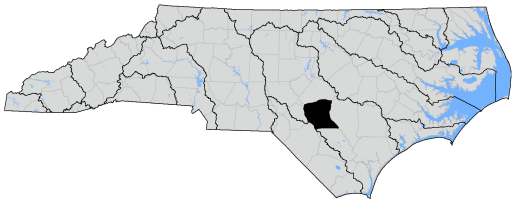
PRELIMINARY FLOOD INSURANCE STUDY

FEDERAL EMERGENCY MANAGEMENT AGENCY

A Report of Flood Hazards in

CUMBERLAND COUNTY, NORTH CAROLINA AND INCORPORATED AREAS



Community Name	Community Number
CITY OF FAYETTEVILLE	370077
CUMBERLAND COUNTY	370076
FORT BRAGG MILITARY RESERVATION	370076
TOWN OF FALCON	370412
TOWN OF GODWIN	370533
TOWN OF HOPE MILLS	370312
TOWN OF LINDEN	370538
TOWN OF SPRING LAKE	370484
TOWN OF STEDMAN	370534
TOWN OF WADE	370532

NORTH CAROLINA
Cooperating Technical State
FEMA'S COOPERATING TECHNICAL PARTNER

PRELIMINARY: 4/30/2014
REVISED: 4/30/2014
Federal Emergency Management Agency
State of North Carolina
Flood Insurance Study Number
37051CV000
www.fema.gov and www.ncfloodmaps.com

FOREWORD

This countywide Flood Insurance Study (FIS) Report 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 floodplain areas at the state level. As a part of this effort, the State of North Carolina has joined with FEMA in a Cooperating Technical State (CTS) agreement to produce and maintain this FIS Report and the accompanying digital Flood Insurance Rate Map (FIRM) for North Carolina.

NOTICE TO FLOOD INSURANCE STUDY USERS

Communities participating in the National Flood Insurance Program have established repositories of flood hazard data for floodplain management and flood insurance purposes. This Flood Insurance Study (FIS) may not contain all data available within the repository. It is advisable to contact the community repository for any additional data.

The following is a list of the publication dates of this Countywide FIS Report starting with the initial Report accompanying the North Carolina Statewide FIRM:

Date	Reason
1/5/2007	Initial Countywide FIS Report Effective Date

This FIS has been produced as part of the North Carolina Floodplain Mapping Program. Cumberland County, North Carolina, falls under the administrative jurisdiction of Region IV of the Federal Emergency Management Agency (FEMA). Questions concerning this FIS may be directed to the North Carolina Floodplain Mapping Program at www.ncfloodmaps.com, the FEMA Map Assistance Center by calling the toll-free information line at 1-877-FEMA MAP (1-877-336-2627), or by contacting the FEMA Regional Office at the following address:

FEMA, Federal Insurance and Mitigation Administration

Koger Center - Rutgers Building

3003 Chamblee Tucker Road

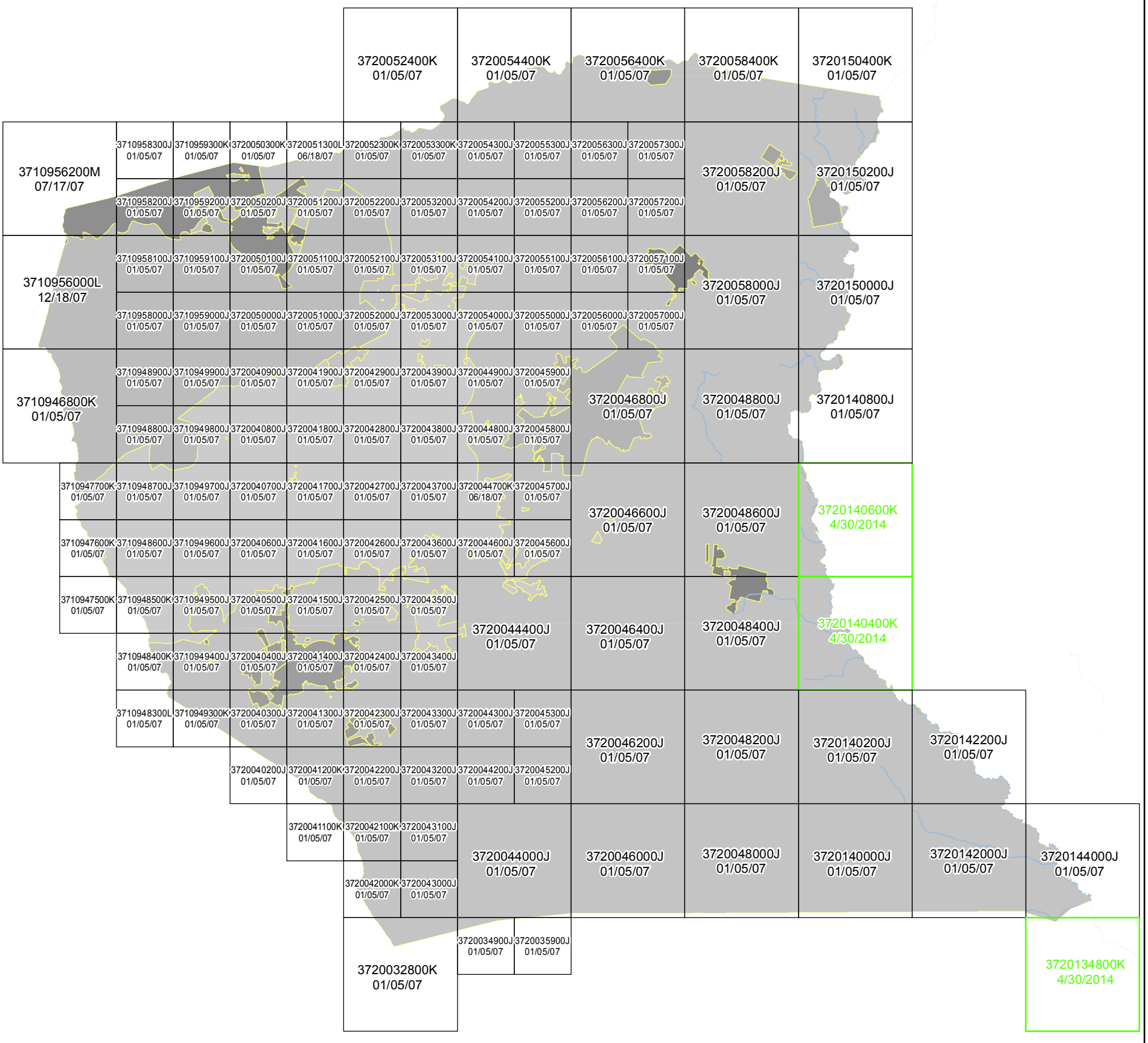
Atlanta, Georgia 30341

(770) 220-5400

Table of Contents

Figures

Page



PRELIMINARY

APRIL 30, 2014

*PANEL NOT PRINTED

N

1 in = 4 miles

Miles

0 0.75 1.5 3 4.5

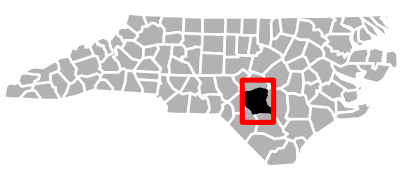
Map Projection:
Lambert Conformal Conic
North American Datum 1983

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

HTTP://FRIS.NC.GOV/FRIS

SEE FLOOD INSURANCE STUDY FOR ADDITIONAL INFORMATION

COUNTY LOCATOR



NATIONAL FLOOD INSURANCE PROGRAM

FLOOD INSURANCE RATE MAP INDEX

CUMBERLAND COUNTY, NORTH CAROLINA And Incorporated Areas
PANELS PRINTED:
1406, 1404, 1348

FEMA

MAP NUMBER
37051CIND0D

MAP REVISED
APRIL 30, 2014

1.0 Introduction

1.1 The National Flood Insurance Program

In 1968, Congress created the National Flood Insurance Program (NFIP) in response to the rising cost of taxpayer-funded disaster relief for flood victims and the increasing amount of damage caused by floods. The NFIP makes federally backed flood insurance available in communities that agree to adopt and enforce floodplain management ordinances to reduce future flood damage. Federally backed flood insurance is available in more than 19,000 communities across the United States and its territories.

The NFIP is managed by the Federal Insurance and Mitigation Administration of the Federal Emergency Management Agency (FEMA). The Federal Insurance and Mitigation Administration manages the insurance component of the NFIP and oversees the flood hazard mapping and the floodplain management aspects of the program.

The NFIP, through involvement with communities, the insurance industry, and the lending industry, helps reduce flood damage by nearly $800 million a year. Further, buildings constructed in compliance with NFIP building standards suffer approximately 80% less damage annually than those not built in compliance. In addition, every $3 paid in flood insurance claims saves $1 in disaster assistance payments. The NFIP is self-supporting for the average historical loss year, which means that operating expenses and flood insurance claims are not paid by the taxpayer, but through premiums collected for flood insurance policies.

Additional information of interest to homeowners, community officials, insurance companies, lenders, and study contractors is available in Section 9.0 of this FIS Report and on the NFIP Internet homepage at http://www.fema.gov/business/nfip/.

1.2 Purpose of this Flood Insurance Study

Flood Insurance Studies (FISs) are one of the primary means by which the NFIP administers the National Flood Insurance Act of 1968, the Flood Disaster Protection Act of 1973, and the National Flood Insurance Reform Act of 1994. FISs develop flood risk data that are used to establish actuarial flood insurance rates. The information in this FIS Report will also be used by Cumberland County and the jurisdictions therein (hereinafter referred to collectively as Cumberland County) to facilitate the adoption and maintenance of floodplain management ordinances, which form the basis of communities' continued participation in the NFIP. Minimum requirements for participation in the NFIP are set forth in Title 44, Part 60, Section 3 of the Code of Federal Regulations (44 CFR 60.3). In some States and/or communities, floodplain management criteria or regulations may exist that are more restrictive than the minimum Federal requirements. In such cases, the more restrictive criteria will take precedence, and the State and/or community (or other jurisdictional agency) will be able to explain them.

This FIS investigates the existence and severity of flood hazards in, or revises and updates previous FISs for, the geographic area of Cumberland County, North Carolina, including the jurisdictions listed in Table 1.

Table 1 - Jurisdictions in Cumberland County

Community	Included in this FIS	If Not Included, Location of Flood Hazard/Flood Insurance Rate Data
CITY OF FAYETTEVILLE	Yes	*
CUMBERLAND COUNTY	Yes	*
FORT BRAGG MILITARY RESERVATION	Yes	*
TOWN OF FALCON	Yes	*
TOWN OF GODWIN	Yes	*
TOWN OF HOPE MILLS	Yes	*
TOWN OF LINDEN	Yes	*
TOWN OF SPRING LAKE	Yes	*
TOWN OF STEDMAN	Yes	*
TOWN OF WADE	Yes	*

1.3 FIS Components

A Flood Insurance Study (FIS) is an analysis of flood hazards, typically presented as a set of Flood Insurance Rate Map (FIRM) panels and the FIS Report, which includes a set of Flood Profiles and/or Water-surface elevation rasters.

Flood Insurance Study Report

The FIS Report provides a context for the information shown on the FIRM, as well as a summary of the data upon which the analyses are based. It also includes an index of sources of additional information on the NFIP.

2.0 Floodplain Management Applications

Flood events of a magnitude expected to occur with a 10%, 2%, 1%, or 0.2% annual chance have been selected as having special significance for developing sound floodplain management programs. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10%, 2%, 1%, and 0.2% chance, respectively, of being equaled in any given year. Therefore, FIS Reports typically determine water-surface elevations for floods with these probabilities. The FIRM delineates 1% and 0.2% annual chance floodplains and 1% annual chance floodway boundaries, and depicts 1% annual chance flood elevations, rounded to the nearest foot, to assist in developing floodplain management measures.

2.1 Floodplains

To provide a national standard without regional discrimination, the 1% annual chance flood has been adopted by FEMA as the base flood for floodplain management purposes. A 1% annual chance flood, or base flood, is defined as that having a 1% chance of being equaled or exceeded in any given year. The 1% annual chance floodplains shown on the FIRM identify areas that are expected to be inundated by the 1% annual chance flood. This 1% annual chance floodplain is also called a Special Flood Hazard Area (SFHA), where the NFIP's floodplain management regulations must be enforced by the community as a condition of participation in the NFIP. The 0.2% annual chance floodplain is employed to indicate additional areas of flood risk associated with exceptionally severe floods.

2.2 Floodways

Encroachment on floodplains such as that caused by placement of structures and fill reduces flood-carrying capacity, increases flood heights and velocities, and increases flood hazards in areas beyond the encroachment itself. One aspect of floodplain management involves balancing the economic gain from floodplain development against the resulting increase in flood hazard. For purposes of the NFIP, floodways are provided as a tool to assist local communities in this aspect of floodplain management. Under this concept, the 1% annual chance riverine floodplain is divided into a floodway and a floodway fringe. The floodway is the channel of a stream, plus any adjacent floodplain areas, that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights. Figure 1, "Floodway Schematic," illustrates this principle. Minimum Federal standards limit such increases to 1.0 foot, provided that hazardous velocities are not produced. The floodways in this FIS are presented to local agencies as a minimum standard that can be adopted directly or that can be used as a basis for additional encroachment studies.

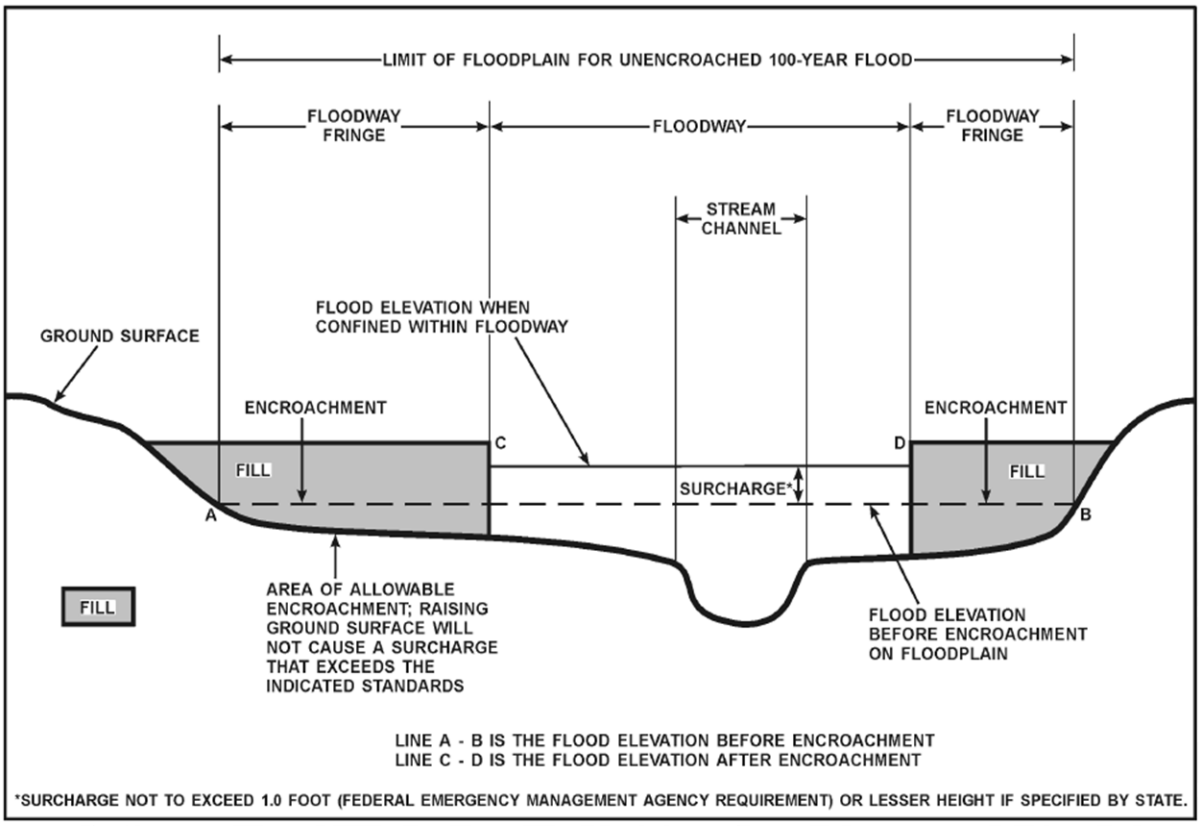


Figure 1- Floodway Schematic

2.3 Base Flood Elevations

The hydraulic characteristics of flooding sources were analyzed to provide estimates of the elevations of floods of the selected recurrence intervals. The Base Flood Elevation (BFE) is the elevation of the 1% annual chance flood. These BFEs are most commonly rounded to the whole foot, as shown on the FIRM, but in certain circumstances or locations they may be rounded to 0.1 foot. Cross section lines shown on the FIRM may also be labeled with the BFE rounded to 0.1 foot. Whole-foot BFEs derived from engineering analyses that apply to coastal areas, areas of ponding, or other static areas with little elevation change may also be shown at selected intervals on the FIRM. Cross sections with BFEs shown on the FIRM correspond to the cross sections shown in the Floodway Data table and Flood Profiles in this FIS Report. BFEs are primarily intended for flood insurance rating purposes. For construction and/or floodplain management purposes, users are cautioned to use the flood elevation data presented in this FIS Report in conjunction with the data shown on the FIRM.

2.4 Watershed Characteristics

Because a FIS is a probability analysis that may not account for some of the factors listed below, communities are strongly encouraged to consider adopting more restrictive or higher floodplain management criteria or ordinances than the minimum Federal requirements. Communities may also increase the validity of their flood hazard data by investing in continuous maintenance of river gages (see the Data Validity and Reliability paragraph below). If the U.S. Geological Survey (USGS) or other agencies do not maintain gages on the flooding sources of interest, partnerships with the USGS may be pursued, or local gages may be installed. For more information, see Section 9.0 of this report.

This flood hazard study represents an analysis of certain watershed characteristics, some of which are summarized as follows:

Drainage Area

In general, streams that drain larger areas have greater flood hazards. FISs, in North Carolina, do not typically analyze flood hazards in places with rural drainage areas of less than one square mile and within urban drainage areas of less than ½ square mile.

Soil Permeability and Infiltration

Differences in the types of soil and the amount of vegetation in a watershed have a significant effect on the amount of water that the soil can absorb; soils with a high sand content absorb much more water than soils with a high clay content. The presence of vegetation increases infiltration; the presence of pavement decreases infiltration and also speeds runoff to receiving waters. As soil permeability and infiltration decrease, the volume and

rate of overland flow increases.

Soil Moisture Conditions

In addition to soil permeability and infiltration, the level of the water table helps determine the saturation point, beyond which no water is absorbed. As rainfall duration increases, the height of the water table increases.

Channel and Floodplain Geometry

The geometric contour of a streambed, termed channel geometry, and the geometric contour of a floodplain determine the volume of water that a channel can hold and partially determine the rate at which water flows through it.

Channel and Floodplain Roughness

The roughness of a surface affects the characteristics of runoff whether the water is on the surface of the watershed or in the channel.

FIS Reports include analyses of how these factors will combine to produce overland flow patterns during floods that have a certain probability of occurring in any given year. Although the recurrence interval represents the long-term average period between floods of a specific magnitude, rare floods could occur at shorter intervals or even within the same year. The risk of experiencing a rare flood increases when longer periods are considered. For example, the risk of having a flood which equals or exceeds the 1% annual chance flood (1% chance of annual exceedence) in any 50-year period is approximately 40% (4 in 10), but for any 90-year period, the risk increases to approximately 60% (6 in 10).

It is important to note that the 1% annual chance flood is used as the national standard to allow a consistent approach to floodplain management, flood hazard assessment, and flood hazard mapping. In any given community, a number of factors may result in flooding characteristics that do not conform to predicted conditions. Therefore, the determination that an area is not shown on the FIRM as being within a Special Flood Hazard Area is no guarantee that it will not flood during a 1% annual chance flood. Examples of these factors include Data Validity and Reliability; Developmental and Topographic Changes Over Time; Erosion, Deposition, and Debris Flow; and Meandering and Lateral Migration.

Data Validity and Reliability

Certain types of analysis methods yield more justifiable characterizations of flood hazards. For example, a gage analysis, to determine peak discharges, is based on actual measurements of watershed conditions over time and, therefore, is typically considered the most accurate method of hydrologic analysis. However, it is not feasible to install enough gages to gather data on every stream. In addition, for many of the gage sites that do exist, there are interruptions in the period of record. The usefulness of gage data for the purpose of predicting flooding behavior decreases with interruptions in the period of record; predicted flooding conditions over a 100-year period based on 20 years of measurements spread over a 35-year period are less valid than those based on 30 years of continuous measurements. A regression analysis is typically considered the best method in the absence of gage data, as it uses gage data from watersheds with similar characteristics to estimate flood frequency and magnitude in an ungaged watershed. Regression equations reflect average conditions for a region; therefore, the results will not exactly match the results of a gage analysis at a particular location. The standard errors of the North Carolina rural regression equations range from 44 to 51 percent for estimates of the 1% annual chance flood. That means the difference between the results of the regression equation and the gage analysis for approximately two-thirds of the locations that gage data exists are within 44 to 51 percent of the gage analysis results. A rainfall-runoff hydrologic analysis may be used for gaged or ungaged watersheds, and can estimate the effects of storage areas and flood control structures and measures. This method is most valid when calibrated against historical data.

Developmental and Topographic Changes Over Time

A FIRM is based on the best topographic and planimetric information available to FEMA and the State of North Carolina at the time the study is produced. In time, however, development and/or natural phenomena can alter the physical characteristics of a watershed and its drainage channels, resulting in changes in the flood hazards in those areas. For example, constructing a housing subdivision reduces the amount of soil that is available to absorb water; this in turn causes an increase in the volume of surface water that flows into the channel.

Erosion, Deposition, and Debris Flow

The flood hazards shown on a FIRM are based on the assumption of unobstructed flow. The FIRM does not reflect an analysis of areas that are subject to erosion caused by the increased water-surface elevations and velocities that occur during flooding. In addition to the risks of landslides or a weakening of the ground underneath roads or structures, any sediment that is removed from one location will be deposited in another; accumulated deposits may have a pronounced effect on flood hazards in those areas. Similarly, debris such as fallen trees or branches, litter, or other items may obstruct stream channels or hydraulic structures, increasing water-surface elevations, velocities, and floodplain width.

Meandering and Lateral Migration

FISs are based on the assumption that channel geometry will remain stable during normal drainage and during flood events. This assumption is valid for most streams, which flow over bedrock or between bedrock outcroppings that form non-alluvial channels. However, alluvial streams change the channel geometry with time, significantly so during flood events. Alluvial streams are subject to erosion and deposition, which may result in braided or meandering channels. Streams of this type may be characterized by lateral migration, or channel shifting, in which the stream may change course entirely during a flood. Whenever clear evidence is available, a FIRM will identify the alluvial nature of a studied flooding source and designate wider

floodways to allow for potential migration. However, these floodways are based on qualitative assessments and not on quantitative geomorphic and engineering analyses.

3.0 Insurance Applications

For flood insurance applications, the FIRM designates flood insurance rate zones and, in 1% annual chance floodplains that were studied by detailed methods, shows selected whole-foot BFEs or average depths. Insurance agents use the zones and BFEs in conjunction with information on structures and their contents to assign premium rates for flood insurance policies. Table 2, "Flood Zone Designations," includes a description of each type of flood hazard zone.

Table 2 - Flood Designations

Zone	Description
A	Zone A is the flood insurance rate zone that corresponds to the 1% annual chance floodplains that are determined in the FIS Report by approximate methods. Because detailed hydraulic analyses are not performed for such areas, no Base Flood Elevations or depths are shown within this zone.
AE	Zone AE is the flood insurance rate zone that corresponds to the 1% annual chance floodplains that are determined in the FIS Report by detailed methods. In most instances, whole-foot Base Flood Elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.
AH	Zone AH is the flood insurance rate zone that corresponds to the areas of 1% annual chance shallow flooding (usually areas of ponding) where average depths are between 1 and 3 feet. Whole-foot Base Flood Elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.
AO	Zone AO is the flood insurance rate zone that corresponds to the areas of 1% annual chance shallow flooding (usually sheet flow on sloping terrain) where average depths are between 1 and 3 feet. Average whole-foot depths derived from the detailed hydraulic analyses are shown within this zone.
AR	Zone AR is the flood insurance rate zone that corresponds to areas that were formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
A99	Zone A99 is the flood insurance rate zone that corresponds to areas of the 1% annual chance floodplain that will be protected by a Federal flood protection system where construction has reached specified statutory milestones. No Base Flood Elevations or depths are shown within this zone.
V	Zone V is the flood insurance rate zone that corresponds to the 1% annual chance coastal floodplains that have additional hazards associated with storm waves. Because approximate hydraulic analyses are performed for such areas, no Base Flood Elevations are shown within this zone.
VE	Zone VE is the flood insurance rate zone that corresponds to the 1% annual chance coastal floodplains that have additional hazards associated with storm waves. Whole-foot Base Flood Elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.
X	Zone X is the flood insurance rate zone that corresponds to areas outside the 0.2% annual chance floodplain, areas within the 0.2% annual chance floodplain, and to areas of 1% annual chance flooding where average depths are less than 1 foot, areas of 1% annual chance flooding where the contributing drainage area is less than 1 square mile, and areas protected from the 1% annual chance flood by levees. No Base Flood Elevations or depths are shown within this zone.
X (Future)	Zone X (Future Base Flood) is the flood insurance risk zone that corresponds to the 1-percent-annual-chance floodplains that are determined based on future-conditions hydrology. No BFEs or base flood depths are shown within this zone.
D	Zone D is the flood insurance rate zone that corresponds to unstudied areas where flood hazards are undetermined, but possible.

3.1 Coastal Barrier Resources System

This section is not applicable to this FIS project.

4.0 Area Studied

Cumberland County is found in the Coastal Plain region of North Carolina. It is surrounded by Harnett County to the north, Sampson County to the east, Bladen County to the south, and Hoke County to the west.

4.1 Basin Description

Table 3, "Basin Description" contains a description of the characteristics of the HUC-8 sub-basins within which each community falls. The table includes the main flooding sources within each basin, a brief description of the basin, and its area.

Table 3 - Basin Description

HUC-8 Sub-Basin Name	HUC-8 Sub-Basin Number	Primary Flooding Source	Description	HUC Area (square miles)
Black	03030006	Black River	The Black River Basin begins in the northeastern region of Harnett County, North Carolina. The basin then drains southeast through significant portions of Bladen, Cumberland, and Sampson Counties, ending at the Cape Fear River in Pender County.	1,574
Lower Cape Fear	03030005	Cape Fear River	The Lower Cape Fear River Basin begins in Cumberland County, southeast of Fayetteville, North Carolina. The basin then drains southeast through Bladen, Brunswick, Columbus, New Hanover, and Pender Counties.	1,122
Lumber	03040203	Lumber River	The Lumber River Basin headwaters are in Montgomery and Moore County. The basin then drains significant portions of Bladen, Columbus, Hoke, and Robeson Counties before confluencing with the Little Pee Dee River in South Carolina.	1,753
Upper Cape Fear	03030004	Cape Fear River	The Upper Cape Fear Basin begins just downstream of B. Everett Jordan Lake in Chatham County flowing through low, rolling hills until exiting in Cumberland County.	1,630

4.2 Principal Flood Problems

Table 4, "Principal Flood Problems" contains a list of principal flooding problems in Cumberland County.

Table 4 - Principal Flood Problems

Flooding Source	Problem
All Sources	Low-lying areas of Cumberland County flood periodically from the Cape Fear River, Little River, Rockfish Creek, Beaver Creek, Rockfish Creek, Little Rockfish Creek, Cross Creek, Blount Creek, Lock Creek, Tank Creek, Tank Creek Tributary A, and other streams included in this study. Flooding on the larger streams results primarily from tropical storms and major weather fronts, while flooding on the smaller streams is due mainly to local thunderstorms. In the City of Fayetteville, a flood of record on the Cape Fear River occurred in September 1945, when the river crested at 89 feet NGVD at the USGS gage with an associated discharge of 122,000 cfs, exceeding the 1% annual chance flood. Minor flooding occurred in February 1973, when the Cape Fear River reached a stage of 68 feet NGVD. The areas of most severe flooding lie within the floodplain adjacent to the Cape Fear River and in low-lying areas along Cross, Blounts, and Locks Creeks which are affected by backwater from the Cape Fear River.

4.3 Historic Flood Elevations

Hurricane Floyd

(9/16/1999)

Hurricane Floyd made landfall near Wilmington with category two winds of 105 to 110 mph. Rainfall totals from Floyd were as high as 15 to 20 inches over portions of eastern North Carolina; with a record of 23.45 inches of rain falling in the month of September at Wilmington, NC. This breaks the previous record of 21.12 inches set in July 1886. These rains combined with saturated ground from previous rain events, including Hurricane Dennis, to produce an inland flood disaster. There were 74 deaths in the United States, including 52 in North Carolina, due to drowning from flood waters. This makes Floyd the deadliest U.S. hurricane since Agnes in 1972. Data from the USGS indicate that eleven of their stream gage monitoring sites in North Carolina (Ahoskie, Rocky Mount, Hilliardston, White Oak, Enfield, Tarboro, Lucama, Hookerton, Trenton, Chinquapin, and Freeland) exceeded 0.2% annual chance flood levels due to Floyd. Total losses in North Carolina approach $5 billion with an estimated $3.5 billion in damages to North Carolina homes, businesses, roads, and infrastructure. Floyd passed relatively close to the entire U.S. east coast, justifying hurricane warnings from Florida to Massachusetts and requiring an estimated two million people to evacuate. The last hurricane to require warnings for as large a stretch of coastline was Hurricane Donna in 1960.

Hurricane Bonnie

(8/26/1998)

The landfall location of Bonnie was in southern North Carolina near Cape Fear very close to landfall of both Hurricanes Bertha and Fran in 1996. Even though a powerful storm, damage from Bonnie was much less than Fran, which was also Category 3. Winds gusted up to 100 knots and storm tides of 5

to 8 feet above normal were reported mainly in eastern beaches of Brunswick County, while a storm surge of 6 feet was reported at Pasquotank and Camden Counties in the Albemarle Sound.

Hurricane Fran
(9/5/1996)
The landfall location of Fran near the city of Wilmington and its progression into the Raleigh-Durham area caused an estimated $1.275 billion in damage in North Carolina alone. Fran hit with gusts up to 105 mph and a storm surge of approximately 16 feet. Over $1 billion in damage was reported in North Topsail Beach and Surf City and 23 people were killed.

Hurricane Bertha
(7/12/1996)
1996 was a damaging year in the hurricane history of North Carolina. Tropical Storm Arthur, Hurricane Bertha, and Hurricane Fran all made direct landfall on the North Carolina coastline. It was the most active tropical cyclone season in the state since 1955, when Hurricanes Connie, Diane, and Ione all hit the coast. Bertha entered North Carolina in North Topsail Beach with 105 mph gust and a storm surge of approximately 5 feet.

Hurricane Gloria
(9/26/1985)
The landfall location of Gloria was Cape Hatteras, with 90 knot winds and a storm surge of approximately 6-8 feet.

Hurricane Diana
(9/13/1984)
The landfall location of Diana was 38 miles south of Wilmington with 90 mph winds at its closest approach to Wilmington. Diana had 115 mph sustained winds before landfall. Storm surge was approximately 5-6 feet.

Table 5, “Historic Flood Elevations” is not applicable in Cumberland County.

4.4 Flood Protection Measures

Flood protection measures may be structural (such as levees, dams, and reservoirs) or non-structural (such as land-use management ordinances, policies, or practices).

Table 6, “Non-Levee Flood Protection Measures” is not applicable in Cumberland County.

Table 7, “Levees” is not applicable in Cumberland County.

4.5 Scope of Study

For this map maintenance revision, a scoping meeting was held in Cumberland County to present the results of initial research to the county and communities within the county and to discuss their floodplain mapping needs. The county and communities were asked to provide input on proposed study priorities and analysis methods. These meetings resulted in the identification of flooding sources having a floodplain mapping need. Map Maintenance Plans were developed based on the results of the scoping meetings and were both mailed to each jurisdiction within Cumberland County and posted to the State’s website at www.ncfloodmaps.com.

Draft basin plans were developed based on the results of the initial scoping meetings. Final scoping meetings were held by the State and FEMA to provide counties and communities an overview of the draft basin plans, including the proposed scope and schedule for the project, and to provide an opportunity for additional county and community input. After the final scoping meeting was held, the Final Basin Plans were produced.

This FIS covers the geographic area of Cumberland County, North Carolina, and all jurisdictions therein. The areas studied by detailed methods were selected with priority given to all known flood hazard areas and areas of projected development and proposed construction. Limits of detailed study are indicated on the Flood Profiles and/or Water-surface elevation rasters and/or the FIRM.

Table 8P, “Scope of Revisions: Revised or New Detailed Study -Preliminary”, lists flooding sources that were newly studied by detailed methods or were previously studied by detailed methods and had a change in backwater elevation due to flooding effects from a newly studied flooding source.

Table 8P - Scope of Revisions: Revised or New Detailed Study - Preliminary

Source	Riverine Sources		Affected Communities
	From	To	
South River	Approximately 2.0 miles downstream of S. Gray Street	Approximately 1.8 miles upstream of W. William Street	Cumberland County Fort Bragg Military Reservation

Table 9P, “Scope of Revisions: Redelineated - Preliminary” is not applicable in Cumberland County.

Table 10P, “Scope of Revisions: Limited Detailed - Preliminary”, lists flooding sources that were newly studied by limited detailed methods or were previously studied by limited detailed methods and had a change in backwater elevation due to flooding effects from a newly studied flooding source.

Table 10P - Scope of Revisions: Limited Detailed - Preliminary

Source	Riverine Sources		Affected Communties
	From	To	
Gum Swamp[1]	At the confluence with South River	Approximately 0.6 mile downstream of Hollow Bridge Road	Cumberland County Fort Bragg Military Reservation
Sandy Creek[1]	At the confluence with South River	Approximately 1,350 feet upstream of Hollow Bridge Road	Cumberland County Fort Bragg Military Reservation Town Of Stedman

[1]Revised to reflect backwater effects from new detailed study

Table 8, “Flooding Sources Studied by Detailed Methods”, lists all flooding sources within the county that were studied by detailed methods for this FIS and previous FISs.

Table 8 - Flooding Sources Studied by Detailed Methods: Revised or Newly Studied

Source	Riverine Sources		Affected Communties
	From	To	
South River	Approximately 2.0 miles downstream of S. Gray Street	Approximately 1.8 miles upstream of W. William Street	Cumberland County Fort Bragg Military Reservation

Table 9, “Flooding Sources Studied by Detailed Methods: Redelineated”, lists all flooding sources that were studied by detailed methods for the pre-statewide FIS and redelineated for previous FISs. These flooding sources were not part of this revision and their effective analyses remain valid.

Table 9 - Flooding Sources Studied by Detailed Methods: Redelineated

Source	Riverine Sources		Affected Communties
	From	To	
Cape Fear River	The Harnett/Cumberland County boundary	Lee/Harnett County Boundary	City Of Fayetteville Cumberland County Fort Bragg Military Reservation Town Of Eastover Town Of Wade

Table 10, “Flooding Sources Studied by Detailed Methods: Limited Detailed”, lists all flooding sources within the county that were studied by limited detailed methods for either this FIS or previous FISs.

Table 10 - Flooding Sources Studied by Detailed Methods: Limited Detailed

Source	Riverine Sources		Affected Communties
	From	To	
Beaver Dam Creek	At the confluence with South River	Approximately 1,800 feet upstream of Spencer Road	Cumberland County Fort Bragg Military Reservation
Big Creek	At the confluence with South River	Approximately 5.1 miles upstream of Maxwell Road	Cumberland County Fort Bragg Military Reservation
Black River	At the confluence with South River	Approximately 1.9 miles upstream of Harnett/Cumberland County boundary	Cumberland County Fort Bragg Military Reservation
Browns Swamp	At the confluence with South River	Approximately 680 feet upstream of South River School Road	Cumberland County Fort Bragg Military Reservation
Browns Swamp Tributary 1	At the confluence with Browns Swamp	Approximately 650 feet upstream of Kennel Road	Cumberland County Fort Bragg Military Reservation
Gum Swamp	At the confluence with South River	Approximately 0.9 mile upstream of Hollow Bridge Road	Cumberland County Fort Bragg Military Reservation
Mingo Swamp	Sampson/Cumberland/ Harnett County boundaries	Approximately 0.7 mile upstream of Red Hill Church Road	Cumberland County Fort Bragg Military Reservation
Peters Creek	At the Cumberland/Bladen County boundary	Approximately 1,400 feet upstream of C.S. Faircloth Road	Cumberland County Fort Bragg Military Reservation
Sandy Creek	At the confluence with South River	Approximately 375 feet upstream of Horne Farm Road	Cumberland County Fort Bragg Military Reservation Town Of Stedman
South River	Approximately 1.7 miles upstream of Clinton Road	Approximately 0.7 mile upstream of confluence of Black River	Cumberland County Fort Bragg Military Reservation Town Of Falcon

Table 10 - Flooding Sources Studied by Detailed Methods: Limited Detailed

Source	Riverine Sources		Affected Communties
	From	To	
South River	Approximately 630 feet upstream of Greens Bridge Road	Approximately 1,500 feet upstream of the confluence of Gum Swamp	Cumberland County Fort Bragg Military Reservation
South River Tributary 1	At the confluence with South River	Approximately 1.1 miles upstream of Smithfield Road	Cumberland County Fort Bragg Military Reservation
South River Tributary 2	At the confluence with South River Tributary 1	Approximately 0.4 mile upstream of Sambo Jackson Road	Cumberland County Fort Bragg Military Reservation
South River Tributary 3	At the confluence with South River	Approximately 0.7 mile upstream of the confluence with South River	Cumberland County Fort Bragg Military Reservation Town Of Falcon
South River Tributary 4	At the confluence with South River	Approximately 0.5 mile upstream of Rhodes Pond Road	Cumberland County Fort Bragg Military Reservation

Table 11, “Stream Name Changes” is not applicable in Cumberland County.

Table 12, “Letters of Map Revision” is not applicable in Cumberland County.

5.0 Engineering Methods

For the flooding sources in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude that are expected to be equaled or exceeded at least once on the average during any 10-, 25-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for floodplain management and for flood insurance rates. These events, commonly termed the 10-, 25-, 50-, 100-, and 500-year floods, have a 10-, 4-, 2-, 1-, and 0.2% annual chance, respectively, of being equaled or exceeded during any year. Although the recurrence interval represents the long-term, average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood that equals or exceeds the 100-year flood (1-percent chance of annual exceedance) during the term of a 30-year mortgage is approximately 26 percent (about 3 in 10); for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

5.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak elevation-frequency relationships for floods of the selected recurrence intervals for each flooding source studied. Hydrologic analyses are typically performed at the watershed level. Depending on factors such as watershed size and shape, land use and urbanization, and natural or man-made storage, various models or methodologies may be applied. For details on the county’s hydrologic analyses, the hydrologic report is available by request.

A summary of the drainage area-peak discharge relationships for the flooding sources studied by detailed methods is shown in Table 13, “Summary of Discharges”.

Table 13 - Summary of Discharges

Flooding Source		Discharges (cfs)			
Location	Drainage Area (square miles)	10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Beaver Dam Creek					
Approximately 1,500 feet upstream of mouth	26.80	*	*	3,013	*
Approximately 2,000 feet upstream of mouth	26.10	*	*	2,968	*
Approximately 0.8 mile upstream of State Highway 242	25.20	*	*	2,906	*
Approximately 1,350 feet upstream of Manly Smith Road	24.20	*	*	2,841	*
Approximately 0.4 mile upstream of Manly Smith Road	19.80	*	*	2,538	*
Approximately 0.8 mile upstream of Manly Smith Road	18.90	*	*	2,469	*
Approximately 0.7 mile upstream of State Highway 210 South	18.00	*	*	2,404	*
Approximately 0.8 mile upstream of State Highway 210 South	13.10	*	*	2,009	*
Approximately 1.2 miles upstream of State Highway 210 South	12.90	*	*	1,986	*
Approximately 1.3 miles upstream of State Highway 210 South	11.70	*	*	1,880	*

Table 13 - Summary of Discharges

Flooding Source		Discharges (cfs)			
Location	Drainage Area (square miles)	10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Approximately 2.5 miles upstream of State Highway 210 South	10.10	*	*	1,734	*
Approximately 1,130 feet downstream of Spencer Road	9.30	*	*	1,651	*
Approximately 1,930 feet upstream of Spencer Road	8.60	*	*	1,585	*
Big Creek					
Approximately 0.7 mile upstream of mouth	21.00	*	*	2,620	*
Approximately 1.1 miles upstream of mouth	20.00	*	*	2,550	*
Approximately 1.1 miles upstream of Maxwell Road	5.20	*	*	1,186	*
Approximately 1.7 miles upstream of Maxwell Road	4.80	*	*	1,135	*
Approximately 2.3 miles upstream of Maxwell Road	2.80	*	*	839	*
Approximately 2.8 miles upstream of Maxwell Road	2.00	*	*	692	*
Approximately 5.1 miles upstream of Maxwell Road	1.00	*	*	476	*
Black River					
At mouth	57.10	*	*	5,770	*
Approximately 1,900 feet downstream of Interstate 95	56.30	*	*	5,730	*
Approximately 275 feet upstream of Main Street	55.20	*	*	5,660	*
Approximately 1.1 miles upstream of Main Street	54.00	*	*	5,590	*
Approximately 1,700 feet downstream of Harnett/Cumberland County boundary	52.80	*	*	5,520	*
Browns Swamp					
Approximately 1,500 feet upstream of mouth	6.10	*	*	1,305	*
Approximately 380 feet upstream of confluence of Browns Swamp Tributary 1	3.00	*	*	868	*
Browns Swamp Tributary 1					
At mouth	2.90	*	*	847	*
Gum Swamp					
At mouth	10.10	*	*	1,736	*
Approximately 0.9 mile upstream of mouth	9.60	*	*	1,684	*
Approximately 490 feet downstream of Hollow Bridge Road	8.60	*	*	1,584	*
Approximately 0.9 mile upstream of Hollow Bridge Road	8.00	*	*	1,519	*
Mingo Swamp					
At mouth	57.70	*	*	4,640	*
Approximately 1.6 miles upstream of the mouth	57.00	*	*	4,610	*
Approximately 2.6 miles upstream of the mouth	55.90	*	*	4,560	*
Approximately 3.3 miles upstream of the mouth	54.80	*	*	4,510	*
Approximately 3.5 miles upstream of the mouth	54.40	*	*	4,490	*
Approximately 130 feet downstream of North Spring Branch Road	53.30	*	*	4,440	*
Approximately 420 feet upstream of North Spring Branch Road	52.80	*	*	4,420	*
Approximately 1.4 miles upstream of North Spring Branch Road	51.40	*	*	4,350	*
Approximately 500 feet upstream of the confluence of Big Juniper Run	42.50	*	*	3,910	*
Approximately 0.9 mile upstream of the confluence of Big Juniper Run	42.10	*	*	3,890	*
Approximately 1.0 mile upstream of the confluence of Big Juniper Run	41.00	*	*	3,830	*
Approximately 1.3 miles upstream of the confluence of Big Juniper Run	39.80	*	*	3,770	*
Approximately 345 feet upstream of Stony Run	30.00	*	*	3,210	*
Approximately 1,000 feet upstream of State Route 55	29.60	*	*	3,180	*
Approximately 1.1 miles upstream of State Route 55	28.70	*	*	3,130	*
Approximately 2.0 miles upstream of State Route 55	27.50	*	*	3,050	*

Table 13 - Summary of Discharges

Flooding Source		Discharges (cfs)			
Location	Drainage Area (square miles)	10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Approximately 2.6 miles upstream of State Route 55	25.70	*	*	2,940	*
Approximately 3.0 miles upstream of State Route 55	24.90	*	*	2,890	*
Approximately 3.6 miles upstream of State Route 55	24.00	*	*	2,830	*
Approximately 360 feet downstream of the confluence of Mingo Swamp Tributary 1	23.20	*	*	2,770	*
Approximately 400 feet upstream of the confluence of Mingo Swamp Tributary 1	19.30	*	*	2,500	*
Approximately 750 feet downstream of Hayner Lake Dam	18.90	*	*	2,470	*
Approximately 0.82 mile upstream of Jonesboro Road	15.20	*	*	2,180	*
Approximately 0.29 mile downstream of Farmview Road	14.30	*	*	2,110	*
Approximately 0.05 mile upstream of Interstate 95	13.50	*	*	2,040	*
Approximately 0.16 mile downstream of U.S. Route 301	12.80	*	*	1,980	*
Approximately 0.15 mile upstream of U.S. Route 301	8.30	*	*	1,560	*
Confluence of East Mingo Creek	3.40	*	*	928	*
Approximately 0.26 mile downstream of Red Hill Church Road	2.20	*	*	738	*
Approximately 0.41 mile upstream of Red Hill Church Road	1.80	*	*	655	*
Peters Creek					
At mouth	6.30	*	*	1,327	*
Approximately 0.6 mile upsteam of State Highway 210	5.60	*	*	1,237	*
Approximately 890 feet upstream of Peters Creek Church Road	4.50	*	*	1,094	*
Sandy Creek					
Approximately 280 feet downstream of Hollow Bridge Road	14.40	*	*	2,120	*
Approximately 0.5 mile upstream of Hollow Bridge Road	13.90	*	*	2,074	*
Approximately 1.4 miles upstream of Hollow Bridge Road	13.10	*	*	2,007	*
Approximately 2.0 miles upstream of Hollow Bridge Road	12.30	*	*	1,934	*
Approximately 2.2 miles upstream of Hollow Bridge Road	10.80	*	*	1,795	*
Approximately 2.4 miles upstream of Hollow Bridge Road	10.60	*	*	1,784	*
Approximately 1,950 feet downstream of Carol Street	9.70	*	*	1,689	*
Approximately 1,360 feet upstream of Carol Street	9.20	*	*	1,641	*
Approximately 1,910 feet upstream of Carol Street	7.80	*	*	1,491	*
Approximately 200 feet downstream of Horne Farm Road	7.40	*	*	1,452	*
South River					
Approximately 0.6 mile upstream of the Bladen/Cumberland County boundary	363.70	*	*	7,704	*
Approximately 1,000 feet upstream of the Bladen/Cumberland County boundary	363.70	*	*	7,704	*
Approximately 1.0 mile upstream of the Bladen/Cumberland County boundary	362.80	*	*	7,699	*
Approximately 575 feet upstream of the confluence of Beaver Dam Creek	362.00	*	*	7,696	*
Approximately 0.5 mile upstream of the confluence of Beaver Dam Creek	334.20	*	*	7,549	*
Approximately 125 feet downstream of State Route 242	330.70	*	*	7,529	*
Approximately 0.5 mile upstream of State Route 242	329.50	*	*	7,522	*
Approximately 775 feet downstream of the confluence of Big Swamp	328.90	*	*	7,518	*
Approximately 1,230 feet upstream of the confluence of Big Swamp	327.90	*	*	7,512	*
Approximately 1.0 mile upstream of the confluence of Big Swamp	275.70	*	*	7,137	*
Approximately 1.9 miles upstream of the confluence of Big Swamp	274.50	*	*	7,127	*
Approximately 0.7 mile upstream of Butler Island Bridge Road	273.60	*	*	7,119	*
Approximately 1.0 mile upstream of Butler Island Bridge Road	272.70	*	*	7,111	*
Approximately 1.3 miles upstream of Butler Island Bridge Road	270.80	*	*	7,095	*
Approximately 2.8 miles upstream of Butler Island Bridge Road	269.80	*	*	7,087	*

Table 13 - Summary of Discharges

Flooding Source		Discharges (cfs)			
Location	Drainage Area (square miles)	10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Approximately 3.6 miles upstream of Butler Island Bridge Road	269.20	*	*	7,081	*
Approximately 4.0 miles upstream of Butler Island Bridge Road	267.40	*	*	7,066	*
Approximately 4.7 miles upstream of Butler Island Bridge Road	266.60	*	*	7,058	*
Approximately 5.1 miles upstream of Butler Island Bridge Road	265.70	*	*	7,050	*
Approximately 5.9 miles upstream of Butler Island Bridge Road	264.40	*	*	7,039	*
Approximately 6.6 miles upstream of Butler Island Bridge Road	263.60	*	*	7,031	*
Approximately 0.6 mile downstream of the confluence of Gum Swamp	262.80	*	*	7,025	*
Approximately 1,110 feet downstream of the confluence of Gum Swamp	262.30	*	*	7,019	*
Approximately 1.05 miles downstream of S Gray Street	249.08	3,604	5,789	6,880	9,387
Approximately 0.63 mile downstream of S Gray Street	233.47	3,547	5,718	6,801	9,278
Approximately 1.5 miles upstream of W Williams Street	230.63	3,496	5,639	6,708	9,151
Approximately 0.6 mile downstream of the confluence of Big Creek	227.60	*	*	6,673	*
Approximately 915 feet upstream of the confluence of Big Creek	206.30	*	*	6,426	*
Approximately 0.6 mile upstream of the confluence of Big Creek	205.90	*	*	6,421	*
Approximately 0.9 mile upstream of the confluence of Big Creek	205.00	*	*	6,410	*
Approximately 1,520 feet upstream of Faircloth Road	202.00	*	*	6,372	*
Approximately 0.7 mile upstream of Faircloth Road	201.40	*	*	6,364	*
Approximately 1.0 mile upstream of Faircloth Road	200.70	*	*	6,356	*
Approximately 1.4 miles upstream of Faircloth Road	199.20	*	*	6,336	*
Approximately 1.8 miles upstream of Faircloth Road	197.40	*	*	6,313	*
Approximately 0.4 mile upstream of Maxwell Road	194.70	*	*	6,277	*
Approximately 0.9 mile upstream of Maxwell Road	193.70	*	*	6,264	*
Approximately 1.3 miles upstream of Maxwell Road	193.10	*	*	6,257	*
Approximately 990 feet upstream of the confluence of Jones Swamp	179.90	*	*	6,076	*
Approximately 1,860 feet upstream of the confluence of Browns Swamp	173.30	*	*	5,981	*
Approximately 1.5 miles upstream of the confluence of Browns Swamp	172.50	*	*	5,968	*
Approximately 1,560 feet upstream of Hayes Mill Road	170.50	*	*	5,938	*
Approximately 1.1 miles upstream of Hayes Mill Road	170.30	*	*	5,935	*
Approximately 1.4 miles upstream of Hayes Mill Road	168.00	*	*	5,901	*
Approximately 0.4 mile upstream of the confluence of South River Tributary 1	162.60	*	*	5,818	*
Approximately 0.5 mile upstream of Highway 13	162.30	*	*	5,813	*
Approximately 0.9 mile upstream of Highway 13	161.30	*	*	5,798	*
Approximately 385 feet downstream of the confluence of Little Beaverdam Swamp	160.30	*	*	5,782	*
Approximately 1,800 feet upstream of the confluence of Little Beaverdam Swamp	143.90	*	*	5,510	*
Approximately 1.4 miles upstream of the confluence of Little Beaverdam Swamp	142.70	*	*	5,490	*
Approximately 300 feet downstream of Green Path Road	141.70	*	*	5,473	*
Approximately 500 feet upstream of the confluence of South River Tributary 3	138.80	*	*	5,422	*
Approximately 1.2 miles upstream of the confluence of South River Tributary 3	138.40	*	*	5,414	*
Approximately 1.4 miles upstream of the confluence of South River Tributary 3	80.70	*	*	5,414	*
South River Tributary 1					
At mouth	5.00	*	*	1,164	*
Approximately 660 feet upstream of the confluence of South River Tributary 2	2.80	*	*	844	*
Approximately 1,440 feet upstream of Stewart Road	2.10	*	*	715	*
South River Tributary 2					
At mouth	1.70	*	*	621	*

Table 13 - Summary of Discharges

Flooding Source		Discharges (cfs)			
Location	Drainage Area (square miles)	10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Approximately 1.0 mile upstream of mouth	1.00	*	*	468	*
South River Tributary 3					
At mouth	1.90	*	*	673	*
Approximately 0.7 mile upstream of mouth	1.30	*	*	549	*
South River Tributary 4					
At mouth	3.50	*	*	953	*

Table 14, “Summary of Stillwater Elevations” is not applicable in Cumberland County.

Table 15, “Gage Information” is not applicable in Cumberland County.

5.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of flooding from the sources studied were carried out to provide estimates of the flood elevations for the selected recurrence intervals. Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles and/or Water-surface elevation rasters. For stream segments for which BFEs were computed, selected cross-section locations are also shown on the FIRM. Flood Profiles and/or Water-surface elevation rasters were developed showing computed water-surface elevations for floods of the selected recurrence intervals.

Users should be aware that flood elevations shown on the FIRM represent rounded whole-foot elevations and may not exactly reflect the elevations shown on the Flood Profiles and/or Water-surface elevation rasters or in the Floodway Data tables in the FIS Report. For construction and/or floodplain management purposes, users are encouraged to use the flood elevation data presented in the FIS in conjunction with the data shown on the FIRM.

The hydraulic analyses for this FIS were based on unobstructed flow. The flood elevations shown on the Flood Profiles are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

For details on the county’s hydraulic analyses, the hydraulic report is available by request.

For the streams studied by detailed methods, water surface elevations of floods of the selected recurrence intervals were computed through use of the Army Corps of Engineers' HEC RAS step backwater computer program . The hydraulic analyses were based on unobstructed flow. The flood elevations shown on the Profiles and/or Water-surface elevation rasters are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail. The computer models were calibrated using historic high water data collected during field investigations.

The cross section geometries were obtained from a combination of digital elevation data obtained by Light Detection and Ranging (LIDAR) and field surveys. All bridges, dams, and culverts were field surveyed to obtain elevation data and structural geometry. Natural floodplain cross sections were surveyed approximately every 4000 feet along the detail study reaches to obtain the channel geometry between bridges and culverts. Overbank cross section data for the backwater analyses were obtained from recently flown LIDAR data.

Channel roughness factors (Manning’s “n”) used in the hydraulic computations were made in the field by an engineer where stream access was possible, with orthophotos used to supplement areas that could not be accessed. The channel and overbank “n” values for all of the streams studied by detailed methods are shown in Table 16, “Roughness Coefficients”.

Table 16 - Roughness Coefficients

Stream	Channel "n"	Overbank "n"
Beaver Dam Creek	0.040 to 0.050	0.110 to 0.150
Big Creek	0.040 to 0.055	0.100 to 0.150
Black River	0.033 to 0.058	0.040 to 0.300
Browns Swamp	0.040 to 0.045	0.100 to 0.140
Browns Swamp Tributary 1	0.040 to 0.045	0.120 to 0.140
Cape Fear River	0.030 to 0.059	0.050 to 0.666
Gum Swamp	0.045 to 0.050	0.120 to 0.150
Mingo Swamp	0.043 to 0.050	0.130 to 0.160
Peters Creek	0.045 to 0.050	0.120 to 0.150
Sandy Creek	0.040 to 0.050	0.100 to 0.150
South River	0.040 to 0.060	0.080 to 0.620
South River Tributary 1	0.040 to 0.050	0.090 to 0.140

Table 16 - Roughness Coefficients

Stream	Channel "n"	Overbank "n"
South River Tributary 2	0.040 to 0.045	0.100 to 0.140
South River Tributary 3	0.045 to 0.500	0.150
South River Tributary 4	0.042	0.090 to 0.110

For flooding sources studied by limited detailed methods in the county, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this report and the FIRM panels. This method entails developing a HEC-RAS hydraulic model, resulting in the calculation of BFEs and the delineation of the 1% annual chance floodplain (designated as Zone AE). Cross sections for the flooding sources studied by limited detailed methods were obtained using digital elevation data obtained with LIDAR technology developed as part of the North Carolina Statewide Floodplain Mapping Program. The hydraulic model is prepared using this digital elevation data, without surveying bathymetric or structural data. Where bridge or culvert data are readily available, such as from the North Carolina Department of Transportation, these data have been reflected in the hydraulic model. If these structural data are not readily available, field measurements of these structures were made to approximate their geometry in the hydraulic models. In addition, this method does not include field surveys that determine specifics on channel and floodplain characteristics. A limited detailed study is a “buildable” product that can be upgraded to a fully detailed study at a later date by verifying stream channel characteristics, bridge and culvert opening geometry, and by analyzing multiple recurrence intervals.

The results of the HEC-RAS computations are tabulated for all cross sections (Table 17, “Limited Detailed Flood Hazard Data”). Flood Profiles have not been developed for streams studied by limited detailed methods. Water-surface elevation rasters were developed for steams studied by limited detailed methods. In addition, floodways for streams studied by limited detailed methods are not delineated on the FIRM. However, the 1% annual chance water-surface elevations, flood discharges, and non-encroachment widths from the limited detailed studies for every modeled cross section are given in Table 17. The non-encroachment widths given at modeled cross sections can be used by communities to enforce floodplain management ordinances that meet the requirement defined in 44 CFR 60.3(c)(10).

Between cross sections for streams studied by limited detailed methods, 1% annual chance water-surface elevations can be calculated by mathematical interpolation using the distance along the stream centerline. Non-encroachment widths and, therefore, the location of a non-encroachment area boundary between cross sections should be determined based on either 1) mathematical interpolation, or 2) the non-encroachment width at the upstream or downstream cross section, whichever is larger. If the width determined by this second method is wider than the Special Flood Hazard Area (SFHA) or the 1% annual chance floodplain delineated on the FIRM for this location along the stream, the non-encroachment area shall be considered to be coincident with the SFHA. A full detailed study incorporating field survey data in the HEC-RAS hydraulic model may be submitted for a Letter of Map Revision (LOMR) request to map a regulatory floodway along a section of a stream in lieu of applying the non-encroachment widths listed in Table 17.

Table 17 - Limited Detailed Flood Hazard Data

Cross Section	Stream Station	Flood Discharge (cfs)	1% Annual Chance Water-Surface Elevation (feet NAVD 88)	Non-Encroachment Width (feet) Left/Right from Stream Centerline
Beaver Dam Creek				
015	1,500	3,013	73.8[1]	696 / 129
020	2,000	2,968	74.3	346 / 184
025	2,500	2,968	75.0	347 / 100
030	3,000	2,968	76.0	198 / 161
035	3,500	2,968	76.6	259 / 254
040	4,000	2,968	77.1	96 / 209
045	4,500	2,968	78.4	77 / 339
049	4,896	2,968	79.0	123 / 310
049	4,941	2,968	79.9	123 / 310
052	5,202	2,968	80.0	112 / 324
055	5,500	2,968	80.2	143 / 322
060	6,000	2,968	80.4	181 / 227
065	6,500	2,968	80.7	215 / 207
070	7,000	2,968	81.2	240 / 40
076	7,623	2,968	81.9	290 / 61
084	8,399	2,968	82.7	398 / 125
090	9,000	2,906	83.2	325 / 81

Table 17 - Limited Detailed Flood Hazard Data

Cross Section	Stream Station	Flood Discharge (cfs)	1% Annual Chance Water-Surface Elevation (feet NAVD 88)	Non-Encroachment Width (feet) Left/Right from Stream Centerline
095	9,500	2,906	83.5	404 / 37
099	9,877	2,906	83.8	272 / 136
105	10,500	2,906	84.6	40 / 377
110	11,000	2,906	85.1	40 / 367
115	11,500	2,906	85.6	99 / 307
120	12,000	2,906	86.0	52 / 368
125	12,500	2,906	86.5	181 / 365
130	13,000	2,906	86.9	106 / 313
133	13,296	2,906	87.1	77 / 430
136	13,613	2,906	87.4	54 / 365
137	13,678	2,906	89.4	54 / 365
141	14,064	2,906	89.5	221 / 407
145	14,500	2,906	89.6	294 / 364
150	15,000	2,841	89.8	218 / 365
155	15,500	2,841	89.9	216 / 511
160	16,000	2,538	90.0	285 / 332
165	16,500	2,538	90.2	252 / 241
170	17,000	2,538	90.5	257 / 266
175	17,500	2,538	90.8	194 / 197
180	18,000	2,469	91.2	154 / 344
185	18,500	2,469	91.5	123 / 164
190	19,000	2,469	91.9	156 / 202
195	19,500	2,469	92.1	388 / 199
201	20,055	2,469	92.2	260 / 345
206	20,589	2,469	92.4	121 / 551
211	21,083	2,469	92.5	310 / 261
215	21,536	2,469	92.5	35 / 35
216	21,614	2,469	93.6	35 / 35
220	22,000	2,469	94.4	281 / 69
225	22,500	2,469	94.6	237 / 247
230	23,000	2,469	94.8	235 / 238
235	23,500	2,469	94.9	166 / 262
240	24,000	2,469	95.1	315 / 334
245	24,500	2,469	95.3	179 / 390
250	25,000	2,469	95.4	196 / 352
255	25,500	2,404	95.8	109 / 299
259	25,909	2,009	96.0	200 / 179
266	26,601	2,009	96.5	301 / 63
270	27,000	2,009	96.8	306 / 276
275	27,500	2,009	97.0	172 / 176
279	27,937	1,986	97.4	188 / 107
286	28,581	1,880	97.9	262 / 113
290	29,000	1,880	98.2	173 / 198
295	29,500	1,880	98.5	82 / 304
300	30,000	1,880	98.8	202 / 178

Table 17 - Limited Detailed Flood Hazard Data

Cross Section	Stream Station	Flood Discharge (cfs)	1% Annual Chance Water-Surface Elevation (feet NAVD 88)	Non-Encroachment Width (feet) Left/Right from Stream Centerline
306	30,562	1,880	99.0	183 / 118
315	31,500	1,820	99.4	288 / 39
321	32,097	1,820	100.0	395 / 40
325	32,459	1,820	100.3	193 / 101
330	33,000	1,820	100.9	149 / 133
335	33,500	1,820	101.4	208 / 124
340	34,000	1,820	101.8	154 / 116
345	34,500	1,820	102.3	242 / 207
349	34,900	1,734	102.5	208 / 228
355	35,500	1,734	102.8	269 / 173
360	36,000	1,734	103.0	197 / 143
365	36,500	1,734	103.4	68 / 231
369	36,940	1,651	103.8	278 / 23
375	37,500	1,651	104.2	185 / 106
378	37,791	1,651	104.4	270 / 107
380	38,032	1,651	104.5	184 / 144
381	38,107	1,651	105.4	184 / 144
385	38,472	1,651	105.5	112 / 185
390	39,015	1,651	105.8	151 / 167
395	39,500	1,651	106.0	257 / 58
400	40,000	1,585	106.3	291 / 183
Big Creek				
035	3,500	2,620	102.0[1]	483 / 119
040	4,000	2,620	102.0[1]	290 / 327
045	4,500	2,620	102.0[1]	339 / 367
050	5,007	2,620	102.0[1]	57 / 407
055	5,500	2,620	102.0[1]	484 / 245
060	6,000	2,550	102.0[1]	404 / 234
065	6,500	2,550	102.0[1]	434 / 355
070	7,000	2,550	102.0[1]	348 / 375
274	27,433	1,300	127.3	167 / 482
279	27,886	1,300	127.5	357 / 384
283	28,301	1,300	127.8	159 / 290
291	29,084	1,186	128.6	240 / 316
295	29,517	1,186	129.0	339 / 357
304	30,413	1,186	129.4	273 / 481
314	31,413	1,186	130.2	240 / 130
324	32,413	1,135	131.0	492 / 245
334	33,413	1,135	132.0	369 / 259
344	34,413	1,135	132.8	1,134 / 29
354	35,413	839	133.1	602 / 405
364	36,413	839	133.6	411 / 198
379	37,913	692	134.4	126 / 572
389	38,913	692	134.9	469 / 183
399	39,913	692	135.5	830 / 53

Table 17 - Limited Detailed Flood Hazard Data

Cross Section	Stream Station	Flood Discharge (cfs)	1% Annual Chance Water-Surface Elevation (feet NAVD 88)	Non-Encroachment Width (feet) Left/Right from Stream Centerline
414	41,413	692	136.0	602 / 53
424	42,413	692	136.6	341 / 183
434	43,413	692	137.1	700 / 53
444	44,413	692	137.6	350 / 50
454	45,415	692	138.4	600 / 450
467	46,737	692	139.0	80 / 4
505	50,503	476	144.9	80 / 225
Black River				
059	5,850	5,775	124.5[1]	1,586 / 31
064	6,439	5,775	125.3	1,171 / 221
073	7,271	5,775	126.5	1,310 / 41
080	8,008	5,775	127.3	1,155 / 100
087	8,668	5,730	127.8	1,175 / 542
094	9,399	5,730	128.3	110 / 710
102	10,182	5,730	130.0	99 / 98
103	10,332	5,730	130.0	99 / 98
108	10,776	5,730	130.8	430 / 532
114	11,379	5,730	130.9	500 / 700
120	12,011	5,730	131.0	1,134 / 459
128	12,792	5,660	134.4	1,400 / 184
129	12,898	5,660	134.4	1,400 / 184
131	13,070	5,660	134.7	964 / 230
132	13,227	5,660	134.7	1,061 / 482
140	14,045	5,660	135.1	935 / 418
146	14,623	5,660	135.3	1,042 / 618
152	15,217	5,660	135.5	1,100 / 100
158	15,830	5,660	135.7	1,069 / 900
165	16,532	5,660	135.9	1,278 / 649
172	17,240	5,660	136.0	1,210 / 396
179	17,902	5,660	136.2	1,146 / 303
187	18,661	5,660	136.4	375 / 684
194	19,420	5,590	136.6	357 / 1,044
202	20,231	5,590	136.8	531 / 1,048
208	20,803	5,590	136.9	559 / 460
218	21,758	5,590	137.4	547 / 733
226	22,644	5,590	137.7	358 / 843
237	23,721	5,520	138.2	730 / 550
246	24,583	5,520	138.6	595 / 1,104
253	25,274	5,520	139.0	96 / 896
259	25,885	5,520	139.4	222 / 997
265	26,539	5,520	139.8	564 / 867
Browns Swamp				
015	1,528	1,305	111.2[1]	150 / 150
021	2,133	1,305	111.2[1]	150 / 150
027	2,732	1,305	111.2[1]	150 / 150
035	3,500	1,305	111.2[1]	160 / 160

Table 17 - Limited Detailed Flood Hazard Data

Cross Section	Stream Station	Flood Discharge (cfs)	1% Annual Chance Water-Surface Elevation (feet NAVD 88)	Non-Encroachment Width (feet) Left/Right from Stream Centerline
042	4,184	868	111.2[1]	155 / 155
047	4,655	868	112.1	45 / 45
050	4,968	868	114.0	15 / 15
050	5,038	868	116.2	15 / 15
056	5,622	868	117.7	71 / 37
063	6,283	868	118.9	58 / 41
069	6,886	868	120.8	15 / 120
075	7,504	868	122.3	33 / 126
083	8,307	868	123.8	60 / 70
084	8,377	868	127.7	60 / 70
090	9,004	868	127.8	60 / 60
Browns Swamp Tributary 1				
004	376	847	110.6[1]	160 / 118
010	1,000	847	111.6	62 / 83
016	1,624	847	113.6	65 / 140
021	2,140	847	114.8	53 / 135
025	2,500	847	115.9	35 / 147
030	3,000	847	118.0	130 / 65
037	3,666	847	120.5	40 / 60
037	3,736	847	123.6	40 / 60
Gum Swamp				
020	2,000	1,736	94.5[1]	926 / 55
025	2,500	1,736	94.5[1]	570 / 99
030	3,000	1,736	94.5[1]	261 / 190
035	3,500	1,736	94.5[1]	182 / 190
040	4,000	1,736	94.5[1]	357 / 63
045	4,500	1,736	94.6	367 / 45
049	4,909	1,684	94.9	425 / 36
055	5,500	1,684	95.4	266 / 29
060	5,971	1,684	96.1	161 / 139
067	6,653	1,684	97.1	186 / 136
072	7,233	1,584	97.7	126 / 136
077	7,694	1,584	98.0	97 / 151
077	7,744	1,584	98.7	97 / 151
085	8,545	1,584	99.1	119 / 256
091	9,057	1,584	99.4	178 / 130
095	9,471	1,584	99.6	270 / 62
105	10,485	1,584	100.3	116 / 162
112	11,239	1,584	101.1	74 / 253
119	11,887	1,584	102.0	30 / 236
124	12,387	1,519	102.9	19 / 322
Mingo Swamp				
000	0	5,206	126.5[1]	48 / 1,617
010	1,015	5,206	126.9	832 / 1,438
019	1,942	4,441	127.2	830 / 1,500
028	2,760	4,441	127.5	174 / 1,386

Table 17 - Limited Detailed Flood Hazard Data

Cross Section	Stream Station	Flood Discharge (cfs)	1% Annual Chance Water-Surface Elevation (feet NAVD 88)	Non-Encroachment Width (feet) Left/Right from Stream Centerline
041	4,124	4,441	128.5	614 / 810
048	4,791	4,441	129.2	808 / 693
055	5,488	4,441	129.6	1,139 / 1,010
063	6,334	4,441	129.9	1,436 / 510
072	7,233	4,441	130.4	1,834 / 343
082	8,226	4,412	131.1	1,319 / 406
089	8,921	4,412	131.8	769 / 684
096	9,640	4,412	132.4	109 / 1,506
104	10,361	4,412	133.2	41 / 1,243
111	11,140	4,412	133.6	952 / 1,057
119	11,942	4,412	134.0	1,742 / 41
Peters Creek				
030	3,000	1,327	70.8[1]	416 / 52
035	3,500	1,327	73.0	133 / 11
040	4,047	1,327	75.6	80 / 124
044	4,402	1,327	77.0	69 / 117
050	5,000	1,327	78.6	187 / 51
056	5,551	1,327	79.5	63 / 57
056	5,621	1,327	81.1	63 / 57
061	6,099	1,327	81.4	87 / 131
066	6,566	1,327	81.9	73 / 101
071	7,094	1,327	82.8	17 / 162
075	7,533	1,327	83.5	33 / 162
081	8,087	1,327	84.3	59 / 70
086	8,563	1,237	85.8	85 / 22
090	9,040	1,237	88.8	47 / 47
095	9,500	1,237	90.8	46 / 62
100	10,035	1,237	91.8	61 / 127
105	10,500	1,237	92.1	105 / 132
108	10,781	1,237	92.3	67 / 196
111	11,072	1,237	92.4	198 / 90
112	11,152	1,237	92.8	198 / 90
116	11,562	1,237	92.9	168 / 163
120	12,000	1,094	93.1	160 / 90
125	12,500	1,094	93.7	160 / 89
Sandy Creek				
024	2,442	2,120	96.8[1]	525 / 74
027	2,686	2,120	96.8[1]	402 / 95
027	2,736	2,120	96.8[1]	402 / 95
032	3,182	2,120	96.8[1]	341 / 95
040	4,000	2,120	96.8	23 / 407
046	4,583	2,120	97.2	185 / 324
051	5,061	2,120	97.5	23 / 493
055	5,500	2,074	97.8	35 / 407
060	6,000	2,074	98.2	134 / 235
065	6,500	2,074	98.5	212 / 377

Table 17 - Limited Detailed Flood Hazard Data

Cross Section	Stream Station	Flood Discharge (cfs)	1% Annual Chance Water-Surface Elevation (feet NAVD 88)	Non-Encroachment Width (feet) Left/Right from Stream Centerline
070	7,000	2,074	98.8	146 / 366
075	7,500	2,074	99.3	99 / 188
079	7,909	2,074	100.1	265 / 281
085	8,500	2,074	101.2	170 / 244
090	9,000	2,074	102.2	22 / 379
093	9,301	2,074	102.6	29 / 320
100	10,000	2,007	103.6	135 / 171
105	10,500	2,007	104.1	88 / 376
110	11,000	2,007	104.5	102 / 445
114	11,419	2,007	104.7	115 / 219
119	11,894	2,007	105.1	159 / 304
125	12,500	2,007	105.6	221 / 175
130	13,000	2,007	106.2	293 / 153
135	13,500	1,934	106.8	182 / 82
141	14,068	1,795	107.8	253 / 127
145	14,500	1,795	108.1	92 / 353
150	15,000	1,795	108.4	102 / 538
155	15,500	1,784	108.8	167 / 310
161	16,079	1,784	109.4	53 / 266
165	16,500	1,784	109.9	255 / 171
170	17,039	1,784	110.4	272 / 134
176	17,625	1,689	111.1	94 / 240
182	18,173	1,689	111.9	133 / 197
186	18,618	1,689	112.5	67 / 275
192	19,244	1,689	113.2	305 / 21
196	19,555	1,689	113.5	38 / 207
196	19,625	1,689	114.7	38 / 207
202	20,152	1,689	115.0	65 / 353
209	20,949	1,641	115.5	147 / 177
215	21,500	1,491	116.1	169 / 107
219	21,940	1,491	116.7	232 / 191
225	22,500	1,491	117.1	195 / 76
231	23,092	1,491	117.6	67 / 201
236	23,567	1,491	118.0	132 / 157
240	24,000	1,491	118.3	65 / 215
245	24,500	1,491	118.6	151 / 112
250	25,000	1,491	118.9	9 / 178
255	25,500	1,491	119.6	15 / 257
260	25,986	1,452	119.8	85 / 194
260	26,046	1,452	119.8	85 / 194
264	26,365	1,452	119.9	133 / 214
South River				
2224	222,428	7,704	70.9	78 / 1,773
2240	224,000	7,704	71.2	78 / 2,038
2260	226,000	7,699	71.6	78 / 1,033

Table 17 - Limited Detailed Flood Hazard Data

Cross Section	Stream Station	Flood Discharge (cfs)	1% Annual Chance Water-Surface Elevation (feet NAVD 88)	Non-Encroachment Width (feet) Left/Right from Stream Centerline
2281	228,113	7,696	72.1	199 / 678
2300	230,000	7,696	72.6	769 / 423
2320	232,000	7,696	73.0	1,270 / 78
2343	234,304	7,696	73.6	1,010 / 780
2361	236,060	7,549	73.9	333 / 1,581
2381	238,089	7,529	74.2	73 / 1,963
2408	240,790	7,529	74.8	82 / 706
2434	243,450	7,522	75.3	154 / 153
2435	243,495	7,522	75.4	154 / 153
2460	246,000	7,518	75.8	73 / 701
2480	248,000	7,518	76.3	1,448 / 397
2502	250,225	7,512	76.7	1,297 / 300
2522	252,230	7,137	77.3	802 / 65
2540	254,000	7,137	78.0	396 / 294
2562	256,169	7,127	78.7	297 / 326
2586	258,558	7,127	79.3	110 / 1,445
2610	260,994	7,119	79.6	516 / 2,315
2624	262,445	7,119	79.7	397 / 2,122
2641	264,075	7,119	79.9	416 / 1,414
2671	267,074	7,119	80.5	116 / 116
2671	267,120	7,119	80.8	116 / 116
2705	270,532	7,111	81.7	496 / 505
2724	272,383	7,095	82.2	424 / 785
2742	274,161	7,087	82.7	703 / 1,199
2760	276,000	7,087	83.2	1,207 / 748
2780	278,000	7,087	83.8	1,634 / 64
2800	280,000	7,087	84.7	256 / 921
2820	282,000	7,081	85.4	235 / 1,503
2840	284,000	7,081	86.0	686 / 623
2860	286,000	7,066	86.5	606 / 796
2882	288,151	7,058	87.1	592 / 697
2900	290,000	7,058	87.8	100 / 888
2920	292,000	7,050	88.4	1,060 / 482
2940	294,000	7,039	88.9	443 / 819
2960	296,000	7,039	89.4	63 / 540
2980	298,000	7,031	90.2	463 / 449
3001	300,135	7,031	90.7	240 / 857
3021	302,115	7,025	91.2	320 / 559
3040	304,000	7,025	91.8	254 / 314
3058	305,754	7,019	92.7	584 / 103
3320	332,000	6,715	101.8	532 / 1,785
3338	333,814	6,673	101.9	577 / 1,160
3360	336,000	6,673	102.0	600 / 1,650
3380	338,000	6,426	102.0	700 / 1,200
3400	340,000	6,421	102.2	1,300 / 800

Table 17 - Limited Detailed Flood Hazard Data

Cross Section	Stream Station	Flood Discharge (cfs)	1% Annual Chance Water-Surface Elevation (feet NAVD 88)	Non-Encroachment Width (feet) Left/Right from Stream Centerline
3420	342,000	6,410	102.3	1,300 / 800
3440	344,000	6,410	102.6	1,300 / 800
3465	346,458	6,410	103.0	300 / 800
3465	346,504	6,410	103.2	72 / 72
3480	348,000	6,372	103.6	769 / 188
3500	350,000	6,364	103.9	341 / 390
3520	352,000	6,356	104.4	880 / 185
3538	353,798	6,336	104.8	1,236 / 218
3560	356,000	6,313	105.3	585 / 53
3582	358,173	6,313	105.9	423 / 673
3611	361,099	6,313	106.7	52 / 52
3611	361,149	6,313	107.0	52 / 52
3634	363,399	6,277	108.0	237 / 406
3660	366,000	6,264	108.6	52 / 352
3680	368,000	6,257	109.2	533 / 257
3700	370,000	6,257	109.6	281 / 134
3720	372,000	6,257	110.1	318 / 214
3740	374,000	6,076	110.6	249 / 556
3760	376,000	6,076	111.1	94 / 680
3780	378,000	5,981	111.6	259 / 242
3800	380,000	5,981	112.1	355 / 325
3820	382,000	5,981	112.5	224 / 599
3840	384,000	5,968	113.0	175 / 111
3860	386,000	5,968	113.6	419 / 163
3880	388,000	5,968	113.9	300 / 300
3904	390,421	5,968	114.3	93 / 93
3905	390,469	5,968	114.5	93 / 93
3920	392,000	5,938	114.9	489 / 645
3940	394,000	5,938	115.1	672 / 240
3961	396,141	5,935	115.6	328 / 180
3980	398,000	5,901	116.0	232 / 318
3999	399,888	5,901	116.4	170 / 245
4020	402,000	5,818	116.9	395 / 834
4033	403,306	5,818	117.1	53 / 53
4034	403,358	5,818	117.6	53 / 53
4060	406,000	5,813	118.3	972 / 172
4079	407,909	5,798	118.6	278 / 684
4100	410,000	5,798	119.0	664 / 47
4120	412,000	5,782	119.5	244 / 279
4142	414,175	5,510	119.9	847 / 408
4160	416,000	5,510	120.3	125 / 900
4180	418,000	5,510	120.7	642 / 69
4200	420,000	5,490	121.2	1,350 / 44
4220	422,000	5,490	121.5	1,016 / 235
4246	424,587	5,473	121.8	126 / 126

Table 17 - Limited Detailed Flood Hazard Data

Cross Section	Stream Station	Flood Discharge (cfs)	1% Annual Chance Water-Surface Elevation (feet NAVD 88)	Non-Encroachment Width (feet) Left/Right from Stream Centerline
4246	424,642	5,473	121.9	126 / 126
4260	426,000	5,473	122.0	371 / 140
4280	428,000	5,422	122.7	549 / 271
4300	430,000	5,422	123.2	93 / 412
4320	432,000	5,422	123.8	44 / 525
4338	433,770	5,410	124.4	154 / 1,114
4346	434,628	5,410	124.9	865 / 956
4359	435,925	5,410	125.4	1,337 / 349
4372	437,187	5,410	125.7	2,670 / 324
4383	438,329	5,410	126.0	2,929 / 342
4387	438,730	5,410	126.1	2,997 / 44
4390	439,039	4,770	126.1	45 / 2,489
4394	439,375	4,770	126.2	45 / 2,748
4397	439,724	4,770	126.3	45 / 2,446
4403	440,272	4,770	126.5	287 / 1,684
South River Tributary 1				
023	2,302	1,164	116.5[1]	233 / 279
029	2,866	1,164	116.5[1]	156 / 90
035	3,451	1,164	116.6	136 / 169
042	4,168	1,164	116.9	15 / 206
048	4,774	1,164	117.5	29 / 220
049	4,947	1,164	119.0	12 / 12
050	5,027	1,164	120.1	12 / 12
058	5,772	1,164	121.1	55 / 50
067	6,688	844	123.4	6 / 42
070	7,000	844	125.8	20 / 75
075	7,500	844	126.1	83 / 103
079	7,943	844	126.4	133 / 24
084	8,411	844	126.7	100 / 30
085	8,466	844	128.2	100 / 30
091	9,111	844	128.4	102 / 109
096	9,573	844	128.7	35 / 20
100	9,973	844	131.4	15 / 15
100	10,018	844	131.6	15 / 15
107	10,720	844	132.2	113 / 87
114	11,438	715	132.6	170 / 20
121	12,090	715	134.2	66 / 125
South River Tributary 2				
003	350	621	121.8[1]	52 / 34
009	856	621	122.7	69 / 54
015	1,511	621	128.4	60 / 30
020	2,045	621	132.1	20 / 25
024	2,431	621	132.6	50 / 50
030	2,957	621	132.6	60 / 70
035	3,500	621	132.9	40 / 30
040	4,029	621	135.2	102 / 29

Table 17 - Limited Detailed Flood Hazard Data

Cross Section	Stream Station	Flood Discharge (cfs)	1% Annual Chance Water-Surface Elevation (feet NAVD 88)	Non-Encroachment Width (feet) Left/Right from Stream Centerline
045	4,500	621	135.8	118 / 38
050	5,000	621	136.8	47 / 88
055	5,500	468	138.1	15 / 80
South River Tributary 3				
004	445	673	122.5[1]	151 / 66
011	1,109	673	123.1	90 / 112
016	1,606	673	123.8	50 / 60
022	2,151	673	127.5	28 / 6
025	2,512	673	133.6	20 / 20
029	2,891	673	135.6	19 / 21
032	3,177	673	138.1	30 / 30
036	3,594	549	139.0	70 / 30
South River Tributary 4				
046	4,601	952	128.2[1]	96 / 177
053	5,317	952	128.1	18 / 176
059	5,889	952	129.4	32 / 185
062	6,238	952	130.1	53 / 51
065	6,502	952	131.0	28 / 28
066	6,576	952	132.9	28 / 28
068	6,791	952	133.2	101 / 28
070	6,963	952	133.3	88 / 35
073	7,289	952	133.7	31 / 33
077	7,718	952	136.1	40 / 81
081	8,074	952	136.6	98 / 97
085	8,465	952	137.0	69 / 48
090	8,986	952	137.9	52 / 124

[1]Elevation includes backwater effects

5.3 Coastal Analyses

This section is not applicable to this FIS project. Table 18 “Summary of Coastal Stillwater Elevations” and Table 19 “Summary of Coastal Analyses” do not apply to Cumberland County.

6.0 Mapping Methods

6.1 Vertical and Horizontal Control

Vertical Datum

All FISs are referenced to a specific vertical datum. The vertical datum provides a starting point against which flood, ground, and structure elevations can be referenced and compared. With the finalization of the North American Vertical Datum of 1988 (NAVD 88), all North Carolina FISs have been prepared using NAVD 88 as the referenced vertical datum.

All flood elevations shown on the FIRM for Cumberland County are referenced to NAVD 88. Structure and ground elevations in the county must, therefore, be referenced to NAVD 88. It is important to note that FISs for adjacent communities in neighboring states may be referenced to NGVD 29. This may result in BFE differences across political boundaries between the communities.

As noted above, the elevations shown in this FIS are referenced to NAVD 88. Ground, structure, and flood elevations may be compared and/or

referenced to NGVD 29 by applying a standard conversion factor. The conversion factor for Cumberland County is # feet. The locations used to establish the conversion factor were USGS quadrangle corners that fell within the county, as well as those that were within 2.5 miles outside the county. The benchmarks are referenced to NAVD 88. Table 20, "Datum Conversion Locations and Values," is shown below.

Table 20, "Datum Conversion Locations and Values."

Table 20 - Datum Conversion Locations and Values

Latitude	Longitude	Conversion from NGVD29 to NAVD88 (feet)
35.25	-78.75	-0.88
35.12	-79.00	-0.81
35.12	-78.87	-0.86
35.13	-78.75	-0.89
35.00	-79.00	-0.82
35.00	-78.88	-0.83
35.00	-78.75	-0.89
34.88	-78.87	-0.89
34.88	-78.75	-0.90
34.87	-78.62	-0.90
Average conversion in Cumberland County from NGVD 29 to NAVD 88 = -0.87 feet		

The vertical datum conversion factor for all flooding sources which run along a county boundary are in accordance with the conversion factor used in those contiguous counties.

BFEs shown on the FIRM represent whole-foot rounded values. For example, a 1% annual chance water-surface elevation of 102.4 feet will appear as 102 on the FIRM and 102.6 feet will appear as 103. Therefore, users who wish to convert the elevations in this FIS to NGVD 29 should apply the stated conversion factor(s) to elevations shown on the Flood Profiles and/or Water-surface elevation rasters and supporting data tables in the FIS Report, which are shown, at a minimum, to the nearest 0.1 foot.

For more information on NAVD 88, see Converting the National Flood Insurance Program to the North American Vertical Datum of 1988, or contact the Vertical Network Branch, National Geodetic Survey, Coast and Geodetic Survey, National Oceanic and Atmospheric Administration, Rockville, Maryland 20910 (http://www.ngs.noaa.gov).

Vertical Control Monuments

Qualifying bench marks within Cumberland County that are cataloged by the National Geodetic Survey (NGS) and entered into the National Spatial Reference System (NSRS) as First or Second Order Vertical, with a vertical stability classification of A, B, or C, are shown and labeled on the FIRM with their 6-character NSRS Permanent Identifier (PID).

The National Geodetic Survey establishes precisely located monuments on the North Carolina Grid System and Bench Marks referenced to a vertical datum (NGVD 1929 and NAVD 1988).

Bench marks cataloged by the NGS and entered into the NSRS vary widely in vertical stability classification. NSRS vertical stability classifications are as follows:

- Stability A: Monuments of the most reliable nature, expected to hold position/elevation well (e.g., mounted in bedrock)
- Stability B: Monuments which generally hold their position/elevation well (e.g., concrete bridge abutment)
- Stability C: Monuments which may be affected by surface ground movements (e.g., concrete monument below frost line)
- Stability D: Mark of questionable or unknown vertical stability (e.g., concrete monument above frost line, or steel witness post)

Monuments with a Stability D classification may be used as Elevation Reference Marks (ERMs) when a Stability C or better monument is not an option. These ERMs must be approved by NCGS and can be set and used as elevation bench marks to establish vertical control and produce NC DFIRMs. Including such ERMs will greatly augment North Carolina's useable vertical control network.

In addition, when local jurisdictions have established their own vertical monument network, these monuments may also be shown on the FIRM with the appropriate designations. Local monuments will be placed on the FIRM if the community has requested that they be included and if the monuments

meet the aforementioned criteria.

North Carolina Geodetic Survey (NCGS) and contractor surveyed vertical control monuments will be shown on the FIRM panels. Those cataloged by NCGS meet similar requirements to the NGS monuments as described above. Most monuments that have been cataloged by NCGS have been established to NGS standards, but have not been submitted to NGS for inclusion into the NSRS. The qualifying criteria for depicting bench marks established by the State's contractors on the new digital FIRM panels include:

- GPS surveying of permanent 3-D survey monuments to 5-centimeter or better local network accuracy guidelines, in accordance with NOAA Technical Memorandum NOS NGS-58 "Guidelines for Establishing GPS-Derived Ellipsoid Heights (Standards: 2 cm and 5 cm)," and conversion to NAVD 88 orthometric heights using NGS' latest geoid mode;

- Requiring a stability classification of "C" or better; and

- Submitting GPS files and station descriptions to NCGS.

To obtain current information for cataloging local bench marks in the NSRS, please visit the Data Sheet page of the NGS website at http://www.ngs.noaa.gov/cgi-bin/datasheet.prl, or contact the NGS Information Services Branch at:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-32822
(301) 713-3242

Information regarding the NCGS or State contractor bench marks can be obtained through the NCGS website at www.ncgs.state.nc.us, or by phone at (919) 733-3836.

It is important to note that temporary vertical monuments, sometimes called Elevation Reference Marks, are often established during the preparation of a flood hazard analysis for the purpose of establishing local vertical control. Although these monuments are not shown on the FIRM, interested individuals may contact FEMA to access this information.

Horizontal Datum and Control

The digital files that comprise the FIRM are georeferenced to an established coordinate system. The coordinate system used for the production of this FIRM is North Carolina State Plane (FIPSZONE 3200) referenced to the North American Datum of 1983 (NAD83), GRS80 ellipsoid.

6.2 Base Map

The FIRMs and FIS Report for this project have been produced in a digital format. The flood hazard information was converted to a Geographic Information System (GIS) format that meets FEMA's FIRM database specifications and geographic information standards. This information is provided in a digital format so that it can be incorporated into a local GIS and be accessed more easily by the community. The FIRM Database includes most of the tabular information contained in the FIS Report in such a way that the data can be associated with pertinent spatial features.

The projection used in the preparation of this map was the North Carolina State Plane Coordinate System. The horizontal datum was NAD83, GRS80 spheroid. Differences in datum, spheroid, or projection used in the production of FIRMs for adjacent states may result in slight positional differences in map features across the state boundary. These differences do not affect the accuracy of this FIRM.

As part of the North Carolina CTS Initiative, North Carolina digital FIRM panel numbers are consistent with the North Carolina Land Records Management Program (LRMP).

The 11-digit digital FIRM panel numbering system for North Carolina is: SS MM LLLL PP X, where SS = State Federal Information Processing Code (37); MM = Easting-Northing (EN) 1,000,000-foot coordinates; LLLL = LRMP map numbers to include the EN 100,000-foot coordinates, and the EN 10,000-foot coordinates; PP = place holders for additional EN 1,000-foot coordinates; and X = suffix ("J" for the initial edition). North Carolina's State Plane Coordinate System origin is outside the State boundary to the southwest (in Georgia), the eastings range from approximately 0,404,000 (Tennessee border) to 3,040,000 (Atlantic Ocean); and the northings range from approximately 0,045,000 (South Carolina border) to 1,043,000 (Virginia border). Digital FIRM panels were compiled at either 1"=1,000', covering an area of 20,000 feet x 20,000 feet (20" x 20" panels); or at 1"=500', covering

an area of 10,000 feet x 10,000 feet (20" x 20" panels). An additional 2 digits (both zeros) are held in reserve as a “place holder” in the event that future FIRMs are printed at a larger scale; e.g., 1"=250', covering an area of 5,000 feet x 5,000 feet for which the 1,000-foot coordinates would either be 0 or 5.

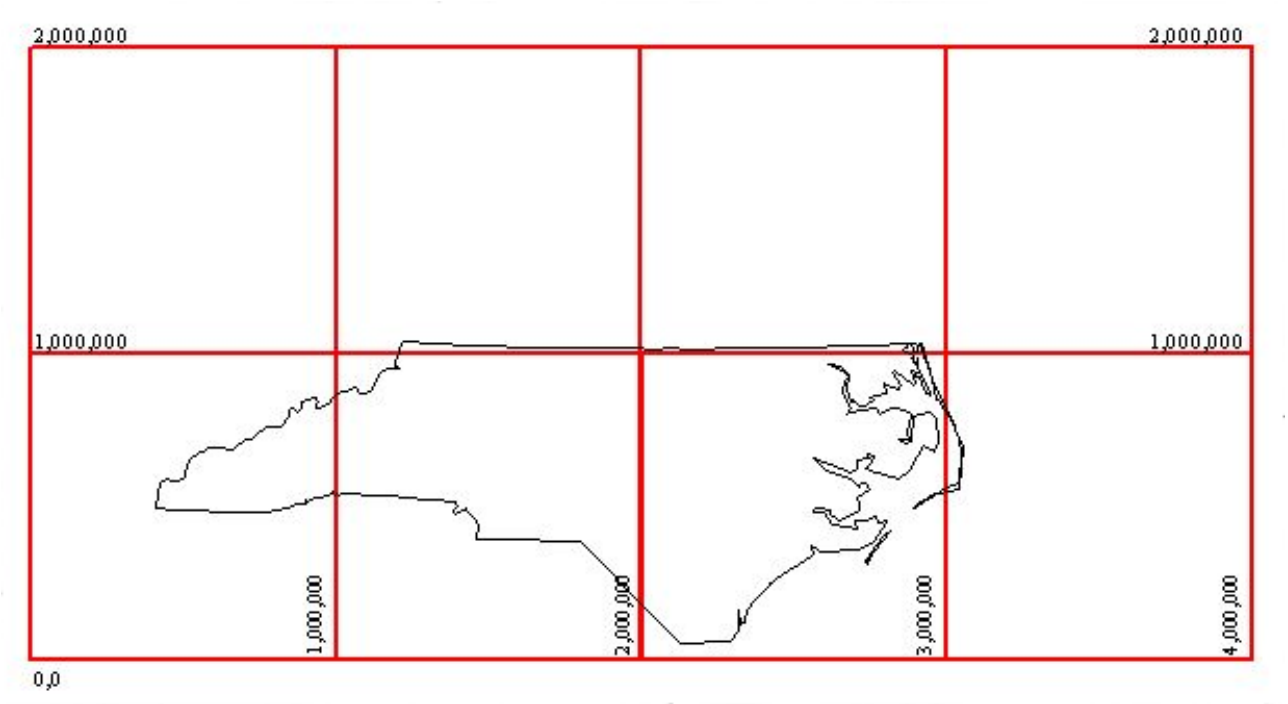


Figure 3 - North Carolina’s State Plane Coordinate System

6.3 Floodplain and Floodway Delineation

Floodplain Delineation

For streams restudied by detailed and limited detailed methods, the 1% and 0.2% annual chance floodplains were delineated using flood elevations determined at each cross section. Between cross sections, the boundaries were interpolated using topographic data acquired using airborne Light Detection and Ranging (LIDAR). This LIDAR data was acquired during the (insert date from basin plan and update for map maintenance, if necessary) flying season.

The topographic data satisfies a vertical root-mean-square error (RMSE) accuracy standard of 20 cm (1.3 feet accuracy at the 95% confidence limit) for the Outer Banks and 25 cm (1.6 feet accuracy at the 95% confidence limit) for those portions of the basin lying west of the Outer Banks. These data could be contoured at roughly a 2-foot vertical contour interval. All elevations were referenced to the NAVD 88 and reflect orthometric heights. Variably spaced, bare-earth digital topographic data in ASCII point file format were combined with imagery (either flown concurrently with the LIDAR data or using existing digital orthophotos) to establish a Triangulated Irregular Network (TIN) of digital elevation points, which include selected breaklines to be used for hydraulic modeling. Furthermore, a uniformly spaced sampling of the TIN resulted in uniformly spaced Digital Elevation Models (DEMs), with 20 ft x 20 ft post spacing, which was generated in multiple file formats.

The 1% annual chance floodplain boundary corresponds to the boundary of the areas of special flood hazards (Zones VE, AO, AH, A99, AR, A, and AE), and the 0.2% annual chance floodplain boundary corresponds to the boundary of areas of moderate flood hazards. In cases where the 1% and 0.2% annual chance floodplain boundaries are close together, only the 1% annual chance floodplain boundaries have been shown.

Floodway Delineation

The floodways presented in this FIS were computed for certain stream segments on the basis of equal conveyance reduction from each side of the floodplain. Floodway widths were computed at cross sections. Between cross sections, the floodway boundaries were interpolated. The results of the floodway computations are tabulated for selected cross sections (Table 21, “Floodway Data”). The computed floodway is shown on the FIRM. In cases where the floodway and 1% annual chance floodplain boundaries are either close together or collinear, only the floodway boundary is shown. In areas where the top of the bridge or road is higher than the 1.0-percent annual chance (100-year) flood, the FIRM will show the flood discharge as contained within the structure for emergency management purposes. It is important to note that FEMA and community floodway regulations still apply in and around those areas.

Table 21 - Floodway Data

Floodway Source		Floodway			Water Surface Elevation			
Cross Section	Distance (Feet Above Mouth)	Width (Feet)	Section Area (Square Feet)	Mean Velocity (Feet Per Second)	Regulatory	Without Floodway	With Floodway	Increase
South River								
3077	307,691	1,281	7,434	0.9	93.7	93.7	94.4	0.7
3104	310,376	853	5,517	1.2	94.9	94.9	95.8	0.9
3119	311,930	817	4,949	1.4	95.7	95.7	96.6	0.9
3129	312,862	1,060	6,707	1.0	96.2	96.2	97.1	0.9
3153	315,277	2,121	14,077	0.5	96.6	96.6	97.5	1.0
3165	316,504	2,582	16,253	0.4	96.7	96.7	97.6	1.0
3173	317,258	2,210	13,826	0.5	96.8	96.8	97.7	0.9
3188	318,798	1,068	6,976	1.0	97.2	97.2	98.2	0.9
3198	319,774	976	7,210	0.9	97.5	97.5	98.4	0.9
3210	320,952	1,171	9,804	0.7	97.8	97.8	98.6	0.9
3216	321,646	1,288	10,266	0.7	97.8	97.8	98.7	0.9
3224	322,420	840	7,013	1.0	97.9	97.9	98.8	0.9
3229	322,879	720	5,917	1.2	98.0	98.0	98.9	0.9
3245	324,521	587	4,972	1.4	99.0	99.0	99.8	0.8
3252	325,204	827	6,140	1.1	99.3	99.3	100.2	0.9
3262	326,246	1,214	9,801	0.7	99.6	99.6	100.5	0.9
3271	327,062	1,448	11,783	0.6	99.8	99.8	100.7	0.9
3285	328,508	1,301	9,685	0.7	100.0	100.0	100.9	0.9
3289	328,902	1,294	10,855	0.6	100.0	100.0	101.0	0.9
3303	330,291	1,211	11,658	0.6	100.2	100.2	101.1	0.9
3311	331,091	1,075	8,707	0.8	100.3	100.3	101.2	0.9
3319	331,884	886	6,539	1.0	100.6	100.6	101.5	0.9
3325	332,497	657	4,984	1.4	101.0	101.0	101.9	1.0
3333	333,295	663	5,483	1.2	101.3	101.3	102.3	1.0

7.0 Revising the FIS

7.1 Letters of Map Amendment and Letters of Map Revision - Based on Fill

LOMAs and LOMR-Fs are documents issued by FEMA that officially remove a property and/or a structure from a Special Flood Hazard Area (SFHA), if data supporting the removal are submitted. LOMAs and LOMR-Fs are generally determinations regarding areas that are too small to be shown on a FIRM panel; consequently, the changes they describe become official without revising the FIRM or the FIS Report.

NFIP regulations require that the lowest adjacent grade (the lowest ground touching the structure) be at or above the 1% annual chance flood elevation for a LOMA to be issued. Currently, there is no fee for FEMA's review of a LOMA request, but the requester of a LOMA is responsible for providing all the information needed for the review, which may include structure and/or property elevations certified by a licensed land surveyor or professional engineer. Therefore, LOMA requesters may need to retain the services of a land surveyor or engineer.

A LOMA cannot be used for property on which fill has been placed. For those situations, a LOMR-F must be used. As a participant in the NFIP, a local government must adopt ordinances that meet the minimum Federal floodplain management standards, which are outlined in Section 60.3 of the NFIP regulations. For a number of reasons, these ordinances generally vary from community to community. Nonetheless, because the placement of fill within the floodplain can affect flood hazards in the surrounding area, additional information is needed before FEMA can process a LOMR-F request. Among

the data required for a LOMR-F is the community acknowledgment form. This form is FEMA's assurance that all appropriate Federal, State, and local floodplain management requirements have been met. Furthermore, NFIP regulations require that the lowest adjacent grade (the lowest ground touching the structure) be at or above the 1% annual chance flood elevation for a LOMR-F to be issued removing the structure from the floodplain. Because LOMR-F requests are the result of changed physical conditions rather than limitations of scale or topographic definition, FEMA charges a fee for the review of a LOMR-F request. As with the LOMA, the requester of a LOMR-F is responsible for providing all supporting information, including structure and/or property elevation data.

In cases where property owners plan to add fill in the SFHA, NFIP regulations require plans and technical information to be submitted for review by FEMA before construction takes place. FEMA will issue a conditional LOMR-F stating how flood hazards would change and what portions of the property, if any, would remain in the SFHA if the project were built according to the submitted plans.

The issuance of a LOMA or LOMR-F ends the property owner's obligation to purchase flood insurance as a condition of Federal or federally backed financing. However, the property owner's mortgage company maintains the prerogative to require flood insurance as a condition of providing financing. Before attempting to obtain a LOMA or LOMR-F, property owners are advised to consult their mortgage companies regarding this policy. Even if the mortgage company indicates that it will require flood insurance if a LOMA or LOMR-F is issued, it may be advantageous for property owners to request a LOMA or LOMR-F because flood insurance premiums are lower for properties removed from the SFHA than for properties that remain within the SFHA.

For additional information regarding LOMAs, LOMR-Fs, conditional LOMR-Fs, or current application fees, please call the FEMA Map Information eXchange (FMIX) toll-free information line at 1-877-FEMA MAP (1-877-336-2627).

7.2 Letters of Map Revision

A Letter of Map Revision (LOMR) is a document issued by FEMA and the NCFMP that revises an FIS Report and/or FIRM. A LOMR is used to change flood risk zones, floodplain and/or floodway delineations, flood elevations, or planimetric features such as road systems or corporate limits. A LOMR provides FEMA and the NCFMP with a cost-effective means of revising the FIS information without physically changing and reprinting the map or report itself. A portion of the FIRM panel or FIS Report showing the revised information is issued with the LOMR. The LOMR is sent to all affected communities and is archived in the communities' NFIP map repository for public reference.

In cases where a proposed project (such as construction in the 1% annual chance floodplain) would result in a significant rise in 1% annual chance water-surface elevations, NFIP regulations require the community to submit plans and technical information for review by FEMA and the NCFMP before construction takes place. This assures communities participating in the NFIP that proposed projects meet minimum NFIP requirements. The result of FEMA and the NCFMP reviews is documented in a conditional LOMR.

For additional information regarding LOMRs, conditional LOMRs, or current application fees, please call the FEMA Map Assistance Center toll-free information line at 1-877-FEMA MAP (1-877-336-2627) or the NCFMP at 919-715-5711.

7.3 Physical Map Revisions

Physical Map Revisions (PMRs) are processed to incorporate information concerning conditions present in the community that are not reflected in the FIS, and involve distributing republished FISs that supersede the most current NFIP data in the community repository. PMRs may be initiated by a request from a community resident or agency, or FEMA may initiate a PMR to incorporate one or more LOMRs, to reflect significant changes in corporate limits, to correct errors, or to update flood hazards to match new information from an adjacent community's FIS. Due to the costs associated with updating and distributing FISs, map revisions will be processed as LOMRs rather than PMRs whenever possible. For more information regarding PMRs, please contact the FEMA Map Information eXchange (FMIX) toll-free information line at 1-877-FEMA MAP (1-877-336-2627), the FEMA Regional Office at the address listed on the Notice to Flood Insurance Study Users page at the front of this report, or the NCFMP at 919-715-5711.

7.4 Contracted Restudies

The NFIP provides for a periodic review and restudy of flood hazards in a given community. FEMA accomplishes this through a national mapping needs assessment process that assigns priorities and allocates funds to sponsor or subsidize new flood hazard analyses used to update FIS Reports. For map maintenance restudies within the state of North Carolina, scoping will be performed by county approximately 2.5-3.5 years after the previous effective date. Scoping will focus on streams with restudy needs within those previously effective counties rather than on full countywide restudies. A restudy refers specifically to updating or reevaluating engineering analyses that were performed for a flood mapping project that directly impact BFEs and/or flood hazard boundary extents or analysis of previously unstudied flood prone areas. Restudy project evaluation triggers and prioritization values are an

essential component of the map maintenance program. For more information regarding NCFMP-contracted restudies, please contact the NCFMP at 919-715-5711 or at www.ncfloodmaps.com. For more information regarding FEMA-contracted restudies, please contact the FEMA Map Information eXchange (FMIX) toll-free information line at 1-877-FEMA MAP(1-877-336-2627) or the FEMA Regional Office at the address listed on the Notice to Flood Insurance Study Users page at the front of this report.

7.5 Map Revision History

The current FIRM is a subset of the Statewide FIRM, showing flood hazard information for the entire geographic area of Cumberland County. Previously, separate Flood Hazard Boundary Maps (FHBMs), Flood Boundary and Floodway Maps (FBFMs), and/or FIRMs were prepared for each identified flood prone jurisdiction within the county. Historical data relating to the NFIP maps prepared for each community prior to and including the 1/5/2007 North Carolina Statewide FIRM, which includes Cumberland County, are presented in Table 22, "Community Map History."

Information pertaining to revised and unrevised flood hazards for each jurisdiction within Cumberland County has been compiled into this FIS. Therefore, this FIS supersedes all previously printed FIS Reports, FHBMs, FIRMs, and/or FBFMs for all of the incorporated and unincorporated jurisdictions within Cumberland County.

Table 22 - Map Revision History

Community	Initial Identification Date	Initial FIRM Effective Date	FIS Revision Date
CITY OF FAYETTEVILLE	11/2/1973	11/2/1973	06/18/2007
CUMBERLAND COUNTY	12/13/1974	12/13/1974	06/18/2007
FORT BRAGG MILITARY RESERVATION	12/13/1974	12/13/1974	06/18/2007
TOWN OF FALCON	1/5/2007	1/5/2007	06/18/2007
TOWN OF GODWIN	1/5/2007	1/5/2007	06/18/2007
TOWN OF HOPE MILLS	7/18/1975	7/18/1975	06/18/2007
TOWN OF LINDEN	1/5/2007	1/5/2007	06/18/2007
TOWN OF SPRING LAKE	12/13/1974	12/13/1974	06/18/2007
TOWN OF STEDMAN	1/5/2007	1/5/2007	06/18/2007
TOWN OF WADE	1/5/2007	1/5/2007	06/18/2007

8.0 Study Contracting and Community Coordination

8.1 Authority and Acknowledgments

The sources of authority for this FIS are the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

This FIS revises and updates the previous countywide FIS for the geographic area of Cumberland County and Incorporated Areas. Table 23, "Authority and Acknowledgments," includes information for the previous countywide FIS and for this revision. This table also includes information for the single-jurisdiction FISs published for each community included in this countywide FIS (if available) as compiled from their previously printed FIS Reports

Table 23 — Authority and Acknowledgments

Community	FIS Dated	Study Contracted By	Data Source	Contract or IAA Number	Work Completed In
CITY OF FAYETTEVILLE	1/5/2007	NCFMP	NCFMP	286-000022	9/3/2013
CITY OF FAYETTEVILLE	1/5/2007	NCFMP	NCFMP	286-0000-23	8/8/8888
CUMBERLAND COUNTY	1/5/2007	NCFMP	NCFMP	286-000022	9/3/2013
CUMBERLAND COUNTY	1/5/2007	NCFMP	NCFMP	286-0000-23	8/8/8888
FORT BRAGG MILITARY RESERVATION	1/5/2007	NCFMP	NCFMP	286-000022	9/3/2013
FORT BRAGG MILITARY RESERVATION	1/5/2007	NCFMP	NCFMP	286-0000-23	8/8/8888
TOWN OF EASTOVER	1/5/2007	NCFMP	NCFMP	286-000022	9/3/2013
TOWN OF EASTOVER	1/5/2007	NCFMP	NCFMP	286-0000-23	8/8/8888
TOWN OF FALCON	1/5/2007	NCFMP	NCFMP	286-000022	9/3/2013
TOWN OF FALCON	1/5/2007	NCFMP	NCFMP	286-0000-23	8/8/8888
TOWN OF GODWIN	1/5/2007	NCFMP	NCFMP	286-000022	9/3/2013
TOWN OF GODWIN	1/5/2007	NCFMP	NCFMP	286-0000-23	8/8/8888
TOWN OF HOPE MILLS	1/5/2007	NCFMP	NCFMP	286-000022	9/3/2013
TOWN OF HOPE MILLS	1/5/2007	NCFMP	NCFMP	286-0000-23	8/8/8888
TOWN OF LINDEN	1/5/2007	NCFMP	NCFMP	286-000022	9/3/2013

Table 23 — Authority and Acknowledgments

Community	FIS Dated	Study Contracted By	Data Source	Contract or IAA Number	Work Completed In
TOWN OF LINDEN	1/5/2007	NCFMP	NCFMP	286-0000-23	8/8/8888
TOWN OF SPRING LAKE	1/5/2007	NCFMP	NCFMP	286-000022	9/3/2013
TOWN OF SPRING LAKE	1/5/2007	NCFMP	NCFMP	286-0000-23	8/8/8888
TOWN OF STEDMAN	1/5/2007	NCFMP	NCFMP	286-000022	9/3/2013
TOWN OF STEDMAN	1/5/2007	NCFMP	NCFMP	286-0000-23	8/8/8888
TOWN OF WADE	1/5/2007	NCFMP	NCFMP	286-000022	9/3/2013
TOWN OF WADE	1/5/2007	NCFMP	NCFMP	286-0000-23	8/8/8888

This FIS Report was produced through a unique cooperative partnership between the State of North Carolina and FEMA. The State of North Carolina, through FEMA's Cooperating Technical Partner (CTP) Initiative, has become the first Cooperating Technical State (CTS) and will assume primary ownership of the NFIP FIRM panels for all North Carolina communities. This role has traditionally been fulfilled by FEMA. The North Carolina Floodplain Mapping Program is conducting flood hazard analyses and producing updated, digital FIRM panels. The hydrologic and hydraulic analyses and the FIRM panels for the initial statewide mapping for Cumberland County were produced by NCFMP under contract with the State of North Carolina and issued on effective 4/30/2014. For this revision, the hydrologic and hydraulic analyses and the FIRM panels were produced by NCFMP, under contract with the State of North Carolina.

8.2 Consultation Coordination Officer's Meetings/Scoping Meetings

In general, for each FIS an initial Consultation Coordination Officer's (CCO) meeting is held with representatives from FEMA, the communities, and the study contractors to explain the nature and purpose of the FIS and to identify the streams to be studied by detailed methods. A final CCO meeting is held with representatives from FEMA, the communities, and the study contractors to review the results of the study

The dates of the initial and final CCO meetings held for Cumberland County and Incorporated Areas were compiled from the previous countywide FIS Report and are shown in Table 24, "Consultation Coordination Officer's Meetings

Table 24 — Consultation Coordination Officer's Meetings

Community	For FIS Dated	Initial CCO Date	Attended By	Final CCO Date	Attended By
CITY OF FAYETTEVILLE	6/15/1984	1/21/1975	Representatives of FEMA, local officials, and local residents	3/29/1977	Representatives of the Study Contractor, FEMA, and community officials
CUMBERLAND COUNTY	8/17/1981	12/12/1977	Representatives of the U.S. Army Corps of Engineers, FEMA, County officials, and local residents	3/5/1981	USACE, FEMA, and local officials
CUMBERLAND COUNTY	8/17/1981	12/12/1977	Representatives of the U.S. Army Corps of Engineers, FEMA, County officials, and local residents	4/13/1981	Representatives of the U.S. Army Corps of Engineers, FEMA, County officials, and local residents
FORT BRAGG MILITARY RESERVATION	8/17/1981	12/12/1977	Representatives of the U.S. Army Corps of Engineers, FEMA, County officials, and local residents	3/5/1981	USACE, FEMA, and local officials
FORT BRAGG MILITARY RESERVATION	8/17/1981	12/12/1977	Representatives of the U.S. Army Corps of Engineers, FEMA, County officials, and local residents	4/13/1981	Representatives of the U.S. Army Corps of Engineers, FEMA, County officials, and local residents
TOWN OF HOPE MILLS	5/4/1981	12/12/1977	USACE, the Flood Insurance Administration, community officials, and local residents	12/4/1979	USACE, the Flood Insurance Administration, community officials, and local residents

For each FIS produced during the initial phase of statewide, an Initial Scoping Meeting was held with representatives from FEMA, the county, the incorporated communities, and the State of North Carolina. A Final Scoping meeting was held to review the Draft Basin Plan and finalize the streams to be studied by detailed methods. This information was then used to create the Final Basin Plan.

For map maintenance revisions, only one scoping meeting was held to identify the streams to be newly studied by detailed methods, redelineated, or to be studied by limited detailed methods. This information was then used to create the Map Maintenance Plan.

The historical dates of the Initial and Final Scoping Meetings held during the first round of statewide mapping for Cumberland County are shown in Table 25, "Scoping Meetings." Meetings held for the map maintenance revision are also included below for Cumberland County.

Table 25 — Scoping Meetings

Community	Riverbasin	Initial Scoping Date	Attended By	Final Scoping Date	Attended By
CITY OF FAYETTEVILLE	CAPE FEAR	11/16/2000	Representatives of FEMA, North Carolina Emergency Management, the community, and Dewberry & Davis	3/7/2001	Representatives of FEMA, North Carolina Emergency Management, the community, and Dewberry & Davis
CUMBERLAND COUNTY	CAPE FEAR	11/14/2000	Representatives of FEMA, North Carolina Emergency Management, the community, and Dewberry & Davis	3/7/2001	Representatives of FEMA, North Carolina Emergency Management, the community, and Dewberry & Davis
FORT BRAGG MILITARY RESERVATION	CAPE FEAR	11/14/2000	Representatives of FEMA, North Carolina Emergency Management, the community, and Dewberry & Davis	3/7/2001	Representatives of FEMA, North Carolina Emergency Management, the community, and Dewberry & Davis
TOWN OF FALCON	CAPE FEAR	11/15/2000	Representatives of FEMA, North Carolina Emergency Management, the community, and Dewberry & Davis	3/7/2001	Representatives of FEMA, North Carolina Emergency Management, the community, and Dewberry & Davis
TOWN OF GODWIN	CAPE FEAR	11/15/2000	Representatives of FEMA, North Carolina Emergency Management, the community, and Dewberry & Davis	3/7/2001	Representatives of FEMA, North Carolina Emergency Management, the community, and Dewberry & Davis
TOWN OF HOPE MILLS	CAPE FEAR	11/15/2000	Representatives of FEMA, North Carolina Emergency Management, the community, and Dewberry & Davis	3/7/2001	Representatives of FEMA, North Carolina Emergency Management, the community, and Dewberry & Davis
TOWN OF LINDEN	CAPE FEAR	11/15/2000	Representatives of FEMA, North Carolina Emergency Management, the community, and Dewberry & Davis	3/7/2001	Representatives of FEMA, North Carolina Emergency Management, the community, and Dewberry & Davis
TOWN OF SPRING LAKE	CAPE FEAR	11/15/2000	Representatives of FEMA, North Carolina Emergency Management, the community, and Dewberry & Davis	3/7/2001	Representatives of FEMA, North Carolina Emergency Management, the community, and Dewberry & Davis
TOWN OF STEDMAN	CAPE FEAR	11/15/2000	Representatives of FEMA, North Carolina Emergency Management, the community, and Dewberry & Davis	3/7/2001	Representatives of FEMA, North Carolina Emergency Management, the community, and Dewberry & Davis
TOWN OF WADE	CAPE FEAR	11/15/2000	Representatives of FEMA, North Carolina Emergency Management, the community, and Dewberry & Davis	3/7/2001	Representatives of FEMA, North Carolina Emergency Management, the community, and Dewberry & Davis

Preliminary Meetings are held in each county to disseminate and review the FIS Report and FIRM panels. This meeting is required by FEMA. Public Participation Meetings are not required by FEMA, but provide an opportunity to review and discuss the FIS Report and FIRM panels for each jurisdiction in a public setting. The dates for the preliminary and public participation meetings are shown in Table 26, “Preliminary and Public Participation Meetings.”

Table 26 — Preliminary and Public Participation Meetings

Community	For FIS Dated	Meeting Location	Preliminary Meeting Date	Attended By	Public Meeting Date	Attended By
CITY OF FAYETTEVILLE	1/5/2007	City of Fayetteville	9/27/2005	Officials from Chatham County, NCDEM, Dewberry and Watershed Concepts	2/20/2003	Members of the Public
CITY OF FAYETTEVILLE	1/5/2007	City of Fayetteville	9/27/2005	Officials from Chatham County, NCDEM, Dewberry and Watershed Concepts	10/20/2005	The Public
CITY OF FAYETTEVILLE	1/5/2007	City of Fayetteville	9/27/2005	Officials from Chatham County, NCDEM, Dewberry and Watershed Concepts	11/1/2005	Members of the Public

9.0 Guide to Additional Information

Information concerning the pertinent data used in the preparation of this FIS Report can be obtained by submitting an order with any required payment to the FEMA Engineering Library. For more information on this process, see http://www.fema.gov.

The Map Repositories table below lists locations where FIRMs for Cumberland County can be viewed. Please note that the maps at these locations are for reference only and are not for distribution. Also, please note that only the maps for the community listed in the table are available at that particular repository. A user may need to visit another repository to view maps from an adjacent community.

Table 27 — Map Repositories

Community	Address	City	State	Zip Code
Town of Falcon	Falcon Town Hall, 7156 South West Street	Falcon	NC	28342
City of Fayetteville	City of Fayetteville Zoning Department, 433 Hay Street	Fayetteville	NC	28301
Town of Godwin	Cumberland County Mapping Department, 117 Dick Street	Fayetteville	NC	28301
Town of Hope Mills	Hope Mills Town Hall, 5770 Rockfish Road	Hope Mills	NC	28348
Town of Spring Lake	Spring Lake Town Hall, 300 Ruth Street	Spring Lake	NC	28390
Town of Wade	Wade Town Hall, 7128 Main Street	Wade	NC	28395
Town of Linden	Town Hall, 9456 Academy Street	Linden	NC	28356
Town of Stedman	Stedman Town Hall, 5110 Front Street	Stedman	NC	28391
Cumberland County	Cumberland County Mapping Department, 117 Dick Street	Fayetteville	NC	28301
Fort Bragg Military Reservation	Cumberland County Mapping Department, 117 Dick Street	Fayetteville	NC	28301

9.1 Additional Information

All FIRM panels created for the State of North Carolina are produced in a seamless statewide format; however, FIS Reports are produced for individual counties.

Copies of FIRM panels are available for a nominal fee. To obtain a copy of the current flood map for a specific community, contact the FEMA Map Service Center at 1-800-358-9616. To facilitate the processing of your request, please review the current flood map on file at your local community repository and obtain the panel number in which you are interested. If necessary, users may also order a FIRM Index from the Map Service Center to determine the appropriate panel numbers. The Map Service Center also accepts orders for the Community Status Book and the Flood Insurance Manual. The FIS Report, FIRM panels, and digital data used to produce the FIRM panels are available online at www.ncfloodmaps.com.

Information concerning the data used in the preparation of this FIS, contained in an Engineering Study Data Package, may be obtained by contacting the FEMA Regional Office at the address listed on the Notice to Flood Insurance Study Users page at the front of this report.

Table 28, “Additional Information” is not applicable in Cumberland County.

10.0 Appendix

10.1 Bibliography

All bibliography and reference information associated within this Flood Insurance Study are maintained and accessible within the geodatabase structure and associated metadata. Users requiring more specific information should contact the North Carolina Floodplain Mapping Program (NCFMP) at www.ncfloodmaps.com under the Contacts menu