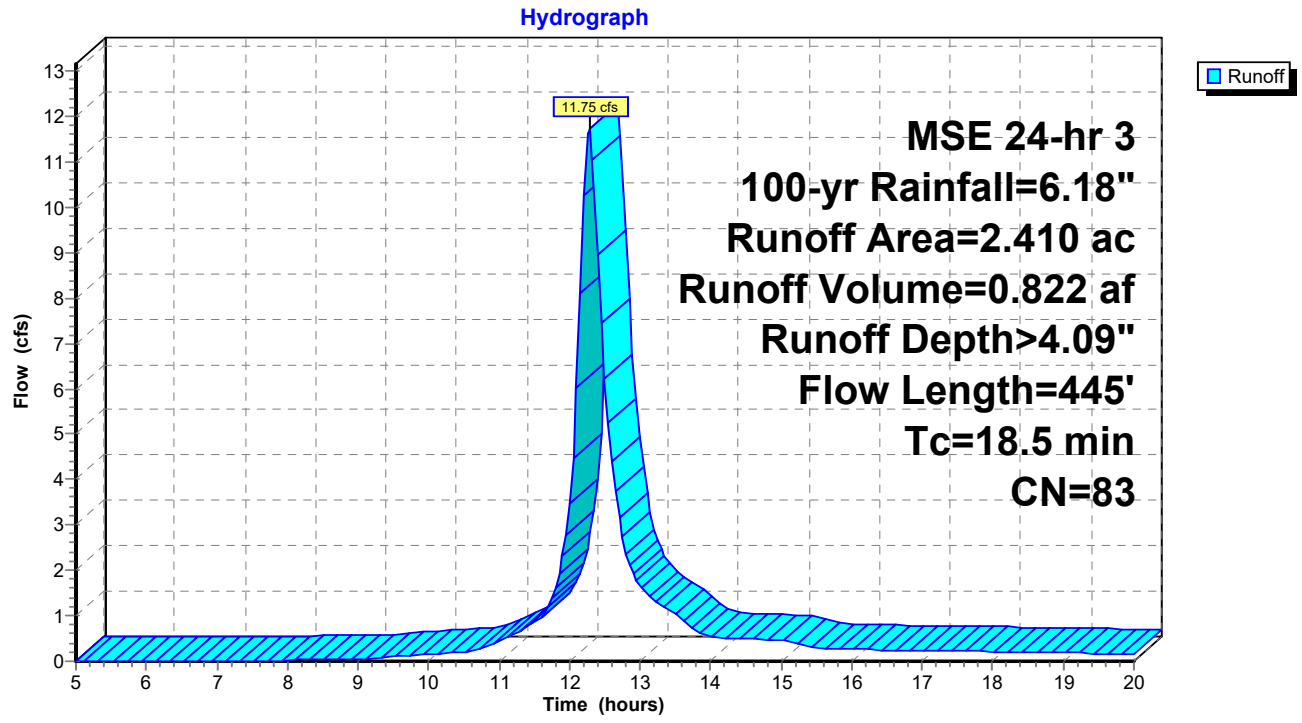
Runoff = 11.75 cfs @ 12.27 hrs, Volume= 0.822 af, Depth> 4.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-yr Rainfall=6.18"

| | Area (ac) | CN | Description |
|---|---|---|---|
| * | 2.350 | 83 | cropland - D soils |
| * | 0.060 | 77 | woodland - D soils |
| | 2.410 | 83 | Weighted Average |
| | 2.410 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 15.4 | 280 | 0.0800 | 0.30 | | **Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.70" |
| 3.1 | 165 | 0.0100 | 0.90 | | **Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps |
| 18.5 | 445 | Total | | | |

## Subcatchment 60W: Subarea



## Summary for Subcatchment 70W: Subarea

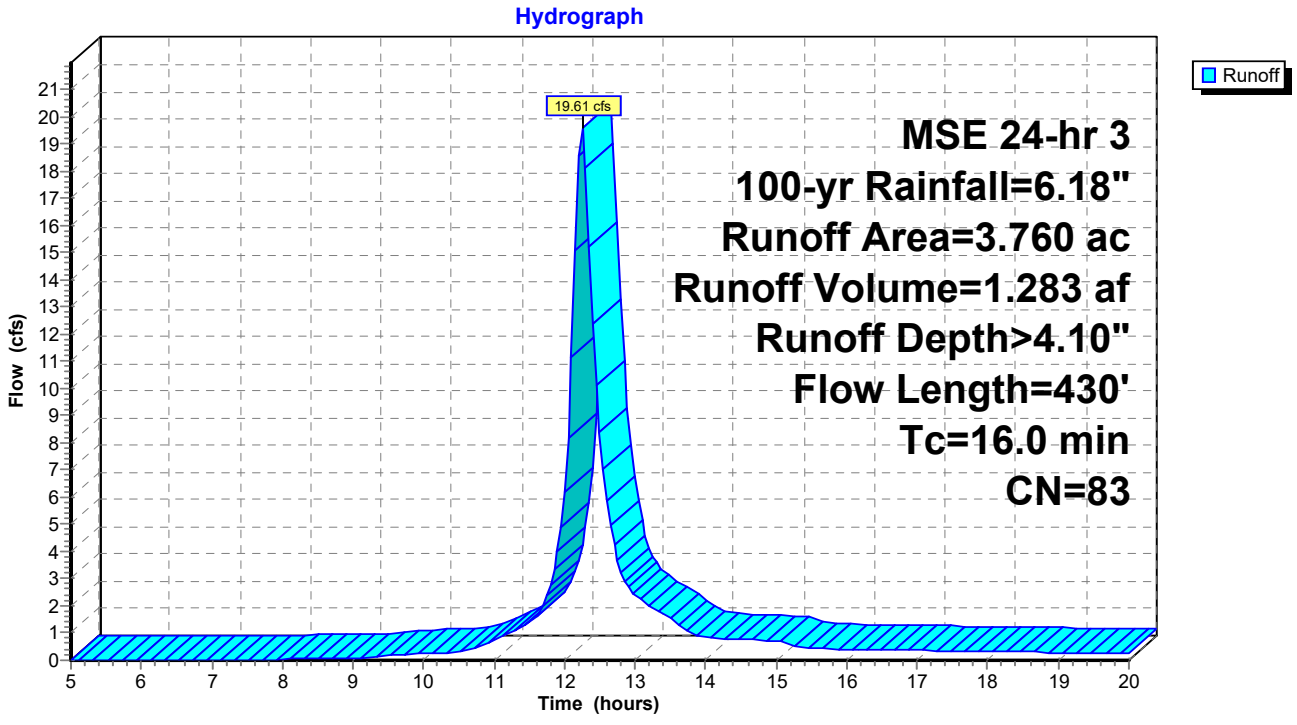
Runoff = 19.61 cfs @ 12.25 hrs, Volume= 1.283 af, Depth> 4.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-yr Rainfall=6.18"

| | Area (ac) | CN | Description |
|---|---|---|---|
| * | 3.630 | 83 | cropland - D soils |
| * | 0.130 | 77 | woodland - D soils |
| | 3.760 | 83 | Weighted Average |
| | 3.760 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 13.9 | 300 | 0.1200 | 0.36 | | **Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.70" |
| 0.1 | 20 | 0.1200 | 3.12 | | **Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps |
| 2.0 | 110 | 0.0100 | 0.90 | | **Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps |
| 16.0 | 430 | Total | | | |

## Subcatchment 70W: Subarea



## Summary for Subcatchment 80W: Subarea

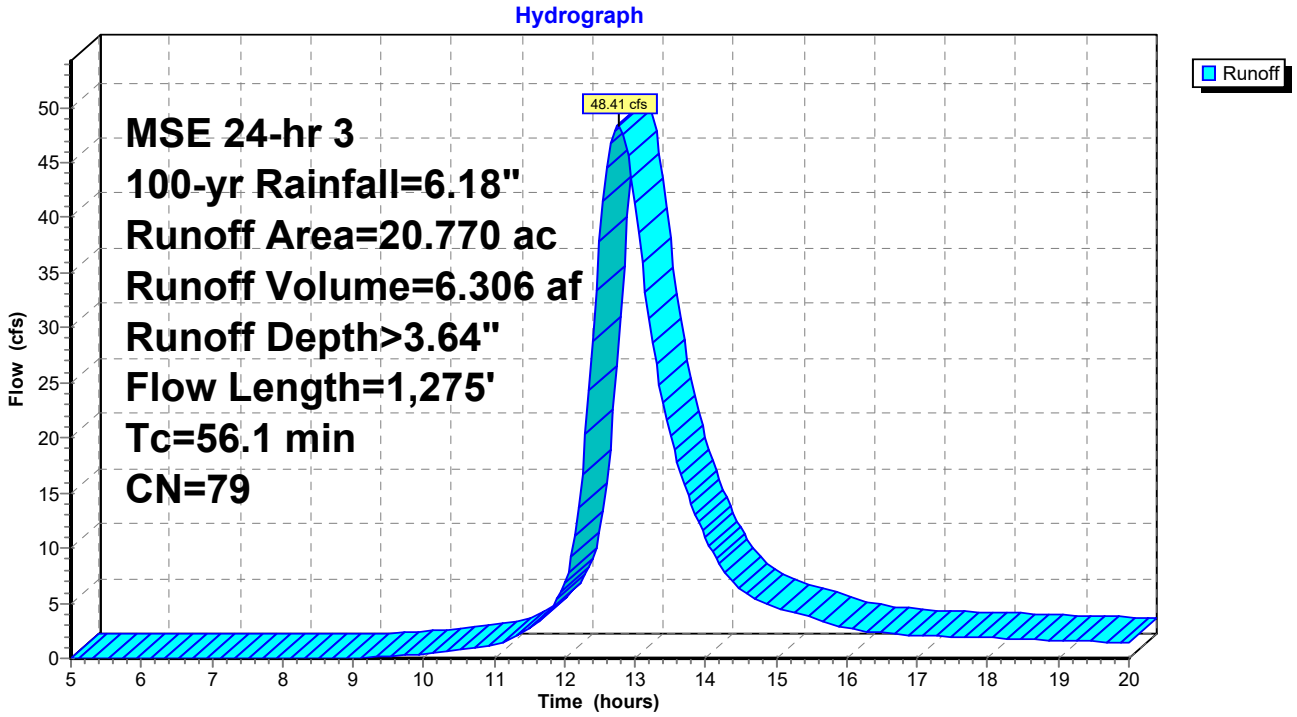
Runoff = 48.41 cfs @ 12.76 hrs, Volume= 6.306 af, Depth> 3.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-yr Rainfall=6.18"

| | Area (ac) | CN | Description |
|---|---|---|---|
| * | 4.430 | 83 | cropland - D soils |
| * | 9.200 | 77 | woodland - D soils |
| * | 0.200 | 78 | wetland - D soils |
| * | 6.600 | 78 | meadow - D soils |
| * | 0.340 | 80 | grass - D soils |
| | 20.770 | 79 | Weighted Average |
| | 20.770 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 5.1 | 80 | 0.0600 | 0.26 | | **Sheet Flow,** Range n= 0.130 P2= 2.70" |
| 28.3 | 220 | 0.0600 | 0.13 | | **Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.70" |
| 6.7 | 495 | 0.0600 | 1.22 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 16.0 | 480 | 0.0100 | 0.50 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 56.1 | 1,275 | Total | | | |

## Subcatchment 80W: Subarea



## Summary for Subcatchment 90W: Subarea

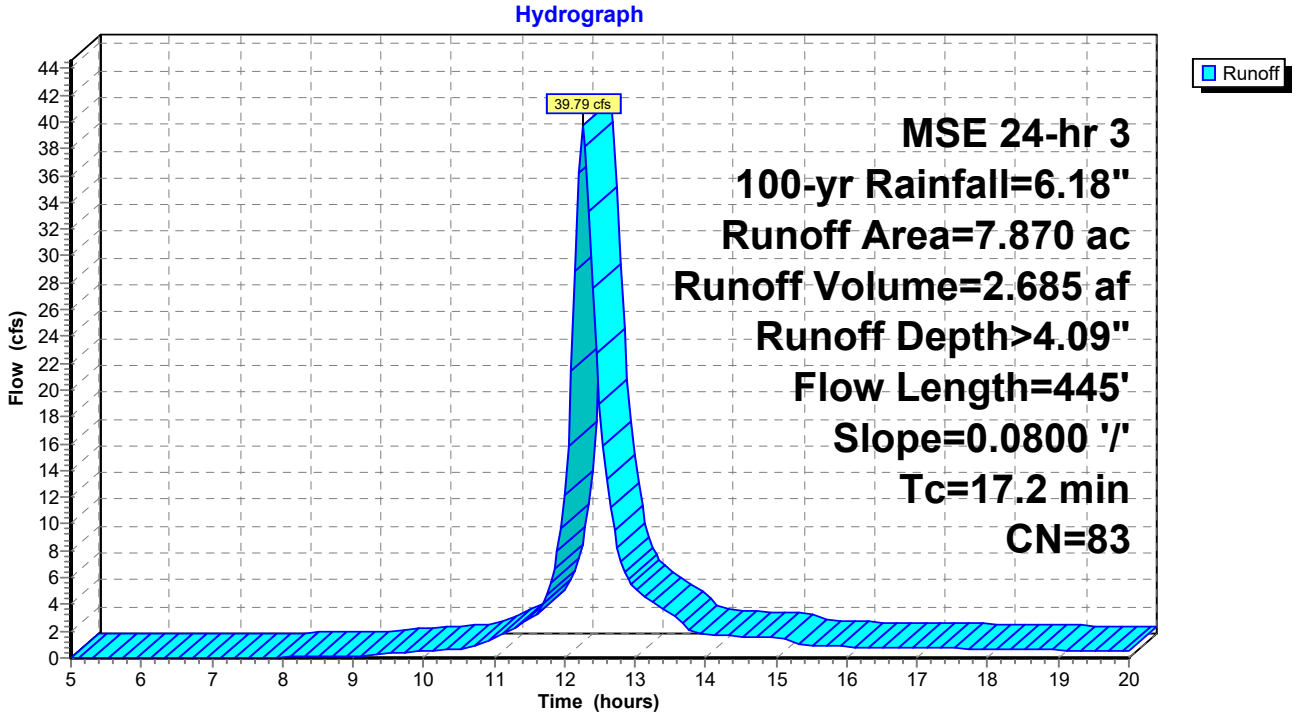
Runoff = 39.79 cfs @ 12.26 hrs, Volume= 2.685 af, Depth> 4.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-yr Rainfall=6.18"

| | Area (ac) | CN | Description |
|---|---|---|---|
| * | 6.420 | 83 | cropland - D soils |
| * | 0.110 | 77 | woodland - D soils |
| * | 1.130 | 80 | grass - D soils |
| * | 0.050 | 96 | gravel |
| * | 0.160 | 98 | impervious |
| | 7.870 | 83 | Weighted Average |
| | 7.710 | | 97.97% Pervious Area |
| | 0.160 | | 2.03% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 16.3 | 300 | 0.0800 | 0.31 | | **Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.70" |
| 0.9 | 145 | 0.0800 | 2.55 | | **Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps |
| 17.2 | 445 | Total | | | |

## Subcatchment 90W: Subarea

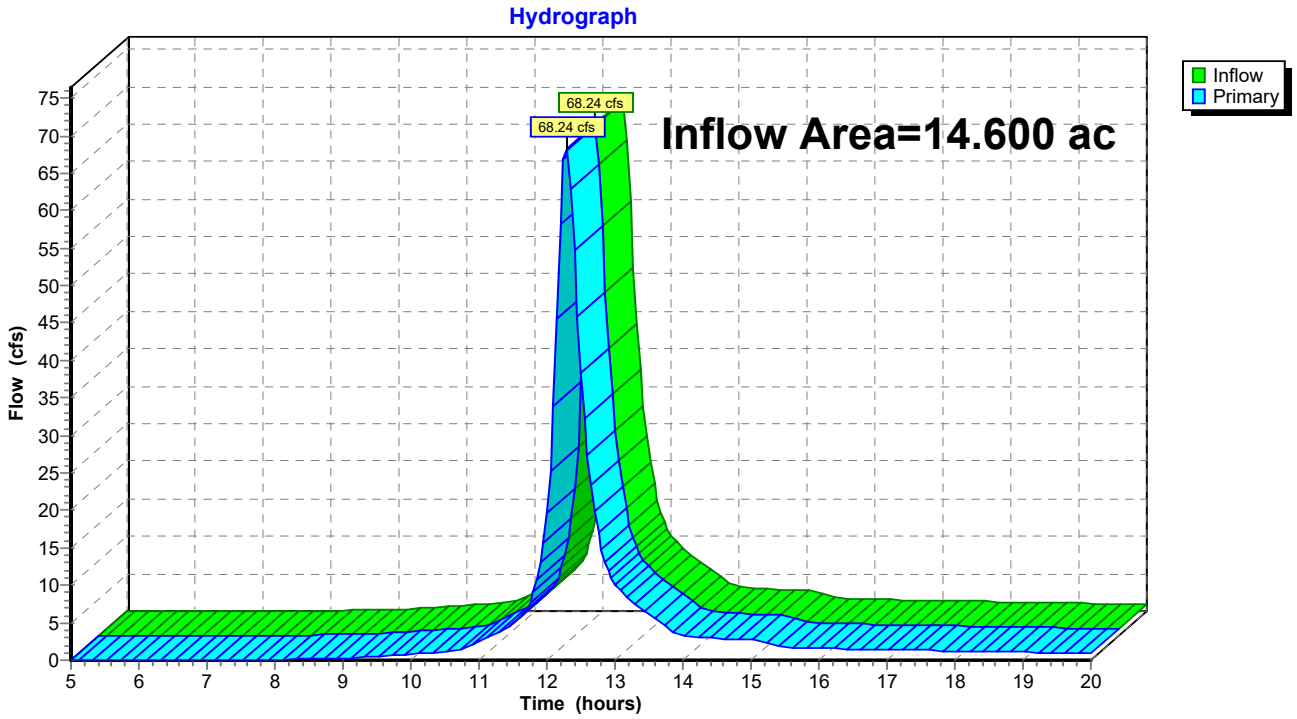


## Summary for Link 15: North Drainage

Inflow Area = 14.600 ac, 0.00% Impervious, Inflow Depth > 3.99" for 100-yr event
Inflow = 68.24 cfs @ 12.28 hrs, Volume= 4.852 af
Primary = 68.24 cfs @ 12.28 hrs, Volume= 4.852 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

## Link 15: North Drainage

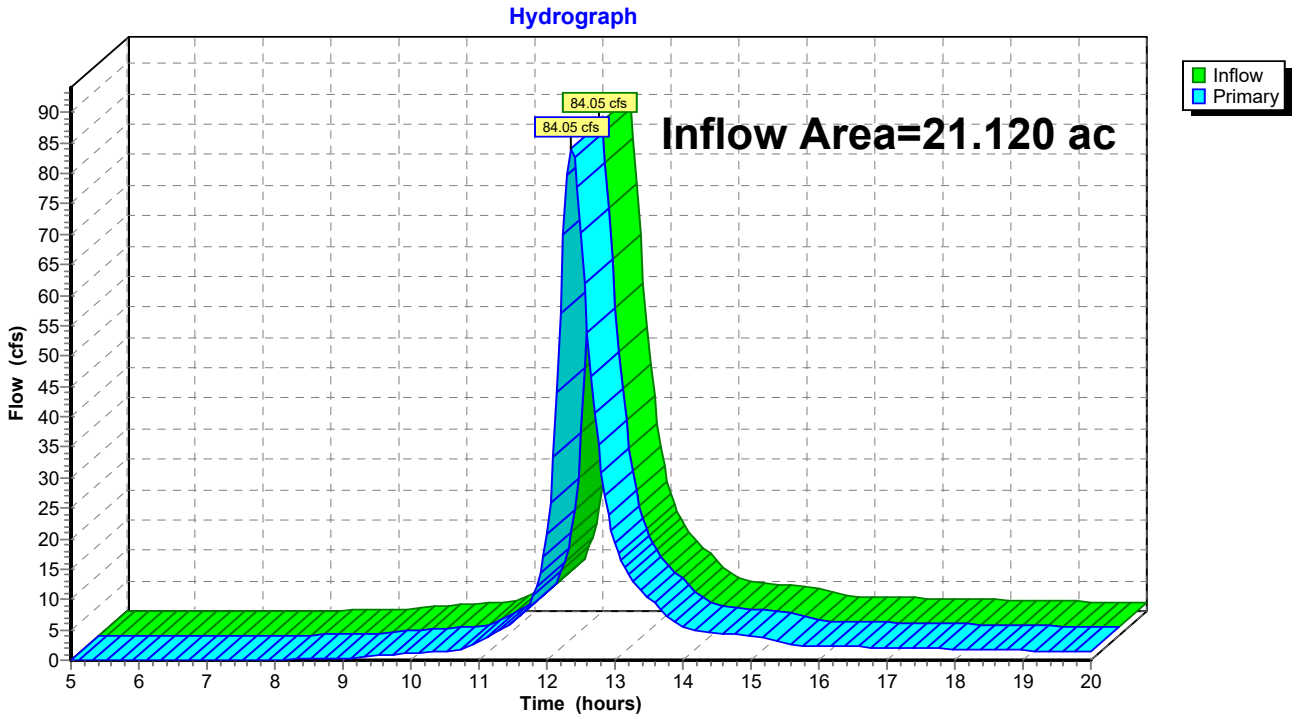


## Summary for Link 35: East to White Oak Way

Inflow Area = 21.120 ac, 0.00% Impervious, Inflow Depth > 3.99" for 100-yr event
Inflow = 84.05 cfs @ 12.36 hrs, Volume= 7.025 af
Primary = 84.05 cfs @ 12.36 hrs, Volume= 7.025 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

## Link 35: East to White Oak Way

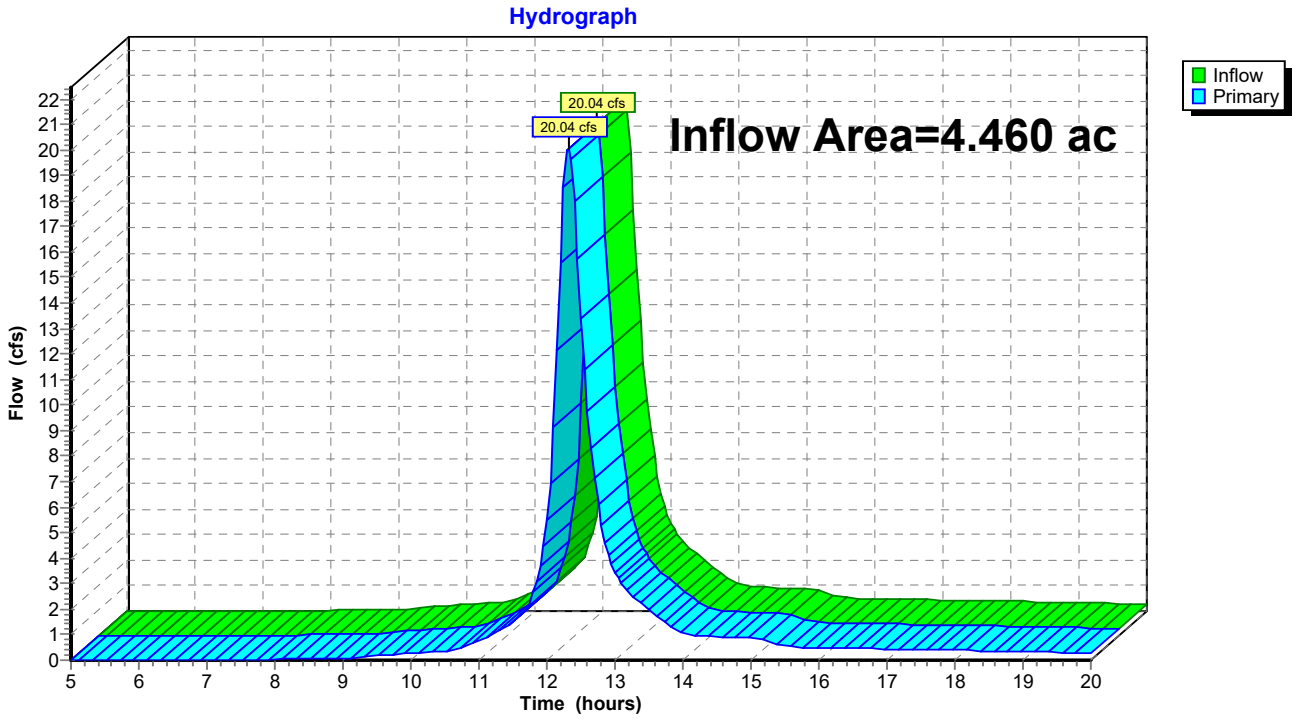


## Summary for Link 45: East to Hawthorn Hill Drive

Inflow Area = 4.460 ac, 0.00% Impervious, Inflow Depth > 4.09" for 100-yr event
Inflow = 20.04 cfs @ 12.31 hrs, Volume= 1.520 af
Primary = 20.04 cfs @ 12.31 hrs, Volume= 1.520 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

## Link 45: East to Hawthorn Hill Drive

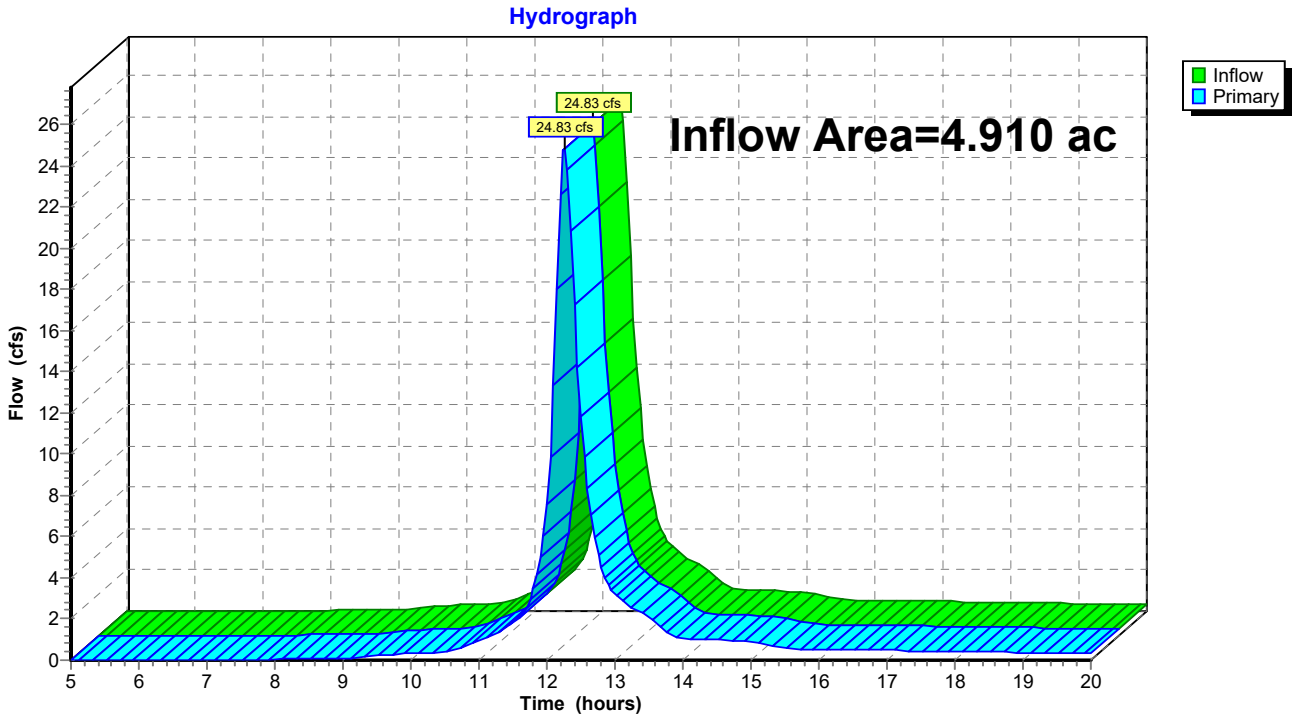


## Summary for Link 55: East to Summit Avenue

Inflow Area = 4.910 ac, 6.31% Impervious, Inflow Depth > 4.09" for 100-yr event
Inflow = 24.83 cfs @ 12.26 hrs, Volume= 1.675 af
Primary = 24.83 cfs @ 12.26 hrs, Volume= 1.675 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

## Link 55: East to Summit Avenue

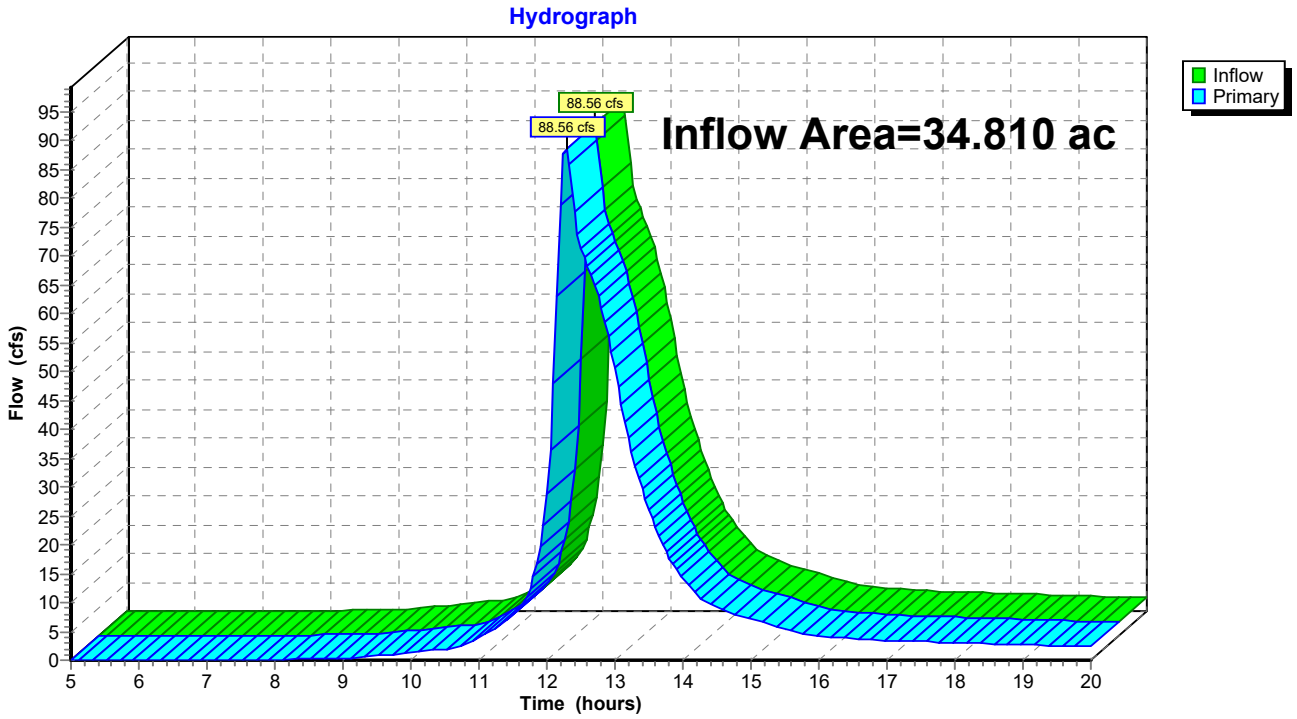


## Summary for Link 95: West Drainage

Inflow Area = 34.810 ac, 0.46% Impervious, Inflow Depth > 3.82" for 100-yr event
Inflow = 88.56 cfs @ 12.28 hrs, Volume= 11.096 af
Primary = 88.56 cfs @ 12.28 hrs, Volume= 11.096 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

## Link 95: West Drainage

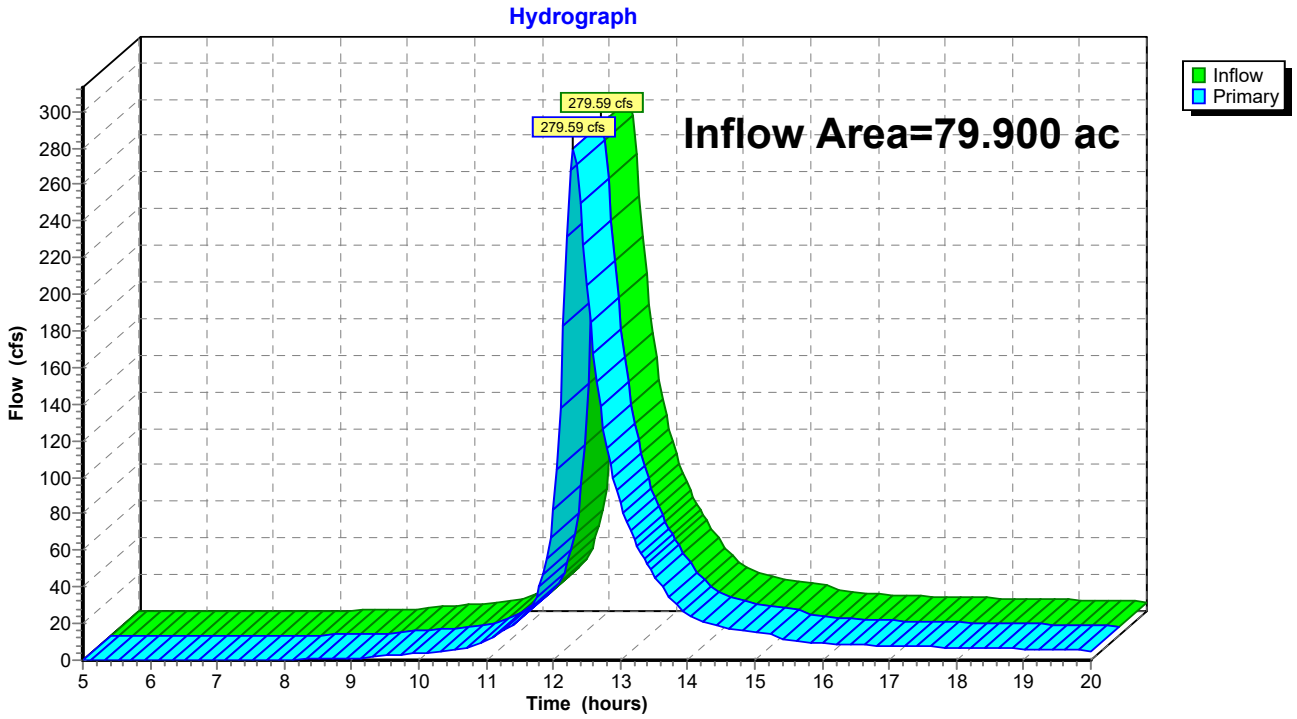


## Summary for Link 99: Total Existing Flow

Inflow Area = 79.900 ac, 0.59% Impervious, Inflow Depth > 3.93" for 100-yr event
Inflow = 279.59 cfs @ 12.30 hrs, Volume= 26.168 af
Primary = 279.59 cfs @ 12.30 hrs, Volume= 26.168 af, Atten= 0%, Lag= 0.0 min

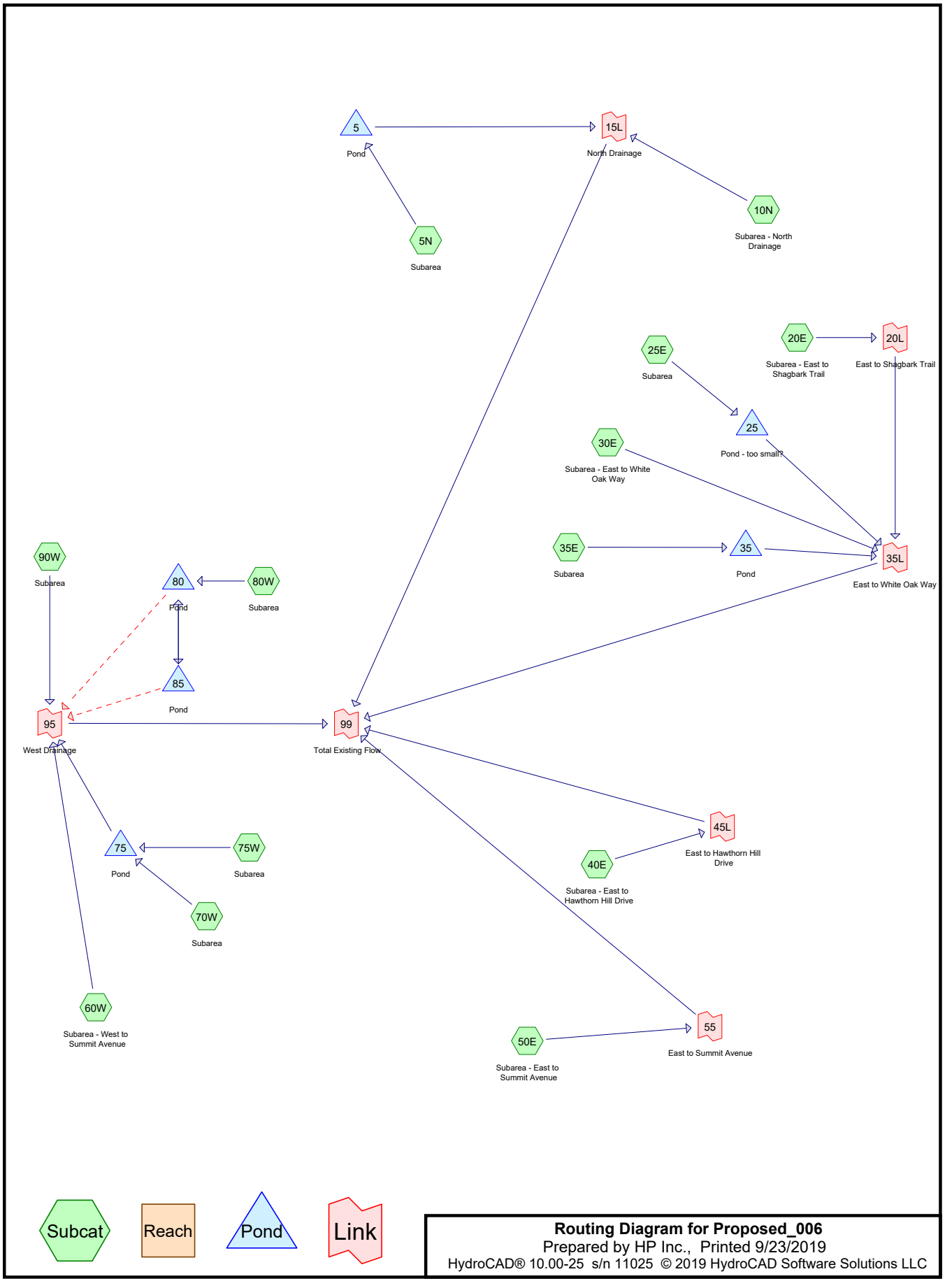
Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

## Link 99: Total Existing Flow



# HYDROLOGIC ANALYSIS

# PROPOSED CONDITIONS




**Routing Diagram for Proposed_006**
Prepared by HP Inc., Printed 9/23/2019

## Area Listing (all nodes)

| Area (acres) | CN | Description (subcatchment-numbers) |
|---|---|---|
| 45.890 | 86 | 1/3 acre lots, 30% imp, HSG D (5N, 10N, 20E, 25E, 30E, 35E, 40E, 50E, 60W, 70W, 75W, 80W) |
| 13.860 | 80 | grass - D soils (5N, 10N, 25E, 30E, 35E, 50E, 60W, 70W, 75W, 80W, 90W) |
| 12.950 | 95 | road (5N, 20E, 25E, 35E, 40E, 60W, 70W, 80W) |
| 2.110 | 98 | water (5N, 25E, 35E, 70W, 75W, 80W) |
| 2.070 | 78 | wetland - D soils (10N, 30E, 90W) |
| 3.020 | 77 | woodland - D soils (5N, 10N, 30E, 35E, 80W, 90W) |
| **79.900** | **86** | **TOTAL AREA** |

Time span=0.00-20.00 hrs, dt=0.03 hrs, 668 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Sim-Route method - Pond routing by Sim-Route method

**Subcatchment5N: Subarea** Runoff Area=14.800 ac 21.75% Impervious Runoff Depth>1.17"
Flow Length=185' Slope=0.0300 '/' Tc=21.6 min CN=87 Runoff=19.56 cfs 1.443 af

**Subcatchment10N: Subarea - North** Runoff Area=4.110 ac 12.48% Impervious Runoff Depth>0.88"
Flow Length=185' Slope=0.0700 '/' Tc=15.4 min CN=82 Runoff=4.76 cfs 0.300 af

**Subcatchment20E: Subarea - East to** Runoff Area=0.570 ac 16.32% Impervious Runoff Depth>1.39"
Tc=6.0 min CN=90 Runoff=1.49 cfs 0.066 af

**Subcatchment25E: Subarea** Runoff Area=6.750 ac 23.30% Impervious Runoff Depth>1.17"
Flow Length=240' Slope=0.0500 '/' Tc=21.7 min CN=87 Runoff=8.90 cfs 0.658 af

**Subcatchment30E: Subarea - East to** Runoff Area=4.200 ac 14.21% Impervious Runoff Depth>0.87"
Flow Length=645' Slope=0.0300 '/' Tc=33.9 min CN=82 Runoff=3.15 cfs 0.305 af

**Subcatchment35E: Subarea** Runoff Area=10.580 ac 20.72% Impervious Runoff Depth>1.24"
Flow Length=85' Slope=0.0600 '/' Tc=8.8 min CN=88 Runoff=22.27 cfs 1.094 af

**Subcatchment40E: Subarea - East to** Runoff Area=3.160 ac 23.07% Impervious Runoff Depth>1.24"
Flow Length=300' Slope=0.0700 '/' Tc=22.7 min CN=88 Runoff=4.30 cfs 0.326 af

**Subcatchment50E: Subarea - East to** Runoff Area=2.300 ac 16.04% Impervious Runoff Depth>0.93"
Flow Length=160' Slope=0.1000 '/' Tc=11.9 min CN=83 Runoff=3.21 cfs 0.179 af

**Subcatchment60W: Subarea - West to** Runoff Area=2.240 ac 13.39% Impervious Runoff Depth>0.93"
Flow Length=165' Slope=0.0800 '/' Tc=13.3 min CN=83 Runoff=2.98 cfs 0.174 af

**Subcatchment70W: Subarea** Runoff Area=9.180 ac 21.42% Impervious Runoff Depth>1.24"
Flow Length=140' Slope=0.0600 '/' Tc=13.1 min CN=88 Runoff=16.39 cfs 0.948 af

**Subcatchment75W: Subarea** Runoff Area=1.260 ac 22.14% Impervious Runoff Depth>0.99"
Flow Length=105' Slope=0.0800 '/' Tc=9.3 min CN=84 Runoff=2.08 cfs 0.104 af

**Subcatchment80W: Subarea** Runoff Area=17.880 ac 22.63% Impervious Runoff Depth>1.17"
Flow Length=190' Slope=0.0900 '/' Tc=14.2 min CN=87 Runoff=29.05 cfs 1.747 af

**Subcatchment90W: Subarea** Runoff Area=2.870 ac 0.00% Impervious Runoff Depth>0.67"
Flow Length=495' Slope=0.0100 '/' Tc=39.9 min CN=78 Runoff=1.46 cfs 0.161 af

**Pond 5: Pond** Peak Elev=997.67' Storage=1.000 af Inflow=19.56 cfs 1.442 af
Outflow=1.13 cfs 0.685 af

**Pond 25: Pond - too small?** Peak Elev=999.11' Storage=0.320 af Inflow=8.90 cfs 0.658 af
Outflow=2.08 cfs 0.629 af

**Pond 35: Pond** Peak Elev=995.40' Storage=0.663 af Inflow=22.27 cfs 1.094 af
Outflow=1.73 cfs 0.867 af

**Pond 75: Pond** Peak Elev=1,001.77' Storage=0.458 af Inflow=18.26 cfs 1.052 af
Outflow=5.60 cfs 0.996 af

**Pond 80: Pond** Peak Elev=991.97' Storage=0.731 af Inflow=29.05 cfs 1.746 af
Primary=10.96 cfs 1.174 af Secondary=0.00 cfs 0.000 af Outflow=10.96 cfs 1.174 af

**Pond 85: Pond** Peak Elev=991.92' Storage=0.548 af Inflow=10.96 cfs 1.172 af
Primary=0.00 cfs 0.000 af Secondary=1.22 cfs 0.733 af Outflow=1.22 cfs 0.733 af

**Link 15L: North Drainage** Inflow=5.25 cfs 0.982 af
Primary=5.25 cfs 0.982 af

**Link 20L: East to Shagbark Trail** Inflow=1.49 cfs 0.066 af
Primary=1.49 cfs 0.066 af

**Link 35L: East to White Oak Way** Inflow=6.63 cfs 1.864 af
Primary=6.63 cfs 1.864 af

**Link 45L: East to Hawthorn Hill Drive** Inflow=4.30 cfs 0.325 af
Primary=4.30 cfs 0.325 af

**Link 55: East to Summit Avenue** Inflow=3.21 cfs 0.178 af
Primary=3.21 cfs 0.178 af

**Link 95: West Drainage** Inflow=8.78 cfs 2.061 af
Primary=8.78 cfs 2.061 af

**Link 99: Total Existing Flow** Inflow=23.96 cfs 5.402 af
Primary=23.96 cfs 5.402 af

**Total Runoff Area = 79.900 ac Runoff Volume = 7.504 af Average Runoff Depth = 1.13"**
**80.13% Pervious = 64.023 ac 19.87% Impervious = 15.877 ac**

Time span=0.00-20.00 hrs, dt=0.03 hrs, 668 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Sim-Route method - Pond routing by Sim-Route method

**Subcatchment5N: Subarea** Runoff Area=14.800 ac 21.75% Impervious Runoff Depth>1.41"
Flow Length=185' Slope=0.0300 '/' Tc=21.6 min CN=87 Runoff=23.60 cfs 1.742 af

**Subcatchment10N: Subarea - North** Runoff Area=4.110 ac 12.48% Impervious Runoff Depth>1.09"
Flow Length=185' Slope=0.0700 '/' Tc=15.4 min CN=82 Runoff=5.96 cfs 0.373 af

**Subcatchment20E: Subarea - East to** Runoff Area=0.570 ac 16.32% Impervious Runoff Depth>1.65"
Tc=6.0 min CN=90 Runoff=1.75 cfs 0.078 af

**Subcatchment25E: Subarea** Runoff Area=6.750 ac 23.30% Impervious Runoff Depth>1.41"
Flow Length=240' Slope=0.0500 '/' Tc=21.7 min CN=87 Runoff=10.74 cfs 0.795 af

**Subcatchment30E: Subarea - East to** Runoff Area=4.200 ac 14.21% Impervious Runoff Depth>1.08"
Flow Length=645' Slope=0.0300 '/' Tc=33.9 min CN=82 Runoff=3.96 cfs 0.379 af

**Subcatchment35E: Subarea** Runoff Area=10.580 ac 20.72% Impervious Runoff Depth>1.49"
Flow Length=85' Slope=0.0600 '/' Tc=8.8 min CN=88 Runoff=26.60 cfs 1.314 af

**Subcatchment40E: Subarea - East to** Runoff Area=3.160 ac 23.07% Impervious Runoff Depth>1.48"
Flow Length=300' Slope=0.0700 '/' Tc=22.7 min CN=88 Runoff=5.16 cfs 0.391 af

**Subcatchment50E: Subarea - East to** Runoff Area=2.300 ac 16.04% Impervious Runoff Depth>1.15"
Flow Length=160' Slope=0.1000 '/' Tc=11.9 min CN=83 Runoff=3.98 cfs 0.221 af

**Subcatchment60W: Subarea - West to** Runoff Area=2.240 ac 13.39% Impervious Runoff Depth>1.15"
Flow Length=165' Slope=0.0800 '/' Tc=13.3 min CN=83 Runoff=3.69 cfs 0.215 af

**Subcatchment70W: Subarea** Runoff Area=9.180 ac 21.42% Impervious Runoff Depth>1.49"
Flow Length=140' Slope=0.0600 '/' Tc=13.1 min CN=88 Runoff=19.61 cfs 1.139 af

**Subcatchment75W: Subarea** Runoff Area=1.260 ac 22.14% Impervious Runoff Depth>1.21"
Flow Length=105' Slope=0.0800 '/' Tc=9.3 min CN=84 Runoff=2.55 cfs 0.128 af

**Subcatchment80W: Subarea** Runoff Area=17.880 ac 22.63% Impervious Runoff Depth>1.42"
Flow Length=190' Slope=0.0900 '/' Tc=14.2 min CN=87 Runoff=35.00 cfs 2.109 af

**Subcatchment90W: Subarea** Runoff Area=2.870 ac 0.00% Impervious Runoff Depth>0.86"
Flow Length=495' Slope=0.0100 '/' Tc=39.9 min CN=78 Runoff=1.90 cfs 0.206 af

**Pond 5: Pond** Peak Elev=998.02' Storage=1.231 af Inflow=23.60 cfs 1.741 af
Outflow=1.26 cfs 0.774 af

**Pond 25: Pond - too small?** Peak Elev=999.33' Storage=0.365 af Inflow=10.74 cfs 0.794 af
Outflow=3.68 cfs 0.763 af

**Pond 35: Pond** Peak Elev=995.69' Storage=0.812 af Inflow=26.60 cfs 1.313 af
Outflow=1.96 cfs 1.025 af

**Pond 75: Pond** Peak Elev=1,001.99' Storage=0.530 af Inflow=21.91 cfs 1.266 af
Outflow=8.01 cfs 1.206 af

**Pond 80: Pond** Peak Elev=992.25' Storage=0.852 af Inflow=35.00 cfs 2.108 af
Primary=13.93 cfs 1.353 af Secondary=1.24 cfs 0.118 af Outflow=15.17 cfs 1.471 af

**Pond 85: Pond** Peak Elev=992.16' Storage=0.626 af Inflow=13.93 cfs 1.351 af
Primary=0.15 cfs 0.000 af Secondary=1.93 cfs 0.862 af Outflow=1.93 cfs 0.862 af

**Link 15L: North Drainage** Inflow=6.56 cfs 1.145 af
Primary=6.56 cfs 1.145 af

**Link 20L: East to Shagbark Trail** Inflow=1.75 cfs 0.078 af
Primary=1.75 cfs 0.078 af

**Link 35L: East to White Oak Way** Inflow=8.98 cfs 2.242 af
Primary=8.98 cfs 2.242 af

**Link 45L: East to Hawthorn Hill Drive** Inflow=5.16 cfs 0.391 af
Primary=5.16 cfs 0.391 af

**Link 55: East to Summit Avenue** Inflow=3.98 cfs 0.221 af
Primary=3.98 cfs 0.221 af

**Link 95: West Drainage** Inflow=13.29 cfs 2.602 af
Primary=13.29 cfs 2.602 af

**Link 99: Total Existing Flow** Inflow=31.43 cfs 6.590 af
Primary=31.43 cfs 6.590 af

**Total Runoff Area = 79.900 ac Runoff Volume = 9.089 af Average Runoff Depth = 1.37"**
**80.13% Pervious = 64.023 ac 19.87% Impervious = 15.877 ac**

Time span=0.00-20.00 hrs, dt=0.03 hrs, 668 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Sim-Route method - Pond routing by Sim-Route method

**Subcatchment5N: Subarea** Runoff Area=14.800 ac 21.75% Impervious Runoff Depth>2.36"
Flow Length=185' Slope=0.0300 '/' Tc=21.6 min CN=87 Runoff=39.12 cfs 2.912 af

**Subcatchment10N: Subarea - North** Runoff Area=4.110 ac 12.48% Impervious Runoff Depth>1.95"
Flow Length=185' Slope=0.0700 '/' Tc=15.4 min CN=82 Runoff=10.69 cfs 0.668 af

**Subcatchment20E: Subarea - East to** Runoff Area=0.570 ac 16.32% Impervious Runoff Depth>2.64"
Tc=6.0 min CN=90 Runoff=2.74 cfs 0.126 af

**Subcatchment25E: Subarea** Runoff Area=6.750 ac 23.30% Impervious Runoff Depth>2.36"
Flow Length=240' Slope=0.0500 '/' Tc=21.7 min CN=87 Runoff=17.78 cfs 1.328 af

**Subcatchment30E: Subarea - East to** Runoff Area=4.200 ac 14.21% Impervious Runoff Depth>1.94"
Flow Length=645' Slope=0.0300 '/' Tc=33.9 min CN=82 Runoff=7.16 cfs 0.679 af

**Subcatchment35E: Subarea** Runoff Area=10.580 ac 20.72% Impervious Runoff Depth>2.46"
Flow Length=85' Slope=0.0600 '/' Tc=8.8 min CN=88 Runoff=42.97 cfs 2.167 af

**Subcatchment40E: Subarea - East to** Runoff Area=3.160 ac 23.07% Impervious Runoff Depth>2.45"
Flow Length=300' Slope=0.0700 '/' Tc=22.7 min CN=88 Runoff=8.40 cfs 0.645 af

**Subcatchment50E: Subarea - East to** Runoff Area=2.300 ac 16.04% Impervious Runoff Depth>2.03"
Flow Length=160' Slope=0.1000 '/' Tc=11.9 min CN=83 Runoff=7.00 cfs 0.389 af

**Subcatchment60W: Subarea - West to** Runoff Area=2.240 ac 13.39% Impervious Runoff Depth>2.03"
Flow Length=165' Slope=0.0800 '/' Tc=13.3 min CN=83 Runoff=6.50 cfs 0.379 af

**Subcatchment70W: Subarea** Runoff Area=9.180 ac 21.42% Impervious Runoff Depth>2.45"
Flow Length=140' Slope=0.0600 '/' Tc=13.1 min CN=88 Runoff=31.79 cfs 1.878 af

**Subcatchment75W: Subarea** Runoff Area=1.260 ac 22.14% Impervious Runoff Depth>2.11"
Flow Length=105' Slope=0.0800 '/' Tc=9.3 min CN=84 Runoff=4.39 cfs 0.222 af

**Subcatchment80W: Subarea** Runoff Area=17.880 ac 22.63% Impervious Runoff Depth>2.37"
Flow Length=190' Slope=0.0900 '/' Tc=14.2 min CN=87 Runoff=57.77 cfs 3.524 af

**Subcatchment90W: Subarea** Runoff Area=2.870 ac 0.00% Impervious Runoff Depth>1.64"
Flow Length=495' Slope=0.0100 '/' Tc=39.9 min CN=78 Runoff=3.72 cfs 0.392 af

**Pond 5: Pond** Peak Elev=999.17' Storage=2.061 af Inflow=39.12 cfs 2.911 af
Outflow=3.33 cfs 1.222 af

**Pond 25: Pond - too small?** Peak Elev=999.91' Storage=0.494 af Inflow=17.78 cfs 1.327 af
Outflow=10.56 cfs 1.287 af

**Pond 35: Pond** Peak Elev=996.51' Storage=1.262 af Inflow=42.97 cfs 2.166 af
Outflow=6.07 cfs 1.692 af

**Pond 75: Pond** Peak Elev=1,002.69' Storage=0.772 af Inflow=35.75 cfs 2.099 af
Outflow=18.27 cfs 2.025 af

**Pond 80: Pond** Peak Elev=993.10' Storage=1.237 af Inflow=57.77 cfs 3.523 af
Primary=22.03 cfs 1.940 af Secondary=11.32 cfs 0.881 af Outflow=33.35 cfs 2.821 af

**Pond 85: Pond** Peak Elev=992.71' Storage=0.811 af Inflow=22.03 cfs 1.938 af
Primary=0.00 cfs 0.000 af Secondary=7.31 cfs 1.399 af Outflow=7.31 cfs 1.399 af

**Link 15L: North Drainage** Inflow=11.62 cfs 1.886 af
Primary=11.62 cfs 1.886 af

**Link 20L: East to Shagbark Trail** Inflow=2.74 cfs 0.125 af
Primary=2.74 cfs 0.125 af

**Link 35L: East to White Oak Way** Inflow=23.86 cfs 3.779 af
Primary=23.86 cfs 3.779 af

**Link 45L: East to Hawthorn Hill Drive** Inflow=8.40 cfs 0.645 af
Primary=8.40 cfs 0.645 af

**Link 55: East to Summit Avenue** Inflow=7.00 cfs 0.389 af
Primary=7.00 cfs 0.389 af

**Link 95: West Drainage** Inflow=37.10 cfs 5.071 af
Primary=37.10 cfs 5.071 af

**Link 99: Total Existing Flow** Inflow=75.57 cfs 11.757 af
Primary=75.57 cfs 11.757 af

**Total Runoff Area = 79.900 ac Runoff Volume = 15.309 af Average Runoff Depth = 2.30"**
**80.13% Pervious = 64.023 ac 19.87% Impervious = 15.877 ac**

Time span=0.00-20.00 hrs, dt=0.03 hrs, 668 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Sim-Route method - Pond routing by Sim-Route method

**Subcatchment5N: Subarea** Runoff Area=14.800 ac 21.75% Impervious Runoff Depth>4.52"
Flow Length=185' Slope=0.0300 '/' Tc=21.6 min CN=87 Runoff=72.86 cfs 5.569 af

**Subcatchment10N: Subarea - North** Runoff Area=4.110 ac 12.48% Impervious Runoff Depth>3.99"
Flow Length=185' Slope=0.0700 '/' Tc=15.4 min CN=82 Runoff=21.46 cfs 1.367 af

**Subcatchment20E: Subarea - East to** Runoff Area=0.570 ac 16.32% Impervious Runoff Depth>4.86"
Tc=6.0 min CN=90 Runoff=4.84 cfs 0.231 af

**Subcatchment25E: Subarea** Runoff Area=6.750 ac 23.30% Impervious Runoff Depth>4.52"
Flow Length=240' Slope=0.0500 '/' Tc=21.7 min CN=87 Runoff=33.11 cfs 2.540 af

**Subcatchment30E: Subarea - East to** Runoff Area=4.200 ac 14.21% Impervious Runoff Depth>3.97"
Flow Length=645' Slope=0.0300 '/' Tc=33.9 min CN=82 Runoff=14.48 cfs 1.391 af

**Subcatchment35E: Subarea** Runoff Area=10.580 ac 20.72% Impervious Runoff Depth>4.64"
Flow Length=85' Slope=0.0600 '/' Tc=8.8 min CN=88 Runoff=78.14 cfs 4.088 af

**Subcatchment40E: Subarea - East to** Runoff Area=3.160 ac 23.07% Impervious Runoff Depth>4.62"
Flow Length=300' Slope=0.0700 '/' Tc=22.7 min CN=88 Runoff=15.42 cfs 1.217 af

**Subcatchment50E: Subarea - East to** Runoff Area=2.300 ac 16.04% Impervious Runoff Depth>4.10"
Flow Length=160' Slope=0.1000 '/' Tc=11.9 min CN=83 Runoff=13.77 cfs 0.786 af

**Subcatchment60W: Subarea - West to** Runoff Area=2.240 ac 13.39% Impervious Runoff Depth>4.10"
Flow Length=165' Slope=0.0800 '/' Tc=13.3 min CN=83 Runoff=12.80 cfs 0.765 af

**Subcatchment70W: Subarea** Runoff Area=9.180 ac 21.42% Impervious Runoff Depth>4.63"
Flow Length=140' Slope=0.0600 '/' Tc=13.1 min CN=88 Runoff=58.03 cfs 3.544 af

**Subcatchment75W: Subarea** Runoff Area=1.260 ac 22.14% Impervious Runoff Depth>4.21"
Flow Length=105' Slope=0.0800 '/' Tc=9.3 min CN=84 Runoff=8.48 cfs 0.442 af

**Subcatchment80W: Subarea** Runoff Area=17.880 ac 22.63% Impervious Runoff Depth>4.52"
Flow Length=190' Slope=0.0900 '/' Tc=14.2 min CN=87 Runoff=107.13 cfs 6.739 af

**Subcatchment90W: Subarea** Runoff Area=2.870 ac 0.00% Impervious Runoff Depth>3.56"
Flow Length=495' Slope=0.0100 '/' Tc=39.9 min CN=78 Runoff=8.11 cfs 0.851 af

**Pond 5: Pond** Peak Elev=1,000.12' Storage=2.821 af Inflow=72.86 cfs 5.567 af
Outflow=33.85 cfs 3.694 af

**Pond 25: Pond - too small?** Peak Elev=1,000.78' Storage=0.721 af Inflow=33.11 cfs 2.539 af
Outflow=25.64 cfs 2.469 af

**Pond 35: Pond** Peak Elev=997.76' Storage=2.015 af Inflow=78.14 cfs 4.087 af
Outflow=25.14 cfs 3.450 af

**Pond 75: Pond** Peak Elev=1,003.80' Storage=1.231 af Inflow=65.69 cfs 3.984 af
Outflow=41.04 cfs 3.886 af

**Pond 80: Pond** Peak Elev=994.93' Storage=2.191 af Inflow=107.13 cfs 6.736 af
Primary=31.25 cfs 3.612 af Secondary=20.25 cfs 2.366 af Outflow=50.94 cfs 5.977 af

**Pond 85: Pond** Peak Elev=993.69' Storage=1.171 af Inflow=31.25 cfs 3.609 af
Primary=0.00 cfs 0.000 af Secondary=23.23 cfs 3.026 af Outflow=23.23 cfs 3.026 af

**Link 15L: North Drainage** Inflow=40.04 cfs 5.057 af
Primary=40.04 cfs 5.057 af

**Link 20L: East to Shagbark Trail** Inflow=4.84 cfs 0.231 af
Primary=4.84 cfs 0.231 af

**Link 35L: East to White Oak Way** Inflow=65.96 cfs 7.533 af
Primary=65.96 cfs 7.533 af

**Link 45L: East to Hawthorn Hill Drive** Inflow=15.42 cfs 1.217 af
Primary=15.42 cfs 1.217 af

**Link 55: East to Summit Avenue** Inflow=13.77 cfs 0.785 af
Primary=13.77 cfs 0.785 af

**Link 95: West Drainage** Inflow=90.49 cfs 10.887 af
Primary=90.49 cfs 10.887 af

**Link 99: Total Existing Flow** Inflow=207.45 cfs 25.461 af
Primary=207.45 cfs 25.461 af

**Total Runoff Area = 79.900 ac Runoff Volume = 29.530 af Average Runoff Depth = 4.43"**
**80.13% Pervious = 64.023 ac 19.87% Impervious = 15.877 ac**

## Summary for Subcatchment 5N: Subarea

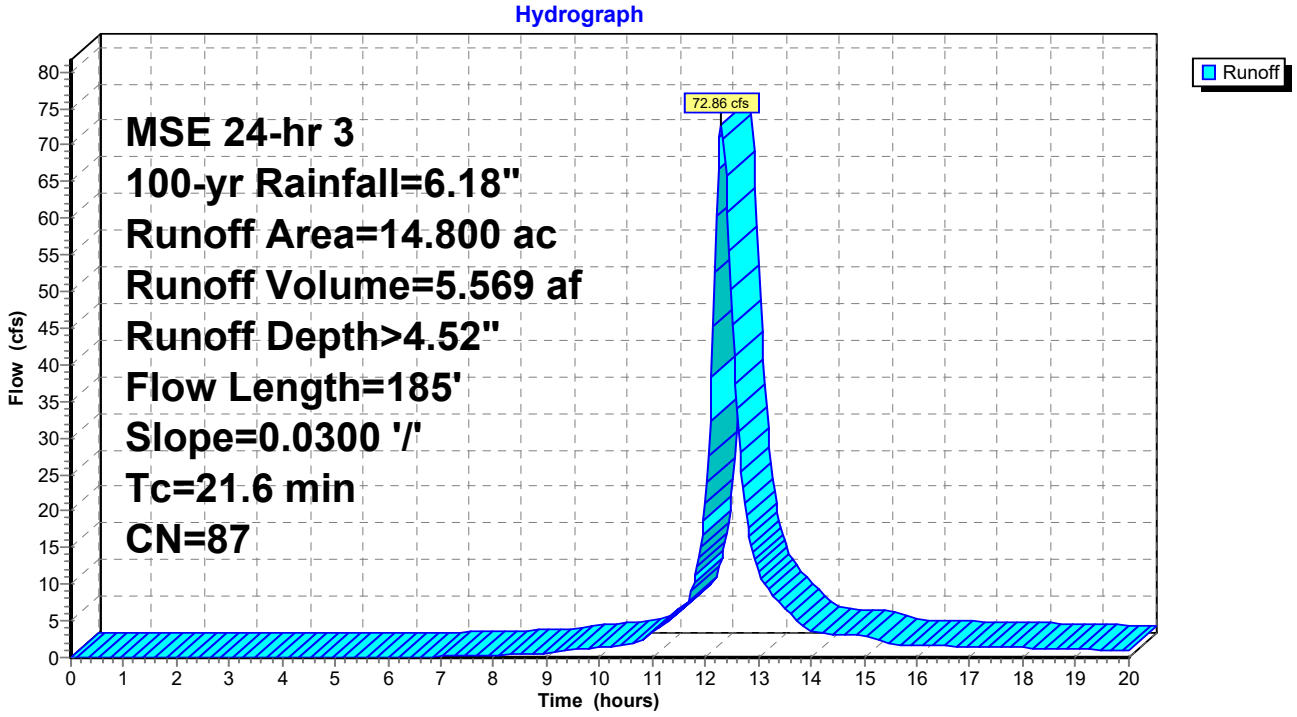
Runoff = 72.86 cfs @ 12.31 hrs, Volume= 5.569 af, Depth> 4.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-20.01 hrs, dt= 0.03 hrs
MSE 24-hr 3 100-yr Rainfall=6.18"

| | Area (ac) | CN | Description |
|---|---|---|---|
| * | 0.150 | 77 | woodland - D soils |
| * | 0.540 | 98 | water |
| * | 2.340 | 95 | road |
| | 8.930 | 86 | 1/3 acre lots, 30% imp, HSG D |
| * | 2.840 | 80 | grass - D soils |
| | 14.800 | 87 | Weighted Average |
| | 11.581 | | 78.25% Pervious Area |
| | 3.219 | | 21.75% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 21.6 | 185 | 0.0300 | 0.14 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 2.70" |

## Subcatchment 5N: Subarea



## Summary for Subcatchment 10N: Subarea - North Drainage

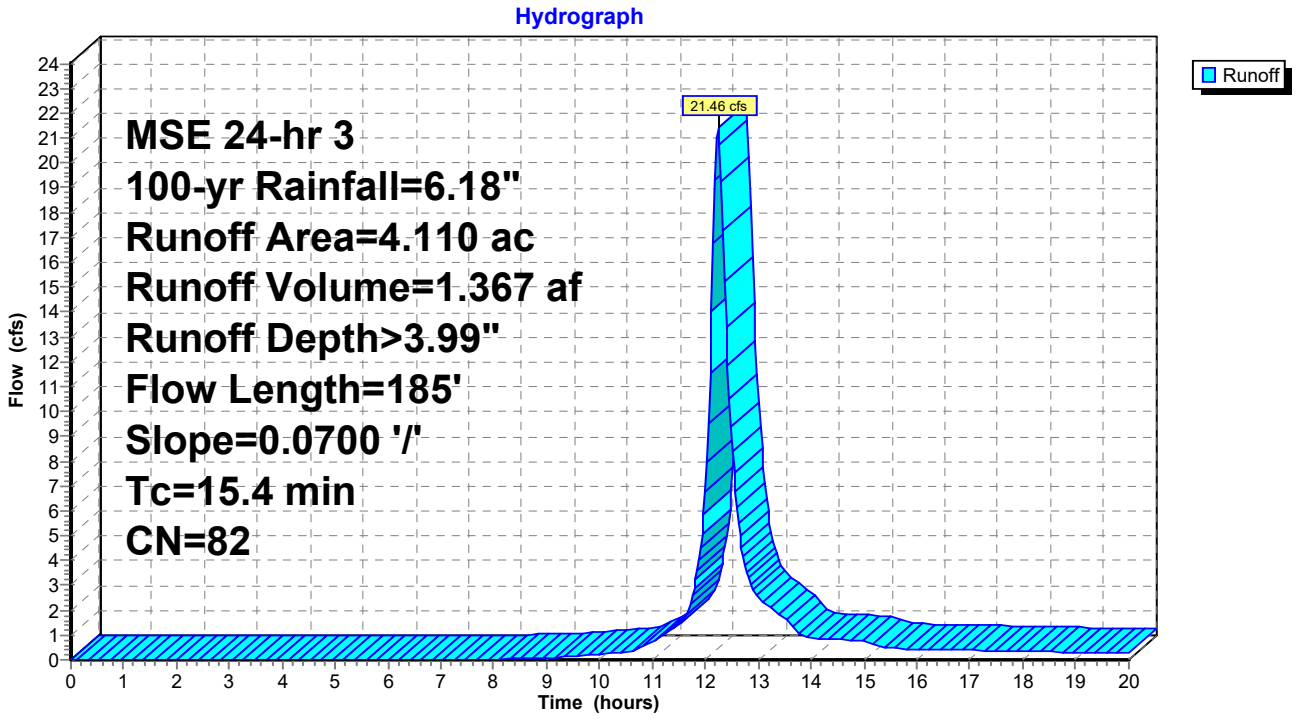
Runoff = 21.46 cfs @ 12.24 hrs, Volume= 1.367 af, Depth> 3.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-20.01 hrs, dt= 0.03 hrs
MSE 24-hr 3 100-yr Rainfall=6.18"

| | Area (ac) | CN | Description |
|---|---|---|---|
| * | 0.910 | 77 | woodland - D soils |
| * | 0.570 | 78 | wetland - D soils |
| * | 0.920 | 80 | grass - D soils |
| | 1.710 | 86 | 1/3 acre lots, 30% imp, HSG D |
| | 4.110 | 82 | Weighted Average |
| | 3.597 | | 87.52% Pervious Area |
| | 0.513 | | 12.48% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 15.4 | 185 | 0.0700 | 0.20 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 2.70" |

## Subcatchment 10N: Subarea - North Drainage



## Summary for Subcatchment 20E: Subarea - East to Shagbark Trail

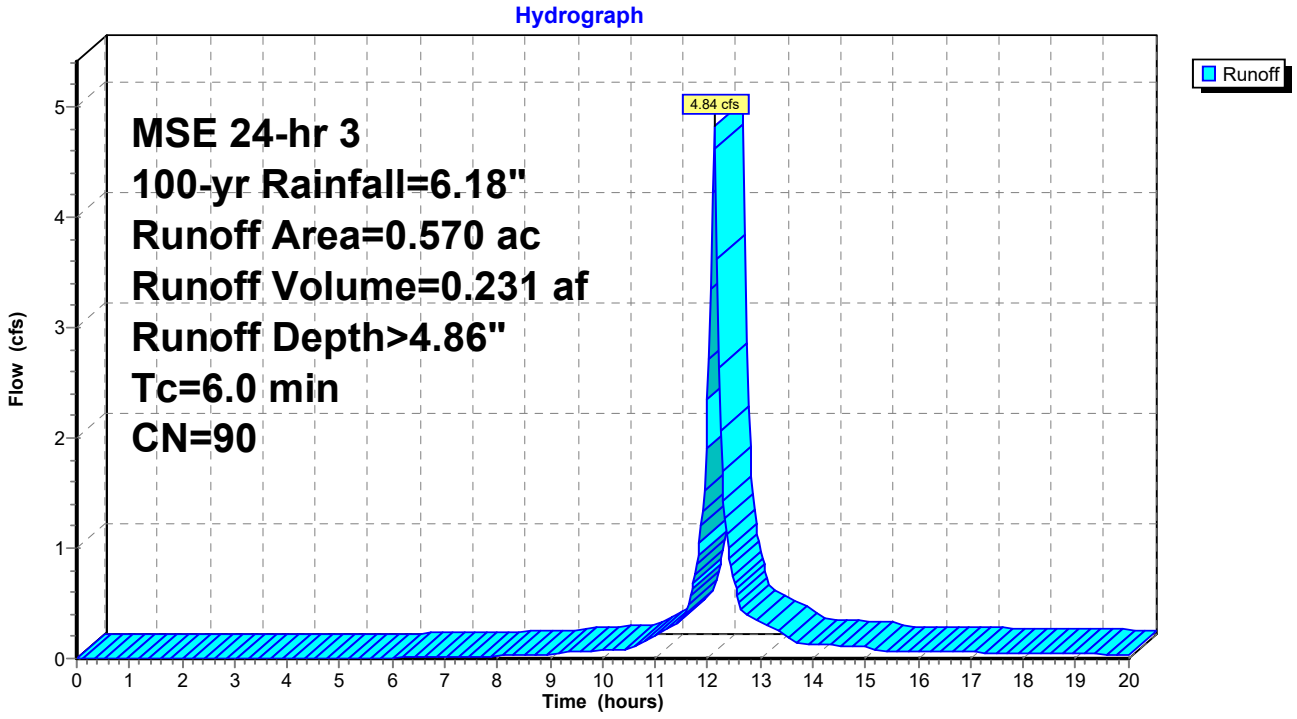
Runoff = 4.84 cfs @ 12.13 hrs, Volume= 0.231 af, Depth> 4.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-20.01 hrs, dt= 0.03 hrs
MSE 24-hr 3 100-yr Rainfall=6.18"

| | Area (ac) | CN | Description |
|---|---|---|---|
| * | 0.260 | 95 | road |
| | 0.310 | 86 | 1/3 acre lots, 30% imp, HSG D |
| | 0.570 | 90 | Weighted Average |
| | 0.477 | | 83.68% Pervious Area |
| | 0.093 | | 16.32% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 6.0 | | | | | **Direct Entry,** |

## Subcatchment 20E: Subarea - East to Shagbark Trail



## Summary for Subcatchment 25E: Subarea

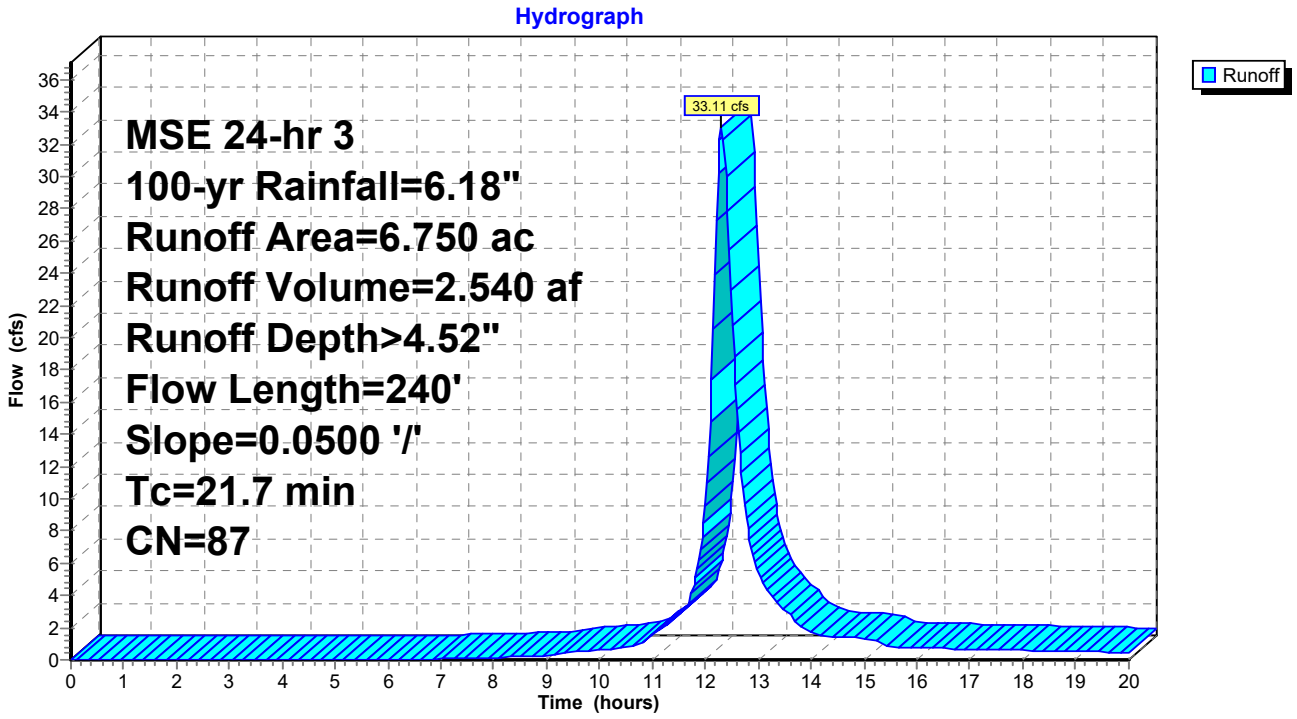
Runoff = 33.11 cfs @ 12.31 hrs, Volume= 2.540 af, Depth> 4.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-20.01 hrs, dt= 0.03 hrs
MSE 24-hr 3 100-yr Rainfall=6.18"

| | Area (ac) | CN | Description |
|---|---|---|---|
| * | 1.190 | 95 | road |
| | 4.710 | 86 | 1/3 acre lots, 30% imp, HSG D |
| * | 0.690 | 80 | grass - D soils |
| * | 0.160 | 98 | water |
| | 6.750 | 87 | Weighted Average |
| | 5.177 | | 76.70% Pervious Area |
| | 1.573 | | 23.30% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 21.7 | 240 | 0.0500 | 0.18 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 2.70" |

## Subcatchment 25E: Subarea



## Summary for Subcatchment 30E: Subarea - East to White Oak Way

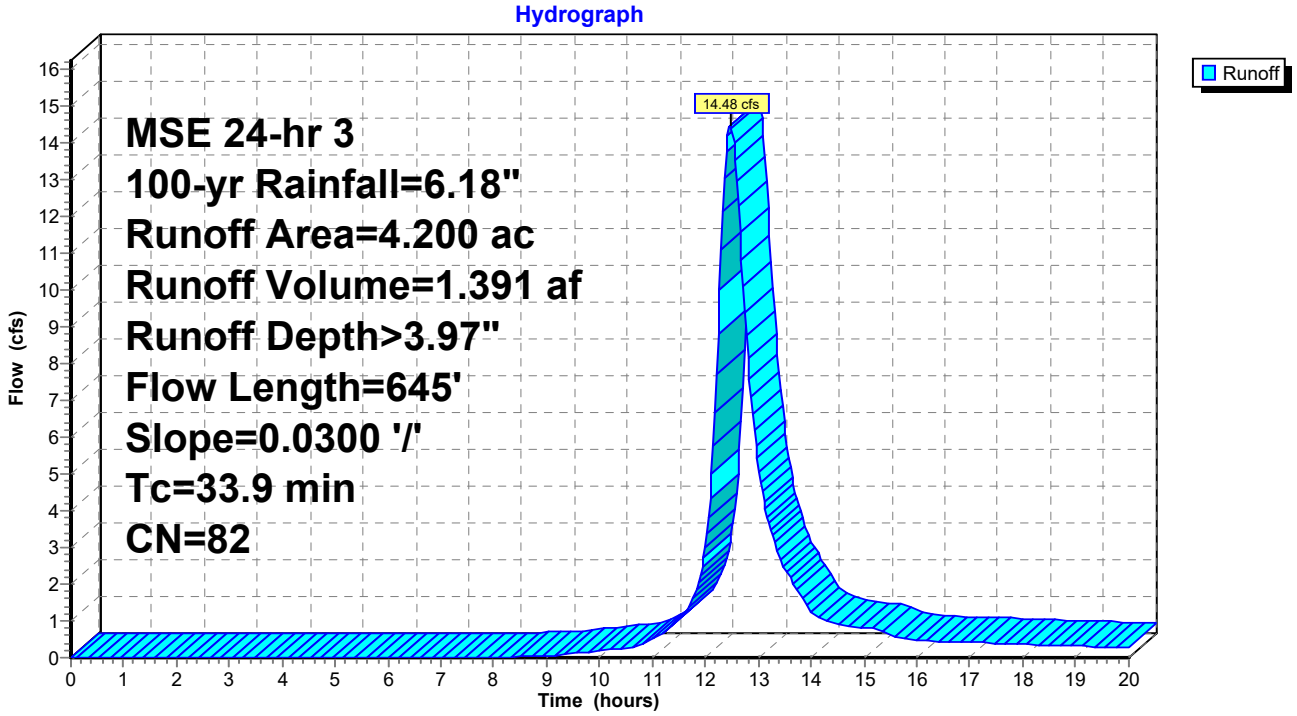
Runoff = 14.48 cfs @ 12.47 hrs, Volume= 1.391 af, Depth> 3.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-20.01 hrs, dt= 0.03 hrs
MSE 24-hr 3 100-yr Rainfall=6.18"

| | Area (ac) | CN | Description |
|---|---|---|---|
| * | 0.040 | 77 | woodland - D soils |
| * | 1.310 | 78 | wetland - D soils |
| | 1.990 | 86 | 1/3 acre lots, 30% imp, HSG D |
| * | 0.860 | 80 | grass - D soils |
| | 4.200 | 82 | Weighted Average |
| | 3.603 | | 85.79% Pervious Area |
| | 0.597 | | 14.21% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 31.8 | 300 | 0.0300 | 0.16 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 2.70" |
| 2.1 | 345 | 0.0300 | 2.79 | | **Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps |
| 33.9 | 645 | Total | | | |

## Subcatchment 30E: Subarea - East to White Oak Way



## Summary for Subcatchment 35E: Subarea

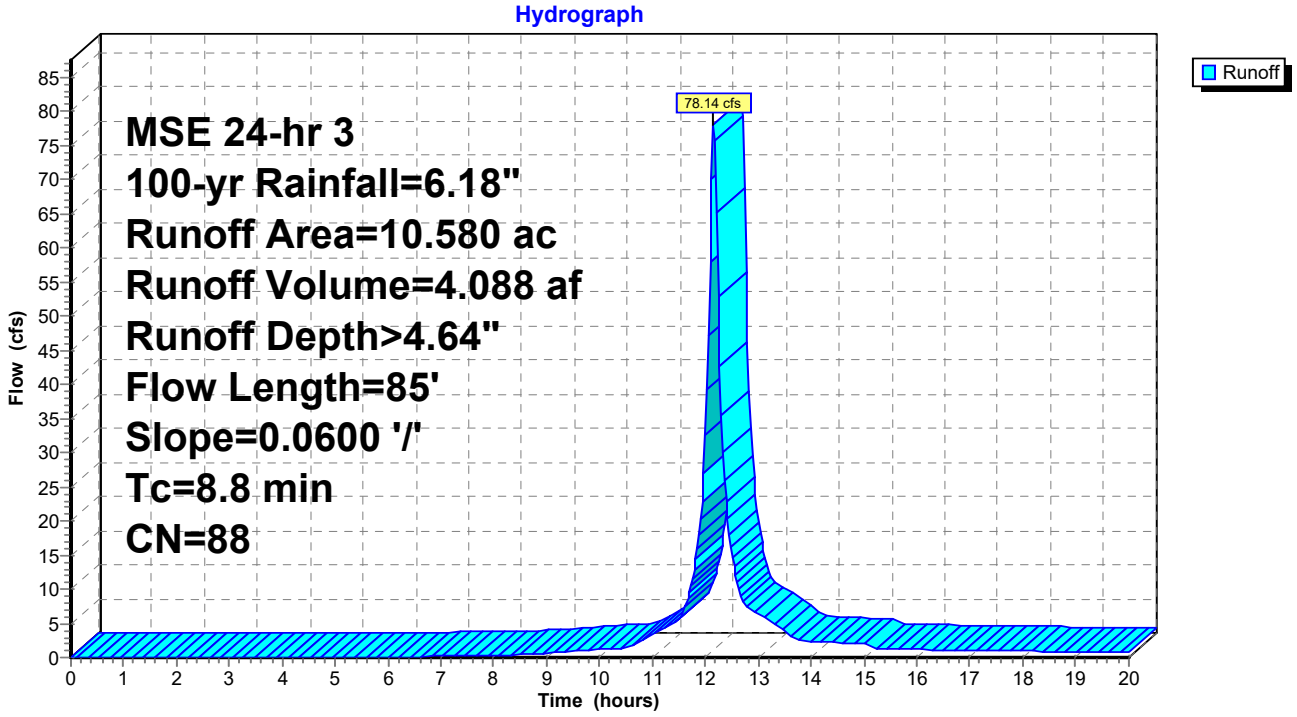
Runoff = 78.14 cfs @ 12.16 hrs, Volume= 4.088 af, Depth> 4.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-20.01 hrs, dt= 0.03 hrs
MSE 24-hr 3 100-yr Rainfall=6.18"

| | Area (ac) | CN | Description |
|---|---|---|---|
| * | 0.250 | 77 | woodland - D soils |
| * | 0.350 | 98 | water |
| * | 2.500 | 95 | road |
| | 6.140 | 86 | 1/3 acre lots, 30% imp, HSG D |
| * | 1.340 | 80 | grass - D soils |
| | 10.580 | 88 | Weighted Average |
| | 8.388 | | 79.28% Pervious Area |
| | 2.192 | | 20.72% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 8.8 | 85 | 0.0600 | 0.16 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 2.70" |

## Subcatchment 35E: Subarea



## Summary for Subcatchment 40E: Subarea - East to Hawthorn Hill Drive

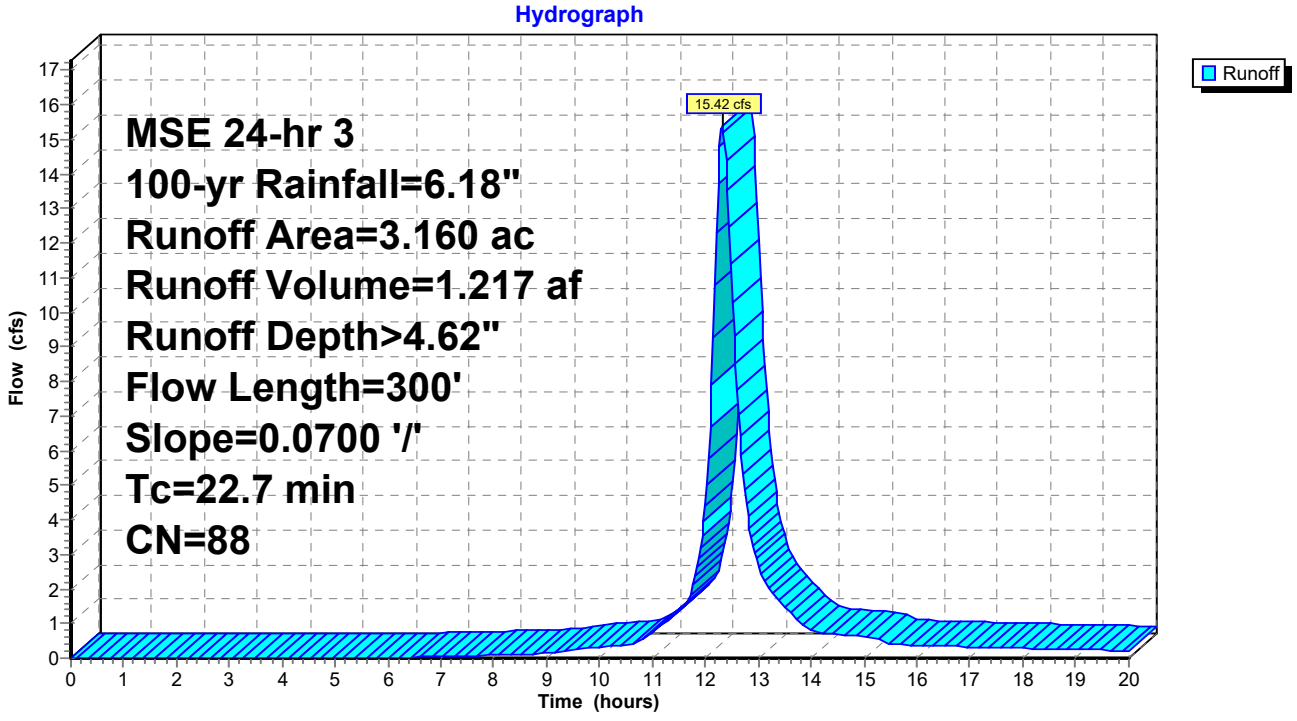
Runoff = 15.42 cfs @ 12.32 hrs, Volume= 1.217 af, Depth> 4.62"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-20.01 hrs, dt= 0.03 hrs
MSE 24-hr 3 100-yr Rainfall=6.18"

| | Area (ac) | CN | Description |
|---|---|---|---|
| * | 0.730 | 95 | road |
| | 2.430 | 86 | 1/3 acre lots, 30% imp, HSG D |
| | 3.160 | 88 | Weighted Average |
| | 2.431 | | 76.93% Pervious Area |
| | 0.729 | | 23.07% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 22.7 | 300 | 0.0700 | 0.22 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 2.70" |

## Subcatchment 40E: Subarea - East to Hawthorn Hill Drive



## Summary for Subcatchment 50E: Subarea - East to Summit Avenue

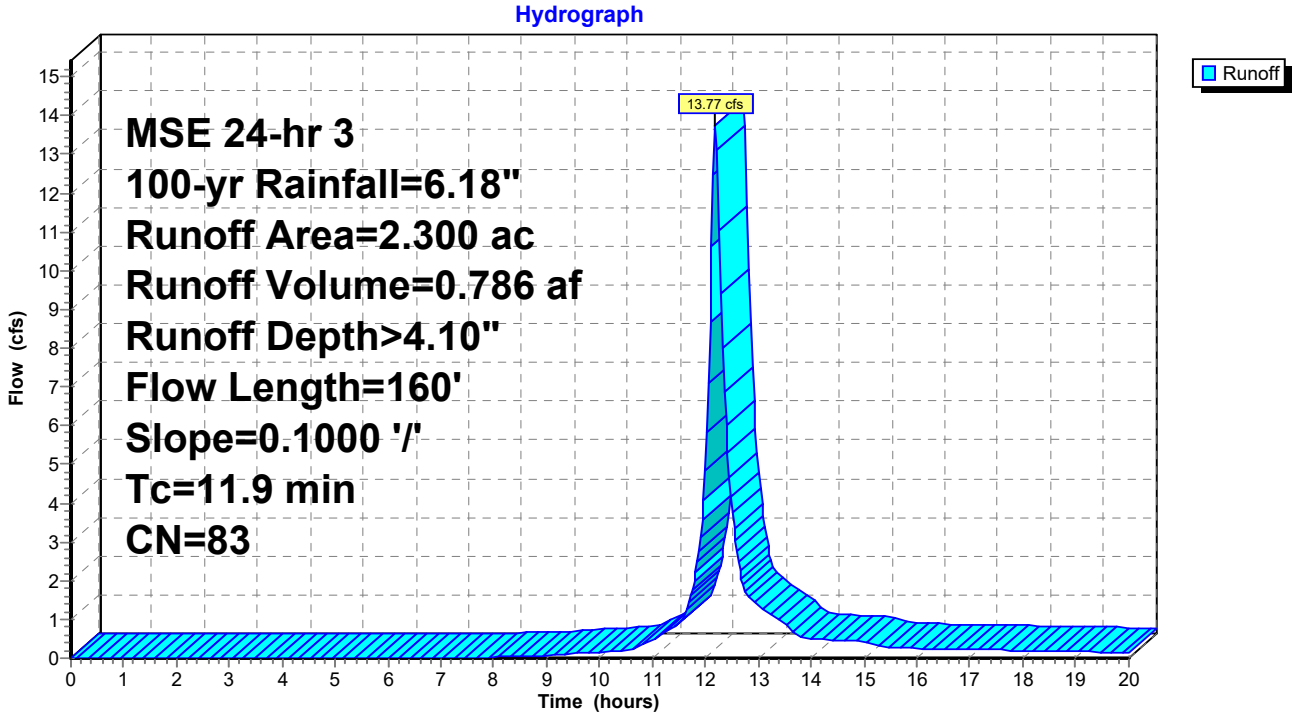
Runoff = 13.77 cfs @ 12.20 hrs, Volume= 0.786 af, Depth> 4.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-20.01 hrs, dt= 0.03 hrs
MSE 24-hr 3 100-yr Rainfall=6.18"

| | Area (ac) | CN | Description |
|---|---|---|---|
| | 1.230 | 86 | 1/3 acre lots, 30% imp, HSG D |
| * | 1.070 | 80 | grass - D soils |
| | 2.300 | 83 | Weighted Average |
| | 1.931 | | 83.96% Pervious Area |
| | 0.369 | | 16.04% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 11.9 | 160 | 0.1000 | 0.22 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 2.70" |

## Subcatchment 50E: Subarea - East to Summit Avenue



## Summary for Subcatchment 60W: Subarea - West to Summit Avenue

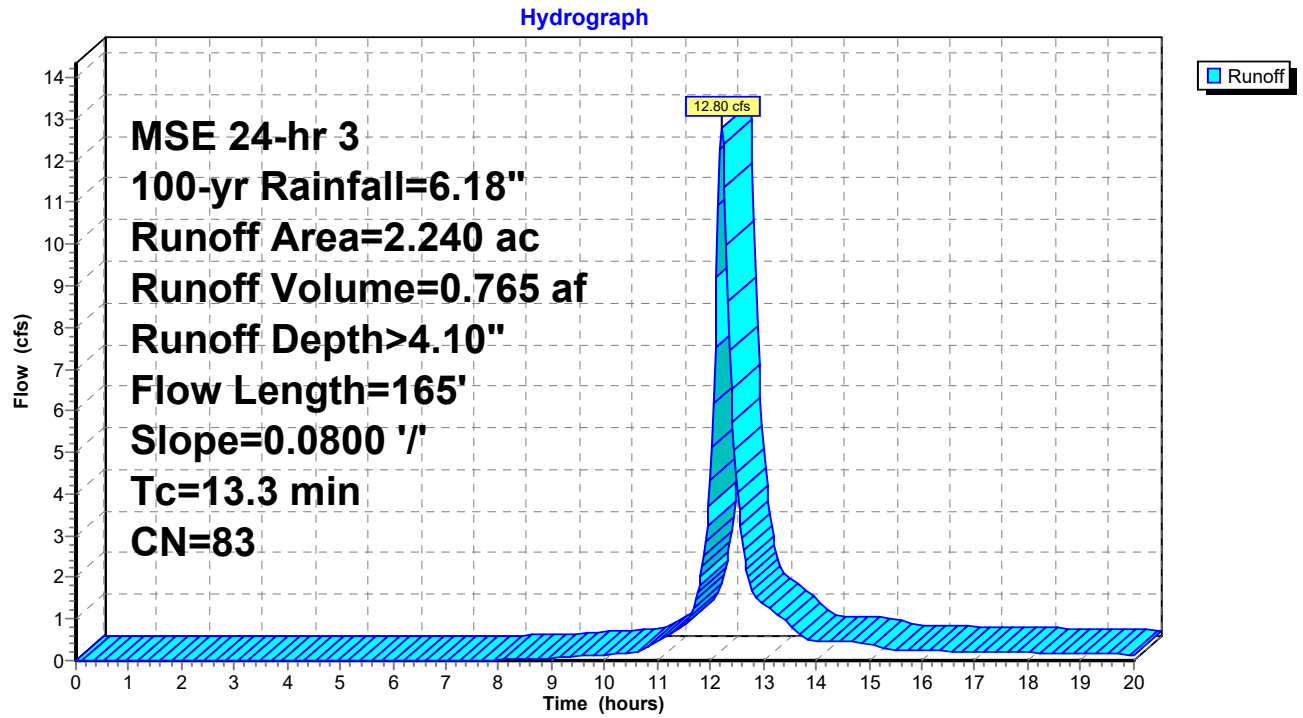
Runoff = 12.80 cfs @ 12.21 hrs, Volume= 0.765 af, Depth> 4.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-20.01 hrs, dt= 0.03 hrs
MSE 24-hr 3 100-yr Rainfall=6.18"

| | Area (ac) | CN | Description |
|---|---|---|---|
| * | 0.090 | 95 | road |
| | 1.000 | 86 | 1/3 acre lots, 30% imp, HSG D |
| * | 1.150 | 80 | grass - D soils |
| | 2.240 | 83 | Weighted Average |
| | 1.940 | | 86.61% Pervious Area |
| | 0.300 | | 13.39% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 13.3 | 165 | 0.0800 | 0.21 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 2.70" |

## Subcatchment 60W: Subarea - West to Summit Avenue



## Summary for Subcatchment 70W: Subarea

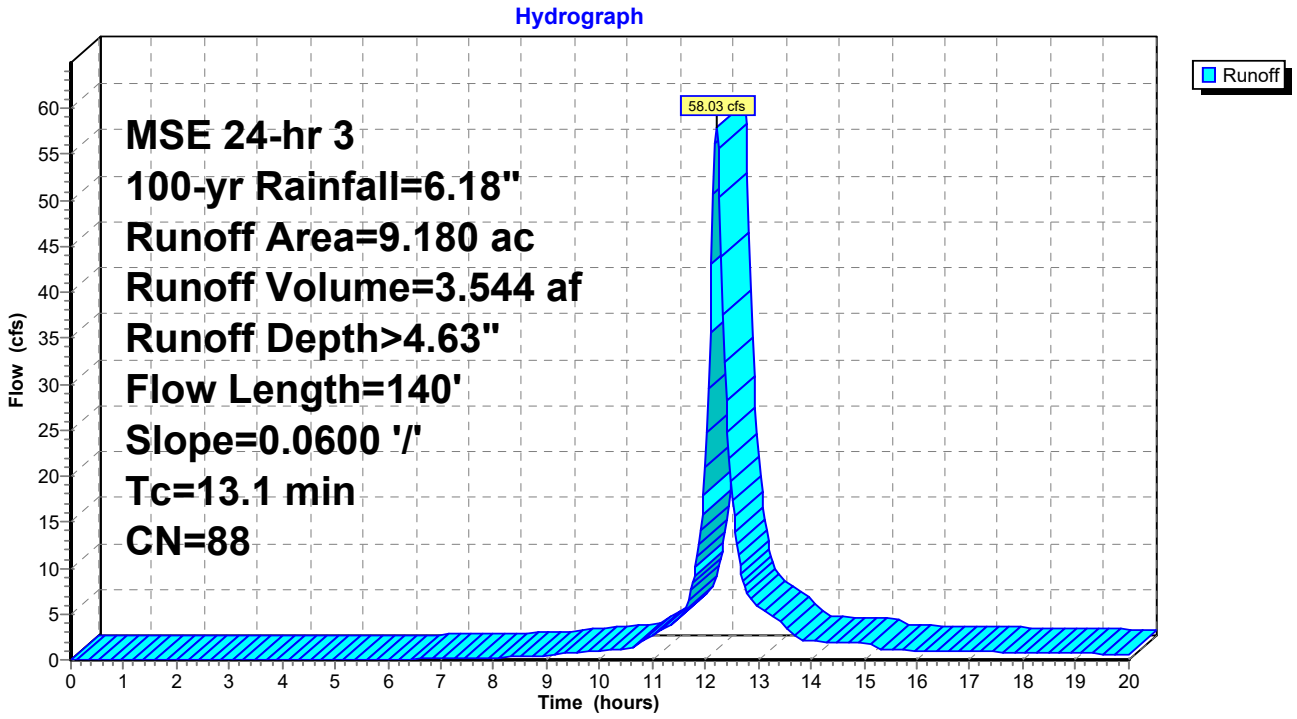
Runoff = 58.03 cfs @ 12.21 hrs, Volume= 3.544 af, Depth> 4.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-20.01 hrs, dt= 0.03 hrs
MSE 24-hr 3 100-yr Rainfall=6.18"

| | Area (ac) | CN | Description |
|---|---|---|---|
| * | 2.410 | 95 | road |
| | 5.520 | 86 | 1/3 acre lots, 30% imp, HSG D |
| * | 0.940 | 80 | grass - D soils |
| * | 0.310 | 98 | water |
| | 9.180 | 88 | Weighted Average |
| | 7.214 | | 78.58% Pervious Area |
| | 1.966 | | 21.42% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 13.1 | 140 | 0.0600 | 0.18 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 2.70" |

## Subcatchment 70W: Subarea



## Summary for Subcatchment 75W: Subarea

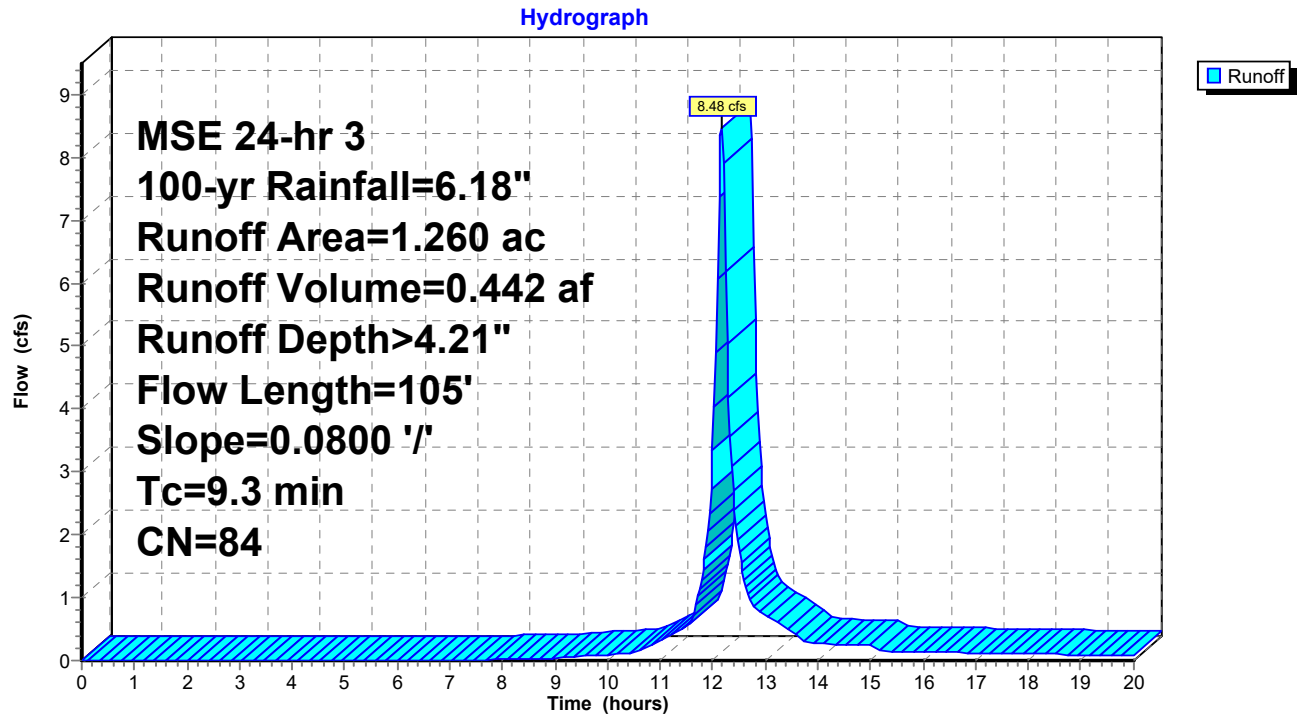
Runoff = 8.48 cfs @ 12.17 hrs, Volume= 0.442 af, Depth> 4.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-20.01 hrs, dt= 0.03 hrs
MSE 24-hr 3 100-yr Rainfall=6.18"

| | Area (ac) | CN | Description |
|---|---|---|---|
| | 0.530 | 86 | 1/3 acre lots, 30% imp, HSG D |
| * | 0.610 | 80 | grass - D soils |
| * | 0.120 | 98 | water |
| | 1.260 | 84 | Weighted Average |
| | 0.981 | | 77.86% Pervious Area |
| | 0.279 | | 22.14% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 9.3 | 105 | 0.0800 | 0.19 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 2.70" |

## Subcatchment 75W: Subarea



## Summary for Subcatchment 80W: Subarea

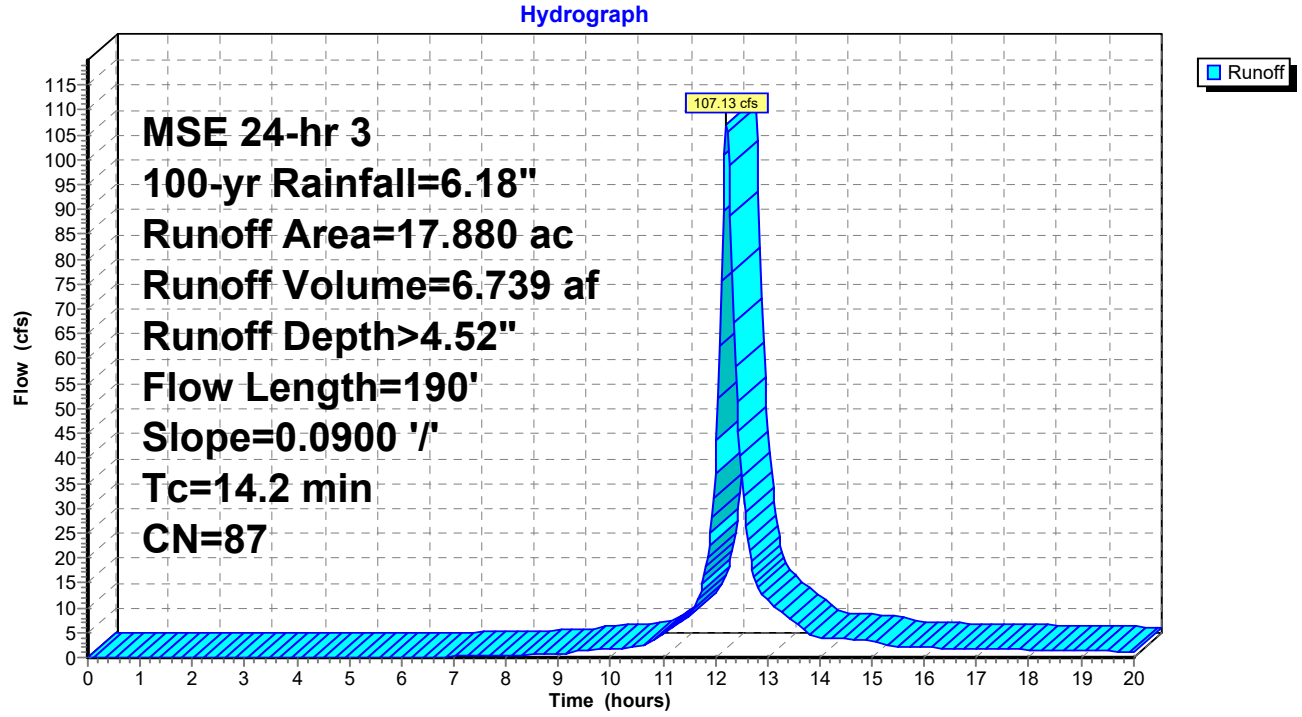
Runoff = 107.13 cfs @ 12.22 hrs, Volume= 6.739 af, Depth> 4.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-20.01 hrs, dt= 0.03 hrs
MSE 24-hr 3 100-yr Rainfall=6.18"

| | Area (ac) | CN | Description |
|---|---|---|---|
| * | 0.040 | 77 | woodland - D soils |
| * | 0.630 | 98 | water |
| * | 3.430 | 95 | road |
| | 11.390 | 86 | 1/3 acre lots, 30% imp, HSG D |
| * | 2.390 | 80 | grass - D soils |
| | 17.880 | 87 | Weighted Average |
| | 13.833 | | 77.37% Pervious Area |
| | 4.047 | | 22.63% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 14.2 | 190 | 0.0900 | 0.22 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 2.70" |

## Subcatchment 80W: Subarea



## Summary for Subcatchment 90W: Subarea

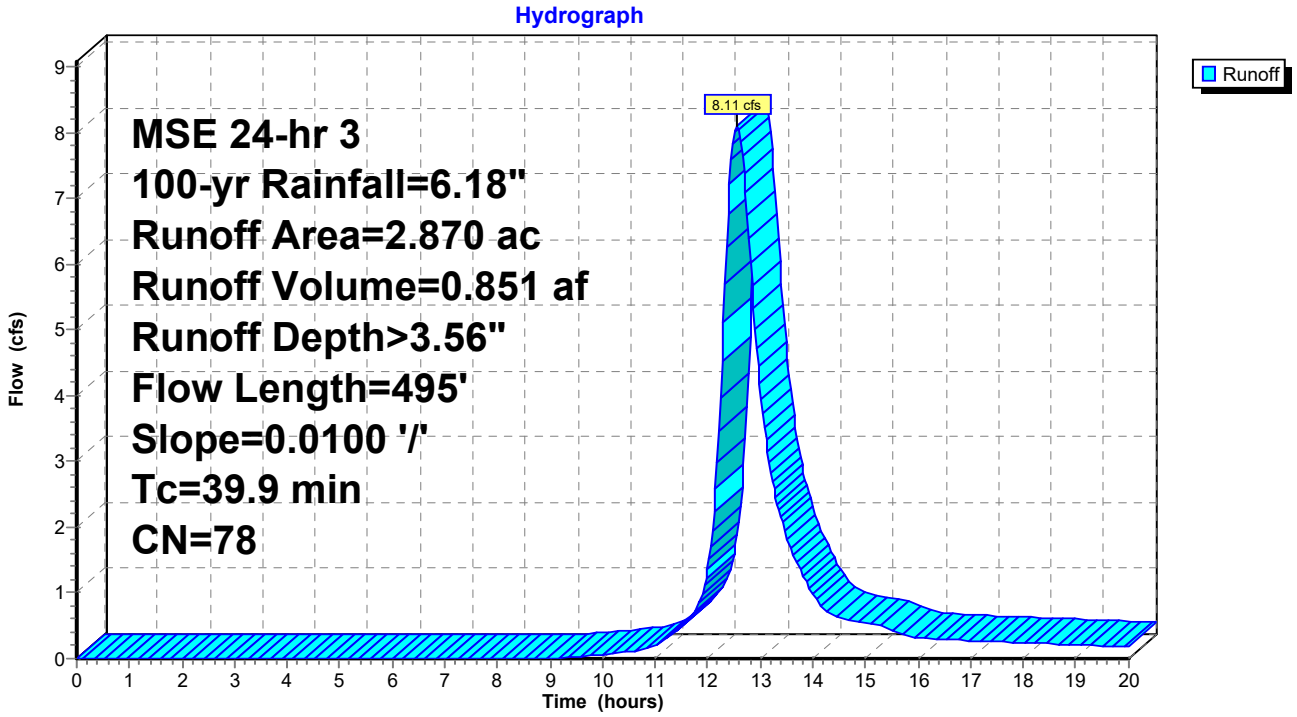
Runoff = 8.11 cfs @ 12.55 hrs, Volume= 0.851 af, Depth> 3.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-20.01 hrs, dt= 0.03 hrs
MSE 24-hr 3 100-yr Rainfall=6.18"

| | Area (ac) | CN | Description |
|---|---|---|---|
| * | 1.630 | 77 | woodland - D soils |
| * | 0.190 | 78 | wetland - D soils |
| * | 1.050 | 80 | grass - D soils |
| | 2.870 | 78 | Weighted Average |
| | 2.870 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 28.4 | 150 | 0.0100 | 0.09 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 2.70" |
| 11.5 | 345 | 0.0100 | 0.50 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 39.9 | 495 | Total | | | |

## Subcatchment 90W: Subarea



## Summary for Pond 5: Pond

Inflow Area = 14.800 ac, 21.75% Impervious, Inflow Depth > 4.51" for 100-yr event
Inflow = 72.86 cfs @ 12.31 hrs, Volume= 5.567 af
Outflow = 33.85 cfs @ 12.62 hrs, Volume= 3.694 af, Atten= 54%, Lag= 18.6 min
Primary = 33.85 cfs @ 12.62 hrs, Volume= 3.694 af

Routing by Sim-Route method, Time Span= 0.00-20.01 hrs, dt= 0.03 hrs
Peak Elev= 1,000.12' @ 12.62 hrs Surf.Area= 0.830 ac Storage= 2.821 af

Plug-Flow detention time= 117.4 min calculated for 3.689 af (66% of inflow)
Center-of-Mass det. time= 64.7 min ( 839.0 - 774.2 )

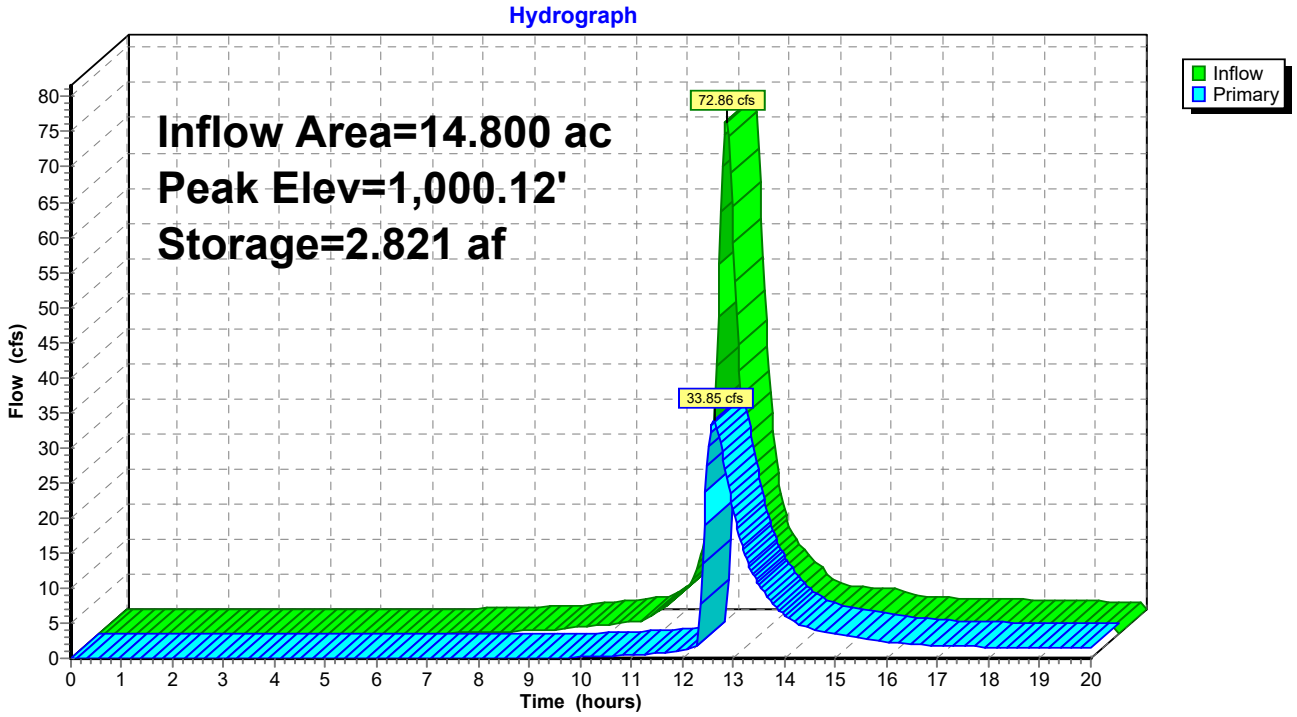
| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 996.00' | 3.578 af | **Custom Stage Data (Conic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (acres) | Inc.Store (acre-feet) | Cum.Store (acre-feet) | Wet.Area (acres) |
|---|---|---|---|---|
| 996.00 | 0.540 | 0.000 | 0.000 | 0.540 |
| 997.00 | 0.610 | 0.575 | 0.575 | 0.611 |
| 998.00 | 0.680 | 0.645 | 1.219 | 0.682 |
| 999.00 | 0.750 | 0.715 | 1.934 | 0.754 |
| 1,000.00 | 0.820 | 0.785 | 2.719 | 0.826 |
| 1,001.00 | 0.900 | 0.860 | 3.578 | 0.907 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 996.00' | **6.0" Vert. Orifice/Grate** C= 0.600 |
| #2 | Primary | 999.00' | **10.0' long x 10.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64 |

**Primary OutFlow** Max=33.80 cfs @ 12.62 hrs HW=1,000.12' TW=0.00' (Dynamic Tailwater)
**1=Orifice/Grate** (Orifice Controls 1.86 cfs @ 9.47 fps)
**2=Broad-Crested Rectangular Weir** (Weir Controls 31.94 cfs @ 2.85 fps)

## Pond 5: Pond


Hydrograph
Inflow Area=14.800 ac
Peak Elev=1,000.12'
Storage=2.821 af
72.86 cfs
33.85 cfs
Inflow
Primary
Flow (cfs)
Time (hours)
0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20

## Stage-Discharge for Pond 5: Pond

| Elevation (feet) | Primary (cfs) | Elevation (feet) | Primary (cfs) |
|---|---|---|---|
| 996.00 | 0.00 | 998.60 | 1.45 |
| 996.05 | 0.01 | 998.65 | 1.46 |
| 996.10 | 0.03 | 998.70 | 1.48 |
| 996.15 | 0.07 | 998.75 | 1.49 |
| 996.20 | 0.11 | 998.80 | 1.51 |
| 996.25 | 0.17 | 998.85 | 1.52 |
| 996.30 | 0.23 | 998.90 | 1.54 |
| 996.35 | 0.30 | 998.95 | 1.55 |
| 996.40 | 0.36 | 999.00 | 1.57 |
| 996.45 | 0.43 | 999.05 | 1.86 |
| 996.50 | 0.47 | 999.10 | 2.38 |
| 996.55 | 0.52 | 999.15 | 3.06 |
| 996.60 | 0.56 | 999.20 | 3.85 |
| 996.65 | 0.60 | 999.25 | 4.77 |
| 996.70 | 0.63 | 999.30 | 5.80 |
| 996.75 | 0.67 | 999.35 | 6.93 |
| 996.80 | 0.70 | 999.40 | 8.15 |
| 996.85 | 0.73 | 999.45 | 9.52 |
| 996.90 | 0.76 | 999.50 | 11.00 |
| 996.95 | 0.79 | 999.55 | 12.59 |
| 997.00 | 0.82 | 999.60 | 14.28 |
| 997.05 | 0.85 | 999.65 | 15.88 |
| 997.10 | 0.87 | 999.70 | 17.54 |
| 997.15 | 0.90 | 999.75 | 19.26 |
| 997.20 | 0.92 | 999.80 | 21.03 |
| 997.25 | 0.95 | 999.85 | 22.85 |
| 997.30 | 0.97 | 999.90 | 24.73 |
| 997.35 | 0.99 | 999.95 | 26.66 |
| 997.40 | 1.01 | 1,000.00 | 28.63 |
| 997.45 | 1.04 | 1,000.05 | 30.70 |
| 997.50 | 1.06 | 1,000.10 | 32.83 |
| 997.55 | 1.08 | 1,000.15 | 35.01 |
| 997.60 | 1.10 | 1,000.20 | 37.24 |
| 997.65 | 1.12 | 1,000.25 | 39.41 |
| 997.70 | 1.14 | 1,000.30 | 41.63 |
| 997.75 | 1.16 | 1,000.35 | 43.87 |
| 997.80 | 1.18 | 1,000.40 | 46.15 |
| 997.85 | 1.20 | 1,000.45 | 48.43 |
| 997.90 | 1.21 | 1,000.50 | 50.72 |
| 997.95 | 1.23 | 1,000.55 | 53.05 |
| 998.00 | 1.25 | 1,000.60 | 55.40 |
| 998.05 | 1.27 | 1,000.65 | 57.94 |
| 998.10 | 1.29 | 1,000.70 | 60.51 |
| 998.15 | 1.30 | 1,000.75 | 63.12 |
| 998.20 | 1.32 | 1,000.80 | 65.77 |
| 998.25 | 1.34 | 1,000.85 | 68.46 |
| 998.30 | 1.35 | 1,000.90 | 71.18 |
| 998.35 | 1.37 | 1,000.95 | 73.94 |
| 998.40 | 1.39 | 1,001.00 | **76.73** |
| 998.45 | 1.40 | | |
| 998.50 | 1.42 | | |
| 998.55 | 1.43 | | |

## Summary for Pond 25: Pond - too small?

Inflow Area = 6.750 ac, 23.30% Impervious, Inflow Depth > 4.51" for 100-yr event
Inflow = 33.11 cfs @ 12.31 hrs, Volume= 2.539 af
Outflow = 25.64 cfs @ 12.46 hrs, Volume= 2.469 af, Atten= 23%, Lag= 9.3 min
Primary = 25.64 cfs @ 12.46 hrs, Volume= 2.469 af

Routing by Sim-Route method, Time Span= 0.00-20.01 hrs, dt= 0.03 hrs
Peak Elev= 1,000.78' @ 12.46 hrs Surf.Area= 0.286 ac Storage= 0.721 af

Plug-Flow detention time= 55.4 min calculated for 2.469 af (97% of inflow)
Center-of-Mass det. time= 44.8 min ( 819.1 - 774.3 )

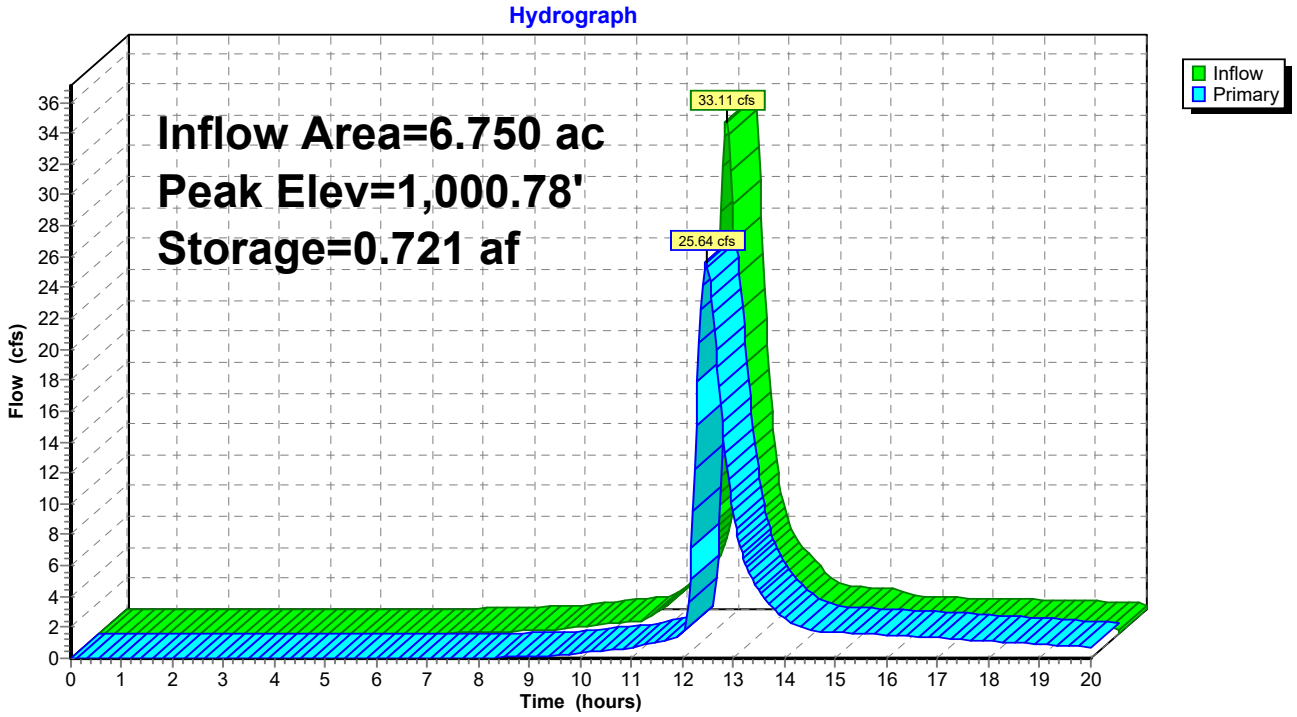
| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 997.00' | 1.115 af | **Custom Stage Data (Conic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (acres) | Inc.Store (acre-feet) | Cum.Store (acre-feet) | Wet.Area (acres) |
|---|---|---|---|---|
| 997.00 | 0.110 | 0.000 | 0.000 | 0.110 |
| 1,002.00 | 0.360 | 1.115 | 1.115 | 0.363 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 997.00' | **7.0" Vert. Orifice/Grate** C= 0.600 |
| #2 | Primary | 999.00' | **3.0' long Sharp-Crested Rectangular Weir** 0 End Contraction(s) |
| #3 | Primary | 1,001.00' | **10.0' long x 10.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64 |

**Primary OutFlow** Max=25.58 cfs @ 12.46 hrs HW=1,000.77' TW=0.00' (Dynamic Tailwater)
- **1=Orifice/Grate** (Orifice Controls 2.40 cfs @ 8.99 fps)
- **2=Sharp-Crested Rectangular Weir** (Weir Controls 23.18 cfs @ 4.36 fps)
- **3=Broad-Crested Rectangular Weir** ( Controls 0.00 cfs)

## Pond 25: Pond - too small?



## Stage-Discharge for Pond 25: Pond - too small?

| Elevation (feet) | Primary (cfs) | Elevation (feet) | Primary (cfs) |
|---|---|---|---|
| 997.00 | 0.00 | 999.60 | 6.51 |
| 997.05 | 0.01 | 999.65 | 7.12 |
| 997.10 | 0.03 | 999.70 | 7.74 |
| 997.15 | 0.07 | 999.75 | 8.39 |
| 997.20 | 0.12 | 999.80 | 9.06 |
| 997.25 | 0.19 | 999.85 | 9.75 |
| 997.30 | 0.26 | 999.90 | 10.45 |
| 997.35 | 0.34 | 999.95 | 11.18 |
| 997.40 | 0.42 | 1,000.00 | 11.93 |
| 997.45 | 0.51 | 1,000.05 | 12.69 |
| 997.50 | 0.59 | 1,000.10 | 13.47 |
| 997.55 | 0.66 | 1,000.15 | 14.27 |
| 997.60 | 0.71 | 1,000.20 | 15.09 |
| 997.65 | 0.77 | 1,000.25 | 15.92 |
| 997.70 | 0.82 | 1,000.30 | 16.77 |
| 997.75 | 0.87 | 1,000.35 | 17.64 |
| 997.80 | 0.92 | 1,000.40 | 18.52 |
| 997.85 | 0.96 | 1,000.45 | 19.42 |
| 997.90 | 1.00 | 1,000.50 | 20.33 |
| 997.95 | 1.04 | 1,000.55 | 21.25 |
| 998.00 | 1.08 | 1,000.60 | 22.19 |
| 998.05 | 1.12 | 1,000.65 | 23.15 |
| 998.10 | 1.16 | 1,000.70 | 24.12 |
| 998.15 | 1.19 | 1,000.75 | 25.10 |
| 998.20 | 1.23 | 1,000.80 | 26.10 |
| 998.25 | 1.26 | 1,000.85 | 27.11 |
| 998.30 | 1.29 | 1,000.90 | 28.14 |
| 998.35 | 1.32 | 1,000.95 | 29.17 |
| 998.40 | 1.35 | 1,001.00 | 30.22 |
| 998.45 | 1.38 | 1,001.05 | 31.57 |
| 998.50 | 1.41 | 1,001.10 | 33.15 |
| 998.55 | 1.44 | 1,001.15 | 34.90 |
| 998.60 | 1.47 | 1,001.20 | 36.78 |
| 998.65 | 1.50 | 1,001.25 | 38.80 |
| 998.70 | 1.53 | 1,001.30 | 40.94 |
| 998.75 | 1.55 | 1,001.35 | 43.20 |
| 998.80 | 1.58 | 1,001.40 | 45.56 |
| 998.85 | 1.61 | 1,001.45 | 48.08 |
| 998.90 | 1.63 | 1,001.50 | 50.72 |
| 998.95 | 1.66 | 1,001.55 | 53.47 |
| 999.00 | 1.68 | 1,001.60 | 56.35 |
| 999.05 | 1.82 | 1,001.65 | 59.14 |
| 999.10 | 2.04 | 1,001.70 | 62.01 |
| 999.15 | 2.32 | 1,001.75 | 64.94 |
| 999.20 | 2.66 | 1,001.80 | 67.94 |
| 999.25 | 3.03 | 1,001.85 | 71.01 |
| 999.30 | 3.44 | 1,001.90 | 74.13 |
| 999.35 | 3.88 | 1,001.95 | 77.32 |
| 999.40 | 4.35 | 1,002.00 | **80.57** |
| 999.45 | 4.85 | | |
| 999.50 | 5.38 | | |
| 999.55 | 5.94 | | |

## Summary for Pond 35: Pond

Inflow Area = 10.580 ac, 20.72% Impervious, Inflow Depth > 4.64" for 100-yr event
Inflow = 78.14 cfs @ 12.16 hrs, Volume= 4.087 af
Outflow = 25.14 cfs @ 12.38 hrs, Volume= 3.450 af, Atten= 68%, Lag= 13.5 min
Primary = 25.14 cfs @ 12.38 hrs, Volume= 3.450 af

Routing by Sim-Route method, Time Span= 0.00-20.01 hrs, dt= 0.03 hrs
Peak Elev= 997.76' @ 12.38 hrs Surf.Area= 0.637 ac Storage= 2.015 af

Plug-Flow detention time= 118.3 min calculated for 3.450 af (84% of inflow)
Center-of-Mass det. time= 79.2 min ( 840.8 - 761.6 )

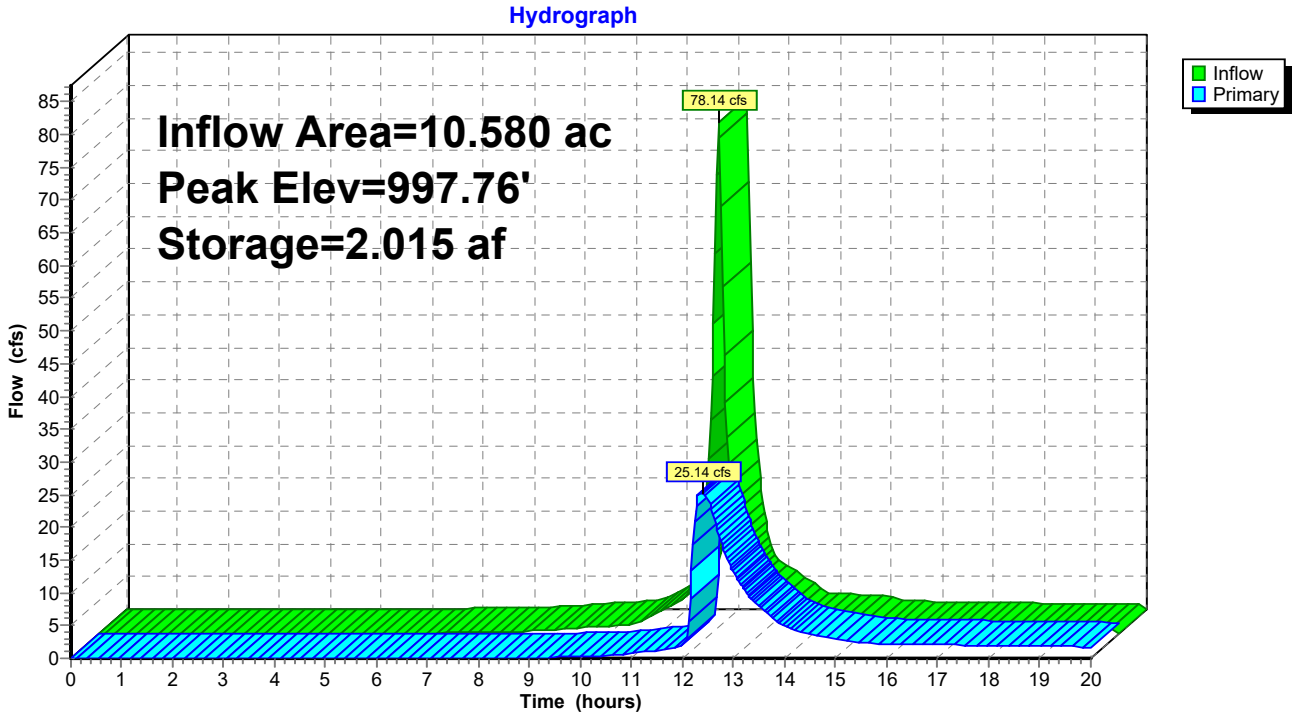
| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 994.00' | 2.848 af | **Custom Stage Data (Conic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (acres) | Inc.Store (acre-feet) | Cum.Store (acre-feet) | Wet.Area (acres) |
|---|---|---|---|---|
| 994.00 | 0.440 | 0.000 | 0.000 | 0.440 |
| 999.00 | 0.710 | 2.848 | 2.848 | 0.717 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 994.00' | **24.0" Round Culvert**<br>L= 100.0' RCP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 994.00' / 993.00' S= 0.0100 '/' Cc= 0.900<br>n= 0.013, Flow Area= 3.14 sf |
| #2 | Device 1 | 994.00' | **8.0" Vert. Orifice/Grate** C= 0.600 |
| #3 | Device 1 | 996.00' | **3.0' long Sharp-Crested Rectangular Weir** 0 End Contraction(s) |

**Primary OutFlow** Max=25.14 cfs @ 12.38 hrs HW=997.76' TW=0.00' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 25.14 cfs @ 8.00 fps)
  ├─**2=Orifice/Grate** (Passes < 3.11 cfs potential flow)
  └─**3=Sharp-Crested Rectangular Weir** (Passes < 22.94 cfs potential flow)

## Pond 35: Pond


Hydrograph
Inflow Area=10.580 ac
Peak Elev=997.76'
Storage=2.015 af
78.14 cfs
25.14 cfs
Inflow
Primary
Flow (cfs)
Time (hours)
0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20

## Stage-Discharge for Pond 35: Pond

| Elevation (feet) | Primary (cfs) | Elevation (feet) | Primary (cfs) |
|---|---|---|---|
| 994.00 | 0.00 | 996.60 | 7.09 |
| 994.05 | 0.01 | 996.65 | 7.70 |
| 994.10 | 0.04 | 996.70 | 8.33 |
| 994.15 | 0.08 | 996.75 | 8.98 |
| 994.20 | 0.13 | 996.80 | 9.66 |
| 994.25 | 0.20 | 996.85 | 10.35 |
| 994.30 | 0.28 | 996.90 | 11.07 |
| 994.35 | 0.37 | 996.95 | 11.80 |
| 994.40 | 0.47 | 997.00 | 12.55 |
| 994.45 | 0.57 | 997.05 | 13.33 |
| 994.50 | 0.68 | 997.10 | 14.11 |
| 994.55 | 0.78 | 997.15 | 14.92 |
| 994.60 | 0.87 | 997.20 | 15.74 |
| 994.65 | 0.95 | 997.25 | 16.58 |
| 994.70 | 1.02 | 997.30 | 17.44 |
| 994.75 | 1.08 | 997.35 | 18.31 |
| 994.80 | 1.15 | 997.40 | 19.19 |
| 994.85 | 1.21 | 997.45 | 20.10 |
| 994.90 | 1.27 | 997.50 | 21.01 |
| 994.95 | 1.32 | 997.55 | 21.95 |
| 995.00 | 1.37 | 997.60 | 22.89 |
| 995.05 | 1.42 | 997.65 | 23.85 |
| 995.10 | 1.47 | 997.70 | 24.83 |
| 995.15 | 1.52 | 997.75 | 25.08 |
| 995.20 | 1.56 | 997.80 | 25.31 |
| 995.25 | 1.61 | 997.85 | 25.54 |
| 995.30 | 1.65 | 997.90 | 25.76 |
| 995.35 | 1.69 | 997.95 | 25.98 |
| 995.40 | 1.74 | 998.00 | 26.20 |
| 995.45 | 1.78 | 998.05 | 26.42 |
| 995.50 | 1.82 | 998.10 | 26.63 |
| 995.55 | 1.85 | 998.15 | 26.85 |
| 995.60 | 1.89 | 998.20 | 27.06 |
| 995.65 | 1.93 | 998.25 | 27.27 |
| 995.70 | 1.96 | 998.30 | 27.48 |
| 995.75 | 2.00 | 998.35 | 27.69 |
| 995.80 | 2.04 | 998.40 | 27.89 |
| 995.85 | 2.07 | 998.45 | 28.10 |
| 995.90 | 2.10 | 998.50 | 28.30 |
| 995.95 | 2.14 | 998.55 | 28.50 |
| 996.00 | 2.17 | 998.60 | 28.70 |
| 996.05 | 2.31 | 998.65 | 28.90 |
| 996.10 | 2.54 | 998.70 | 29.10 |
| 996.15 | 2.84 | 998.75 | 29.29 |
| 996.20 | 3.17 | 998.80 | 29.49 |
| 996.25 | 3.55 | 998.85 | 29.68 |
| 996.30 | 3.97 | 998.90 | 29.87 |
| 996.35 | 4.42 | 998.95 | 30.06 |
| 996.40 | 4.90 | 999.00 | **30.25** |
| 996.45 | 5.41 | | |
| 996.50 | 5.94 | | |
| 996.55 | 6.50 | | |

## Summary for Pond 75: Pond

Inflow Area = 10.440 ac, 21.50% Impervious, Inflow Depth > 4.58" for 100-yr event
Inflow = 65.69 cfs @ 12.20 hrs, Volume= 3.984 af
Outflow = 41.04 cfs @ 12.35 hrs, Volume= 3.886 af, Atten= 38%, Lag= 8.8 min
Primary = 41.04 cfs @ 12.35 hrs, Volume= 3.886 af

Routing by Sim-Route method, Time Span= 0.00-20.01 hrs, dt= 0.03 hrs
Peak Elev= 1,003.80' @ 12.35 hrs Surf.Area= 0.454 ac Storage= 1.231 af

Plug-Flow detention time= 44.3 min calculated for 3.886 af (98% of inflow)
Center-of-Mass det. time= 34.6 min ( 800.2 - 765.6 )

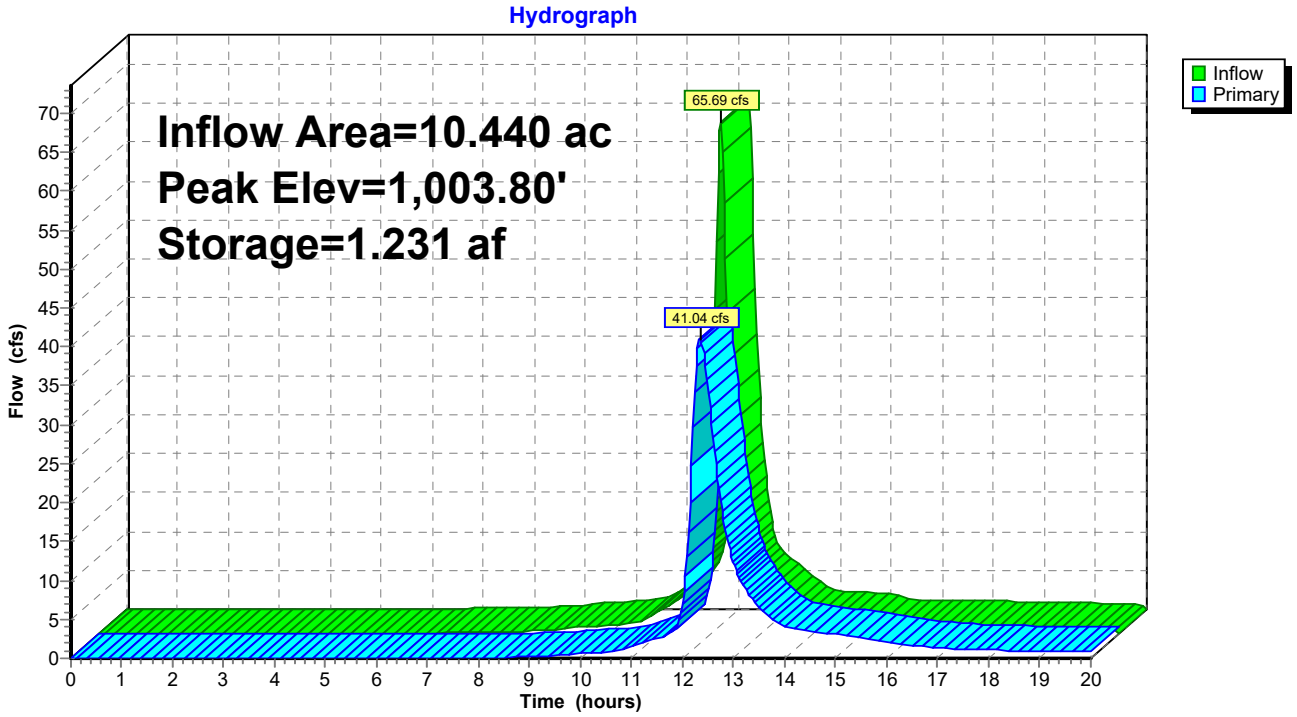
| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 1,000.00' | 1.833 af | **Custom Stage Data (Conic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (acres) | Inc.Store (acre-feet) | Cum.Store (acre-feet) | Wet.Area (acres) |
|---|---|---|---|---|
| 1,000.00 | 0.210 | 0.000 | 0.000 | 0.210 |
| 1,005.00 | 0.550 | 1.833 | 1.833 | 0.554 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 1,000.00' | **12.0" Vert. Orifice/Grate** C= 0.600 |
| #2 | Primary | 1,001.50' | **3.0' long Sharp-Crested Rectangular Weir** 0 End Contraction(s) |
| #3 | Primary | 1,004.00' | **10.0' long x 10.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64 |

**Primary OutFlow** Max=40.95 cfs @ 12.35 hrs HW=1,003.79' TW=0.00' (Dynamic Tailwater)
- **1=Orifice/Grate** (Orifice Controls 6.86 cfs @ 8.74 fps)
- **2=Sharp-Crested Rectangular Weir** (Weir Controls 34.09 cfs @ 4.95 fps)
- **3=Broad-Crested Rectangular Weir** ( Controls 0.00 cfs)

## Pond 75: Pond


Hydrograph
Inflow Area=10.440 ac
Peak Elev=1,003.80'
Storage=1.231 af
65.69 cfs
41.04 cfs
Inflow
Primary
Flow (cfs)
Time (hours)
0
5
10
15
20
25
30
35
40
45
50
55
60
65
70
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20

## Stage-Discharge for Pond 75: Pond

| Elevation (feet) | Primary (cfs) | Elevation (feet) | Primary (cfs) |
|---|---|---|---|
| 1,000.00 | 0.00 | 1,002.60 | 16.80 |
| 1,000.05 | 0.01 | 1,002.65 | 17.64 |
| 1,000.10 | 0.04 | 1,002.70 | 18.50 |
| 1,000.15 | 0.10 | 1,002.75 | 19.38 |
| 1,000.20 | 0.17 | 1,002.80 | 20.28 |
| 1,000.25 | 0.26 | 1,002.85 | 21.18 |
| 1,000.30 | 0.37 | 1,002.90 | 22.11 |
| 1,000.35 | 0.49 | 1,002.95 | 23.05 |
| 1,000.40 | 0.63 | 1,003.00 | 24.00 |
| 1,000.45 | 0.78 | 1,003.05 | 24.97 |
| 1,000.50 | 0.95 | 1,003.10 | 25.95 |
| 1,000.55 | 1.12 | 1,003.15 | 26.95 |
| 1,000.60 | 1.30 | 1,003.20 | 27.96 |
| 1,000.65 | 1.48 | 1,003.25 | 28.98 |
| 1,000.70 | 1.67 | 1,003.30 | 30.02 |
| 1,000.75 | 1.86 | 1,003.35 | 31.07 |
| 1,000.80 | 2.05 | 1,003.40 | 32.13 |
| 1,000.85 | 2.23 | 1,003.45 | 33.21 |
| 1,000.90 | 2.40 | 1,003.50 | 34.30 |
| 1,000.95 | 2.56 | 1,003.55 | 35.40 |
| 1,001.00 | 2.67 | 1,003.60 | 36.51 |
| 1,001.05 | 2.80 | 1,003.65 | 37.64 |
| 1,001.10 | 2.93 | 1,003.70 | 38.78 |
| 1,001.15 | 3.05 | 1,003.75 | 39.93 |
| 1,001.20 | 3.16 | 1,003.80 | 41.09 |
| 1,001.25 | 3.28 | 1,003.85 | 42.26 |
| 1,001.30 | 3.38 | 1,003.90 | 43.45 |
| 1,001.35 | 3.49 | 1,003.95 | 44.64 |
| 1,001.40 | 3.59 | 1,004.00 | 45.85 |
| 1,001.45 | 3.69 | 1,004.05 | 47.35 |
| 1,001.50 | 3.78 | 1,004.10 | 49.09 |
| 1,001.55 | 3.98 | 1,004.15 | 50.99 |
| 1,001.60 | 4.28 | 1,004.20 | 53.02 |
| 1,001.65 | 4.63 | 1,004.25 | 55.19 |
| 1,001.70 | 5.02 | 1,004.30 | 57.48 |
| 1,001.75 | 5.45 | 1,004.35 | 59.88 |
| 1,001.80 | 5.92 | 1,004.40 | 62.39 |
| 1,001.85 | 6.43 | 1,004.45 | 65.05 |
| 1,001.90 | 6.96 | 1,004.50 | 67.84 |
| 1,001.95 | 7.52 | 1,004.55 | 70.73 |
| 1,002.00 | 8.10 | 1,004.60 | 73.75 |
| 1,002.05 | 8.71 | 1,004.65 | 76.68 |
| 1,002.10 | 9.34 | 1,004.70 | 79.69 |
| 1,002.15 | 10.00 | 1,004.75 | 82.76 |
| 1,002.20 | 10.68 | 1,004.80 | 85.90 |
| 1,002.25 | 11.37 | 1,004.85 | 89.10 |
| 1,002.30 | 12.09 | 1,004.90 | 92.36 |
| 1,002.35 | 12.83 | 1,004.95 | 95.68 |
| 1,002.40 | 13.59 | 1,005.00 | **99.06** |
| 1,002.45 | 14.36 | | |
| 1,002.50 | 15.16 | | |
| 1,002.55 | 15.97 | | |

## Summary for Pond 80: Pond

| | | | | | |
|---|---|---|---|---|---|
| Inflow | = | 107.13 cfs @ | 12.22 hrs, | Volume= | 6.736 af |
| Outflow | = | 50.94 cfs @ | 12.36 hrs, | Volume= | 5.977 af, Atten= 52%, Lag= 8.3 min |
| Primary | = | 31.25 cfs @ | 12.33 hrs, | Volume= | 3.612 af |
| Secondary | = | 20.25 cfs @ | 12.44 hrs, | Volume= | 2.366 af |

Routing by Sim-Route method, Time Span= 0.00-20.01 hrs, dt= 0.03 hrs
Peak Elev= 994.93' @ 12.44 hrs Surf.Area= 0.567 ac Storage= 2.191 af

Plug-Flow detention time= 64.1 min calculated for 5.977 af (89% of inflow)
Center-of-Mass det. time= 31.8 min ( 799.9 - 768.1 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 990.00' | 2.829 af | **Custom Stage Data (Conic)** Listed below (Recalc) |

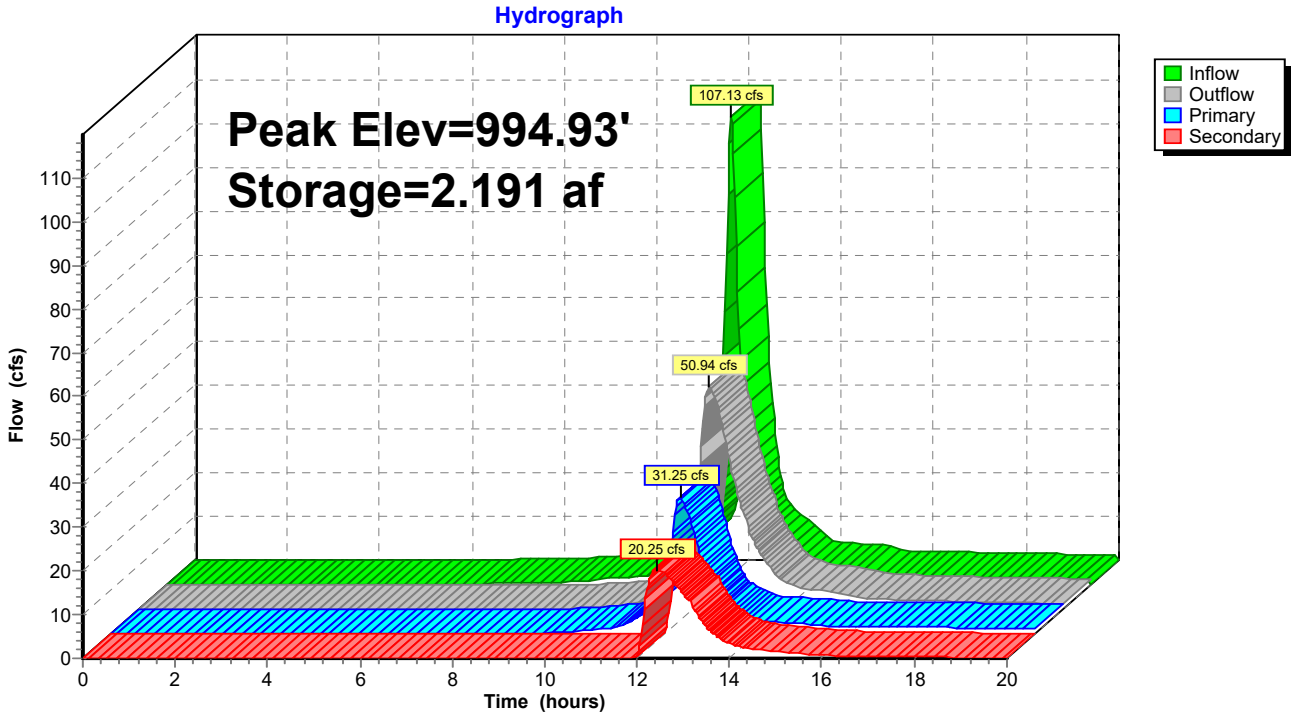
| Elevation (feet) | Surf.Area (acres) | Inc.Store (acre-feet) | Cum.Store (acre-feet) | Wet.Area (acres) |
|---|---|---|---|---|
| 990.00 | 0.330 | 0.000 | 0.000 | 0.330 |
| 991.00 | 0.370 | 0.350 | 0.350 | 0.371 |
| 992.00 | 0.420 | 0.395 | 0.745 | 0.422 |
| 993.00 | 0.470 | 0.445 | 1.189 | 0.474 |
| 994.00 | 0.520 | 0.495 | 1.684 | 0.525 |
| 995.00 | 0.570 | 0.545 | 2.229 | 0.577 |
| 996.00 | 0.630 | 0.600 | 2.829 | 0.638 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 990.00' | **30.0" Round Culvert**<br>L= 110.0' RCP, end-section conforming to fill, Ke= 0.500<br>Inlet / Outlet Invert= 990.00' / 990.00' S= 0.0000 '/' Cc= 0.900<br>n= 0.013, Flow Area= 4.91 sf |
| #2 | Secondary | 991.00' | **21.0" Round Culvert**<br>L= 50.0' RCP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 991.00' / 990.50' S= 0.0100 '/' Cc= 0.900<br>n= 0.013, Flow Area= 2.41 sf |
| #3 | Device 2 | 992.00' | **3.0' long Sharp-Crested Rectangular Weir** 0 End Contraction(s) |
| #4 | Secondary | 995.00' | **10.0' long x 10.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64 |

**Primary OutFlow** Max=29.97 cfs @ 12.33 hrs HW=994.70' TW=993.09' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 29.97 cfs @ 6.11 fps)

**Secondary OutFlow** Max=20.25 cfs @ 12.44 hrs HW=994.93' TW=0.00' (Dynamic Tailwater)
└─**2=Culvert** (Inlet Controls 20.25 cfs @ 8.42 fps)
└─**3=Sharp-Crested Rectangular Weir** (Passes 20.25 cfs of 49.22 cfs potential flow)
└─**4=Broad-Crested Rectangular Weir** ( Controls 0.00 cfs)

## Pond 80: Pond


Hydrograph
Peak Elev=994.93'
Storage=2.191 af
107.13 cfs
50.94 cfs
31.25 cfs
20.25 cfs
Inflow
Outflow
Primary
Secondary
Flow (cfs)
Time (hours)
0
10
20
30
40
50
60
70
80
90
100
110
0
2
4
6
8
10
12
14
16
18
20

## Stage-Discharge for Pond 80: Pond

| Elevation (feet) | Discharge (cfs) | Primary (cfs) | Secondary (cfs) |
|---|---|---|---|
| 990.00 | 0.00 | 0.00 | 0.00 |
| 990.10 | 0.01 | 0.01 | 0.00 |
| 990.20 | 0.06 | 0.06 | 0.00 |
| 990.30 | 0.16 | 0.16 | 0.00 |
| 990.40 | 0.33 | 0.33 | 0.00 |
| 990.50 | 0.57 | 0.57 | 0.00 |
| 990.60 | 0.88 | 0.88 | 0.00 |
| 990.70 | 1.25 | 1.25 | 0.00 |
| 990.80 | 1.70 | 1.70 | 0.00 |
| 990.90 | 2.21 | 2.21 | 0.00 |
| 991.00 | 2.78 | 2.78 | 0.00 |
| 991.10 | 3.42 | 3.42 | 0.00 |
| 991.20 | 4.11 | 4.11 | 0.00 |
| 991.30 | 4.86 | 4.86 | 0.00 |
| 991.40 | 5.66 | 5.66 | 0.00 |
| 991.50 | 6.51 | 6.51 | 0.00 |
| 991.60 | 7.40 | 7.40 | 0.00 |
| 991.70 | 8.33 | 8.33 | 0.00 |
| 991.80 | 9.29 | 9.29 | 0.00 |
| 991.90 | 10.28 | 10.28 | 0.00 |
| 992.00 | 11.30 | 11.30 | 0.00 |
| 992.10 | 12.65 | 12.33 | 0.31 |
| 992.20 | 14.26 | 13.38 | 0.88 |
| 992.30 | 16.05 | 14.44 | 1.61 |
| 992.40 | 17.98 | 15.50 | 2.48 |
| 992.50 | 20.02 | 16.55 | 3.47 |
| 992.60 | 22.14 | 17.58 | 4.56 |
| 992.70 | 24.33 | 18.58 | 5.75 |
| 992.80 | 26.57 | 19.55 | 7.02 |
| 992.90 | 28.84 | 20.46 | 8.38 |
| 993.00 | 31.11 | 21.30 | 9.81 |
| 993.10 | 33.35 | 22.03 | 11.32 |
| 993.20 | 35.51 | 22.61 | 12.90 |
| 993.30 | 36.43 | 22.89 | 13.54 |
| 993.40 | 37.37 | 23.55 | 13.82 |
| 993.50 | 39.23 | 24.82 | 14.40 |
| 993.60 | 41.00 | 26.04 | 14.97 |
| 993.70 | 42.71 | 27.19 | 15.51 |
| 993.80 | 44.34 | 28.30 | 16.04 |
| 993.90 | 45.85 | 29.37 | 16.48 |
| 994.00 | 47.29 | 30.40 | 16.88 |
| 994.10 | 48.68 | 31.40 | 17.28 |
| 994.20 | 50.03 | 32.37 | 17.66 |
| 994.30 | 51.34 | 33.30 | 18.03 |
| 994.40 | 52.62 | 34.22 | 18.40 |
| 994.50 | 53.87 | 35.11 | 18.76 |
| 994.60 | 55.09 | 35.97 | 19.12 |
| 994.70 | 56.29 | 36.82 | 19.47 |
| 994.80 | 57.45 | 37.65 | 19.81 |
| 994.90 | 58.60 | 38.46 | 20.14 |
| 995.00 | 59.72 | 39.25 | 20.47 |
| 995.10 | 61.61 | 40.03 | 21.59 |
| 995.20 | 64.13 | 40.79 | 23.35 |
| 995.30 | 67.12 | 41.54 | 25.58 |
| 995.40 | 70.49 | 42.27 | 28.22 |
| 995.50 | 74.34 | 43.00 | 31.35 |
| 995.60 | 78.61 | 43.71 | 34.90 |
| 995.70 | 82.84 | 44.41 | 38.43 |
| 995.80 | 87.29 | 45.09 | 42.19 |
| 995.90 | 91.93 | 45.77 | 46.16 |
| 996.00 | **96.76** | **46.44** | **50.32** |

## Summary for Pond 85: Pond

| | | | | | |
|---|---|---|---|---|---|
| Inflow | = | 31.25 cfs @ | 12.33 hrs, | Volume= | 3.609 af |
| Outflow | = | 23.23 cfs @ | 12.64 hrs, | Volume= | 3.026 af, Atten= 26%, Lag= 18.5 min |
| Primary | = | 0.00 cfs @ | 0.00 hrs, | Volume= | 0.000 af |
| Secondary | = | 23.23 cfs @ | 12.64 hrs, | Volume= | 3.026 af |

Routing by Sim-Route method, Time Span= 0.00-20.01 hrs, dt= 0.03 hrs
Peak Elev= 993.69' @ 12.64 hrs Surf.Area= 0.387 ac Storage= 1.171 af

Plug-Flow detention time= 86.3 min calculated for 3.021 af (84% of inflow)
Center-of-Mass det. time= 39.4 min ( 842.1 - 802.7 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 990.00' | 1.714 af | **Custom Stage Data (Conic)** Listed below (Recalc) |

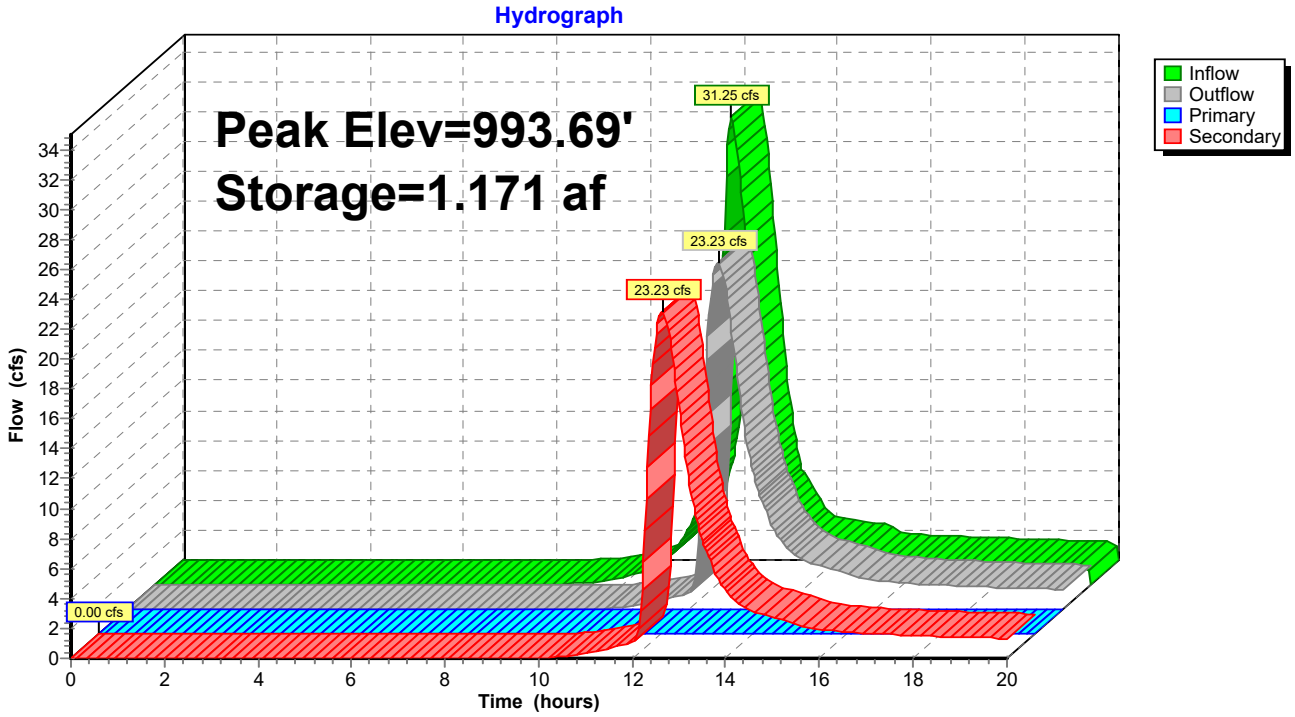
| Elevation (feet) | Surf.Area (acres) | Inc.Store (acre-feet) | Cum.Store (acre-feet) | Wet.Area (acres) |
|---|---|---|---|---|
| 990.00 | 0.250 | 0.000 | 0.000 | 0.250 |
| 991.00 | 0.290 | 0.270 | 0.270 | 0.291 |
| 992.00 | 0.320 | 0.305 | 0.575 | 0.322 |
| 993.00 | 0.360 | 0.340 | 0.914 | 0.364 |
| 994.00 | 0.400 | 0.380 | 1.294 | 0.405 |
| 995.00 | 0.440 | 0.420 | 1.714 | 0.446 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 990.00' | **30.0" Round Culvert**<br>L= 110.0' RCP, end-section conforming to fill, Ke= 0.500<br>Inlet / Outlet Invert= 990.00' / 990.00' S= 0.0000 '/' Cc= 0.900<br>n= 0.013, Flow Area= 4.91 sf |
| #2 | Secondary | 990.00' | **6.0" Vert. Orifice/Grate** C= 0.600 |
| #3 | Secondary | 992.00' | **3.0' long Sharp-Crested Rectangular Weir** 0 End Contraction(s) |

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=990.00' TW=990.00' (Dynamic Tailwater)
└─**1=Culvert** ( Controls 0.00 cfs)

**Secondary OutFlow** Max=23.21 cfs @ 12.64 hrs HW=993.69' TW=0.00' (Dynamic Tailwater)
├─**2=Orifice/Grate** (Orifice Controls 1.75 cfs @ 8.92 fps)
└─**3=Sharp-Crested Rectangular Weir** (Weir Controls 21.46 cfs @ 4.25 fps)

## Pond 85: Pond


Hydrograph
Peak Elev=993.69'
Storage=1.171 af
31.25 cfs
23.23 cfs
23.23 cfs
0.00 cfs
Inflow
Outflow
Primary
Secondary
Flow (cfs)
Time (hours)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34

## Stage-Discharge for Pond 85: Pond

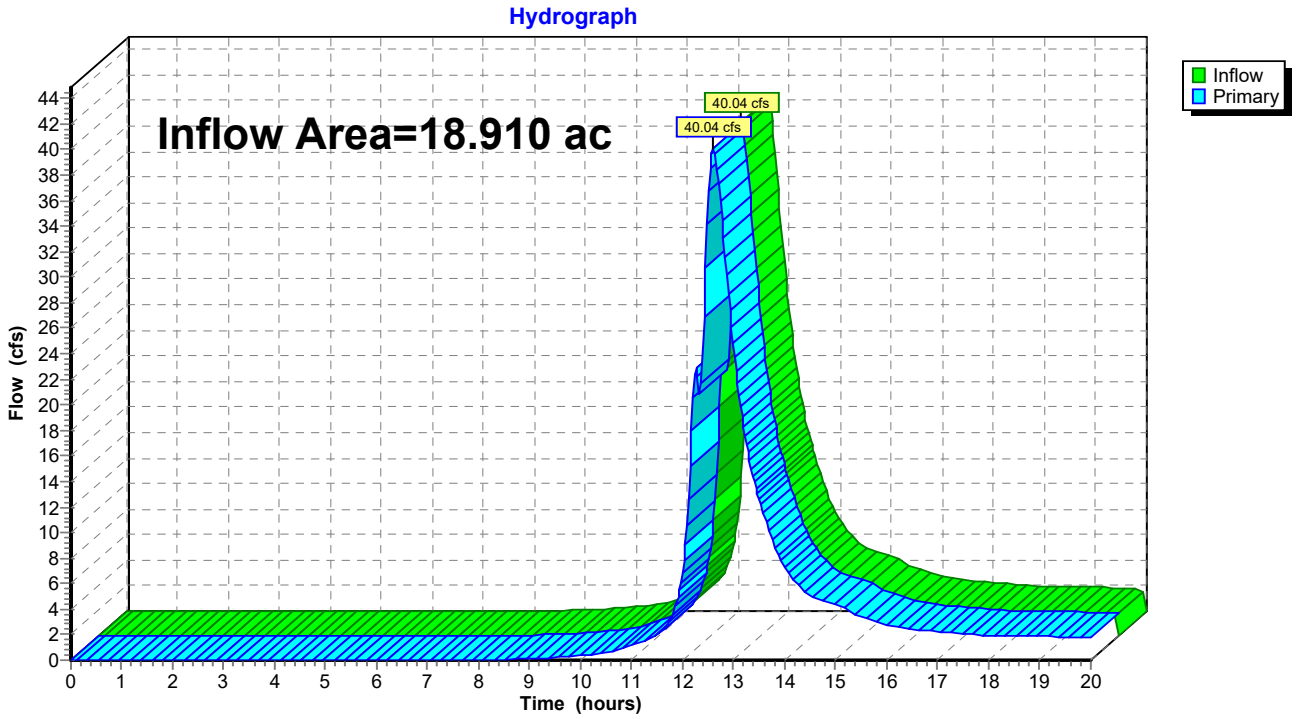
| Elevation (feet) | Discharge (cfs) | Primary (cfs) | Secondary (cfs) |
|---|---|---|---|
| 990.00 | 0.00 | 0.00 | 0.00 |
| 990.05 | 0.01 | 0.00 | 0.01 |
| 990.10 | 0.04 | 0.01 | 0.03 |
| 990.15 | 0.09 | 0.03 | 0.07 |
| 990.20 | 0.17 | 0.06 | 0.11 |
| 990.25 | 0.27 | 0.10 | 0.17 |
| 990.30 | 0.39 | 0.16 | 0.23 |
| 990.35 | 0.53 | 0.24 | 0.30 |
| 990.40 | 0.69 | 0.33 | 0.36 |
| 990.45 | 0.87 | 0.44 | 0.43 |
| 990.50 | 1.04 | 0.57 | 0.47 |
| 990.55 | 1.23 | 0.71 | 0.52 |
| 990.60 | 1.43 | 0.88 | 0.56 |
| 990.65 | 1.65 | 1.05 | 0.60 |
| 990.70 | 1.89 | 1.25 | 0.63 |
| 990.75 | 2.13 | 1.47 | 0.67 |
| 990.80 | 2.40 | 1.70 | 0.70 |
| 990.85 | 2.68 | 1.94 | 0.73 |
| 990.90 | 2.97 | 2.21 | 0.76 |
| 990.95 | 3.28 | 2.49 | 0.79 |
| 991.00 | 3.60 | 2.78 | 0.82 |
| 991.05 | 3.94 | 3.09 | 0.85 |
| 991.10 | 4.29 | 3.42 | 0.87 |
| 991.15 | 4.66 | 3.76 | 0.90 |
| 991.20 | 5.03 | 4.11 | 0.92 |
| 991.25 | 5.43 | 4.48 | 0.95 |
| 991.30 | 5.83 | 4.86 | 0.97 |
| 991.35 | 6.25 | 5.25 | 0.99 |
| 991.40 | 6.67 | 5.66 | 1.01 |
| 991.45 | 7.11 | 6.08 | 1.04 |
| 991.50 | 7.56 | 6.51 | 1.06 |
| 991.55 | 8.02 | 6.95 | 1.08 |
| 991.60 | 8.50 | 7.40 | 1.10 |
| 991.65 | 8.98 | 7.86 | 1.12 |
| 991.70 | 9.46 | 8.33 | 1.14 |
| 991.75 | 9.96 | 8.80 | 1.16 |
| 991.80 | 10.47 | 9.29 | 1.18 |
| 991.85 | 10.98 | 9.78 | 1.20 |
| 991.90 | 11.50 | 10.28 | 1.21 |
| 991.95 | 12.02 | 10.79 | 1.23 |
| 992.00 | 12.55 | 11.30 | 1.25 |
| 992.05 | 13.19 | 11.81 | 1.38 |
| 992.10 | 13.93 | 12.33 | 1.60 |
| 992.15 | 14.73 | 12.86 | 1.87 |
| 992.20 | 15.58 | 13.38 | 2.20 |
| 992.25 | 16.48 | 13.91 | 2.56 |
| 992.30 | 17.41 | 14.44 | 2.97 |
| 992.35 | 18.37 | 14.97 | 3.40 |
| 992.40 | 19.37 | 15.50 | 3.87 |
| 992.45 | 20.39 | 16.02 | 4.36 |
| 992.50 | 21.43 | 16.55 | 4.89 |
| 992.55 | 22.50 | 17.07 | 5.44 |
| 992.60 | 23.59 | 17.58 | 6.01 |
| 992.65 | 24.69 | 18.09 | 6.61 |
| 992.70 | 25.81 | 18.58 | 7.23 |
| 992.75 | 26.94 | 19.07 | 7.87 |
| 992.80 | 28.08 | 19.55 | 8.53 |
| 992.85 | 29.23 | 20.01 | 9.21 |
| 992.90 | 30.38 | 20.46 | 9.91 |
| 992.95 | 31.53 | 20.89 | 10.64 |
| 993.00 | 32.68 | 21.30 | 11.38 |
| 993.05 | 33.82 | 21.68 | 12.14 |
| 993.10 | 34.95 | 22.03 | 12.91 |
| 993.15 | 36.05 | 22.35 | 13.71 |
| 993.20 | 37.13 | 22.61 | 14.52 |
| 993.25 | 38.16 | 22.81 | 15.35 |
| 993.30 | 39.08 | 22.89 | 16.19 |
| 993.35 | 39.94 | 22.89 | 17.05 |
| 993.40 | 41.48 | 23.55 | 17.93 |
| 993.45 | 43.01 | 24.20 | 18.82 |
| 993.50 | 44.55 | 24.82 | 19.73 |
| 993.55 | 46.08 | 25.44 | 20.65 |
| 993.60 | 47.62 | 26.04 | 21.58 |
| 993.65 | 49.16 | 26.62 | 22.54 |
| 993.70 | 50.69 | 27.19 | 23.50 |
| 993.75 | 52.23 | 27.75 | 24.48 |
| 993.80 | 53.78 | 28.30 | 25.47 |
| 993.85 | 55.32 | 28.84 | 26.48 |
| 993.90 | 56.87 | 29.37 | 27.50 |
| 993.95 | 58.42 | 29.89 | 28.53 |
| 994.00 | 59.98 | 30.40 | 29.58 |
| 994.05 | 61.54 | 30.91 | 30.64 |
| 994.10 | 63.11 | 31.40 | 31.71 |
| 994.15 | 64.68 | 31.89 | 32.79 |
| 994.20 | 66.26 | 32.37 | 33.89 |
| 994.25 | 67.84 | 32.84 | 35.00 |
| 994.30 | 69.43 | 33.30 | 36.12 |
| 994.35 | 71.02 | 33.76 | 37.25 |
| 994.40 | 72.62 | 34.22 | 38.40 |
| 994.45 | 74.22 | 34.66 | 39.56 |
| 994.50 | 75.83 | 35.11 | 40.73 |
| 994.55 | 77.45 | 35.54 | 41.91 |
| 994.60 | 79.07 | 35.97 | 43.10 |
| 994.65 | 80.70 | 36.40 | 44.30 |
| 994.70 | 82.34 | 36.82 | 45.52 |
| 994.75 | 83.98 | 37.24 | 46.74 |
| 994.80 | 85.63 | 37.65 | 47.98 |
| 994.85 | 87.28 | 38.05 | 49.23 |
| 994.90 | 88.94 | 38.46 | 50.49 |
| 994.95 | 90.61 | 38.86 | 51.75 |
| 995.00 | **92.28** | **39.25** | **53.03** |

## Summary for Link 15L: North Drainage

Inflow Area = 18.910 ac, 19.74% Impervious, Inflow Depth > 3.21" for 100-yr event
Inflow = 40.04 cfs @ 12.58 hrs, Volume= 5.057 af
Primary = 40.04 cfs @ 12.61 hrs, Volume= 5.057 af, Atten= 0%, Lag= 1.8 min

Primary outflow = Inflow, Time Span= 0.00-20.01 hrs, dt= 0.03 hrs

## Link 15L: North Drainage

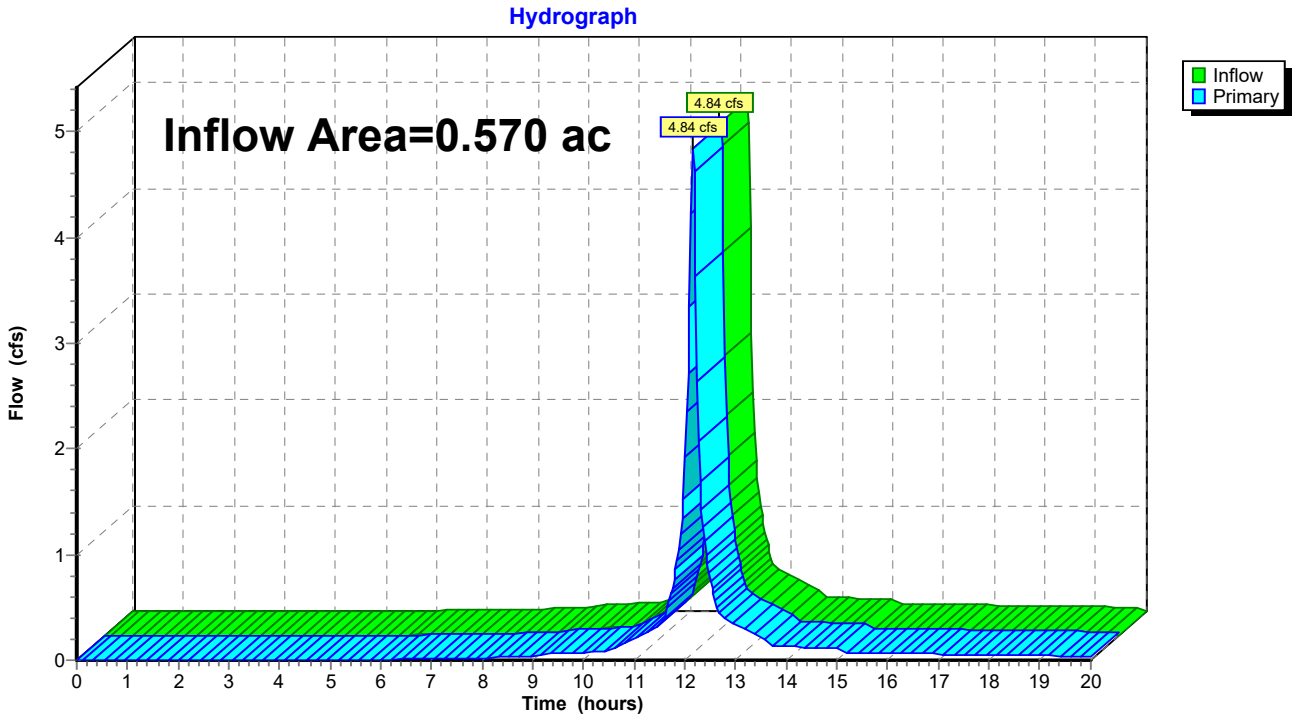


## Summary for Link 20L: East to Shagbark Trail

Inflow Area = 0.570 ac, 16.32% Impervious, Inflow Depth > 4.86" for 100-yr event
Inflow = 4.84 cfs @ 12.13 hrs, Volume= 0.231 af
Primary = 4.84 cfs @ 12.16 hrs, Volume= 0.231 af, Atten= 0%, Lag= 1.8 min

Primary outflow = Inflow, Time Span= 0.00-20.01 hrs, dt= 0.03 hrs

## Link 20L: East to Shagbark Trail

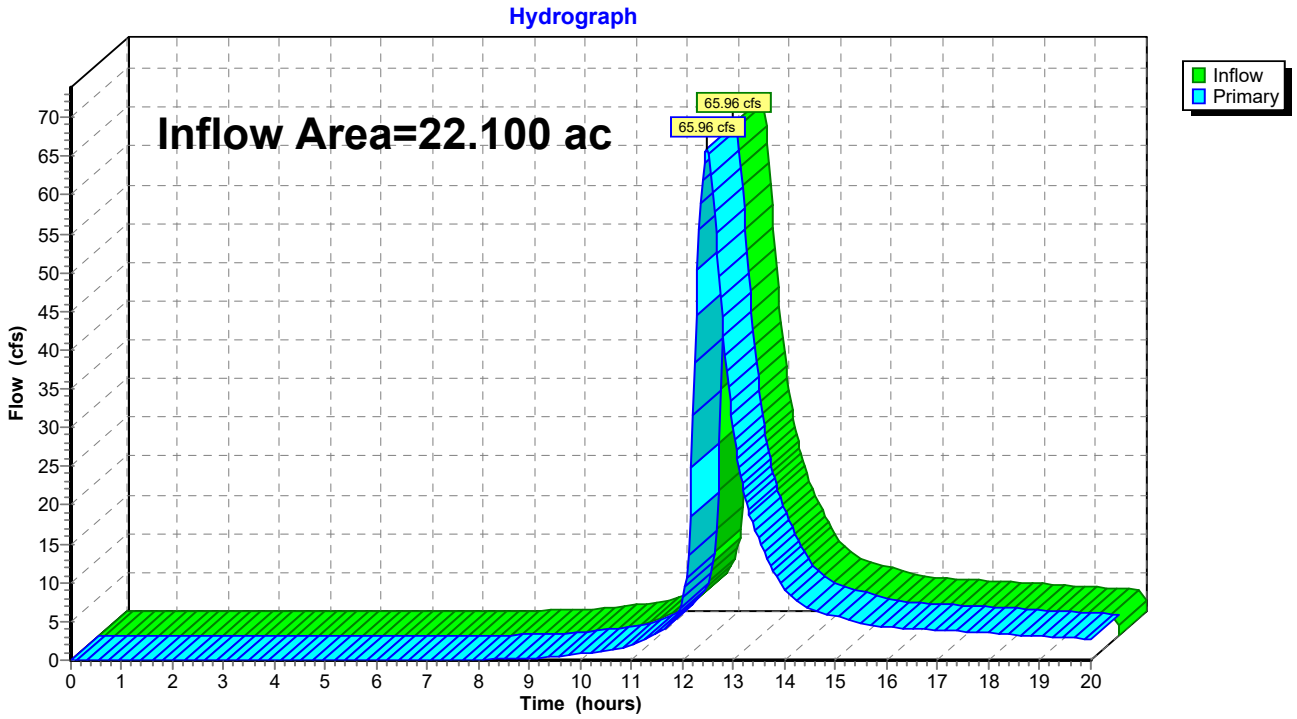


## Summary for Link 35L: East to White Oak Way

Inflow Area = 22.100 ac, 20.16% Impervious, Inflow Depth > 4.09" for 100-yr event
Inflow = 65.96 cfs @ 12.46 hrs, Volume= 7.533 af
Primary = 65.96 cfs @ 12.49 hrs, Volume= 7.533 af, Atten= 0%, Lag= 1.8 min

Primary outflow = Inflow, Time Span= 0.00-20.01 hrs, dt= 0.03 hrs

## Link 35L: East to White Oak Way

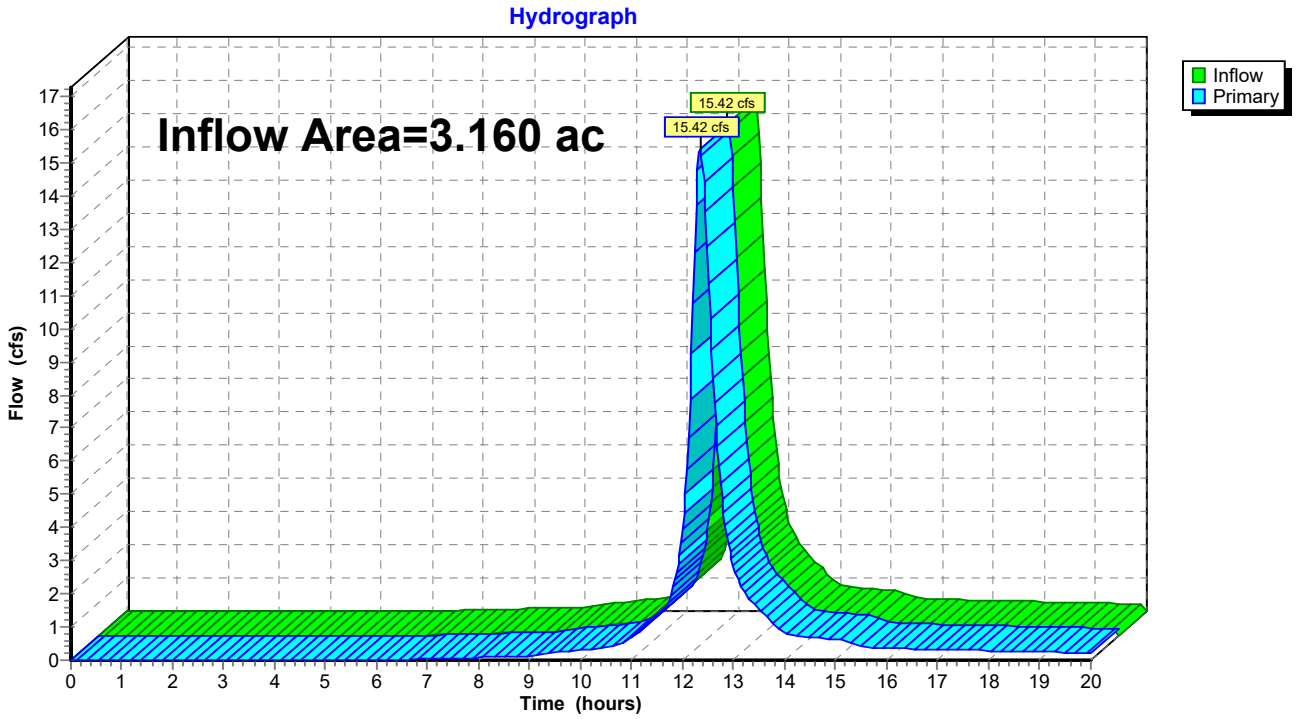


## Summary for Link 45L: East to Hawthorn Hill Drive

Inflow Area = 3.160 ac, 23.07% Impervious, Inflow Depth > 4.62" for 100-yr event
Inflow = 15.42 cfs @ 12.32 hrs, Volume= 1.217 af
Primary = 15.42 cfs @ 12.35 hrs, Volume= 1.217 af, Atten= 0%, Lag= 1.8 min

Primary outflow = Inflow, Time Span= 0.00-20.01 hrs, dt= 0.03 hrs

## Link 45L: East to Hawthorn Hill Drive

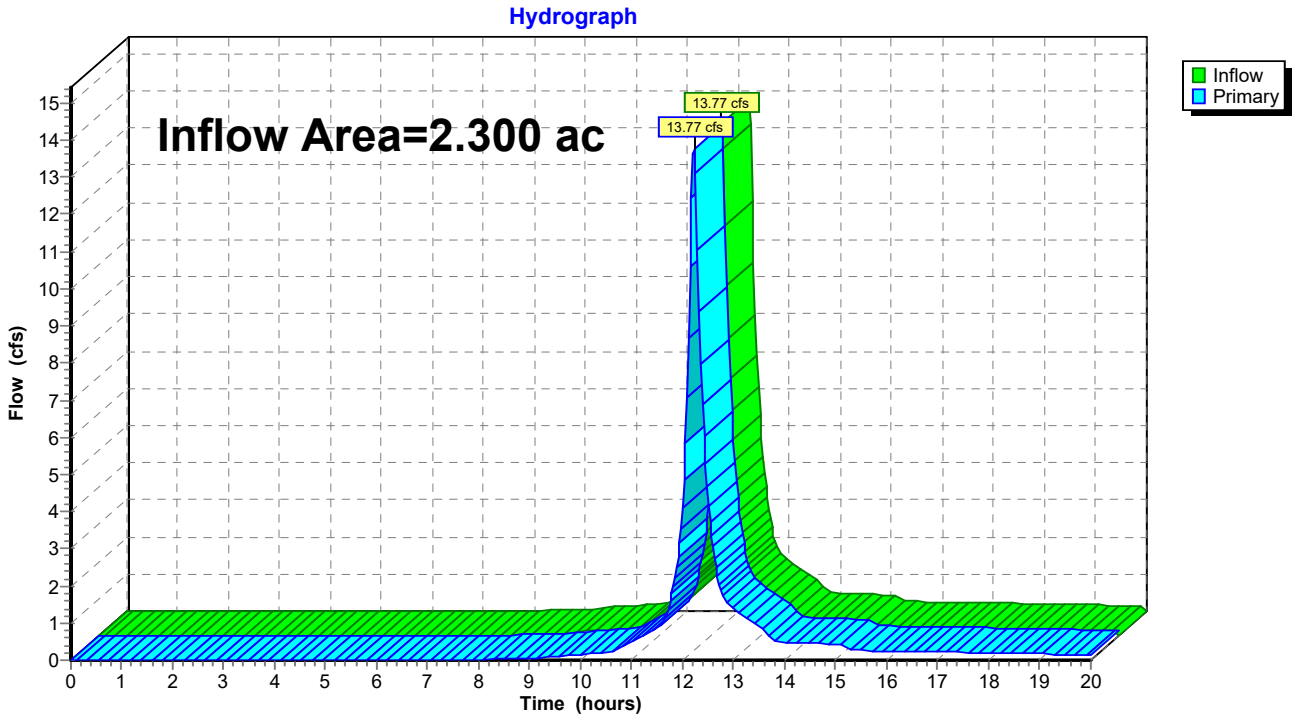


## Summary for Link 55: East to Summit Avenue

Inflow Area = 2.300 ac, 16.04% Impervious, Inflow Depth > 4.10" for 100-yr event
Inflow = 13.77 cfs @ 12.20 hrs, Volume= 0.785 af
Primary = 13.77 cfs @ 12.23 hrs, Volume= 0.785 af, Atten= 0%, Lag= 1.8 min

Primary outflow = Inflow, Time Span= 0.00-20.01 hrs, dt= 0.03 hrs

## Link 55: East to Summit Avenue

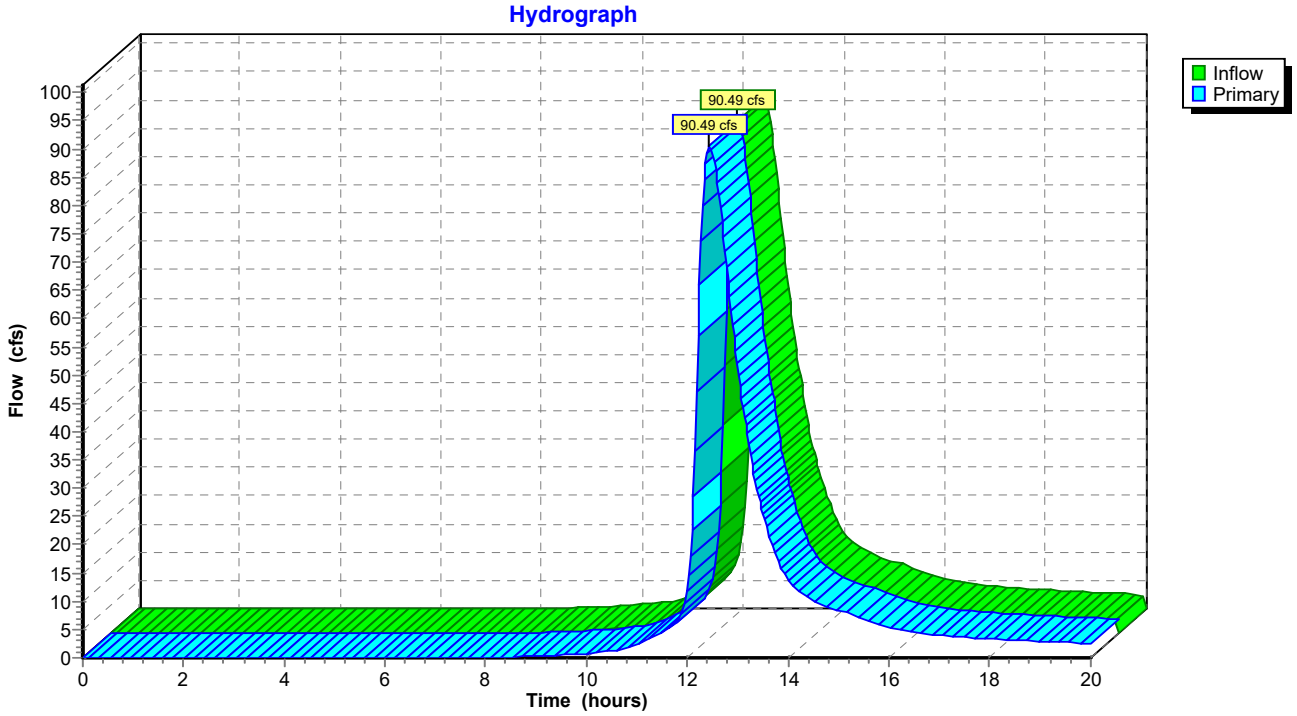


## Summary for Link 95: West Drainage

Inflow = 90.49 cfs @ 12.41 hrs, Volume= 10.887 af
Primary = 90.49 cfs @ 12.44 hrs, Volume= 10.887 af, Atten= 0%, Lag= 1.8 min

Primary outflow = Inflow, Time Span= 0.00-20.01 hrs, dt= 0.03 hrs

## Link 95: West Drainage

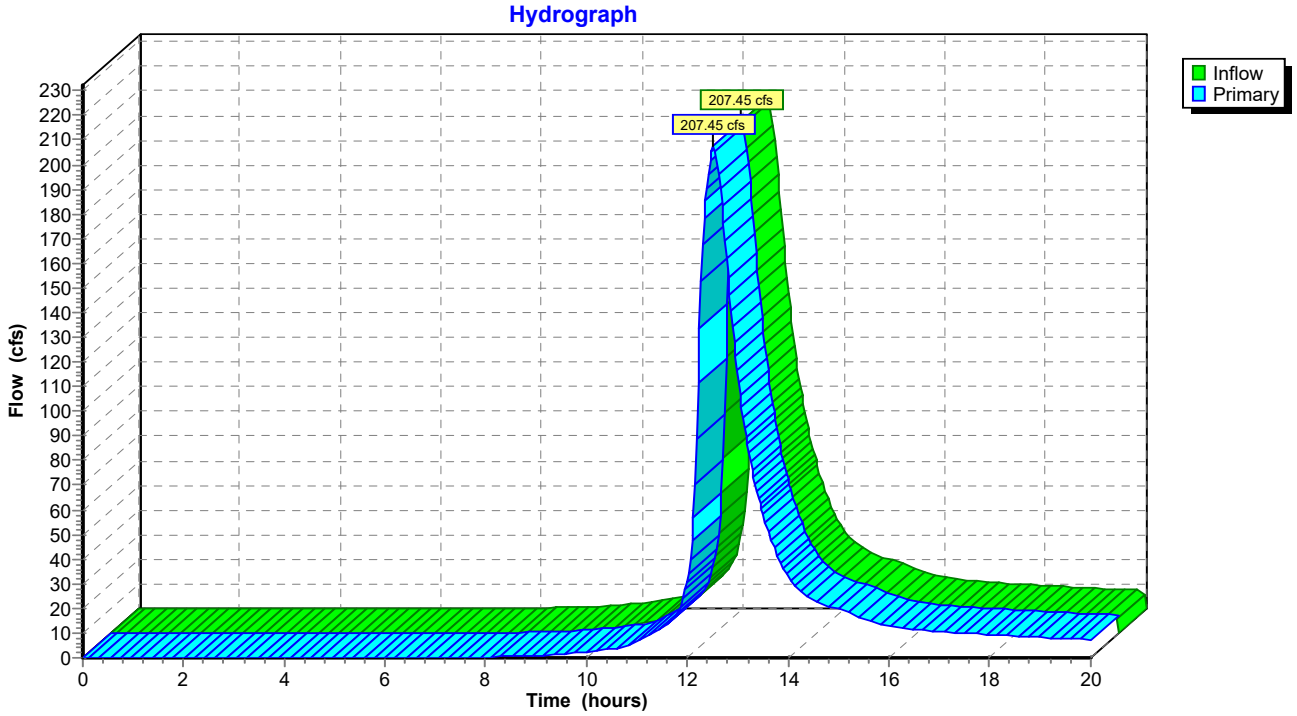


## Summary for Link 99: Total Existing Flow

Inflow = 207.45 cfs @ 12.49 hrs, Volume= 25.461 af
Primary = 207.45 cfs @ 12.52 hrs, Volume= 25.461 af, Atten= 0%, Lag= 1.8 min

Primary outflow = Inflow, Time Span= 0.00-20.01 hrs, dt= 0.03 hrs

## Link 99: Total Existing Flow



# SLAMM ANALYSIS

# SLAMM Analysis Results

FOR: Highlands Subdivision
LOCATION: Waukesha, Wisconsin

| Land Use | Particulate Solids (lbs) | | | | | | | Treatment System | | % Removed | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Roof | Drive | Street | Sidewalk | Landscape | Undeveloped | Total | lbs IN | lbs OUT | | |
| Subarea 5 | 299.8 | 790.3 | 1237.0 | 237.4 | 1015.3 | 1.1 | 3580.9 | 3580.9 | 451.8 | 87% | Pond 5 |
| Subarea 10 - undetained | 58.2 | | | 89.9 | | | 148.1 | 148.1 | 13.3 | 91% | Disconnected |
| Subarea 20 - undetained | 9.0 | 36.9 | 138.5 | 14.4 | 28.8 | | 227.6 | 227.6 | 227.6 | 0% | |
| Subarea 25 | 158.9 | 421.0 | 627.2 | 122.3 | 447.9 | | 1777.3 | 1777.3 | 361.4 | 80% | Pond 25 |
| Subarea 30 - undetained | 67.1 | | | 107.9 | | | 175.0 | 175.0 | 15.8 | 91% | Disconnected |
| Subarea 35 | 205.9 | 546.6 | 1327.0 | 215.8 | 649.5 | 1.9 | 2946.7 | 2946.7 | 482.3 | 84% | Pond 35 |
| Subarea 40 - undetained | 80.6 | 265.9 | 382.8 | 43.2 | 197.33 | | 969.8 | 969.8 | 712.7 | 27% | Disconnected |
| Subarea 50 - undetained | 40.3 | | | 64.7 | | | 105.0 | 105.0 | 9.5 | 91% | Disconnected |
| Subarea 60 - undetained | 33.6 | | 48.1 | 61.2 | | | 142.8 | 142.8 | 63.2 | 56% | Disconnected |
| Subarea 70 | 203.6 | 494.9 | 1277.0 | 233.8 | 662.2 | | 2871.6 | 2871.6 | 549.3 | 81% | Pond 75 |
| Subarea 80 | 382.6 | 1012.0 | 1814.0 | 327.3 | 1172.1 | 0.3 | 4708.3 | 4708.3 | 603.9 | 87% | Pond 80 and 85 |
| Subarea 90 - undetained | | | | | | | 0.0 | | | | |
| Total | 1539.5 | 3567.6 | 6851.6 | 1518.0 | 4173.1 | 3.3 | 17653.0 | 17653.0 | 3490.7 | 80% | |

NR151.122 TSS Removal Summary

**Redevelopment ~ 4.41 acres @ 40% TSS
New Development ~ 75.49 acres @ 80% TSS
Total Site ~ 79.90 acres

Weighted Removal Rate: **78%**