SOUND STORMWATER DESIGN LLC

Muskego, Wisconsin 53150
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# MEMORANDUM

**TO:** Josh Pudelko

**FROM:** Jayme Sisel

**DATE:** January 25, 2021

**SUBJECT:** Skyline Subdivision Stormwater Management

The following is a summary of preliminary stormwater assumptions and calculations for the proposed Skyline Subdivision project. This preliminary stormwater management plan meets the City of Waukesha's requirements for stormwater management.

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

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 22.8 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) = 20.23 cfs
Q(2yr) = 25.60 cfs
Q(10yr) = 64.38 cfs
Q(100yr) = 187.44 cfs

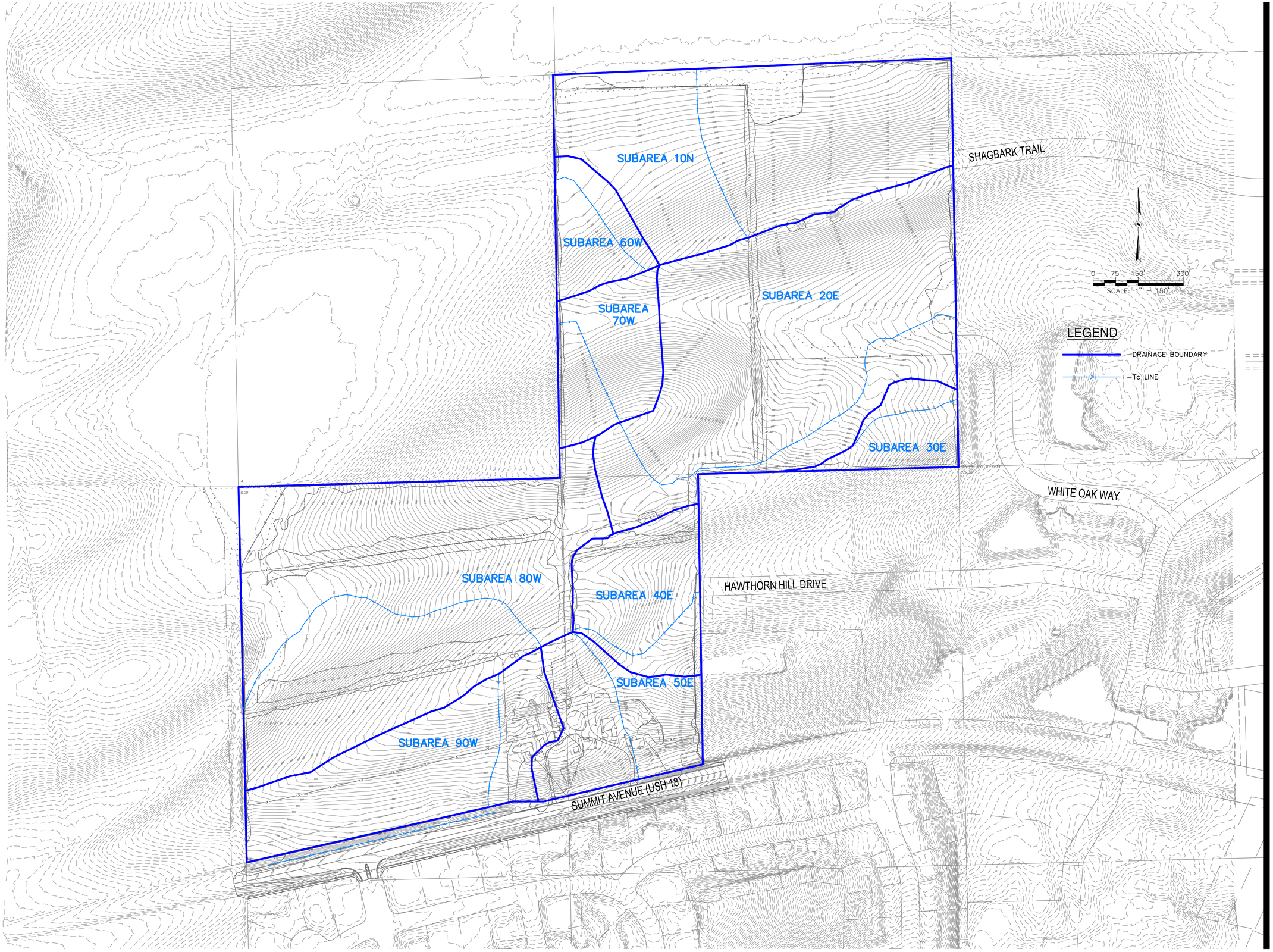
Stormwater Quality:
Stormwater quality will be accomplished by six stormwater management ponds and three infiltration basins. The stormwater management ponds and infiltration basins are designed in accordance with WDNR's Technical Standard 1001 (Wet Detention Basin) and 1003 (Infiltration Basin), respectively.

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.

# FIGURES

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Copper Oaks Ct.
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CLIENT:

BIELINSKI HOMES
1830 MEADOW LANE, SUITE A
PEWAUKEE, WISCONSIN 53072

PROJECT TITLE:

# SKYLINE SUBDIVISION

SUMMIT AVENUE (USH 18)
WAUKESHA, WISCONSIN

DATE: 01-25-21

JOB NO: 2019-006

SHEET TITLE:

## EXISTING CONDITIONS PLAN

FIGURE:

**1**

D:\Jobs\2019\2019-006_Skyline Subdivision\CAD\Site\dwg\00\Existing-2019-006
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SUBAREA 10N

SUBAREA 5N

SUBAREA 20E

SUBAREA 25E

SUBAREA 30E

SUBAREA 90W

SUBAREA 40E

SUBAREA 80W

SUBAREA 70W

SUB 50E

SUBAREA 60W

SHAGBARK TRAIL

WHITE OAK WAY

HAWTHORN HILL DRIVE

SUMMIT AVENUE (USH 18)

O.L. #1

O.L. #2

O.L. #3

O.L. #6

O.L. #7

O.L. #9

0 75' 150' 300'

SCALE: 1" = 150'

## LEGEND

—DRAINAGE BOUNDARY

—Tc LINE


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# SKYLINE SUBDIVISION

SUMMIT AVENUE (USH 18)
WAUKESHA, WISCONSIN

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# PROPOSED CONDITIONS PLAN

FIGURE:

**2**

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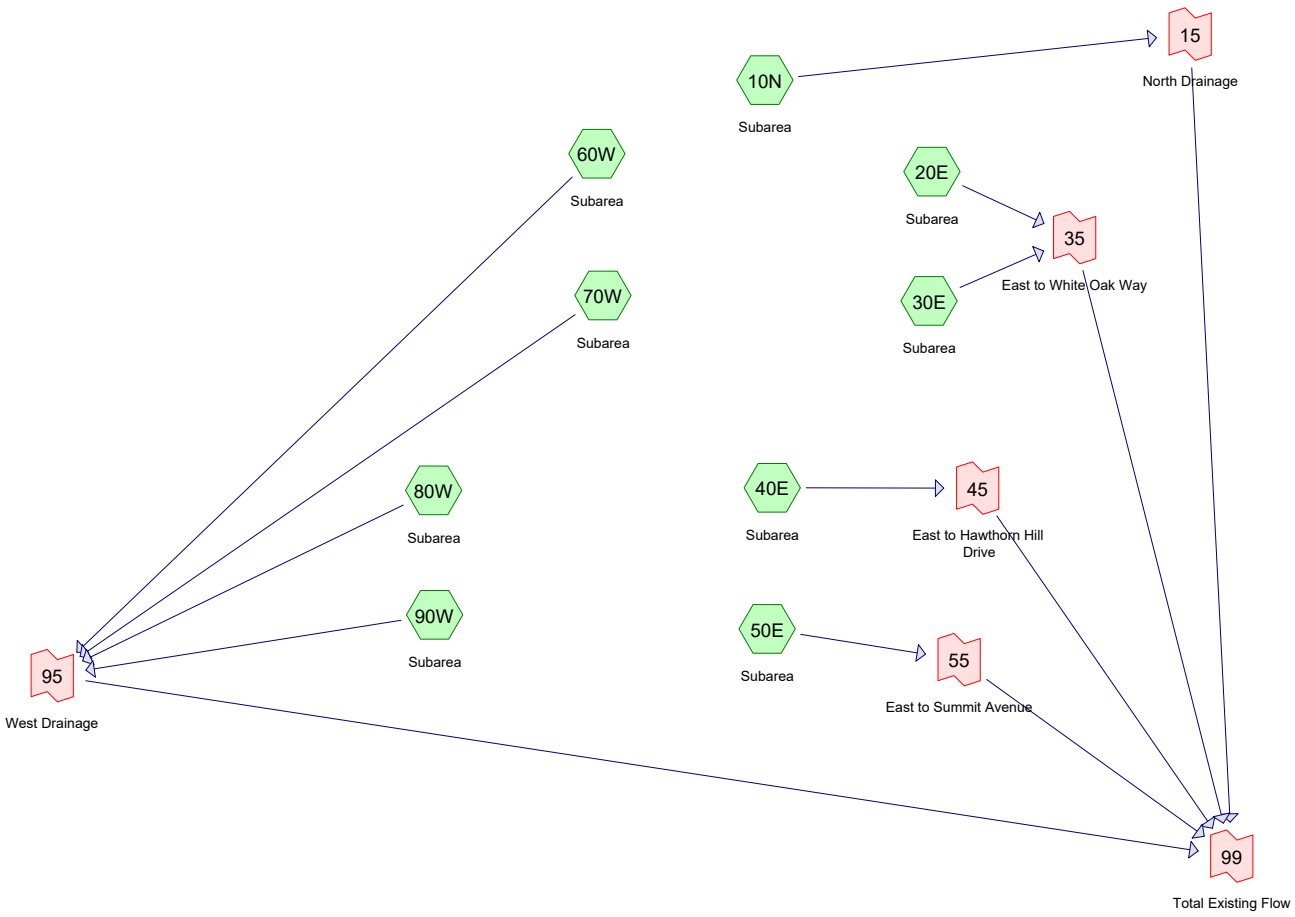
# HYDROLOGIC ANALYSIS

# EXISTING CONDITIONS




Subcat Reach Pond Link

**Routing Diagram for Existing_006**
Prepared by HP Inc., Printed 1/24/2021

## 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=0.00-24.00 hrs, dt=0.05 hrs, 481 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>0.92"
Flow Length=590' Slope=0.0700 '/' Tc=19.2 min CN=82 Runoff=15.07 cfs 1.124 af

**Subcatchment20E: Subarea** Runoff Area=18.960 ac 0.00% Impervious Runoff Depth>0.92"
Flow Length=1,495' Tc=26.7 min CN=82 Runoff=16.34 cfs 1.459 af

**Subcatchment30E: Subarea** Runoff Area=2.160 ac 0.00% Impervious Runoff Depth>0.98"
Flow Length=390' Slope=0.0500 '/' Tc=20.4 min CN=83 Runoff=2.31 cfs 0.176 af

**Subcatchment40E: Subarea** Runoff Area=4.460 ac 0.00% Impervious Runoff Depth>0.98"
Flow Length=550' Slope=0.0500 '/' Tc=21.8 min CN=83 Runoff=4.59 cfs 0.364 af

**Subcatchment50E: Subarea** Runoff Area=4.910 ac 6.31% Impervious Runoff Depth>0.98"
Flow Length=545' Slope=0.0800 '/' Tc=17.2 min CN=83 Runoff=5.73 cfs 0.401 af

**Subcatchment60W: Subarea** Runoff Area=2.410 ac 0.00% Impervious Runoff Depth>0.98"
Flow Length=445' Tc=18.5 min CN=83 Runoff=2.70 cfs 0.197 af

**Subcatchment70W: Subarea** Runoff Area=3.760 ac 0.00% Impervious Runoff Depth>0.98"
Flow Length=430' Tc=16.0 min CN=83 Runoff=4.54 cfs 0.307 af

**Subcatchment80W: Subarea** Runoff Area=20.770 ac 0.00% Impervious Runoff Depth>0.77"
Flow Length=1,275' Tc=56.1 min CN=79 Runoff=9.08 cfs 1.326 af

**Subcatchment90W: Subarea** Runoff Area=7.870 ac 2.03% Impervious Runoff Depth>0.98"
Flow Length=445' Slope=0.0800 '/' Tc=17.2 min CN=83 Runoff=9.19 cfs 0.643 af

**Link 15: North Drainage** Inflow=15.07 cfs 1.124 af
Primary=15.07 cfs 1.124 af

**Link 35: East to White Oak Way** Inflow=18.41 cfs 1.635 af
Primary=18.41 cfs 1.635 af

**Link 45: East to Hawthorn Hill Drive** Inflow=4.59 cfs 0.364 af
Primary=4.59 cfs 0.364 af

**Link 55: East to Summit Avenue** Inflow=5.73 cfs 0.401 af
Primary=5.73 cfs 0.401 af

**Link 95: West Drainage** Inflow=18.47 cfs 2.473 af
Primary=18.47 cfs 2.473 af

**Link 99: Total Existing Flow** Inflow=60.68 cfs 5.997 af
Primary=60.68 cfs 5.997 af

**Total Runoff Area = 79.900 ac Runoff Volume = 5.997 af Average Runoff Depth = 0.90"**
**99.41% Pervious = 79.430 ac 0.59% Impervious = 0.470 ac**

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 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>1.15"
Flow Length=590' Slope=0.0700 '/' Tc=19.2 min CN=82 Runoff=18.87 cfs 1.394 af

**Subcatchment20E: Subarea** Runoff Area=18.960 ac 0.00% Impervious Runoff Depth>1.14"
Flow Length=1,495' Tc=26.7 min CN=82 Runoff=20.48 cfs 1.809 af

**Subcatchment30E: Subarea** Runoff Area=2.160 ac 0.00% Impervious Runoff Depth>1.21"
Flow Length=390' Slope=0.0500 '/' Tc=20.4 min CN=83 Runoff=2.87 cfs 0.217 af

**Subcatchment40E: Subarea** Runoff Area=4.460 ac 0.00% Impervious Runoff Depth>1.21"
Flow Length=550' Slope=0.0500 '/' Tc=21.8 min CN=83 Runoff=5.70 cfs 0.449 af

**Subcatchment50E: Subarea** Runoff Area=4.910 ac 6.31% Impervious Runoff Depth>1.21"
Flow Length=545' Slope=0.0800 '/' Tc=17.2 min CN=83 Runoff=7.12 cfs 0.494 af

**Subcatchment60W: Subarea** Runoff Area=2.410 ac 0.00% Impervious Runoff Depth>1.21"
Flow Length=445' Tc=18.5 min CN=83 Runoff=3.35 cfs 0.243 af

**Subcatchment70W: Subarea** Runoff Area=3.760 ac 0.00% Impervious Runoff Depth>1.21"
Flow Length=430' Tc=16.0 min CN=83 Runoff=5.64 cfs 0.378 af

**Subcatchment80W: Subarea** Runoff Area=20.770 ac 0.00% Impervious Runoff Depth>0.97"
Flow Length=1,275' Tc=56.1 min CN=79 Runoff=11.72 cfs 1.676 af

**Subcatchment90W: Subarea** Runoff Area=7.870 ac 2.03% Impervious Runoff Depth>1.21"
Flow Length=445' Slope=0.0800 '/' Tc=17.2 min CN=83 Runoff=11.41 cfs 0.792 af

**Link 15: North Drainage** Inflow=18.87 cfs 1.394 af
Primary=18.87 cfs 1.394 af

**Link 35: East to White Oak Way** Inflow=23.07 cfs 2.026 af
Primary=23.07 cfs 2.026 af

**Link 45: East to Hawthorn Hill Drive** Inflow=5.70 cfs 0.449 af
Primary=5.70 cfs 0.449 af

**Link 55: East to Summit Avenue** Inflow=7.12 cfs 0.494 af
Primary=7.12 cfs 0.494 af

**Link 95: West Drainage** Inflow=23.33 cfs 3.089 af
Primary=23.33 cfs 3.089 af

**Link 99: Total Existing Flow** Inflow=76.17 cfs 7.452 af
Primary=76.17 cfs 7.452 af

**Total Runoff Area = 79.900 ac Runoff Volume = 7.452 af Average Runoff Depth = 1.12"**
**99.41% Pervious = 79.430 ac 0.59% Impervious = 0.470 ac**

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 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>2.04"
Flow Length=590' Slope=0.0700 '/' Tc=19.2 min CN=82 Runoff=33.92 cfs 2.481 af

**Subcatchment20E: Subarea** Runoff Area=18.960 ac 0.00% Impervious Runoff Depth>2.04"
Flow Length=1,495' Tc=26.7 min CN=82 Runoff=36.96 cfs 3.220 af

**Subcatchment30E: Subarea** Runoff Area=2.160 ac 0.00% Impervious Runoff Depth>2.12"
Flow Length=390' Slope=0.0500 '/' Tc=20.4 min CN=83 Runoff=5.07 cfs 0.381 af

**Subcatchment40E: Subarea** Runoff Area=4.460 ac 0.00% Impervious Runoff Depth>2.12"
Flow Length=550' Slope=0.0500 '/' Tc=21.8 min CN=83 Runoff=10.11 cfs 0.788 af

**Subcatchment50E: Subarea** Runoff Area=4.910 ac 6.31% Impervious Runoff Depth>2.12"
Flow Length=545' Slope=0.0800 '/' Tc=17.2 min CN=83 Runoff=12.56 cfs 0.867 af

**Subcatchment60W: Subarea** Runoff Area=2.410 ac 0.00% Impervious Runoff Depth>2.12"
Flow Length=445' Tc=18.5 min CN=83 Runoff=5.92 cfs 0.426 af

**Subcatchment70W: Subarea** Runoff Area=3.760 ac 0.00% Impervious Runoff Depth>2.12"
Flow Length=430' Tc=16.0 min CN=83 Runoff=9.93 cfs 0.664 af

**Subcatchment80W: Subarea** Runoff Area=20.770 ac 0.00% Impervious Runoff Depth>1.80"
Flow Length=1,275' Tc=56.1 min CN=79 Runoff=22.57 cfs 3.117 af

**Subcatchment90W: Subarea** Runoff Area=7.870 ac 2.03% Impervious Runoff Depth>2.12"
Flow Length=445' Slope=0.0800 '/' Tc=17.2 min CN=83 Runoff=20.13 cfs 1.390 af

**Link 15: North Drainage** Inflow=33.92 cfs 2.481 af
Primary=33.92 cfs 2.481 af

**Link 35: East to White Oak Way** Inflow=41.66 cfs 3.601 af
Primary=41.66 cfs 3.601 af

**Link 45: East to Hawthorn Hill Drive** Inflow=10.11 cfs 0.788 af
Primary=10.11 cfs 0.788 af

**Link 55: East to Summit Avenue** Inflow=12.56 cfs 0.867 af
Primary=12.56 cfs 0.867 af

**Link 95: West Drainage** Inflow=42.94 cfs 5.598 af
Primary=42.94 cfs 5.598 af

**Link 99: Total Existing Flow** Inflow=137.92 cfs 13.335 af
Primary=137.92 cfs 13.335 af

**Total Runoff Area = 79.900 ac Runoff Volume = 13.335 af Average Runoff Depth = 2.00"**
**99.41% Pervious = 79.430 ac 0.59% Impervious = 0.470 ac**

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 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>4.15"
Flow Length=590' Slope=0.0700 '/' Tc=19.2 min CN=82 Runoff=68.24 cfs 5.047 af

**Subcatchment20E: Subarea** Runoff Area=18.960 ac 0.00% Impervious Runoff Depth>4.15"
Flow Length=1,495' Tc=26.7 min CN=82 Runoff=74.84 cfs 6.551 af

**Subcatchment30E: Subarea** Runoff Area=2.160 ac 0.00% Impervious Runoff Depth>4.25"
Flow Length=390' Slope=0.0500 '/' Tc=20.4 min CN=83 Runoff=10.05 cfs 0.766 af

**Subcatchment40E: Subarea** Runoff Area=4.460 ac 0.00% Impervious Runoff Depth>4.25"
Flow Length=550' Slope=0.0500 '/' Tc=21.8 min CN=83 Runoff=20.04 cfs 1.581 af

**Subcatchment50E: Subarea** Runoff Area=4.910 ac 6.31% Impervious Runoff Depth>4.25"
Flow Length=545' Slope=0.0800 '/' Tc=17.2 min CN=83 Runoff=24.83 cfs 1.741 af

**Subcatchment60W: Subarea** Runoff Area=2.410 ac 0.00% Impervious Runoff Depth>4.25"
Flow Length=445' Tc=18.5 min CN=83 Runoff=11.75 cfs 0.854 af

**Subcatchment70W: Subarea** Runoff Area=3.760 ac 0.00% Impervious Runoff Depth>4.26"
Flow Length=430' Tc=16.0 min CN=83 Runoff=19.61 cfs 1.333 af

**Subcatchment80W: Subarea** Runoff Area=20.770 ac 0.00% Impervious Runoff Depth>3.82"
Flow Length=1,275' Tc=56.1 min CN=79 Runoff=48.41 cfs 6.619 af

**Subcatchment90W: Subarea** Runoff Area=7.870 ac 2.03% Impervious Runoff Depth>4.25"
Flow Length=445' Slope=0.0800 '/' Tc=17.2 min CN=83 Runoff=39.79 cfs 2.790 af

**Link 15: North Drainage** Inflow=68.24 cfs 5.047 af
Primary=68.24 cfs 5.047 af

**Link 35: East to White Oak Way** Inflow=84.05 cfs 7.317 af
Primary=84.05 cfs 7.317 af

**Link 45: East to Hawthorn Hill Drive** Inflow=20.04 cfs 1.581 af
Primary=20.04 cfs 1.581 af

**Link 55: East to Summit Avenue** Inflow=24.83 cfs 1.741 af
Primary=24.83 cfs 1.741 af

**Link 95: West Drainage** Inflow=88.56 cfs 11.597 af
Primary=88.56 cfs 11.597 af

**Link 99: Total Existing Flow** Inflow=279.59 cfs 27.282 af
Primary=279.59 cfs 27.282 af

**Total Runoff Area = 79.900 ac Runoff Volume = 27.282 af Average Runoff Depth = 4.10"**
**99.41% Pervious = 79.430 ac 0.59% Impervious = 0.470 ac**

## Summary for Subcatchment 10N: Subarea

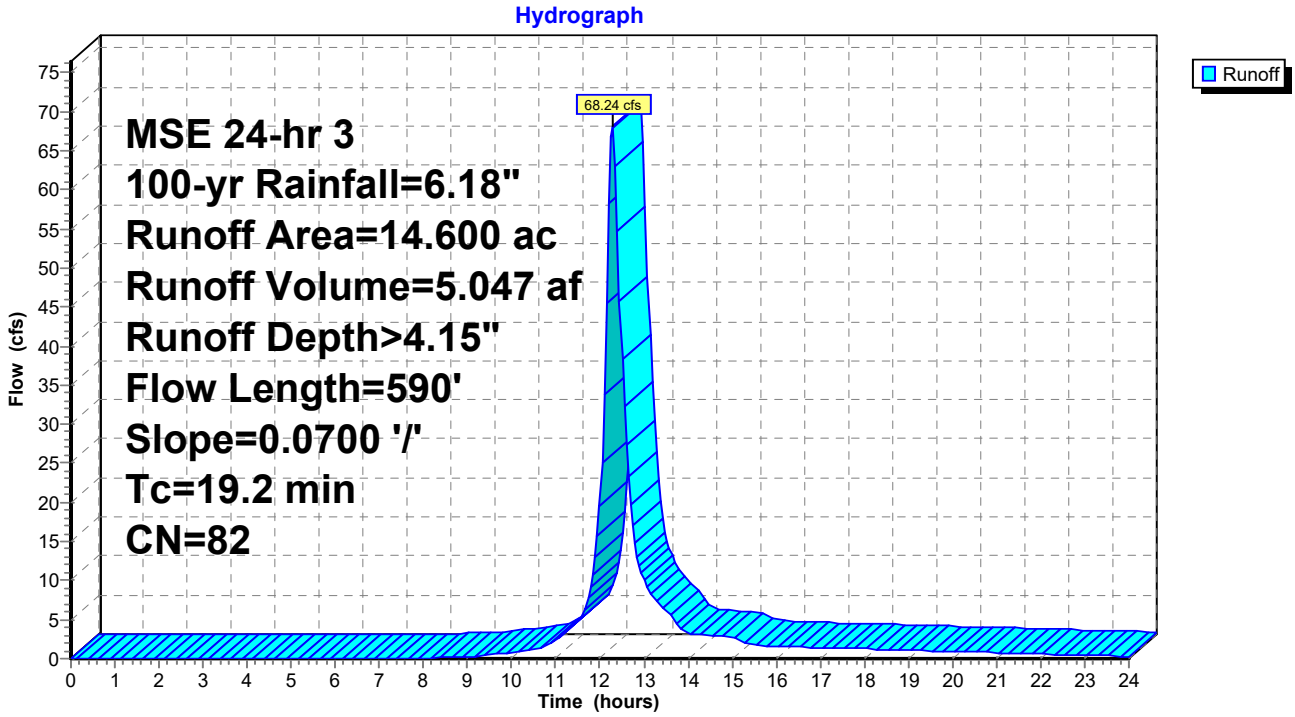
Runoff = 68.24 cfs @ 12.28 hrs, Volume= 5.047 af, Depth> 4.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 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

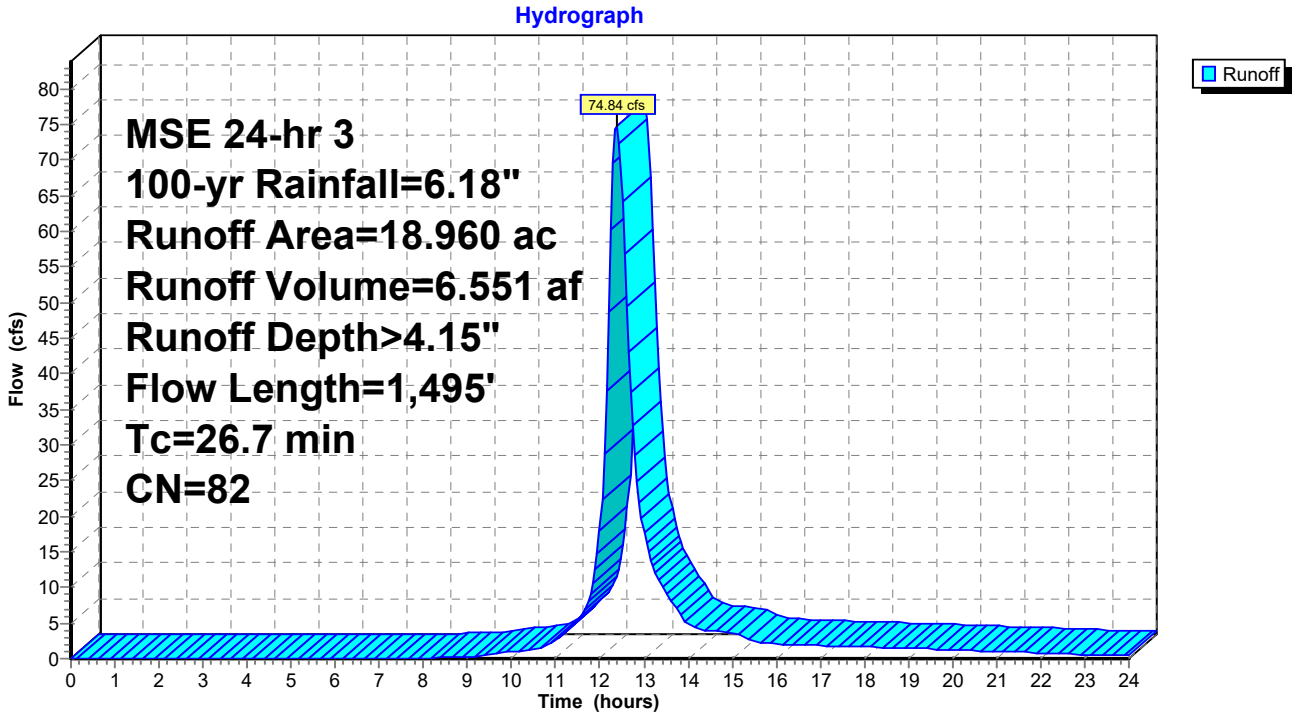
Runoff = 74.84 cfs @ 12.37 hrs, Volume= 6.551 af, Depth> 4.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 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

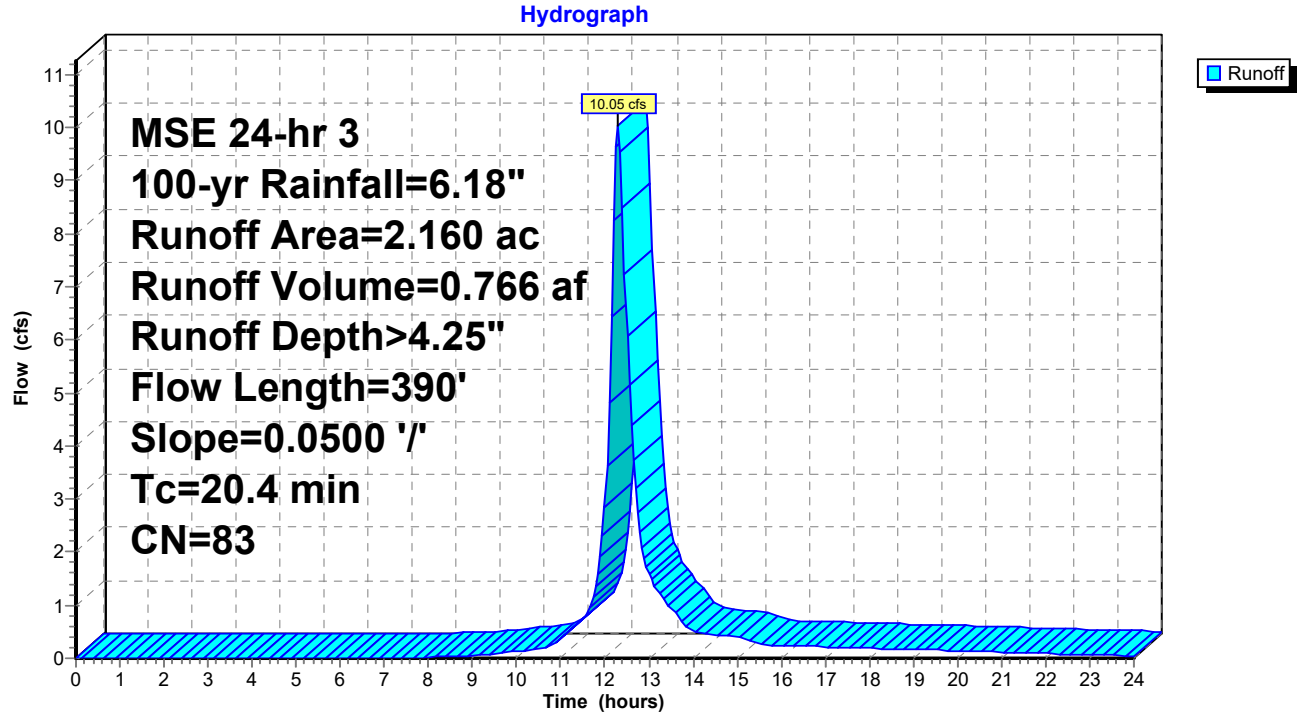
Runoff = 10.05 cfs @ 12.30 hrs, Volume= 0.766 af, Depth> 4.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 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

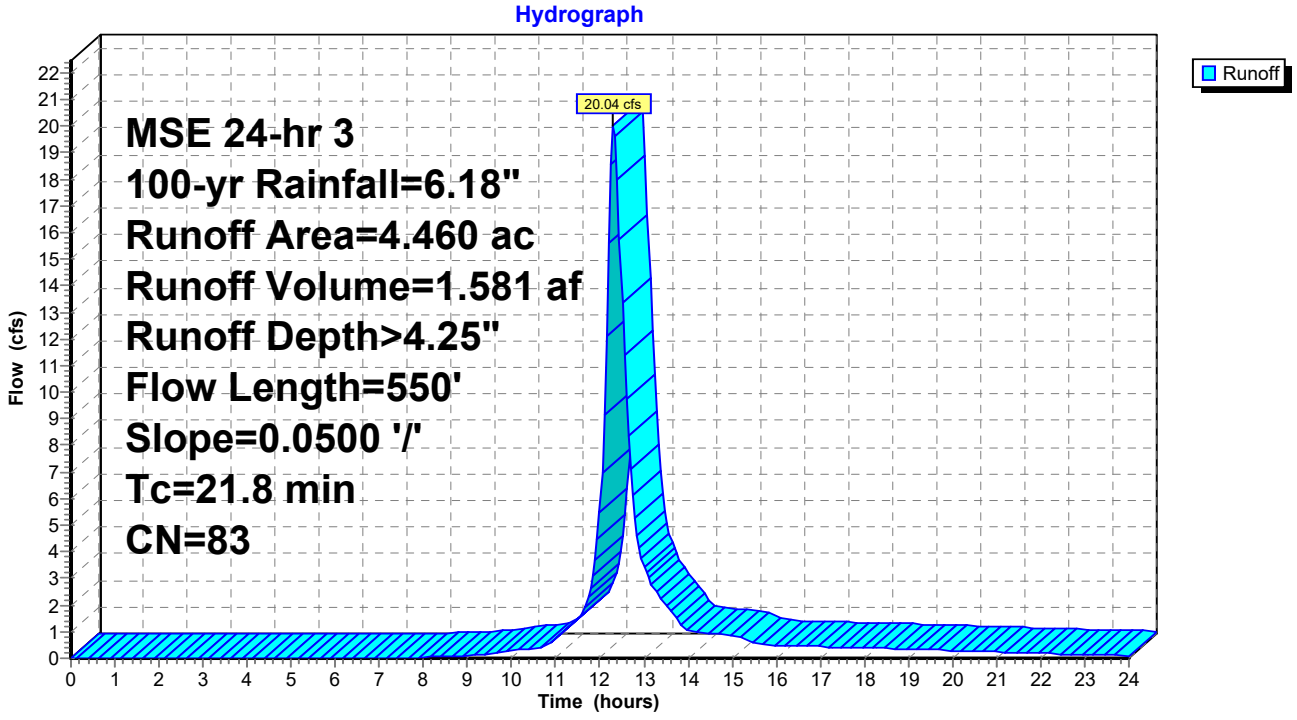
Runoff = 20.04 cfs @ 12.31 hrs, Volume= 1.581 af, Depth> 4.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 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

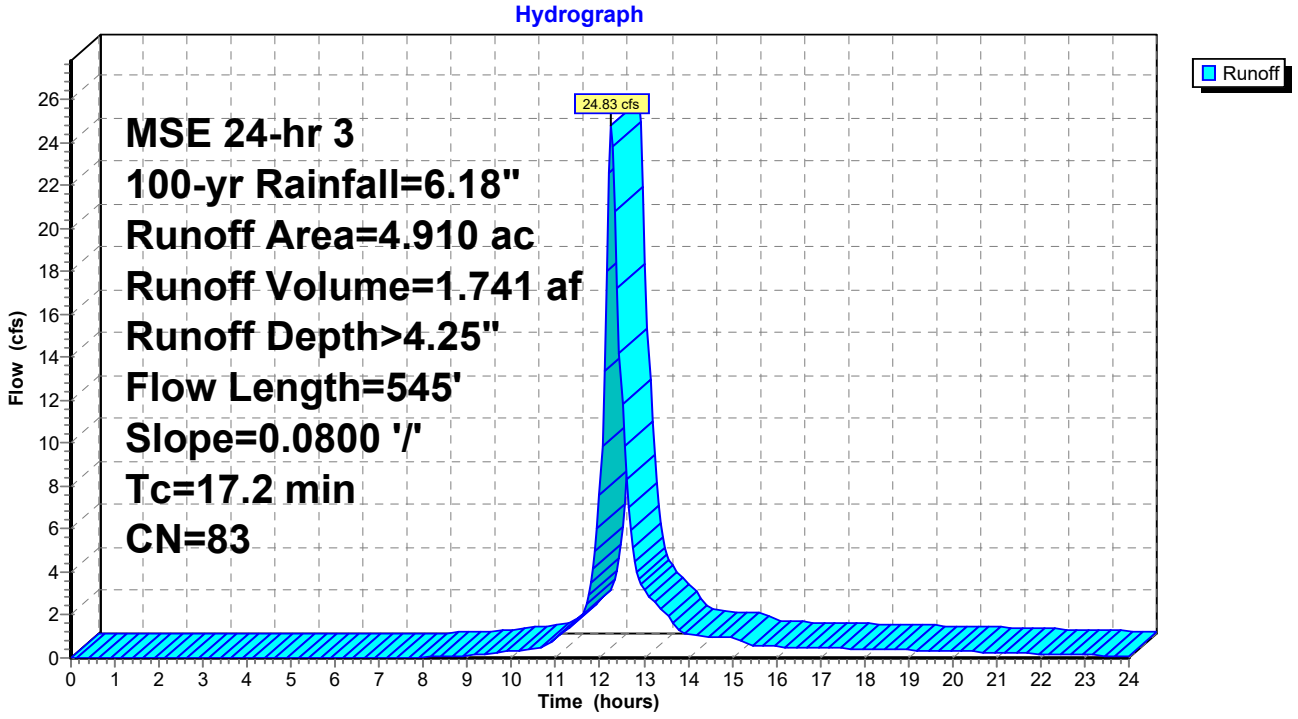
Runoff = 24.83 cfs @ 12.26 hrs, Volume= 1.741 af, Depth> 4.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 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

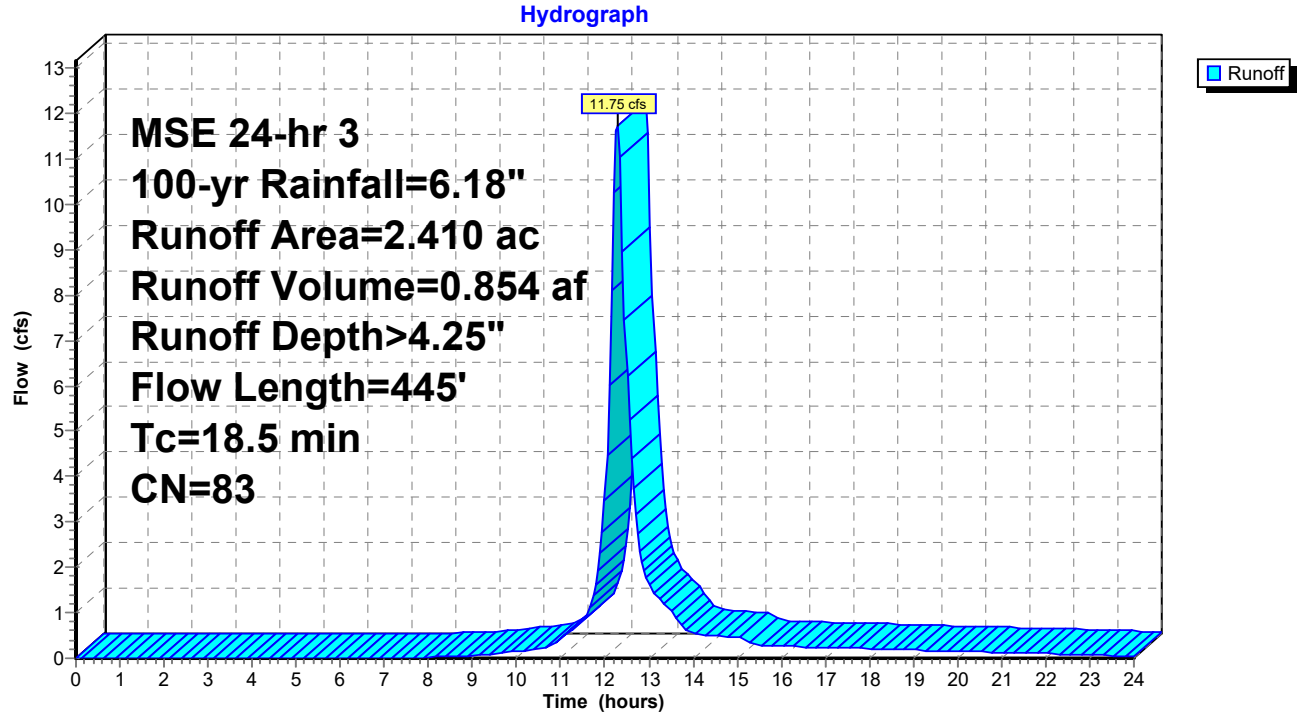
Runoff = 11.75 cfs @ 12.27 hrs, Volume= 0.854 af, Depth> 4.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 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

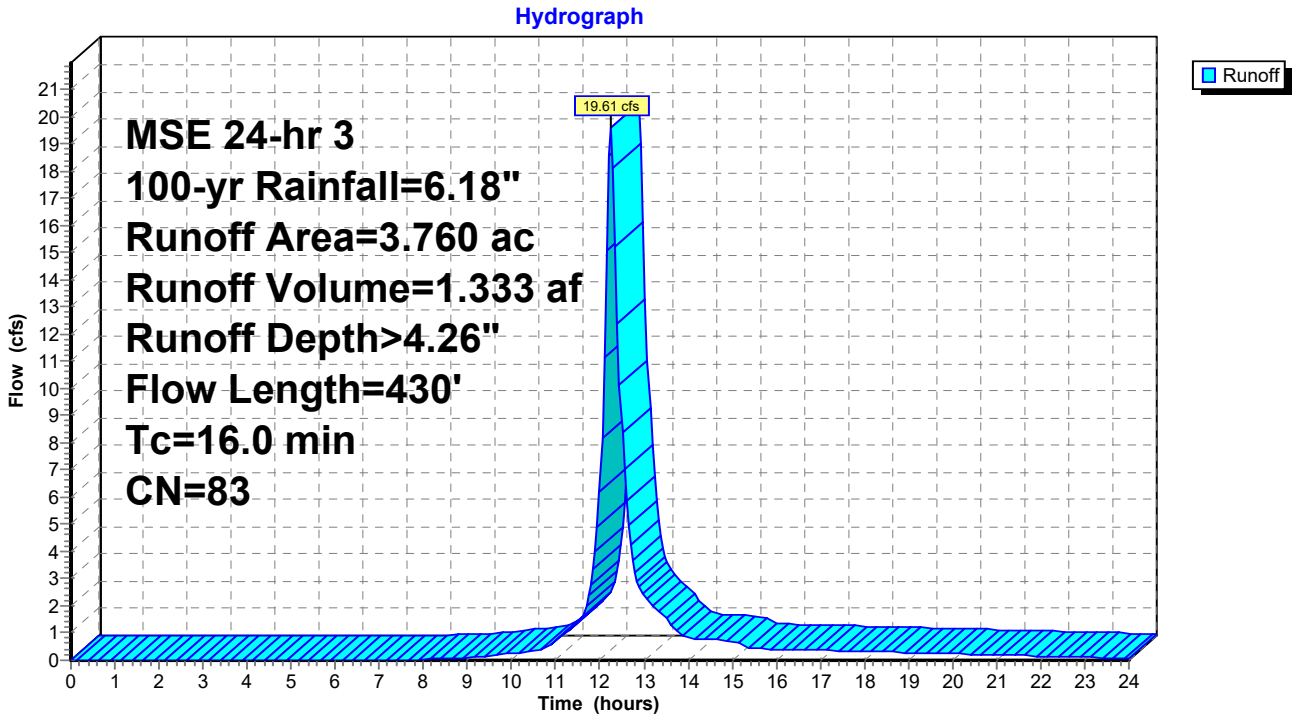
Runoff = 19.61 cfs @ 12.25 hrs, Volume= 1.333 af, Depth> 4.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 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

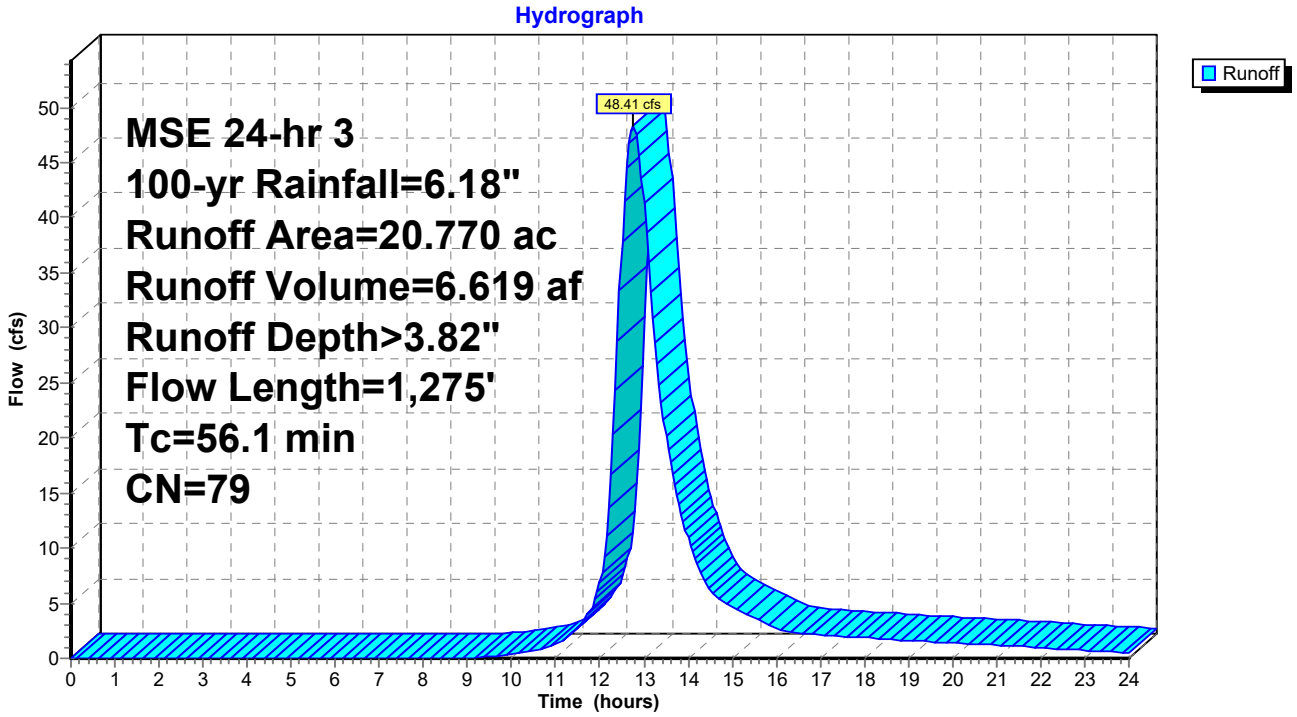
Runoff = 48.41 cfs @ 12.76 hrs, Volume= 6.619 af, Depth> 3.82"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 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

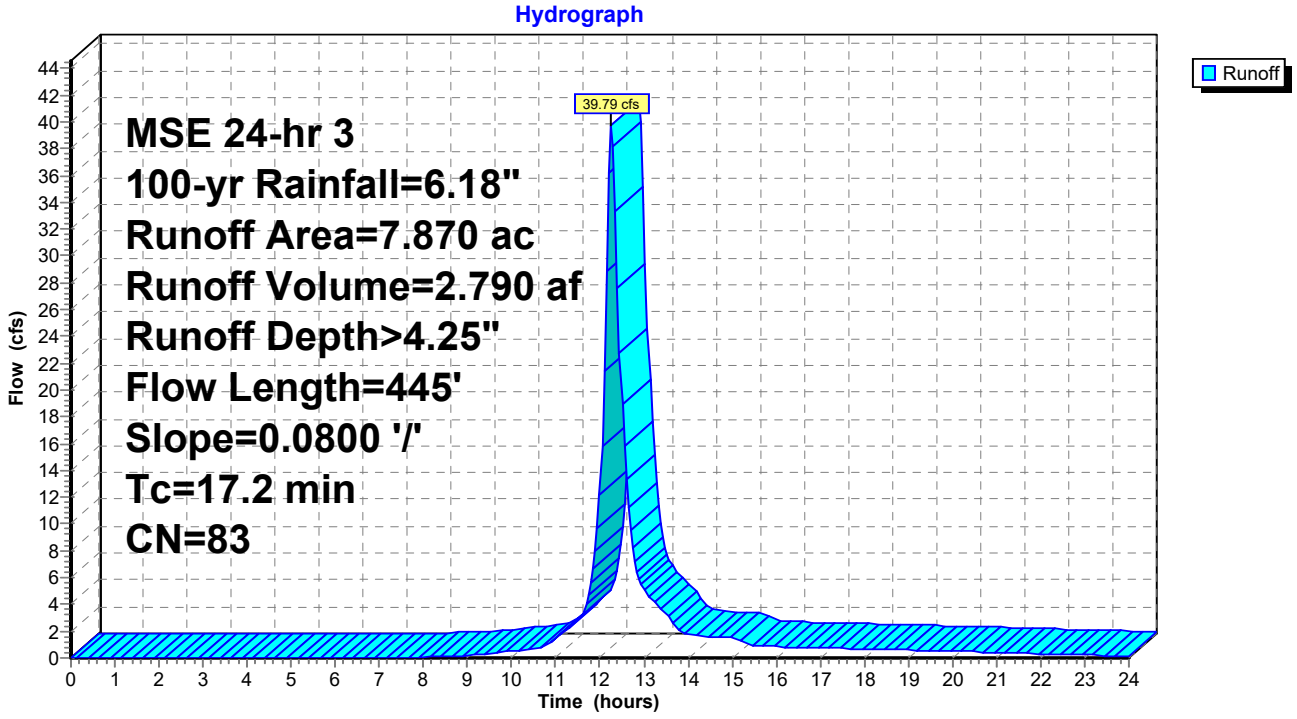
Runoff = 39.79 cfs @ 12.26 hrs, Volume= 2.790 af, Depth> 4.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 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

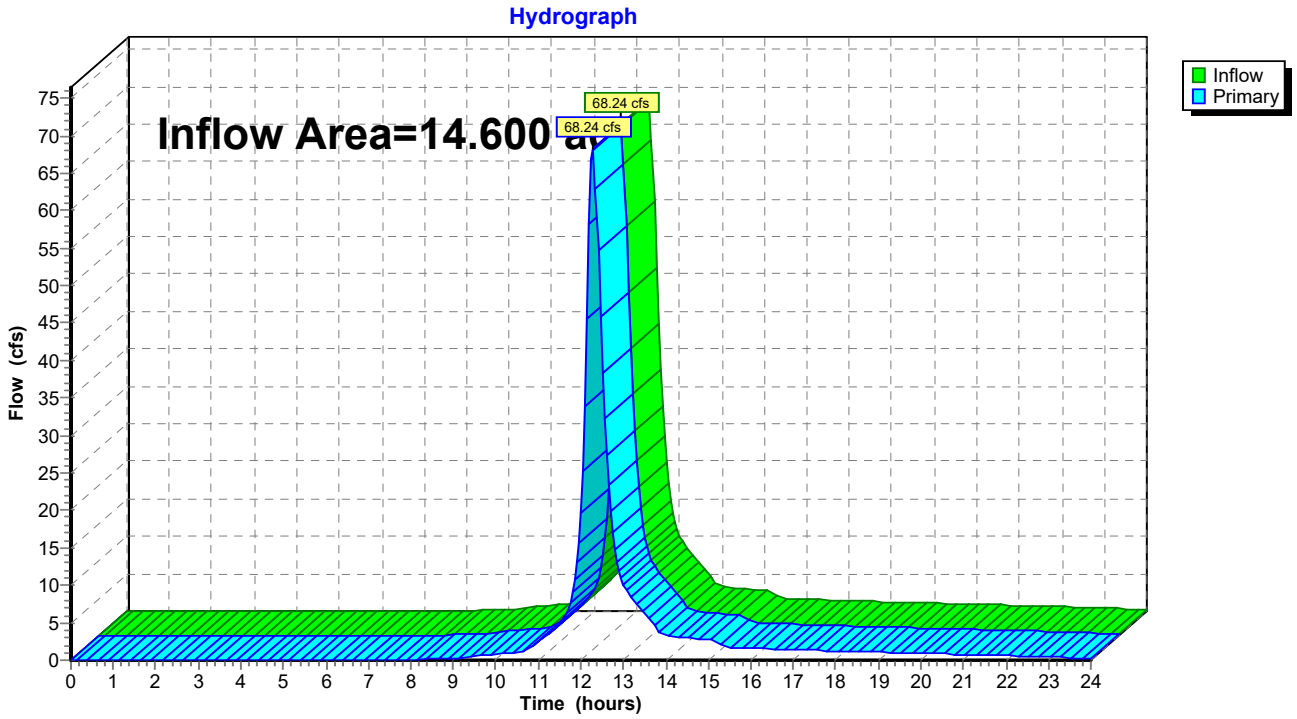


## Summary for Link 15: North Drainage

Inflow Area = 14.600 ac, 0.00% Impervious, Inflow Depth > 4.15" for 100-yr event
Inflow = 68.24 cfs @ 12.28 hrs, Volume= 5.047 af
Primary = 68.24 cfs @ 12.28 hrs, Volume= 5.047 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

## Link 15: North Drainage

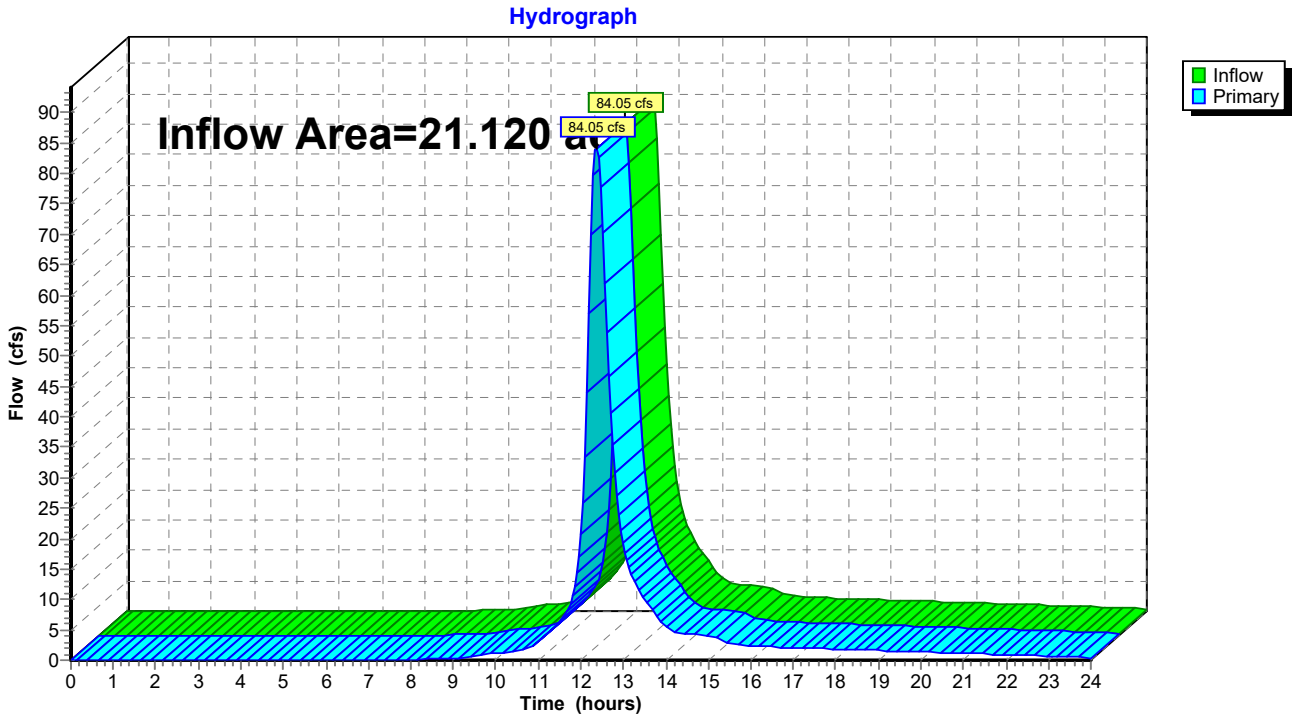


## Summary for Link 35: East to White Oak Way

Inflow Area = 21.120 ac, 0.00% Impervious, Inflow Depth > 4.16" for 100-yr event
Inflow = 84.05 cfs @ 12.36 hrs, Volume= 7.317 af
Primary = 84.05 cfs @ 12.36 hrs, Volume= 7.317 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

## Link 35: East to White Oak Way

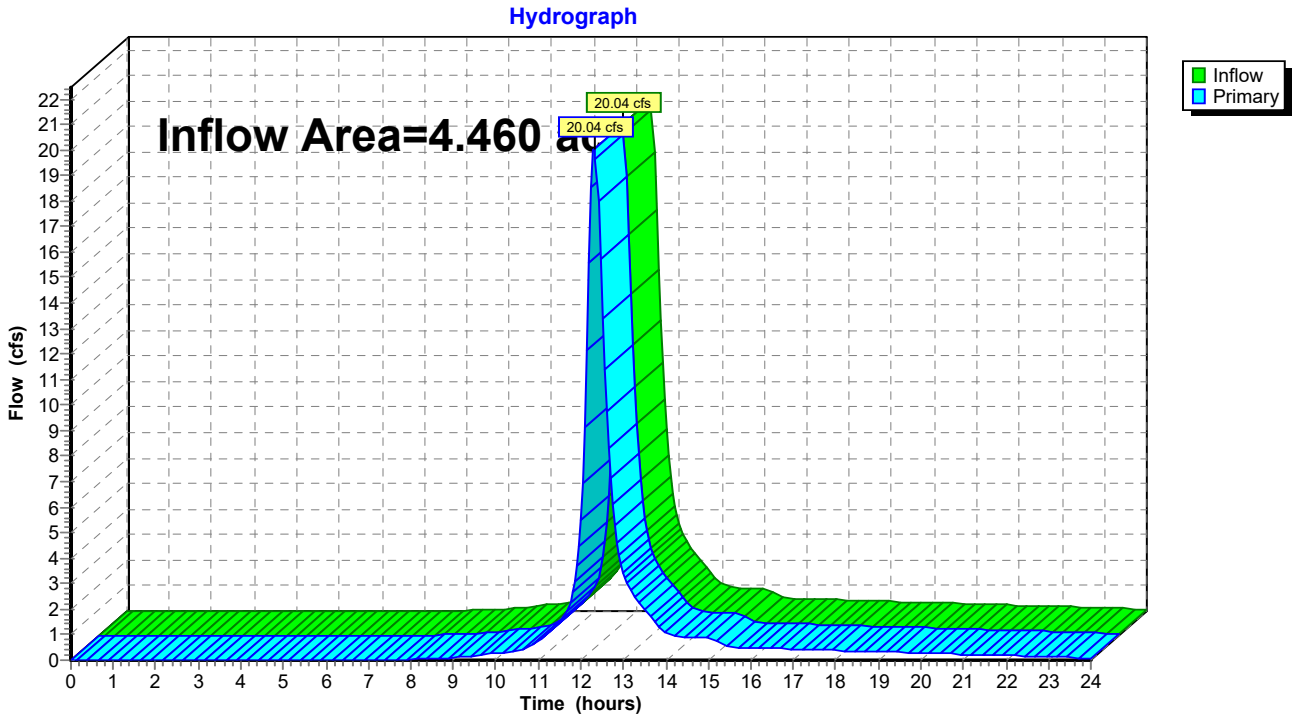


## Summary for Link 45: East to Hawthorn Hill Drive

Inflow Area = 4.460 ac, 0.00% Impervious, Inflow Depth > 4.25" for 100-yr event
Inflow = 20.04 cfs @ 12.31 hrs, Volume= 1.581 af
Primary = 20.04 cfs @ 12.31 hrs, Volume= 1.581 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

## Link 45: East to Hawthorn Hill Drive

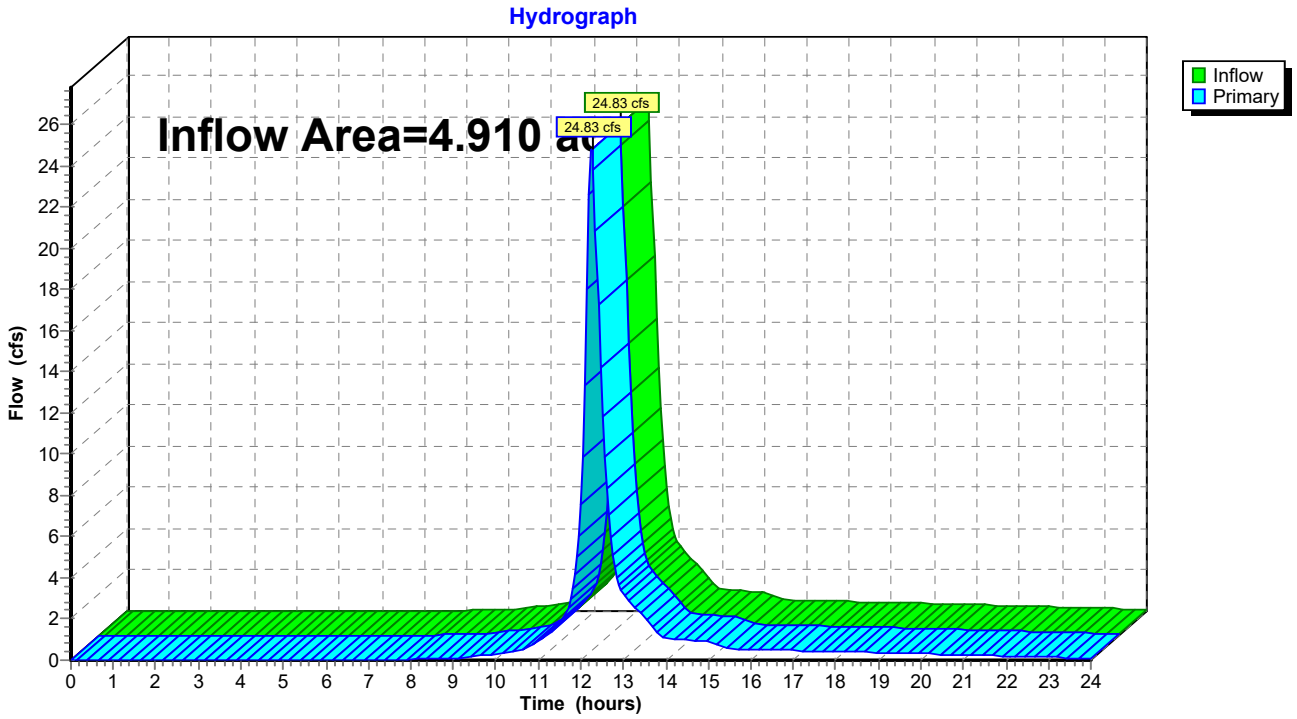


## Summary for Link 55: East to Summit Avenue

Inflow Area = 4.910 ac, 6.31% Impervious, Inflow Depth > 4.25" for 100-yr event
Inflow = 24.83 cfs @ 12.26 hrs, Volume= 1.741 af
Primary = 24.83 cfs @ 12.26 hrs, Volume= 1.741 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

## Link 55: East to Summit Avenue

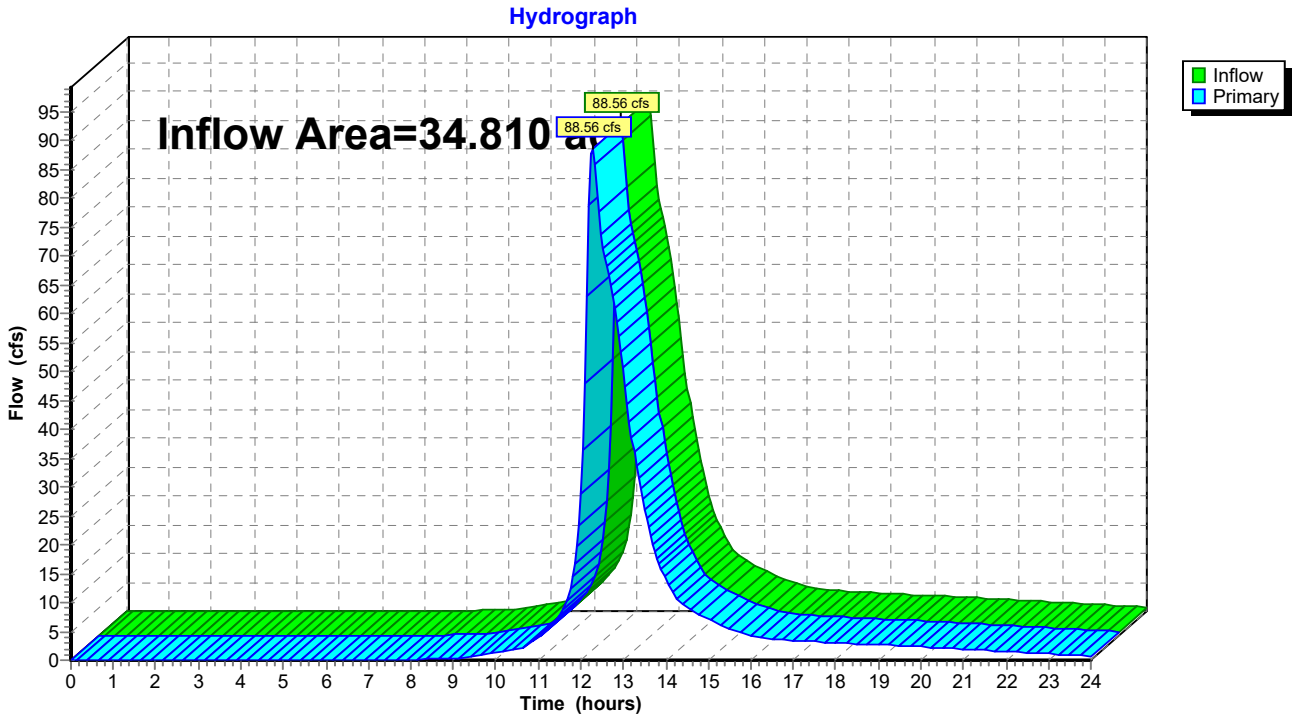


## Summary for Link 95: West Drainage

Inflow Area = 34.810 ac, 0.46% Impervious, Inflow Depth > 4.00" for 100-yr event
Inflow = 88.56 cfs @ 12.28 hrs, Volume= 11.597 af
Primary = 88.56 cfs @ 12.28 hrs, Volume= 11.597 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

## Link 95: West Drainage

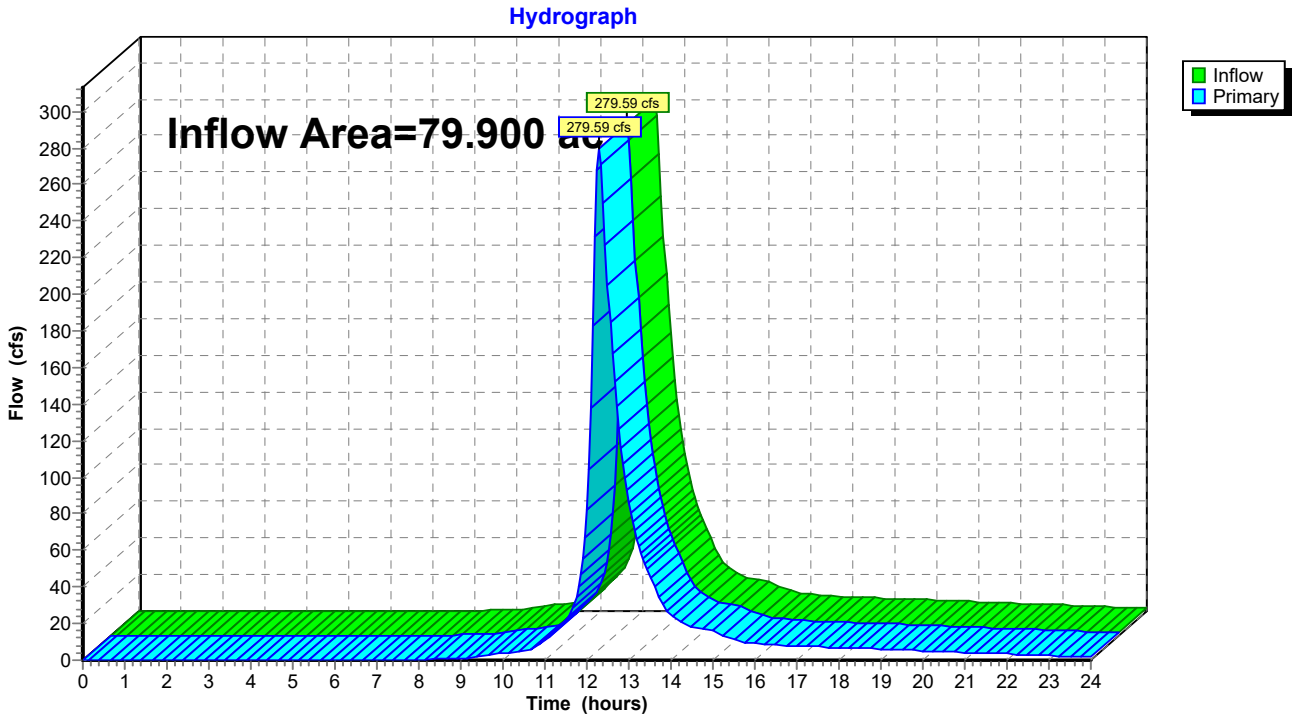


## Summary for Link 99: Total Existing Flow

Inflow Area = 79.900 ac, 0.59% Impervious, Inflow Depth > 4.10" for 100-yr event
Inflow = 279.59 cfs @ 12.30 hrs, Volume= 27.282 af
Primary = 279.59 cfs @ 12.30 hrs, Volume= 27.282 af, Atten= 0%, Lag= 0.0 min

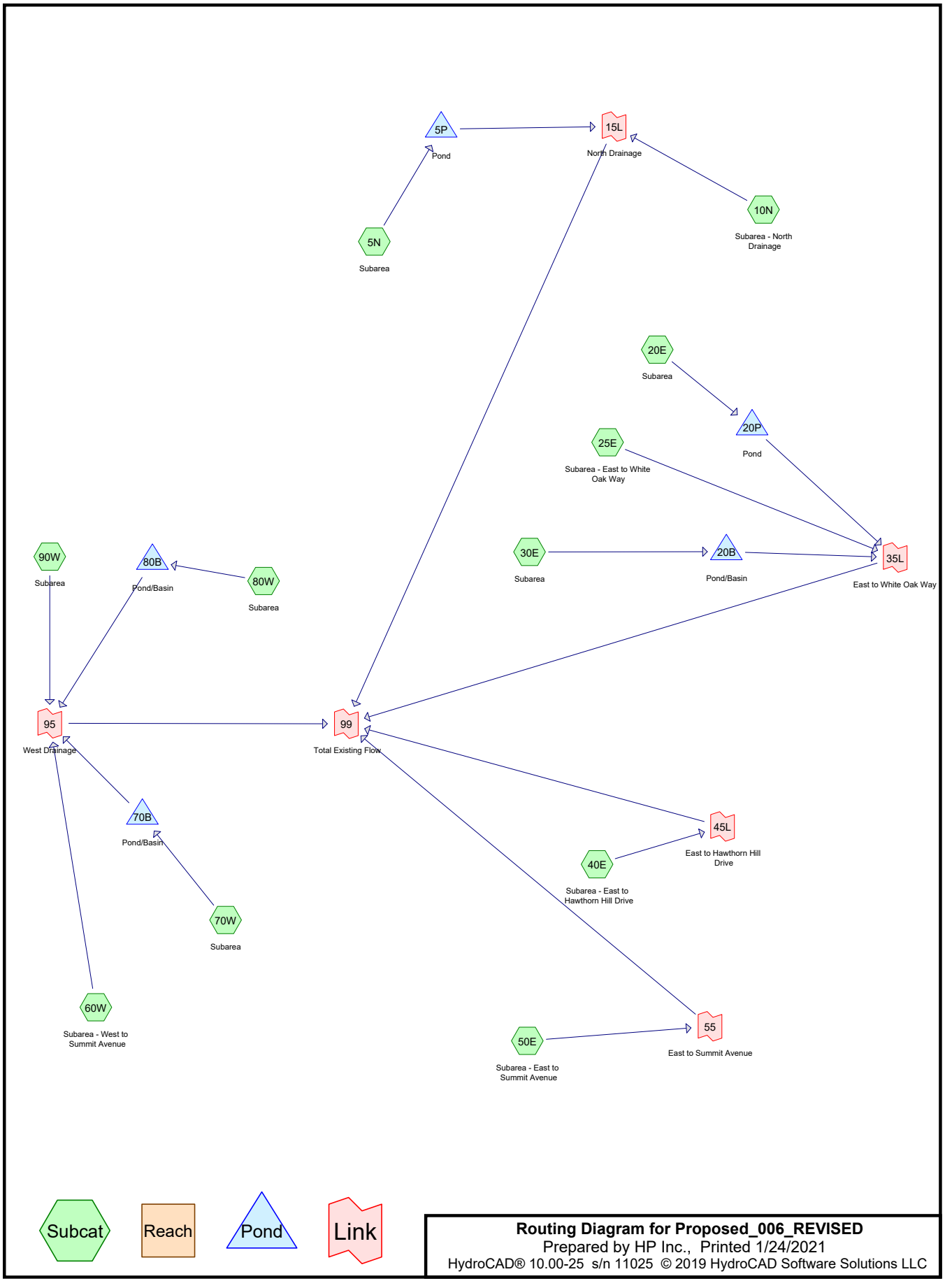
Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

## Link 99: Total Existing Flow



# HYDROLOGIC ANALYSIS

# PROPOSED CONDITIONS




**Routing Diagram for Proposed_006_REVISED**
Prepared by HP Inc., Printed 1/24/2021

## Area Listing (all nodes)

| Area (acres) | CN | Description (subcatchment-numbers) |
|---|---|---|
| 50.480 | 86 | 1/3 acre lots, 30% imp, HSG D (5N, 10N, 20E, 25E, 30E, 40E, 50E, 60W, 70W, 80W) |
| 14.180 | 80 | grass - D soils (5N, 10N, 20E, 25E, 30E, 50E, 60W, 70W, 80W, 90W) |
| 8.070 | 98 | road (5N, 10N, 20E, 30E, 40E, 70W, 80W) |
| 0.280 | 98 | sidewalk (10N, 30E, 50E, 60W, 70W, 80W) |
| 1.610 | 98 | water (5N, 20E, 30E, 70W, 80W) |
| 2.070 | 78 | wetland - D soils (10N, 25E, 90W) |
| 3.210 | 77 | woodland - D soils (5N, 10N, 20E, 25E, 30E, 80W, 90W) |
| **79.900** | **86** | **TOTAL AREA** |

Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 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=17.500 ac 35.06% Impervious Runoff Depth>1.23"
Flow Length=185' Slope=0.0300 '/' Tc=21.6 min CN=87 Runoff=23.21 cfs 1.788 af

**Subcatchment10N: Subarea - North** Runoff Area=4.960 ac 12.94% Impervious Runoff Depth>0.92"
Flow Length=185' Slope=0.0700 '/' Tc=15.4 min CN=82 Runoff=5.75 cfs 0.382 af

**Subcatchment20E: Subarea** Runoff Area=5.400 ac 35.15% Impervious Runoff Depth>1.23"
Flow Length=240' Slope=0.0500 '/' Tc=21.7 min CN=87 Runoff=7.15 cfs 0.552 af

**Subcatchment25E: Subarea - East to** Runoff Area=3.510 ac 11.03% Impervious Runoff Depth>0.87"
Flow Length=645' Slope=0.0300 '/' Tc=33.9 min CN=81 Runoff=2.46 cfs 0.254 af

**Subcatchment30E: Subarea** Runoff Area=9.140 ac 36.70% Impervious Runoff Depth>1.23"
Flow Length=85' Slope=0.0600 '/' Tc=8.8 min CN=87 Runoff=18.41 cfs 0.935 af

**Subcatchment40E: Subarea - East to** Runoff Area=1.690 ac 37.04% Impervious Runoff Depth>1.23"
Flow Length=300' Slope=0.0700 '/' Tc=22.7 min CN=87 Runoff=2.18 cfs 0.173 af

**Subcatchment50E: Subarea - East to** Runoff Area=2.510 ac 20.72% Impervious Runoff Depth>1.04"
Flow Length=160' Slope=0.1000 '/' Tc=11.9 min CN=84 Runoff=3.75 cfs 0.217 af

**Subcatchment60W: Subarea - West to** Runoff Area=1.780 ac 20.11% Impervious Runoff Depth>1.04"
Flow Length=165' Slope=0.0800 '/' Tc=13.3 min CN=84 Runoff=2.52 cfs 0.154 af

**Subcatchment70W: Subarea** Runoff Area=16.300 ac 37.82% Impervious Runoff Depth>1.23"
Flow Length=140' Slope=0.0600 '/' Tc=13.1 min CN=87 Runoff=27.67 cfs 1.666 af

**Subcatchment80W: Subarea** Runoff Area=14.390 ac 34.89% Impervious Runoff Depth>1.23"
Flow Length=190' Slope=0.0900 '/' Tc=14.2 min CN=87 Runoff=23.49 cfs 1.471 af

**Subcatchment90W: Subarea** Runoff Area=2.720 ac 0.00% Impervious Runoff Depth>0.72"
Flow Length=495' Slope=0.0100 '/' Tc=39.9 min CN=78 Runoff=1.38 cfs 0.163 af

**Pond 5P: Pond** Peak Elev=216.88' Storage=1.201 af Inflow=23.21 cfs 1.788 af
Outflow=1.21 cfs 1.072 af

**Pond 20B: Pond/Basin** Peak Elev=214.60' Storage=0.548 af Inflow=18.41 cfs 0.935 af
Discarded=0.10 cfs 0.096 af Primary=1.10 cfs 0.751 af Outflow=1.20 cfs 0.847 af

**Pond 20P: Pond** Peak Elev=222.24' Storage=0.226 af Inflow=7.15 cfs 0.552 af
Outflow=3.23 cfs 0.528 af

**Pond 70B: Pond/Basin** Peak Elev=213.46' Storage=0.861 af Inflow=27.67 cfs 1.666 af
Discarded=0.14 cfs 0.124 af Primary=3.70 cfs 1.357 af Outflow=3.84 cfs 1.482 af

**Pond 80B: Pond/Basin** Peak Elev=212.76' Storage=0.860 af Inflow=23.49 cfs 1.471 af
Discarded=0.25 cfs 0.249 af Primary=1.89 cfs 0.849 af Outflow=2.14 cfs 1.098 af

**Link 15L: North Drainage** Inflow=6.31 cfs 1.453 af
Primary=6.31 cfs 1.453 af

**Link 35L: East to White Oak Way** Inflow=6.55 cfs 1.533 af
Primary=6.55 cfs 1.533 af

**Link 45L: East to Hawthorn Hill Drive** Inflow=2.18 cfs 0.173 af
Primary=2.18 cfs 0.173 af

**Link 55: East to Summit Avenue** Inflow=3.75 cfs 0.217 af
Primary=3.75 cfs 0.217 af

**Link 95: West Drainage** Inflow=7.24 cfs 2.524 af
Primary=7.24 cfs 2.524 af

**Link 99: Total Existing Flow** Inflow=20.23 cfs 5.898 af
Primary=20.23 cfs 5.898 af

**Total Runoff Area = 79.900 ac Runoff Volume = 7.755 af Average Runoff Depth = 1.16"**
**68.58% Pervious = 54.796 ac 31.42% Impervious = 25.104 ac**

Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 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=17.500 ac 35.06% Impervious Runoff Depth>1.48"
Flow Length=185' Slope=0.0300 '/' Tc=21.6 min CN=87 Runoff=28.02 cfs 2.155 af

**Subcatchment10N: Subarea - North** Runoff Area=4.960 ac 12.94% Impervious Runoff Depth>1.15"
Flow Length=185' Slope=0.0700 '/' Tc=15.4 min CN=82 Runoff=7.20 cfs 0.474 af

**Subcatchment20E: Subarea** Runoff Area=5.400 ac 35.15% Impervious Runoff Depth>1.48"
Flow Length=240' Slope=0.0500 '/' Tc=21.7 min CN=87 Runoff=8.62 cfs 0.665 af

**Subcatchment25E: Subarea - East to** Runoff Area=3.510 ac 11.03% Impervious Runoff Depth>1.08"
Flow Length=645' Slope=0.0300 '/' Tc=33.9 min CN=81 Runoff=3.11 cfs 0.317 af

**Subcatchment30E: Subarea** Runoff Area=9.140 ac 36.70% Impervious Runoff Depth>1.48"
Flow Length=85' Slope=0.0600 '/' Tc=8.8 min CN=87 Runoff=22.13 cfs 1.127 af

**Subcatchment40E: Subarea - East to** Runoff Area=1.690 ac 37.04% Impervious Runoff Depth>1.48"
Flow Length=300' Slope=0.0700 '/' Tc=22.7 min CN=87 Runoff=2.63 cfs 0.208 af

**Subcatchment50E: Subarea - East to** Runoff Area=2.510 ac 20.72% Impervious Runoff Depth>1.27"
Flow Length=160' Slope=0.1000 '/' Tc=11.9 min CN=84 Runoff=4.61 cfs 0.266 af

**Subcatchment60W: Subarea - West to** Runoff Area=1.780 ac 20.11% Impervious Runoff Depth>1.27"
Flow Length=165' Slope=0.0800 '/' Tc=13.3 min CN=84 Runoff=3.11 cfs 0.189 af

**Subcatchment70W: Subarea** Runoff Area=16.300 ac 37.82% Impervious Runoff Depth>1.48"
Flow Length=140' Slope=0.0600 '/' Tc=13.1 min CN=87 Runoff=33.33 cfs 2.009 af

**Subcatchment80W: Subarea** Runoff Area=14.390 ac 34.89% Impervious Runoff Depth>1.48"
Flow Length=190' Slope=0.0900 '/' Tc=14.2 min CN=87 Runoff=28.30 cfs 1.773 af

**Subcatchment90W: Subarea** Runoff Area=2.720 ac 0.00% Impervious Runoff Depth>0.92"
Flow Length=495' Slope=0.0100 '/' Tc=39.9 min CN=78 Runoff=1.80 cfs 0.208 af

**Pond 5P: Pond** Peak Elev=217.16' Storage=1.402 af Inflow=28.02 cfs 2.155 af
Outflow=2.59 cfs 1.320 af

**Pond 20B: Pond/Basin** Peak Elev=214.91' Storage=0.680 af Inflow=22.13 cfs 1.127 af
Discarded=0.11 cfs 0.104 af Primary=1.22 cfs 0.909 af Outflow=1.33 cfs 1.013 af

**Pond 20P: Pond** Peak Elev=222.34' Storage=0.248 af Inflow=8.62 cfs 0.665 af
Outflow=4.82 cfs 0.640 af

**Pond 70B: Pond/Basin** Peak Elev=213.77' Storage=1.059 af Inflow=33.33 cfs 2.009 af
Discarded=0.15 cfs 0.132 af Primary=4.30 cfs 1.683 af Outflow=4.45 cfs 1.814 af

**Pond 80B: Pond/Basin** Peak Elev=212.93' Storage=1.028 af Inflow=28.30 cfs 1.773 af
Discarded=0.26 cfs 0.260 af Primary=2.51 cfs 1.118 af Outflow=2.76 cfs 1.378 af

**Link 15L: North Drainage** Inflow=7.87 cfs 1.793 af
Primary=7.87 cfs 1.793 af

**Link 35L: East to White Oak Way** Inflow=9.03 cfs 1.865 af
Primary=9.03 cfs 1.865 af

**Link 45L: East to Hawthorn Hill Drive** Inflow=2.63 cfs 0.208 af
Primary=2.63 cfs 0.208 af

**Link 55: East to Summit Avenue** Inflow=4.61 cfs 0.266 af
Primary=4.61 cfs 0.266 af

**Link 95: West Drainage** Inflow=9.03 cfs 3.196 af
Primary=9.03 cfs 3.196 af

**Link 99: Total Existing Flow** Inflow=25.60 cfs 7.326 af
Primary=25.60 cfs 7.326 af

**Total Runoff Area = 79.900 ac Runoff Volume = 9.390 af Average Runoff Depth = 1.41"**
**68.58% Pervious = 54.796 ac 31.42% Impervious = 25.104 ac**

Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 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=17.500 ac 35.06% Impervious Runoff Depth>2.46"
Flow Length=185' Slope=0.0300 '/' Tc=21.6 min CN=87 Runoff=46.38 cfs 3.587 af

**Subcatchment10N: Subarea - North** Runoff Area=4.960 ac 12.94% Impervious Runoff Depth>2.04"
Flow Length=185' Slope=0.0700 '/' Tc=15.4 min CN=82 Runoff=12.93 cfs 0.843 af

**Subcatchment20E: Subarea** Runoff Area=5.400 ac 35.15% Impervious Runoff Depth>2.46"
Flow Length=240' Slope=0.0500 '/' Tc=21.7 min CN=87 Runoff=14.26 cfs 1.107 af

**Subcatchment25E: Subarea - East to** Runoff Area=3.510 ac 11.03% Impervious Runoff Depth>1.96"
Flow Length=645' Slope=0.0300 '/' Tc=33.9 min CN=81 Runoff=5.75 cfs 0.573 af

**Subcatchment30E: Subarea** Runoff Area=9.140 ac 36.70% Impervious Runoff Depth>2.46"
Flow Length=85' Slope=0.0600 '/' Tc=8.8 min CN=87 Runoff=36.28 cfs 1.875 af

**Subcatchment40E: Subarea - East to** Runoff Area=1.690 ac 37.04% Impervious Runoff Depth>2.46"
Flow Length=300' Slope=0.0700 '/' Tc=22.7 min CN=87 Runoff=4.36 cfs 0.346 af

**Subcatchment50E: Subarea - East to** Runoff Area=2.510 ac 20.72% Impervious Runoff Depth>2.20"
Flow Length=160' Slope=0.1000 '/' Tc=11.9 min CN=84 Runoff=7.96 cfs 0.461 af

**Subcatchment60W: Subarea - West to** Runoff Area=1.780 ac 20.11% Impervious Runoff Depth>2.20"
Flow Length=165' Slope=0.0800 '/' Tc=13.3 min CN=84 Runoff=5.37 cfs 0.327 af

**Subcatchment70W: Subarea** Runoff Area=16.300 ac 37.82% Impervious Runoff Depth>2.46"
Flow Length=140' Slope=0.0600 '/' Tc=13.1 min CN=87 Runoff=54.90 cfs 3.343 af

**Subcatchment80W: Subarea** Runoff Area=14.390 ac 34.89% Impervious Runoff Depth>2.46"
Flow Length=190' Slope=0.0900 '/' Tc=14.2 min CN=87 Runoff=46.60 cfs 2.951 af

**Subcatchment90W: Subarea** Runoff Area=2.720 ac 0.00% Impervious Runoff Depth>1.73"
Flow Length=495' Slope=0.0100 '/' Tc=39.9 min CN=78 Runoff=3.53 cfs 0.392 af

**Pond 5P: Pond** Peak Elev=217.76' Storage=1.859 af Inflow=46.38 cfs 3.587 af
Outflow=14.48 cfs 2.614 af

**Pond 20B: Pond/Basin** Peak Elev=215.59' Storage=1.002 af Inflow=36.28 cfs 1.875 af
Discarded=0.13 cfs 0.120 af Primary=5.84 cfs 1.546 af Outflow=5.96 cfs 1.666 af

**Pond 20P: Pond** Peak Elev=222.63' Storage=0.320 af Inflow=14.26 cfs 1.107 af
Outflow=11.02 cfs 1.076 af

**Pond 70B: Pond/Basin** Peak Elev=214.62' Storage=1.644 af Inflow=54.90 cfs 3.343 af
Discarded=0.18 cfs 0.151 af Primary=13.45 cfs 2.969 af Outflow=13.63 cfs 3.120 af

**Pond 80B: Pond/Basin** Peak Elev=213.65' Storage=1.761 af Inflow=46.60 cfs 2.951 af
Discarded=0.30 cfs 0.301 af Primary=4.05 cfs 2.168 af Outflow=4.35 cfs 2.469 af

**Link 15L: North Drainage** Inflow=17.21 cfs 3.456 af
Primary=17.21 cfs 3.456 af

**Link 35L: East to White Oak Way** Inflow=22.37 cfs 3.193 af
Primary=22.37 cfs 3.193 af

**Link 45L: East to Hawthorn Hill Drive** Inflow=4.36 cfs 0.346 af
Primary=4.36 cfs 0.346 af

**Link 55: East to Summit Avenue** Inflow=7.96 cfs 0.461 af
Primary=7.96 cfs 0.461 af

**Link 95: West Drainage** Inflow=22.26 cfs 5.855 af
Primary=22.26 cfs 5.855 af

**Link 99: Total Existing Flow** Inflow=64.38 cfs 13.310 af
Primary=64.38 cfs 13.310 af

**Total Runoff Area = 79.900 ac Runoff Volume = 15.804 af Average Runoff Depth = 2.37"**
**68.58% Pervious = 54.796 ac 31.42% Impervious = 25.104 ac**

Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 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=17.500 ac 35.06% Impervious Runoff Depth>4.68"
Flow Length=185' Slope=0.0300 '/' Tc=21.6 min CN=87 Runoff=86.37 cfs 6.831 af

**Subcatchment10N: Subarea - North** Runoff Area=4.960 ac 12.94% Impervious Runoff Depth>4.15"
Flow Length=185' Slope=0.0700 '/' Tc=15.4 min CN=82 Runoff=25.97 cfs 1.715 af

**Subcatchment20E: Subarea** Runoff Area=5.400 ac 35.15% Impervious Runoff Depth>4.68"
Flow Length=240' Slope=0.0500 '/' Tc=21.7 min CN=87 Runoff=26.51 cfs 2.108 af

**Subcatchment25E: Subarea - East to** Runoff Area=3.510 ac 11.03% Impervious Runoff Depth>4.04"
Flow Length=645' Slope=0.0300 '/' Tc=33.9 min CN=81 Runoff=11.85 cfs 1.181 af

**Subcatchment30E: Subarea** Runoff Area=9.140 ac 36.70% Impervious Runoff Depth>4.69"
Flow Length=85' Slope=0.0600 '/' Tc=8.8 min CN=87 Runoff=66.90 cfs 3.570 af

**Subcatchment40E: Subarea - East to** Runoff Area=1.690 ac 37.04% Impervious Runoff Depth>4.68"
Flow Length=300' Slope=0.0700 '/' Tc=22.7 min CN=87 Runoff=8.11 cfs 0.660 af

**Subcatchment50E: Subarea - East to** Runoff Area=2.510 ac 20.72% Impervious Runoff Depth>4.36"
Flow Length=160' Slope=0.1000 '/' Tc=11.9 min CN=84 Runoff=15.41 cfs 0.912 af

**Subcatchment60W: Subarea - West to** Runoff Area=1.780 ac 20.11% Impervious Runoff Depth>4.36"
Flow Length=165' Slope=0.0800 '/' Tc=13.3 min CN=84 Runoff=10.41 cfs 0.647 af

**Subcatchment70W: Subarea** Runoff Area=16.300 ac 37.82% Impervious Runoff Depth>4.69"
Flow Length=140' Slope=0.0600 '/' Tc=13.1 min CN=87 Runoff=101.68 cfs 6.366 af

**Subcatchment80W: Subarea** Runoff Area=14.390 ac 34.89% Impervious Runoff Depth>4.69"
Flow Length=190' Slope=0.0900 '/' Tc=14.2 min CN=87 Runoff=86.38 cfs 5.619 af

**Subcatchment90W: Subarea** Runoff Area=2.720 ac 0.00% Impervious Runoff Depth>3.73"
Flow Length=495' Slope=0.0100 '/' Tc=39.9 min CN=78 Runoff=7.70 cfs 0.845 af

**Pond 5P: Pond** Peak Elev=218.82' Storage=2.760 af Inflow=86.37 cfs 6.830 af
Outflow=49.85 cfs 5.685 af

**Pond 20B: Pond/Basin** Peak Elev=216.68' Storage=1.620 af Inflow=66.90 cfs 3.570 af
Discarded=0.16 cfs 0.141 af Primary=23.18 cfs 3.094 af Outflow=23.34 cfs 3.235 af

**Pond 20P: Pond** Peak Elev=223.07' Storage=0.438 af Inflow=26.51 cfs 2.108 af
Outflow=23.06 cfs 2.064 af

**Pond 70B: Pond/Basin** Peak Elev=215.95' Storage=2.738 af Inflow=101.68 cfs 6.365 af
Discarded=0.24 cfs 0.181 af Primary=39.10 cfs 5.915 af Outflow=39.34 cfs 6.096 af

**Pond 80B: Pond/Basin** Peak Elev=214.95' Storage=3.297 af Inflow=86.38 cfs 5.619 af
Discarded=0.36 cfs 0.378 af Primary=11.61 cfs 4.552 af Outflow=11.97 cfs 4.930 af

**Link 15L: North Drainage** Inflow=60.01 cfs 7.399 af
Primary=60.01 cfs 7.399 af

**Link 35L: East to White Oak Way** Inflow=57.33 cfs 6.338 af
Primary=57.33 cfs 6.338 af

**Link 45L: East to Hawthorn Hill Drive** Inflow=8.11 cfs 0.660 af
Primary=8.11 cfs 0.660 af

**Link 55: East to Summit Avenue** Inflow=15.41 cfs 0.912 af
Primary=15.41 cfs 0.912 af

**Link 95: West Drainage** Inflow=59.30 cfs 11.958 af
Primary=59.30 cfs 11.958 af

**Link 99: Total Existing Flow** Inflow=187.44 cfs 27.263 af
Primary=187.44 cfs 27.263 af

**Total Runoff Area = 79.900 ac Runoff Volume = 30.454 af Average Runoff Depth = 4.57"**
**68.58% Pervious = 54.796 ac 31.42% Impervious = 25.104 ac**

## Summary for Subcatchment 5N: Subarea

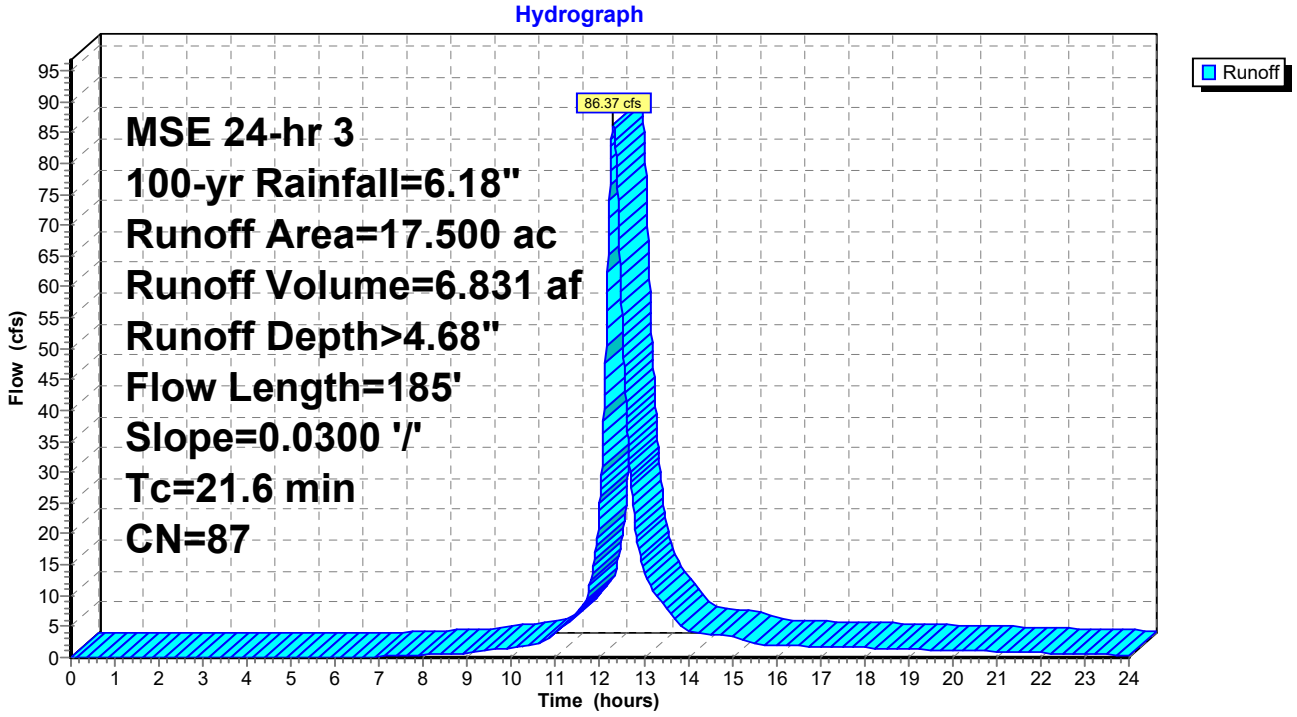
Runoff = 86.37 cfs @ 12.31 hrs, Volume= 6.831 af, Depth> 4.68"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-yr Rainfall=6.18"

| | Area (ac) | CN | Description |
|---|---|---|---|
| * | 0.200 | 77 | woodland - D soils |
| * | 0.570 | 98 | water |
| * | 1.800 | 98 | road |
| | 12.550 | 86 | 1/3 acre lots, 30% imp, HSG D |
| * | 2.380 | 80 | grass - D soils |
| | 17.500 | 87 | Weighted Average |
| | 11.365 | | 64.94% Pervious Area |
| | 6.135 | | 35.06% 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

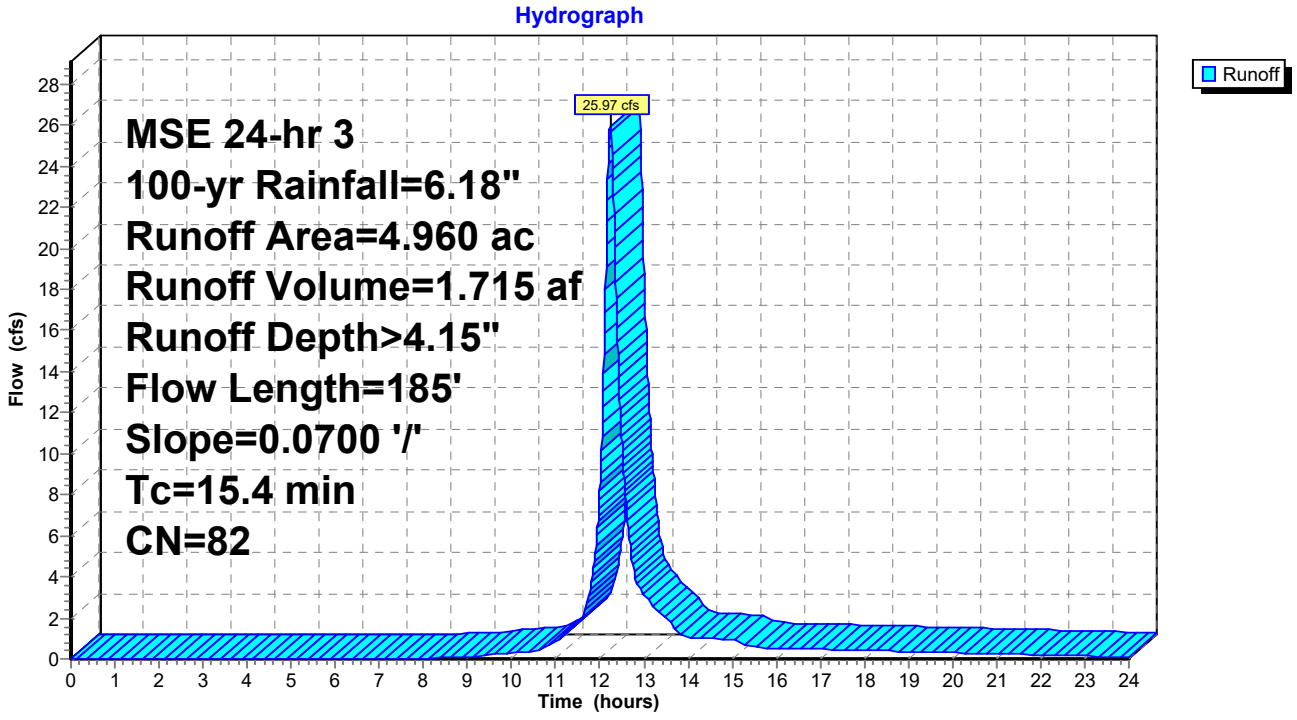
Runoff = 25.97 cfs @ 12.24 hrs, Volume= 1.715 af, Depth> 4.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-yr Rainfall=6.18"

| | Area (ac) | CN | Description |
|---|---|---|---|
| * | 0.940 | 77 | woodland - D soils |
| * | 0.570 | 78 | wetland - D soils |
| * | 1.380 | 80 | grass - D soils |
| | 2.040 | 86 | 1/3 acre lots, 30% imp, HSG D |
| * | 0.020 | 98 | road |
| * | 0.010 | 98 | sidewalk |
| | 4.960 | 82 | Weighted Average |
| | 4.318 | | 87.06% Pervious Area |
| | 0.642 | | 12.94% 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

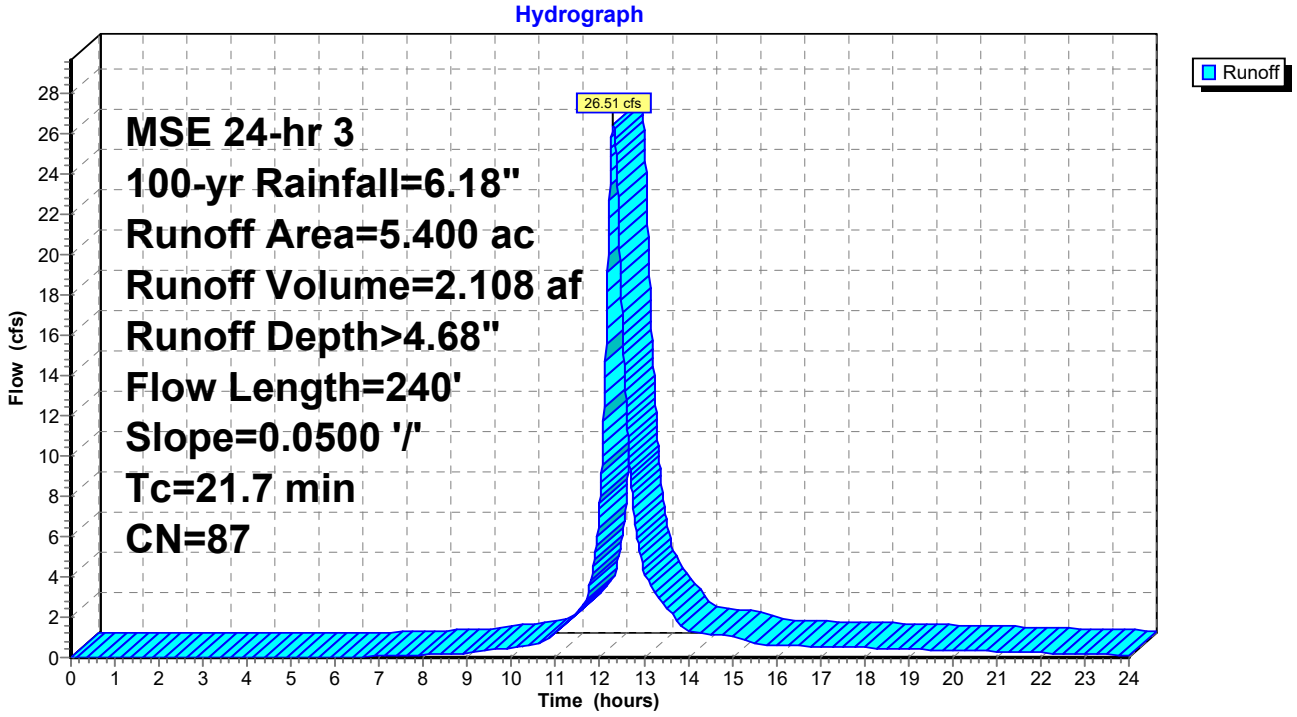
Runoff = 26.51 cfs @ 12.31 hrs, Volume= 2.108 af, Depth> 4.68"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-yr Rainfall=6.18"

| | Area (ac) | CN | Description |
|---|---|---|---|
| * | 0.570 | 98 | road |
| | 3.960 | 86 | 1/3 acre lots, 30% imp, HSG D |
| * | 0.690 | 80 | grass - D soils |
| * | 0.140 | 98 | water |
| * | 0.040 | 77 | woodland - D soils |
| | 5.400 | 87 | Weighted Average |
| | 3.502 | | 64.85% Pervious Area |
| | 1.898 | | 35.15% 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 20E: Subarea



## Summary for Subcatchment 25E: Subarea - East to White Oak Way

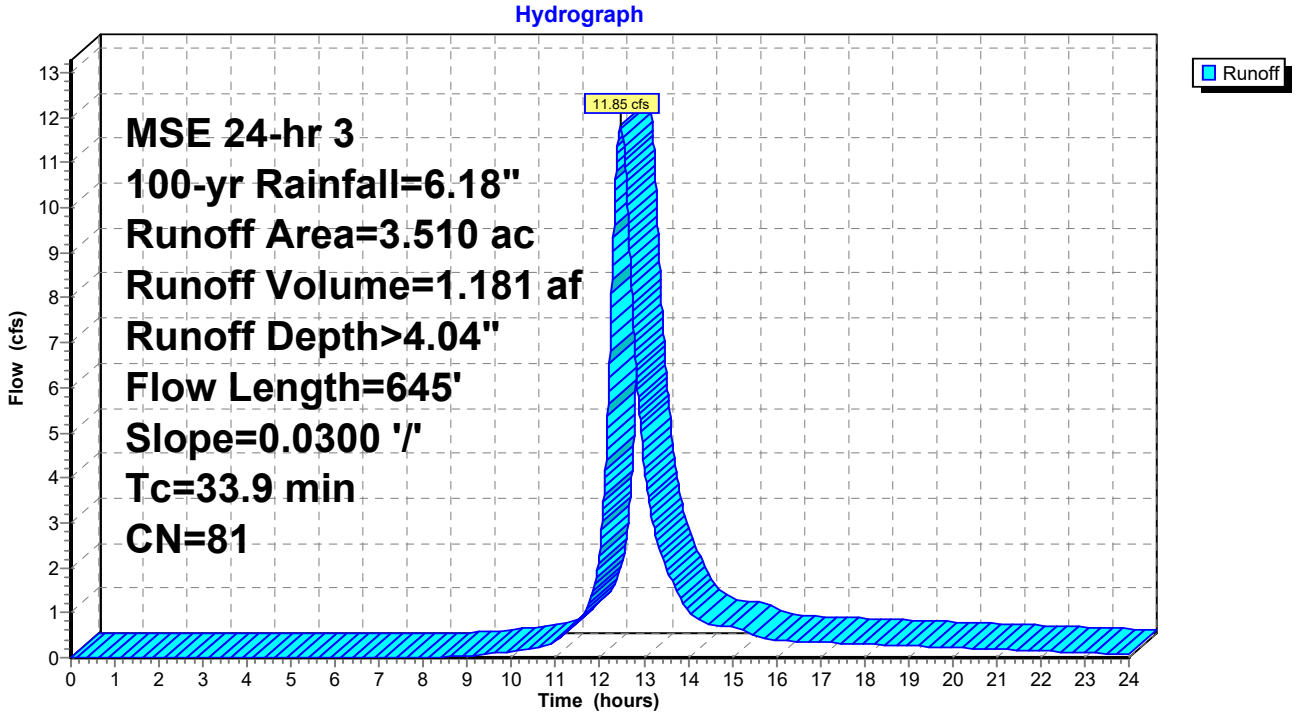
Runoff = 11.85 cfs @ 12.47 hrs, Volume= 1.181 af, Depth> 4.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-yr Rainfall=6.18"

| | Area (ac) | CN | Description |
|---|---|---|---|
| * | 0.110 | 77 | woodland - D soils |
| * | 1.310 | 78 | wetland - D soils |
| | 1.290 | 86 | 1/3 acre lots, 30% imp, HSG D |
| * | 0.800 | 80 | grass - D soils |
| | 3.510 | 81 | Weighted Average |
| | 3.123 | | 88.97% Pervious Area |
| | 0.387 | | 11.03% 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 25E: Subarea - East to White Oak Way



## Summary for Subcatchment 30E: Subarea

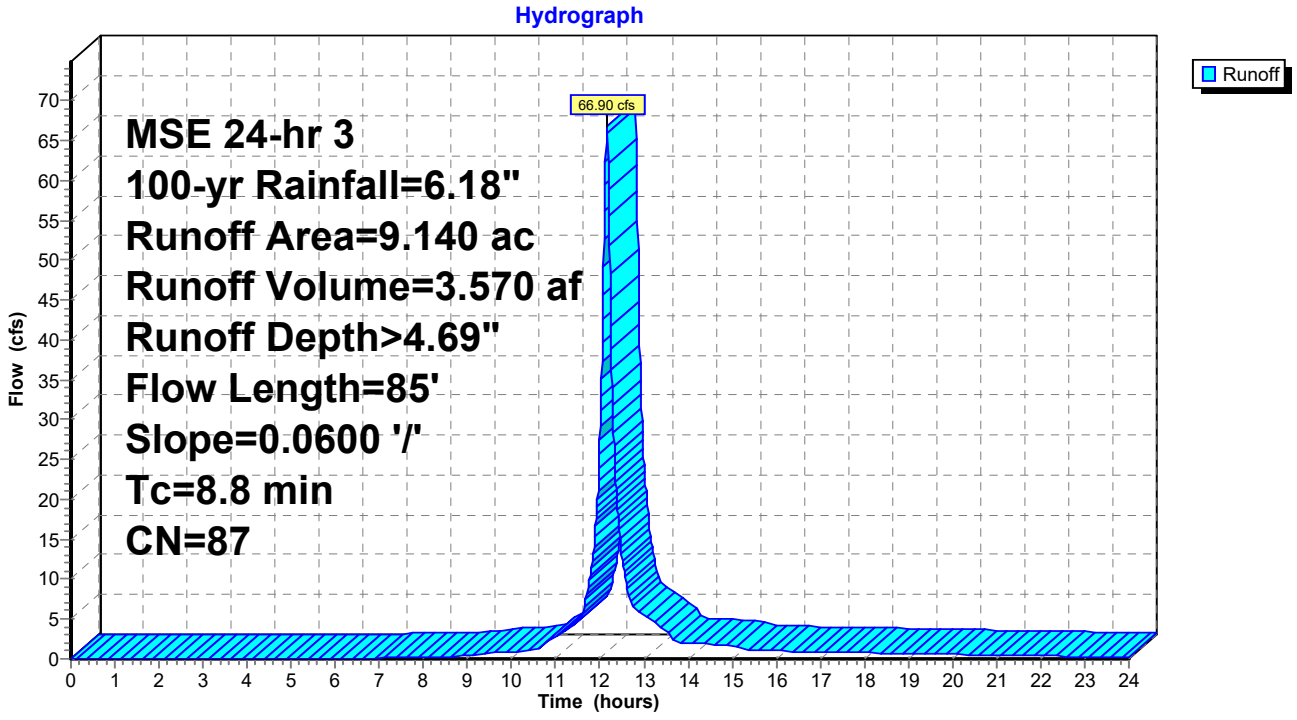
Runoff = 66.90 cfs @ 12.16 hrs, Volume= 3.570 af, Depth> 4.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-yr Rainfall=6.18"

| | Area (ac) | CN | Description |
|---|---|---|---|
| * | 0.250 | 77 | woodland - D soils |
| * | 0.190 | 98 | water |
| * | 1.450 | 98 | road |
| | 5.480 | 86 | 1/3 acre lots, 30% imp, HSG D |
| * | 1.700 | 80 | grass - D soils |
| * | 0.070 | 98 | sidewalk |
| | 9.140 | 87 | Weighted Average |
| | 5.786 | | 63.30% Pervious Area |
| | 3.354 | | 36.70% 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 30E: Subarea



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

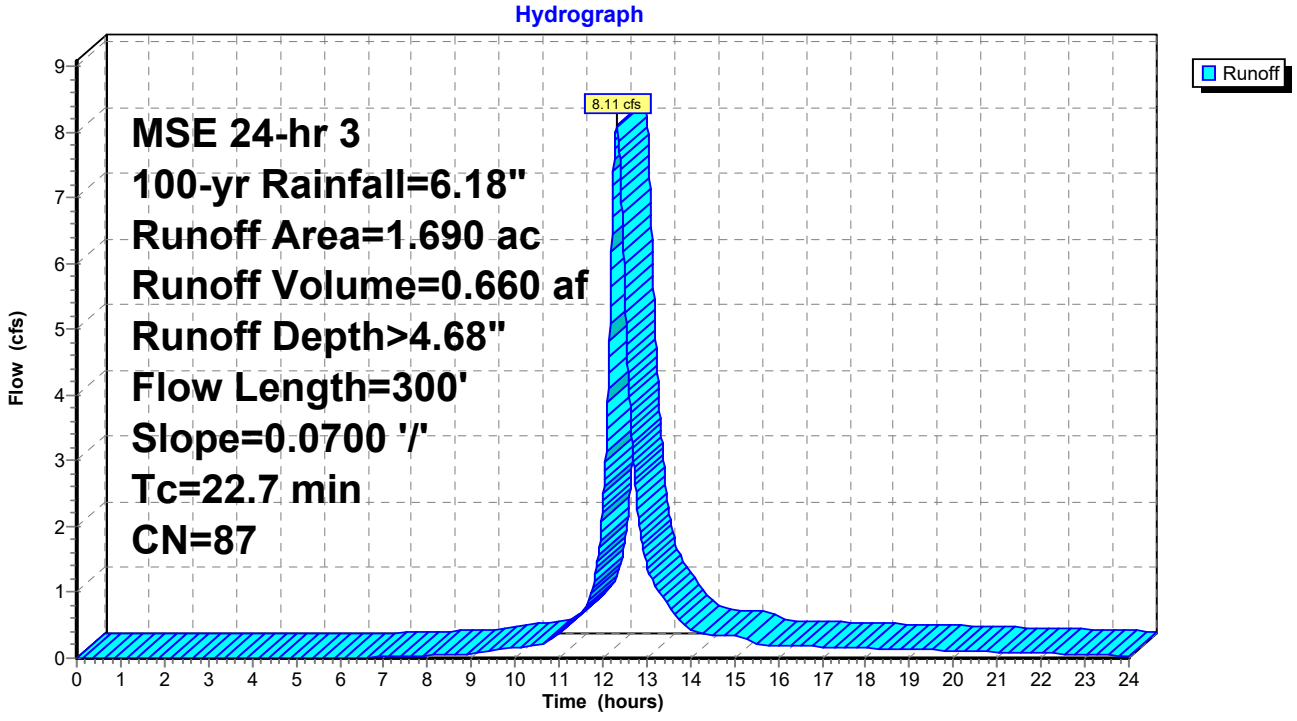
Runoff = 8.11 cfs @ 12.33 hrs, Volume= 0.660 af, Depth> 4.68"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-yr Rainfall=6.18"

| | Area (ac) | CN | Description |
|---|---|---|---|
| * | 0.170 | 98 | road |
| | 1.520 | 86 | 1/3 acre lots, 30% imp, HSG D |
| | 1.690 | 87 | Weighted Average |
| | 1.064 | | 62.96% Pervious Area |
| | 0.626 | | 37.04% 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

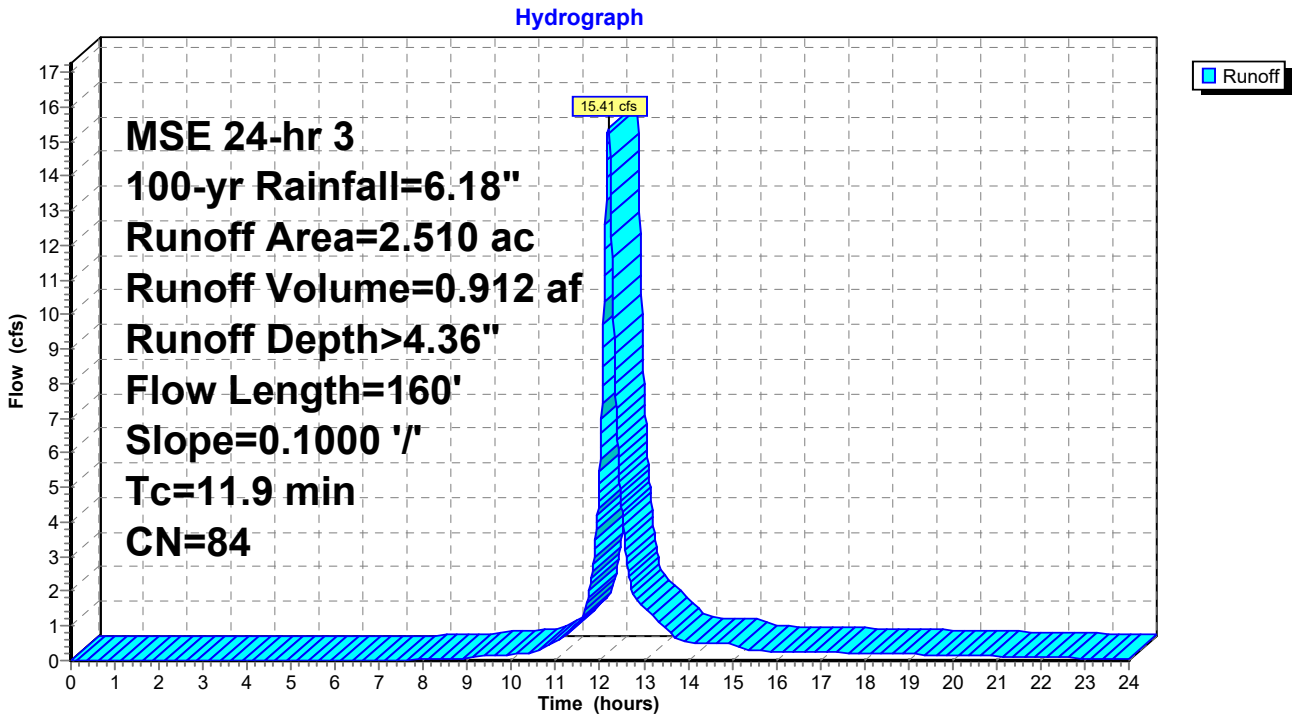
Runoff = 15.41 cfs @ 12.20 hrs, Volume= 0.912 af, Depth> 4.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-yr Rainfall=6.18"

| | Area (ac) | CN | Description |
|---|---|---|---|
| | 1.500 | 86 | 1/3 acre lots, 30% imp, HSG D |
| * | 0.940 | 80 | grass - D soils |
| * | 0.070 | 98 | sidewalk |
| | 2.510 | 84 | Weighted Average |
| | 1.990 | | 79.28% Pervious Area |
| | 0.520 | | 20.72% 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

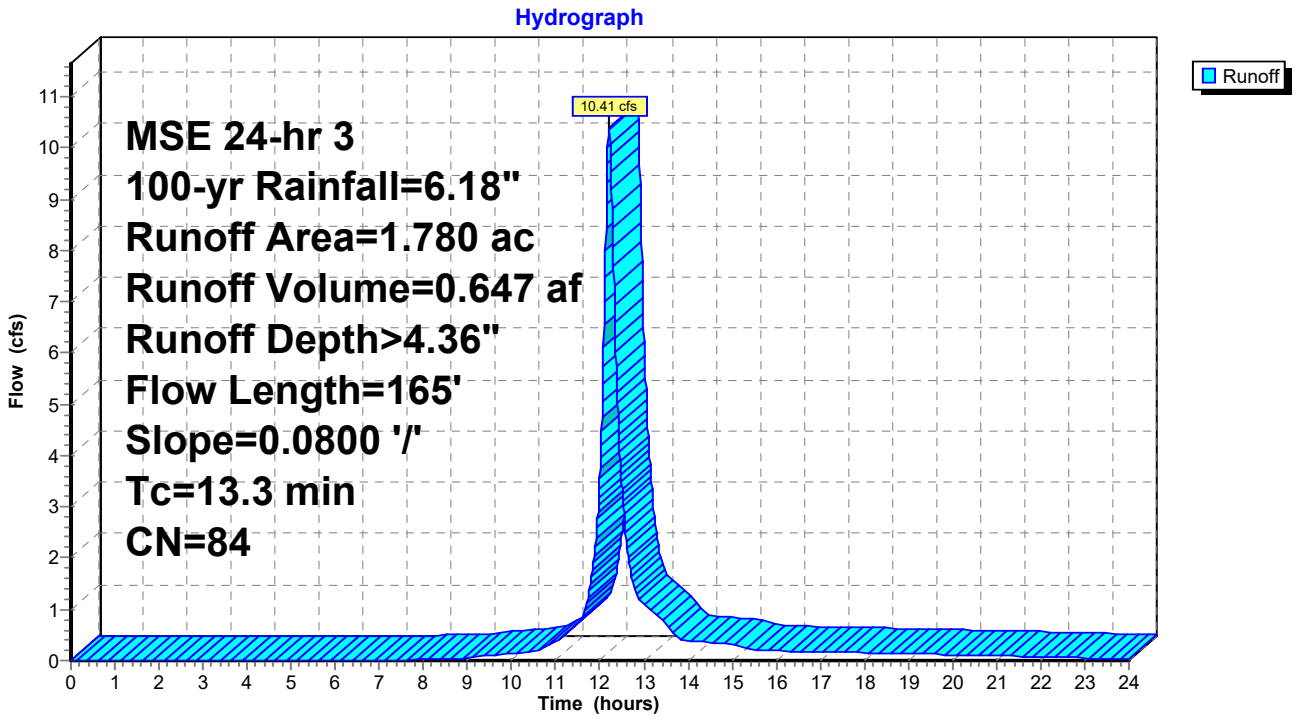
Runoff = 10.41 cfs @ 12.21 hrs, Volume= 0.647 af, Depth> 4.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-yr Rainfall=6.18"

| | Area (ac) | CN | Description |
|---|---|---|---|
| | 0.960 | 86 | 1/3 acre lots, 30% imp, HSG D |
| * | 0.750 | 80 | grass - D soils |
| * | 0.070 | 98 | sidewalk |
| | 1.780 | 84 | Weighted Average |
| | 1.422 | | 79.89% Pervious Area |
| | 0.358 | | 20.11% 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

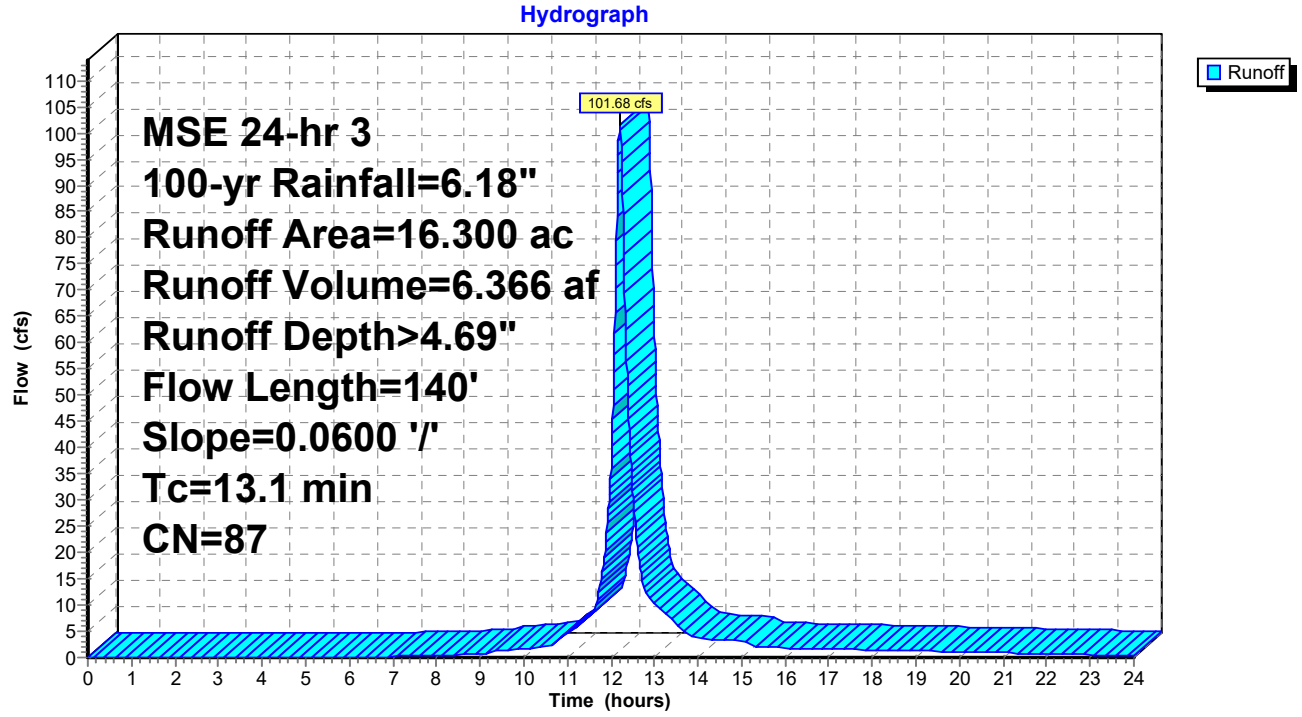
Runoff = 101.68 cfs @ 12.21 hrs, Volume= 6.366 af, Depth> 4.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-yr Rainfall=6.18"

| | Area (ac) | CN | Description |
|---|---|---|---|
| * | 2.340 | 98 | road |
| | 11.680 | 86 | 1/3 acre lots, 30% imp, HSG D |
| * | 1.960 | 80 | grass - D soils |
| * | 0.280 | 98 | water |
| * | 0.040 | 98 | sidewalk |
| | 16.300 | 87 | Weighted Average |
| | 10.136 | | 62.18% Pervious Area |
| | 6.164 | | 37.82% 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 80W: Subarea

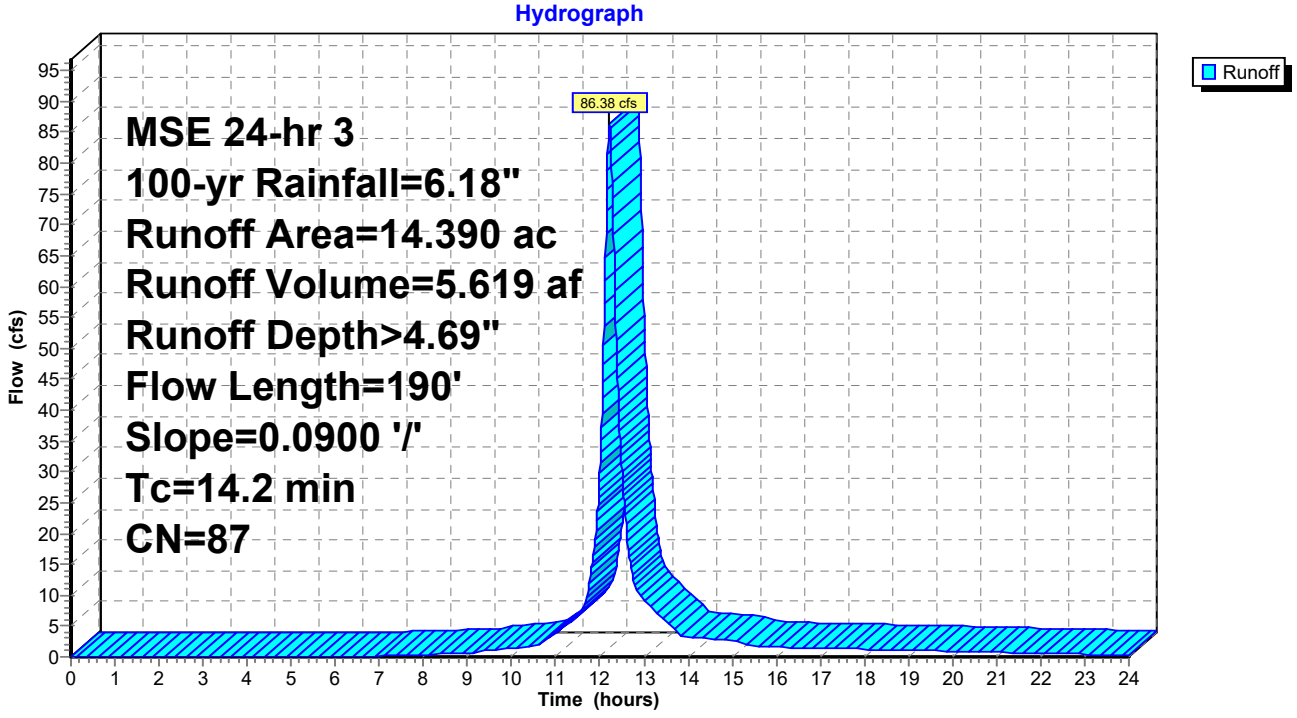
Runoff = 86.38 cfs @ 12.22 hrs, Volume= 5.619 af, Depth> 4.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-yr Rainfall=6.18"

| | Area (ac) | CN | Description |
|---|---|---|---|
| * | 0.040 | 77 | woodland - D soils |
| * | 0.430 | 98 | water |
| * | 1.720 | 98 | road |
| | 9.500 | 86 | 1/3 acre lots, 30% imp, HSG D |
| * | 2.680 | 80 | grass - D soils |
| * | 0.020 | 98 | sidewalk |
| | 14.390 | 87 | Weighted Average |
| | 9.370 | | 65.11% Pervious Area |
| | 5.020 | | 34.89% 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

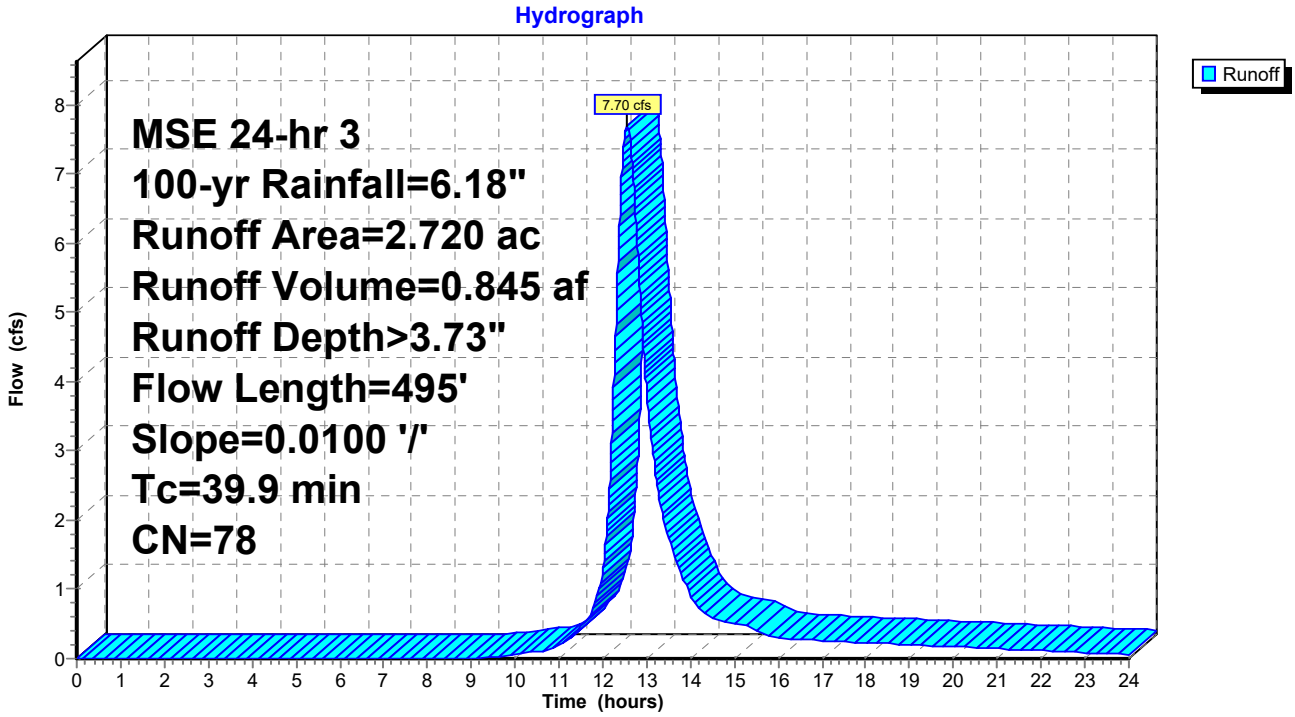
Runoff = 7.70 cfs @ 12.55 hrs, Volume= 0.845 af, Depth> 3.73"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 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 |
| * | 0.900 | 80 | grass - D soils |
| | 2.720 | 78 | Weighted Average |
| | 2.720 | | 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 5P: Pond

Inflow Area = 17.500 ac, 35.06% Impervious, Inflow Depth > 4.68" for 100-yr event
Inflow = 86.37 cfs @ 12.31 hrs, Volume= 6.830 af
Outflow = 49.85 cfs @ 12.54 hrs, Volume= 5.685 af, Atten= 42%, Lag= 13.7 min
Primary = 49.85 cfs @ 12.54 hrs, Volume= 5.685 af

Routing by Sim-Route method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 218.82' @ 12.54 hrs Surf.Area= 0.909 ac Storage= 2.760 af

Plug-Flow detention time= 119.0 min calculated for 5.683 af (83% of inflow)
Center-of-Mass det. time= 64.5 min ( 857.7 - 793.3 )

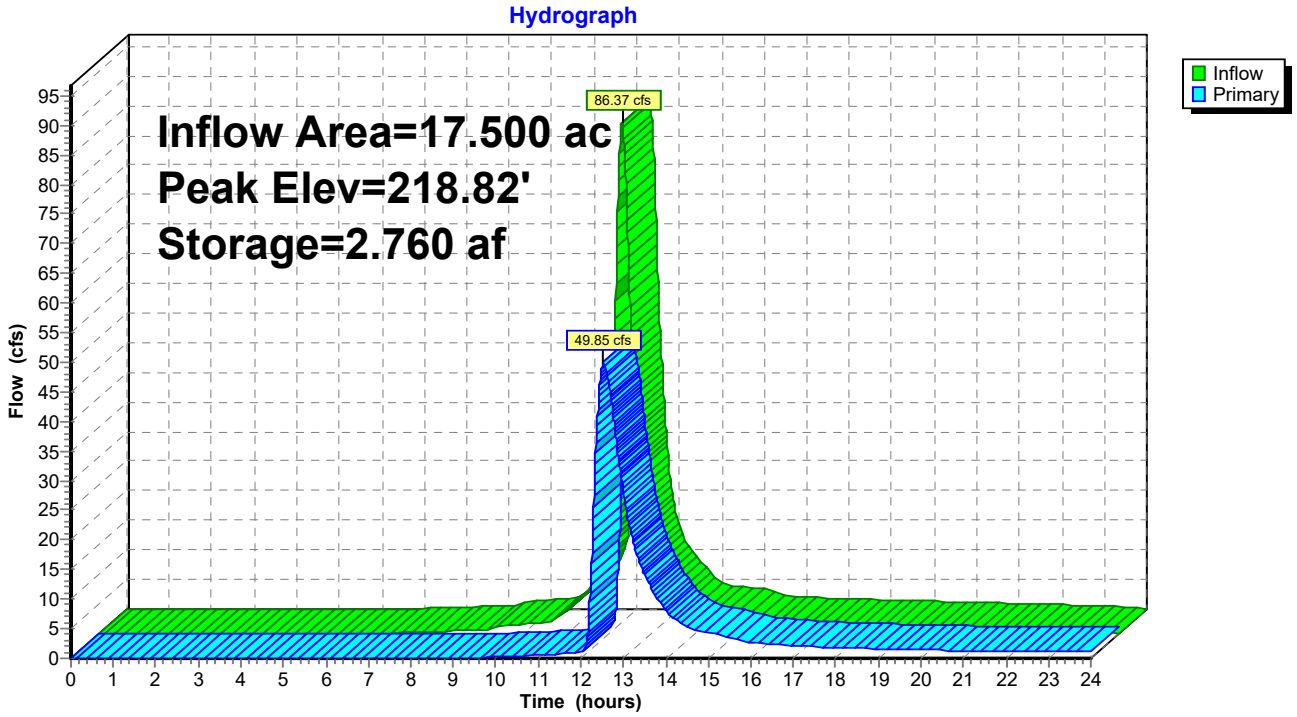
| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 215.00' | 3.913 af | **Pond (Conic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (acres) | Inc.Store (acre-feet) | Cum.Store (acre-feet) | Wet.Area (acres) |
|---|---|---|---|---|
| 215.00 | 0.570 | 0.000 | 0.000 | 0.570 |
| 216.00 | 0.640 | 0.605 | 0.605 | 0.641 |
| 217.00 | 0.720 | 0.680 | 1.284 | 0.722 |
| 218.00 | 0.820 | 0.769 | 2.054 | 0.824 |
| 219.00 | 0.930 | 0.874 | 2.928 | 0.935 |
| 220.00 | 1.040 | 0.984 | 3.913 | 1.046 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 214.25' | **24.0" Round Culvert X 2.00**<br>L= 30.0' RCP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 214.25' / 214.00' S= 0.0083 '/' Cc= 0.900<br>n= 0.013, Flow Area= 3.14 sf |
| #2 | Device 1 | 215.00' | **6.0" Vert. Orifice/Grate** C= 0.600 |
| #3 | Device 1 | 217.00' | **3.0' long Sharp-Crested Rectangular Weir X 2.00**<br>0 End Contraction(s) |
| #4 | Primary | 219.00' | **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=49.85 cfs @ 12.54 hrs HW=218.82' TW=0.00' (Dynamic Tailwater)
- **1=Culvert** (Passes 49.85 cfs of 57.14 cfs potential flow)
  - **2=Orifice/Grate** (Orifice Controls 1.79 cfs @ 9.09 fps)
  - **3=Sharp-Crested Rectangular Weir** (Weir Controls 48.06 cfs @ 4.41 fps)
- **4=Broad-Crested Rectangular Weir** ( Controls 0.00 cfs)

## Pond 5P: Pond


Hydrograph
Inflow Area=17.500 ac
Peak Elev=218.82'
Storage=2.760 af
86.37 cfs
49.85 cfs
Inflow
Primary
Flow (cfs)
Time (hours)
0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

## Summary for Pond 20B: Pond/Basin

Inflow Area = 9.140 ac, 36.70% Impervious, Inflow Depth > 4.69" for 100-yr event
Inflow = 66.90 cfs @ 12.16 hrs, Volume= 3.570 af
Outflow = 23.34 cfs @ 12.35 hrs, Volume= 3.235 af, Atten= 65%, Lag= 11.6 min
Discarded = 0.16 cfs @ 12.35 hrs, Volume= 0.141 af
Primary = 23.18 cfs @ 12.35 hrs, Volume= 3.094 af

Routing by Sim-Route method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 216.68' @ 12.35 hrs Surf.Area= 0.264 ac Storage= 1.620 af

Plug-Flow detention time= 140.3 min calculated for 3.235 af (91% of inflow)
Center-of-Mass det. time= 100.5 min ( 882.4 - 781.9 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 213.50' | 1.371 af | **Pond (Conic)** Listed below (Recalc) -Impervious |
| #2 | 212.50' | 1.139 af | **Infiltration Basin (Conic)** Listed below (Recalc) |
| | | 2.510 af | Total Available Storage |

| Elevation (feet) | Surf.Area (acres) | Inc.Store (acre-feet) | Cum.Store (acre-feet) | Wet.Area (acres) |
|---|---|---|---|---|
| 213.50 | 0.190 | 0.000 | 0.000 | 0.190 |
| 214.00 | 0.220 | 0.102 | 0.102 | 0.220 |
| 215.00 | 0.260 | 0.240 | 0.342 | 0.261 |
| 216.00 | 0.320 | 0.289 | 0.632 | 0.322 |
| 217.00 | 0.370 | 0.345 | 0.976 | 0.373 |
| 218.00 | 0.420 | 0.395 | 1.371 | 0.424 |

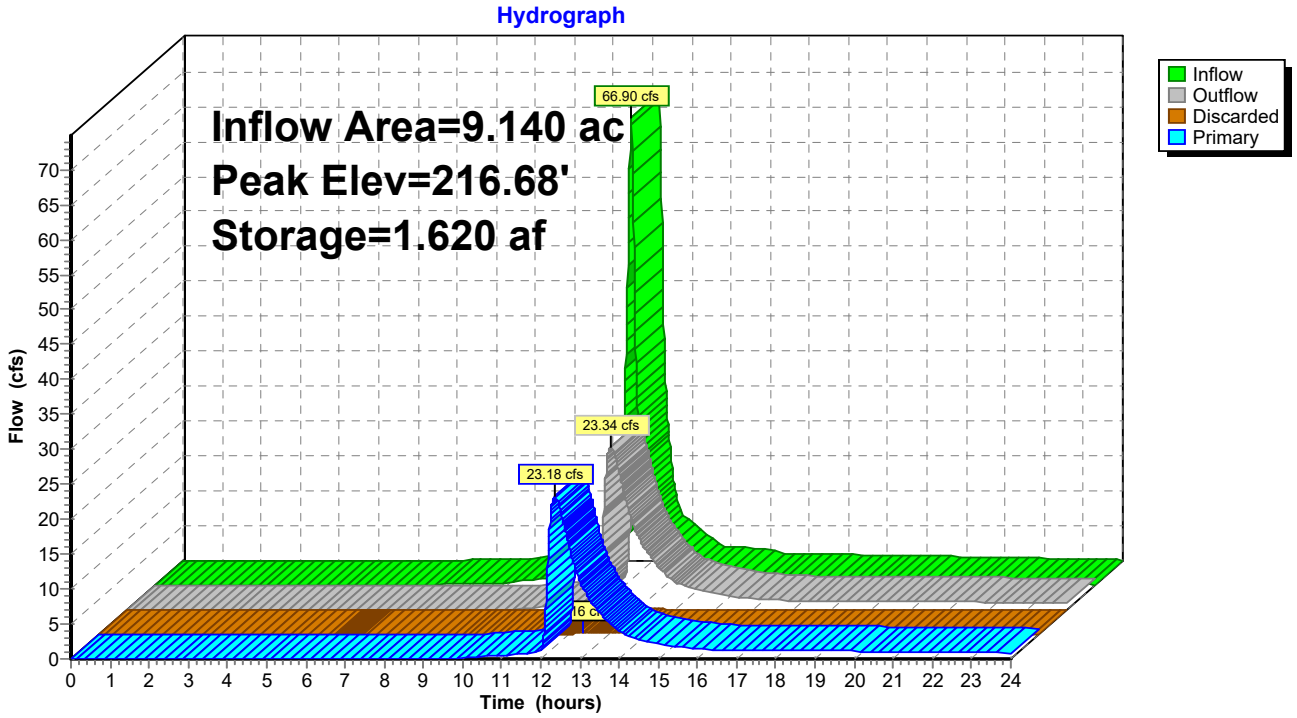
| Elevation (feet) | Surf.Area (acres) | Inc.Store (acre-feet) | Cum.Store (acre-feet) | Wet.Area (acres) |
|---|---|---|---|---|
| 212.50 | 0.110 | 0.000 | 0.000 | 0.110 |
| 213.00 | 0.130 | 0.060 | 0.060 | 0.130 |
| 214.00 | 0.160 | 0.145 | 0.205 | 0.161 |
| 215.00 | 0.190 | 0.175 | 0.379 | 0.192 |
| 216.00 | 0.230 | 0.210 | 0.589 | 0.232 |
| 217.00 | 0.280 | 0.255 | 0.844 | 0.283 |
| 218.00 | 0.310 | 0.295 | 1.139 | 0.315 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Discarded | 212.50' | **0.500 in/hr Exfiltration over Surface area**<br>Conductivity to Groundwater Elevation = 200.00' Phase-In= 0.01' |
| #2 | Primary | 210.00' | **18.0" Round Culvert**<br>L= 50.0' RCP, rounded edge headwall, Ke= 0.100<br>Inlet / Outlet Invert= 210.00' / 204.00' S= 0.1200 '/' Cc= 0.900<br>n= 0.013, Flow Area= 1.77 sf |
| #3 | Device 2 | 213.00' | **6.0" Vert. Orifice/Grate** C= 0.600 |
| #4 | Device 2 | 215.00' | **3.0' long Sharp-Crested Rectangular Weir** 0 End Contraction(s) |

**Discarded OutFlow** Max=0.16 cfs @ 12.35 hrs HW=216.68' (Free Discharge)
└**1=Exfiltration** ( Controls 0.16 cfs)

**Primary OutFlow** Max=23.18 cfs @ 12.35 hrs HW=216.68' TW=0.00' (Dynamic Tailwater)
└**2=Culvert** (Passes 23.18 cfs of 28.26 cfs potential flow)
  └**3=Orifice/Grate** (Orifice Controls 1.75 cfs @ 8.92 fps)
  └**4=Sharp-Crested Rectangular Weir** (Weir Controls 21.43 cfs @ 4.24 fps)

## Pond 20B: Pond/Basin



## Summary for Pond 20P: Pond

Inflow Area = 5.400 ac, 35.15% Impervious, Inflow Depth > 4.68" for 100-yr event
Inflow = 26.51 cfs @ 12.31 hrs, Volume= 2.108 af
Outflow = 23.06 cfs @ 12.41 hrs, Volume= 2.064 af, Atten= 13%, Lag= 5.9 min
Primary = 23.06 cfs @ 12.41 hrs, Volume= 2.064 af

Routing by Sim-Route method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 223.07' @ 12.41 hrs Surf.Area= 0.286 ac Storage= 0.438 af

Plug-Flow detention time= 55.8 min calculated for 2.064 af (98% of inflow)
Center-of-Mass det. time= 44.2 min ( 837.5 - 793.3 )

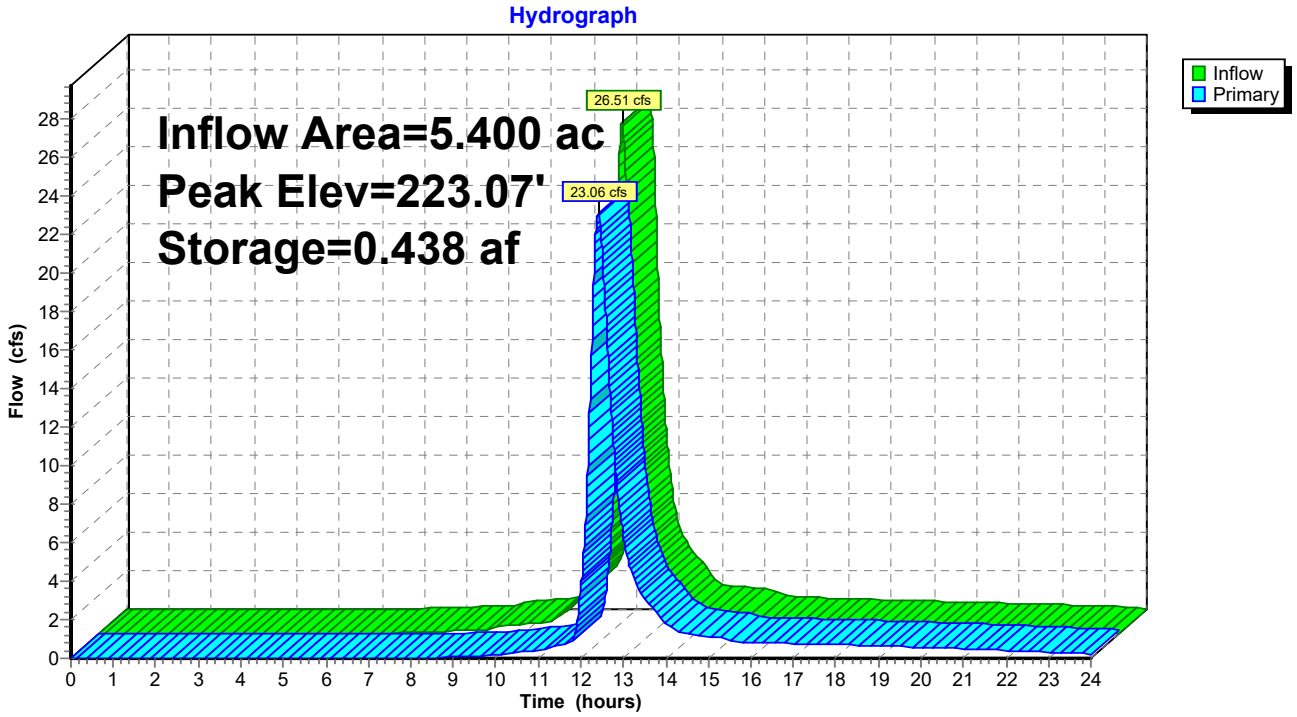
| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 221.00' | 0.742 af | **Pond (Conic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (acres) | Inc.Store (acre-feet) | Cum.Store (acre-feet) | Wet.Area (acres) |
|---|---|---|---|---|
| 221.00 | 0.140 | 0.000 | 0.000 | 0.140 |
| 222.00 | 0.210 | 0.174 | 0.174 | 0.210 |
| 223.00 | 0.280 | 0.244 | 0.418 | 0.281 |
| 224.00 | 0.370 | 0.324 | 0.742 | 0.371 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 218.00' | **15.0" Round Culvert X 2.00**<br>L= 30.0' RCP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 218.00' / 217.00' S= 0.0333 '/' Cc= 0.900<br>n= 0.013, Flow Area= 1.23 sf |
| #2 | Device 1 | 221.00' | **6.0" Vert. Orifice/Grate** C= 0.600 |
| #3 | Device 1 | 222.00' | **3.0' long Sharp-Crested Rectangular Weir X 2.00**<br>0 End Contraction(s) |
| #4 | Primary | 223.30' | **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=23.06 cfs @ 12.41 hrs HW=223.07' TW=0.00' (Dynamic Tailwater)
- **1=Culvert** (Passes 23.06 cfs of 24.92 cfs potential flow)
  - **2=Orifice/Grate** (Orifice Controls 1.28 cfs @ 6.50 fps)
  - **3=Sharp-Crested Rectangular Weir** (Weir Controls 21.78 cfs @ 3.39 fps)
- **4=Broad-Crested Rectangular Weir** ( Controls 0.00 cfs)

## Pond 20P: Pond



## Summary for Pond 70B: Pond/Basin

Inflow Area = 16.300 ac, 37.82% Impervious, Inflow Depth > 4.69" for 100-yr event
Inflow = 101.68 cfs @ 12.21 hrs, Volume= 6.365 af
Outflow = 39.34 cfs @ 12.45 hrs, Volume= 6.096 af, Atten= 61%, Lag= 14.4 min
Discarded = 0.24 cfs @ 12.45 hrs, Volume= 0.181 af
Primary = 39.10 cfs @ 12.45 hrs, Volume= 5.915 af

Routing by Sim-Route method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 215.95' @ 12.45 hrs Surf.Area= 0.377 ac Storage= 2.738 af

Plug-Flow detention time= 102.1 min calculated for 6.094 af (96% of inflow)
Center-of-Mass det. time= 80.4 min ( 866.1 - 785.7 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 212.00' | 2.250 af | **Pond (Conic)** Listed below (Recalc) -Impervious |
| #2 | 211.50' | 1.583 af | **Infiltration Basin (Conic)** Listed below (Recalc) |
| | | 3.833 af | Total Available Storage |

| Elevation (feet) | Surf.Area (acres) | Inc.Store (acre-feet) | Cum.Store (acre-feet) | Wet.Area (acres) |
|---|---|---|---|---|
| 212.00 | 0.280 | 0.000 | 0.000 | 0.280 |
| 213.00 | 0.340 | 0.310 | 0.310 | 0.341 |
| 214.00 | 0.400 | 0.370 | 0.679 | 0.402 |
| 215.00 | 0.460 | 0.430 | 1.109 | 0.463 |
| 216.00 | 0.540 | 0.499 | 1.608 | 0.544 |
| 217.00 | 0.750 | 0.642 | 2.250 | 0.754 |

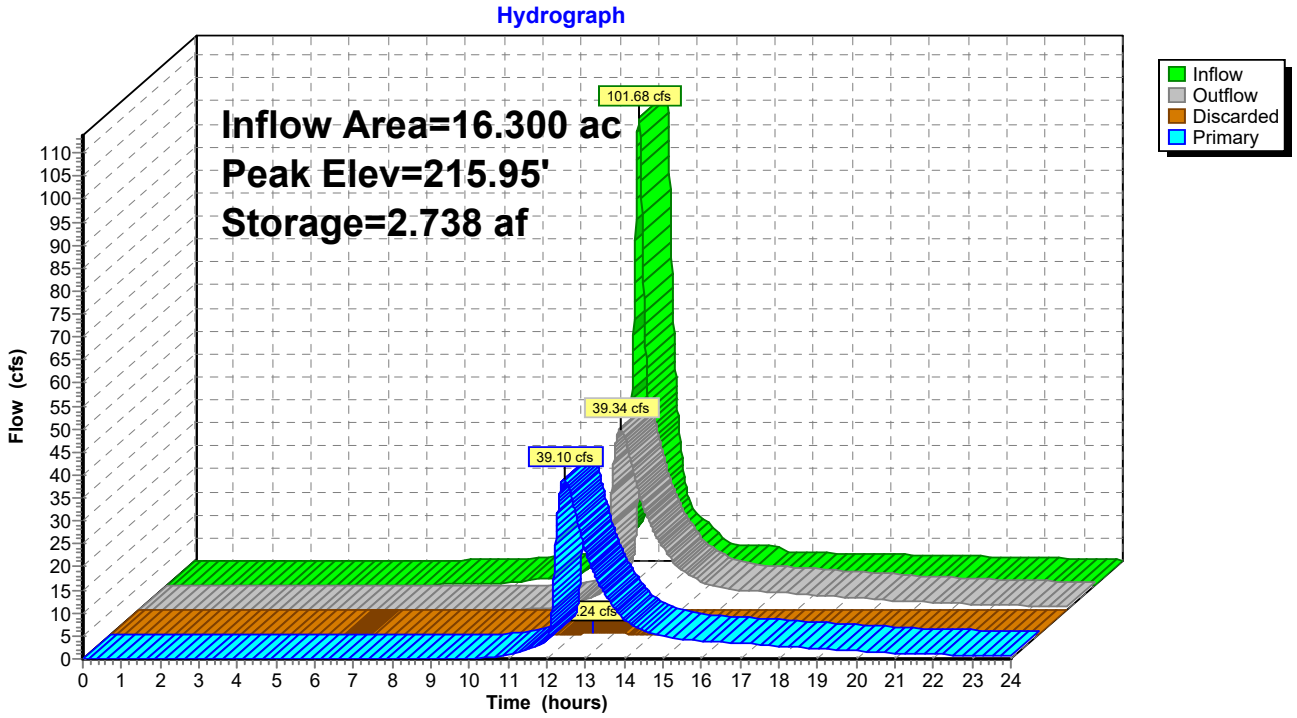
| Elevation (feet) | Surf.Area (acres) | Inc.Store (acre-feet) | Cum.Store (acre-feet) | Wet.Area (acres) |
|---|---|---|---|---|
| 211.50 | 0.160 | 0.000 | 0.000 | 0.160 |
| 212.00 | 0.180 | 0.085 | 0.085 | 0.180 |
| 213.00 | 0.220 | 0.200 | 0.285 | 0.221 |
| 214.00 | 0.270 | 0.245 | 0.529 | 0.272 |
| 215.00 | 0.320 | 0.295 | 0.824 | 0.323 |
| 216.00 | 0.380 | 0.350 | 1.173 | 0.383 |
| 217.00 | 0.440 | 0.410 | 1.583 | 0.444 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Discarded | 211.50' | **0.500 in/hr Exfiltration over Wetted area**<br>Conductivity to Groundwater Elevation = 200.00' Phase-In= 0.01' |
| #2 | Primary | 209.75' | **27.0" Round Culvert**<br>L= 40.0' RCP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 209.75' / 209.00' S= 0.0187 '/' Cc= 0.900<br>n= 0.013, Flow Area= 3.98 sf |
| #3 | Device 2 | 212.00' | **12.0" Vert. Orifice/Grate** C= 0.600 |
| #4 | Device 2 | 213.75' | **3.0' long Sharp-Crested Rectangular Weir** 0 End Contraction(s) |

**Discarded OutFlow** Max=0.24 cfs @ 12.45 hrs HW=215.95' (Free Discharge)
└**1=Exfiltration** ( Controls 0.24 cfs)

**Primary OutFlow** Max=39.10 cfs @ 12.45 hrs HW=215.95' TW=0.00' (Dynamic Tailwater)
└**2=Culvert** (Passes 39.10 cfs of 43.14 cfs potential flow)
  └**3=Orifice/Grate** (Orifice Controls 7.03 cfs @ 8.95 fps)
  └**4=Sharp-Crested Rectangular Weir** (Weir Controls 32.07 cfs @ 4.85 fps)

## Pond 70B: Pond/Basin



## Summary for Pond 80B: Pond/Basin

Inflow Area = 14.390 ac, 34.89% Impervious, Inflow Depth > 4.69" for 100-yr event
Inflow = 86.38 cfs @ 12.22 hrs, Volume= 5.619 af
Outflow = 11.97 cfs @ 12.80 hrs, Volume= 4.930 af, Atten= 86%, Lag= 34.5 min
Discarded = 0.36 cfs @ 12.80 hrs, Volume= 0.378 af
Primary = 11.61 cfs @ 12.80 hrs, Volume= 4.552 af

Routing by Sim-Route method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 214.95' @ 12.80 hrs Surf.Area= 0.577 ac Storage= 3.297 af

Plug-Flow detention time= 230.8 min calculated for 4.930 af (88% of inflow)
Center-of-Mass det. time= 184.0 min ( 970.7 - 786.7 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 212.00' | 2.593 af | **Larger Pond (Conic)**Listed below (Recalc) -Impervious |
| #2 | 212.00' | 0.702 af | **Smaller Pond (Conic)**Listed below (Recalc) -Impervious |
| #3 | 211.50' | 2.948 af | **Infiltration Basin (Conic)**Listed below (Recalc) |
| | | 6.243 af | Total Available Storage |

| Elevation (feet) | Surf.Area (acres) | Inc.Store (acre-feet) | Cum.Store (acre-feet) | Wet.Area (acres) |
|---|---|---|---|---|
| 212.00 | 0.360 | 0.000 | 0.000 | 0.360 |
| 213.00 | 0.410 | 0.385 | 0.385 | 0.411 |
| 214.00 | 0.480 | 0.445 | 0.829 | 0.482 |
| 215.00 | 0.540 | 0.510 | 1.339 | 0.543 |
| 216.00 | 0.620 | 0.580 | 1.919 | 0.624 |
| 217.00 | 0.730 | 0.674 | 2.593 | 0.735 |

| Elevation (feet) | Surf.Area (acres) | Inc.Store (acre-feet) | Cum.Store (acre-feet) | Wet.Area (acres) |
|---|---|---|---|---|
| 212.00 | 0.080 | 0.000 | 0.000 | 0.080 |
| 213.00 | 0.110 | 0.095 | 0.095 | 0.110 |
| 213.50 | 0.120 | 0.057 | 0.152 | 0.121 |
| 214.00 | 0.140 | 0.065 | 0.217 | 0.141 |
| 215.00 | 0.150 | 0.145 | 0.362 | 0.153 |
| 216.00 | 0.170 | 0.160 | 0.522 | 0.174 |
| 217.00 | 0.190 | 0.180 | 0.702 | 0.195 |

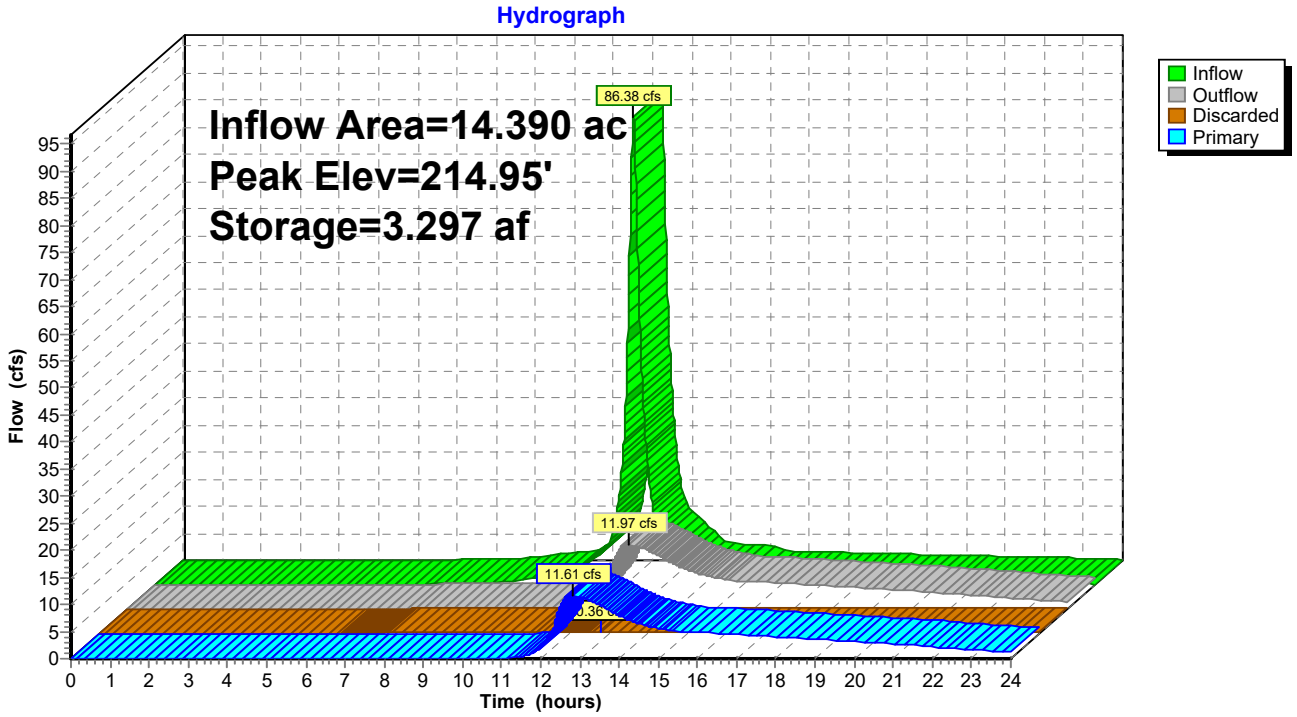
| Elevation (feet) | Surf.Area (acres) | Inc.Store (acre-feet) | Cum.Store (acre-feet) | Wet.Area (acres) |
|---|---|---|---|---|
| 211.50 | 0.370 | 0.000 | 0.000 | 0.370 |
| 212.00 | 0.390 | 0.190 | 0.190 | 0.391 |
| 213.00 | 0.460 | 0.425 | 0.614 | 0.462 |
| 214.00 | 0.530 | 0.495 | 1.109 | 0.533 |
| 215.00 | 0.580 | 0.555 | 1.664 | 0.584 |
| 216.00 | 0.640 | 0.610 | 2.274 | 0.646 |
| 217.00 | 0.710 | 0.675 | 2.948 | 0.717 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Discarded | 211.50' | **0.500 in/hr Exfiltration over Wetted area**<br>Conductivity to Groundwater Elevation = 200.00' Phase-In= 0.01' |
| #2 | Primary | 211.00' | **18.0" Round Culvert**<br>L= 30.0' RCP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 211.00' / 209.70' S= 0.0433 '/' Cc= 0.900<br>n= 0.013, Flow Area= 1.77 sf |
| #3 | Device 2 | 212.00' | **12.0" Vert. Orifice/Grate** C= 0.600 |
| #4 | Device 2 | 214.25' | **3.0' long Sharp-Crested Rectangular Weir** 0 End Contraction(s) |

**Discarded OutFlow** Max=0.36 cfs @ 12.80 hrs HW=214.95' (Free Discharge)
└**1=Exfiltration** ( Controls 0.36 cfs)

**Primary OutFlow** Max=11.61 cfs @ 12.80 hrs HW=214.95' TW=0.00' (Dynamic Tailwater)
└**2=Culvert** (Passes 11.61 cfs of 15.21 cfs potential flow)
└**3=Orifice/Grate** (Orifice Controls 5.91 cfs @ 7.53 fps)
└**4=Sharp-Crested Rectangular Weir** (Weir Controls 5.70 cfs @ 2.73 fps)

## Pond 80B: Pond/Basin

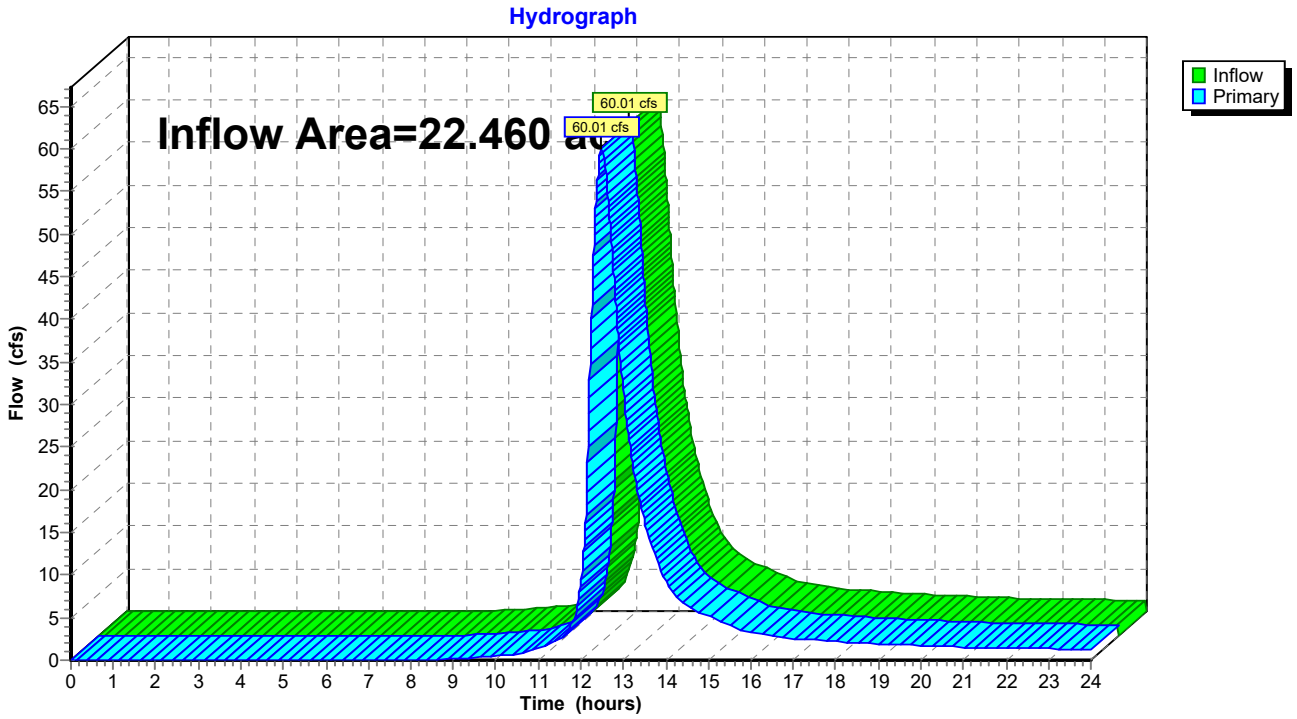


## Summary for Link 15L: North Drainage

Inflow Area = 22.460 ac, 30.17% Impervious, Inflow Depth > 3.95" for 100-yr event
Inflow = 60.01 cfs @ 12.48 hrs, Volume= 7.399 af
Primary = 60.01 cfs @ 12.49 hrs, Volume= 7.399 af, Atten= 0%, Lag= 0.6 min

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

## Link 15L: North Drainage

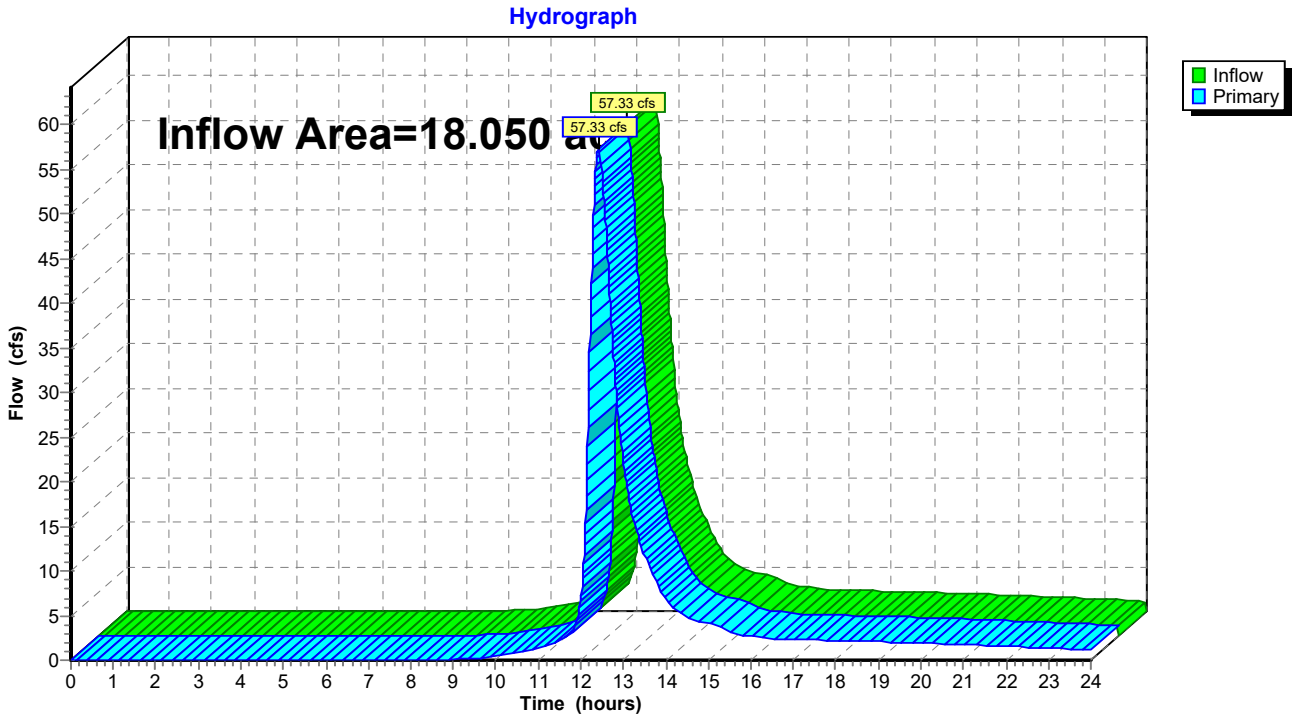


## Summary for Link 35L: East to White Oak Way

Inflow Area = 18.050 ac, 31.24% Impervious, Inflow Depth > 4.21" for 100-yr event
Inflow = 57.33 cfs @ 12.41 hrs, Volume= 6.338 af
Primary = 57.33 cfs @ 12.42 hrs, Volume= 6.338 af, Atten= 0%, Lag= 0.6 min

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

## Link 35L: East to White Oak Way

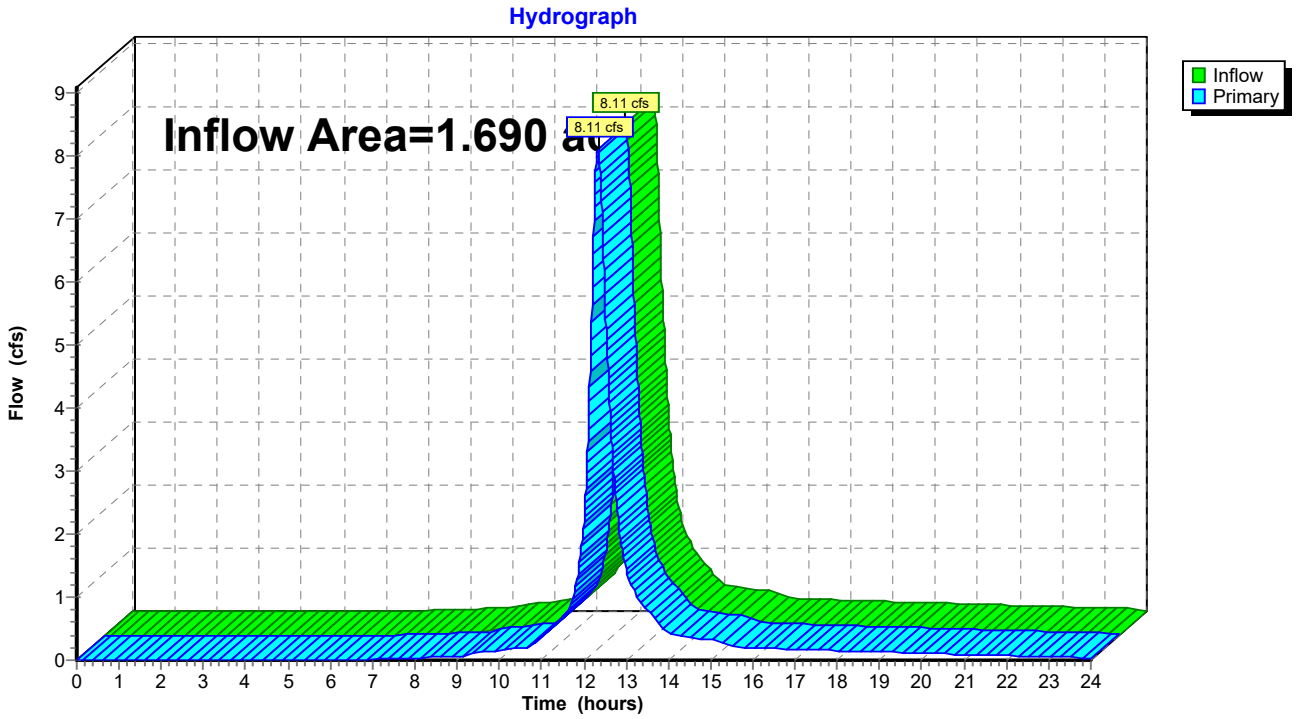


## Summary for Link 45L: East to Hawthorn Hill Drive

Inflow Area = 1.690 ac, 37.04% Impervious, Inflow Depth > 4.68" for 100-yr event
Inflow = 8.11 cfs @ 12.33 hrs, Volume= 0.660 af
Primary = 8.11 cfs @ 12.34 hrs, Volume= 0.660 af, Atten= 0%, Lag= 0.6 min

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

## Link 45L: East to Hawthorn Hill Drive

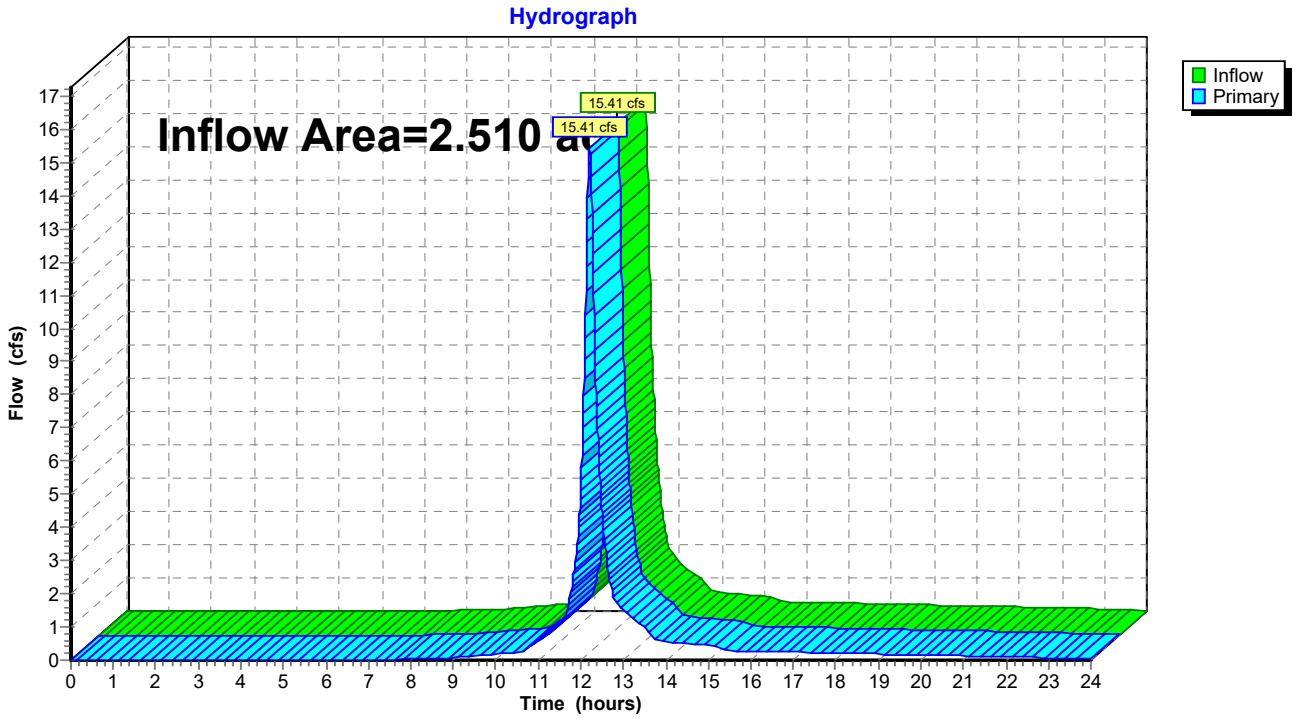


## Summary for Link 55: East to Summit Avenue

Inflow Area = 2.510 ac, 20.72% Impervious, Inflow Depth > 4.36" for 100-yr event
Inflow = 15.41 cfs @ 12.20 hrs, Volume= 0.912 af
Primary = 15.41 cfs @ 12.21 hrs, Volume= 0.912 af, Atten= 0%, Lag= 0.6 min

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

## Link 55: East to Summit Avenue

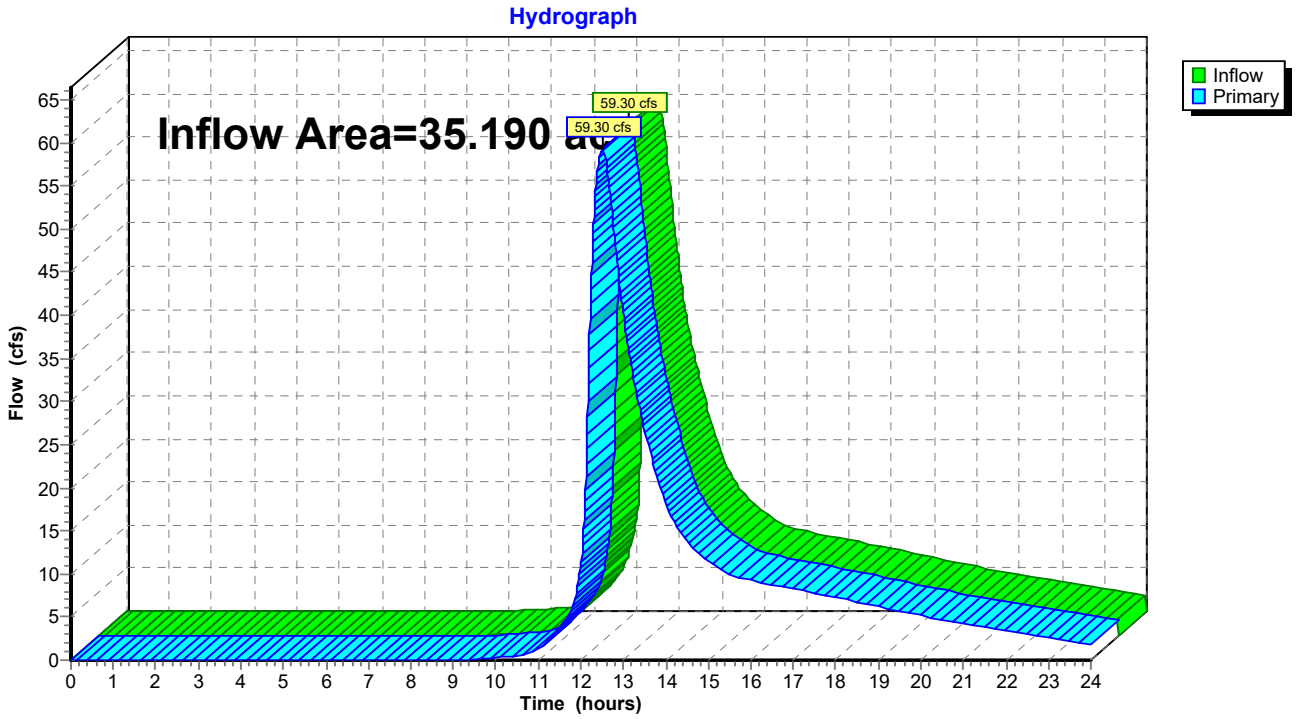


## Summary for Link 95: West Drainage

Inflow Area = 35.190 ac, 32.80% Impervious, Inflow Depth > 4.08" for 100-yr event
Inflow = 59.30 cfs @ 12.49 hrs, Volume= 11.958 af
Primary = 59.30 cfs @ 12.50 hrs, Volume= 11.958 af, Atten= 0%, Lag= 0.6 min

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

## Link 95: West Drainage

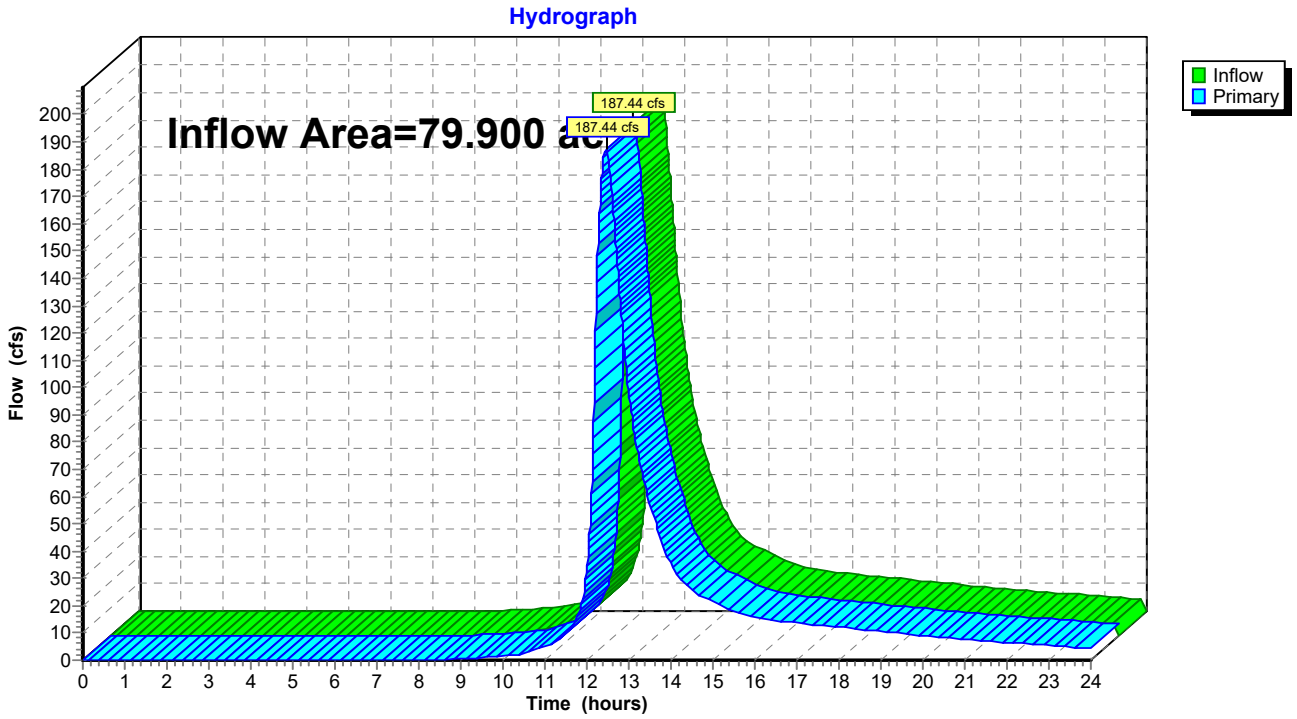


## Summary for Link 99: Total Existing Flow

Inflow Area = 79.900 ac, 31.42% Impervious, Inflow Depth > 4.09" for 100-yr event
Inflow = 187.44 cfs @ 12.44 hrs, Volume= 27.263 af
Primary = 187.44 cfs @ 12.45 hrs, Volume= 27.263 af, Atten= 0%, Lag= 0.6 min

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

## Link 99: Total Existing Flow



# SLAMM ANALYSIS

# SLAMM Analysis Results

FOR: Skyline 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 | 378.2 | 997.1 | 1539.0 | 298.6 | 1131.5 | 1.0 | 4345.4 | 4345.4 | 714.0 | 84% | Pond 5 |
| Subarea 10 - undetained | 67.1 | | | 107.9 | | | 175.0 | 175.0 | 15.8 | 91% | Disconnected Impevious |
| Subarea 20 | 100.7 | 265.9 | 488.6 | 89.9 | 298.6 | | 1243.7 | 1243.7 | 304.8 | 75% | Pond 25 |
| Subarea 25 - undetained | 64.9 | | | 104.3 | | | 169.2 | 169.2 | 15.3 | 91% | Disconnected Impevious |
| Subarea 30 | 183.5 | 487.5 | 1222.0 | 197.9 | 586.6 | 1.9 | 2679.3 | 2679.3 | 506.1 | 81% | Pond 35 and Infiltration Basin |
| Subarea 40 - undetained | 91.7 | 236.3 | 407.8 | 75.5 | 217.53 | | 1028.9 | 1028.9 | 1028.9 | 0% | |
| Subarea 50 - undetained | 40.3 | | | 64.7 | | | 105.0 | 105.0 | 9.5 | 91% | Disconnected Impevious |
| Subarea 60 - undetained | 33.6 | | | 54.0 | | | 87.5 | 87.5 | 7.9 | 91% | Disconnected Impevious |
| Subarea 70 | 246.1 | 649.9 | 1652.0 | 266.2 | 794.6 | | 3608.8 | 3608.8 | 519.9 | 86% | Pond 75 and Infiltration Basin |
| Subarea 80 | 331.2 | 878.9 | 1554.0 | 284.2 | 1129.4 | 0.3 | 4178.0 | 4178.0 | 399.0 | 90% | Pond 80 and Infiltration Basin |
| Subarea 90 - undetained | | | | | | | 0.0 | | | | |
| Total | 1537.3 | 3515.6 | 6863.4 | 1543.3 | 4158.2 | 3.2 | 17620.9 | 17620.9 | 3521.1 | 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%**