Downstream Analysis

The Point – CD Package 3 / AWH-20000 / February 2024

McADAMS

THE POINT – NORTH

PACKAGE 3

ROLESVILLE, NORTH CAROLINA

DOWNSTREAM ANALYSIS

CONSTRUCTION DRAWINGS

PROJECT NUMBER:	AWH-20000
DESIGNED BY:	DANIEL WIEBKE, PE, CFM TOMMY DABOLT
DATE:	FEBRUARY 2024

NORTH CAROLINA PROFESSIONAL ENGINEER
SEAL
043300
DANIEL C. WIEBKE

Daniel C Wiebke

Digitally signed by Daniel C Wiebke
DN: cn=Daniel C Wiebke, c=US, o=North Carolina, email=wiebke@mcadamsco.com
Date: 2024.03.01 14:53:25 -05'00'

MCADAMS
2905 MERIDIAN PARKWAY
DURHAM, NORTH CAROLINA 27713
NC LIC. # C-0293

THE POINT – CD PACKAGE 3

Downstream Analysis

GENERAL DESCRIPTION

The Point is a proposed residential development in Rolesville, North Carolina, located between Highway 401 and East Young Street/Rolesville Road. The development is approximately 300 acres, divided into a northern parcel and a southern parcel. This Stormwater Impact Analysis covers the development of the southern parcel only. The total development will consist of approximately 804 lots, a mixture of townhomes and various types of single-family housing, thirteen stormwater control measures, sidewalks, roadways, greenway trail, and associated infrastructure.

Of the total site area, approximately 34.1 acres of CD Package 3 will be treated by primary stormwater control measures (SCMs). The outflow from the SCM discharges into Harris Creek and leaves the property just upstream of the flooded quarry on the neighboring properties. The overall Harris Creek watershed to the southern property boundary extends northeast of the site to the other side of Highway 401 up to South Main Street as well as east of East Young Street, enveloping the previous two CD Packages, totaling approximately 822.22 acres. The CD Package 3 project site is 47.48 acres (including bypass areas), making up approximately 5% of the total watershed at this point, which is less than the 10% rule requirement. This point along Reedy Creek is referred to as the Downstream Point of Analysis (POA #6) in this report.

A hydrologic analysis was performed for the 10-year storm event using both pre- and post-development conditions to determine if the proposed project will cause any impacts to flooding or channel degradation downstream of the project site, in accordance with the stormwater management performance standards for development set forth in the Rolesville Unified Development Ordinance Article 7, Section 7.5.4 – Standards.

The downstream analysis regulations are as follows:

<u>(B) General Standards</u>

(1) Downstream Impact Analysis The downstream impact analysis must be performed in accordance with the "ten percent rule," and a copy of the analysis must be provided with the permit application. The purpose of the downstream impact analysis is to determine if the project will cause any impacts on flooding or channel degradation downstream of the project site. The analysis must include the assumptions, results and supporting calculations to show safe passage of post-Development design flows downstream. This analysis shall be performed at the outlet(s) of the site, and downstream at each tributary junction to the point(s) in the conveyance system where the area of the portion of the site draining into the system is less than or equal to ten percent of the total drainage area above that point.

CALCULATION METHODOLOGY

- The SCS Curve Number Method was used to estimate direct runoff. A composite curve number was calculated for each subbasin using soils and land cover data.

- Depth-Duration Frequency (DDF) rainfall data was obtained from NOAA Atlas 14. Synthetic rainfall hyetographs were generated using frequency-based hypothetical storms assuming a storm duration of 1 day, intensity duration of 5 minutes, intensity position of 50%, and a uniform distribution for all subbasins. Rainfall depths were input into the meteorological model within PondPack for peak flow rate calculations. Please reference the rainfall data section within this report for additional information.

- Hydrologic soil groups within each subbasin were determined using NRCS Web Soil Survey.
- Land cover conditions for the pre-development condition were based on survey provided by McAdams and aerial imagery for the site. Land cover conditions for the post-development condition were taken from the proposed layout. Offsite cover conditions were based onQL2 LiDAR, aerial imagery for the site, and Town of Apex Official Zoning Map.
- Existing conditions survey data and proposed grading was used for onsite topography. QL2 LiDAR topography data was obtained from North Carolina Spatial Data Download and used for offsite areas.
- The pre-development and post-development times of concentration were calculated using the SCS TR-55 Segmental Approach. The flow path was divided into the following segments where applicable: overland flow, concentrated flow, pipe flow, and channel flow. The travel time was then computed for each segment, from which the overall time of concentration was determined by taking the sum of each segmental time.
- The time of concentration to the proposed stormwater control measures was conservatively assumed to be 5 minutes.
- PondPack Version V8i was used in determining the pre- and post-development peak flow rates and routing calculations for the proposed stormwater control measures.
- Design and routing information for the proposed SCMs can be found in The Point – CD Package 3 Stormwater Impact Analysis report dated February 2023.

DISCUSSION OF RESULTS

A hydrologic analysis was performed for the 10year storm event to POA 6, the point along Harris Creek at which the project site makes up approximately 5% of the total watershed. Our analysis shows that peak flows in the post development 10-year storm are less than in the pre development at point of analysis 6. As shown in the Summary of Results section of this report, the proposed stormwater control measures provide the peak runoff control for the proposed development such that there are no adverse impacts to the existing downstream infrastructure. Therefore, the proposed project will not cause any impacts to flooding or channel degradation downstream of the project site, in accordance with the stormwater management performance standards for development set forth in the Rolesville Unified Development Ordinance Article 7, Section 7.5.4 – Standards.

CONCLUSION

If the development on this tract is built as proposed within this report, then the requirements set forth in Town of Rolesville regulations will be met. However, modifications to the proposed development may require that this analysis be revised. Some modifications that would require this analysis to be revised include:

1. The proposed site impervious surface exceeds the amount accounted for in this report.
2. The post-development watershed breaks change significantly from those used to prepare this report.

The above modifications may result in the assumptions within this report becoming invalid. The computations within this report will need to be revisited if any of the above conditions become apparent as development of the proposed site moves forward.

SUMMARY OF RESULTS

SUMMARY OF RESULTS

RELEASE RATE MANAGEMENT RESULTS

POINT OF ANALYSIS #1			
Return Period	Pre-Dev [cfs]	Post-Dev [cfs]	% Increase [%]
1-Year	283.5	219.4	-23%
10-Year	545.3	514.0	-6%

POINT OF ANALYSIS #2			
Return Period	Pre-Dev [cfs]	Post-Dev [cfs]	% Increase [%]
1-Year	77.3	70.0	-9%
10-Year	153.0	138.6	-9%

POINT OF ANALYSIS #3			
Return Period	Pre-Dev [cfs]	Post-Dev [cfs]	% Increase [%]
1-Year	8.7	6.7	-23%
10-Year	22.3	16.6	-26%

POINT OF ANALYSIS #4			
Return Period	Pre-Dev [cfs]	Post-Dev [cfs]	% Increase [%]
1-Year	344.2	248.9	-28%
10-Year	704.1	636.3	-10%

POINT OF ANALYSIS #5			
Return Period	Pre-Dev [cfs]	Post-Dev [cfs]	% Increase [%]
1-Year	359.7	241.2	-33%
10-Year	787.2	611.7	-22%

POINT OF ANALYSIS #6			
Return Period	Pre-Dev [cfs]	Post-Dev [cfs]	% Increase [%]
1-Year	704.0	485.3	-31%
10-Year	1494.8	1231.6	-18%

POINT OF ANALYSIS #7			
Return Period	Pre-Dev [cfs]	Post-Dev [cfs]	% Increase [%]
1-Year	2.5	2.5	0%
10-Year	17.2	8.6	-50%

POINT OF ANALYSIS #8			
Return Period	Pre-Dev [cfs]	Post-Dev [cfs]	% Increase [%]
1-Year	0.2	0.6	200%
10-Year	4.3	3.7	-14%

MISCELLANEOUS SITE INFORMATION

N

0 750 1,500 3,000 Feet

1 inch = 1,500 feet

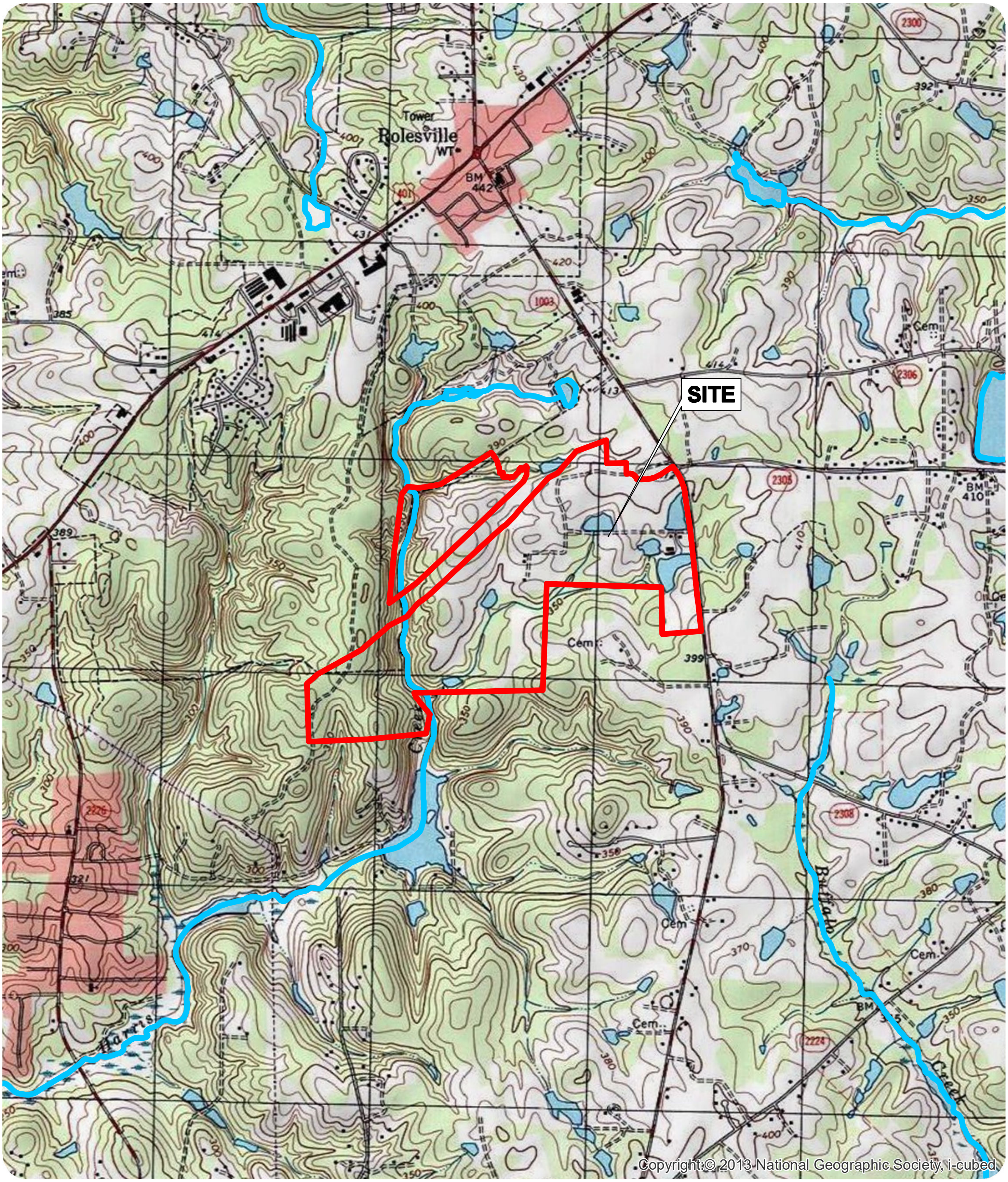
THE POINT

SITE AERIAL MAP

PROJECT #: AWH-20000

ROLESVILLE, NORTH CAROLINA

McADAMS



N

0 1,000 2,000 4,000
Feet
1 inch = 2,000 feet

THE POINT

USGS TOPO MAP
PROJECT #: AWH-20000

ROLESVILLE, NORTH CAROLINA

MCADAMS

. 0315 NEUSE RIVER BASIN

Name of Stream	Description	Class	Class Date	Index No.
NEUSE RIVER	From a point 0.5 mile upstream of Town of Wake Forest proposed water supply intake to Town of Wake Forest proposed water supply intake	WS-IV;NSW,CA	07/01/04	27-(22)
NEUSE RIVER	From Town of Wake Forest proposed water supply intake to mouth of Beddingfield Creek	C;NSW	08/03/92	27-(22.5)
Smith Creek	From source to a point 0.3 mile downstream of Franklin-Wake County Line	WS-II;HQW,NSW	08/03/92	27-23-(1)
Smith Creek (Wake Forest Reservoir)	From a point 0.3 mile downstream of Franklin-Wake County Line to dam at Wake Reservoir	WS-II;HQW,NSW, CA	08/03/92	27-23-(1.5)
Smith Creek	From dam at Wake Forest Reservoir to Neuse River	C;NSW	05/01/88	27-23-(2)
Austin Creek (Mitchell Pond)	From source to Smith Creek	C;NSW	07/01/96	27-23-3
Hatters Branch	From source to Smith Creek	C;NSW	05/01/88	27-23-4
Spring Branch	From source to Hatters Branch	C;NSW	05/01/88	27-23-4-1
Sanford Creek	From source to Smith Creek	C;NSW	05/01/88	27-23-5
Toms Creek (Mill Creek)	From source to Neuse River	C;NSW	05/01/88	27-24
Perry Creek (Greshams Lake)	From source to dam at Greshams Lake	B;NSW	05/01/88	27-25-(1)
Perry Creek	From dam at Greshams Lake to Neuse River	C;NSW	05/01/88	27-25-(2)
Unnamed Tributary near Neuse	From source to dam at Camp Durant	B;NSW	05/01/88	27-25-3-(1)
Unnamed Tributary near Neuse	From dam at Camp Durant to Perry Creek	C;NSW	05/01/88	27-25-3-(2)
Harris Creek (Peeples Creek) (Wake Crossroads Lake)	From source to Neuse River	C;NSW	05/01/88	27-26
Hodges Mill Creek (Lake Mirl)	From source to water intake at Lake Mirl	B;NSW	05/01/88	27-26-1-(1)
Hodges Mill Creek	From water intake at Lake Mirl to Harris Creek	C;NSW	05/01/88	27-26-1-(2)
Beaverdam Creek (west side of Neuse River)	From source to Neuse River	C;NSW	05/01/88	27-27
Rocky Creek	From source to Neuse River	C;NSW	05/01/88	27-28
Beaverdam Creek (east side of Neuse River) (Neuseco Lake, Beaverdam Lake)	From soruce to Neuse River	C;NSW	05/01/88	27-29
Bridges Creek (Bridges Lake)	From source to Neuse River	C;NSW	05/01/88	27-30
Milburnie Creek (Milburnie Lake)	From source to Neuse River	C;NSW	05/01/88	27-31
Mango Creek	From source to Neuse River	C;NSW	05/01/88	27-32
Crabtree Creek	From source to backwaters of Crabtree Lake	C;NSW	05/01/88	27-33-(1)
Turkey Creek	From source to Crabtree Creek	C;NSW	05/01/88	27-33-2
Coles Branch	From source to Crabtree Creek	C;NSW	05/01/88	27-33-3
South Fork Coles Branch	From source to Coles Branch	C;NSW	05/01/88	27-33-3-1
Crabtree Creek (Crabtree Lake)	From backwaters of Crabtree Lake to mouth of Richlands Creek	B;NSW	04/01/94	27-33-(3.5)

2160000 FEET | 78°27'30"W | 78°27'0"W | 78°26'30"W | 78°26'0"W | 2170000 FEET

790000 FEET | 790000 FEET

35°55'0"N | 35°54'30"N | 35°54'0"N

780000 FEET | 780000 FEET

2160000 FEET | 78°27'30"W | 78°27'0"W | 78°26'30"W | 78°26'0"W | 2170000 FEET

NORTH CAROLINA Cooperating Technical State
FEMA'S COOPERATING TECHNICAL PARTNER

This digital Flood Insurance Rate Map (FIRM) was produced through a unique cooperative partnership between the State of North Carolina and the Federal Emergency Management Agency (FEMA). The State of North Carolina has implemented a long term approach to floodplain management to decrease the costs associated with flooding. This is demonstrated by the State's commitment to map flood hazard areas at the local level. As a part of this effort, the State of North Carolina has joined in a Cooperating Technical State agreement with FEMA to produce and maintain this digital FIRM.

FLOOD HAZARD INFORMATION

SEE FIS REPORT FOR ZONE DESCRIPTIONS AND INDEX MAP FOR FIRM PANEL LAYOUT

THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT

HTTPS://FRIS.NC.GOV/FRIS
HTTPS://MSC.FEMA.GOV

SPECIAL FLOOD HAZARD AREAS	Without Base Flood Elevation (BFE) *Zone A,V, A99*
	With BFE or Depth *Zone AE, AO, AH, VE, AR*
	Regulatory Floodway
OTHER AREAS OF FLOOD HAZARD	0.2% Annual Chance Flood Hazard, Areas of 1% Annual Chance Flood with Average Depth Less Than One Foot or With Drainage Areas of Less Than One Square Mile *Zone X*
	Future Conditions 1% Annual Chance Flood Hazard *Zone X*
	Area with Reduced Flood Risk due to Levee See Notes *Zone X*
OTHER AREAS	Areas Determined to be Outside the 0.2% Annual Chance Floodplain *Zone X*
GENERAL STRUCTURES	Channel, Culvert, or Storm Sewer
	Levee, Dike, or Floodwall
	012 — 18.2 Cross Sections with 1% Annual Chance Water Surface Elevation (BFE)
	8 Coastal Transect
	Coastal Transect Baseline
	Profile Baseline
	Hydrographic Feature
OTHER FEATURES	Limit of Study
	Jurisdiction Boundary

NOTES TO USERS

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Limit of Moderate Wave Action (LiMWA)

SCALE

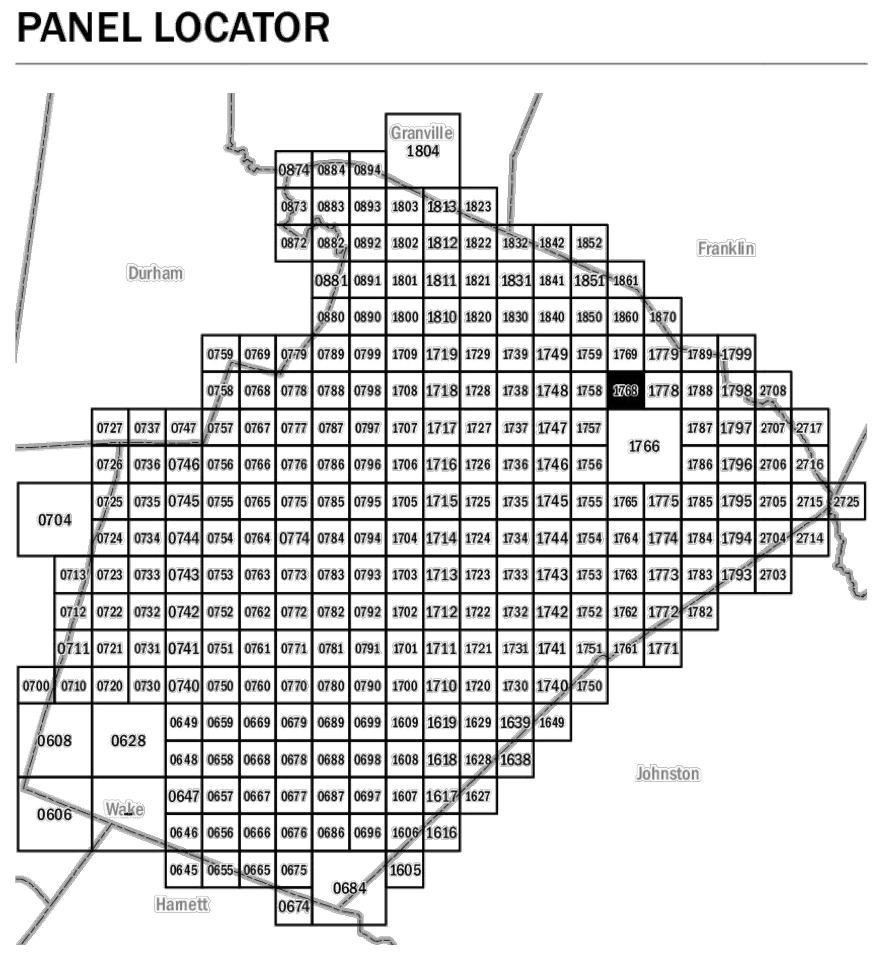
Map Projection:
North Carolina State Plane Projection Feet (Zone 3200)
Datum: NAD 1983 (Horizontal), NAVD 1988 (Vertical)

1 inch = 500 feet | 1:6,000

0 250 500 1,000 Feet

0 75 150 300 Meters

PANEL LOCATOR



NORTH CAROLINA FLOODPLAIN MAPPING PROGRAM
NATIONAL FLOOD INSURANCE PROGRAM
FLOOD INSURANCE RATE MAP

NORTH CAROLINA

PANEL 1768

FEMA National Flood Insurance Program

Panel Contains:

COMMUNITY	CID	PANEL	SUFFIX
ROLESVILLE, TOWN OF	370468	1768	K
WAKE COUNTY	370368	1768	K

VERSION NUMBER
2.3.3.2

MAP NUMBER
3720176800K

MAP REVISED
July 19, 2022

2150000 FEET 78°29'30"W 78°29'0"W 78°28'30"W 78°28'0"W 2160000 FEET

790000 FEET 790000 FEET

35°55'0"N 35°55'0"N

35°54'30"N 35°54'30"N

35°54'0"N 35°54'0"N

780000 FEET 780000 FEET

2150000 FEET 78°29'30"W 78°29'0"W 78°28'30"W 78°28'0"W 2160000 FEET

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Limit of Moderate Wave Action (LiMWA)

SCALE

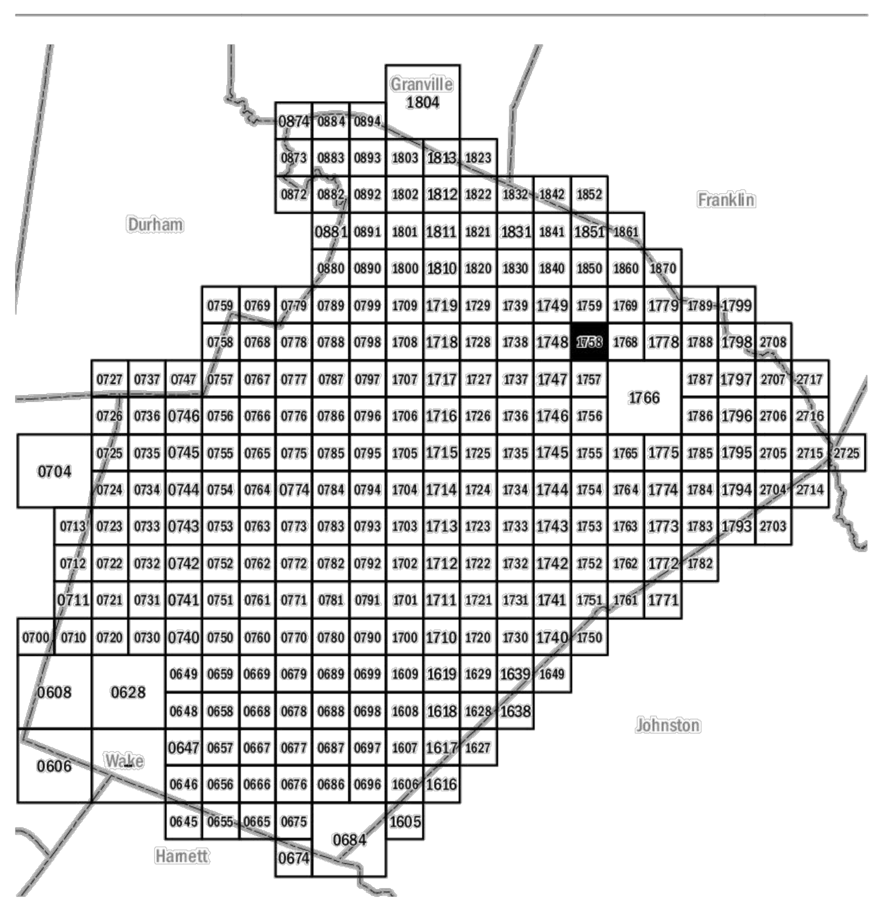
Map Projection:
North Carolina State Plane Projection Feet (Zone 3200)
Datum: NAD 1983 (Horizontal), NAVD 1988 (Vertical)

1 inch = 500 feet 1:6,000

0 250 500 1,000 Feet

0 75 150 300 Meters

PANEL LOCATOR



FEMA
National Flood Insurance Program

NORTH CAROLINA FLOODPLAIN MAPPING PROGRAM
NATIONAL FLOOD INSURANCE PROGRAM
FLOOD INSURANCE RATE MAP

NORTH CAROLINA

PANEL 1758

FEMA

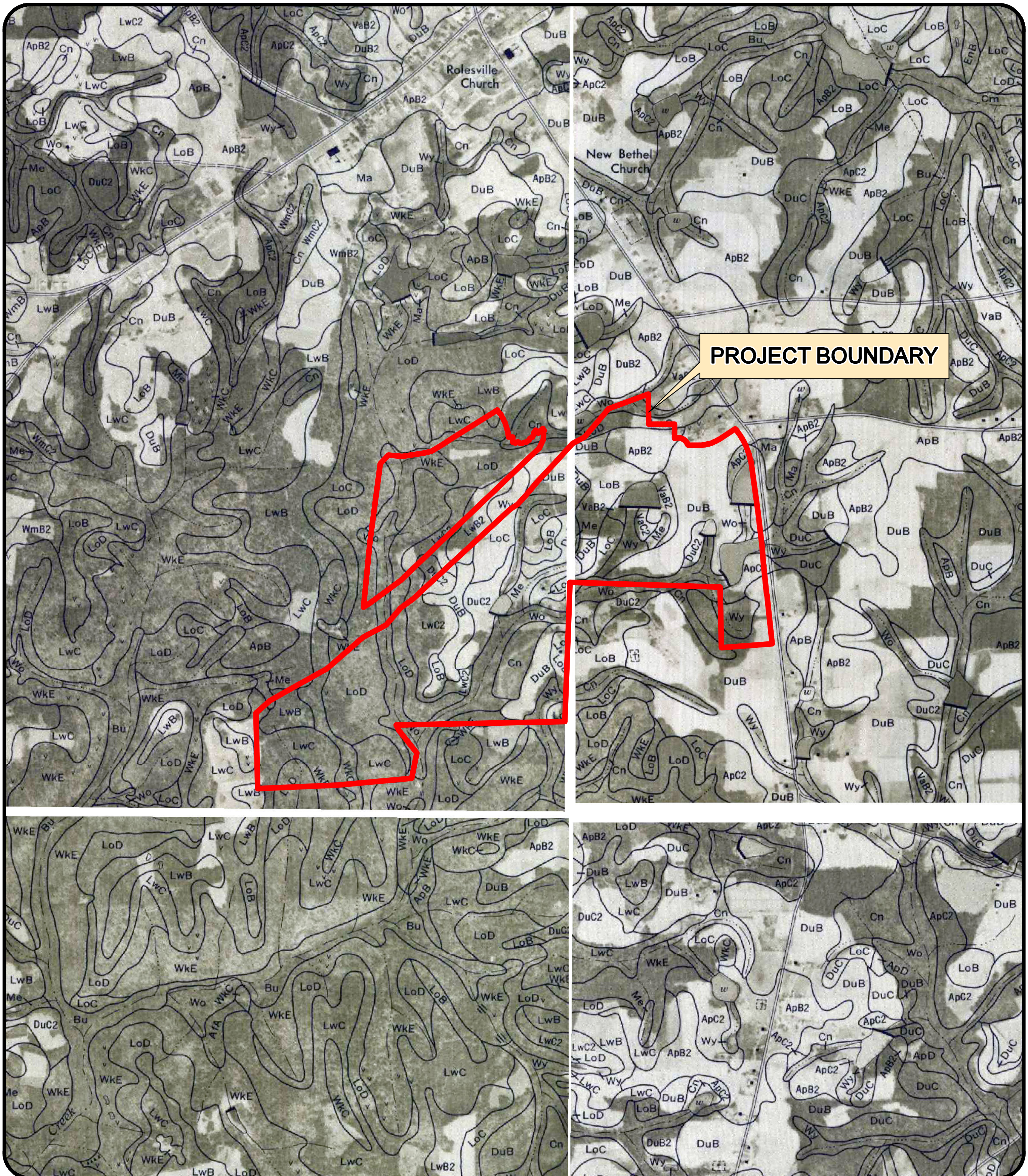
Panel Contains:

COMMUNITY	CID	PANEL	SUFFIX
ROLESVILLE, TOWN OF	370468	1758	K
WAKE COUNTY	370368	1758	K

VERSION NUMBER
2.3.3.2

MAP NUMBER
3720175800K

MAP REVISED
July 19, 2022



N

0 750 1,500 3,000
Feet
1 inch = 1,500 feet

THE POINT

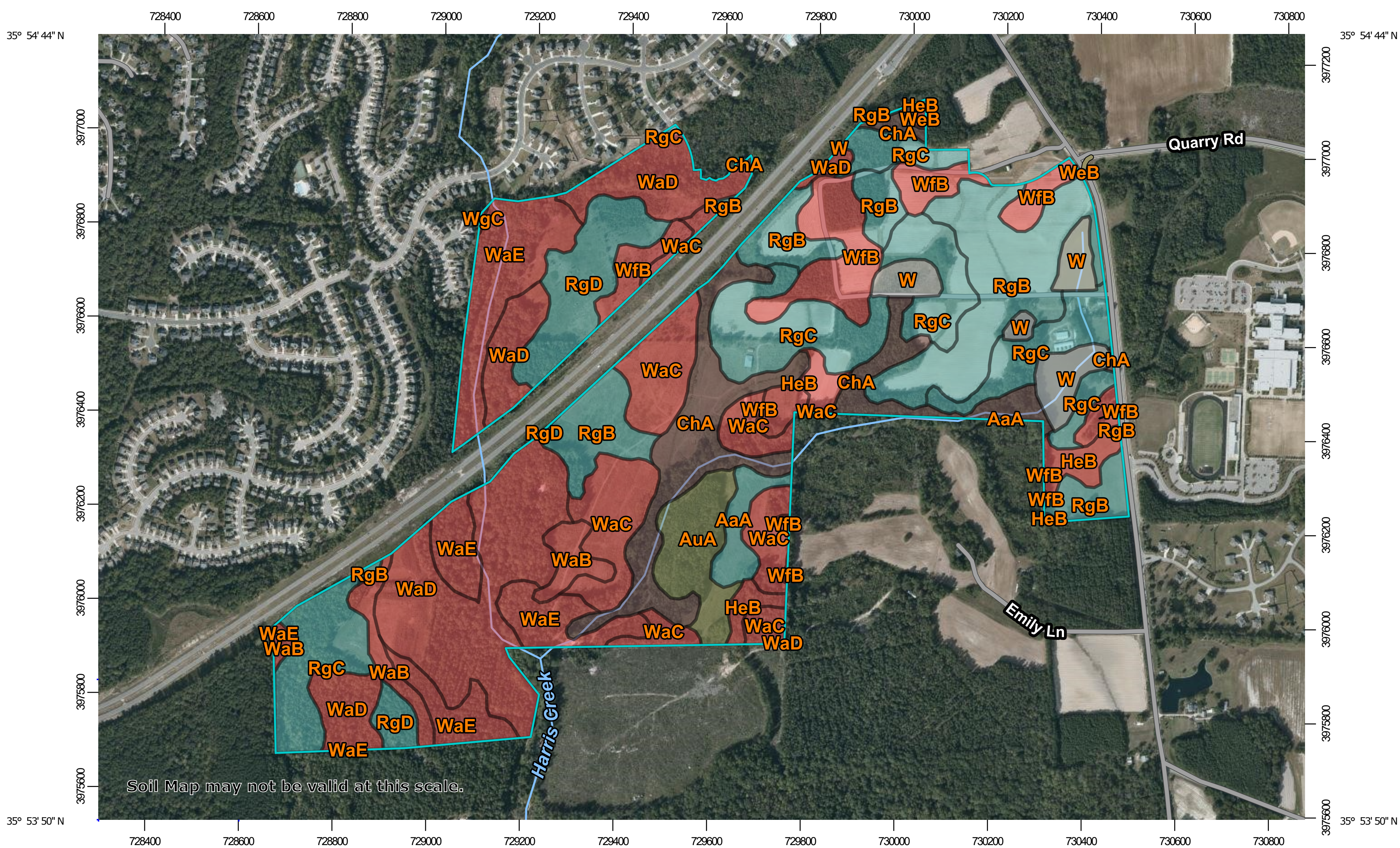
SOIL MAP

PROJECT #: AWH-20000

ROLESVILLE, NORTH CAROLINA

McADAMS

Hydrologic Soil Group—Wake County, North Carolina
(Property Line)



Map Scale: 1:11,800 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0, 150, 300, 600, 900

Feet: 0, 500, 1000, 2000, 3000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 17N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Wake County, North Carolina
Survey Area Data: Version 18, Sep 16, 2019

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Oct 11, 2019—Oct 19, 2019

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
AaA	Altavista fine sandy loam, 0 to 4 percent slopes, rarely flooded	C	4.1	1.4%
AuA	Augusta fine sandy loam, 0 to 2 percent slopes, rarely flooded	C/D	10.1	3.3%
ChA	Chewacla and Wehadkee soils, 0 to 2 percent slopes, frequently flooded	B/D	27.0	8.9%
HeB	Helena sandy loam, 2 to 6 percent slopes	D	7.1	2.4%
RgB	Rawlings-Rion complex, 2 to 6 percent slopes	C	43.5	14.4%
RgC	Rawlings-Rion complex, 6 to 10 percent slopes	C	45.6	15.1%
RgD	Rawlings-Rion complex, 10 to 15 percent slopes	C	15.0	5.0%
W	Water		9.7	3.2%
WaB	Wake-Rolesville complex, 2 to 6 percent slopes, very rocky	D	7.4	2.4%
WaC	Wake-Rolesville complex, 6 to 10 percent slopes, very rocky	D	29.0	9.6%
WaD	Wake-Rolesville complex, 10 to 15 percent slopes, very rocky	D	51.1	16.9%
WaE	Wake-Rolesville complex, 15 to 25 percent slopes, very rocky	D	28.9	9.6%
WeB	Wedowee sandy loam, 2 to 6 percent slopes	D	0.2	0.1%
WfB	Wedowee-Saw complex, 2 to 6 percent slopes	D	22.9	7.6%
WgC	Wedowee-Urban land complex, 6 to 15 percent slopes	D	0.1	0.0%
Totals for Area of Interest			**301.6**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

NOAA Atlas 14, Volume 2, Version 3
Location name: Wake Forest, North Carolina, USA*
Latitude: 35.9053°, Longitude: -78.452°
Elevation: 354.67 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

G.M. Bonnin, D. Martin, B. Lin, T. Parzybok, M.Yekta, and D. Riley

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.403 (0.369-0.442)	0.468 (0.429-0.512)	0.534 (0.489-0.582)	0.600 (0.548-0.654)	0.666 (0.606-0.726)	0.718 (0.651-0.783)	0.765 (0.690-0.834)	0.807 (0.723-0.881)	0.853 (0.758-0.932)	0.895 (0.789-0.979)
10-min	0.644 (0.590-0.705)	0.749 (0.687-0.818)	0.855 (0.783-0.933)	0.959 (0.877-1.05)	1.06 (0.966-1.16)	1.14 (1.04-1.25)	1.22 (1.10-1.33)	1.28 (1.15-1.40)	1.35 (1.20-1.47)	1.41 (1.24-1.54)
15-min	0.806 (0.738-0.882)	0.942 (0.863-1.03)	1.08 (0.991-1.18)	1.21 (1.11-1.32)	1.35 (1.22-1.47)	1.45 (1.31-1.58)	1.54 (1.39-1.68)	1.61 (1.45-1.76)	1.70 (1.51-1.86)	1.77 (1.56-1.94)
30-min	1.10 (1.01-1.21)	1.30 (1.19-1.42)	1.54 (1.41-1.68)	1.76 (1.61-1.92)	1.99 (1.81-2.17)	2.18 (1.98-2.38)	2.35 (2.12-2.57)	2.51 (2.25-2.74)	2.70 (2.40-2.95)	2.87 (2.52-3.14)
60-min	1.38 (1.26-1.51)	1.63 (1.50-1.78)	1.97 (1.81-2.15)	2.29 (2.09-2.50)	2.65 (2.42-2.89)	2.96 (2.68-3.22)	3.24 (2.92-3.53)	3.52 (3.16-3.85)	3.88 (3.45-4.24)	4.18 (3.69-4.58)
2-hr	1.61 (1.46-1.78)	1.92 (1.75-2.10)	2.34 (2.13-2.56)	2.75 (2.49-3.01)	3.23 (2.91-3.54)	3.66 (3.28-4.00)	4.07 (3.63-4.45)	4.49 (3.98-4.91)	5.04 (4.42-5.51)	5.52 (4.80-6.05)
3-hr	1.71 (1.55-1.89)	2.03 (1.85-2.24)	2.49 (2.26-2.74)	2.94 (2.67-3.24)	3.50 (3.15-3.84)	3.99 (3.58-4.39)	4.49 (3.98-4.92)	5.00 (4.41-5.48)	5.69 (4.96-6.24)	6.32 (5.45-6.95)
6-hr	2.05 (1.87-2.26)	2.44 (2.23-2.68)	2.99 (2.72-3.28)	3.54 (3.22-3.88)	4.22 (3.82-4.62)	4.84 (4.35-5.29)	5.46 (4.86-5.96)	6.12 (5.39-6.67)	7.00 (6.10-7.64)	7.82 (6.72-8.55)
12-hr	2.41 (2.21-2.66)	2.87 (2.64-3.15)	3.54 (3.24-3.88)	4.21 (3.84-4.62)	5.07 (4.59-5.53)	5.85 (5.26-6.36)	6.64 (5.91-7.22)	7.49 (6.59-8.14)	8.66 (7.50-9.41)	9.76 (8.32-10.6)
24-hr	2.86 (2.66-3.08)	3.46 (3.22-3.73)	4.35 (4.04-4.69)	5.06 (4.69-5.44)	6.02 (5.57-6.49)	6.80 (6.27-7.32)	7.60 (6.98-8.19)	8.43 (7.71-9.09)	9.58 (8.71-10.3)	10.5 (9.50-11.3)
2-day	3.32 (3.09-3.57)	3.99 (3.72-4.30)	4.98 (4.64-5.37)	5.77 (5.35-6.21)	6.83 (6.32-7.36)	7.68 (7.09-8.27)	8.56 (7.87-9.22)	9.46 (8.66-10.2)	10.7 (9.74-11.6)	11.7 (10.6-12.7)
3-day	3.52 (3.28-3.77)	4.23 (3.94-4.54)	5.25 (4.89-5.63)	6.06 (5.64-6.50)	7.17 (6.64-7.69)	8.05 (7.44-8.64)	8.96 (8.25-9.62)	9.89 (9.07-10.6)	11.2 (10.2-12.1)	12.2 (11.1-13.2)
4-day	3.72 (3.47-3.98)	4.46 (4.17-4.77)	5.52 (5.15-5.90)	6.35 (5.92-6.79)	7.50 (6.96-8.01)	8.42 (7.79-9.00)	9.36 (8.63-10.0)	10.3 (9.49-11.1)	11.7 (10.7-12.5)	12.7 (11.6-13.7)
7-day	4.31 (4.04-4.61)	5.15 (4.82-5.50)	6.29 (5.88-6.71)	7.19 (6.72-7.68)	8.43 (7.85-9.00)	9.42 (8.75-10.1)	10.4 (9.66-11.2)	11.5 (10.6-12.3)	12.9 (11.8-13.9)	14.1 (12.8-15.1)
10-day	4.91 (4.61-5.24)	5.85 (5.48-6.23)	7.04 (6.60-7.50)	7.99 (7.47-8.50)	9.26 (8.64-9.86)	10.3 (9.55-10.9)	11.3 (10.5-12.0)	12.3 (11.4-13.2)	13.7 (12.6-14.7)	14.8 (13.6-15.9)
20-day	6.59 (6.20-7.02)	7.79 (7.32-8.29)	9.23 (8.67-9.81)	10.4 (9.72-11.0)	11.9 (11.1-12.7)	13.1 (12.2-14.0)	14.3 (13.3-15.3)	15.6 (14.5-16.6)	17.3 (16.0-18.5)	18.6 (17.1-19.9)
30-day	8.18 (7.72-8.69)	9.63 (9.08-10.2)	11.2 (10.6-11.9)	12.5 (11.7-13.2)	14.1 (13.2-15.0)	15.4 (14.4-16.3)	16.6 (15.5-17.7)	17.9 (16.7-19.0)	19.5 (18.1-20.9)	20.8 (19.3-22.3)
45-day	10.4 (9.89-11.0)	12.2 (11.6-12.9)	14.0 (13.3-14.8)	15.4 (14.6-16.2)	17.2 (16.3-18.1)	18.6 (17.5-19.6)	19.9 (18.7-21.0)	21.2 (19.9-22.5)	23.0 (21.5-24.4)	24.3 (22.7-25.8)
60-day	12.5 (11.9-13.1)	14.6 (13.9-15.4)	16.6 (15.7-17.4)	18.1 (17.1-19.0)	20.0 (19.0-21.1)	21.5 (20.3-22.6)	22.9 (21.6-24.1)	24.2 (22.9-25.6)	26.0 (24.5-27.5)	27.4 (25.7-29.0)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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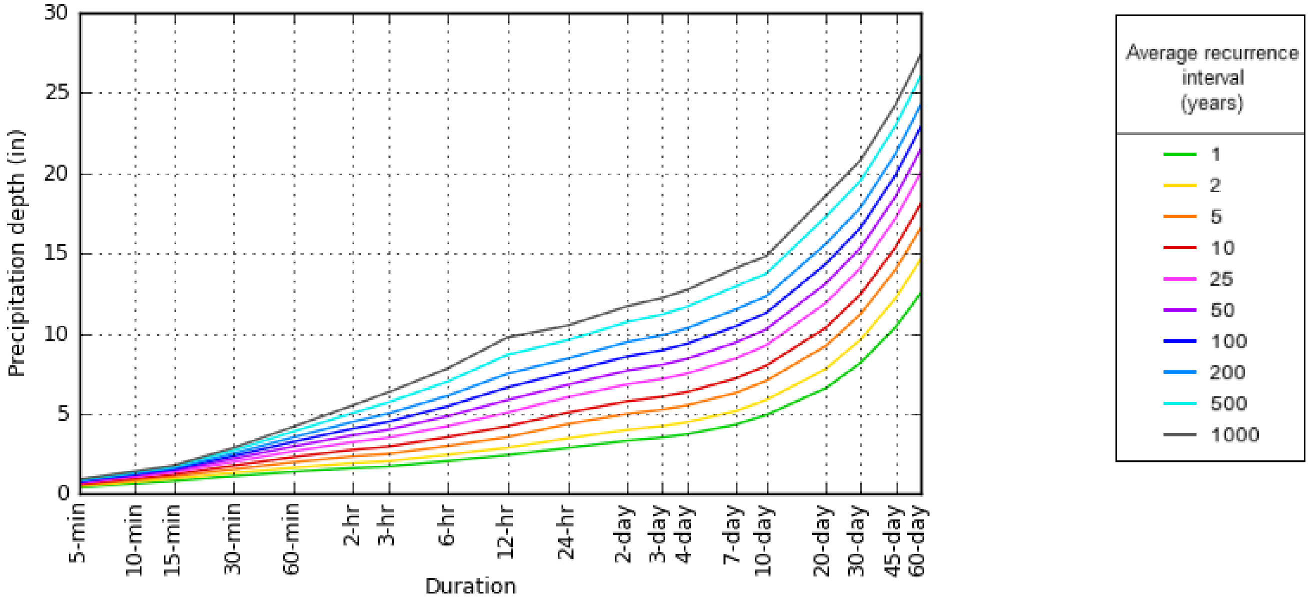
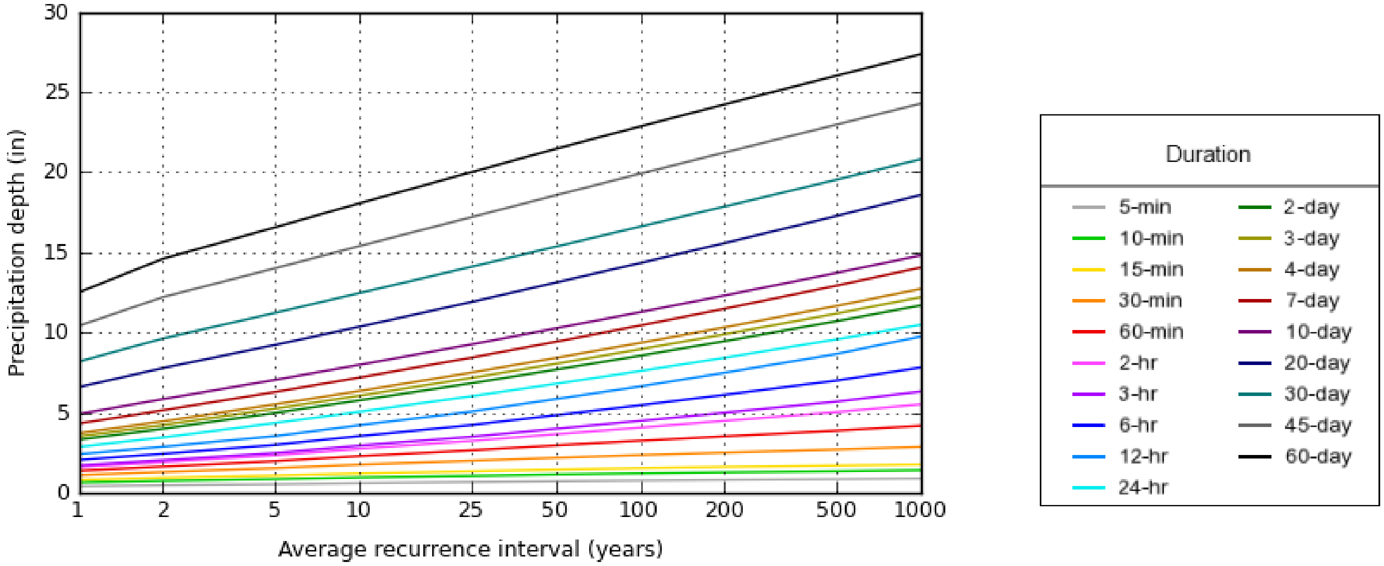
PF graphical

PDS-based depth-duration-frequency (DDF) curves
Latitude: 35.9053°, Longitude: -78.4520°





NOAA Atlas 14, Volume 2, Version 3

Created (GMT): Wed Jun 3 19:09:38 2020

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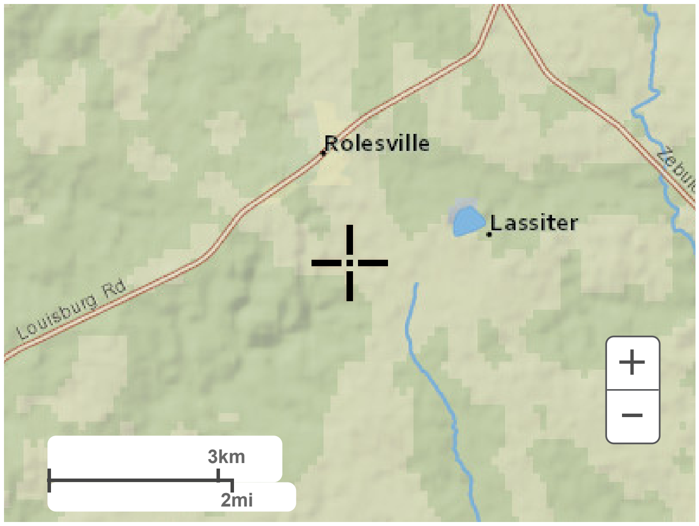
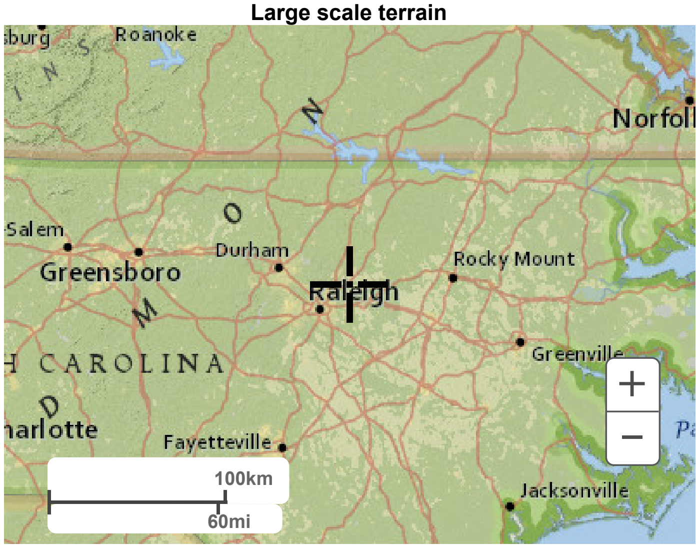
Maps & aerials

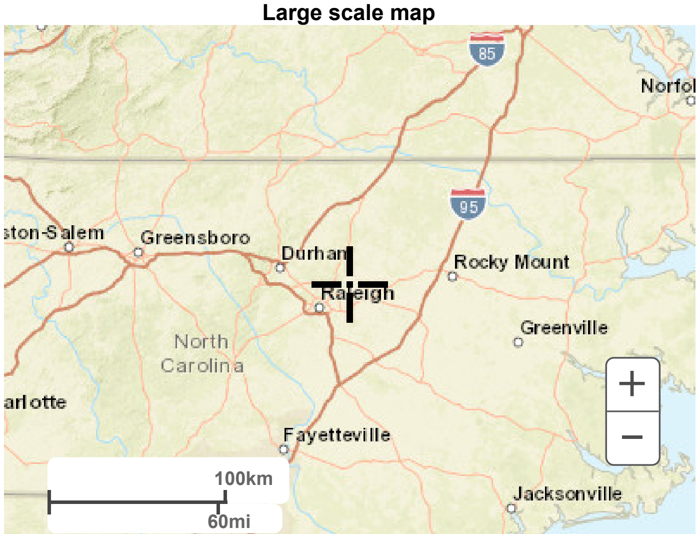
Small scale terrain



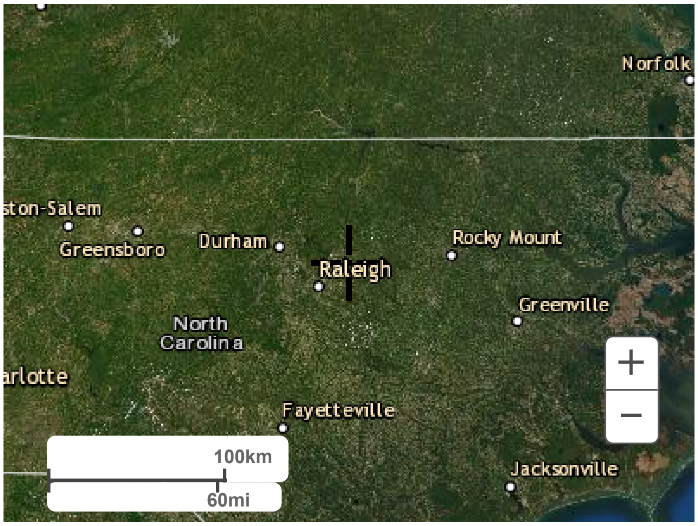
Large scale terrain



Large scale map



Large scale aerial



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National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer

PRE-DEVELOPMENT
HYDROLOGIC CALCULATIONS

PRE-DEVELOPMENT HYDROLOGY

Subbasin 1

Land Use	HSG	CN	Onsite	Percent Impervious (%)	Impervious Area (ac)	Total Area (ac)
Crops	B	78	Yes	0	0.00	23.79
Crops	B/D	89	Yes	0	0.00	0.13
Crops	D	89	Yes	0	0.00	6.70
Low Density Residential	B	68		20	0.06	0.29
Low Density Residential	D	84		20	4.53	22.63
Medium Density Residential	B	70		25	0.29	1.14
Medium Density Residential	D	85		25	0.02	0.08
Mixed Use Neighborhood	B	85		65	9.26	14.25
Mixed Use Neighborhood	B/D	92		65	2.68	4.12
Mixed Use Neighborhood	C	90		65	1.16	1.79
Mixed Use Neighborhood	D	92		65	10.60	16.30
Open	B	61	Yes	0	0.00	16.63
Open	B/D	80	Yes	0	0.00	0.38
Open	D	80	Yes	0	0.00	8.88
Pond	B	100	Yes	0	0.00	0.13
Pond	B/D	100	Yes	0	0.00	0.02
Pond	D	100	Yes	0	0.00	6.78
Roadway		98		100	7.98	7.98
Roof	B	98	Yes	100	0.35	0.35
Roof	D	98	Yes	100	0.00	0.00
School	B	88		72	12.90	17.91
School	B/D	93		72	6.11	8.49
School	D	93		72	43.84	60.89
Trail	B	82	Yes	100	0.52	0.52
Trail	B/D	89	Yes	100	0.01	0.01
Trail	D	89	Yes	100	0.11	0.11
Wooded	B	55	Yes	0	0.00	8.52
Wooded	B/D	77	Yes	0	0.00	6.40
Wooded	C	70	Yes	0	0.00	0.03
Wooded	D	77	Yes	0	0.00	1.61

Total Area	**236.88**	**ac**
Total Impervious Area	**100.42**	**ac**
Onsite Area	**81.00**	**ac**
Onsite Impervious Area	**0.99**	**ac**
Percent Impervious	**42**	**%**
Composite Curve Number	**89**	

PRE-DEVELOPMENT HYDROLOGY
Subbasin 1

Time of Concentration Information
Time of concentration is calculated using the SCS Segmental Approach (TR-55).

Segment 1: Overland Flow

Length =	100	ft
Top Elev =	426.00	ft
Bot Elev =	425.00	ft
Height =	1	ft
Slope =	0.0100	ft/ft
Manning's n =	0.17	cultivated soils, residue cover
P (2-year/24-hour) =	3.46	inches (Rolesville, NC)
Segment Time =	***13.74***	***minutes***

Segment 2: Concentrated Flow

Length =	2645	ft
Top Elev =	425.00	ft
Bot Elev =	374.00	ft
Height =	51	ft
Slope =	0.0193	ft/ft
Paved ? =	No	
Velocity =	2.24	ft/sec
Segment Time =	***19.68***	***minutes***

Segment 3: Open Water Flow

Length =	580	ft
Top Elev =	374.00	ft
Bot Elev =	372.00	ft
Segment Time =	***0.00***	***minutes***

Segment 4: Channel Flow

Length =	2088	ft
Top Elev =	372.00	ft
Bot Elev =	344.00	ft
Height =	28	ft
Slope =	0.0134	ft/ft
Manning's n =	0.045	natural channel
Flow Area =	15.00	sf (assume 5'w x 3'h channel)
Wetted Perimeter =	11.00	lf (assume 5'w x 3'h channel)
Channel Velocity =	4.72	ft/sec
Segment Time =	***7.38***	***minutes***

Time of Concentration =	40.80	minutes
SCS Lag Time =	24.48	minutes (SCS Lag = 0.6* Tc)
Time Increment =	7.10	minutes (= 0.29*SCS Lag)

PRE-DEVELOPMENT HYDROLOGY
Subbasin 2

Land Use	HSG	CN	Onsite	Percent Impervious (%)	Impervious Area (ac)	Area (ac)
Crops	B	78	Yes	0	0.00	1.34
Crops	D	89	Yes	0	0.00	0.55
Low Density Residential	D	84		20	3.59	17.96
Mixed Use Neighborhood	B	85		65	3.44	5.30
Mixed Use Neighborhood	B/D	92		65	0.58	0.89
Mixed Use Neighborhood	D	92		65	8.11	12.48
Open	B	61	Yes	0	0.00	0.92
Open	D	80	Yes	0	0.00	0.75
Roadway		98		100	13.35	13.35
Trail	B	82	Yes	100	0.07	0.07
Trail	D	89	Yes	100	0.22	0.22
Wooded	B	55	Yes	0	0.00	2.53
Wooded	B/D	77	Yes	0	0.00	1.21
Wooded	D	77	Yes	0	0.00	2.33

Total Area	**59.90**	**ac**
Total Impervious Area	**29.36**	**ac**
Onsite Area	**9.92**	**ac**
Onsite Impervious Area	**0.28**	**ac**
Percent Impervious	**49**	**%**
Composite Curve Number	**87**	

Time of Concentration Information
Time of concentration is calculated using the SCS Segmental Approach (TR-55).

Segment 1: Overland Flow

Length =	100	ft
Top Elev =	427.00	ft
Bot Elev =	426.00	ft
Height =	1	ft
Slope =	0.0100	ft/ft
Manning's n =	0.17	cultivated soils, residue cover
P (2-year/24-hour) =	3.46	inches (Rolesville, NC)
Segment Time =	***13.74***	***minutes***

Segment 2: Concentrated Flow

Length =	2541	ft
Top Elev =	426.00	ft
Bot Elev =	368.00	ft
Height =	58	ft
Slope =	0.0228	ft/ft
Paved ? =	No	
Velocity =	2.44	ft/sec
Segment Time =	***17.37***	***minutes***

Time of Concentration =	31.12	minutes
SCS Lag Time =	18.67	minutes (SCS Lag = 0.6* Tc)
Time Increment =	5.41	minutes (= 0.29*SCS Lag)

PRE-DEVELOPMENT HYDROLOGY
Subbasin 3

Land Use	HSG	CN	Onsite	Percent Impervious (%)	Impervious Area (ac)	Area (ac)
Open	C	74	Yes	0	0.00	1.23
Open	D	80	Yes	0	0.00	1.45
Wooded	C	70	Yes	0	0.00	0.85
Wooded	D	77	Yes	0	0.00	4.59

Total Area	**8.11**	**ac**
Total Impervious Area	**0.00**	**ac**
Onsite Area	**8.11**	**ac**
Onsite Impervious Area	**0.00**	**ac**
Percent Impervious	**0**	**%**
Composite Curve Number	**76**	

Time of Concentration Information

Time of concentration is calculated using the SCS Segmental Approach (TR-55).

Segment 1: Overland Flow

Length =	100	ft
Top Elev =	368.00	ft
Bot Elev =	363.00	ft
Height =	5	ft
Slope =	0.0500	ft/ft
Manning's n =	0.24	dense grasses
P (2-year/24-hour) =	3.46	inches (Rolesville, NC)
Segment Time =	***9.51***	***minutes***

Segment 2: Concentrated Flow

Length =	698	ft
Top Elev =	363.00	ft
Bot Elev =	336.00	ft
Height =	27	ft
Slope =	0.0387	ft/ft
Paved ? =	No	
Velocity =	3.17	ft/sec
Segment Time =	***3.67***	***minutes***

Segment 3: Channel Flow

Length =	249	ft
Top Elev =	336.00	ft
Bot Elev =	333.00	ft
Height =	3	ft
Slope =	0.0120	ft/ft
Manning's n =	0.045	natural channel
Flow Area =	15.00	sf (assume 5'w x 3'h channel)
Wetted Perimeter =	11.00	lf (assume 5'w x 3'h channel)
Channel Velocity =	4.47	ft/sec
Segment Time =	***0.93***	***minutes***

Time of Concentration =	14.11	minutes
SCS Lag Time =	8.46	minutes (SCS Lag = 0.6* Tc)
Time Increment =	2.45	minutes (= 0.29*SCS Lag)

PRE-DEVELOPMENT HYDROLOGY

Subbasin 4

Land Use	HSG	CN	Onsite	Percent Impervious (%)	Impervious Area (ac)	Area (ac)
Crops	B	78	Yes	0	0.00	6.35
Crops	B/D	89	Yes	0	0.00	0.16
Crops	D	89	Yes	0	0.00	3.19
Mixed Use Neighborhood	B	85		65	1.18	1.82
Mixed Use Neighborhood	B/D	92		65	0.56	0.86
Mixed Use Neighborhood	C	90		65	0.68	1.04
Mixed Use Neighborhood	D	92		65	5.08	7.81
Open	A	39	Yes	0	0.00	1.44
Open	B	61	Yes	0	0.00	10.63
Open	B/D	80	Yes	0	0.00	8.78
Open	C	74	Yes	0	0.00	4.91
Open	D	80	Yes	0	0.00	20.40
Roadway		98		100	7.47	7.47
Roof	B	98	Yes	100	0.11	0.11
Roof	B/D	98	Yes	100	0.00	0.00
Roof	D	98	Yes	100	0.03	0.03
Trail	A	72	Yes	100	0.17	0.17
Trail	B	82	Yes	100	0.39	0.39
Trail	B/D	89	Yes	100	0.19	0.19
Trail	D	89	Yes	100	0.69	0.69
Wooded	A	30	Yes	0	0.00	0.00
Wooded	B	55	Yes	0	0.00	3.07
Wooded	B/D	77	Yes	0	0.00	9.47
Wooded	C	70	Yes	0	0.00	7.15
Wooded	D	77	Yes	0	0.00	12.43

Total Area	**108.57**	**ac**
Total Impervious Area	**16.56**	**ac**
Onsite Area	**89.56**	**ac**
Onsite Impervious Area	**1.59**	**ac**
Percent Impervious	**15**	**%**
Composite Curve Number	**78**	

Time of Concentration Information

Time of concentration is calculated using the SCS Segmental Approach (TR-55).

Segment 1: Overland Flow

Length =	100	ft
Top Elev =	389.00	ft
Bot Elev =	388.00	ft
Height =	1	ft
Slope =	0.0100	ft/ft
Manning's n =	0.17	cultivated soils, residue cover
P (2-year/24-hour) =	3.46	inches (Rolesville, NC)
Segment Time =	***13.74***	***minutes***

Segment 2: Concentrated Flow

Length =	1855	ft
Top Elev =	388.00	ft
Bot Elev =	339.00	ft
Height =	49	ft
Slope =	0.0264	ft/ft
Paved ? =	No	
Velocity =	2.62	ft/sec
Segment Time =	***11.79***	***minutes***

Segment 3: Channel Flow

Length =	2366	ft
Top Elev =	339.00	ft
Bot Elev =	302.00	ft
Height =	37	ft
Slope =	0.0156	ft/ft
Manning's n =	0.045	natural channel
Flow Area =	15.00	sf (assume 5'w x 3'h channel)
Wetted Perimeter =	11.00	lf (assume 5'w x 3'h channel)
Channel Velocity =	5.09	ft/sec
Segment Time =	***7.74***	***minutes***

Time of Concentration =	33.28	minutes
SCS Lag Time =	19.97	minutes (SCS Lag = 0.6* Tc)
Time Increment =	5.79	minutes (= 0.29*SCS Lag)

PRE-DEVELOPMENT HYDROLOGY
Subbasin 5

Land Use	HSG	CN	Onsite	Percent Impervious (%)	Impervious Area (ac)	Area (ac)
Business Park	A	89		85	0.01	0.01
Business Park	B	92		85	0.02	0.02
Business Park	D	95		85	0.03	0.03
Commercial	D	95		85	0.86	1.01
High Density Residential	B	85		65	46.03	70.82
High Density Residential	D	92		65	33.44	51.45
Low Density Residential	B	65		20	0.18	0.92
Low Density Residential	D	82		20	0.37	1.85
Medium Density Residential	A	54		25	0.00	0.01
Medium Density Residential	B	70		25	11.98	47.92
Medium Density Residential	D	85		25	10.74	42.98
Mixed Use Neighborhood	B	85		65	4.36	6.71
Mixed Use Neighborhood	B/D	92		65	2.15	3.31
Mixed Use Neighborhood	D	92		65	7.50	11.55
Open	A	49	Yes	0	0.00	1.90
Open	B	69	Yes	0	0.00	10.33
Open	D	84	Yes	0	0.00	11.86
Preserved Open Space	A	39		0	0.00	0.39
Preserved Open Space	B	61		0	0.00	4.48
Preserved Open Space	D	80		0	0.00	34.05
Roadway		98		100	49.05	49.05
School	B	88		72	0.34	0.47
School	D	93		72	5.12	7.11
Town Center	B	92		85	5.55	6.53
Town Center	D	95		85	1.48	1.74
Trail	A	72	Yes	100	0.02	0.02
Trail	B	82	Yes	100	0.43	0.43
Trail	D	89	Yes	100	1.93	1.93
Wooded	A	30	Yes	0	0.00	0.70
Wooded	B	55	Yes	0	0.00	4.50
Wooded	B/D	77	Yes	0	0.00	0.15
Wooded	D	77	Yes	0	0.00	50.68

Total Area	**424.89**	**ac**
Total Impervious Area	**181.60**	**ac**
Onsite Area	**82.49**	**ac**
Onsite Impervious Area	**2.38**	**ac**
Percent Impervious	**43**	**%**
Composite Curve Number	**84**	

Time of Concentration Information

Time of concentration is calculated using the SCS Segmental Approach (TR-55).

Segment 1: Overland Flow

Length =	100	ft
Top Elev =	440.00	ft
Bot Elev =	438.00	ft
Height =	2	ft
Slope =	0.0200	ft/ft
Manning's n =	0.24	dense grasses
P (2-year/24-hour) =	3.46	inches (Rolesville, NC)
Segment Time =	***13.72***	***minutes***

Segment 2: Concentrated Flow

Length =	2989	ft
Top Elev =	438.00	ft
Bot Elev =	372.00	ft
Height =	66	ft
Slope =	0.0221	ft/ft
Paved ? =	No	
Velocity =	2.40	ft/sec
Segment Time =	***20.78***	***minutes***

Segment 3: Open Water Flow

Length =	655	ft
Top Elev =	372.00	ft
Bot Elev =	372.00	ft
Segment Time =	***0.00***	***minutes***

Segment 4: Concentrated Flow

Length =	2379	ft
Top Elev =	372.00	ft
Bot Elev =	320.00	ft
Height =	52	ft
Slope =	0.0219	ft/ft
Paved ? =	No	
Velocity =	2.39	ft/sec
Segment Time =	***16.62***	***minutes***

Segment 5: Channel Flow

Length =	3730	ft
Top Elev =	320.00	ft
Bot Elev =	292.00	ft
Height =	28	ft
Slope =	0.0075	ft/ft
Manning's n =	0.045	natural channel
Flow Area =	32.00	sf (assume 8'w x 4'h channel)
Wetted Perimeter =	16.00	lf (assume 8'w x 4'h channel)
Channel Velocity =	4.55	ft/sec
Segment Time =	***13.65***	***minutes***

Time of Concentration =	64.78	minutes
SCS Lag Time =	38.87	minutes (SCS Lag = 0.6* Tc)
Time Increment =	11.27	minutes (= 0.29*SCS Lag)

PRE-DEVELOPMENT HYDROLOGY
Subbasin 6

Land Use	HSG	CN	Onsite	Percent Impervious (%)	Impervious Area (ac)	Area (ac)
Trail	D	89	Yes	100	0.16	0.16
Wooded	A	30	Yes	0	0.00	0.37
Wooded	D	77	Yes	0	0.00	8.04

Total Area	**8.56**	**ac**
Total Impervious Area	**0.16**	**ac**
Onsite Area	**8.56**	**ac**
Onsite Impervious Area	**0.16**	**ac**
Percent Impervious	**2**	**%**
Composite Curve Number	**75**	

Time of Concentration Information

Time of concentration is calculated using the SCS Segmental Approach (TR-55).

Segment 1: Overland Flow

Length =	100	ft
Top Elev =	386.00	ft
Bot Elev =	380.00	ft
Height =	6	ft
Slope =	0.0600	ft/ft
Manning's n =	0.40	wooded
P (2-year/24-hour) =	3.46	inches (Rolesville, NC)
Segment Time =	***13.31***	***minutes***

Segment 2: Concentrated Flow

Length =	599	ft
Top Elev =	380.00	ft
Bot Elev =	288.00	ft
Height =	92	ft
Slope =	0.1536	ft/ft
Paved ? =	No	
Velocity =	6.32	ft/sec
Segment Time =	***1.58***	***minutes***

Time of Concentration =	14.89	minutes
SCS Lag Time =	8.93	minutes (SCS Lag = 0.6* Tc)
Time Increment =	2.59	minutes (= 0.29*SCS Lag)

PRE-DEVELOPMENT HYDROLOGY

Subbasin 7

Land Use	HSG	CN	Onsite	Percent Impervious (%)	Impervious Area (ac)	Area (ac)
Open	A	39	Yes	0	0.00	0.70
Open	B	61	Yes	0	0.00	1.00
Open	D	80	Yes	0	0.00	0.06
Trail	B	82	Yes	100	0.15	0.15
Wooded	A	30	Yes	0	0.00	0.66
Wooded	B	55	Yes	0	0.00	7.85
Wooded	D	77	Yes	0	0.00	5.24

Total Area	**15.67**	**ac**
Total Impervious Area	**0.15**	**ac**
Onsite Area	**15.67**	**ac**
Onsite Impervious Area	**0.15**	**ac**
Percent Impervious	**1**	**%**
Composite Curve Number	**61**	

Time of Concentration Information

Time of concentration is calculated using the SCS Segmental Approach (TR-55).

Segment 1: Overland Flow

Length =	100	ft
Top Elev =	418.00	ft
Bot Elev =	417.00	ft
Height =	1	ft
Slope =	0.0100	ft/ft
Manning's n =	0.24	dense grasses
P (2-year/24-hour) =	3.46	inches (Rolesville, NC)
Segment Time =	***18.11***	***minutes***

Segment 2: Concentrated Flow

Length =	593	ft
Top Elev =	417.00	ft
Bot Elev =	338.00	ft
Height =	79	ft
Slope =	0.1332	ft/ft
Paved ? =	No	
Velocity =	5.89	ft/sec
Segment Time =	***1.68***	***minutes***

Segment 3: Channel Flow

Length =	285	ft
Top Elev =	338.00	ft
Bot Elev =	324.00	ft
Height =	14	ft
Slope =	0.0491	ft/ft
Manning's n =	0.045	natural channel
Flow Area =	10.00	sf (assume 5'w x 2'h channel)
Wetted Perimeter =	9.00	lf (assume 5'w x 2'h channel)
Channel Velocity =	7.87	ft/sec
Segment Time =	***0.60***	***minutes***

Time of Concentration =	20.39	minutes
SCS Lag Time =	12.23	minutes (SCS Lag = 0.6* Tc)
Time Increment =	3.55	minutes (= 0.29*SCS Lag)

PRE-DEVELOPMENT HYDROLOGY

Subbasin 8

Land Use	HSG	CN	Onsite	Percent Impervious (%)	Impervious Area (ac)	Area (ac)
Open	A	39	Yes	0	0.00	0.67
Open	B	61	Yes	0	0.00	1.24
Open	D	80	Yes	0	0.00	0.02
Trail	A	72	Yes	100	0.04	0.04
Trail	B	82	Yes	100	0.07	0.07
Wooded	A	30	Yes	0	0.00	0.71
Wooded	B	55	Yes	0	0.00	3.22
Wooded	D	77	Yes	0	0.00	0.26

Total Area	**6.23**	**ac**
Total Impervious Area	**0.11**	**ac**
Onsite Area	**6.23**	**ac**
Onsite Impervious Area	**0.11**	**ac**
Percent Impervious	**2**	**%**
Composite Curve Number	**53**	

Time of Concentration Information

Time of concentration is calculated using the SCS Segmental Approach (TR-55).

Segment 1: Overland Flow

Length =	100	ft
Top Elev =	398.00	ft
Bot Elev =	393.00	ft
Height =	5	ft
Slope =	0.0500	ft/ft
Manning's n =	0.24	dense grasses
P (2-year/24-hour) =	3.46	inches (Rolesville, NC)
Segment Time =	***9.51***	***minutes***

Segment 2: Concentrated Flow

Length =	697	ft
Top Elev =	393.00	ft
Bot Elev =	365.00	ft
Height =	28	ft
Slope =	0.0402	ft/ft
Paved ? =	No	
Velocity =	3.23	ft/sec
Segment Time =	***3.59***	***minutes***

Time of Concentration =	13.10	minutes
SCS Lag Time =	7.86	minutes (SCS Lag = 0.6* Tc)
Time Increment =	2.28	minutes (= 0.29*SCS Lag)

PRE-DEVELOPMENT HYDROLOGY

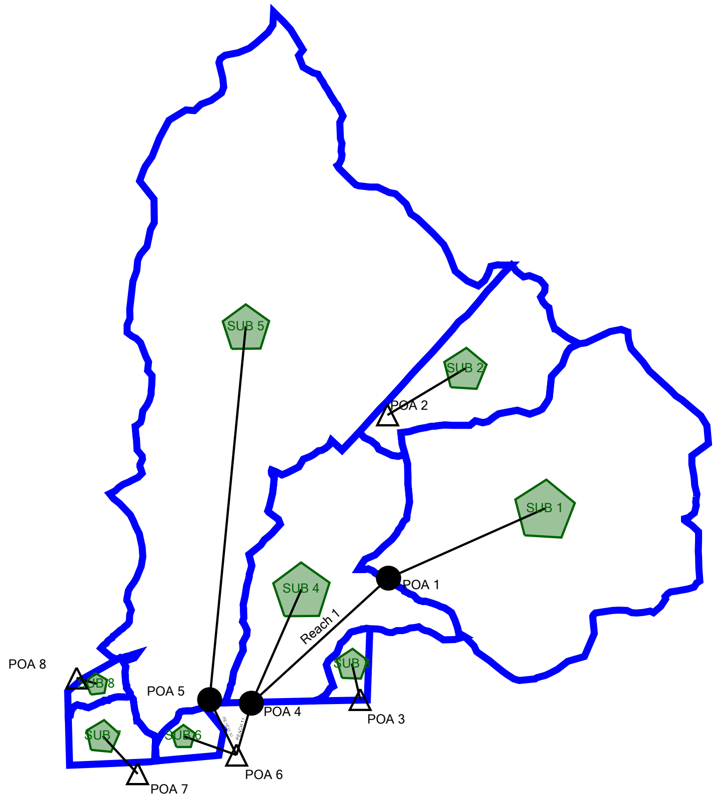
Reach Data

REACH DATA

Reach 1 - POA 1 to POA 4

Length =	2988	ft
Top Elev =	344.00	ft
Bot Elev =	302.00	ft
Height =	42	ft
Slope =	0.0141	ft/ft
Manning's n =	0.045	natural channel
Flow Area =	10.00	sf (assume 5'w x 2'h channel)
Wetted Perimeter =	9.00	lf (assume 5'w x 2'h channel)
Channel Velocity =	4.21	ft/sec
Reach Travel Time =	***11.83***	***minutes***

Scenario: Pre-Dev 1 yr



FlexTable: Catchment Table (AWH20000-Master.ppc)

Current Time: 0.00 min

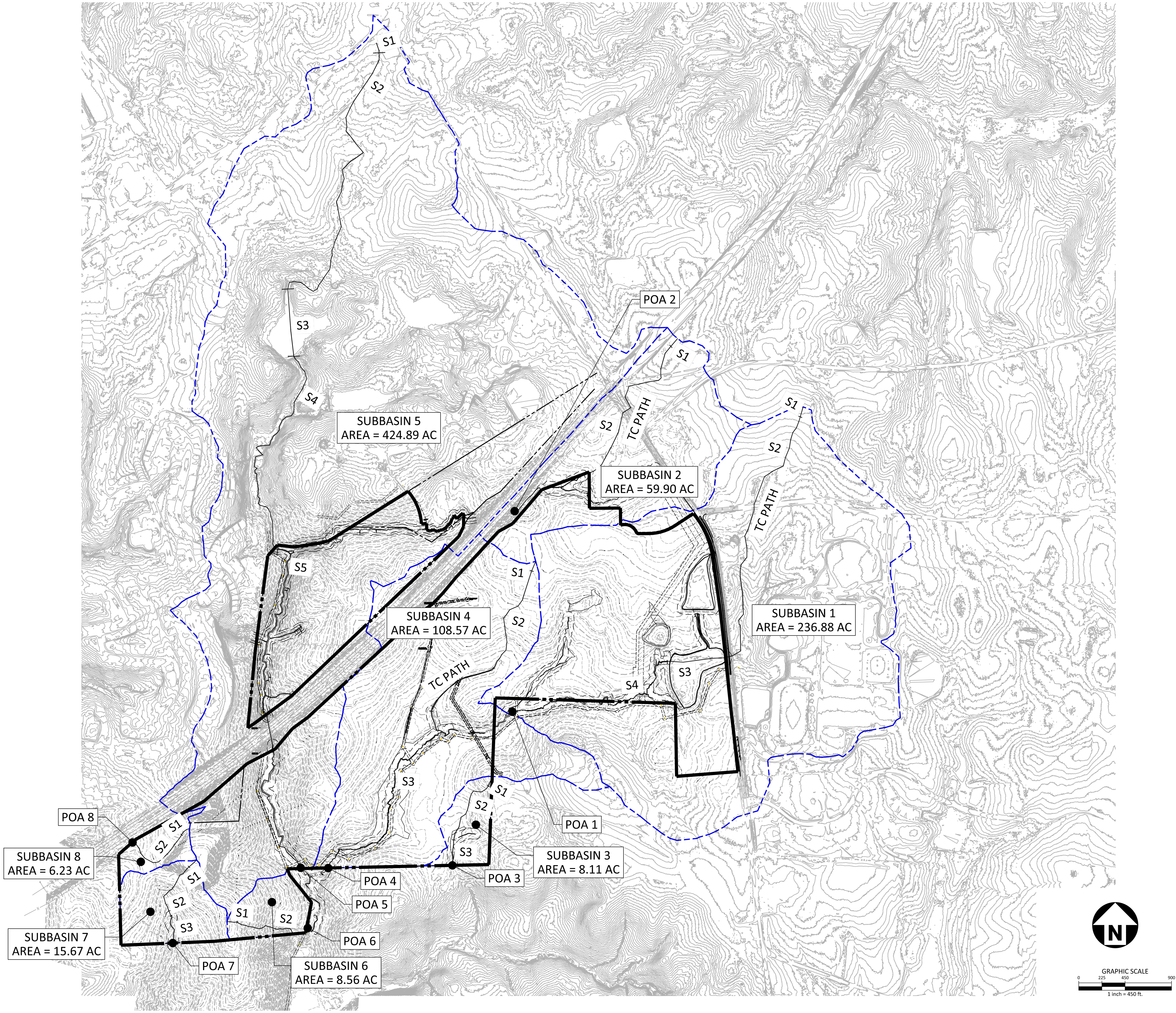
Label	Area (ft^2)	SCS CN	Time of Concentration (min)	Notes
SUB 1	10,318,492.80	89.0	40.80	PRE
SUB 2	2,609,244.00	87.0	31.12	PRE
SUB 5	18,508,208.41	84.0	48.15	PRE
SUB 4	4,729,309.20	78.0	33.28	PRE
SUB 7	682,585.20	61.0	20.39	PRE
SUB 8	271,269.00	53.0	13.10	PRE
SUB 6	372,873.60	75.0	14.89	PRE
SUB 3	353,271.60	76.0	14.11	PRE

Catchments Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (min)	Peak Flow (ft^3/s)
SUB 1	Pre-Dev 10 yr	10	74.868	745.00	545.3
SUB 2	Pre-Dev 10 yr	10	17.950	738.00	153.0
SUB 3	Pre-Dev 10 yr	10	1.740	728.00	22.3
SUB 4	Pre-Dev 10 yr	10	24.755	741.00	204.9
SUB 5	Pre-Dev 10 yr	10	116.278	751.00	787.2
SUB 6	Pre-Dev 10 yr	10	1.774	728.00	22.0
SUB 7	Pre-Dev 10 yr	10	1.820	734.00	17.2
SUB 8	Pre-Dev 10 yr	10	0.458	729.00	4.3

Node Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (min)	Peak Flow (ft^3/s)
POA 1	Pre-Dev 10 yr	10	74.868	745.00	545.3
POA 2	Pre-Dev 10 yr	10	17.950	738.00	153.0
POA 3	Pre-Dev 10 yr	10	1.740	728.00	22.3
POA 4	Pre-Dev 10 yr	10	99.357	752.00	704.1
POA 5	Pre-Dev 10 yr	10	116.278	751.00	787.2
POA 6	Pre-Dev 10 yr	10	216.993	758.00	1,494.8
POA 7	Pre-Dev 10 yr	10	1.820	734.00	17.2
POA 8	Pre-Dev 10 yr	10	0.458	729.00	4.3



PRELIMINARY DRAWING - NOT RELEASED FOR CONSTRUCTION

M:\Projects\AWH\AWH-20000\04-Production\Water Resources\South Site\Current Drawings\AWH20000 - Pre.dwg, 12/12/2023 1:09:24 PM, Tommy Dabolt

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THE POINT
PHASES 1-10 AND 14

PRELIMINARY PLAT PLANS
EAST YOUNG STREET
TOWN OF ROLESVILLE, WAKE FOREST TOWNSHIP,
WAKE COUNTY, NORTH CAROLINA

REVISIONS

N0.	DATE	
1	04. 09. 2020	REV PER TOWN COMMENTS
2	06. 19. 2020	REV PER MUNICIPAL COMMENTS
3	08. 21. 2020	REV PER MUNICIPAL COMMENTS

PLAN INFORMATION

PROJECT NO.	AWH-20000
FILENAME	AWH-20000 PRE
CHECKED BY	DCW
DRAWN BY	TKD
SCALE	1" = 450'
DATE	08.12.2021

SHEET

PRE DEVELOPMENT
HYDROLOGY MAP

PRE

POST-DEVELOPMENT HYDROLOGIC CALCULATIONS

POST-DEVELOPMENT HYDROLOGY

Curve Numbers

SUB 1 to SCM A

CURVE NUMBER CALCULATIONS

Land Use	HSG	CN	Onsite	Area (ac)	Percent Impervious (%)	Impervious Area (ac)
Open Space, Good Condition	B	61	Yes	2.20	0	0.00
Open Space, Good Condition	D	80	Yes	0.87	0	0.00
Pond	B	100	Yes	0.26	99	0.26
Road	B	98	Yes	1.80	100	1.80
Road	D	98	Yes	0.57	100	0.57
Sidewalk	B	98	Yes	1.28	100	1.28
Sidewalk	D	98	Yes	0.52	100	0.52
Singlefam40	B	84	Yes	1.85	62	1.15
Singlefam40	D	91	Yes	0.16	62	0.10
Singlefam60	B	80	Yes	0.53	50	0.27
Sidewalk	B	98	No	0.02	100	0.02
Sidewalk	D	98	No	0.07	100	0.07
Mixed Use Neighborhood	B	85	No	0.42	65	0.27
Mixed Use Neighborhood	D	92	No	1.81	65	1.18

Onsite Area	**10.03**	**ac**
Onsite Impervious Area	**5.93**	**ac**
Offsite Area	**2.33**	**ac**
Offsite Impervious Area	**1.55**	**ac**
Total Area	**12.35**	**ac**
Total Impervious Area	**7.48**	**ac**
Percent Impervious	**61**	**%**
Composite Curve Number	**86**	

TIME OF CONCENTRATION

Time of concentration is assumed to be 5 minutes.

Time of Concentration =	5.00	minutes
SCS Lag Time =	3.00	minutes (SCS Lag = 0.6* Tc)
Time Increment =	0.87	minutes (= 0.29*SCS Lag)

POST-DEVELOPMENT HYDROLOGY
Curve Numbers
SUB1 to SCM P

CURVE NUMBER CALCULATIONS

Land Use	HSG	CN	Onsite	Area (ac)	Percent Impervious (%)	Impervious Area (ac)
Open Space, Good Condition	A	39	Yes	0.05	0	0.00
Open Space, Good Condition	B	61	Yes	0.04	0	0.00
Open Space, Good Condition	C	74	Yes	0.00	0	0.00
Open Space, Good Condition	D	80	Yes	0.19	0	0.00
Road	D	98	Yes	0.46	100	0.46
Sidewalk	A	98	Yes	0.00	100	0.00
Sidewalk	B	98	Yes	0.00	100	0.00
Sidewalk	C	98	Yes	0.00	100	0.00
Sidewalk	D	98	Yes	0.00	100	0.00

Onsite Area	**0.74**	**ac**
Onsite Impervious Area	**0.47**	**ac**
Offsite Area	**0.00**	**ac**
Offsite Impervious Area	**0.00**	**ac**
Total Area	**0.74**	**ac**
Total Impervious Area	**0.47**	**ac**
Percent Impervious	**63**	**%**
Composite Curve Number	**87**	

TIME OF CONCENTRATION

Time of concentration is assumed to be 5 minutes.

Time of Concentration =	5.00	minutes
SCS Lag Time =	3.00	minutes (SCS Lag = 0.6* Tc)
Time Increment =	0.87	minutes (= 0.29*SCS Lag)

POST-DEVELOPMENT HYDROLOGY

Curve Numbers

SUB1 to SCM B

CURVE NUMBER CALCULATIONS

Land Use	HSG	CN	Onsite	Area (ac)	Percent Impervious (%)	Impervious Area (ac)
Open Space, Good Condition	B	61	Yes	1.65	0	0.00
Open Space, Good Condition	D	80	Yes	1.34	0	0.00
Pond	B	100	Yes	0.13	99	0.13
Pond	D	100	Yes	0.08	100	0.08
Road	B	98	Yes	0.66	100	0.66
Road	D	98	Yes	0.90	100	0.90
Sidewalk	B	98	Yes	0.20	100	0.20
Sidewalk	D	98	Yes	0.24	100	0.24
Townhome 22	B	95	Yes	1.56	91	1.42
Townhome 22	D	96	Yes	1.53	91	1.39
Mixed Use Neighborhood	B	85	No	1.61	65	1.05
Mixed Use Neighborhood	D	92	No	0.32	65	0.21

Onsite Area	**8.29**	**ac**
Onsite Impervious Area	**5.02**	**ac**
Offsite Area	**1.93**	**ac**
Offsite Impervious Area	**1.25**	**ac**
Total Area	**10.22**	**ac**
Total Impervious Area	**6.28**	**ac**
Percent Impervious	**61**	**%**
Composite Curve Number	**87**	

TIME OF CONCENTRATION

Time of concentration is assumed to be 5 minutes.

Time of Concentration =	5.00	minutes
SCS Lag Time =	3.00	minutes (SCS Lag = 0.6* Tc)
Time Increment =	0.87	minutes (= 0.29*SCS Lag)

POST-DEVELOPMENT HYDROLOGY
Curve Numbers
SUB1 to SCM C

CURVE NUMBER CALCULATIONS

Land Use	HSG	CN	Onsite	Area (ac)	Percent Impervious (%)	Impervious Area (ac)
Open Space, Good Condition	B	61	Yes	1.45	0	0.00
Open Space, Good Condition	D	80	Yes	1.18	0	0.00
Pond	B	100	Yes	0.03	99	0.03
Pond	D	100	Yes	0.32	100	0.32
Road	A	98	Yes	0.00	100	0.00
Road	B	98	Yes	1.68	100	1.68
Road	D	98	Yes	0.93	100	0.93
Sidewalk	B	98	Yes	0.51	100	0.51
Sidewalk	D	98	Yes	0.30	100	0.30
Singlefam39	B	85	Yes	2.07	0	0.00
Singlefam39	D	80	Yes	1.83	0	0.00
Singlefam40	B	84	Yes	3.25	62	2.02
Singlefam40	D	91	Yes	0.90	62	0.56
Singlefam60	B	80	Yes	1.00	50	0.50
Singlefam60	D	89	Yes	0.24	50	0.12

Onsite Area	**15.68**	**ac**
Onsite Impervious Area	**6.96**	**ac**
Offsite Area	**0.00**	**ac**
Offsite Impervious Area	**0.00**	**ac**
Total Area	**15.68**	**ac**
Total Impervious Area	**6.96**	**ac**
Percent Impervious	**44**	**%**
Composite Curve Number	**85**	

TIME OF CONCENTRATION

Time of concentration is assumed to be 5 minutes.

Time of Concentration =	5.00	minutes
SCS Lag Time =	3.00	minutes (SCS Lag = 0.6* Tc)
Time Increment =	0.87	minutes (= 0.29*SCS Lag)

POST-DEVELOPMENT HYDROLOGY
Curve Numbers
SUB1 to SCM E

CURVE NUMBER CALCULATIONS

Land Use	HSG	CN	Onsite	Area (ac)	Percent Impervious (%)	Impervious Area (ac)
Open Space, Good Condition	B	61	Yes	1.07	0	0.00
Open Space, Good Condition	D	80	Yes	1.22	0	0.00
Pond	B	100	Yes	0.20	99	0.20
Pond	D	100	Yes	0.35	100	0.35
Road	B	98	Yes	1.37	100	1.37
Road	D	98	Yes	1.48	100	1.48
Sidewalk	B	98	Yes	0.37	100	0.37
Sidewalk	D	98	Yes	0.42	100	0.42
Singlefam39	B	85	Yes	1.32	0	0.00
Singlefam39	D	80	Yes	1.14	0	0.00
Singlefam40	B	84	Yes	2.25	62	1.40
Singlefam40	D	91	Yes	2.36	62	1.47
Singlefam60	B	80	Yes	2.00	50	1.00
Singlefam60	D	89	Yes	1.80	50	0.90

Onsite Area	**17.35**	**ac**
Onsite Impervious Area	**8.95**	**ac**
Offsite Area	**0.00**	**ac**
Offsite Impervious Area	**0.00**	**ac**
Total Area	**17.35**	**ac**
Total Impervious Area	**8.95**	**ac**
Percent Impervious	**52**	**%**
Composite Curve Number	**87**	

TIME OF CONCENTRATION

Time of concentration is assumed to be 5 minutes.

Time of Concentration =	5.00	minutes
SCS Lag Time =	3.00	minutes (SCS Lag = 0.6* Tc)
Time Increment =	0.87	minutes (= 0.29*SCS Lag)

POST-DEVELOPMENT HYDROLOGY

Curve Numbers

SUB1 to SCM D

CURVE NUMBER CALCULATIONS

Land Use	HSG	CN	Onsite	Area (ac)	Percent Impervious (%)	Impervious Area (ac)
Open Space, Good Condition	B	61	Yes	1.62	0	0.00
Open Space, Good Condition	D	80	Yes	0.08	0	0.00
Pond	B	100	Yes	0.45	99	0.44
Road	B	98	Yes	1.65	100	1.65
Road	D	98	Yes	0.07	100	0.07
Sidewalk	B	98	Yes	0.57	100	0.57
Sidewalk	D	98	Yes	0.03	100	0.03
Singlefam60	B	80	Yes	8.33	50	4.17
Singlefam60	D	89	Yes	0.39	50	0.20

Onsite Area	**13.20**	**ac**
Onsite Impervious Area	**7.13**	**ac**
Offsite Area	**0.00**	**ac**
Offsite Impervious Area	**0.00**	**ac**
Total Area	**13.20**	**ac**
Total Impervious Area	**7.13**	**ac**
Percent Impervious	**54**	**%**
Composite Curve Number	**82**	

TIME OF CONCENTRATION

Time of concentration is assumed to be 5 minutes.

Time of Concentration =	5.00	minutes
SCS Lag Time =	3.00	minutes (SCS Lag = 0.6* Tc)
Time Increment =	0.87	minutes (= 0.29*SCS Lag)

POST-DEVELOPMENT HYDROLOGY
Curve Numbers
SUB4 to SCM F

CURVE NUMBER CALCULATIONS

Land Use	HSG	CN	Onsite	Area (ac)	Percent Impervious (%)	Impervious Area (ac)
Open Space, Good Condition	B	61	Yes	1.24	0	0.00
Open Space, Good Condition	D	80	Yes	4.15	0	0.00
Pond	D	100	Yes	0.37	100	0.37
Road	B	98	Yes	1.18	100	1.18
Road	D	98	Yes	1.73	100	1.73
Sidewalk	B	98	Yes	0.31	100	0.31
Sidewalk	D	98	Yes	0.64	100	0.64
Townhome 22	B	95	Yes	0.23	91	0.21
Townhome 22	D	96	Yes	1.30	91	1.18
Singlefam39	B	85	Yes	2.08	0	0.00
Singlefam39	D	80	Yes	0.86	0	0.00
Singlefam40	B	84	Yes	1.97	62	1.22
Singlefam40	D	91	Yes	1.97	62	1.22
Singlefam60	D	89	Yes	0.60	50	0.30

Onsite Area	**18.63**	**ac**
Onsite Impervious Area	**8.36**	**ac**
Offsite Area	**0.00**	**ac**
Offsite Impervious Area	**0.00**	**ac**
Total Area	**18.63**	**ac**
Total Impervious Area	**8.36**	**ac**
Percent Impervious	**45**	**%**
Composite Curve Number	**87**	

TIME OF CONCENTRATION

Time of concentration is assumed to be 5 minutes.

Time of Concentration =	5.00	minutes
SCS Lag Time =	3.00	minutes (SCS Lag = 0.6* Tc)
Time Increment =	0.87	minutes (= 0.29*SCS Lag)

POST-DEVELOPMENT HYDROLOGY
Curve Numbers
SUB4 to SCM G

CURVE NUMBER CALCULATIONS

Land Use	HSG	CN	Onsite	Area (ac)	Percent Impervious (%)	Impervious Area (ac)
Open Space, Good Condition	B	61	Yes	0.92	0	0.00
Open Space, Good Condition	D	80	Yes	2.65	0	0.00
Pond	D	100	Yes	0.36	100	0.36
Road	B	98	Yes	0.71	100	0.71
Road	D	98	Yes	1.60	100	1.60
Sidewalk	B	98	Yes	0.26	100	0.26
Sidewalk	D	98	Yes	0.50	100	0.50
Townhome 22	B	95	Yes	1.30	91	1.18
Townhome 22	D	96	Yes	2.40	91	2.19
Singlefam50	B	83	Yes	0.58	59	0.35
Singlefam50	D	91	Yes	2.38	59	1.40

Onsite Area	**13.66**	**ac**
Onsite Impervious Area	**8.54**	**ac**
Offsite Area	**0.00**	**ac**
Offsite Impervious Area	**0.00**	**ac**
Total Area	**13.66**	**ac**
Total Impervious Area	**8.54**	**ac**
Percent Impervious	**63**	**%**
Composite Curve Number	**90**	

TIME OF CONCENTRATION

Time of concentration is assumed to be 5 minutes.

Time of Concentration =	5.00	minutes
SCS Lag Time =	3.00	minutes (SCS Lag = 0.6* Tc)
Time Increment =	0.87	minutes (= 0.29*SCS Lag)

POST-DEVELOPMENT HYDROLOGY
Curve Numbers
SUB4 to SCM H

CURVE NUMBER CALCULATIONS

Land Use	HSG	CN	Onsite	Area (ac)	Percent Impervious (%)	Impervious Area (ac)
Open Space, Good Condition	C	74	Yes	0.96	0	0.00
Open Space, Good Condition	D	80	Yes	0.94	0	0.00
Pond	D	100	Yes	0.76	100	0.76
Road	C	98	Yes	1.31	100	1.31
Road	D	98	Yes	0.99	100	0.99
Sidewalk	C	98	Yes	0.41	100	0.41
Sidewalk	D	98	Yes	0.27	100	0.27
Singlefam50	C	89	Yes	7.71	59	4.55
Singlefam50	D	91	Yes	2.85	59	1.68
Woods, Good Condition	D	77	Yes	0.22	0	0.00

Onsite Area	**16.40**	**ac**
Onsite Impervious Area	**9.96**	**ac**
Offsite Area	**0.00**	**ac**
Offsite Impervious Area	**0.00**	**ac**
Total Area	**16.40**	**ac**
Total Impervious Area	**9.96**	**ac**
Percent Impervious	**61**	**%**
Composite Curve Number	**90**	

TIME OF CONCENTRATION

Time of concentration is assumed to be 5 minutes.

Time of Concentration =	5.00	minutes
SCS Lag Time =	3.00	minutes (SCS Lag = 0.6* Tc)
Time Increment =	0.87	minutes (= 0.29*SCS Lag)

POST-DEVELOPMENT HYDROLOGY

Curve Numbers

SUB4 to SCM I

CURVE NUMBER CALCULATIONS

Land Use	HSG	CN	Onsite	Area (ac)	Percent Impervious (%)	Impervious Area (ac)
Open Space, Good Condition	A	39	Yes	0.15	0	0.00
Open Space, Good Condition	B	61	Yes	0.04	0	0.00
Open Space, Good Condition	D	80	Yes	1.31	0	0.00
Pond	D	100	Yes	0.18	100	0.18
Road	A	98	Yes	0.26	100	0.26
Road	B	98	Yes	0.08	100	0.08
Road	D	98	Yes	0.77	100	0.77
Sidewalk	A	98	Yes	0.09	100	0.09
Sidewalk	B	98	Yes	0.03	100	0.03
Sidewalk	D	98	Yes	0.27	100	0.27
Singlefam50	A	74	Yes	0.91	59	0.54
Singlefam50	B	83	Yes	0.69	59	0.41
Singlefam50	D	91	Yes	3.58	59	2.11

Onsite Area	**8.37**	**ac**
Onsite Impervious Area	**4.75**	**ac**
Offsite Area	**0.00**	**ac**
Offsite Impervious Area	**0.00**	**ac**
Total Area	**8.37**	**ac**
Total Impervious Area	**4.75**	**ac**
Percent Impervious	**57**	**%**
Composite Curve Number	**87**	

TIME OF CONCENTRATION

Time of concentration is assumed to be 5 minutes.

Time of Concentration =	5.00	minutes
SCS Lag Time =	3.00	minutes (SCS Lag = 0.6* Tc)
Time Increment =	0.87	minutes (= 0.29*SCS Lag)

POST-DEVELOPMENT HYDROLOGY
Curve Numbers
SUB5 to SCM J

CURVE NUMBER CALCULATIONS

Land Use	HSG	CN	Onsite	Area (ac)	Percent Impervious (%)	Impervious Area (ac)
Open Space, Good Condition	A	39	Yes	0.56	0	0.00
Open Space, Good Condition	B	61	Yes	0.64	0	0.00
Open Space, Good Condition	D	80	Yes	2.51	0	0.00
Pond	D	100	Yes	0.31	100	0.31
Road	A	98	Yes	0.20	100	0.20
Road	B	98	Yes	0.42	100	0.42
Road	D	98	Yes	1.68	100	1.68
Sidewalk	A	98	Yes	0.07	100	0.07
Sidewalk	B	98	Yes	0.13	100	0.13
Sidewalk	D	98	Yes	0.54	100	0.54
Townhome 22	B	95	Yes	0.51	91	0.47
Townhome 22	D	96	Yes	1.30	91	1.19
Singlefam50	A	74	Yes	1.08	59	0.64
Singlefam50	B	83	Yes	0.44	59	0.26
Singlefam50	D	91	Yes	3.83	59	2.26

Onsite Area	**14.20**	**ac**
Onsite Impervious Area	**8.14**	**ac**
Offsite Area	**0.00**	**ac**
Offsite Impervious Area	**0.00**	**ac**
Total Area	**14.20**	**ac**
Total Impervious Area	**8.14**	**ac**
Percent Impervious	**57**	**%**
Composite Curve Number	**86**	

TIME OF CONCENTRATION

Time of concentration is assumed to be 5 minutes.

Time of Concentration =	5.00	minutes
SCS Lag Time =	3.00	minutes (SCS Lag = 0.6* Tc)
Time Increment =	0.87	minutes (= 0.29*SCS Lag)

POST-DEVELOPMENT HYDROLOGY
Curve Numbers
SUB6 to SCM K

CURVE NUMBER CALCULATIONS

Land Use	HSG	CN	Onsite	Area (ac)	Percent Impervious (%)	Impervious Area (ac)
Open Space, Good Condition	A	39	Yes	0.15	0	0.00
Open Space, Good Condition	B	61	Yes	0.00	0	0.00
Open Space, Good Condition	D	80	Yes	5.38	0	0.00
Pond	D	100	Yes	0.73	100	0.73
Road	D	98	Yes	1.94	100	1.94
Sidewalk	D	98	Yes	0.53	100	0.53
Townhome 22	A	93	Yes	0.00	91	0.00
Townhome 22	D	96	Yes	4.75	91	4.33
Singlefam50	A	74	Yes	1.08	59	0.64
Singlefam50	B	83	Yes	1.19	59	0.70
Singlefam50	D	91	Yes	0.42	59	0.25

Onsite Area	**16.19**	**ac**
Onsite Impervious Area	**9.12**	**ac**
Offsite Area	**0.00**	**ac**
Offsite Impervious Area	**0.00**	**ac**
Total Area	**16.19**	**ac**
Total Impervious Area	**9.12**	**ac**
Percent Impervious	**56**	**%**
Composite Curve Number	**88**	

TIME OF CONCENTRATION

Time of concentration is assumed to be 5 minutes.

Time of Concentration =	5.00	minutes
SCS Lag Time =	3.00	minutes (SCS Lag = 0.6* Tc)
Time Increment =	0.87	minutes (= 0.29*SCS Lag)

POST-DEVELOPMENT HYDROLOGY

Curve Numbers

SUB 7 to SCM L

CURVE NUMBER CALCULATIONS

Land Use	HSG	CN	Onsite	Area (ac)	Percent Impervious (%)	Impervious Area (ac)
Open Space, Good Condition	A	39	Yes	1.24	0	0.00
Open Space, Good Condition	B	61	Yes	2.96	0	0.00
Open Space, Good Condition	D	80	Yes	0.64	0	0.00
Pond	B	100	Yes	0.37	99	0.37
Pond	D	100	Yes	0.42	100	0.42
Road	A	98	Yes	0.06	100	0.06
Road	B	98	Yes	1.24	100	1.24
Road	D	98	Yes	0.29	100	0.29
Sidewalk	A	98	Yes	0.02	100	0.02
Sidewalk	B	98	Yes	0.36	100	0.36
Sidewalk	D	98	Yes	0.11	100	0.11
Singlefam50	A	74	Yes	0.60	59	0.36
Singlefam50	B	83	Yes	5.41	59	3.19
Singlefam50	D	91	Yes	2.10	59	1.24
Woods, Good Condition	A	30	Yes	0.09	0	0.00
Woods, Good Condition	B	55	Yes	0.11	0	0.00
Woods, Good Condition	D	77	Yes	0.01	0	0.00

Onsite Area	**16.04**	**ac**
Onsite Impervious Area	**7.65**	**ac**
Offsite Area	**0.00**	**ac**
Offsite Impervious Area	**0.00**	**ac**
Total Area	**16.04**	**ac**
Total Impervious Area	**7.65**	**ac**
Percent Impervious	**48**	**%**
Composite Curve Number	**78**	

TIME OF CONCENTRATION

Time of concentration is assumed to be 5 minutes.

Time of Concentration =	5.00	minutes
SCS Lag Time =	3.00	minutes (SCS Lag = 0.6* Tc)
Time Increment =	0.87	minutes (= 0.29*SCS Lag)

POST-DEVELOPMENT HYDROLOGY
Curve Numbers
SUB1 BYPASS

CURVE NUMBER CALCULATIONS

Land Use	HSG	CN	Onsite	Area (ac)	Percent Impervious (%)	Impervious Area (ac)
Open Space, Good Condition	B	61	Yes	12.28	0	0.00
Open Space, Good Condition	D	80	Yes	4.82	0	0.00
Pond	B	100	Yes	0.09	99	0.09
Pond	D	100	Yes	6.80	100	6.80
Road	B	98	Yes	0.18	100	0.18
Sidewalk	B	98	Yes	0.22	100	0.22
Sidewalk	D	98	Yes	0.00	100	0.00
Singlefam60	B	80	Yes	0.30	50	0.15
Singlefam60	D	89	Yes	0.05	50	0.03
Woods, Good Condition	B	55	Yes	3.23	0	0.00
Woods, Good Condition	C	70	Yes	0.03	0	0.00
Woods, Good Condition	D	77	Yes	5.78	0	0.00
Mixed Use Neighborhood	B	85	No	12.22	65	7.94
Mixed Use Neighborhood	C	90	No	1.79	65	1.16
Mixed Use Neighborhood	D	92	No	18.30	65	11.89
Low Density Residential	B	68	No	0.29	20	0.06
Low Density Residential	D	84	No	22.63	20	4.53
Medium Density Residential	B	70	No	1.14	25	0.29
Medium Density Residential	D	85	No	0.08	25	0.02
Right-Of-Way	B	89	No	4.08	90	3.67
Right-Of-Way	D	93	No	3.89	90	3.50
School	B	88	No	17.91	72	12.90
School	D	93	No	69.37	72	49.95

Onsite Area	**33.79**	**ac**
Onsite Impervious Area	**7.47**	**ac**
Offsite Area	**151.71**	**ac**
Offsite Impervious Area	**95.91**	**ac**
Total Area	**185.50**	**ac**
Total Impervious Area	**103.38**	**ac**
Percent Impervious	**56**	**%**
Composite Curve Number	**87**	

TIME OF CONCENTRATION

Time of concentration is calculated using the SCS Segmental Approach (TR-55).

Segment 1: Overland Flow

Length =	100	ft
Top Elev =	426.00	ft
Bot Elev =	425.00	ft
Height =	1	ft
Slope =	0.0100	ft/ft
Manning's n =	0.17	cultivated soils, residue cover
P (2-year/24-hour) =	3.46	inches (Rolesville, NC)
Segment Time =	***13.74***	***minutes***

Segment 2: Concentrated Flow

Length =	2645	ft
Top Elev =	425.00	ft
Bot Elev =	374.00	ft
Height =	51	ft
Slope =	0.0193	ft/ft
Paved ? =	No	
Velocity =	2.24	ft/sec
Segment Time =	***19.68***	***minutes***

Segment 3: Open Water Flow

Length =	580	ft
Top Elev =	374.00	ft
Bot Elev =	372.00	ft
Segment Time =	***0.00***	***minutes***

Segment 4: Channel Flow

Length =	2088	ft
Top Elev =	372.00	ft
Bot Elev =	344.00	ft
Height =	28	ft
Slope =	0.0134	ft/ft
Manning's n =	0.045	natural channel
Flow Area =	15.00	sf (assume 5'w x 3'h channel)
Wetted Perimeter =	11.00	lf (assume 5'w x 3'h channel)
Channel Velocity =	4.72	ft/sec
Segment Time =	***7.38***	***minutes***

Time of Concentration =	40.80	minutes
SCS Lag Time =	24.48	minutes (SCS Lag = 0.6* Tc)
Time Increment =	7.10	minutes (= 0.29*SCS Lag)

POST-DEVELOPMENT HYDROLOGY
Curve Numbers
SUB2

CURVE NUMBER CALCULATIONS

Land Use	HSG	CN	Onsite	Area (ac)	Percent Impervious (%)	Impervious Area (ac)
Open Space, Good Condition	B	61	Yes	1.27	0	0.00
Open Space, Good Condition	D	80	Yes	0.71	0	0.00
Sidewalk	B	98	Yes	0.14	100	0.14
Sidewalk	D	98	Yes	0.07	100	0.07
Woods, Good Condition	B	55	Yes	0.43	0	0.00
Woods, Good Condition	D	77	Yes	1.65	0	0.00
Mixed Use Neighborhood	B	85	No	5.30	65	3.44
Mixed Use Neighborhood	D	92	No	13.37	65	8.69
Low Density Residential	D	84	No	17.96	20	3.59
Right-Of-Way	B	89	No	2.31	90	2.08
Right-Of-Way	D	93	No	11.03	90	9.93

Onsite Area	**4.28**	**ac**
Onsite Impervious Area	**0.22**	**ac**
Offsite Area	**49.97**	**ac**
Offsite Impervious Area	**27.74**	**ac**
Total Area	**54.25**	**ac**
Total Impervious Area	**27.95**	**ac**
Percent Impervious	**52**	**%**
Composite Curve Number	**87**	

TIME OF CONCENTRATION

Time of concentration is calculated using the SCS Segmental Approach (TR-55).

Segment 1: Overland Flow

Length =	100	ft
Top Elev =	427.00	ft
Bot Elev =	426.00	ft
Height =	1	ft
Slope =	0.0100	ft/ft
Manning's n =	0.17	cultivated soils, residue cover
P (2-year/24-hour) =	3.46	inches (Rolesville, NC)
Segment Time =	***13.74***	***minutes***

Segment 2: Concentrated Flow

Length =	2541	ft
Top Elev =	426.00	ft
Bot Elev =	368.00	ft
Height =	58	ft
Slope =	0.0228	ft/ft
Paved ? =	No	
Velocity =	2.44	ft/sec
Segment Time =	***17.37***	***minutes***

Time of Concentration =	31.12	minutes
SCS Lag Time =	18.67	minutes (SCS Lag = 0.6* Tc)
Time Increment =	5.41	minutes (= 0.29*SCS Lag)

POST-DEVELOPMENT HYDROLOGY
Curve Numbers
SUB3

CURVE NUMBER CALCULATIONS

Land Use	HSG	CN	Onsite	Area (ac)	Percent Impervious (%)	Impervious Area (ac)
Open Space, Good Condition	C	74	Yes	0.23	0	0.00
Open Space, Good Condition	D	80	Yes	0.76	0	0.00
Singlefam50	D	91	Yes	0.02	59	0.01
Woods, Good Condition	C	70	Yes	0.23	0	0.00
Woods, Good Condition	D	77	Yes	4.14	0	0.00

Onsite Area	**5.38**	**ac**
Onsite Impervious Area	**0.01**	**ac**
Offsite Area	**0.00**	**ac**
Offsite Impervious Area	**0.00**	**ac**
Total Area	**5.38**	**ac**
Total Impervious Area	**0.01**	**ac**
Percent Impervious	**0**	**%**
Composite Curve Number	**77**	

TIME OF CONCENTRATION

Time of concentration is calculated using the SCS Segmental Approach (TR-55).

Segment 1: Overland Flow

Length =	100	ft
Top Elev =	362.00	ft
Bot Elev =	357.00	ft
Height =	5	ft
Slope =	0.0500	ft/ft
Manning's n =	0.24	dense grasses
P (2-year/24-hour) =	3.46	inches (Rolesville, NC)
Segment Time =	***9.51***	***minutes***

Segment 2: Concentrated Flow

Length =	160	ft
Top Elev =	357.00	ft
Bot Elev =	341.00	ft
Height =	16	ft
Slope =	0.1000	ft/ft
Paved ? =	No	
Velocity =	5.10	ft/sec
Segment Time =	***0.52***	***minutes***

Segment 3: Channel Flow

Length =	476	ft
Top Elev =	341.00	ft
Bot Elev =	333.00	ft
Height =	8	ft
Slope =	0.0168	ft/ft
Manning's n =	0.045	natural channel
Flow Area =	15.00	sf (assume 5'w x 3'h channel)
Wetted Perimeter =	11.00	lf (assume 5'w x 3'h channel)
Channel Velocity =	5.28	ft/sec
Segment Time =	***1.50***	***minutes***

Time of Concentration =	11.54	minutes
SCS Lag Time =	6.92	minutes (SCS Lag = 0.6* Tc)
Time Increment =	2.01	minutes (= 0.29*SCS Lag)

POST-DEVELOPMENT HYDROLOGY
Curve Numbers
SUB4 BYPASS

CURVE NUMBER CALCULATIONS

Land Use	HSG	CN	Onsite	Area (ac)	Percent Impervious (%)	Impervious Area (ac)
Open Space, Good Condition	A	39	Yes	0.00	0	0.00
Open Space, Good Condition	B	61	Yes	0.00	0	0.00
Open Space, Good Condition	C	74	Yes	1.50	0	0.00
Open Space, Good Condition	D	80	Yes	4.88	0	0.00
Singlefam50	C	89	Yes	0.00	59	0.00
Singlefam60	D	89	Yes	0.02	50	0.01
Woods, Good Condition	C	70	Yes	1.79	0	0.00
Woods, Good Condition	D	77	Yes	9.53	0	0.00
Mixed Use Neighborhood	B	85	No	1.78	65	1.16
Mixed Use Neighborhood	C	90	No	1.04	65	0.68
Mixed Use Neighborhood	D	92	No	8.00	65	5.20

Onsite Area	**17.72**	**ac**
Onsite Impervious Area	**0.01**	**ac**
Offsite Area	**10.83**	**ac**
Offsite Impervious Area	**7.04**	**ac**
Total Area	**28.55**	**ac**
Total Impervious Area	**7.05**	**ac**
Percent Impervious	**25**	**%**
Composite Curve Number	**82**	

TIME OF CONCENTRATION

Time of concentration is calculated using the SCS Segmental Approach (TR-55).

Segment 1: Overland Flow

Length =	100	ft
Top Elev =	394.00	ft
Bot Elev =	392.00	ft
Height =	2	ft
Slope =	0.0200	ft/ft
Manning's n =	0.17	cultivated soils, residue cover
P (2-year/24-hour) =	3.46	inches (Rolesville, NC)
Segment Time =	***10.41***	***minutes***

Segment 2: Concentrated Flow

Length =	1223	ft
Top Elev =	392.00	ft
Bot Elev =	341.00	ft
Height =	51	ft
Slope =	0.0417	ft/ft
Paved ? =	No	
Velocity =	3.29	ft/sec
Segment Time =	***6.19***	***minutes***

Segment 3: Channel Flow

Length =	2660	ft
Top Elev =	341.00	ft
Bot Elev =	302.00	ft
Height =	39	ft
Slope =	0.0147	ft/ft
Manning's n =	0.045	natural channel
Flow Area =	15.00	sf (assume 5'w x 3'h channel)
Wetted Perimeter =	11.00	lf (assume 5'w x 3'h channel)
Channel Velocity =	4.93	ft/sec
Segment Time =	***8.99***	***minutes***

Time of Concentration =	25.59	minutes
SCS Lag Time =	15.36	minutes (SCS Lag = 0.6* Tc)
Time Increment =	4.45	minutes (= 0.29*SCS Lag)

CURVE NUMBER CALCULATIONS

Land Use	HSG	CN	Onsite	Area (ac)	Percent Impervious (%)	Impervious Area (ac)
Open Space, Good Condition	A	39	Yes	0.43	0	0.00
Open Space, Good Condition	B	61	Yes	2.06	0	0.00
Open Space, Good Condition	D	80	Yes	9.69	0	0.00
Sidewalk	A	98	Yes	0.02	100	0.02
Sidewalk	B	98	Yes	0.26	100	0.26
Sidewalk	D	98	Yes	0.86	100	0.86
Townhome 22	D	96	Yes	0.03	91	0.03
Woods, Good Condition	B	55	Yes	0.03	0	0.00
Woods, Good Condition	D	77	Yes	6.25	0	0.00
Open Space, Good Condition	B	61	No	9.58	0	0.00
Open Space, Good Condition	D	80	No	9.24	0	0.00
Mixed Use Neighborhood	B	85	No	6.75	65	4.39
Mixed Use Neighborhood	D	92	No	15.53	65	10.09
Low Density Residential	B	68	No	0.92	20	0.18
Low Density Residential	D	84	No	1.85	20	0.37
Medium Density Residential	A	54	No	0.01	25	0.00
Medium Density Residential	B	70	No	47.92	25	11.98
Medium Density Residential	D	85	No	42.98	25	10.74
High Density Residential	B	72	No	70.82	30	21.24
High Density Residential	D	86	No	51.45	30	15.43
Right-Of-Way	A	83	No	0.76	90	0.68
Right-Of-Way	B	89	No	23.84	90	21.46
Right-Of-Way	D	93	No	31.95	90	28.75
School	B	88	No	0.47	72	0.34
School	D	93	No	7.11	72	5.12
Preserved Open	A	39	No	0.39	0	0.00
Preserved Open	B	61	No	4.48	0	0.00
Preserved Open	D	80	No	34.04	0	0.00
Woods, Good Condition	B	55	No	3.27	0	0.00
Woods, Good Condition	D	77	No	23.30	0	0.00
Business Park	A	89	No	0.01	85	0.01
Business Park	B	92	No	0.02	85	0.02
Business Park	D	95	No	0.03	85	0.03
Commercial	D	95	No	1.01	85	0.86
Town Center	B	92	No	6.53	85	5.55
Town Center	C	94	No	0.00	85	0.00
Town Center	D	95	No	1.74	85	1.48

Onsite Area	**19.63**	**ac**
Onsite Impervious Area	**1.16**	**ac**
Offsite Area	**395.98**	**ac**
Offsite Impervious Area	**138.72**	**ac**
Total Area	**415.61**	**ac**
Total Impervious Area	**139.88**	**ac**
Percent Impervious	**34**	**%**
Composite Curve Number	**80**	

POST-DEVELOPMENT HYDROLOGY
Curve Numbers
SUB5 BYPASS

TIME OF CONCENTRATION

Time of concentration is calculated using the SCS Segmental Approach (TR-55).

Segment 1: Overland Flow

Length =	100	ft
Top Elev =	440.00	ft
Bot Elev =	438.00	ft
Height =	2	ft
Slope =	0.0200	ft/ft
Manning's n =	0.24	dense grasses
P (2-year/24-hour) =	3.46	inches (Rolesville, NC)
Segment Time =	***13.72***	***minutes***

Segment 2: Concentrated Flow

Length =	2989	ft
Top Elev =	438.00	ft
Bot Elev =	372.00	ft
Height =	66	ft
Slope =	0.0221	ft/ft
Paved ? =	No	
Velocity =	2.40	ft/sec
Segment Time =	***20.78***	***minutes***

Segment 3: Open Water Flow

Length =	655	ft
Top Elev =	372.00	ft
Bot Elev =	372.00	ft
Segment Time =	***0.00***	***minutes***

Segment 4: Concentrated Flow

Length =	2379	ft
Top Elev =	372.00	ft
Bot Elev =	320.00	ft
Height =	52	ft
Slope =	0.0219	ft/ft
Paved ? =	No	
Velocity =	2.39	ft/sec
Segment Time =	***16.62***	***minutes***

Segment 5: Channel Flow

Length =	3029	ft
Top Elev =	320.00	ft
Bot Elev =	292.00	ft
Height =	28	ft
Slope =	0.0092	ft/ft
Manning's n =	0.045	natural channel
Flow Area =	32.00	sf (assume 8'w x 4'h channel)
Wetted Perimeter =	16.00	lf (assume 8'w x 4'h channel)
Channel Velocity =	5.05	ft/sec
Segment Time =	***9.99***	***minutes***

Time of Concentration =	61.11	minutes
SCS Lag Time =	36.67	minutes (SCS Lag = 0.6* Tc)
Time Increment =	10.63	minutes (= 0.29*SCS Lag)

POST-DEVELOPMENT HYDROLOGY
Curve Numbers
SUB6 BYPASS

CURVE NUMBER CALCULATIONS

Land Use	HSG	CN	Onsite	Area (ac)	Percent Impervious (%)	Impervious Area (ac)
Open Space, Good Condition	D	80	Yes	1.69	0	0.00
Road	D	98	Yes	0.01	100	0.01
Sidewalk	D	98	Yes	0.14	100	0.14
Townhome 22	D	96	Yes	0.04	91	0.04
Woods, Good Condition	D	77	Yes	0.23	0	0.00

Onsite Area	**2.11**	**ac**
Onsite Impervious Area	**0.19**	**ac**
Offsite Area	**0.00**	**ac**
Offsite Impervious Area	**0.00**	**ac**
Total Area	**2.11**	**ac**
Total Impervious Area	**0.19**	**ac**
Percent Impervious	**9**	**%**
Composite Curve Number	**81**	

TIME OF CONCENTRATION

Time of concentration is assumed to be 5 minutes.

Time of Concentration =	5.00	minutes
SCS Lag Time =	3.00	minutes (SCS Lag = 0.6* Tc)
Time Increment =	0.87	minutes (= 0.29*SCS Lag)

CURVE NUMBER CALCULATIONS

Land Use	HSG	CN	Onsite	Area (ac)	Percent Impervious (%)	Impervious Area (ac)
Open Space, Good Condition	A	39	Yes	0.01	0	0.00
Open Space, Good Condition	B	61	Yes	0.10	0	0.00
Open Space, Good Condition	D	80	Yes	0.63	0	0.00
Woods, Good Condition	A	30	Yes	0.05	0	0.00
Woods, Good Condition	B	55	Yes	0.17	0	0.00
Woods, Good Condition	D	77	Yes	1.16	0	0.00

Onsite Area	**2.12**	**ac**
Onsite Impervious Area	**0.00**	**ac**
Offsite Area	**0.00**	**ac**
Offsite Impervious Area	**0.00**	**ac**
Total Area	**2.12**	**ac**
Total Impervious Area	**0.00**	**ac**
Percent Impervious	**0**	**%**
Composite Curve Number	**74**	

TIME OF CONCENTRATION

Time of concentration is calculated using the SCS Segmental Approach (TR-55).

Segment 1: Overland Flow

Length =	100	ft
Top Elev =	352.00	ft
Bot Elev =	345.00	ft
Height =	7	ft
Slope =	0.0700	ft/ft
Manning's n =	0.24	dense grasses
P (2-year/24-hour) =	3.46	inches (Rolesville, NC)
Segment Time =	***8.31***	***minutes***

Segment 2: Concentrated Flow

Length =	115	ft
Top Elev =	345.00	ft
Bot Elev =	324.00	ft
Height =	21	ft
Slope =	0.1826	ft/ft
Paved ? =	No	
Velocity =	6.89	ft/sec
Segment Time =	***0.28***	***minutes***

Time of Concentration =	8.59	minutes
SCS Lag Time =	5.16	minutes (SCS Lag = 0.6* Tc)
Time Increment =	1.50	minutes (= 0.29*SCS Lag)

POST-DEVELOPMENT HYDROLOGY
Curve Numbers
SUB8

CURVE NUMBER CALCULATIONS

Land Use	HSG	CN	Onsite	Area (ac)	Percent Impervious (%)	Impervious Area (ac)
Open Space, Good Condition	A	39	Yes	0.25	0	0.00
Open Space, Good Condition	B	61	Yes	0.94	0	0.00
Open Space, Good Condition	D	80	Yes	0.10	0	0.00
Sidewalk	A	98	Yes	0.03	100	0.03
Sidewalk	B	98	Yes	0.13	100	0.13
Sidewalk	D	98	Yes	0.02	100	0.02
Woods, Good Condition	A	30	Yes	0.02	0	0.00
Woods, Good Condition	B	55	Yes	0.56	0	0.00
Woods, Good Condition	D	77	Yes	0.08	0	0.00

Onsite Area	**2.13**	**ac**
Onsite Impervious Area	**0.18**	**ac**
Offsite Area	**0.00**	**ac**
Offsite Impervious Area	**0.00**	**ac**
Total Area	**2.13**	**ac**
Total Impervious Area	**0.18**	**ac**
Percent Impervious	**9**	**%**
Composite Curve Number	**61**	

TIME OF CONCENTRATION

Time of concentration is calculated using the SCS Segmental Approach (TR-55).

Segment 1: Overland Flow

Length =	37	ft
Top Elev =	398.00	ft
Bot Elev =	396.00	ft
Height =	2	ft
Slope =	0.0541	ft/ft
Manning's n =	0.24	dense grasses
P (2-year/24-hour) =	3.46	inches (Rolesville, NC)
Segment Time =	***4.16***	***minutes***

Segment 2: Concentrated Flow

Length =	575	ft
Top Elev =	396.00	ft
Bot Elev =	365.00	ft
Height =	31	ft
Slope =	0.0539	ft/ft
Paved ? =	No	
Velocity =	3.75	ft/sec
Segment Time =	***2.56***	***minutes***

Time of Concentration =	6.72	minutes
SCS Lag Time =	4.03	minutes (SCS Lag = 0.6* Tc)
Time Increment =	1.17	minutes (= 0.29*SCS Lag)

POST-DEVELOPMENT HYDROLOGY
Curve Numbers
Reach Data

REACH DATA

Reach #1 - POA 1 to POA 4

Segment 1: Concentrated Flow

Length =	2988	ft
Top Elev =	344.00	ft
Bot Elev =	302.00	ft
Height =	42	ft
Slope =	0.0141	ft/ft
Manning's n =	0.045	natural channel
Flow Area =	10.00	sf (assume 5'w x 2'h channel)
Wetted Perimeter =	9.00	lf (assume 5'w x 2'h channel)
Channel Velocity =	4.21	ft/sec
Reach Travel Time =	***11.83***	***minutes***

Total Travel Time = 11.83 minutes

Reach #2 - SCM A TO POA 1

Segment 1: Concentrated Flow			***Segment 2: Channel Flow***		
Length =	647	ft	Length =	2038	ft
Top Elev =	377.00	ft	Top Elev =	368.00	ft
Bot Elev =	368.00	ft	Bot Elev =	344.00	ft
Height =	9	ft	Height =	24	ft
Slope =	0.0139	ft/ft	Slope =	0.0118	ft/ft
Paved ? =	No		Manning's n =	0.045	natural channel
Velocity =	1.90	ft/sec	Flow Area =	12.00	sf (assume 6'w x 2'h channel)
			Wetted Perimeter =	10.00	lf (assume 6'w x 2'h channel)
			Channel Velocity =	4.06	ft/sec
Segment Time =	***5.67***	***minutes***	***Reach Travel Time =***	***8.37***	***minutes***

Total Travel Time = 14.04 minutes

Reach #3 - SCM C TO POA 1

Segment 1: Concentrated Flow			***Segment 2: Channel Flow***		
Length =	83	ft	Length =	1220	ft
Top Elev =	370.00	ft	Top Elev =	366.00	ft
Bot Elev =	366.00	ft	Bot Elev =	344.00	ft
Height =	4	ft	Height =	22	ft
Slope =	0.0482	ft/ft	Slope =	0.0180	ft/ft
Paved ? =	No		Manning's n =	0.045	natural channel
Velocity =	3.54	ft/sec	Flow Area =	8.00	sf (assume 4'w x 2'h channel)
			Wetted Perimeter =	8.00	lf (assume 4'w x 2'h channel)
			Channel Velocity =	4.45	ft/sec
Segment Time =	***0.39***	***minutes***	***Reach Travel Time =***	***4.57***	***minutes***

Total Travel Time = 4.96 minutes

Reach #4 - SCM F TO POA 4

Segment 1: Concentrated Flow			***Segment 2: Channel Flow***		
Length =	77	ft	Length =	2292	ft
Top Elev =	339.00	ft	Top Elev =	336.00	ft
Bot Elev =	336.00	ft	Bot Elev =	302.00	ft
Height =	3	ft	Height =	34	ft
Slope =	0.0390	ft/ft	Slope =	0.0148	ft/ft
Paved ? =	No		Manning's n =	0.045	natural channel
Velocity =	3.18	ft/sec	Flow Area =	10.00	sf (assume 5'w x 2'h channel)
			Wetted Perimeter =	9.00	lf (assume 5'w x 2'h channel)
			Channel Velocity =	4.33	ft/sec
Segment Time =	***0.40***	***minutes***	***Reach Travel Time =***	***8.83***	***minutes***

Total Travel Time = 9.23 minutes

Reach #5 - SCM B TO POA 1

Segment 1: Concentrated Flow			***Segment 2: Channel Flow***		
Length =	161	ft	Length =	1850	ft
Top Elev =	375.00	ft	Top Elev =	363.00	ft
Bot Elev =	363.00	ft	Bot Elev =	344.00	ft
Height =	12	ft	Height =	19	ft
Slope =	0.0745	ft/ft	Slope =	0.0103	ft/ft
Paved ? =	No		Manning's n =	0.045	natural channel
Velocity =	4.40	ft/sec	Flow Area =	12.00	sf (assume 6'w x 2'h channel)
			Wetted Perimeter =	10.00	lf (assume 6'w x 2'h channel)
			Channel Velocity =	3.79	ft/sec
Segment Time =	***0.61***	***minutes***	***Reach Travel Time =***	***8.14***	***minutes***

Total Travel Time = 8.75 minutes

Reach #6 - SCM G TO POA 4

Segment 1: Concentrated Flow			*Segment 2: Channel Flow*		
Length =	75	ft	Length =	1566	ft
Top Elev =	338.00	ft	Top Elev =	337.00	ft
Bot Elev =	337.00	ft	Bot Elev =	303.00	ft
Height =	1	ft	Height =	34	ft
Slope =	0.0133	ft/ft	Slope =	0.0217	ft/ft
Paved ? =	No		Manning's n =	0.045	natural channel
Velocity =	1.86	ft/sec	Flow Area =	12.00	sf (assume 6'w x 2'h channel)
			Wetted Perimeter =	10.00	lf (assume 6'w x 2'h channel)
			Channel Velocity =	5.51	ft/sec
Segment Time =	***0.67***	***minutes***	***Reach Travel Time =***	***4.74***	***minutes***

Total Travel Time = 5.41 minutes

Reach #7 - SCM H TO POA 4

Segment 1: Concentrated Flow			*Segment 2: Channel Flow*		
Length =	482	ft	Length =	1567	ft
Top Elev =	374.00	ft	Top Elev =	361.00	ft
Bot Elev =	361.00	ft	Bot Elev =	344.00	ft
Height =	13	ft	Height =	17	ft
Slope =	0.0270	ft/ft	Slope =	0.0108	ft/ft
Paved ? =	No		Manning's n =	0.045	natural channel
Velocity =	2.65	ft/sec	Flow Area =	12.00	sf (assume 6'w x 2'h channel)
			Wetted Perimeter =	10.00	lf (assume 6'w x 2'h channel)
			Channel Velocity =	3.89	ft/sec
Segment Time =	***3.03***	***minutes***	***Reach Travel Time =***	***6.71***	***minutes***

Total Travel Time = 9.74 minutes

Reach #8 - SCM I TO POA 4

Segment 1: Concentrated Flow			*Segment 2: Channel Flow*		
Length =	482	ft	Length =	805	ft
Top Elev =	308.00	ft	Top Elev =	296.00	ft
Bot Elev =	296.00	ft	Bot Elev =	292.00	ft
Height =	12	ft	Height =	4	ft
Slope =	0.0249	ft/ft	Slope =	0.0050	ft/ft
Paved ? =	No		Manning's n =	0.045	natural channel
Velocity =	2.55	ft/sec	Flow Area =	12.00	sf (assume 6'w x 2'h channel)
			Wetted Perimeter =	10.00	lf (assume 6'w x 2'h channel)
			Channel Velocity =	2.64	ft/sec
Segment Time =	***3.16***	***minutes***	***Reach Travel Time =***	***5.09***	***minutes***

Total Travel Time = 8.25 minutes

Reach #9 - CULVERT TO POA 5

Segment 1: Channel Flow		
Length =	650	ft
Top Elev =	296.00	ft
Bot Elev =	291.00	ft
Height =	5	ft
Slope =	0.0077	ft/ft
Manning's n =	0.045	natural channel
Flow Area =	12.00	sf (assume 6'w x 2'h channel)
Wetted Perimeter =	10.00	lf (assume 6'w x 2'h channel)
Channel Velocity =	3.28	ft/sec
Reach Travel Time =	***3.30***	***minutes***

Total Travel Time = 3.30 minutes

Reach #10 - POA 5 TO POA 6

Segment 1: Channel Flow		
Length =	822	ft
Top Elev =	291.00	ft
Bot Elev =	288.00	ft
Height =	3	ft
Slope =	0.0036	ft/ft
Manning's n =	0.045	natural channel
Flow Area =	12.00	sf (assume 6'w x 2'h channel)
Wetted Perimeter =	10.00	lf (assume 6'w x 2'h channel)
Channel Velocity =	2.26	ft/sec
Reach Travel Time =	***6.07***	***minutes***

Total Travel Time = 6.07 minutes

Reach #11 - POA 4 TO POA 6

Segment 1: Channel Flow

Length =	883	ft
Top Elev =	292.00	ft
Bot Elev =	288.00	ft
Height =	4	ft
Slope =	0.0045	ft/ft
Manning's n =	0.045	natural channel
Flow Area =	12.00	sf (assume 6'w x 2'h channel)
Wetted Perimeter =	10.00	lf (assume 6'w x 2'h channel)
Channel Velocity =	2.52	ft/sec
Reach Travel Time =	*5.85*	*minutes*

Total Travel Time = 5.85 minutes

Reach #12 - SCM L TO POA 7

Segment 1: Concentrated Flow

Length =	85	ft
Top Elev =	338.00	ft
Bot Elev =	327.00	ft
Height =	11	ft
Slope =	0.1294	ft/ft
Paved ? =	No	
Velocity =	5.80	ft/sec
Segment Time =	***0.24***	***minutes***

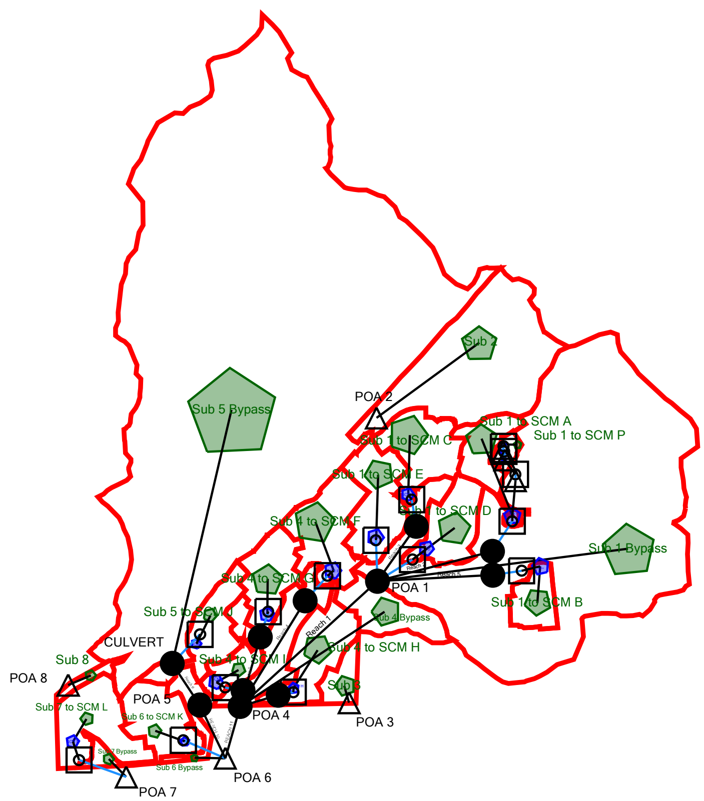
Segment 2: Channel Flow

Length =	68	ft
Top Elev =	327.00	ft
Bot Elev =	324.00	ft
Height =	3	ft
Slope =	0.0441	ft/ft
Manning's n =	0.045	natural channel
Flow Area =	12.00	sf (assume 6'w x 2'h channel)
Wetted Perimeter =	10.00	lf (assume 6'w x 2'h channel)
Channel Velocity =	7.85	ft/sec
Reach Travel Time =	*0.14*	*minutes*

Total Travel Time = 0.39 minutes

MCADAMS

Scenario: Post-Dev 1 yr



MCADAMS

FlexTable: Catchment Table (AWH20000-Master.ppc)

Current Time: 0.00 min

Label	Area (ft^2)	SCS CN	Time of Concentration (min)	Notes
Sub 5 Bypass	18,106,649.00	80.0	61.11	POST
Sub 2	2,363,457.00	87.0	31.12	POST
Sub 1 Bypass	8,081,866.00	87.0	40.80	POST
Sub 1 to SCM B	445,000.00	87.0	5.00	POST
Sub 1 to SCM A	538,121.00	86.0	5.00	POST
Sub 1 to SCM D	574,908.00	82.0	5.00	POST
Sub 1 to SCM C	683,139.00	86.0	5.00	POST
Sub 1 to SCM E	755,874.00	87.0	5.00	POST
Sub 4 to SCM F	811,326.00	87.0	5.00	POST
Sub 4 to SCM H	714,539.00	90.0	5.00	POST
Sub 4 Bypass	1,243,502.00	82.0	25.59	POST
Sub 4 to SCM G	595,088.00	90.0	5.00	POST
Sub 5 to SCM J	618,668.00	86.0	5.00	POST
Sub 4 to SCM I	364,616.00	87.0	5.00	POST
Sub 6 to SCM K	705,046.00	88.0	5.00	POST
Sub 7 to SCM L	698,883.00	78.0	5.00	POST
Sub 7 Bypass	92,480.00	74.0	8.59	POST
Sub 8	92,863.00	61.0	6.72	POST
Sub 1 to SCM P	32,425.00	87.0	5.00	POST
Sub 6 Bypass	92,122.00	81.0	5.00	POST

Catchments Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (min)	Peak Flow (ft³/s)
Sub 1 Bypass	Post-Dev 10 yr	10	55.470	745.00	407.2
Sub 1 to SCM A	Post-Dev 10 yr	10	3.622	721.00	65.5
Sub 1 to SCM B	Post-Dev 10 yr	10	3.081	721.00	55.5
Sub 1 to SCM C	Post-Dev 10 yr	10	4.598	721.00	83.2
Sub 1 to SCM D	Post-Dev 10 yr	10	3.441	721.00	62.8
Sub 1 to SCM E	Post-Dev 10 yr	10	5.234	721.00	94.4
Sub 1 to SCM P	Post-Dev 10 yr	10	0.225	721.00	4.0
Sub 2	Post-Dev 10 yr	10	16.259	738.00	138.6
Sub 3	Post-Dev 10 yr	10	1.195	726.00	16.6
Sub 4 Bypass	Post-Dev 10 yr	10	7.401	734.00	70.7
Sub 4 to SCM F	Post-Dev 10 yr	10	5.618	721.00	101.3
Sub 4 to SCM G	Post-Dev 10 yr	10	4.474	721.00	79.4
Sub 4 to SCM H	Post-Dev 10 yr	10	5.372	721.00	95.4
Sub 4 to SCM I	Post-Dev 10 yr	10	2.525	721.00	45.5
Sub 5 Bypass	Post-Dev 10 yr	10	100.289	758.00	596.8
Sub 5 to SCM J	Post-Dev 10 yr	10	4.164	721.00	75.4
Sub 6 Bypass	Post-Dev 10 yr	10	0.535	721.00	9.8
Sub 6 to SCM K	Post-Dev 10 yr	10	5.020	721.00	90.1
Sub 7 Bypass	Post-Dev 10 yr	10	0.426	724.00	6.5
Sub 7 to SCM L	Post-Dev 10 yr	10	3.688	721.00	67.2
Sub 8	Post-Dev 10 yr	10	0.249	723.00	3.7

Node Summary

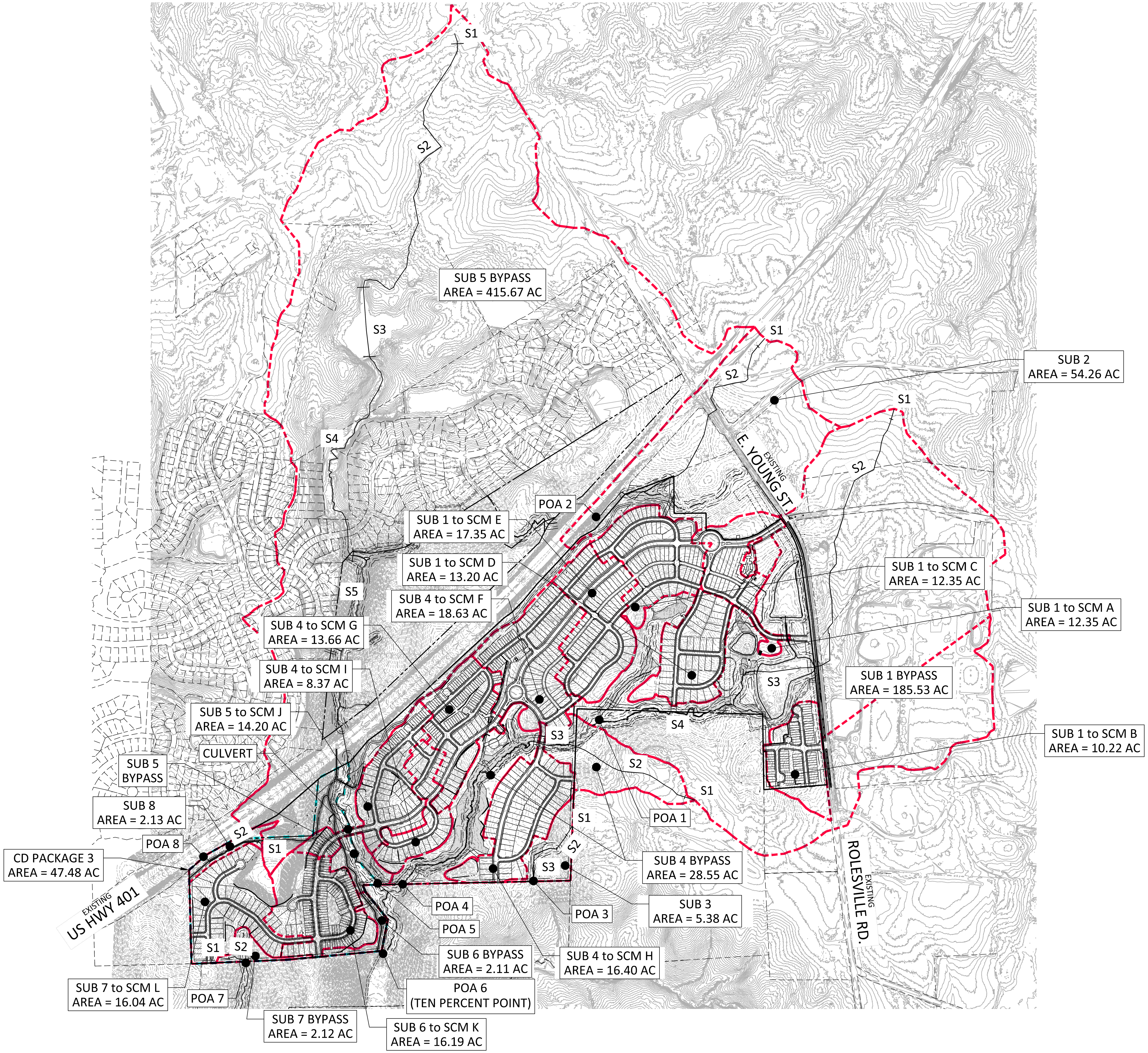
Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (min)	Peak Flow (ft³/s)
	Post-Dev 10 yr	10	2.205	728.00	28.8
	Post-Dev 10 yr	10	3.010	730.00	24.2
	Post-Dev 10 yr	10	3.738	726.00	51.5
	Post-Dev 10 yr	10	4.686	725.00	73.1
	Post-Dev 10 yr	10	3.287	729.00	37.1
	Post-Dev 10 yr	10	1.478	730.00	16.5
	Post-Dev 10 yr	10	2.665	734.00	19.7
CULVERT	Post-Dev 10 yr	10	103.144	758.00	611.7
POA 1	Post-Dev 10 yr	10	70.939	743.00	514.0
POA 2	Post-Dev 10 yr	10	16.259	738.00	138.6
POA 3	Post-Dev 10 yr	10	1.195	726.00	16.6
POA 4	Post-Dev 10 yr	10	90.143	753.00	636.3
POA 5	Post-Dev 10 yr	10	103.033	761.00	611.7
POA 6	Post-Dev 10 yr	10	195.937	763.00	1,231.6
POA 7	Post-Dev 10 yr	10	2.441	753.00	8.6
POA 8	Post-Dev 10 yr	10	0.249	723.00	3.7

Pond Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (min)	Peak Flow (ft³/s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ac-ft)
SCM A (IN)	Post-Dev 10 yr	10	3.669	721.00	65.5	(N/A)	(N/A)

Pond Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (min)	Peak Flow (ft³/s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ac-ft)
SCM A (OUT)	Post-Dev 10 yr	10	3.010	730.00	24.2	384.19	1.488
SCM B (IN)	Post-Dev 10 yr	10	3.081	721.00	55.5	(N/A)	(N/A)
SCM B (OUT)	Post-Dev 10 yr	10	2.205	728.00	28.8	377.88	1.176
SCM C (IN)	Post-Dev 10 yr	10	4.598	721.00	83.2	(N/A)	(N/A)
SCM C (OUT)	Post-Dev 10 yr	10	3.738	726.00	51.5	379.49	1.405
SCM D (IN)	Post-Dev 10 yr	10	3.441	721.00	62.8	(N/A)	(N/A)
SCM D (OUT)	Post-Dev 10 yr	10	2.382	783.00	3.9	357.55	2.006
SCM E (IN)	Post-Dev 10 yr	10	5.234	721.00	94.4	(N/A)	(N/A)
SCM E (OUT)	Post-Dev 10 yr	10	4.166	731.00	29.2	358.69	2.112
SCM F (IN)	Post-Dev 10 yr	10	5.618	721.00	101.3	(N/A)	(N/A)
SCM F (OUT)	Post-Dev 10 yr	10	4.686	725.00	73.1	347.79	1.625
SCM G (IN)	Post-Dev 10 yr	10	4.474	721.00	79.4	(N/A)	(N/A)
SCM G (OUT)	Post-Dev 10 yr	10	2.665	734.00	19.7	344.41	2.160
SCM H (IN)	Post-Dev 10 yr	10	5.372	721.00	95.4	(N/A)	(N/A)
SCM H (OUT)	Post-Dev 10 yr	10	3.287	729.00	37.1	334.37	2.463
SCM I (IN)	Post-Dev 10 yr	10	2.525	721.00	45.5	(N/A)	(N/A)
SCM I (OUT)	Post-Dev 10 yr	10	1.478	730.00	16.5	322.28	1.134
SCM J (IN)	Post-Dev 10 yr	10	4.164	721.00	75.4	(N/A)	(N/A)
SCM J (OUT)	Post-Dev 10 yr	10	2.855	732.00	21.0	314.19	1.851
SCM K (IN)	Post-Dev 10 yr	10	5.020	721.00	90.1	(N/A)	(N/A)
SCM K (OUT)	Post-Dev 10 yr	10	2.635	761.00	7.2	303.40	3.036
SCM L (IN)	Post-Dev 10 yr	10	3.688	721.00	67.2	(N/A)	(N/A)
SCM L (OUT)	Post-Dev 10 yr	10	2.016	757.00	6.8	343.71	2.036
SCM P (1) (IN)	Post-Dev 10 yr	10	0.090	725.00	3.1	(N/A)	(N/A)
SCM P (1) (OUT)	Post-Dev 10 yr	10	0.047	734.00	1.3	400.59	0.037
SCM P (2) (IN)	Post-Dev 10 yr	10	0.185	722.00	3.9	(N/A)	(N/A)
SCM P (2) (OUT)	Post-Dev 10 yr	10	0.090	725.00	3.1	402.06	0.046
SCM P (3) (IN)	Post-Dev 10 yr	10	0.225	721.00	4.0	(N/A)	(N/A)
SCM P (3) (OUT)	Post-Dev 10 yr	10	0.185	722.00	3.9	403.06	0.010



N
GRAPHIC SCALE
0 225 450 900
1 inch = 450 ft.

FINAL DRAWING - NOT RELEASED FOR CONSTRUCTION

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THE POINT
PHASES 8 AND 14

CONSTRUCTION DRAWINGS - PACKAGE 3
EAST YOUNG STREET
TOWN OF ROLESVILLE, WAKE FOREST TOWNSHIP,
WAKE COUNTY, NORTH CAROLINA

CID-24-01

REVISIONS

NO.	DATE	
1	03. 01. 2024	RESPOND TO MUNICIPAL COMMENTS

PLAN INFORMATION

PROJECT NO.	AWH-20000
FILENAME	XXXXXXXX-S1
CHECKED BY	DCW
DRAWN BY	JKD
SCALE	1"=450'
DATE	02. 16. 2024

SHEET

POST DEVELOPMENT
DA MAP

POST