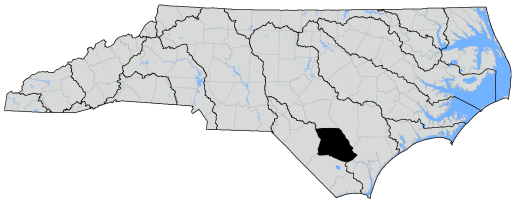
PRELIMINARY FLOOD INSURANCE STUDY

FEDERAL EMERGENCY MANAGEMENT AGENCY

A Report of Flood Hazards in

BLADEN COUNTY, NORTH CAROLINA AND INCORPORATED AREAS



Community Name	Community Number
BLADEN COUNTY	370293
TOWN OF BLADENBORO	370020
TOWN OF CLARKTON	370021
TOWN OF DUBLIN	370022
TOWN OF EAST ARCADIA	370496
TOWN OF ELIZABETHTOWN	370027
TOWN OF TAR HEEL	370294
TOWN OF WHITE LAKE	370490

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
37017CV000
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. Bladen 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

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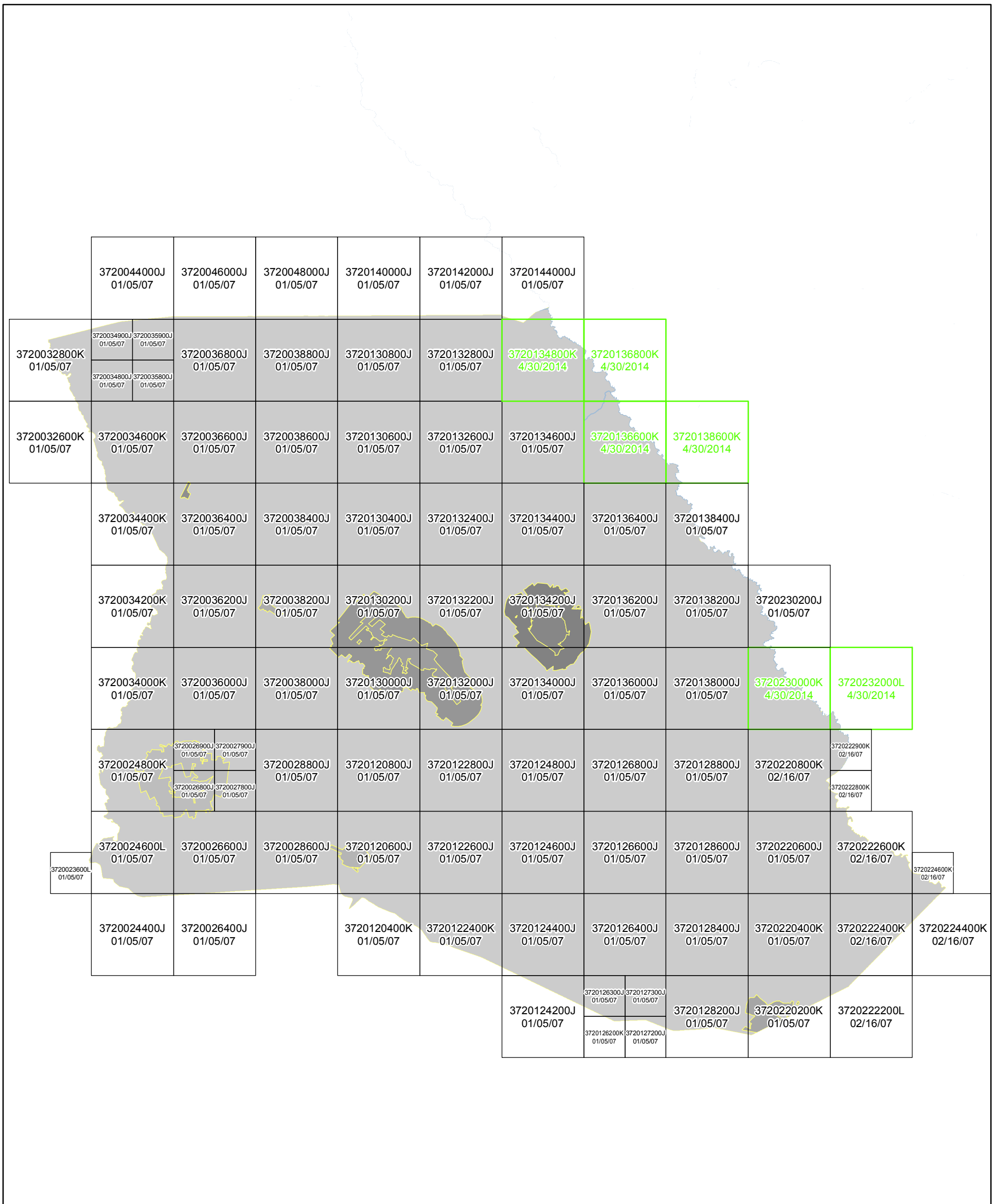


PRELIMINARY

APRIL 30, 2014

*PANEL NOT PRINTED

1 in = 5 miles

Miles

0 0.75 1.5 3 4.5

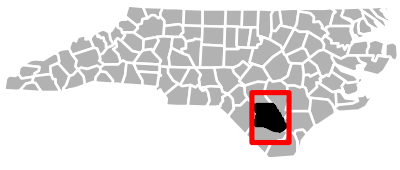
Map Projection:
Lambert Conformal Conic
North American Datum 1983

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

BLADEN COUNTY, NORTH CAROLINA And Incorporated Areas
PANELS PRINTED:
2300, 2320, 1366, 1386, 1348, 1368

FEMA

MAP NUMBER
37017CIND0C

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 Bladen County and the jurisdictions therein (hereinafter referred to collectively as Bladen 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 Bladen County, North Carolina, including the jurisdictions listed in Table 1.

Table 1 - Jurisdictions in Bladen County

Community	Included in this FIS	If Not Included, Location of Flood Hazard/Flood Insurance Rate Data
BLADEN COUNTY	Yes	*
TOWN OF BLADENBORO	Yes	*
TOWN OF CLARKTON	Yes	*
TOWN OF DUBLIN	Yes	*
TOWN OF EAST ARCADIA	Yes	*
TOWN OF ELIZABETHTOWN	Yes	*
TOWN OF TAR HEEL	Yes	*
TOWN OF WHITE LAKE	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.

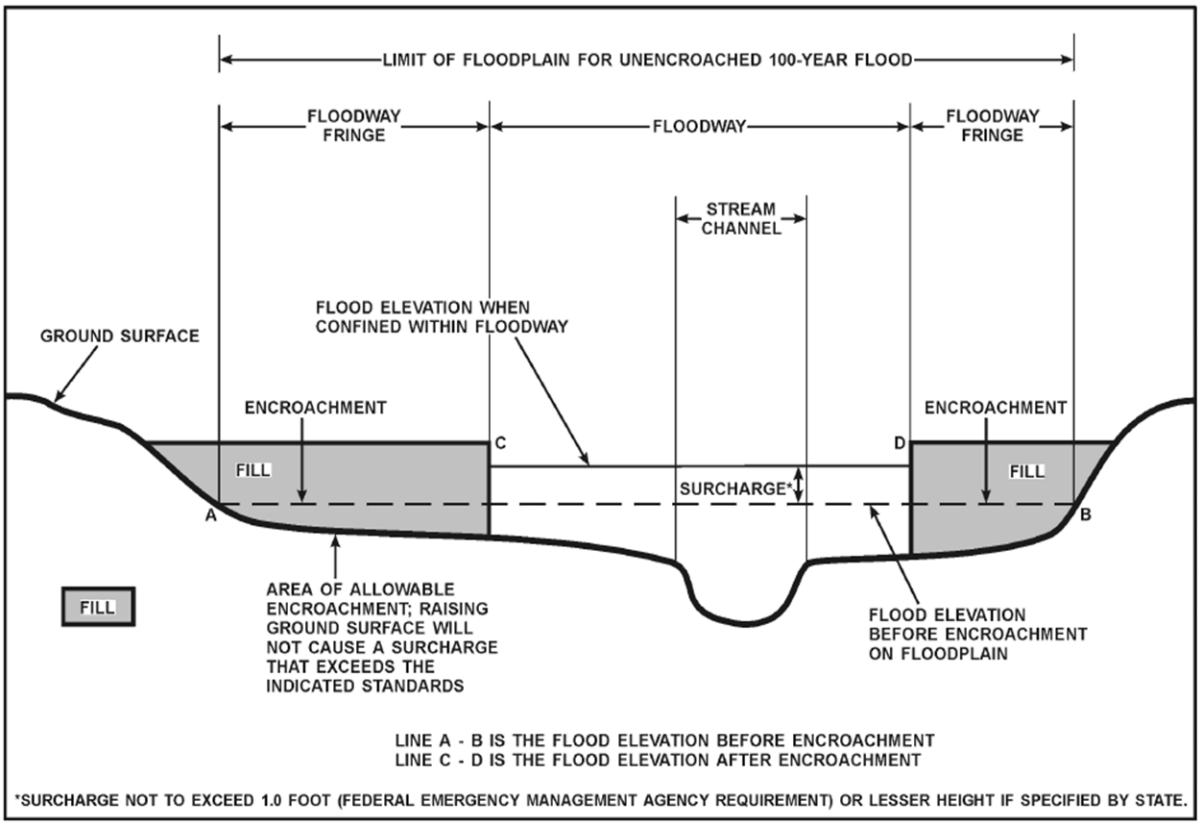


Figure 1- Floodway Schematic

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

Bladen County is found in the Coastal Plain region of North Carolina. It is surrounded by Cumberland County to the north, Sampson and Pender Counties to the east, Columbus County to the south, and Robeson 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
Waccamaw	03040206	Waccamaw River	The Waccamaw River Basin headwaters rise from Bladen County, North Carolina. The basin then drains portions of Columbus and Brunswick Counties before flowing into South Carolina and joining the Intracoastal Waterway.	1,652

4.2 Principal Flood Problems

Table 4, “Principal Flood Problems” contains a list of principal flooding problems in Bladen County.

Table 4 - Principal Flood Problems

Flooding Source	Problem
All Sources	Principal flood problems are not known to exist in Bladen County.

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”, lists selected flooding sources in Bladen County with records of past stages. The table shows the historic peak, a location description, approximate stream station, the date of the historic peak, and approximate recurrence interval of the flood elevation. The approximate recurrence interval for a flood is often estimated based on an analysis of rainfall amounts from a storm and /or stream gage data.

Table 5 - Historic Flood Elevations

Flooding Source/Tropical Storm	Location Description	Approx. Stream Station	Historic Peak (Feet NAVD 88)	Date	Approximate Recurrence Interval (in years)
Black River / Hurricane Floyd	At Beattys Bridge Road	175997	25.4	9/1/1999	*

* Data Not Available

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 Bladen County.

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

4.5 Scope of Study

For this map maintenance revision, a scoping meeting was held in Bladen 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 Bladen 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 Bladen 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 Communties
	From	To	
Black River	The confluence of South River	Approximately 1,400 feet upstream of Dr Kerr Road	Bladen County
Cape Fear River	Approximately 2.6 miles downstream of the confluence with Black River	Approximately 15.6 miles upstream of the confluence of Hood Creek	Bladen County
South River	Approximately 1.3 miles downstream of U.S. Highway 701	Approximately 0.5 mile upstream of Greens Bridge Road	Bladen County

Table 9P, “Scope of Revisions: Redelineated - Preliminary” is not applicable in Bladen 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	
Black River[1]	Approximately 9.4 miles upstream of the confluence with the Cape Fear River	Approximately 6.9 miles upstream of the confluence with the Cape Fear River	Bladen County
Colly Creek[1]	The confluence with Black River	Approximately 2.7 miles upstream of NC Highway 11	Bladen County Town Of White Lake
Cypress Creek[1]	At the confluence with South River	Approximately 0.5 mile upstream of South River	Bladen County

[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	
Black River	Approximately 3.7 miles downstream of Beattys Bridge Road	At the confluence of South River	Bladen County
Black River	The confluence of South River	Approximately 1,400 feet upstream of Dr Kerr Road	Bladen County
Cape Fear River	Approximately 2.6 miles downstream of the confluence with Black River	Approximately 15.6 miles upstream of the confluence of Hood Creek	Bladen County
South River	Approximately 1.3 miles downstream of U.S. Highway 701	Approximately 0.5 mile upstream of Greens Bridge Road	Bladen County

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	Bladen County

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	
Beaverdam Creek	The confluence with Waymans Creek	The Columbus/Bladen County Boundary	Bladen County

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

Source	Riverine Sources		Affected Communties
	From	To	
Big Swamp	The confluence with Lumber River	The confluence with Big Marsh Swamp and Galberry Swamp	Bladen County
Bigfoot Marsh	At the confluence with Brown Marsh Swamp	Approximately 100 feet downstream of U.S. Business 701	Bladen County Town Of Clarkton
Black River	Approximately 9.4 miles upstream of the confluence with the Cape Fear River	Approximately 3.7 miles downstream of Beattys Bridge Road	Bladen County
Brown Marsh Swamp	At the Bladen/Columbus County boundary	Approximately 0.9 mile upstream of U.S. Business 701	Bladen County
Cape Fear River	Confluence with the Black River	Approximately 190 feet downstream of Bladen/Cumberland County boundary	Bladen County Town Of Elizabethtown
Colly Creek	The confluence with Black River	Approximately 0.3 mile upstream of Susie Sand Hill Road	Bladen County Town Of White Lake
Cypress Creek	At the confluence with South River	Approximately 0.5 mile upstream of NC 210	Bladen County
Elkton Marsh	At the confluence with Brown Marsh Swamp	At the confluence with Doubles Branch and Horseshoe Swamp	Bladen County
Horsepen Branch	At the Bladen/Robeson County boundary	Approximately 0.5 mile upstream of State Road 410	Bladen County
Middle Swamp	At the confluence with Elkton Marsh	Approximately 1.0 mile upstream of Portersville School Road	Bladen County
Peters Creek	At the Cumberland/Bladen County boundary	Approximately 1,400 feet upstream of C.S. Faircloth Road	Bladen County
Rattlesnake Branch	At the confluence with Spring Branch	At the Bladen/Columbus County boundary	Bladen County
Saespan Branch	At the confluence with Friar Swamp	Approximately 0.6 mile upstream of Old Lake Road	Bladen County
Slender Branch	At the confluence with Horsepen Branch	Approximately 200 feet downstream of Clyde Evans Road	Bladen County
South River	Approximately 630 feet upstream of Greens Bridge Road	Approximately 1,500 feet upstream of the confluence of Gum Swamp	Bladen County
South River	Confluence with Black River and Great Coharie Creek	Approximately 0.9 mile downstream of Garland Highway	Bladen County
Spring Branch	At the confluence with Horsepen Branch	Approximately 0.9 mile upstream of State Road 242	Bladen County

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

Table 12, “Letters of Map Revision” is not applicable in Bladen 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
Big Swamp					
At the confluence with Lumber River	447.11	*	*	9,790	*
Approximately 4.4 miles downstream of Old Allentown Road	444.35	*	*	9,749	*
Approximately 2,400 feet downstream of Old Allentown Road	422.96	*	*	9,423	*
At the confluence of Horsepen Branch	403.68	*	*	9,126	*
Bigfoot Marsh					
At confluence with Brown Marsh Swamp	5.90	*	*	1,200	*
Approximately 0.6 mile downstream of US Business 701	3.40	*	*	876	*
Black River					
Approximately 9.8 miles downstream of NC Hwy 210	1543.16	*	*	29,800	*
Approximately 8.1 miles downstream of NC Hwy 210	1541.37	*	*	29,800	*
Approximately 7.0 miles downstream of NC Hwy 210	1539.06	*	*	29,800	*
Approximately 6.0 miles downstream of NC Hwy 210	1536.97	*	*	29,800	*
Approximately 4.8 miles downstream of NC Hwy 210	1532.52	*	*	29,700	*
Approximately 3.6 miles downstream of NC Hwy 210	1439.36	*	*	28,700	*
Approximately 1.4 miles downstream of NC Hwy 210	1437.48	*	*	28,700	*
Approximately 0.6 mile upstream of NC Hwy 210	1301.11	*	*	27,100	*
Approximately 3.7 miles downstream of Beattys Bridge Road	1277.40	15,300	23,100	26,800	36,500
Approximately 3.7 miles downstream of Beattys Bridge Road	1277.36	15,300	23,100	26,800	36,500
Brown Marsh Swamp					
At Red Hill Road	116.60	*	*	6,647	*
Approximately 1.4 miles upstream of US Business 701	98.60	*	*	6,040	*
At the confluence of Big Foot Marsh	92.00	*	*	5,805	*
At the confluence of Elkton Marsh	49.80	*	*	4,085	*
Approximately 0.75 mile upstream of Railroad	47.40	*	*	3,967	*
At SR 1760 (Burney Ford Road)	46.60	*	*	3,932	*
Cape Fear River					
Approximately 2.8 miles upstream of Pender/Bladen/Columbus county bondaries	5268.73	66,000	104,000	123,000	175,000
At the Bladen/Columbus County boundary	5022.30	*	*	121,000	*
Colly Creek					
At the Bladen/Pender County boundary	122.50	*	*	2,773	*
Approximately 0.7 mile downstream of NC 11	121.60	*	*	2,748	*
Approximately 0.5 mile downstream of NC 11	121.10	*	*	2,736	*
Approximately 0.7 mile upstream of NC 11	120.30	*	*	2,714	*
Approximately 0.9 mile upstream of NC 11	119.60	*	*	2,696	*
Approximately 1.7 miles downstream of NC 53	119.00	*	*	2,681	*
Approximately 0.6 mile downstream of NC 53	118.20	*	*	2,659	*
Approximately 230 feet upstream of NC 53	117.30	*	*	2,636	*
Approximately 0.9 mile upstream of NC 53	102.90	*	*	2,626	*
Approximately 1.1 miles upstream of NC 53	102.50	*	*	2,625	*
Approximately 1.3 miles downstream of NC 210	101.80	*	*	2,624	*
Approximately 0.8 mile downstream of NC 210	100.90	*	*	2,622	*
Approximately 0.3 mile downstream of NC 210	100.50	*	*	2,621	*
Approximately 2.7 miles upstream of NC 210	97.10	*	*	2,611	*

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 3.0 miles upstream of NC 210	95.20	*	*	2,604	*
Approximately 3.8 miles upstream of NC 210	94.20	*	*	2,601	*
Approximately 5.6 miles downstream of Bivens Bridge Road	93.20	*	*	2,597	*
Approximately 5.4 miles downstream of Bivens Bridge Road	91.60	*	*	2,590	*
Approximately 5.0 miles downstream of Bivens Bridge Road	90.50	*	*	2,585	*
Cypress Creek					
At the confluence with South River	18.70	*	*	2,453	*
Approximately 0.3 mile upstream of the confluence with South River	17.60	*	*	2,375	*
Approximately 0.1 mile upstream of NC 210	16.70	*	*	2,305	*
Elkton Marsh					
At confluence with Brown Marsh Swamp	40.70	*	*	3,636	*
Horsepen Branch					
At the confluence with Big Swamp	18.10	*	*	1,080	*
At the confluence of Spring Branch	12.20	*	*	820	*
At the confluence of Slender Branch	9.30	*	*	680	*
Lumber River					
At the confluence of Big Swamp	766.73	7,507	11,909	14,160	20,127
Middle Swamp					
Approximately 750 feet upstream of NC 211	5.90	*	*	1,206	*
Approximately 1,800 feet upstream of SR 1755	3.30	*	*	868	*
Rattlesnake Creek					
Confluence of Spring Branch Creek	3.08	*	*	320	*
Slender Branch					
At the confluence with Horsepen Branch	2.60	*	*	280	*
South River					
At mouth	488.20	*	*	9,848	*
Approximately 0.7 mile upstream of the confluence with Black River	486.10	*	*	9,806	*
Approximately 1.2 miles upstream of the confluence with Black River	485.20	*	*	9,787	*
Approximately 1.5 miles upstream of the confluence with Black River	484.60	*	*	9,776	*
Approximately 2.6 miles upstream of the confluence with Black River	468.40	*	*	9,453	*
Approximately 3.7 miles upstream of the confluence with Black River	467.40	*	*	9,433	*
Approximately 4.8 miles upstream of the confluence with Black River	467.40	*	*	9,433	*
Approximately 4.7 miles downstream of Ennis Bridge Road	466.50	*	*	9,414	*
Approximately 4.4 miles downstream of Ennis Bridge Road	465.80	*	*	9,401	*
Approximately 3.0 miles downstream of Ennis Bridge Road	465.30	*	*	9,390	*
Approximately 2.6 miles downstream of Ennis Bridge Road	462.00	*	*	9,324	*
Approximately 1.4 miles downstream of Ennis Bridge Road	461.00	*	*	9,305	*
Approximately 1.1 miles downstream of Ennis Bridge Road	460.20	*	*	9,289	*
Approximately 1.1 miles downstream of Ennis Bridge Road	459.70	*	*	9,280	*
Approximately 1.0 mile downstream of Ennis Bridge Road	457.70	*	*	9,241	*
Approximately 15.3 miles upstream of the Bladen/Pender County boundary	456.40	*	*	9,215	*
Approximately 15.9 miles upstream of the Bladen/Pender County boundary	451.70	*	*	9,122	*
Approximately 16.2 miles upstream of the Bladen/Pender County boundary	450.40	*	*	9,096	*
Approximately 17.0 miles upstream of the Bladen/Pender County boundary	450.00	*	*	9,088	*

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 17.8 miles upstream of the Bladen/Pender County boundary	449.00	*	*	9,069	*
Approximately 17.9 miles upstream of the Bladen/Pender County boundary	447.90	*	*	9,047	*
Approximately 18.3 miles upstream of the Bladen/Pender County boundary	447.20	*	*	9,034	*
Approximately 18.7 miles upstream of the Bladen/Pender County boundary	446.40	*	*	9,017	*
Approximately 19.9 miles upstream of the Bladen/Pender County boundary	444.30	*	*	8,976	*
Approximately 21.2 miles upstream of the Bladen/Pender County boundary	443.60	*	*	8,962	*
Approximately 1.8 miles downstream of NC 41	439.00	*	*	8,872	*
Approximately 0.4 mile upstream of NC 41	436.10	*	*	8,816	*
Approximately 1.2 miles upstream of NC 41	435.10	*	*	8,797	*
Approximately 1.4 miles upstream of NC 41	434.40	*	*	8,782	*
Approximately 2.1 miles upstream of NC 41	433.70	*	*	8,768	*
Approximately 2.7 miles upstream of NC 41	433.40	*	*	8,762	*
Approximately 3.0 miles upstream of NC 41	431.60	*	*	8,727	*
Approximately 3.4 miles upstream of NC 41	430.60	*	*	8,707	*
Approximately 3.9 miles upstream of NC 41	430.30	*	*	8,702	*
Approximately 4.6 miles upstream of NC 41	429.30	*	*	8,684	*
Approximately 4.8 miles upstream of NC 41	428.70	*	*	8,670	*
Approximately 5.4 miles upstream of NC 41	427.90	*	*	8,656	*
Approximately 6.7 miles upstream of NC 41	422.50	*	*	8,551	*
Approximately 1 mile downstream of Garland Highway	419.09	4,512	7,052	8,326	11,376
Approximately 7.4 miles upstream of NC 41	416.90	*	*	8,442	*
Approximately 7.6 miles upstream of NC 41	416.90	*	*	8,441	*
Approximately 2.3 miles downstream of Greens Bridge Road	386.19	4,290	6,643	7,833	10,755
At Greens Bridge Road	383.03	4,226	6,538	7,707	10,588
Approximately 2.2 miles downstream of Melvins Bridge Road	380.90	*	*	7,778	*
Approximately 2.8 miles downstream of Melvins Bridge Road	380.20	*	*	7,776	*
Approximately 2.0 miles downstream of Melvins Bridge Road	379.50	*	*	7,773	*
Approximately 1.4 miles downstream of Melvins Bridge Road	377.50	*	*	7,764	*
Approximately 0.6 miles downstream of Melvins Bridge Road	376.80	*	*	7,762	*
Approximately 1,440 feet downstream of Melvins Bridge Road	375.00	*	*	7,754	*
Approximately 1,700 upstream of Melvins Bridge Road	374.10	*	*	7,750	*
Approximately 0.4 mile upstream of Melvins Bridge Road	372.70	*	*	7,744	*
Approximately 1.3 miles upstream of Melvins Bridge Road	370.50	*	*	7,735	*
Approximately 1,000 feet upstream of the Bladen/Cumberland County boundary	363.70	*	*	7,704	*
Spring Branch					
At the confluence with Horsepen Branch	5.50	*	*	470	*
At the confluence of Rattlesnake Creek	2.40	*	*	270	*

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

Table 15, “Gage Information”, lists the stream gages located in Bladen County, including the drainage area of the flooding source at the gage and the period of record available at the time of the publication of this FIS Report.

Table 15 - Gage Information

Gage Number	Flooding Source	Site Name	Drainage Area (square miles)	Period of Record	
				From	To
02105769	Cape Fear River	CAPE FEAR R AT LOCK # 1 NR KELLY, NC	5250.00	1970	2013
NP	Colly Creek	COLLY CREEK NEAR KELLY, NC	103.00	1950	1971

Table 15 - Gage Information

Gage Number	Flooding Source	Site Name	Drainage Area (square miles)	Period of Record	
				From	To
02107000	South River	SOUTH RIVER NEAR PARKERSBURG, NC	379.00	1952	1986

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"
Beaverdam Creek	0.045 to 0.050	0.150
Big Creek	0.060	0.120
Bigfoot Marsh	0.060	0.095
Black River	0.038 to 0.072	0.070 to 0.280
Brown Marsh Swamp	0.060	0.095
Cape Fear River	0.030 to 0.059	0.050 to 0.666
Colly Creek	0.040 to 0.050	0.110 to 0.150
Cypress Creek	0.040 to 0.045	0.120 to 0.140
Elkton Marsh	0.060	0.095
Friar Swamp	0.060	0.120
Peters Creek	0.045 to 0.050	0.120 to 0.150
Ricefield Branch	0.060	0.120
Saespan Branch	0.050 to 0.060	0.080 to 0.120
South River	0.040 to 0.060	0.080 to 0.620
Turkeypen Branch	0.040 to 0.045	0.120 to 0.150

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
Beaverdam Creek				
088	8,789	1,652	24.4	114 / 15
089	8,862	1,652	24.4	114 / 15
091	9,141	1,652	24.4	77 / 15
Bigfoot Marsh				
045	4,531	1,200	70.6	9 / 862
057	5,679	1,200	71.6	399 / 23
064	6,365	1,200	72.3	248 / 156
073	7,320	1,200	73.3	514 / 5
079	7,930	1,200	73.9	303 / 27
095	9,507	876	75.0	6 / 268
106	10,592	876	76.4	72 / 77
111	11,133	876	77.5	201 / 11
115	11,504	876	77.9	114 / 20
117	11,707	876	78.2	305 / 58
Black River				
1062	106,155	26,818	19.7[1]	1,780 / 391
1082	108,232	26,818	19.7[1]	1,746 / 577
1102	110,187	26,818	19.7[1]	2,223 / 372
1124	112,388	26,818	19.7[1]	2,117 / 234
1142	114,156	26,818	19.7[1]	1,558 / 868
1161	116,113	26,818	19.7[1]	1,430 / 187
1165	116,514	26,818	19.7[1]	238 / 145
1166	116,573	26,818	19.7[1]	238 / 145
1176	117,574	26,818	19.7[1]	1,795 / 120
1196	119,641	26,818	19.7[1]	1,553 / 1,061
1216	121,555	26,818	19.7[1]	589 / 2,212

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
1232	123,189	26,818	19.7[1]	198 / 2,612
1258	125,789	26,818	19.7[1]	438 / 2,221
1271	127,100	26,818	19.7[1]	593 / 1,858
1287	128,670	26,818	19.7[1]	418 / 1,224
1298	129,778	26,818	19.7[1]	198 / 1,298
1312	131,207	26,818	19.7[1]	198 / 2,394
1330	132,973	26,818	19.7[1]	732 / 1,327
1350	135,001	26,818	19.7[1]	1,155 / 694
1372	137,181	26,818	19.7[1]	1,400 / 926
1391	139,075	26,818	19.7[1]	583 / 1,731
1406	140,580	26,818	19.7[1]	745 / 1,537
1426	142,599	26,818	19.7[1]	929 / 1,540
1442	144,231	26,818	19.8	1,213 / 1,297
1460	145,972	26,818	19.9	1,100 / 1,848
1472	147,247	26,818	19.9	900 / 1,920
1508	150,763	26,818	20.2	135 / 2,700
1524	152,426	26,818	20.3	459 / 2,032
1536	153,589	26,818	20.4	202 / 1,900
1550	155,026	26,818	20.5	138 / 2,800
1566	156,579	26,818	20.7	495 / 2,000
Brown Marsh Swamp				
000	42	6,647	69.8	741 / 959
018	1,790	6,647	69.9	494 / 1,755
030	2,952	6,647	70.0	652 / 2,274
047	4,719	6,647	70.0	10 / 2,750
059	5,936	6,647	70.1	14 / 2,817
075	7,490	6,647	70.1	376 / 2,724
109	10,871	6,040	70.3	23 / 3,069
132	13,167	5,805	70.7	11 / 1,418
149	14,887	5,805	71.5	192 / 1,529
161	16,078	5,805	72.4	69 / 1,191
162	16,235	5,805	74.0	69 / 1,191
173	17,312	5,805	74.5	296 / 1,435
184	18,412	5,805	74.5	1,116 / 70
186	18,590	5,805	74.7	1,116 / 70
200	19,964	4,085	74.7	1,194 / 1,387
214	21,415	4,085	74.7	1,071 / 1,210
225	22,531	4,085	74.8	1,193 / 406
234	23,424	4,085	75.0	1,311 / 38
249	24,912	3,967	75.3	873 / 505
266	26,574	3,967	75.7	1,104 / 153
281	28,055	3,967	76.2	1,112 / 275
285	28,519	3,932	77.1	1,112 / 275
299	29,945	3,932	77.3	1,458 / 11
327	32,665	3,932	77.7	967 / 645

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
347	34,700	3,932	77.9	1,099 / 521
362	36,196	3,932	78.2	172 / 673
379	37,864	3,932	79.4	1,165 / 11
397	39,713	3,932	81.4	65 / 66
399	39,887	3,932	84.2	65 / 66
401	40,090	3,932	85.2	66 / 65
411	41,130	3,932	85.2	861 / 495
427	42,706	3,932	85.3	1,765 / 586
429	42,904	2,838	85.4	1,765 / 586
Cape Fear River				
2849	284,857	123,000	19.1	13,200 / 1,595
2870	286,956	123,000	19.4	12,500 / 859
2895	289,500	123,000	19.9	11,000 / 1,800
2928	292,761	123,000	20.4	13,800 / 217
2955	295,459	123,000	20.8	12,100 / 1,232
2978	297,760	123,000	21.2	11,500 / 421
3014	301,371	123,000	21.8	9,000 / 2,100
3044	304,414	123,000	22.5	9,300 / 450
3078	307,842	123,000	23.1	12,300 / 1,701
3098	309,813	123,000	23.5	11,200 / 160
3112	311,229	123,000	23.6	17,300 / 160
3114	311,391	123,000	23.7	17,300 / 160
3127	312,711	123,000	23.8	19,395 / 160
3153	315,296	123,000	24.0	17,354 / 2,360
3178	317,767	123,000	24.3	17,966 / 1,434
3213	321,290	123,000	24.7	14,576 / 110
3218	321,840	123,000	24.8	17,350 / 146
3224	322,395	123,000	24.9	17,350 / 146
3250	324,996	123,000	25.1	20,263 / 643
3287	328,693	123,000	25.6	19,794 / 135
3320	332,008	123,000	26.1	15,993 / 130
3341	334,081	123,000	26.6	14,005 / 130
3377	337,657	123,000	27.1	3,370 / 2,712
3391	339,126	123,000	27.5	4,400 / 2,637
3422	342,182	123,000	28.2	9,163 / 4,034
3456	345,577	123,000	28.5	2,600 / 3,111
3467	346,681	123,000	29.0	12,695 / 3,525
3514	351,430	123,000	29.5	4,500 / 1,398
3549	354,852	123,000	30.2	11,638 / 3,722
3564	356,373	123,000	30.3	13,283 / 3,230
3580	357,998	123,000	30.5	13,676 / 2,104
3607	360,705	123,000	30.8	14,340 / 620
3632	363,152	123,000	31.0	8,818 / 130
3940	394,002	123,000	37.2	4,244 / 1,823
3960	395,987	123,000	37.4	4,809 / 1,539

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
3983	398,266	123,000	37.8	6,413 / 397
4001	400,102	123,000	38.1	6,008 / 217
4020	402,038	123,000	38.4	3,855 / 683
4039	403,922	123,000	38.7	3,977 / 985
4060	406,011	123,000	39.1	2,572 / 1,429
4081	408,116	123,000	39.4	1,335 / 3,044
4097	409,656	123,000	39.7	138 / 5,226
4125	412,502	123,000	40.0	146 / 5,268
4140	413,995	123,000	40.1	702 / 4,529
4153	415,323	123,000	40.3	2,295 / 3,538
4173	417,250	123,000	40.5	2,823 / 2,317
4194	419,399	123,000	40.8	1,044 / 4,546
4227	422,658	123,000	41.1	1,657 / 2,575
4243	424,255	123,000	41.2	2,652 / 1,799
4262	426,242	123,000	41.5	982 / 1,907
4286	428,551	123,000	42.0	3,930 / 894
4316	431,563	123,000	42.5	5,606 / 129
4329	432,901	123,000	42.6	5,882 / 129
4356	435,557	123,000	43.0	3,961 / 2,202
4371	437,093	123,000	43.2	3,581 / 2,973
4396	439,615	123,000	43.4	4,308 / 3,987
4422	442,173	123,000	43.6	1,545 / 5,630
4442	444,234	123,000	43.8	2,790 / 4,282
4462	446,195	123,000	44.0	2,146 / 2,714
4478	447,818	123,000	44.1	3,314 / 1,808
4496	449,609	123,000	44.3	4,104 / 226
4516	451,613	123,000	44.6	2,997 / 1,179
4540	454,043	123,000	44.9	1,928 / 2,988
4550	454,950	123,000	45.0	1,114 / 4,735
4582	458,158	123,000	45.3	129 / 7,317
4599	459,928	123,000	45.4	878 / 7,054
4640	463,956	123,000	45.7	138 / 8,772
4657	465,685	123,000	45.9	168 / 8,004
4703	470,277	123,000	46.3	3,584 / 3,299
4729	472,889	123,000	46.5	4,507 / 2,517
4750	474,971	123,000	46.6	3,192 / 3,887
Colly Creek				
270	27,000	2,736	22.3[2]	166 / 141
287	28,654	2,736	22.4[2]	100 / 100
287	28,705	2,736	22.4[2]	100 / 100
300	30,000	2,736	22.5[2]	183 / 141
316	31,638	2,736	22.6[2]	150 / 206
330	33,000	2,714	22.7[2]	493 / 91
346	34,602	2,696	22.7[2]	210 / 453
360	36,000	2,696	22.8[2]	123 / 463

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
375	37,500	2,696	22.8[2]	226 / 422
390	39,000	2,681	22.9[2]	100 / 208
405	40,500	2,681	22.9[2]	141 / 218
420	42,000	2,681	23.0[2]	141 / 232
435	43,500	2,659	23.0[1]	173 / 172
450	45,000	2,659	23.0[1]	168 / 139
470	46,990	2,659	23.0[1]	120 / 120
470	47,038	2,659	23.0[1]	120 / 120
480	48,000	2,636	23.0[1]	134 / 110
495	49,500	2,636	23.0[1]	77 / 121
509	50,893	2,636	23.0[1]	203 / 184
526	52,604	2,626	23.9	115 / 138
540	54,000	2,625	24.7	215 / 637
555	55,500	2,624	25.1	334 / 402
570	57,000	2,624	25.7	203 / 191
585	58,500	2,622	26.3	298 / 252
600	60,000	2,621	26.8	190 / 138
614	61,360	2,621	27.9	70 / 70
614	61,408	2,621	28.3	70 / 70
630	63,000	2,621	29.7	242 / 320
645	64,500	2,621	30.1	108 / 286
660	66,000	2,618	30.8	138 / 397
675	67,500	2,618	31.3	633 / 448
690	69,000	2,618	31.7	385 / 286
705	70,500	2,616	32.0	263 / 646
720	72,000	2,612	32.3	157 / 426
735	73,500	2,612	32.8	86 / 260
750	75,000	2,612	33.7	138 / 500
765	76,500	2,611	34.6	137 / 385
780	78,000	2,604	35.4	137 / 272
795	79,500	2,604	36.1	140 / 411
810	81,000	2,604	36.5	417 / 439
825	82,500	2,601	36.9	427 / 396
840	84,000	2,601	37.3	998 / 190
855	85,500	2,601	37.7	179 / 909
870	87,000	2,597	38.1	79 / 789
885	88,500	2,590	38.5	890 / 629
900	90,031	2,590	38.9	566 / 851
915	91,500	2,585	39.3	702 / 211
930	93,000	2,585	39.8	95 / 1,183
945	94,500	2,583	40.1	151 / 1,251
961	96,113	2,540	40.5	301 / 835
975	97,500	2,540	41.0	302 / 408
990	99,000	2,538	41.4	187 / 2,263
1005	100,500	2,505	41.5	760 / 2,592

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
1020	102,000	2,505	41.7	461 / 2,311
1035	103,500	2,505	41.9	1,712 / 194
1050	105,000	2,504	42.1	722 / 2,814
1065	106,500	2,504	42.3	251 / 1,576
1080	108,000	2,504	42.7	257 / 1,530
1095	109,500	2,504	43.0	234 / 2,147
1110	111,000	2,504	43.2	234 / 2,093
1125	112,500	2,504	43.6	234 / 1,343
1140	114,000	2,496	44.0	234 / 1,892
1155	115,500	2,372	44.4	112 / 2,015
1164	116,440	2,372	44.6	100 / 100
1165	116,490	2,372	45.0	100 / 100
1185	118,500	2,372	47.0	232 / 392
1200	120,000	2,372	47.3	232 / 1,143
1215	121,500	2,372	47.5	163 / 1,138
1230	123,037	2,372	47.7	493 / 894
1245	124,500	2,365	48.0	298 / 718
1260	126,000	2,333	48.3	232 / 1,471
1275	127,500	2,333	48.5	122 / 1,110
1290	129,000	2,296	48.9	599 / 810
1305	130,500	2,285	49.2	373 / 431
1320	132,000	2,285	49.6	1,207 / 630
1335	133,500	2,285	50.0	864 / 331
1350	135,000	2,285	50.4	61 / 491
1365	136,500	2,247	51.1	643 / 102
1380	138,000	2,235	51.5	958 / 791
1395	139,500	2,228	51.8	191 / 331
1405	140,549	2,228	52.3	164 / 661
1425	142,500	2,228	52.8	225 / 1,222
1442	144,210	2,214	53.0	459 / 521
1455	145,500	2,214	53.4	169 / 259
1469	146,905	2,169	53.8	92 / 761
1485	148,500	2,169	54.1	130 / 1,352
1501	150,122	2,169	54.4	130 / 1,545
1515	151,500	2,148	54.5	130 / 1,649
1529	152,879	2,146	54.7	159 / 730
1545	154,500	2,092	55.1	1,055 / 283
1560	156,000	2,081	55.3	567 / 602
1575	157,500	2,056	55.6	674 / 127
1590	159,000	2,056	56.0	279 / 127
1605	160,500	2,015	56.4	343 / 426
1620	162,000	2,015	56.8	178 / 531
1621	162,126	2,015	56.8	40 / 40
1622	162,196	2,015	58.7	40 / 40
1650	165,000	2,000	59.2	405 / 215

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
1665	166,500	1,982	59.2	761 / 392
1678	167,798	1,972	59.3	260 / 1,213
1710	171,000	1,639	59.7	36 / 195
1725	172,500	1,639	60.6	95 / 332
1739	173,851	1,610	61.3	75 / 247
1755	175,500	1,579	62.0	535 / 95
1770	177,000	1,579	62.6	219 / 177
1785	178,500	1,557	63.3	781 / 54
1799	179,892	1,502	63.8	482 / 167
1810	181,026	1,226	64.1	97 / 566
1831	183,084	1,226	64.5	54 / 153
1845	184,500	1,189	67.6	41 / 44
1860	186,000	1,189	69.0	42 / 56
1875	187,482	1,189	69.7	40 / 40
1876	187,552	1,189	69.9	40 / 40
1887	188,713	1,145	70.3	101 / 92
1905	190,500	1,007	71.2	36 / 137
1920	192,000	973	72.2	24 / 237
1935	193,500	973	72.9	218 / 174
1950	195,000	937	73.8	58 / 241
1965	196,500	869	75.2	55 / 37
1985	198,503	869	76.0	210 / 179
1985	198,548	869	76.2	210 / 179
2010	201,000	816	76.7	58 / 105
2025	202,500	816	78.5	28 / 201
2040	204,000	749	80.2	98 / 106
2055	205,500	672	81.0	130 / 91
2066	206,615	672	81.5	57 / 65
2085	208,500	657	84.2	58 / 62
2099	209,895	534	84.5	85 / 104
2100	209,960	534	84.5	85 / 104
2115	211,500	477	84.6	79 / 104
Cypress Creek				
010	1,000	2,453	61.3[3]	150 / 100
015	1,500	2,453	61.1[3]	200 / 110
020	1,996	2,375	61.2	56 / 292
025	2,500	2,375	61.9	188 / 192
030	3,000	2,375	62.7	246 / 132
035	3,500	2,375	63.5	195 / 217
040	4,000	2,375	64.1	250 / 210
044	4,434	2,375	64.6	50 / 50
050	5,000	2,375	67.6	157 / 313
055	5,500	2,375	68.1	200 / 50
060	6,000	2,375	68.7	199 / 338
065	6,500	2,375	69.0	214 / 329

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	2,375	69.4	271 / 200
077	7,658	2,375	70.0	285 / 100
082	8,186	2,375	70.8	200 / 160
087	8,741	2,375	71.7	38 / 38
088	8,811	2,375	73.8	38 / 38
095	9,500	2,305	74.6	110 / 110
100	10,000	2,305	74.9	100 / 130
105	10,500	2,305	75.4	150 / 90
110	11,000	2,305	75.9	64 / 250
Elkton Marsh				
015	1,520	3,636	74.7	60 / 70
020	2,027	3,636	75.3	230 / 1,366
044	4,366	3,636	75.4	471 / 1,213
063	6,345	3,636	75.5	11 / 1,211
079	7,853	3,636	75.6	769 / 405
090	8,995	3,636	75.7	164 / 862
100	10,034	3,636	75.8	46 / 1,288
102	10,245	3,636	77.1	46 / 1,288
Horsepen Branch				
001	82	1,076	88.7[1]	10 / 1,053
009	926	1,076	88.7[1]	13 / 637
018	1,790	1,076	88.7[1]	10 / 706
027	2,687	1,076	88.7[1]	135 / 469
035	3,515	1,076	88.7[1]	132 / 264
042	4,201	1,076	89.0	302 / 223
047	4,678	1,076	89.4	278 / 325
055	5,452	822	89.7	133 / 519
062	6,152	822	90.0	189 / 355
069	6,886	822	90.6	352 / 92
077	7,680	822	91.3	402 / 12
084	8,363	822	92.2	310 / 297
095	9,516	822	92.9	255 / 321
098	9,756	679	93.0	435 / 272
104	10,448	679	93.1	320 / 118
111	11,104	679	93.4	86 / 308
118	11,767	679	93.8	214 / 141
124	12,398	679	94.2	38 / 260
129	12,934	679	94.6	103 / 208
132	13,231	679	94.9	155 / 173
134	13,412	679	95.0	37 / 38
135	13,519	679	96.2	37 / 38
136	13,612	679	96.5	66 / 426
142	14,169	679	96.6	110 / 344
148	14,844	679	96.6	503 / 198
155	15,526	679	96.7	165 / 297
162	16,157	679	96.8	140 / 175

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
169	16,913	679	96.9	225 / 52
175	17,488	679	97.1	279 / 113
181	18,145	679	97.2	81 / 276
187	18,712	679	97.4	20 / 263
192	19,179	679	97.6	51 / 287
193	19,349	679	97.7	37 / 38
195	19,501	679	97.9	37 / 38
197	19,706	679	98.2	230 / 274
203	20,323	679	98.3	103 / 183
213	21,281	679	99.0	250 / 79
218	21,800	679	99.4	125 / 143
226	22,557	679	99.7	115 / 339
Middle Swamp				
133	13,292	1,607	85.8	27 / 327
137	13,725	1,607	86.0	236 / 45
140	14,032	1,607	86.1	392 / 148
142	14,178	1,607	91.4	392 / 148
146	14,569	1,607	91.4	8 / 419
149	14,918	1,607	91.5	43 / 412
151	15,075	1,607	91.5	44 / 411
155	15,478	1,607	91.5	153 / 327
164	16,413	1,206	91.5	350 / 78
167	16,727	1,206	91.6	343 / 109
168	16,809	1,206	91.6	343 / 109
171	17,053	1,206	91.6	322 / 8
177	17,697	1,206	91.7	96 / 94
194	19,441	1,206	92.5	214 / 54
210	20,984	868	93.6	176 / 8
221	22,145	868	94.4	91 / 63
233	23,262	868	95.6	129 / 100
Peters Creek				
030	3,000	1,327	70.8[1]	416 / 52
Rattlesnake Branch				
001	123	319	90.6[1]	81 / 162
002	213	319	90.6[1]	27 / 68
003	316	319	90.7	73 / 18
004	379	319	94.2	-9,999 / -9,999
006	562	319	94.2	-9,999 / -9,999
010	1,037	319	94.2	-9,999 / -9,999
016	1,553	319	94.3	-9,999 / -9,999
020	2,002	319	94.5	86 / 66
024	2,436	319	95.5	94 / 14
025	2,549	319	95.6	22 / 22
027	2,676	319	96.2	24 / 20
028	2,770	319	96.4	30 / 119
Slender Branch				

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
002	161	282	92.9[1]	189 / 149
008	820	282	92.9[1]	37 / 159
013	1,281	282	92.9[1]	97 / 69
014	1,397	282	92.9[1]	17 / 17
015	1,525	282	93.1	17 / 17
016	1,613	282	93.5	27 / 131
022	2,185	282	94.0	10 / 136
031	3,137	282	95.6	68 / 27
039	3,923	282	97.3	280 / 9
046	4,586	282	98.5	41 / 81
052	5,190	282	100.0	51 / 11
South River				
022	2,205	9,848	26.1[1]	97 / 895
040	4,000	9,806	26.1[1]	77 / 586
064	6,389	9,787	26.1[1]	463 / 911
084	8,369	9,776	26.1[1]	153 / 1,158
103	10,339	9,776	26.1[1]	789 / 436
128	12,766	9,776	26.1[1]	1,423 / 524
141	14,096	9,453	26.1[1]	690 / 585
160	16,000	9,453	26.1[1]	1,083 / 94
177	17,654	9,453	26.1[1]	195 / 1,136
197	19,667	9,433	26.1[1]	666 / 94
222	22,178	9,433	26.1[1]	626 / 94
251	25,112	9,433	26.1[1]	244 / 542
263	26,259	9,414	26.1[1]	382 / 941
280	28,000	9,401	26.1[1]	94 / 454
300	30,000	9,390	26.1[1]	94 / 159
320	32,000	9,390	26.1[1]	1,178 / 94
342	34,241	9,390	26.1[1]	901 / 94
362	36,217	9,324	26.1[1]	93 / 310
377	37,727	9,324	26.1[1]	93 / 93
398	39,780	9,305	26.1	415 / 93
424	42,396	9,305	26.7	123 / 169
440	44,000	9,289	27.0	668 / 254
460	46,000	9,280	27.3	668 / 776
480	48,000	9,280	27.6	316 / 109
498	49,840	9,280	28.0	129 / 300
516	51,638	9,280	28.5	73 / 73
517	51,686	9,280	28.8	73 / 73
542	54,162	9,280	29.6	93 / 369
571	57,071	9,241	30.0	92 / 747
580	58,000	9,241	30.0	171 / 493
603	60,297	9,241	30.4	384 / 93
622	62,176	9,215	30.7	625 / 197
640	64,000	9,122	30.9	166 / 92

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
660	66,000	9,096	31.3	248 / 351
682	68,195	9,096	31.7	92 / 91
705	70,508	9,088	32.1	333 / 173
721	72,133	9,088	32.4	91 / 103
740	74,000	9,069	32.8	289 / 773
758	75,790	9,047	33.1	577 / 422
782	78,230	9,034	33.6	450 / 91
800	80,000	9,017	34.1	109 / 253
813	81,340	9,017	34.5	91 / 571
840	84,000	9,017	35.1	208 / 91
864	86,445	8,976	35.8	105 / 90
880	88,000	8,976	36.2	90 / 90
909	90,890	8,976	36.9	90 / 90
923	92,285	8,962	37.2	94 / 90
945	94,479	8,872	37.7	821 / 275
960	96,000	8,872	37.9	106 / 90
974	97,422	8,872	38.3	234 / 90
997	99,719	8,872	38.8	90 / 90
1027	102,709	8,872	39.6	489 / 90
1035	103,532	8,872	39.8	86 / 86
1036	103,579	8,872	40.0	86 / 86
1047	104,669	8,872	40.5	160 / 89
1076	107,587	8,816	41.2	89 / 462
1105	110,474	8,797	41.9	89 / 273
1120	112,000	8,782	42.2	638 / 105
1137	113,726	8,782	42.6	591 / 89
1160	116,000	8,768	43.1	317 / 150
1180	118,000	8,762	43.6	760 / 137
1205	120,486	8,727	44.2	88 / 830
1230	123,040	8,707	44.8	200 / 92
1244	124,352	8,702	45.3	88 / 159
1262	126,197	8,702	45.8	173 / 723
1283	128,253	8,684	46.3	305 / 149
1300	130,000	8,670	46.8	88 / 416
1321	132,130	8,656	47.4	103 / 88
1340	134,000	8,656	48.1	302 / 88
1363	136,318	8,656	48.8	135 / 369
1380	138,000	8,656	49.3	88 / 664
1401	140,054	8,551	49.8	177 / 996
1427	142,695	8,442	50.3	846 / 677
1940	194,000	7,778	65.4	254 / 1,281
1957	195,698	7,776	65.6	1,300 / 1,632
1980	198,000	7,773	65.7	1,484 / 1,306
2000	200,000	7,764	66.0	80 / 2,584
2021	202,067	7,762	66.4	85 / 414

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
2040	204,000	7,762	66.9	80 / 2,224
2065	206,458	7,758	67.2	320 / 1,848
2076	207,603	7,754	67.4	113 / 1,126
2087	208,726	7,754	67.7	1,974 / 881
2088	208,771	7,754	68.8	1,974 / 881
2110	211,040	7,750	69.2	2,050 / 149
2139	213,896	7,744	69.5	239 / 1,697
2164	216,389	7,735	69.8	1,397 / 759
2180	218,000	7,735	70.0	609 / 1,479
2202	220,163	7,735	70.4	383 / 1,722
2224	222,428	7,704	70.9	78 / 1,773
Spring Branch				
002	221	473	89.2[1]	160 / 229
007	741	473	89.6	10 / 232
012	1,196	473	90.6	206 / 108
018	1,850	265	91.1	92 / 73
024	2,372	265	91.4	172 / 39
027	2,740	265	91.8	20 / 43
031	3,070	265	92.8	10 / 77
032	3,164	265	93.1	13 / 13
033	3,267	265	94.2	13 / 13
033	3,327	265	94.4	9 / 51
039	3,853	265	95.0	37 / 62
046	4,588	265	95.9	70 / 70
052	5,209	265	97.6	10 / 24
058	5,814	265	99.1	68 / 29
065	6,482	265	99.7	87 / 19
073	7,316	265	101.3	6 / 47
081	8,122	265	104.3	59 / 10
Turkeypen Branch				
055	5,460	591	43.7	45 / 37

[1]Elevation includes backwater effects

[2]Cape Fear River

[3]ELEVATION INCLUDES FLOODING CONTROLLED BY SOUTH RIVER

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 Bladen 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 Bladen 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 Bladen 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)
34.75	-78.75	-0.94
34.75	-78.63	-0.91
34.75	-78.50	-0.88
34.63	-78.75	-0.98
34.63	-78.62	-0.96
34.62	-78.50	-0.93
34.63	-78.38	-0.86
34.50	-78.75	-0.99
34.50	-78.63	-0.97
34.50	-78.50	-0.97
34.50	-78.38	-0.94
34.50	-78.25	-0.89
34.37	-78.38	-1.02
Average conversion in Bladen County from NGVD 29 to NAVD 88 = -0.94 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 Bladen 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.

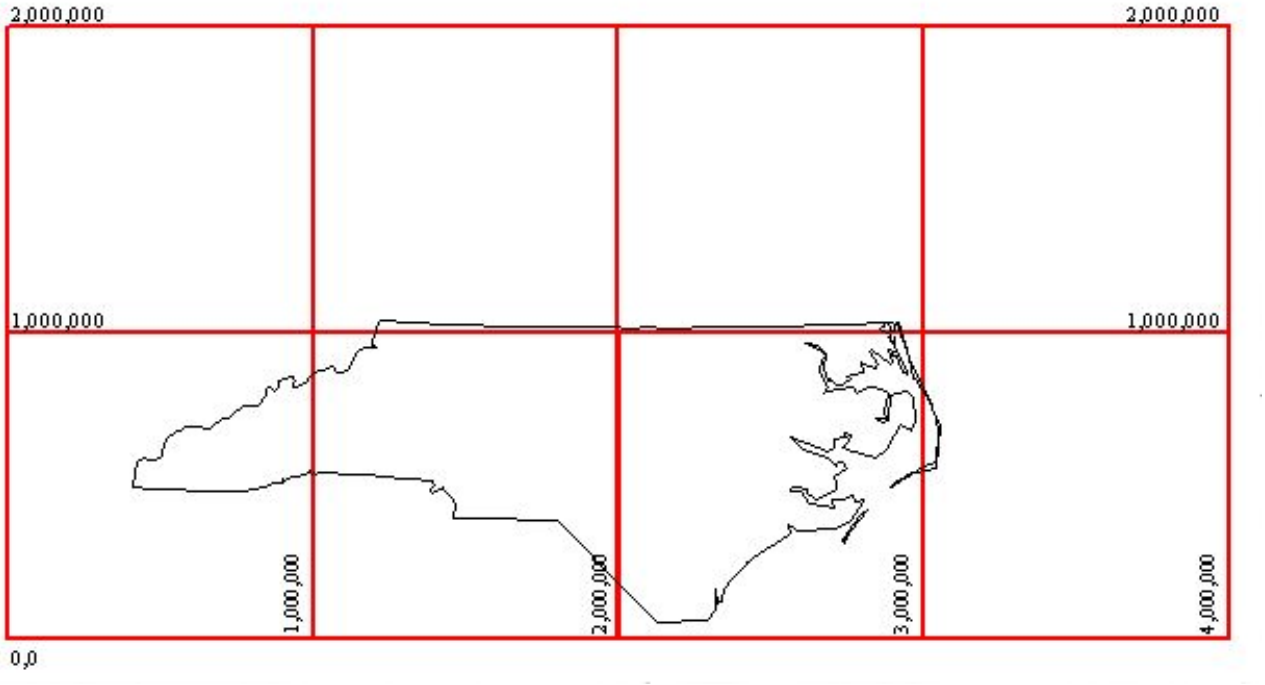


Figure 3 - North Carolina’s State Plane Coordinate System

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
Bills Swamp								
136	13,618	80	334	1.7	79.8	79.8	80.8	1.0
141	14,124	63	209	2.7	81.2	81.2	82.0	0.8
143	14,287	68	222	2.6	82.3	82.3	82.9	0.7
145	14,461	65	225	2.5	82.9	82.9	83.8	0.9
149	14,933	88	235	2.2	84.4	84.4	85.4	0.9
154	15,350	44	118	4.3	86.6	86.6	87.4	0.8
155	15,494	57	168	3.0	88.5	88.5	89.4	0.9
157	15,749	74	316	1.6	89.5	89.5	90.5	1.0
Black River								
1576	157,623	2,090	25,944	1.0	20.8	20.8	21.8	1.0
1587	158,748	2,075	25,582	1.0	21.0	21.0	22.0	1.0
1605	160,547	2,750	36,947	0.7	21.2	21.2	22.2	1.0
1628	162,798	2,230	29,566	0.9	21.4	21.4	22.4	1.0
1642	164,247	2,565	32,496	0.8	21.5	21.5	22.5	1.0
1657	165,667	2,150	28,609	0.9	21.7	21.7	22.7	1.0
1665	166,464	2,050	27,226	1.0	21.8	21.8	22.8	1.0
1672	167,180	1,750	22,741	1.2	21.8	21.8	22.8	1.0
1684	168,374	2,000	23,676	1.1	22.0	22.0	23.0	1.0
1696	169,624	1,890	20,715	1.3	22.2	22.2	23.2	1.0
1721	172,114	1,775	20,920	1.3	22.6	22.6	23.6	1.0
1788	178,788	1,875	22,975	1.2	24.2	24.2	25.2	0.9
1797	179,674	2,050	27,779	1.0	24.4	24.4	25.4	1.0
1806	180,604	1,350	19,958	1.3	24.6	24.6	25.6	1.0
1816	181,598	1,580	21,878	1.2	24.8	24.8	25.8	1.0
1832	183,216	1,786	27,336	1.0	25.1	25.1	26.1	1.0
1841	184,096	2,080	35,407	0.8	25.3	25.3	26.2	1.0
1867	186,696	1,935	32,996	0.8	25.5	25.5	26.5	1.0
1892	189,198	2,355	40,247	0.7	25.8	25.8	26.8	1.0
1904	190,386	2,700	37,805	0.7	25.9	25.9	26.9	1.0
1932	193,199	5,100	75,792	0.4	26.1	26.1	27.0	1.0
1964	196,403	5,100	72,545	0.4	26.1	26.1	27.1	1.0
Cape Fear River								
2983	298,261	14,230	135,647	0.9	21.9	21.9	22.7	0.8
3018	301,816	12,670	111,764	1.1	22.3	22.3	23.2	0.9
3038	303,846	11,910	116,387	1.1	22.6	22.6	23.6	1.0
3049	304,941	8,050	82,192	1.5	23.0	23.0	24.0	1.0
South River								

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
1442	144,150	668	3,109	2.7	50.7	50.7	51.4	0.8
1460	145,959	1,218	4,883	1.7	52.2	52.2	52.8	0.6
1476	147,558	1,500	8,464	1.0	53.0	53.0	53.7	0.7
1500	150,049	1,556	7,925	1.0	53.5	53.5	54.4	0.9
1519	151,942	1,708	10,483	0.8	55.2	55.2	56.2	1.0
1538	153,805	1,881	11,958	0.7	55.6	55.6	56.6	1.0
1558	155,769	2,004	11,006	0.8	56.1	56.1	57.0	0.9
1578	157,796	2,219	10,545	0.8	56.6	56.6	57.5	0.8
1588	158,799	1,937	10,640	0.8	56.9	56.9	57.8	0.8
1602	160,222	1,999	8,396	1.0	57.3	57.3	58.1	0.8
1620	162,017	2,269	11,884	0.7	57.6	57.6	58.6	1.0
1633	163,296	2,516	12,017	0.7	57.8	57.8	58.8	1.0
1653	165,270	1,684	8,627	1.0	58.2	58.2	59.1	1.0
1672	167,217	1,549	6,822	1.2	59.3	59.3	60.2	0.9
1691	169,063	1,939	12,739	0.6	59.8	59.8	60.7	0.9
1705	170,535	1,941	10,362	0.8	60.1	60.1	60.9	0.8
1715	171,502	1,952	12,275	0.7	60.4	60.4	61.2	0.8
1758	175,755	2,105	12,504	0.7	60.8	60.8	61.6	0.8
1772	177,203	2,114	10,488	0.8	61.0	61.0	61.8	0.9
1796	179,585	1,840	12,754	0.6	61.2	61.2	62.2	0.9
1810	181,043	1,671	9,328	0.8	61.4	61.4	62.4	0.9
1826	182,553	1,639	7,357	1.1	61.8	61.8	62.7	0.9
1834	183,441	923	6,292	1.2	62.0	62.0	62.9	0.9
1849	184,908	971	5,871	1.3	62.4	62.4	63.2	0.8
1861	186,101	1,215	8,308	0.9	62.8	62.8	63.6	0.8
1875	187,524	2,385	12,078	0.6	63.1	63.1	63.8	0.8
1895	189,501	2,200	11,113	0.7	63.5	63.5	64.1	0.6
1912	191,234	1,578	10,691	0.7	64.8	64.8	65.2	0.4
1932	193,241	3,237	14,114	0.6	65.0	65.0	65.4	0.4

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 Bladen 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 Bladen County, are presented in Table 22, “Community Map History.”

Information pertaining to revised and unrevised flood hazards for each jurisdiction within Bladen 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 Bladen County.

Table 22 - Map Revision History

Community	Initial Identification Date	Initial FIRM Effective Date	FIS Revision Date
BLADEN COUNTY	1/20/1978	9/1/1989	01/05/2007
TOWN OF BLADENBORO	11/30/1973	7/17/1986	01/05/2007
TOWN OF CLARKTON	12/7/1973	7/3/1986	01/05/2007
TOWN OF DUBLIN	1/5/2007	1/5/2007	01/05/2007
TOWN OF EAST ARCADIA	1/5/2007	9/1/1989	01/05/2007
TOWN OF ELIZABETHTOWN	12/21/1973	7/17/1986	01/05/2007
TOWN OF TAR HEEL	1/5/2007	1/5/2007	01/05/2007
TOWN OF WHITE LAKE	1/20/1978	9/1/1989	01/05/2007

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 Bladen 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
BLADEN COUNTY	1/5/2007	NCFMP	NCFMP	286-000022	9/3/2013
BLADEN COUNTY	1/5/2007	NCFMP	NCFMP	286-000022	2/5/2014
BLADEN COUNTY	1/5/2007	NCFMP	NCFMP	286-0000-23	8/8/8888
TOWN OF BLADENBORO	1/5/2007	NCFMP	NCFMP	286-000022	9/3/2013
TOWN OF BLADENBORO	1/5/2007	NCFMP	NCFMP	286-000022	2/5/2014
TOWN OF BLADENBORO	1/5/2007	NCFMP	NCFMP	286-0000-23	8/8/8888
TOWN OF CLARKTON	1/5/2007	NCFMP	NCFMP	286-000022	9/3/2013
TOWN OF CLARKTON	1/5/2007	NCFMP	NCFMP	286-000022	2/5/2014
TOWN OF CLARKTON	1/5/2007	NCFMP	NCFMP	286-0000-23	8/8/8888
TOWN OF DUBLIN	1/5/2007	NCFMP	NCFMP	286-000022	9/3/2013
TOWN OF DUBLIN	1/5/2007	NCFMP	NCFMP	286-000022	2/5/2014
TOWN OF DUBLIN	1/5/2007	NCFMP	NCFMP	286-0000-23	8/8/8888
TOWN OF EAST ARCADIA	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 EAST ARCADIA	1/5/2007	NCFMP	NCFMP	286-000022	2/5/2014
TOWN OF EAST ARCADIA	1/5/2007	NCFMP	NCFMP	286-0000-23	8/8/8888
TOWN OF ELIZABETHTOWN	1/5/2007	NCFMP	NCFMP	286-000022	9/3/2013
TOWN OF ELIZABETHTOWN	1/5/2007	NCFMP	NCFMP	286-000022	2/5/2014
TOWN OF ELIZABETHTOWN	1/5/2007	NCFMP	NCFMP	286-0000-23	8/8/8888
TOWN OF TAR HEEL	1/5/2007	NCFMP	NCFMP	286-000022	9/3/2013
TOWN OF TAR HEEL	1/5/2007	NCFMP	NCFMP	286-000022	2/5/2014
TOWN OF TAR HEEL	1/5/2007	NCFMP	NCFMP	286-0000-23	8/8/8888
TOWN OF WHITE LAKE	1/5/2007	NCFMP	NCFMP	286-000022	9/3/2013
TOWN OF WHITE LAKE	1/5/2007	NCFMP	NCFMP	286-000022	2/5/2014
TOWN OF WHITE LAKE	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 Bladen 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

Table 24, "Consultation Coordination Officer's Meetings" is not applicable in Bladen County.

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 Bladen County are shown in Table 25, "Scoping Meetings." Meetings held for the map maintenance revision are also included below for Bladen County.

Table 25 — Scoping Meetings

Community	Riverbasin	Initial Scoping Date	Attended By	Final Scoping Date	Attended By
BLADEN COUNTY	CAPE FEAR	11/29/2000	Representatives of the State, FEMA, Dewberry and Brunswick County	1/4/2001	Representatives of the State, FEMA, Dewberry, and Brunswick County
BLADEN COUNTY	CAPE FEAR	11/29/2000	Representatives of the State, FEMA, Dewberry and Brunswick County	3/8/2001	Representatives of the State, FEMA, Dewberry, and Brunswick County
BLADEN COUNTY	LUMBER	11/29/2000	Representatives of the State, FEMA, Dewberry and Brunswick County	1/4/2001	Representatives of the State, FEMA, Dewberry, and Brunswick County
BLADEN COUNTY	LUMBER	11/29/2000	Representatives of the State, FEMA, Dewberry and Brunswick County	3/8/2001	Representatives of the State, FEMA, Dewberry, and Brunswick County
BLADEN COUNTY	LUMBER	11/1/2000	Representatives from the State, community, and FEMA-MCC/D&D	1/4/2001	Representatives from the State, community, and FEMA-MCC/D&D
TOWN OF BLADENBORO	LUMBER	11/1/2000	Representatives from the State, community, and FEMA-MCC/D&D	1/4/2001	Representatives from the State, community, and FEMA-MCC/D&D

Table 25 — Scoping Meetings

Community	Riverbasin	Initial Scoping Date	Attended By	Final Scoping Date	Attended By
TOWN OF BLADENBORO ETJ	LUMBER	11/1/2000	Representatives from the State, community, and FEMA-MCC/D&D	1/4/2001	Representatives from the State, community, and FEMA-MCC/D&D
TOWN OF CLARKTON	LUMBER	11/1/2000	Representatives from the State, community, and FEMA-MCC/D&D	1/4/2001	Representatives from the State, community, and FEMA-MCC/D&D
TOWN OF DUBLIN	LUMBER	11/1/2000	Representatives from the State, community, and FEMA-MCC/D&D	1/4/2001	Representatives from the State, community, and FEMA-MCC/D&D

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
BLADEN COUNTY	1/5/2007	Town of Elizabethtown	2/20/2003	Representatives of Bladen County and Incorporated Communities, NCDEM, D&D and Watershed Concepts	2/20/2003	Members of the Public
BLADEN COUNTY	1/5/2007	Town of Elizabethtown	2/20/2003	Representatives of Bladen County and Incorporated Communities, NCDEM, D&D and Watershed Concepts	10/20/2005	The Public
BLADEN COUNTY	1/5/2007	Town of Elizabethtown	2/20/2003	Representatives of Bladen County and Incorporated Communities, NCDEM, D&D and Watershed Concepts	11/1/2005	Members of the Public
BLADEN COUNTY	1/5/2007	Town of Elizabethtown	9/21/2005	Representatives of Bladen County and Incorporated Communities, NCDEM, D&D and Watershed Concepts	2/20/2003	Members of the Public
BLADEN COUNTY	1/5/2007	Town of Elizabethtown	9/21/2005	Representatives of Bladen County and Incorporated Communities, NCDEM, D&D and Watershed Concepts	10/20/2005	The Public
BLADEN COUNTY	1/5/2007	Town of Elizabethtown	9/21/2005	Representatives of Bladen County and Incorporated Communities, NCDEM, D&D 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 Bladen 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 Tar Heel	No Special Flood Hazard Area,	Tar Heel	NC	28392
Town of Elizabethtown	Elizabeth Town Hall, 805 West Broad Street	Elizabethtown	NC	28337

Table 27 — Map Repositories

Town of White Lake	White Lake Town Hall, 1879 White Lake Drive	White Lake	NC	28337
Town of Clarkton	Clarkton Town Hall, 81 North Elm Street	Clarkton	NC	28433
Town of Bladenboro	Bladenboro Town Hall, 305 South Main Street	Bladenboro	NC	28320
Town of Dublin	Town Hall, 7386 Albert Street	Dublin	NC	28332
Town of East Arcadia	Town Hall, 1516 East Arcadia Road	East Arcadia	NC	28456
Bladen County	Bladen County Courthouse, 106 East Broad Street, Room 107	Elizabethtown	NC	28337

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 Bladen 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