Falls Centre Redevelopment – Phase 2 Multifamily

Stormwater Impact Analysis

August 12th, 2026

Submitted by:
Bolton & Menk, Inc.
418 S Dawson St
Raleigh, NC 27601
P: 919-719-1800

BOLTON & MENK

Real People. Real Solutions.

Professional Engineers Certification

Stormwater Impact Analysis

For

Falls Centre Redevelopment – Phase 2 Multifamily

PROFESSIONAL ENGINEER
I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision, and that I am a duly Licensed Professional Engineer under the laws of the State of North Carolina.

Signature: _____
Typed or Printed Name: Will Swaringen
Date: 08/12/2026 License Number: _____

Table of Contents

I. Project Data 3
II. Site History 3
III. Project Description 3
IV. Stormwater Management Approach 3
APPENDIX A (Reference Material) 4
APPENDIX B (Impervious Area Maps) 33

I. Project Data

Table 1 – Project Data	
Project Name	Falls Centre Redevelopment – Phase 2 Multifamily
Project Address	4500 & 4408 Falls Of Neuse Road, Raleigh NC 27609
PINs	1716523039, 1716419785
Zoning District	CX-5-PL-CU
Existing Impervious	9.65 AC
Land Disturbance	3.36 AC (Phase 2)
Proposed Impervious	2.43 AC (Phase 2)
Stormwater Watershed	Marsh

II. Site History

The subject 10.389-acre site is located at 4500 Falls of Neuse Road in Raleigh, NC. The existing site is the Falls Centre shopping center. Within phase one of this redevelopment, the site has been mass graded, the roadways have been constructed, and the public utilities have been installed. The site currently drains to three constructed temporary sediment basins via sheet flow. The extents of the roadway drain through a stormwater network that ties out at Old Wake Forest and the intersection of Memory Road and Pacific Drive. The existing soil is urban land, type D soil as seen in the USDA soil report within Appendix 1A. The existing slopes range between 1 and 30%. To handle the construction of the multifamily building in phase 2, the swales draining to temporary sediment basin A will be regraded. This is being done to comply with the water quality and quantity requirements and to better minimize runoff throughout construction.

III. Project Description

Fairway- Falls LLC has proposed to redevelop the Falls Centre shopping center. A portion of the buildings will remain, six commercial buildings are proposed in addition to one multifamily building. Along with this, associated roadways, a parking deck, parking lot area, landscaping improvements, and utilities are also being proposed. The project will be constructed in three phases, with the roadway being constructed in phase one. The second phase will be the multifamily building and the third phase will be the commercial buildings.

IV. Stormwater Management Approach

The proposed redevelopment decreases the overall impervious area across the site. From pre to post development the impervious area decreases by approximately 0.06 acres. To ensure that each parcel remains independently compliant following subdivision and redevelopment, built-upon area (BUA) allocations have been established for each parcel. These allocations are intended to maintain the overall reduction in impervious coverage and allow each parcel to function as a stand-alone lot. Existing and proposed impervious area exhibits are provided in Appendix B. As a result of the reduction in impervious surface area, post-development runoff volumes and peak discharge rates are anticipated to decrease

compared to existing conditions. Specifically, the peak flows for the 2 year, 10 year and 25 year storms will decrease from pre conditions flows since there is less impervious area. Due to this, the project is exempt from stormwater control requirements as outlined in UDO section 9.2.2.E.2 (B).

APPENDIX A

(REFERENCE MATERIAL)

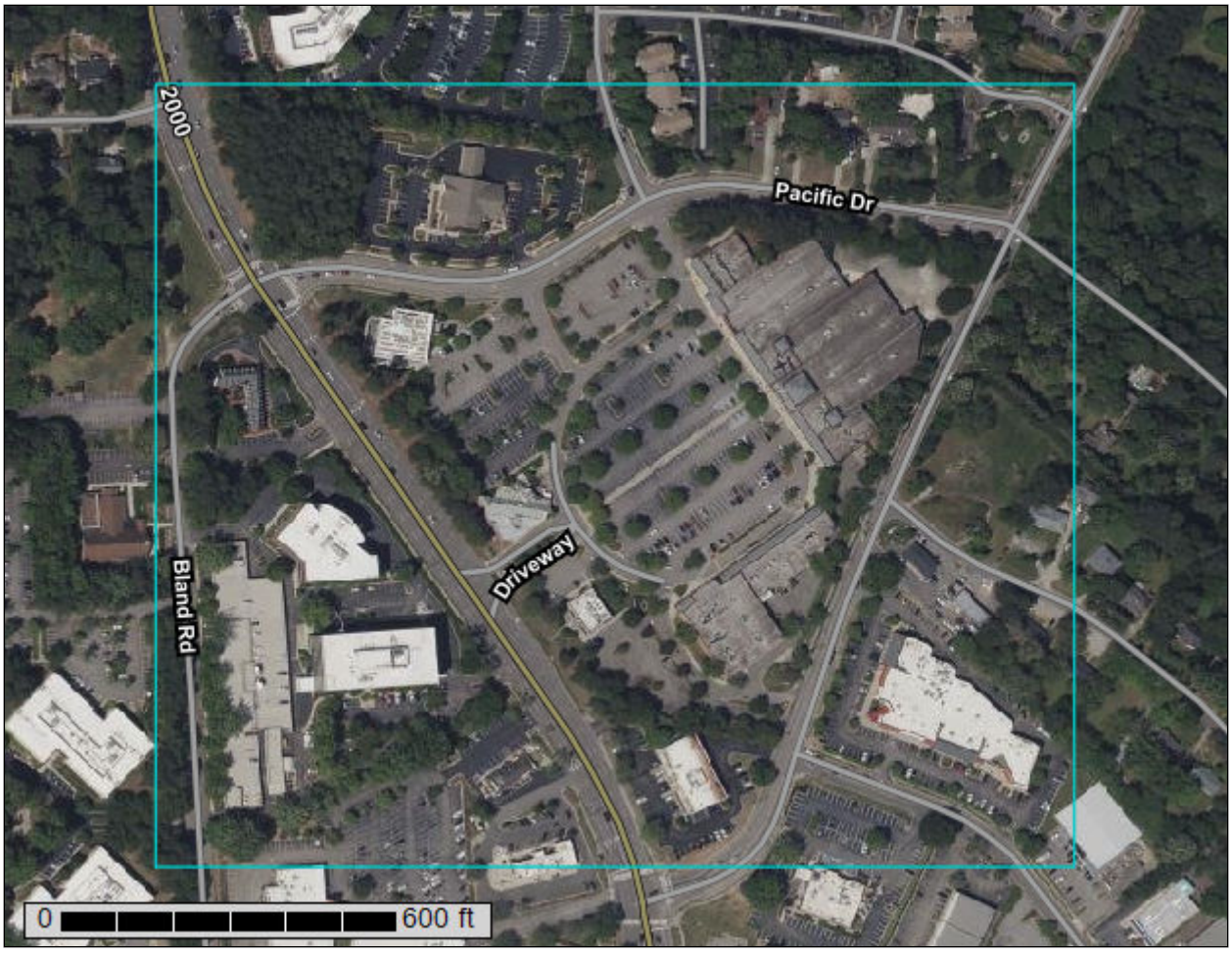
United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Wake County, North Carolina



March 26, 2026

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

Contents

Preface.....2
How Soil Surveys Are Made.....5
Soil Map.....8
Soil Map.....9
Legend.....10
Map Unit Legend.....11
Map Unit Descriptions.....11
Wake County, North Carolina.....13
BcC—Beltline-Urban land-Cecil complex, 2 to 10 percent slopes.....13
ChA—Chewacla and Wehadkee soils, 0 to 2 percent slopes, frequently flooded.....15
UbB—Urban land-Beltline complex, 2 to 6 percent slopes.....17
References.....20

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



Map Scale: 1:3,600 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 150 300 600 900

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 Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

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 27, Aug 27, 2025

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

Date(s) aerial images were photographed: Apr 24, 2022—May 9, 2022

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.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
BcC	Beltline-Urban land-Cecil complex, 2 to 10 percent slopes	4.5	8.6%
ChA	Chewacla and Wehadkee soils, 0 to 2 percent slopes, frequently flooded	0.2	0.4%
UbB	Urban land-Beltline complex, 2 to 6 percent slopes	48.0	91.0%
Totals for Area of Interest		**52.7**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate

pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Wake County, North Carolina

BcC—Beltline-Urban land-Cecil complex, 2 to 10 percent slopes

Map Unit Setting

National map unit symbol: 31gbh
Landscape: Piedmonts
Elevation: 70 to 560 feet
Mean annual precipitation: 39 to 47 inches
Mean annual air temperature: 55 to 63 degrees F
Frost-free period: 200 to 250 days
Farmland classification: Not prime farmland

Map Unit Composition

Beltline and similar soils: 40 percent
Urban land: 35 percent
Cecil and similar soils: 20 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Beltline

Setting

Landscape: Piedmonts
Landform: Hillslopes
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Head slope
Anthropogenic Landform: Fills
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Fine-loamy human-transported material derived from igneous and metamorphic rock over fine-loamy residuum weathered from igneous and metamorphic rock

Typical profile

^A - 0 to 9 inches: clay loam
^C - 9 to 19 inches: clay
2Btb1 - 19 to 26 inches: clay loam
2Btb2 - 26 to 37 inches: clay loam
2BCtb - 37 to 49 inches: loam
2CB - 49 to 79 inches: loam

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low (0.01 to 0.14 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 7.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Ecological site: F136XY820GA - Acidic upland forest, moist
Hydric soil rating: No

Description of Urban Land

Setting

Landscape: Piedmonts
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Anthroscape: Anthroscapes
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Impervious layers over human transported material

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydric soil rating: No

Description of Cecil

Setting

Landscape: Piedmonts
Landform: Interfluves
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Nose slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum weathered from igneous and metamorphic rock

Typical profile

A - 0 to 3 inches: sandy loam
BA - 3 to 8 inches: gravelly sandy loam
Bt1 - 8 to 14 inches: clay loam
Bt2 - 14 to 31 inches: clay
Bt3 - 31 to 49 inches: clay loam
Bt4 - 49 to 79 inches: clay loam

Properties and qualities

Slope: 2 to 10 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.01 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 6.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: D
Ecological site: F136XY820GA - Acidic upland forest, moist
Hydric soil rating: No

Minor Components

Chavis

Percent of map unit: 5 percent
Landscape: Piedmonts
Landform: Hillslopes
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Side slope
Anthropogenic Landform: Fills
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: F136XY820GA - Acidic upland forest, moist
Hydric soil rating: No

ChA—Chewacla and Wehadkee soils, 0 to 2 percent slopes, frequently flooded

Map Unit Setting

National map unit symbol: 2qwpj
Landscape: Piedmonts, river valleys
Elevation: 70 to 560 feet
Mean annual precipitation: 39 to 47 inches
Mean annual air temperature: 55 to 63 degrees F
Frost-free period: 200 to 250 days
Farmland classification: Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season

Map Unit Composition

Chewacla, frequently flooded, and similar soils: 50 percent
Wehadkee, frequently flooded, and similar soils: 45 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Chewacla, Frequently Flooded

Setting

Landscape: Piedmonts, river valleys
Landform: Flood plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Loamy alluvium derived from igneous and metamorphic rock

Typical profile

A - 0 to 4 inches: loam
Bw1 - 4 to 26 inches: silty clay loam

Bw2 - 26 to 38 inches: loam
Bw3 - 38 to 60 inches: clay loam
C - 60 to 80 inches: loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 6 to 24 inches
Frequency of flooding: Frequent
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 10.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: B/D
Ecological site: F136XY610GA - Flood plain forest, wet
Hydric soil rating: No

Description of Wehadkee, Frequently Flooded

Setting

Landscape: Piedmonts, river valleys
Landform: Flood plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Loamy alluvium derived from igneous and metamorphic rock

Typical profile

A - 0 to 7 inches: silt loam
Bg - 7 to 49 inches: clay loam
Cg - 49 to 80 inches: clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 1.98 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: Frequent
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 11.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6w
Hydrologic Soil Group: B/D
Ecological site: F136XY600NC - Flood plain forest, very wet
Hydric soil rating: Yes

Minor Components

Riverview, frequently flooded

Percent of map unit: 5 percent
Landscape: Piedmonts, river valleys
Landform: Flood plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

UbB—Urban land-Beltline complex, 2 to 6 percent slopes

Map Unit Setting

National map unit symbol: 31gbj
Landscape: Piedmonts
Elevation: 70 to 560 feet
Mean annual precipitation: 39 to 47 inches
Mean annual air temperature: 55 to 63 degrees F
Frost-free period: 200 to 250 days
Farmland classification: Not prime farmland

Map Unit Composition

Urban land: 55 percent
Beltline and similar soils: 30 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Urban Land

Setting

Landscape: Piedmonts
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Anthroscape: Anthroscapes
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Impervious layers over human transported material

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydric soil rating: No

Description of Beltline

Setting

Landscape: Piedmonts

Landform: Hillslopes
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Head slope
Anthropogenic Landform: Fills
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Fine-loamy human-transported material derived from igneous and metamorphic rock over fine-loamy residuum weathered from igneous and metamorphic rock

Typical profile

^A - 0 to 9 inches: clay loam
^C - 9 to 19 inches: clay
2Btb1 - 19 to 26 inches: clay loam
2Btb2 - 26 to 37 inches: clay loam
2BCtb - 37 to 49 inches: loam
2CB - 49 to 79 inches: loam

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low (0.01 to 0.14 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 7.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Ecological site: F136XY820GA - Acidic upland forest, moist
Hydric soil rating: No

Minor Components

Cecil

Percent of map unit: 10 percent
Landscape: Piedmonts
Landform: Interfluves
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Nose slope
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: F136XY820GA - Acidic upland forest, moist
Hydric soil rating: No

Chavis

Percent of map unit: 5 percent
Landscape: Piedmonts
Landform: Hillslopes
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Side slope
Anthropogenic Landform: Fills
Down-slope shape: Convex

Across-slope shape: Linear
Ecological site: F136XY820GA - Acidic upland forest, moist
Hydric soil rating: No

References

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

National Research Council. 1995. Wetlands: Characteristics and boundaries.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577

Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580

Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374

United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf

NOAA Atlas 14, Volume 2, Version 3
Location name: Raleigh, North Carolina, USA*
Latitude: 35.8438°, Longitude: -78.6107°
Elevation: 341 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** (0.369-0.441)	**0.470** (0.432-0.514)	**0.540** (0.496-0.589)	**0.601** (0.551-0.656)	**0.665** (0.606-0.724)	**0.712** (0.647-0.775)	**0.754** (0.681-0.821)	**0.791** (0.710-0.862)	**0.831** (0.740-0.906)	**0.865** (0.764-0.945)
10-min	**0.644** (0.590-0.704)	**0.752** (0.691-0.822)	**0.865** (0.794-0.943)	**0.962** (0.881-1.05)	**1.06** (0.966-1.15)	**1.13** (1.03-1.24)	**1.20** (1.08-1.30)	**1.25** (1.13-1.37)	**1.32** (1.17-1.43)	**1.36** (1.20-1.49)
15-min	**0.806** (0.738-0.880)	**0.946** (0.868-1.03)	**1.09** (1.00-1.19)	**1.22** (1.11-1.33)	**1.34** (1.22-1.46)	**1.44** (1.30-1.56)	**1.52** (1.37-1.65)	**1.58** (1.42-1.72)	**1.66** (1.47-1.80)	**1.71** (1.51-1.87)
30-min	**1.10** (1.01-1.21)	**1.31** (1.20-1.43)	**1.55** (1.43-1.70)	**1.76** (1.61-1.92)	**1.99** (1.81-2.17)	**2.16** (1.96-2.35)	**2.32** (2.10-2.53)	**2.46** (2.21-2.68)	**2.63** (2.34-2.87)	**2.77** (2.44-3.02)
60-min	**1.38** (1.26-1.50)	**1.64** (1.50-1.79)	**1.99** (1.83-2.17)	**2.30** (2.10-2.50)	**2.65** (2.42-2.88)	**2.93** (2.66-3.19)	**3.20** (2.88-3.48)	**3.45** (3.10-3.77)	**3.78** (3.36-4.12)	**4.04** (3.57-4.42)
2-hr	**1.61** (1.46-1.77)	**1.92** (1.75-2.11)	**2.36** (2.15-2.59)	**2.74** (2.49-3.01)	**3.20** (2.89-3.51)	**3.59** (3.23-3.93)	**3.96** (3.54-4.34)	**4.34** (3.85-4.74)	**4.82** (4.24-5.27)	**5.22** (4.55-5.72)
3-hr	**1.70** (1.55-1.88)	**2.04** (1.86-2.24)	**2.51** (2.29-2.76)	**2.94** (2.67-3.22)	**3.47** (3.13-3.80)	**3.93** (3.53-4.30)	**4.38** (3.90-4.79)	**4.85** (4.28-5.29)	**5.46** (4.78-5.97)	**6.00** (5.19-6.57)
6-hr	**2.05** (1.87-2.25)	**2.45** (2.25-2.69)	**3.02** (2.76-3.31)	**3.54** (3.23-3.87)	**4.20** (3.80-4.58)	**4.77** (4.29-5.20)	**5.34** (4.76-5.81)	**5.93** (5.24-6.45)	**6.73** (5.87-7.31)	**7.43** (6.40-8.08)
12-hr	**2.42** (2.21-2.65)	**2.89** (2.65-3.17)	**3.58** (3.28-3.92)	**4.22** (3.84-4.61)	**5.04** (4.57-5.49)	**5.76** (5.18-6.25)	**6.49** (5.78-7.04)	**7.27** (6.39-7.87)	**8.33** (7.21-9.02)	**9.27** (7.90-10.0)
24-hr	**2.87** (2.67-3.09)	**3.47** (3.23-3.74)	**4.35** (4.05-4.69)	**5.05** (4.69-5.43)	**6.00** (5.56-6.45)	**6.75** (6.24-7.26)	**7.52** (6.93-8.10)	**8.31** (7.64-8.96)	**9.40** (8.60-10.1)	**10.3** (9.34-11.1)
2-day	**3.32** (3.10-3.58)	**4.00** (3.73-4.31)	**4.99** (4.64-5.37)	**5.76** (5.35-6.20)	**6.80** (6.30-7.32)	**7.63** (7.05-8.21)	**8.47** (7.80-9.12)	**9.34** (8.57-10.1)	**10.5** (9.62-11.4)	**11.4** (10.4-12.4)
3-day	**3.52** (3.29-3.78)	**4.23** (3.95-4.54)	**5.25** (4.90-5.63)	**6.05** (5.63-6.48)	**7.13** (6.62-7.65)	**7.99** (7.40-8.57)	**8.87** (8.18-9.52)	**9.77** (8.99-10.5)	**11.0** (10.1-11.8)	**12.0** (10.9-12.9)
4-day	**3.72** (3.48-3.98)	**4.47** (4.18-4.78)	**5.51** (5.15-5.89)	**6.34** (5.91-6.77)	**7.46** (6.93-7.98)	**8.36** (7.75-8.94)	**9.27** (8.56-9.92)	**10.2** (9.40-10.9)	**11.5** (10.5-12.3)	**12.5** (11.4-13.4)
7-day	**4.32** (4.05-4.60)	**5.15** (4.83-5.49)	**6.28** (5.88-6.69)	**7.17** (6.70-7.64)	**8.39** (7.82-8.94)	**9.36** (8.70-9.98)	**10.4** (9.59-11.0)	**11.4** (10.5-12.2)	**12.8** (11.7-13.7)	**13.9** (12.7-14.9)
10-day	**4.91** (4.62-5.24)	**5.85** (5.49-6.23)	**7.03** (6.60-7.49)	**7.96** (7.46-8.48)	**9.22** (8.61-9.82)	**10.2** (9.51-10.9)	**11.2** (10.4-11.9)	**12.2** (11.3-13.0)	**13.6** (12.5-14.5)	**14.6** (13.5-15.7)
20-day	**6.58** (6.20-7.01)	**7.77** (7.31-8.28)	**9.19** (8.64-9.78)	**10.3** (9.68-11.0)	**11.8** (11.1-12.6)	**13.0** (12.2-13.9)	**14.2** (13.2-15.1)	**15.4** (14.3-16.5)	**17.1** (15.8-18.2)	**18.4** (16.9-19.7)
30-day	**8.18** (7.71-8.68)	**9.62** (9.07-10.2)	**11.2** (10.5-11.9)	**12.4** (11.7-13.2)	**14.0** (13.2-14.9)	**15.3** (14.3-16.2)	**16.5** (15.4-17.5)	**17.7** (16.5-18.9)	**19.3** (18.0-20.6)	**20.6** (19.1-22.0)
45-day	**10.4** (9.89-11.0)	**12.2** (11.6-12.9)	**14.0** (13.3-14.7)	**15.3** (14.5-16.2)	**17.1** (16.2-18.0)	**18.5** (17.4-19.5)	**19.8** (18.6-20.9)	**21.1** (19.8-22.3)	**22.8** (21.3-24.1)	**24.0** (22.5-25.5)
60-day	**12.5** (11.9-13.1)	**14.6** (13.9-15.3)	**16.5** (15.7-17.3)	**18.0** (17.1-18.9)	**19.9** (18.8-20.9)	**21.3** (20.2-22.5)	**22.7** (21.4-23.9)	**24.0** (22.6-25.4)	**25.7** (24.2-27.2)	**27.0** (25.4-28.6)

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

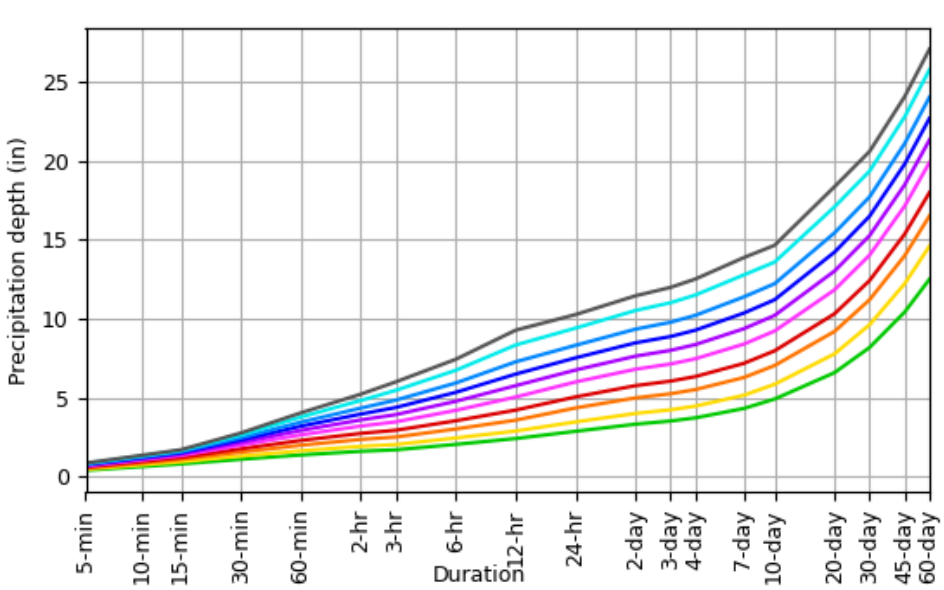
Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper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

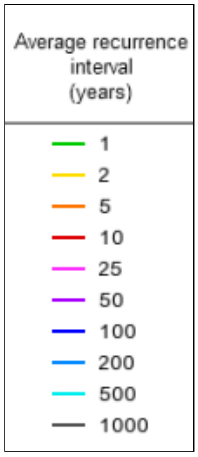
Please refer to NOAA Atlas 14 document for more information.

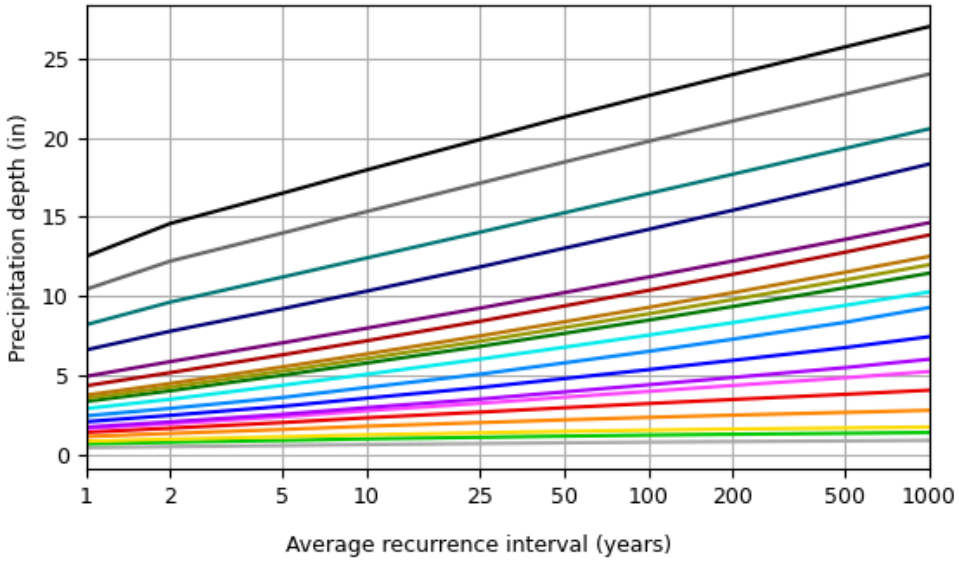
Back to Top

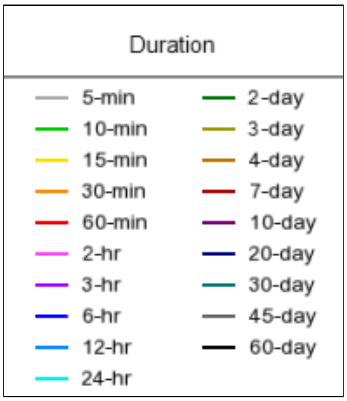
PF graphical

PDS-based depth-duration-frequency (DDF) curves
Latitude: 35.8438°, Longitude: -78.6107°









NOAA Atlas 14, Volume 2, Version 3

Created (GMT): Mon Mar 23 12:21:59 2026

Back to Top

Maps & aerials

Small scale terrain

NOAA Atlas 14, Volume 2, Version 3
Location name: Raleigh, North Carolina, USA*
Latitude: 35.8438°, Longitude: -78.6107°
Elevation: 341 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/hour)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**4.84** (4.43-5.29)	**5.64** (5.18-6.17)	**6.48** (5.95-7.07)	**7.21** (6.61-7.87)	**7.98** (7.27-8.69)	**8.54** (7.76-9.30)	**9.05** (8.17-9.85)	**9.49** (8.52-10.3)	**9.97** (8.88-10.9)	**10.4** (9.17-11.3)
10-min	**3.86** (3.54-4.22)	**4.51** (4.15-4.93)	**5.19** (4.76-5.66)	**5.77** (5.29-6.29)	**6.35** (5.80-6.92)	**6.80** (6.18-7.41)	**7.19** (6.49-7.83)	**7.52** (6.76-8.20)	**7.89** (7.03-8.60)	**8.17** (7.21-8.93)
15-min	**3.22** (2.95-3.52)	**3.78** (3.47-4.13)	**4.38** (4.02-4.77)	**4.86** (4.46-5.30)	**5.37** (4.90-5.85)	**5.74** (5.22-6.25)	**6.06** (5.47-6.60)	**6.32** (5.68-6.90)	**6.62** (5.89-7.22)	**6.84** (6.04-7.47)
30-min	**2.21** (2.02-2.41)	**2.61** (2.40-2.85)	**3.11** (2.85-3.39)	**3.53** (3.23-3.84)	**3.98** (3.63-4.33)	**4.32** (3.93-4.71)	**4.64** (4.19-5.05)	**4.92** (4.42-5.37)	**5.27** (4.69-5.74)	**5.54** (4.89-6.05)
60-min	**1.38** (1.26-1.50)	**1.64** (1.50-1.79)	**1.99** (1.83-2.17)	**2.30** (2.10-2.50)	**2.65** (2.42-2.88)	**2.93** (2.66-3.19)	**3.20** (2.88-3.48)	**3.45** (3.10-3.77)	**3.78** (3.36-4.12)	**4.04** (3.57-4.42)
2-hr	**0.804** (0.731-0.886)	**0.961** (0.877-1.05)	**1.18** (1.07-1.30)	**1.37** (1.24-1.50)	**1.60** (1.44-1.75)	**1.80** (1.61-1.96)	**1.98** (1.77-2.17)	**2.17** (1.92-2.37)	**2.41** (2.12-2.64)	**2.61** (2.28-2.86)
3-hr	**0.566** (0.516-0.625)	**0.678** (0.620-0.746)	**0.836** (0.762-0.919)	**0.979** (0.889-1.07)	**1.16** (1.04-1.27)	**1.31** (1.17-1.43)	**1.46** (1.30-1.60)	**1.61** (1.42-1.76)	**1.82** (1.59-1.99)	**2.00** (1.73-2.19)
6-hr	**0.341** (0.312-0.375)	**0.409** (0.375-0.448)	**0.504** (0.461-0.552)	**0.591** (0.538-0.646)	**0.701** (0.635-0.765)	**0.796** (0.717-0.867)	**0.891** (0.795-0.969)	**0.990** (0.874-1.08)	**1.12** (0.980-1.22)	**1.24** (1.07-1.35)
12-hr	**0.200** (0.183-0.219)	**0.239** (0.220-0.262)	**0.296** (0.271-0.325)	**0.349** (0.319-0.382)	**0.418** (0.378-0.455)	**0.478** (0.429-0.519)	**0.538** (0.479-0.584)	**0.603** (0.530-0.653)	**0.691** (0.598-0.748)	**0.769** (0.656-0.833)
24-hr	**0.119** (0.111-0.128)	**0.144** (0.134-0.155)	**0.181** (0.168-0.195)	**0.210** (0.195-0.226)	**0.249** (0.231-0.268)	**0.281** (0.259-0.302)	**0.313** (0.288-0.337)	**0.346** (0.318-0.373)	**0.391** (0.358-0.422)	**0.427** (0.389-0.461)
2-day	**0.069** (0.064-0.074)	**0.083** (0.077-0.089)	**0.103** (0.096-0.111)	**0.119** (0.111-0.129)	**0.141** (0.131-0.152)	**0.158** (0.146-0.170)	**0.176** (0.162-0.189)	**0.194** (0.178-0.209)	**0.219** (0.200-0.236)	**0.238** (0.217-0.257)
3-day	**0.048** (0.045-0.052)	**0.058** (0.054-0.063)	**0.072** (0.068-0.078)	**0.084** (0.078-0.090)	**0.099** (0.091-0.106)	**0.111** (0.102-0.119)	**0.123** (0.113-0.132)	**0.135** (0.124-0.145)	**0.152** (0.139-0.164)	**0.166** (0.151-0.179)
4-day	**0.038** (0.036-0.041)	**0.046** (0.043-0.049)	**0.057** (0.053-0.061)	**0.066** (0.061-0.070)	**0.077** (0.072-0.083)	**0.087** (0.080-0.093)	**0.096** (0.089-0.103)	**0.106** (0.097-0.113)	**0.119** (0.109-0.128)	**0.130** (0.118-0.139)
7-day	**0.025** (0.024-0.027)	**0.030** (0.028-0.032)	**0.037** (0.034-0.039)	**0.042** (0.039-0.045)	**0.049** (0.046-0.053)	**0.055** (0.051-0.059)	**0.061** (0.057-0.065)	**0.067** (0.062-0.072)	**0.075** (0.069-0.081)	**0.082** (0.075-0.088)
10-day	**0.020** (0.019-0.021)	**0.024** (0.022-0.025)	**0.029** (0.027-0.031)	**0.033** (0.031-0.035)	**0.038** (0.035-0.040)	**0.042** (0.039-0.045)	**0.046** (0.043-0.049)	**0.050** (0.047-0.054)	**0.056** (0.052-0.060)	**0.061** (0.056-0.065)
20-day	**0.013** (0.012-0.014)	**0.016** (0.015-0.017)	**0.019** (0.017-0.020)	**0.021** (0.020-0.022)	**0.024** (0.023-0.026)	**0.027** (0.025-0.028)	**0.029** (0.027-0.031)	**0.032** (0.029-0.034)	**0.035** (0.032-0.038)	**0.038** (0.035-0.040)
30-day	**0.011** (0.010-0.012)	**0.013** (0.012-0.014)	**0.015** (0.014-0.016)	**0.017** (0.016-0.018)	**0.019** (0.018-0.020)	**0.021** (0.019-0.022)	**0.022** (0.021-0.024)	**0.024** (0.022-0.026)	**0.026** (0.024-0.028)	**0.028** (0.026-0.030)
45-day	**0.009** (0.009-0.010)	**0.011** (0.010-0.011)	**0.012** (0.012-0.013)	**0.014** (0.013-0.014)	**0.015** (0.014-0.016)	**0.017** (0.016-0.018)	**0.018** (0.017-0.019)	**0.019** (0.018-0.020)	**0.021** (0.019-0.022)	**0.022** (0.020-0.023)
60-day	**0.008** (0.008-0.009)	**0.010** (0.009-0.010)	**0.011** (0.010-0.012)	**0.012** (0.011-0.013)	**0.013** (0.013-0.014)	**0.014** (0.013-0.015)	**0.015** (0.014-0.016)	**0.016** (0.015-0.017)	**0.017** (0.016-0.018)	**0.018** (0.017-0.019)

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

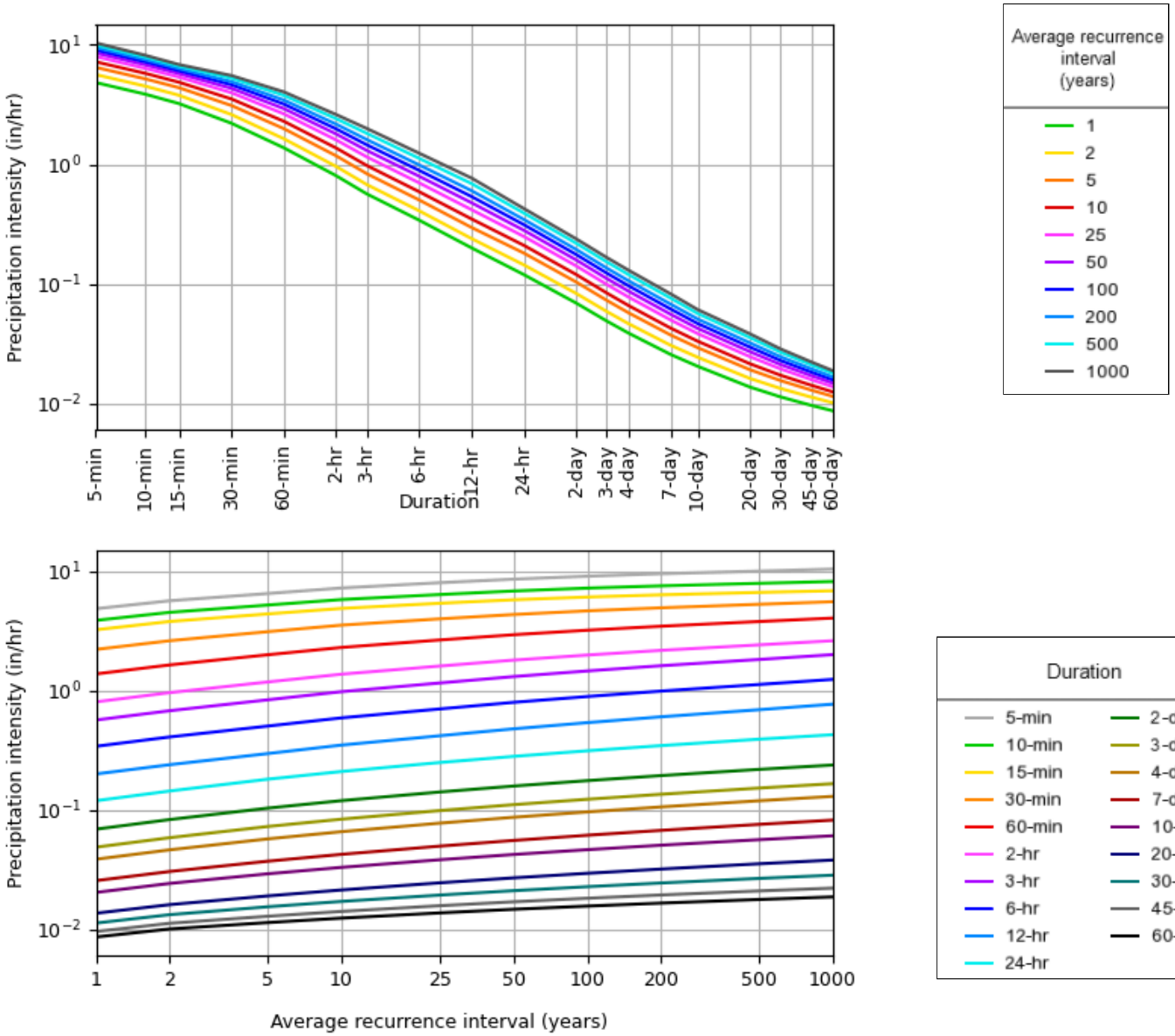
Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper 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.

Back to Top

PF graphical

PDS-based intensity-duration-frequency (IDF) curves
Latitude: 35.8438°, Longitude: -78.6107°



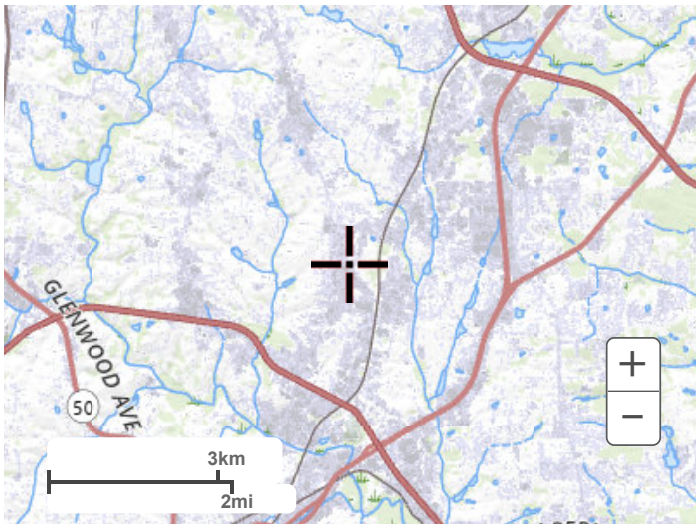
NOAA Atlas 14, Volume 2, Version 3

Created (GMT): Mon Mar 23 12:27:27 2026

Back to Top

Maps & aerials

Small scale terrain



Large scale terrain



Large scale map



Large scale aerial



Back to Top

US Department of Commerce
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



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

NOTES TO USERS

For information and questions about this map, available products associated with this FIRM including historic versions of this FIRM, how to order products or the National Flood Insurance Program in general, please call the FEMA Map Information eXchange at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA Map Service Center website at https://msc.fema.gov. An accompanying Flood Insurance Study report, Letter of Map Revision (LOMR) or Letter of Map Amendment (LOMA) revising portions of this panel, and digital versions of this FIRM may be available. Visit the North Carolina Floodplain Mapping Program website at https://flood.nc.gov/ncflood, or contact the FEMA Map Service Center.

Communities annexing land on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM Index. These may be ordered directly from the Map Service Center at the number listed above.

For community and countywide map dates refer to the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in the community, contact your Insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

Flood Insurance Study (FIS) means an examination, evaluation, and determination of flood hazards, corresponding water surface elevations, flood hazard risk zones, and other flood data in a community issued by the North Carolina Floodplain Mapping Program (NCFMP). The Flood Insurance Study (FIS) is comprised of the following products used together: the Digital Flood Hazard Database, the Water Surface Elevation Rasters, the digitally derived, autogenerated Flood Insurance Rate Map and the Flood Insurance Survey Report. A Flood Insurance Survey is a compilation and presentation of flood risk data for specific watercourses, lakes, and coastal flood hazard areas within a community. This report contains detailed flood elevation data, data tables and FIRM indices. When a flood study is completed for the NFIP, the digital information, reports and maps are assembled into an FIS. Information shown on this FIRM is provided in digital format by the NCFMP. Base map information shown on this FIRM was provided in digital format by the NCFMP. The source of this information can be determined from the metadata available in the digital FLOOD database and in the Technical Support Data Notebook (TSDN).

ACCREDITED LEVEE NOTES TO USERS: If an accredited levee note appears on this panel check with your local community to obtain more information, such as the estimated level of protection provided (which may exceed the 1-percent-annual-chance level) and Emergency Action Plan, on the levee system(s) shown as providing protection for areas on this panel. To mitigate flood risk in residual risk areas, property owners and residents are encouraged to consider flood insurance and floodproofing or other protective measures. For more information on flood insurance, interested parties should visit the FEMA Website at https://www.fema.gov/national-flood-insurance-program.

PROVISIONALLY ACCREDITED LEVEE NOTES TO USERS: If a Provisionally Accredited Levee (PAL) note appears on this panel, check with your local community to obtain more information, such as the estimated level of protection provided (which may exceed the 1-percent-annual-chance level) and Emergency Action Plan, on the levee system(s) shown as providing protection for areas on this panel. To maintain accreditation, the levee owner or community is required to submit the data and documentation necessary to comply with Section 65.10 of the NFIP regulations. If the community or owner does not provide the necessary data and documentation or if the data and documentation provided indicate the levee system does not comply with Section 65.10 requirements, FEMA will revise the flood hazard and risk information for this area to reflect de-accreditation of the levee system. To mitigate flood risk in residual risk areas, property owners and residents are encouraged to consider flood insurance and floodproofing or other protective measures. For more information on flood insurance, interested parties should visit the FEMA Website at https://www.fema.gov/national-flood-insurance-program.

LIMIT OF MODERATE WAVE ACTION NOTES TO USERS: For some coastal flooding zones the AE Zone category has been divided by a Limit of Moderate Wave Action (LiMWA). The LiMWA represents the approximate landward limit of the 1.5-foot breaking wave. The effects of wave hazards between the VE Zone and the LiMWA (or between the shoreline and the LiMWA for areas where VE Zones are not identified) will be similar to, but less severe than those in the VE Zone.

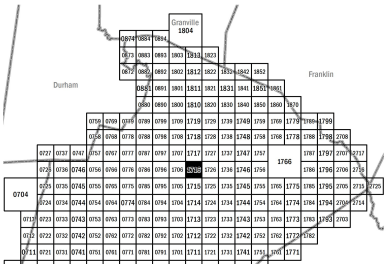
SCALE

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 1716

FEMA

Panel Contains:

COMMUNITY	CID	PANEL	SUFFIX
RALEIGH, CITY OF	370243	1716	K

APPENDIX B

(IMPERVIOUS AREA MAPS)

PRE-DEVELOPMENT IMPERVIOUS MAP



LEGEND

- IMPERVIOUS - BUILDINGS/ROOF
- IMPERVIOUS - SIDEWALKS
- IMPERVIOUS - ROADWAYS / PARKING
- PRE-DEVELOPMENT DRAINAGE AREAS

PRE DEVELOPMENT TOTALS:

TOTAL AREA: 11.61 AC
IMPERVIOUS AREA: 9.41 AC (81.1%)

BOLTON & MENK

418 SOUTH DAWSON STREET
RALEIGH, NC 27601
Phone: (919) 719-1800
Email: Raleigh@bolton-menk.com
www.bolton-menk.com

FAIRWAY INVESTMENTS

728 Shades Creek Parkway, Suite 210
Birmingham, AL 35209

FALLS CENTRE REDEVELOPMENT

4500 FALLS OF NEUSE RD.
RALEIGH, NC 27609

PRE VS POST IMPERVIOUS AREA MAPS

PROJECT NO:
50716

REVISIONS:

NOT FOR CONSTRUCTION

DATE:	07/24/2025
DESIGNED BY:	BJ, HW, WS
DRAWN BY:	HW, IR
CHECKED BY:	WS, CG

© Bolton & Menk, Inc. 2026, All Rights Reserved

K:\GS_PROJ\FDG_Design_Calculations\2_Stormwater\3 - CADD\1_EXHIBITS\50716_PRE-DA-MAPS.dwg 8/11/2026 5:38:05 PM

POST-DEVELOPMENT IMPERVIOUS MAP



LEGEND

SYMBOL

- IMPERVIOUS - BUILDINGS/ROOF
- IMPERVIOUS - SIDEWALKS
- IMPERVIOUS - ROADWAYS / PARKING
- POST-DEVELOPMENT DRAINAGE AREAS

POST TOTALS:

BUA ALLOCATION:

PHASE 1 PUBLIC INFRASTRUCTURE: 1.44 AC

PHASE 2 MULTIFAMILY: 2.55 AC

PHASE 3 RETAIL: 5.42 AC

TOTAL IMPERVIOUS = 9.35 AC

BOLTON & MENK

418 SOUTH DAWSON STREET
RALEIGH, NC 27601
Phone: (919) 719-1800
Email: Raleigh@bolton-menk.com
www.bolton-menk.com

FAIRWAY INVESTMENTS

728 Shades Creek Parkway, Suite 210
Birmingham, AL 35209

FALLS CENTRE REDEVELOPMENT

4500 FALLS OF NEUSE RD.
RALEIGH, NC 27609

PRE VS POST IMPERVIOUS AREA MAPS

PROJECT NO:
50716

REVISIONS:

NOT FOR CONSTRUCTION

DATE:	07/24/2025
DESIGNED BY:	BJ, HW, WS
DRAWN BY:	HW, IR
CHECKED BY:	WS, CG

© Bolton & Menk, Inc. 2026. All Rights Reserved

N:\GIS_PROJ\50716\3_Design\A_Calculations\2_Stormwater\3 - CAD\1_EXHIBIT\50716_POST-DA-MAPS.dwg 8/11/2026 5:39:33 PM

POST-DEVELOPMENT IMPERVIOUS MAP



LEGEND

SYMBOL

- IMPERVIOUS - BUILDINGS/ROOF
- IMPERVIOUS - SIDEWALKS
- IMPERVIOUS - ROADWAYS / PARKING
- POST-DEVELOPMENT DRAINAGE AREA FOR PHASE 2
- POST-DEVELOPMENT DRAINAGE AREAS FOR PHASES 1 AND 3

POST TOTALS:

PHASE II - MULTIFAMILY DEVELOPMENT

BUA ALLOCATION: 2.55 AC

PROPOSED IMPERVIOUS AREA: 2.53 AC

BOLTON & MENK

418 SOUTH DAWSON STREET
RALEIGH, NC 27601
Phone: (919) 719-1800
Email: Raleigh@bolton-menk.com
www.bolton-menk.com

FAIRWAY INVESTMENTS

728 Shades Creek Parkway, Suite 210
Birmingham, AL 35209

FALLS CENTRE REDEVELOPMENT

4500 FALLS OF NEUSE RD.
RALEIGH, NC 27609

PRE VS POST IMPERVIOUS AREA MAPS

PROJECT NO:
50716

REVISIONS:

NOT FOR CONSTRUCTION

DATE:	07/24/2025
DESIGNED BY:	BJ, HW, WS
DRAWN BY:	HW, IR
CHECKED BY:	WS, CG

© Bolton & Menk, Inc. 2026, All Rights Reserved

I:\FALLS_PKS\0163_Design\4_Calculations\2_Stormwater\3 - CAD\1_EXHIBITS\50716_POST-DA-MAPS.dwg 8/11/2026 5:40:46 PM