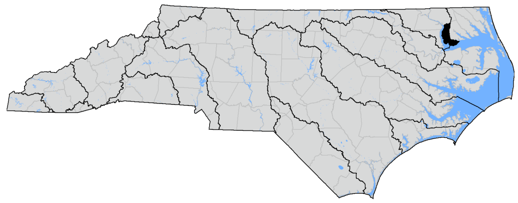
PRELIMINARY FLOOD INSURANCE STUDY

FEDERAL EMERGENCY MANAGEMENT AGENCY

A Report of Flood Hazards in

CHOWAN COUNTY, NORTH CAROLINA AND INCORPORATED AREAS



Community Name	Community Number
CHOWAN COUNTY	370301
TOWN OF EDENTON	370062

FEMA'S COOPERATING TECHNICAL PARTNER

NORTH CAROLINA Cooperating Technical State

PRELIMINARY: 11/30/2015

REVISED: 9/9/9999

Federal Emergency Management Agency

State of North Carolina

Flood Insurance Study Number

37041CV000

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
10/16/2008	Initial Countywide FIS Report Effective Date

This FIS has been produced as part of the North Carolina Floodplain Mapping Program. Chowan 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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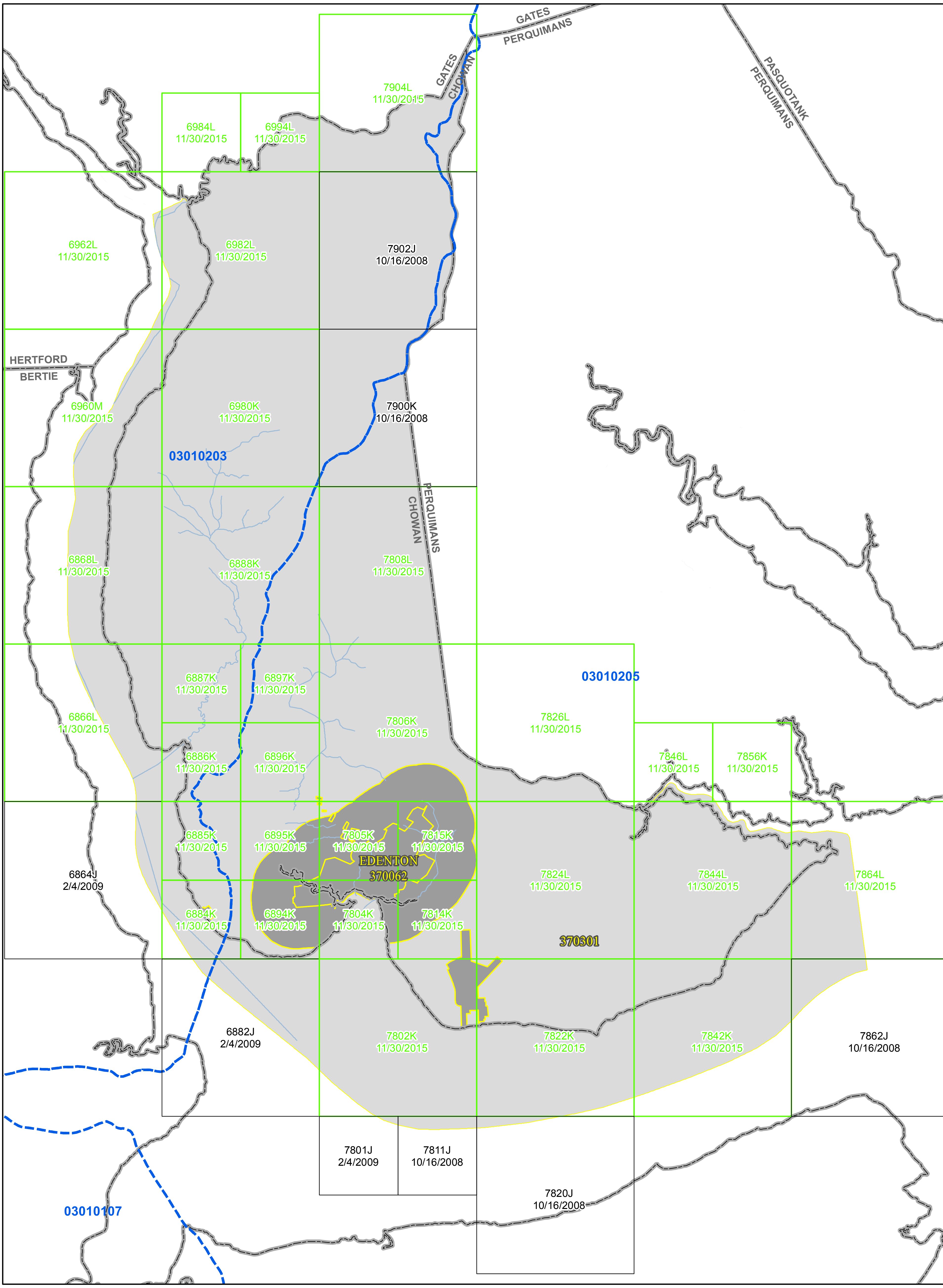

1 in = 2 miles

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Miles: 0, 0.45, 0.9, 1.8, 2.7

Map Projection:
Lambert Conformal Conic
North American Datum 1983

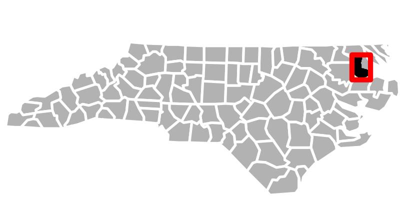
THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT

HTTP://FRIS.NC.GOV/FRIS

SEE FLOOD INSURANCE STUDY FOR ADDITIONAL INFORMATION

PRELIMINARY
11/30/2015

COUNTY LOCATOR



NATIONAL FLOOD INSURANCE PROGRAM

FLOOD INSURANCE RATE MAP INDEX

CHOWAN COUNTY, NORTH CAROLINA And Incorporated Areas

PANELS PRINTED:
6868, 6888, 7808, 7904, 6984, 6994, 6962, 6982, 7902, 6960, 6980, 7900, 6866, 6887, 6897, 7806, 7826, 7864, 6884, 6894, 7804, 7814, 6882, 7802, 7822, 7842, 7862, 7801, 7811, 7820, 6886, 6896, 7846, 7856, 6864, 6885, 6895, 7805, 7815, 7824, 7844

FEMA

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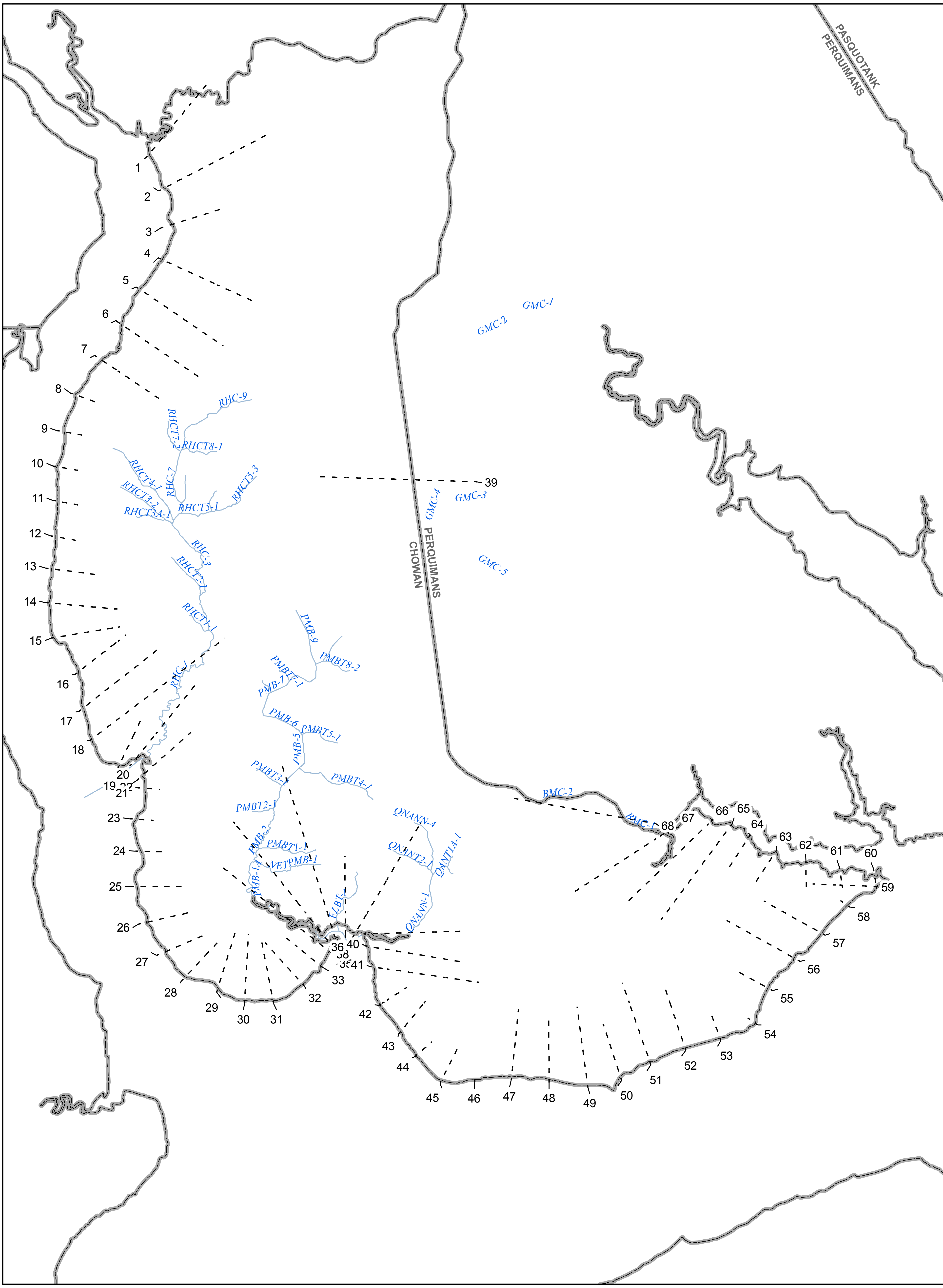

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1 in = 2 miles

0 0.5 1 2 3 Miles

Map Projection:
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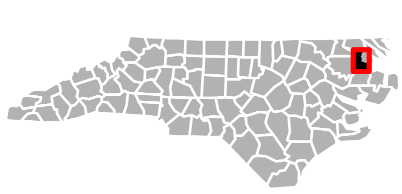
COUNTY LOCATOR



NATIONAL FLOOD INSURANCE PROGRAM

TRANSECT LOCATOR MAP

CHOWAN COUNTY, NORTH CAROLINA

PANELS WITH TRANSECTS:

6868, 6888, 7808, 6984, 6994, 6982, 6960, 6980, 7900, 6866, 6887, 6897, 7806, 7826, 6886, 6896, 7846, 7856, 6885, 6895, 7805, 7815, 7824, 7844, 7864, 6884, 6894, 7804, 7814, 6882, 7802, 7822, 7842

FEMA

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

Table 1 - Jurisdictions in Chowan County

Community	Included in this FIS	If Not Included, Location of Flood Hazard/Flood Insurance Rate Data
CHOWAN COUNTY	Yes	*
TOWN OF EDENTON	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.

1.4 Considerations for Using this Flood Insurance Study Report

The NFIP encourages State and local governments to implement sound floodplain management programs. To assist in this endeavor, each FIS Report provides floodplain data, which may include a combination of the following: 10-, 4-, 2-, 1-, and 0.2-percent annual chance flood elevations (the 1% annual chance flood elevation is also referred to as the Base Flood Elevation (BFE)); delineations of the 1% annual chance and 0.2% annual chance floodplains; and 1% annual chance floodway. This information is presented on the FIRM and/or in many components of the FIS Report, including Flood Profiles, Floodway Data tables, Summary of Non-Coastal Stillwater Elevations tables, and Coastal Transect Parameters tables (not all components may be provided for a specific FIS).

It is, therefore, the responsibility of the user to consult with community officials by contacting the community repository to obtain the most current FIS Report components. Communities participating in the NFIP have established repositories of flood hazard data for floodplain management and flood insurance purposes. Community map repository addresses are provided in Table 27, “Map Repositories,” within this FIS Report.

New FIS Reports are frequently developed for multiple communities, such as entire counties. A countywide FIS Report incorporates previous FIS Reports for individual communities and the unincorporated area of the county (if not jurisdictional) into a single document and supersedes those documents for the purposes of the NFIP.

The Initial Countywide FIS Report for Chowan became Effective on 10/16/2008. Refer to Table XX for information about subsequent revisions to FIRMs.

Selected FIRM panels for the community may contain information (such as floodways and cross sections) that was previously shown separately on the corresponding Flood Boundary and Floodway Map panels. In addition, former flood hazard zone designations have been changed as follows:

Old Zone	New Zone
A1 through A30	AE
V1 through V30	VE
B	X (shaded)
C	X (unshaded)

FEMA does not impose floodplain management requirements or special insurance ratings based on Limit of Moderate Wave Action (LiMWA) delineations at this time. The LiMWA represents the approximate landward limit of the 1.5-foot breaking wave. If the LiMWA is shown on the FIRM, it is being provided by FEMA as information only. For communities that do adopt Zone VE building standards in the area defined by the LiMWA, additional Community Rating System (CRS) credits are available. Refer to Section 2.5.4 for additional information about the LiMWA.

The CRS is a voluntary incentive program that recognizes and encourages community floodplain management activities that exceed the minimum NFIP requirements. Visit the FEMA Web site at http://www.fema.gov or contact your appropriate FEMA Regional Office for more information about this program.

Previous FIS Reports and FIRMs may have included levees that were accredited as reducing the risk associated with the 1% annual chance flood based on the information available and the mapping standards of the NFIP at that time. For FEMA to continue to accredit the identified levees, the levees must meet the criteria of the Code of Federal Regulations, Title 44, Section 65.10 (44 CFR 65.10), titled “Mapping of Areas Protected by Levee Systems.

Since the status of levees is subject to change at any time, the user should contact the appropriate agency for the latest information regarding levees presented in Table 9 of this FIS Report. For levees owned or operated by the U.S. Army Corps of Engineers (USACE), information may be obtained from the USACE national levee database. For all other levees, the user is encouraged to contact the appropriate local community.

FEMA has developed a Guide to Flood Maps (FEMA 258) and online tutorials to assist users in accessing the information contained on the FIRM. These include how to read panels and step-by-step instructions to obtain specific information. To obtain this guide and other assistance in using the FIRM, visit the FEMA Web site at http://www.fema.gov.

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.

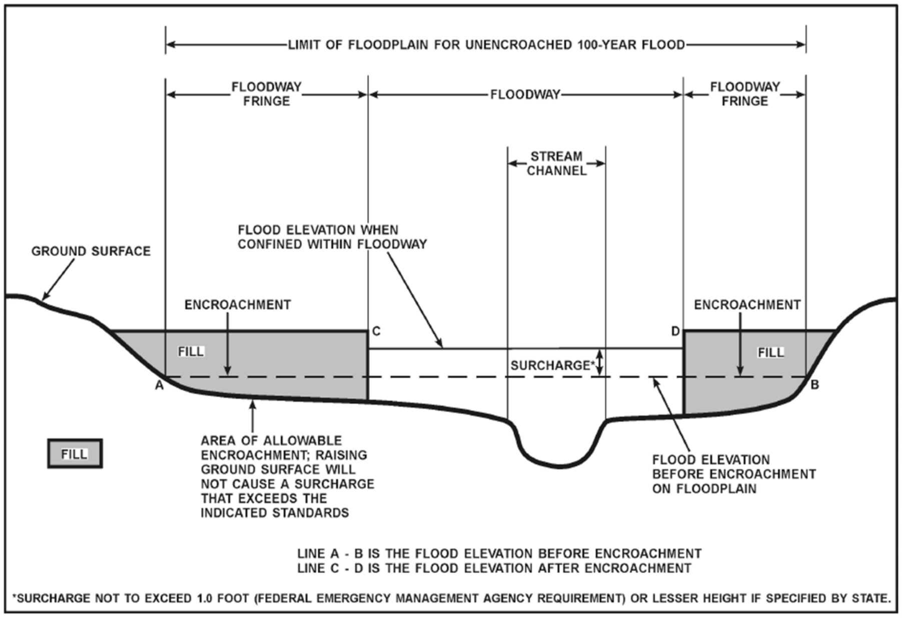


Figure 1- Floodway Schematic

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.

Coastal flood elevations are provided in the Summary of Coastal Stillwater Elevations table in this report. If the elevation on the FIRM is higher than the elevation shown in this table, a wave height, wave runup and/or wave setup component likely exists, in which case, the higher elevation should be used for construction and/or floodplain management purposes.

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.

2.5 Coastal Flood Hazard Areas

For most areas along rivers, streams, and small lakes, BFEs and floodplain boundaries are based on the amount of water expected to enter the area during a 1% annual chance flood and the geometry of the floodplain. Floods in these areas are typically caused by storm events. However, for areas on or near ocean coasts, large rivers, or large bodies of water, BFE and floodplain boundaries may need to be based on additional components, including storm surges and waves. Communities on or near ocean coasts face flood hazards caused by offshore seismic events as well as storm events.

Coastal flooding sources that are included in this Flood Risk Project are shown in Table XX.

2.5.1 Water Elevations and the Effects of Waves

Specific terminology is used in coastal analyses to indicate which components have been included in evaluating flood hazards.

The stillwater elevation (SWEL or still water level) is the surface of the water resulting from astronomical tides, storm surge, and freshwater inputs, but excluding wave setup contribution or the effects of waves.

- *Astronomical tides* are periodic rises and falls in large bodies of water caused by the rotation of the earth and by the gravitational forces exerted by the earth, moon and sun.
- *Storm surge* is the additional water depth that occurs during large storm events. These events can bring air pressure changes and strong winds that force water up against the shore.
- *Freshwater inputs* include rainfall that falls directly on the body of water, runoff from surfaces and overland flow, and inputs from rivers.

The 1% annual chance stillwater elevation is the stillwater elevation that has been calculated for a storm surge from a 1% annual chance storm. The 1% annual chance storm surge can be determined from analyses of tidal gage records, statistical study of regional historical storms, or other modeling approaches. Stillwater elevations for storms of other frequencies can be developed using similar approaches.

The total stillwater elevation (also referred to as the mean water level) is the stillwater elevation plus wave setup contribution but excluding the effects of waves.

- *Wave setup* is the increase in stillwater elevation at the shoreline caused by the reduction of waves in shallow water. It occurs as breaking wave momentum is transferred to the water column.

Like the stillwater elevation, the total stillwater elevation is based on a storm of a particular frequency, such as the 1% annual chance storm. Wave setup is typically estimated using standard engineering practices or calculated using models, since tidal gages are often sited in areas sheltered from wave action and do not capture this information.

Coastal analyses may examine the effects of overland waves by analyzing storm-induced erosion, overland wave propagation, wave runup, and/or wave overtopping.

- *Storm-induced erosion* is the modification of existing topography by erosion caused by a specific storm event, as opposed to general erosion that occurs at a more constant rate.
- *Overland wave propagation* describes the combined effects of variation in ground elevation, vegetation, and physical features on wave characteristics as waves move onshore.
- *Wave runup* is the uprush of water from wave action on a shore barrier. It is a function of the roughness and geometry of the shoreline at the point where the stillwater elevation intersects the land.
- *Wave overtopping* refers to wave runup that occurs when waves pass over the crest of a barrier.

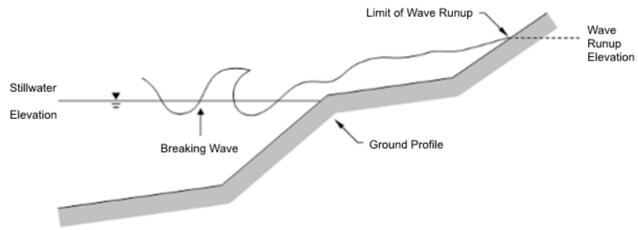


Figure 5: Wave Runup Transect Schematic

2.5.2 Floodplain Boundaries and BFEs for Coastal Areas

For coastal communities along the Atlantic and Pacific Oceans, the Gulf of Mexico, the Great Lakes, and the Caribbean Sea, flood hazards must take into account how storm surges, waves, and extreme tides interact with factors such as topography and vegetation. Storm surge and waves must also be considered in assessing flood risk for certain communities on rivers or large inland bodies of water.

Beyond areas that are affected by waves and tides, coastal communities can also have riverine floodplains with designated floodways, as described in previous sections.

Floodplain Boundaries

In many coastal areas, storm surge is the principle component of flooding. The extent of the 1% annual chance floodplain in these areas is derived from the total stillwater elevation (stillwater elevation including storm surge plus wave setup) for the 1% annual chance storm. The methods that were used for calculation of total stillwater elevations for coastal areas are described in Section 5.3 of this FIS Report. Location of total stillwater elevations for coastal areas are shown in Figure 8, “1% Annual Chance Total Stillwater Levels for Coastal Areas.

In some areas, the 1% annual chance floodplain is determined based on the limit of wave runup or wave overtopping for the 1% annual chance storm surge. The methods that were used for calculation of wave hazards are described in Section 5.3 of this FIS Report.

Table 18 and 18P presents the types of coastal analyses that were used in mapping the 1% annual chance floodplain in coastal areas.

Coastal BFEs

CWhere they apply, coastal BFEs are calculated along transects extending from offshore to the limit of coastal flooding onshore. Results of these analyses are accurate until local topography, vegetation, or development type and density within the community undergoes major changes.

Parameters that were included in calculating coastal BFEs for each transect included in this FIS Report are presented in Table 20, “Coastal Transect Parameters.” The locations of transects are shown in Figure 9, “Transect Location Map.” More detailed information about the methods used in coastal analyses and the results of intermediate steps in the coastal analyses are presented in Section 5.3 of this FIS Report. Additional information on specific mapping methods is provided in Section 6.4 of this FIS Report.

2.5.3 Coastal High Hazard Areas

Certain areas along the open coast and other areas may have higher risk of experiencing structural damage caused by wave action and/or high-velocity water during the 1% annual chance flood. These areas will be identified on the FIRM as Coastal High Hazard Areas.

- *Coastal High Hazard Area (CHHA)* is a SFHA extending from offshore to the inland limit of the primary frontal dune (PFD) or any other area subject to damages caused by wave action and/or high-velocity water during the 1% annual chance flood.
- *Primary Frontal Dune (PFD)* is a continuous or nearly continuous mound or ridge of sand with relatively steep slopes immediately landward and adjacent to the beach. The PFD is subject to erosion and overtopping from high tides and waves during major coastal storms.

CHHAs are designated as “V” zones (for “velocity wave zones”) and are subject to more stringent regulatory requirements and a different flood insurance rate structure. The areas of greatest risk are shown as VE on the FIRM. Zone VE is further subdivided into elevation zones and shown with BFEs on the FIRM.

The landward limit of the PFD occurs at a point where there is a distinct change from a relatively steep slope to a relatively mild slope; this point represents the landward extension of Zone VE. Areas of lower risk in the CHHA are designated with Zone V on the FIRM. More detailed information about the identification and designation of Zone VE is presented in Section 6.4 of this FIS Report.

Areas that are not within the CHHA but are SFHAs may still be impacted by coastal flooding and damaging waves; these areas are shown as “A” zones on the FIRM.

Figure 6, “Coastal Transect Schematic,” illustrates the relationship between the base flood elevation, the 1% annual chance stillwater elevation, and the ground profile as well as the location of the Zone VE and Zone AE areas in an area without a PFD subject to overland wave propagation. This figure also illustrates energy dissipation and regeneration of a wave as it moves inland.

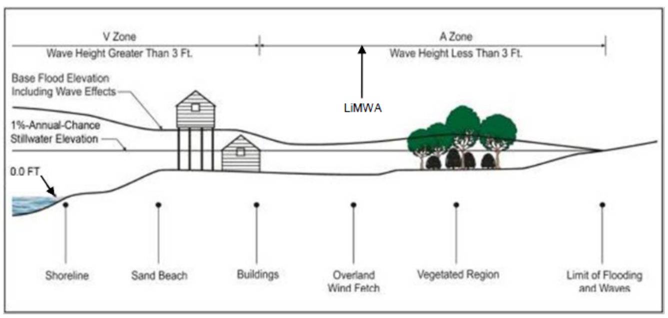


Figure 6: Coastal Transect Schematic

Methods used in coastal analyses in this Flood Risk Project are presented in Section 5.3 and mapping methods are provided in Section 6.4 of this FIS Report.

Coastal floodplains are shown on the FIRM using the symbology described in Figure 3, “Map Legend for FIRM.” In many cases, the BFE on the FIRM is higher than the stillwater elevations shown in Table 17 due to the presence of wave effects. The higher elevation should be used for construction and/or floodplain management purposes.

2.5.4 Limit of Moderate Wave Action

Laboratory tests and field investigations have shown that wave heights as little as 1.5 feet can cause damage to and failure of typical Zone AE building construction. Wood-frame, light gage steel, or masonry walls on shallow footings or slabs are subject to damage when exposed to waves less than 3 feet in height. Other flood hazards associated with coastal waves (floating debris, high velocity flow, erosion, and scour) can also damage Zone AE construction.

Therefore, a LiMWA boundary may be shown on the FIRM as an informational layer to assist coastal communities in safe rebuilding practices. The LiMWA represents the approximate landward limit of the 1.5-foot breaking wave. The location of the LiMWA relative to Zone VE and Zone AE is shown in Figure 6.

The effects of wave hazards in Zone AE between Zone VE (or the shoreline where Zone VE is not identified) and the limit of the LiMWA boundary are similar to, but less severe than, those in Zone VE where 3-foot or greater breaking waves are projected to occur during the 1% annual chance flooding event. Communities are therefore encouraged to adopt and enforce more stringent floodplain management requirements than the minimum NFIP requirements in the LiMWA. The NFIP Community Rating System provides credits for these actions.

Where wave runup elevations dominate over wave heights, there is no evidence to date of significant damage to residential structures by runup depths less than 3 feet. Examples of these areas include areas with steeply sloped beaches, bluffs, or flood protection structures that lie parallel to the shore. In these areas, the FIRM shows the LiMWA immediately landward of the VE/AE boundary. Similarly, in areas where the zone VE designation is based on the presence of a primary frontal dune or wave overtopping, the LiMWA is delineated immediately landward of the Zone VE/AE boundary.

3.0 Insurance Applications

3.1 National Flood Insurance Program Insurance Zones

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.

3.2 Coastal Barrier Resources System

3.2 Coastal Barrier Resources System

The Coastal Barrier Resources Act (CBRA) of 1982 was established by Congress to create areas along the Atlantic and Gulf coasts and the Great Lakes, where restrictions for Federal financial assistance including flood insurance are prohibited. In 1990, Congress passed the Coastal Barrier Improvement Act (CBIA), which increased the extent of areas established by the CBRA and added "Otherwise Protected Areas" (OPA) to the system. These areas are collectively referred to as the John. H Chafee Coastal Barrier Resources System (CBRS). The CBRS boundaries that have been identified in the project area are in Table 4: Coastal Barrier Resource System Information.

Table 4: "Coastal Barrier Resources System Information" is not applicable in Chowan County.

4.0 Area Studied

Chowan County is found in the Coastal Plain region of North Carolina. It is surrounded by Gates County to the north, Perquimans County to the east, Tyrrell County to the southeast, Washington County to the east, Bertie County to the west, and Hertford County to the northwest.

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)
Albemarle	03010205	Albemarle Sound	The Albemarle Basin covers the Albemarle Sound and surrounding drainage areas along the northeast North Carolina coast and into southeastern Virginia. The Albemarle Sound begins where Roanoke River and Chowan River join in eastern Bertie County.	4,323
Chowan	03010203	Chowan River	The Chowan River Basin begins where the Nottoway River and Blackwater River confluence. From there, the basin drains significant portions of Bertie, Chowan, Gates, and Hertford Counties, ending where the Chowan River enters the Albemarle Sound.	899

4.2 Principal Flood Problems

Table 4, "Principal Flood Problems" is not applicable in Chowan County.

4.3 Historic Flood Elevations

Hurricane Isabel
(8/18/2003)

Hurricane Isabel made landfall along the Outer Banks just north of Cape Lookout around 1:00 pm on September 18, 2003. The eye of the storm tracked northeast passing over eastern Halifax County. Winds gusts to near hurricane force were recorded over Halifax County. Many locations across the Coastal Plain and even back into the Triangle received wind gusts between 50 to 70 mph late in the afternoon until early evening. Many trees were uprooted falling on vehicles and homes all across the area. Up to 6 inches of rain fell across Edgecombe, Halifax and Wilson counties resulting in flooding of several roads. Property damage was estimated to be $7.3 million.

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.

Hurricane Donna
(8/29/1960)
Hurricane Donna crossed the North Carolina coast between Wilmington and Morehead City of September 11, 1960. The center of the storm passed a few miles east of Wrightsville Beach, although Wilmington and Wrightsville Beach were each in the eye for about an hour. The lowest barometric pressure recorded during this storm was 962 mb at Wilmington. High tides, 6 to 8 feet above normal, together with high winds, caused severe damage at many points. Winds of hurricane force, up to 97 mph, were reported from Wilmington. During the night of September 11, the storm center moved northward, parallel, and slightly east of a line drawn between Wilmington and Norfolk. Wind gusts were in excess of 97 mph and tides were 4 to 8 feet above normal. High tides of 10.3 and 8.3 feet NGVD were reported at Atlantic Beach and Wrightsville Beach, respectively. Coastal communities from Wilmington to Nags Head suffered heavy structural damage and considerable beach erosion. Eight deaths and approximately 100 injuries were attributed to the storm. Damages were estimated at millions of dollars.

Hurricane Helene
(9/21/1958)

Hurricane Helene was one of the most powerful storms of recent history. Fortunately for the people of North Carolina, the storm center was well out at sea as it moved north on September 26 and 27. Nevertheless, high winds were recorded at Wilmington, with the highest winds measured at 85 mph and peak gusts recorded at 135 mph. The lowest reported central pressure of the storm was 932 mb; this measurement was recorded south-southeast of Cape Fear early on the morning of September 27. There was some beach erosion due to seas and tides, but this erosion was minimized by the fact that the storm occurred at the time of low astronomical tides. High tides were estimated at 3 to 5 feet above normal; a high tide of 5.1 feet NGVD was reported at Wrightsville Beach. Tides were higher on the southern edge of Pamlico Sound, when the wind shift as the storm center passed brought the tides 7 to 8 feet above normal.

Hurricane Ione
(9/10/1955)
Hurricane Ione moved up from the south and crossed the North Carolina coast near Salter Path, 10 miles west of Morehead City, at about 5 a.m. on September 19. It then slowly curved to the northeast and went out to sea near the Virginia border early on September 20. When Ione entered North Carolina, winds gusted to over 100 mph. Wind speeds of 75 mph with gusts to 107 mph were recorded at Cherry Point. The minimum barometric pressure recorded over North Carolina during this storm was 960 mb. Heavy rains also accompanied Ione. At the same time, prolonged easterly winds drove tidal water onto beaches and into sounds and estuaries to heights of 3 to 10 feet above normal. The result was the largest inundation of eastern North Carolina ever known to have occurred. At New Bern, the depth of the flood was the greatest ever recorded, about 10.5 feet above mean low water; forty city blocks were flooded, several hundred homes were washed away, and thousands more were flooded with up to 4 feet of water. A high tide of 6.9 feet NGVD was reported at Atlantic Beach, North Carolina, and an estimated 5.3 feet NGVD at Wrightsville Beach.

Hurricane Diane
(8/7/1955)
Five days after Hurricane Connie, and before the damage from that storm could be estimated, Hurricane Diane struck the coast near Carolina Beach about 6 a.m. on August 17. The highest wind speed reported during this storm was 74 mph at Wilmington Airport. Storm tides ranged from 5 to 9 feet above mean low water on the beaches (6.8 feet NGVD at Wrightsville Beach), and in some areas of sounds and rivers emptying into sounds, estimated water levels were 5 to 9 feet above normal. Water was 3 feet above flood level in the business district of Belhaven and "waist deep" in parts of Washington and New Bern. Diane caused severe beach erosion along the North Carolina coast. The total damage caused in North Carolina by both Connie and Diane was estimated to be in excess of $90 million. No deaths or injuries in North Carolina were attributed to either of the storms.

Hurricane Connie
(8/3/1955)
Hurricane Connie entered North Carolina close to Cape Lookout at about 8:30 a.m. on August 12. The prolonged pounding of high waves against the coast caused tremendous beach erosion, probably worse than that caused by Hazel in 1954. Storm tides along the coast from Southport to Nags Head were reported to be about 7 feet NGVD (6.9 feet NGVD at Wrightsville Beach and 7.5 feet NGVD at Kure Beach). Water in sounds and near the mouths of rivers was 5 to 8 feet above normal. At Wilmington, winds were reported at 72 mph, gusting to 83 mph. At Fort Macon, winds of 75 mph, gusts of 100 mph, and barometric pressure of 962 mb were reported. The storm also brought torrential rains with the maximum rainfall, around 12 inches in 48 hours, occurring near Morehead City. Total damage throughout the state was estimated at $50 million.

Hurricane Hazel
(10/5/1954)
Hurricane Hazel was the most destructive storm in the history of North Carolina. The storm crossed the coast just north of Myrtle Beach, South Carolina, as hurricane winds hit the Atlantic coast between Georgetown, South Carolina, and Cape Lookout, North Carolina. Storm tides (i.e., hurricane surge) devastated the immediate ocean front of this stretch of coast. Every fishing pier along 170 miles of coast, from Myrtle Beach to Cedar Island, North Carolina, was destroyed. The waterfront between the South Carolina/North Carolina state boundary and Cape Fear was destroyed. Beach homes, which had been built in a continuous line five miles long behind and along grass-covered dunes (some of which were 20 feet high), simply disappeared – dunes, houses, and all. From Cape Fear to Cape Lookout, the degree of devastation was not as great, but oceanfront property was damaged an average of 50 percent along this entire stretch. To the north of Cape Lookout, the damage was relatively light. Storm surges of 16.6 feet above NGVD were observed at Holden Beach Bridge and Calabash, North Carolina. The highest tide of record was observed during Hurricane Hazel, when ocean tide levels reached approximately 10 feet NGVD at Wrightsville Beach and 11 feet NGVD at Carolina Beach. The lowest recorded

barometric pressure of the storm was 938 millibars (mb), reported at Little River Inlet on the North Carolina/South Carolina border. Maximum wind speeds were 83 miles per hour (mph), with gusts recorded at 98 mph at Wilmington, North Carolina, 106 mph at Myrtle Beach, South Carolina, and an estimated 150 mph at Cape Fear. The storm continued inland through North Carolina, causing widespread damage due to high winds and record rainfalls. Nineteen people were killed and 200 injured during this storm.

Table 5, "Historic Flood Elevations" is not applicable in Chowan County.

4.4 Flood Protection Measures

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

Table 6, "Non-Levee Flood Protection Measures" is not applicable in Chowan County.

Table 7, "Levees" is not applicable in Chowan County.

4.5 Scope of Study

For this map maintenance revision, a scoping meeting was held in Chowan 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 Chowan 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 Chowan 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	
Filberts Creek	Approximately 250 feet downstream of Virginia Road/NC Highway 32	Approximately 1,050 feet upstream of Virginia Road/NC Highway 32	Town Of Edenton
Pembroke Creek Tributary 1[1]	Approximately 0.5 miles upstream of the confluence with Pembroke Creek	Approximately 0.7 miles upstream of the confluence with Pembroke Creek	Chowan County Town Of Edenton
Queen Anne Creek[1]	The confluence with Edenton Bay	Approximately 3.0 miles upstream o the confluence with Edenton Bay	Town Of Edenton

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

Table 9P, "Scope of Revisions: Redelineated - Preliminary", contains a list of flooding sources that were studied by detailed methods for previous FISs, but were only partially revised in the current study. There effective analyses remain valid; however, their floodplain delineations have been revised on the current FIRM.

Table 9P - Scope of Revisions: Redelineated - Preliminary

Source	Riverine Sources		Affected Communties
	From	To	
Northeast Tributary of Pembroke Creek[1]	The confluence with Pembroke Creek	Approximately 3700 feet upstream of the confleuence with Pembroke Creek	Town Of Edenton

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

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	
Burnt Mill Creek[1]	Approximately 0.40 mile upstream of the confluence with the Yeopim River	Approximately 0.60 mile upstream of the confluence with the Yeopim River	Chowan County
Pembroke Creek	Wildcat Road (SR 1208)	Approximately 1.2 miles upstream of confluence of Pembroke Creek Tributary 8	Chowan County
Pembroke Creek Tributary 2[1]	The confluence with Pembroke Creek	Approximately 1,500 feet upstream of the confluence with Pembroke Creek	Chowan County
Pembroke Creek Tributary 3[1]	The confluence with Pembroke Creek	Approximately 1,400 feet upstream of the confluence with Pembroke Creek	Chowan County
Pembroke Creek Tributary 4[1]	The confluence with Pembroke Creek	Approximately 2,500 feet upstream of the confluence with Pembroke Creek	Chowan County Town Of Edenton
Pembroke Creek Tributary 5[1]	The confluence with Pembroke Creek	Approximately 1,200 feet upstream of the confluence with Pembroke Creek	Chowan County
Pembroke Creek Tributary 6[1]	The confluence with Pembroke Creek	Approximately 1,400 feet upstream of the confluence with Pembroke Creek	Chowan County
Pembroke Creek Tributary 7[1]	The confluence with Pembroke Creek	Approximately 1,700 feet upstream of confluence with Pembroke Creek	Chowan County
Pembroke Creek Tributary 8[1]	The confluence with Pembroke Creek	Approximately 0.5 mile upstream of confluence of Pembroke Creek Tributary 8A	Chowan County
Pembroke Creek Tributary 8A[1]	The confluence with Pembroke Creek Tributary 8	Approximately 0.5 mile upstream of confluence with Pembroke Creek Tributary 8	Chowan County
Rockyhock Creek[1]	Approximately 700 feet downstream of Rocky Hock Road (SR 1222)	Approximately 0.6 mile upstream of Rocky Hock Road (SR 1222)	Chowan 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	
Filberts Creek	Approximately 250 feet downstream of Virginia Road/NC Highway 32	Approximately 1,050 feet upstream of Virginia Road/NC Highway 32	Town Of Edenton
Northeast Tributary of Queen Anne Creek	The confluence with Queen Anne Creek	Approximately 500 feet upstream of confluence of Northeast Tributary of Queen Anne Creek Tributary 1	Town Of Edenton
Northwest Tributary of Queen Anne Creek	The confluence with Queen Anne Creek	Approximately 0.4 mile upstream of U.S. Highway 17 Business	Town Of Edenton
Pembroke Creek Tributary 1	Approximately 0.5 miles upstream of the confluence with Pembroke Creek	Approximately 350 feet downstream of NC Highway 32 / VS Road	Chowan County Town Of Edenton
Queen Anne Creek	The confluence with Edenton Bay	Approximately 320 feet downstream of U.S. Highway 17	Town Of Edenton

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	
Northeast Tributary of Pembroke Creek	The confluence with Pembroke Creek	Approximately 1.5 miles upstream of the confluence with Pembroke Creek	Town Of Edenton

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	
Northeast Tributary of Queen Anne Creek	Approximately 500 feet upstream of the confluence of Northeast Tributary of Queen Anne Creek Tributary 1	Approximately 950 feet upstream of confluence of Northeast Tributary of Queen Anne’s Creek Tributary 1	Town Of Edenton
Northeast Tributary of Queen Anne Creek Tributary 1	The confluence with Northeast Tributary of Queen Anne Creek	Approximately 1,100 feet upstream of confluence with Northeast Tributary of Queen Anne Creek	Town Of Edenton
Pembroke Creek	Wildcat Road (SR 1208)	Approximately 1.2 miles upstream of confluence of Pembroke Creek Tributary 8	Chowan County
Pembroke Creek Tributary 2	The confluence with Pembroke Creek	Approximately 0.4 mile upstream of confluence with Pembroke Creek	Chowan County
Pembroke Creek Tributary 3	The confluence with Pembroke Creek	Approximately 0.5 mile upstream of confluence with Pembroke Creek	Chowan County
Pembroke Creek Tributary 4	The confluence with Pembroke Creek	Approximately 1.4 miles upstream of Greenhall Road (SR 1315)	Chowan County Town Of Edenton
Pembroke Creek Tributary 5	The confluence with Pembroke Creek	Approximately 0.6 mile upstream of Greenhall Road (SR 1315)	Chowan County
Pembroke Creek Tributary 6	The confluence with Pembroke Creek	Approximately 1,630 feet upstream of confluence with Pembroke Creek	Chowan County
Pembroke Creek Tributary 7	The confluence with Pembroke Creek	Approximately 1,700 feet upstream of confluence with Pembroke Creek	Chowan County
Pembroke Creek Tributary 8	The confluence with Pembroke Creek	Approximately 0.5 mile upstream of confluence of Pembroke Creek Tributary 8A	Chowan County
Pembroke Creek Tributary 8A	The confluence with Pembroke Creek Tributary 8	Approximately 0.5 mile upstream of confluence with Pembroke Creek Tributary 8	Chowan County
Queen Anne Creek	Approximately 320 feet downstream of U.S. Highway 17	Approximately 300 feet upstream of U.S. Highway 17	Town Of Edenton
Rockyhock Creek	Approximately 700 feet downstream of Rocky Hock Road (SR 1222)	Approximately 0.8 mile upstream of N.C. Highway 32	Chowan County
Rockyhock Creek Tributary 1	The confluence with Rockyhock Creek	Approximately 0.6 mile upstream of confluence with Rockyhock Creek	Chowan County
Rockyhock Creek Tributary 2	The confluence with Rockyhock Creek	Approximately 0.9 mile upstream of confluence with Rockyhock Creek	Chowan County
Rockyhock Creek Tributary 3	The confluence with Rockyhock Creek	Approximately 0.8 mile upstream of Rocky Hock Landing Road (SR 1224)	Chowan County
Rockyhock Creek Tributary 3A	The confluence with Rockyhock Creek Tributary 3	Approximately 0.6 mile upstream of confluence with Rockyhock Creek Tributary 3	Chowan County
Rockyhock Creek Tributary 4	The confluence with Rockyhock Creek	Approximately 1,250 feet upstream of Parrish Road (SR 1238)	Chowan County
Rockyhock Creek Tributary 5	The confluence with Rockyhock Creek	Approximately 270 feet downstream of Cisco Road (SR 1314)	Chowan County
Rockyhock Creek Tributary 5A	The confluence with Rockyhock Creek Tributary 5	Approximately 0.5 mile upstream of confluence with Rockyhock Creek Tributary 5	Chowan County
Rockyhock Creek Tributary 6	The confluence with Rockyhock Creek	Approximately 0.4 mile upstream of Rocky Hock Landing Road (SR 1224)	Chowan County
Rockyhock Creek Tributary 7	The confluence with Rockyhock Creek	Approximately 0.8 mile upstream of confluence with Rockyhock Creek	Chowan County
Rockyhock Creek Tributary 8	The confluence with Rockyhock Creek	Approximately 0.7 mile upstream of confluence with Rockyhock Creek	Chowan County

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

Table 12, “Letters of Map Revision” is not applicable in Chowan 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
Burnt Mill Creek					
Approximately 0.6 mile downstream of the confluence of Burnt Mill Creek Tributary 1	8.69	*	*	1591	*
Approximately 200 feet upstream of the confluence of Burnt Mill Creek Tributary 1	4.72	*	*	1126	*
Approximately 0.3 mile upstream of the confluence of Burnt Mill Creek Tributary 1	4.46	*	*	1092	*
Approximately 0.3 mile downstream of U.S. Highway 17	2.22	*	*	736	*
Filberts Creek					
Upstream of confluence with Edenton Bay	1.34	*	*	552	*
Approximately 400 feet downstream of Virginia Road/U.S. Highway 32	0.40	*	*	422	*
At Virginia Road/N.C. Highway 32	0.20	*	*	330	*
Goodwin Mill Creek					
Approximately 0.3 mile upstream of Great Hope Church Road	19.25	*	*	2496	*
Just upstream of the confluence of Goodwin Mill Creek Tributary 2	13.62	*	*	2052	*
Approximately 0.3 mile upstream of Center Hill Road	13.00	*	*	1998	*
Approximately 0.9 mile upstream of Center Hill Road	5.83	*	*	1269	*
Northeast Tributary of Pembroke Creek					
Just upstream of confluence with Pembroke Creek	0.90	*	*	990	*
Northeast Tributary of Queen Anne Creek					
At the confluence with Queen Anne Creek	0.29	*	*	231	*
Approximately 800 feet upstream of confluence with Queen Anne Creek	0.12	*	*	142	*
Approximately 0.4 mile upstream of confluence with Queen Anne Creek	0.07	*	*	105	*
Northeast Tributary of Queen Anne Creek Tributary 1					

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
At the confluence with Northeast Tributary of Queen Anne Creek	0.13	*	*	147	*
Northwest Tributary of Queen Anne Creek					
At the confluence with Queen Anne Creek	0.70	*	*	703	*
Approximately 550 feet downstream of Old Hertford Road	0.34	*	*	488	*
Approximately 1,650 feet upstream of Old Herford Road	0.18	*	*	180	*
Pembroke Creek					
At U.S. Highway 17	35.50	*	*	3005	*
At Mexico Road (SR 1200)	31.50	*	*	2730	*
Approximately 0.5 mile downstream of Wildcat Road (SR 1208)	27.71	*	*	3067	*
At Wildcat Road (SR 1208)	27.53	*	*	3056	*
Approximately 0.8 mile downstream of VS Road/N.C. Highway 32	26.40	*	*	2984	*
Approximately 1,320 feet downstream of VS Road / N.C. Highway 32	25.78	*	*	2945	*
Approximately 0.7 mile downstream of New Road (SR 1318)	21.57	*	*	2662	*
Approximately 100 feet upstream of New Road (SR 1318)	19.50	*	*	2514	*
Approximately 1.0 mile upstream of New Road (SR 1318)	17.61	*	*	2373	*
Approximately 0.6 mile downstream of Greenhall Road (SR 1316)	16.30	*	*	2272	*
Approximately 1,000 feet downstream of Greenhall Road (SR 1316)	14.72	*	*	2144	*
Approximately 0.8 mile upstream of Greenhall Road (SR 1316)	7.60	*	*	1475	*
Approximately 1.5 miles upstream of Greenhall Road (SR 1316)	6.72	*	*	1376	*
Pembroke Creek Tributary 1					
At the confluence with Pembroke Creek	0.93	*	*	448	*
Approximately 0.5 mile upstream of confluence with Pembroke Creek	0.68	*	*	376	*
Approximately 1.1 miles upstream of confluence with Pembroke Creek	0.51	*	*	320	*
Pembroke Creek Tributary 2					
At the confluence with Pembroke Creek	0.46	*	*	301	*
Approximately 1,500 feet upstream of confluence with Pembroke Creek	0.37	*	*	267	*
Pembroke Creek Tributary 3					
At the confluence with Pembroke Creek	0.45	*	*	297	*
Approximately 1,950 feet upstream of confluence with Pembroke Creek	0.39	*	*	273	*
Pembroke Creek Tributary 4					
At the confluence with Pembroke Creek	3.04	*	*	878	*
Approximately 0.7 mile upstream of Greenhall Road (SR 1316)	2.24	*	*	739	*
Pembroke Creek Tributary 5					
At the confluence with Pembroke Creek	1.74	*	*	640	*
Approximately 700 feet upstream of Greenhall Road (SR 1316)	1.22	*	*	524	*
Pembroke Creek Tributary 6					
At the confluence with Pembroke Creek	0.69	*	*	379	*
Pembroke Creek Tributary 7					
At the confluence with Pembroke Creek	1.44	*	*	575	*
Pembroke Creek Tributary 8					
At the confluence with Pembroke Creek	6.52	*	*	1353	*
Approximately 970 feet upstream of confluence with Pembroke Creek	5.14	*	*	1183	*
Pembroke Creek Tributary 8A					

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
At the confluence with Pembroke Creek Tributary 8	1.34	*	*	553	*
Queen Anne Creek					
Approximately 2.5 miles upstream of confluence with Edenton Bay	2.40	*	*	768	*
Approximately 0.4 mile upstream of Paxton Lane	1.74	*	*	639	*
Just upstream of the confluence of Northwest Tributary of Queen Anne Creek	1.02	*	*	474	*
At U.S. Highway 17 Business	0.33	*	*	251	*
Approximately 1,800 feet upstream of U.S. Highway 17 Business	0.04	*	*	80	*
Rockyhock Creek					
Approximately 1,800 feet upstream of Rocky Hock Road (SR 1222)	17.71	*	*	2381	*
Approximately 1.0 mile upstream of Rocky Hock Road (SR 1222)	16.11	*	*	2257	*
Approximately 1.8 miles upstream of Rocky Hock Road (SR 1222)	13.92	*	*	2078	*
Approximately 0.6 mile downstream of Evans Church Road (SR 1223)	12.31	*	*	1938	*
Approximately 0.5 mile upstream of Evans Church Road (SR 1223)	10.31	*	*	1753	*
Just upstream of the confluence of Rockyhock Creek Tributary 4	8.42	*	*	1563	*
Approximately 700 feet downstream of Rocky Hock Landing Road (SR 1224)	5.75	*	*	1260	*
Approximately 0.8 mile upstream of Rocky Hock Landing Road (SR 1224)	5.17	*	*	1187	*
Just upstream of the confluence of Rockyhock Creek Tributary 7	4.18	*	*	1051	*
Just upstream of the confluence of Rockyhock Creek Tributary 8	2.17	*	*	726	*
Approximately 0.6 mile downstream of Dillard's Mill Road (SR 1226)	2.08	*	*	708	*
Approximately 700 feet downstream of Dillard's Mill Road (SR 1226)	1.71	*	*	633	*
Approximately 380 feet downstream of NC Highway 32	1.08	*	*	489	*
Approximately 0.7 mile upstream of NC Highway 32	0.59	*	*	348	*
Rockyhock Creek Tributary 1					
At the confluence with Rockyhock Creek	0.49	*	*	312	*
Approximately 1,700 feet upstream of confluence with Rockyhock Creek	0.36	*	*	265	*
Rockyhock Creek Tributary 2					
At the confluence with Rockyhock Creek	1.60	*	*	611	*
Approximately 0.6 mile upstream of confluence with Rockyhock Creek	0.26	*	*	217	*
Rockyhock Creek Tributary 3					
At the confluence with Rockyhock Creek	1.15	*	*	507	*
Approximately 1,080 feet upstream of confluence with Rockyhock Creek	0.78	*	*	406	*
Approximately 1.1 miles upstream of confluence with Rockyhock Creek	0.56	*	*	338	*
Rockyhock Creek Tributary 3A					
At the confluence with Rockyhock Creek Tributary 3	0.36	*	*	260	*
Rockyhock Creek Tributary 4					
At the confluence with Rockyhock Creek	1.89	*	*	671	*
At Parrish Road (SR 1238)	1.40	*	*	566	*
Rockyhock Creek Tributary 5					
At the confluence with Rockyhock Creek	2.27	*	*	744	*
Approximately 550 feet upstream of Virginia Road/N.C. Highway 32	1.41	*	*	569	*
Approximately 0.8 mile upstream of Virginia Road/N.C. Highway 32	0.96	*	*	457	*
Rockyhock Creek Tributary 5A					

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
At the confluence with Rockyhock Creek Tributary 5	0.28	*	*	229	*
Rockyhock Creek Tributary 6					
At the confluence with Rockyhock Creek	0.29	*	*	232	*
Rockyhock Creek Tributary 7					
At the confluence with Rockyhock Creek	0.84	*	*	423	*
Approximately 1,680 feet upstream of confluence with Rockyhock Creek	0.27	*	*	221	*
Approximately 0.6 mile upstream of confluence with Rockyhock Creek	0.19	*	*	182	*
Rockyhock Creek Tributary 8					
At the confluence with Rockyhock Creek	2.00	*	*	693	*

The stillwater elevations have been determined for the 1% [add 10%, 2%, and 0.2% here if that data is available] annual chance flood for the flooding sources studied by detailed methods and are summarized in Table 14, “Summary of Stillwater Elevations.”

Table 14 - Summary of Non-Coastal Stillwater Elevations

Flooding Source	FIRM Panel Number(s)	Elevations (feet NAVD)			
		10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Trotman Creek	3720696200	5	6	7	9

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

5.2 Hydraulic Analyses

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

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

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

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

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

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

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

Table 16 - Roughness Coefficients

Stream	Channel "n"	Overbank "n"
Filberts Creek	0.050 to 0.053	0.050 to 0.130
Northeast Tributary of Queen Anne Creek	0.050 to 0.055	0.080 to 0.160
Northeast Tributary of Queen Anne Creek Tributary 1	0.048	0.080 to 0.160
Northwest Tributary of Queen Anne Creek	0.044 to 0.050	0.080 to 0.160
Pembroke Creek	0.044 to 0.060	0.035 to 0.200
Pembroke Creek Tributary 1	0.049	0.080 to 0.150
Pembroke Creek Tributary 2	0.048	0.080 to 0.130
Pembroke Creek Tributary 3	0.048	0.080 to 0.130
Pembroke Creek Tributary 4	0.048	0.080 to 0.130
Pembroke Creek Tributary 5	0.048	0.080 to 0.130
Pembroke Creek Tributary 6	0.048	0.080 to 0.130
Pembroke Creek Tributary 7	0.048	0.080 to 0.130
Pembroke Creek Tributary 8	0.048	0.080 to 0.130
Pembroke Creek Tributary 8A	0.048	0.070 to 0.130
Queen Anne Creek	0.050 to 0.053	0.080 to 0.160
Rockyhock Creek	0.035 to 0.053	0.050 to 0.140
Rockyhock Creek Tributary 1	0.035 to 0.053	0.050 to 0.140
Rockyhock Creek Tributary 2	0.052	0.050 to 0.140
Rockyhock Creek Tributary 3	0.052	0.050 to 0.140
Rockyhock Creek Tributary 3A	0.051	0.050 to 0.140
Rockyhock Creek Tributary 4	0.050 to 0.052	0.050 to 0.140
Rockyhock Creek Tributary 5	0.035 to 0.050	0.070 to 0.130
Rockyhock Creek Tributary 5A	0.050	0.070 to 0.150
Rockyhock Creek Tributary 6	0.035 to 0.042	0.080 to 0.140
Rockyhock Creek Tributary 7	0.042 to 0.050	0.080 to 0.140
Rockyhock Creek Tributary 8	0.050	0.070 to 0.130

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
Burnt Mill Creek				
080	8,020	1,591	4.1	267 / 166
085	8,515	1,591	4.3	197 / 194
090	9,019	1,591	4.6	136 / 276
095	9,524	1,591	4.8	189 / 140
100	10,018	1,591	5.0	300 / 110
105	10,544	1,126	5.2	78 / 103
110	11,028	1,126	5.6	162 / 76
115	11,544	1,126	5.9	230 / 18
120	12,043	1,092	6.2	47 / 213
125	12,542	1,092	6.6	167 / 103
130	13,040	1,092	7.0	88 / 18
135	13,542	1,092	7.4	165 / 36
140	14,036	1,092	7.8	105 / 90
145	14,527	1,092	8.2	53 / 212
150	14,981	1,092	8.6	33 / 119
155	15,542	1,092	12.3	253 / 120
160	16,010	1,092	12.4	494 / 120
166	16,581	1,092	12.4	285 / 57
170	17,040	1,092	12.6	297 / 144
175	17,537	736	12.6	120 / 106
180	18,004	736	12.8	100 / 70
192	19,241	736	13.2	24 / 133
197	19,724	736	13.4	144 / 180
Goodwin Mill Creek				
460	46,013	1,998	13.8	800 / 700
470	47,006	1,269	13.8	2,800 / 1,200
480	48,008	993	13.8	2,600 / 585
490	48,991	993	13.8	2,400 / 780
500	49,994	993	13.8	2,100 / 790
511	51,105	993	13.9	1,900 / 560
Northeast Tributary of Queen Anne Creek				
025	2,469	105	11.2	9 / 21
027	2,673	105	11.5	12 / 12
029	2,902	105	12.4	7 / 12
Northeast Tributary of Queen Anne Creek Tributary 1				
001	61	147	8.9	9 / 9
001	123	147	9.9	15 / 6
002	218	147	11.5	26 / 7
003	306	147	12.6	7 / 14

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
004	376	147	13.2	7 / 14
004	446	147	13.4	12 / 28
008	750	147	13.7	14 / 7
009	889	147	14.0	20 / 15
011	1,146	147	14.4	15 / 13
Pembroke Creek				
284	28,447	3,056	5.0	241 / 709
293	29,311	3,056	5.2	268 / 796
302	30,245	2,984	5.4	737 / 258
305	30,549	2,984	5.4	532 / 222
312	31,179	2,984	5.6	510 / 197
316	31,578	2,984	5.7	551 / 539
320	32,000	2,984	5.8	200 / 618
324	32,450	2,984	5.9	404 / 549
330	33,000	2,984	6.0	480 / 531
335	33,500	2,945	6.1	504 / 324
339	33,854	2,945	6.1	663 / 475
342	34,152	2,945	6.2	207 / 480
344	34,429	2,945	6.5	207 / 480
346	34,617	2,945	6.6	422 / 590
351	35,148	2,945	6.6	367 / 522
355	35,534	2,945	6.7	302 / 532
360	36,000	2,945	6.8	474 / 614
364	36,444	2,662	6.8	457 / 458
371	37,096	2,662	6.9	480 / 55
375	37,466	2,662	7.1	354 / 178
381	38,064	2,662	7.2	232 / 189
384	38,357	2,662	7.3	266 / 82
386	38,620	2,662	7.4	319 / 147
389	38,938	2,662	7.5	298 / 215
395	39,514	2,662	7.6	359 / 224
398	39,752	2,662	7.7	400 / 189
399	39,927	2,662	7.8	500 / 189
401	40,140	2,514	7.8	501 / 116
404	40,432	2,514	7.8	372 / 197
411	41,110	2,514	8.0	370 / 132
415	41,533	2,514	8.1	391 / 81
420	41,956	2,514	8.2	129 / 169
424	42,446	2,514	8.5	274 / 320
429	42,884	2,514	8.6	421 / 386
432	43,225	2,514	8.6	376 / 312
437	43,657	2,514	8.7	290 / 176
440	44,000	2,514	8.7	421 / 162
443	44,337	2,514	8.8	353 / 62
449	44,901	2,514	9.0	453 / 45

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
453	45,282	2,373	9.3	226 / 179
457	45,677	2,373	9.4	62 / 234
464	46,397	2,373	9.6	285 / 138
469	46,946	2,373	9.7	181 / 148
473	47,310	2,373	9.8	203 / 208
478	47,799	2,272	9.9	197 / 183
484	48,364	2,272	10.0	172 / 236
489	48,898	2,272	10.1	260 / 213
492	49,193	2,272	10.2	412 / 50
497	49,691	2,272	10.3	300 / 102
500	49,964	2,272	10.4	245 / 343
503	50,271	2,272	10.4	55 / 503
508	50,754	2,144	10.5	266 / 159
510	50,965	2,144	10.5	119 / 180
511	51,107	2,144	10.5	82 / 78
512	51,193	2,144	10.6	68 / 68
514	51,427	2,144	10.8	198 / 18
520	52,035	2,144	11.0	92 / 153
525	52,500	2,144	11.2	196 / 18
529	52,854	2,144	11.3	145 / 49
532	53,243	2,144	11.4	175 / 18
535	53,500	2,144	11.5	94 / 195
538	53,816	2,144	11.6	300 / 188
542	54,165	2,144	11.6	390 / 83
548	54,783	2,144	11.7	313 / 155
556	55,603	1,475	11.8	571 / 14
559	55,911	1,475	11.8	548 / 184
561	56,108	1,475	11.8	380 / 229
565	56,470	1,475	11.8	36 / 299
571	57,108	1,475	11.9	306 / 56
575	57,510	1,475	12.0	256 / 109
579	57,902	1,475	12.0	64 / 139
584	58,358	1,475	12.2	226 / 98
590	59,000	1,376	12.3	257 / 135
596	59,581	1,376	12.4	108 / 119
599	59,857	1,376	12.5	29 / 226
601	60,140	1,376	12.6	160 / 180
606	60,599	1,376	12.7	200 / 250
611	61,065	1,376	12.7	130 / 180
617	61,688	1,376	12.8	240 / 176
Pembroke Creek Tributary 2				
010	1,033	301	5.2[1]	12 / 50
012	1,236	301	5.7	33 / 26
015	1,500	301	6.5	23 / 61
018	1,750	267	6.8	33 / 55

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
019	1,927	267	7.1	58 / 21
023	2,250	267	7.8	60 / 12
Pembroke Creek Tributary 3				
006	640	297	6.0[1]	58 / 29
008	831	297	6.0[1]	18 / 44
010	991	297	6.0[1]	31 / 21
012	1,240	297	6.0	15 / 57
017	1,687	297	7.9	7 / 64
019	1,925	297	8.1	37 / 63
022	2,172	273	8.2	70 / 25
024	2,427	273	8.3	9 / 127
Pembroke Creek Tributary 4				
006	585	878	6.8[1]	123 / 180
008	841	878	6.8[1]	126 / 150
012	1,208	878	6.8[1]	73 / 154
015	1,500	878	6.9	15 / 269
026	2,589	878	7.1	14 / 234
030	3,000	878	7.3	34 / 132
035	3,500	878	7.5	115 / 105
040	4,000	878	7.7	154 / 126
044	4,362	878	7.8	54 / 128
048	4,824	878	8.2	41 / 100
055	5,500	739	9.1	26 / 94
060	6,000	739	9.6	23 / 82
065	6,500	739	10.1	13 / 85
070	7,000	739	11.0	13 / 80
075	7,500	739	11.5	43 / 58
080	8,000	739	12.0	95 / 45
085	8,500	739	12.6	38 / 125
089	8,870	739	13.6	48 / 68
090	9,000	739	13.9	70 / 69
095	9,500	739	15.1	69 / 68
Pembroke Creek Tributary 5				
006	590	640	7.8[1]	32 / 77
015	1,528	640	8.3	5 / 47
020	1,974	524	9.4	33 / 85
025	2,458	524	9.8	18 / 125
030	2,978	524	10.4	72 / 28
035	3,476	524	11.0	36 / 25
040	3,976	524	12.6	75 / 8
045	4,476	524	13.4	17 / 131
Pembroke Creek Tributary 6				
002	240	379	9.9[1]	23 / 71
005	491	379	9.9[1]	39 / 39
006	600	379	9.9[1]	33 / 12
008	750	379	9.9[1]	46 / 12

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
009	900	379	9.9[1]	39 / 12
011	1,050	379	9.9[1]	57 / 12
012	1,200	379	10.0	29 / 12
014	1,350	379	10.4	44 / 12
015	1,500	379	10.7	12 / 53
016	1,625	379	11.3	12 / 40
Pembroke Creek Tributary 7				
006	611	575	10.5[1]	52 / 41
009	878	575	10.5[1]	55 / 31
011	1,050	575	10.5[1]	14 / 53
012	1,200	575	10.5[1]	24 / 47
014	1,350	575	10.5[1]	42 / 50
015	1,500	575	10.5[1]	26 / 68
016	1,577	575	10.5[1]	24 / 68
017	1,696	575	10.5	34 / 31
Pembroke Creek Tributary 8				
008	750	1,353	11.8[1]	250 / 132
018	1,788	1,183	11.8[1]	17 / 186
023	2,250	1,183	11.8[1]	86 / 140
027	2,683	1,183	11.8[1]	126 / 69
031	3,079	1,183	11.8[1]	124 / 104
033	3,250	1,183	11.8[1]	189 / 18
035	3,500	1,183	11.8[1]	161 / 17
Pembroke Creek Tributary 8A				
003	270	553	11.8[1]	72 / 136
009	920	553	11.8[1]	55 / 22
014	1,366	553	11.8[1]	23 / 45
018	1,846	553	11.8[1]	16 / 36
023	2,326	553	11.8[1]	18 / 28
027	2,697	553	11.8[1]	19 / 27
Queen Anne Creek				
221	22,073	80	13.0	8 / 11
221	22,104	80	13.0	11 / 10
229	22,918	80	14.6	6 / 6
Rockyhock Creek				
290	28,964	2,381	5.8	29 / 300
302	30,172	2,381	7.1	311 / 609
307	30,693	2,381	7.1	292 / 152
313	31,253	2,381	7.1	288 / 257
320	32,013	2,381	7.1	311 / 286
330	32,953	2,381	7.1	396 / 556
340	33,964	2,381	7.1	742 / 382
344	34,401	2,257	7.1	202 / 253
351	35,094	2,257	7.1	262 / 192
355	35,485	2,257	7.2	273 / 202
359	35,935	2,257	7.2	439 / 354

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
365	36,500	2,257	7.2	504 / 366
369	36,906	2,257	7.2	166 / 184
373	37,330	2,257	7.2	318 / 274
379	37,852	2,257	7.3	188 / 143
385	38,511	2,257	7.3	89 / 121
391	39,072	2,257	7.4	124 / 191
396	39,644	2,257	7.6	174 / 220
400	40,000	2,257	7.7	134 / 328
405	40,515	2,078	8.1	260 / 192
410	41,006	2,078	8.4	201 / 294
415	41,534	2,078	8.6	318 / 95
420	41,978	2,078	8.9	453 / 78
426	42,585	2,078	9.1	240 / 217
430	43,005	2,078	9.2	189 / 367
435	43,500	2,078	9.3	265 / 226
440	43,986	1,938	9.5	312 / 213
444	44,411	1,938	9.6	286 / 206
450	45,000	1,938	9.7	260 / 244
455	45,491	1,938	9.8	220 / 213
461	46,050	1,938	9.9	220 / 193
466	46,589	1,938	10.1	286 / 209
475	47,500	1,938	10.4	347 / 121
480	47,989	1,938	10.5	328 / 166
485	48,472	1,938	10.6	295 / 162
490	49,016	1,938	10.8	413 / 236
495	49,498	1,938	10.8	486 / 255
500	50,005	1,753	10.9	327 / 404
505	50,520	1,563	11.0	568 / 203
510	51,016	1,563	11.0	415 / 152
515	51,517	1,563	11.2	202 / 252
521	52,060	1,563	11.4	218 / 183
525	52,498	1,563	11.6	291 / 161
529	52,898	1,260	11.7	257 / 80
537	53,696	1,260	12.4	304 / 19
540	54,023	1,260	12.5	331 / 14
545	54,488	1,260	12.7	306 / 57
550	54,978	1,260	12.9	223 / 171
555	55,513	1,260	13.1	160 / 158
560	56,026	1,260	13.3	98 / 265
565	56,480	1,260	13.6	133 / 177
567	56,702	1,260	13.7	258 / 71
576	57,558	1,187	14.2	168 / 165
582	58,232	1,187	14.5	177 / 176
585	58,506	1,187	14.6	201 / 108
589	58,908	1,051	14.7	137 / 101

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
595	59,512	726	15.2	125 / 69
600	59,993	726	15.7	145 / 49
605	60,535	726	16.0	184 / 78
611	61,099	708	16.3	207 / 107
615	61,547	708	16.5	96 / 130
619	61,885	708	16.7	183 / 67
625	62,548	708	17.3	215 / 8
630	63,002	708	17.7	163 / 26
634	63,435	633	18.4	243 / 7
642	64,150	633	19.5	142 / 101
645	64,516	633	19.9	224 / 38
650	65,039	633	20.5	79 / 105
660	66,011	489	22.7	21 / 116
664	66,409	489	22.8	7 / 80
669	66,891	489	23.0	7 / 82
676	67,612	489	23.9	10 / 33
680	68,001	489	24.5	7 / 65
685	68,503	489	25.1	7 / 69
690	68,982	348	26.1	86 / 7
695	69,510	348	27.5	7 / 92
699	69,895	348	28.9	7 / 90
Rockyhock Creek Tributary 1				
006	613	312	7.1[1]	88 / 69
011	1,125	312	7.1[1]	66 / 55
015	1,500	312	7.1[1]	8 / 46
017	1,709	312	7.1[1]	70 / 8
020	2,005	265	7.1[1]	31 / 44
023	2,285	265	7.1[1]	19 / 20
025	2,513	265	7.9	18 / 8
028	2,770	265	8.8	12 / 8
031	3,072	265	9.4	11 / 25
Rockyhock Creek Tributary 2				
006	569	611	7.7[2]	191 / 475
009	852	611	7.7[2]	77 / 55
011	1,132	611	7.7[2]	62 / 68
016	1,572	611	7.8	8 / 199
020	1,993	611	8.1	37 / 111
025	2,500	611	8.4	69 / 81
030	2,955	611	8.6	131 / 110
035	3,500	217	8.7	140 / 123
040	4,000	217	8.8	65 / 75
045	4,510	217	9.1	100 / 39
Rockyhock Creek Tributary 3				
005	474	507	10.9[1]	29 / 123
009	856	507	10.9[1]	61 / 32
011	1,077	406	10.9[1]	75 / 9

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
016	1,643	406	10.9[1]	68 / 24
021	2,068	406	10.9[1]	17 / 65
025	2,500	406	10.9[1]	39 / 88
035	3,500	406	11.5	32 / 196
040	4,000	406	11.8	9 / 223
045	4,500	406	12.1	73 / 106
050	5,004	406	12.7	136 / 9
055	5,500	406	13.5	59 / 30
060	6,000	338	14.0	63 / 43
065	6,500	338	14.3	81 / 16
070	7,000	338	14.7	100 / 9
Rockyhock Creek Tributary 3A				
002	180	260	9.2[1]	16 / 24
005	500	260	10.0	14 / 16
010	1,000	260	11.7	15 / 12
015	1,505	260	12.4	9 / 17
023	2,284	260	14.2	40 / 14
028	2,793	260	15.0	55 / 17
030	3,034	260	15.0	100 / 9
Rockyhock Creek Tributary 4				
005	471	671	10.9[1]	432 / 120
010	1,000	671	10.9[1]	107 / 61
015	1,495	671	10.9[1]	153 / 10
020	2,000	671	10.9[1]	101 / 88
026	2,555	671	10.9[1]	96 / 136
035	3,500	671	10.9[1]	87 / 153
040	4,042	671	11.0	112 / 85
045	4,500	671	11.1	120 / 148
050	4,963	671	11.3	125 / 56
055	5,538	671	11.6	32 / 92
060	6,000	671	11.9	149 / 77
065	6,503	671	12.1	62 / 119
070	7,000	671	12.5	10 / 130
074	7,399	671	12.8	10 / 136
077	7,683	671	13.2	84 / 79
087	8,744	566	13.5	235 / 43
094	9,384	566	13.6	536 / 9
Rockyhock Creek Tributary 5				
007	677	744	11.2[1]	22 / 147
010	1,000	744	11.2	139 / 8
016	1,555	744	12.8	85 / 38
020	2,000	744	13.8	28 / 132
025	2,500	744	14.8	104 / 43
030	3,000	744	16.6	74 / 48
035	3,500	744	19.3	66 / 113
038	3,788	569	19.6	81 / 29

Table 17 - Limited Detailed Flood Hazard Data

Cross Section	Stream Station	Flood Discharge (cfs)	1% Annual Chance Water-Surface Elevation (feet NAVD 88)	Non-Encroachment Width (feet) Left/Right from Stream Centerline
045	4,500	569	20.4	46 / 60
050	5,000	569	20.9	71 / 56
055	5,500	569	21.4	27 / 51
057	5,664	569	21.7	32 / 53
060	6,000	569	22.1	28 / 71
074	7,422	569	26.8	47 / 33
077	7,681	457	26.8	30 / 16
079	7,922	457	27.4	25 / 9
081	8,077	457	30.2	22 / 15
082	8,229	457	31.6	17 / 31
084	8,377	457	32.4	74 / 7
085	8,507	457	32.7	120 / 7
089	8,871	457	33.1	130 / 7
094	9,428	457	33.3	200 / 7
099	9,928	457	33.7	247 / 5
104	10,428	457	35.9	196 / 3
109	10,928	457	36.4	215 / 3
Rockyhock Creek Tributary 5A				
003	343	229	19.5[1]	39 / 12
007	729	229	19.5[1]	21 / 12
016	1,597	229	20.7	12 / 12
025	2,537	229	24.8	18 / 21
Rockyhock Creek Tributary 6				
003	333	232	11.6[1]	126 / 12
007	698	232	11.6[1]	85 / 12
012	1,239	232	12.1	52 / 31
015	1,547	232	12.4	7 / 95
019	1,875	232	12.5	12 / 84
024	2,400	232	13.1	21 / 61
028	2,806	232	14.1	44 / 12
032	3,213	232	15.2	86 / 12
Rockyhock Creek Tributary 7				
002	151	423	14.7[1]	21 / 99
006	603	423	16.3	12 / 197
012	1,185	423	17.4	35 / 349
017	1,672	423	17.5	12 / 450
023	2,328	221	17.5	12 / 690
029	2,859	221	17.5	55 / 354
033	3,331	182	17.6	12 / 654
037	3,708	182	17.6	12 / 758
040	3,998	182	17.6	12 / 1,088
Rockyhock Creek Tributary 8				
005	490	693	14.8[1]	45 / 67
007	722	693	14.8[1]	55 / 38
010	969	693	14.8[1]	55 / 48
012	1,224	693	15.3	98 / 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
017	1,736	693	16.3	99 / 16
021	2,110	693	17.1	84 / 24
024	2,383	693	17.8	82 / 33
027	2,656	693	18.7	56 / 26
029	2,901	693	19.6	46 / 32
032	3,174	693	20.4	60 / 43
034	3,418	693	21.0	120 / 16
037	3,659	693	21.6	39 / 34
038	3,831	693	22.1	23 / 69

[1]Elevation includes backwater effects

[2]ELEVATION INCLUDES FLOODING CONTROLLED BY ROCKYHOCK CREEK

5.3 Coastal Analyses

For the areas of Chowan County that are impacted by coastal flooding processes, coastal flood hazard analyses were performed to provide estimates of coastal BFEs. Coastal BFEs reflect the increase in water levels during a flood event due to extreme tides and storm surge as well as overland wave effects.

The following subsections provide summaries of how each coastal process was considered for the FIS Report. Greater detail (including assumptions, analysis, and results) is available in the archived project documentation. Table 15 summarizes the methods and/or models used for each of the coastal analyses. Refer to Section 2.5.1 for descriptions of the terms used in this section.

Table 18P, “Summary of Coastal Analyses - Preliminary: Revised or Newly Studied”

Table 18P - Summary of Coastal Analyses - Preliminary: Revised or Newly Studied

Flooding Source	Study Limits From	Study Limits To	Hazard Evaluated	Model or Method Used	Date Analysis Was Completed	Study Type
Albemarle Sound	The Chowan/Perquimans County Boundary	The Chowan/Gates County Boundary	*	2D WAVE MODEL	12/16/2011	DETAILED STUDY
Albemarle Sound	The Chowan/Perquimans County Boundary	The Chowan/Gates County Boundary	*	2D WAVE MODEL	12/16/2011	LIMITED DETAILED STUDY
Albemarle Sound	The Chowan/Perquimans County Boundary	The Chowan/Gates County Boundary	*	2D WAVE MODEL	12/16/2011	REDELINEATION
Albemarle Sound	The Chowan/Perquimans County Boundary	The Chowan/Gates County Boundary	*	ADCIRC	12/6/2011	DETAILED STUDY
Albemarle Sound	The Chowan/Perquimans County Boundary	The Chowan/Gates County Boundary	*	ADCIRC	*	LIMITED DETAILED STUDY
Albemarle Sound	The Chowan/Perquimans County Boundary	The Chowan/Gates County Boundary	*	ADCIRC	*	REDELINEATION
Albemarle Sound	The Chowan/Perquimans County Boundary	The Chowan/Gates County Boundary	*	TAW METHOD	8/22/2014	DETAILED STUDY
Albemarle Sound	The Chowan/Perquimans County Boundary	The Chowan/Gates County Boundary	*	TAW METHOD	8/22/2014	LIMITED DETAILED STUDY
Albemarle Sound	The Chowan/Perquimans County Boundary	The Chowan/Gates County Boundary	*	TAW METHOD	8/22/2014	REDELINEATION
Albemarle Sound	The Chowan/Perquimans County Boundary	The Chowan/Gates County Boundary	*	WHAFIS 4.0	8/22/2014	DETAILED STUDY
Albemarle Sound	The Chowan/Perquimans County Boundary	The Chowan/Gates County Boundary	*	WHAFIS 4.0	8/22/2014	LIMITED DETAILED STUDY
Albemarle Sound	The Chowan/Perquimans County Boundary	The Chowan/Gates County Boundary	*	WHAFIS 4.0	8/22/2014	REDELINEATION

Table 18, “Summary of Coastal Analyses”

Table 18 - Summary of Coastal Analyses

Flooding Source	Study Limits From	Study Limits To	Hazard Evaluated	Model or Method Used	Date Analysis Was Completed
Albemarle Sound	The Chowan/Perquimans County Boundary	The Chowan/Gates County Boundary	*	2D WAVE MODEL	12/16/2011
Albemarle Sound	The Chowan/Perquimans County Boundary	The Chowan/Gates County Boundary	*	2D WAVE MODEL	12/16/2011
Albemarle Sound	The Chowan/Perquimans County Boundary	The Chowan/Gates County Boundary	*	2D WAVE MODEL	12/16/2011
Albemarle Sound	The Chowan/Perquimans County Boundary	The Chowan/Gates County Boundary	*	ADCIRC	12/6/2011
Albemarle Sound	The Chowan/Perquimans County Boundary	The Chowan/Gates County Boundary	*	ADCIRC	*
Albemarle Sound	The Chowan/Perquimans County Boundary	The Chowan/Gates County Boundary	*	ADCIRC	*
Albemarle Sound	The Chowan/Perquimans County Boundary	The Chowan/Gates County Boundary	*	TAW METHOD	8/22/2014
Albemarle Sound	The Chowan/Perquimans County Boundary	The Chowan/Gates County Boundary	*	TAW METHOD	8/22/2014
Albemarle Sound	The Chowan/Perquimans County Boundary	The Chowan/Gates County Boundary	*	TAW METHOD	8/22/2014
Albemarle Sound	The Chowan/Perquimans County Boundary	The Chowan/Gates County Boundary	*	WHAFIS 4.0	8/22/2014
Albemarle Sound	The Chowan/Perquimans County Boundary	The Chowan/Gates County Boundary	*	WHAFIS 4.0	8/22/2014
Albemarle Sound	The Chowan/Perquimans County Boundary	The Chowan/Gates County Boundary	*	WHAFIS 4.0	8/22/2014

5.3.1 Total Stillwater Elevations

The total stillwater elevations (stillwater including storm surge plus wave setup) for the 1% annual chance flood were determined for areas subject to coastal flooding. The models and methods that were used to determine storm surge and wave setup are listed in Table 15. The stillwater elevation that was used for each transect in coastal analyses is shown in Table 20, “Coastal Transect Parameters.”

Astronomical Tide

Astronomical tidal statistics were generated directly from local tidal constituents by sampling the predicted tide at random times throughout the tidal epoch.

Storm Surge Statistics

Storm surge is modeled based on characteristics of actual storms responsible for significant coastal flooding. The characteristics of these storms are typically determined by statistical study of the regional historical record of storms or by statistical study of tidal gages.

When historic records are used to calculate storm surge, characteristics such as the strength, size, track, etc., of storms are identified by site. Storm data was used in conjunction with numerical hydrodynamic models to determine the corresponding storm surge levels. An extreme value analysis was performed on the storm surge modeling results to determine a stillwater elevation for the 1% annual chance event.

Tidal gages can be used instead of historic records of storms when the available tidal gage record for the area represents both the astronomical tide component and the storm surge component. Table 16 provides the gage name, managing agency, gage type, gage identifier, start date, end date, and statistical methodology applied to each gage used to determine the stillwater elevations. For areas between gages, peak stillwater elevations for selected recurrence intervals were estimated by combining interpolation between gages and observed high water marks during major storms. A regionalized statistical approach was applied to the gage data so that stillwater elevations in areas between gages could be identified.

Table 19, “Tide Gage Analysis Specifics” is not applicable in Chowan County.

Combined Riverine and Tidal Effects

Riverine and surge rates for the lower reaches of the Inundation River were combined by developing curves for rate of occurrence vs. flood level for each flood source.

Wave Setup Analysis

Wave setup was computed during the storm surge modeling through the methods and models listed in Table 15 and included in the frequency analysis for the determination of the total stillwater elevations. The oscillating component of wave setup, dynamic wave setup, was calculated for areas subject to wave runup hazards.

5.3.2 Waves

A coastal wave model (Coastal State University 2007) was used to calculate the nearshore wave fields required for the addition of wave setup effects. Three nested grids were used to obtain sufficient nearshore resolution to represent the radiation stress gradients required as ADCIRC inputs. Radiation stress fields output from the inner grids are used by ADCIRC to estimate the contribution of breaking waves (wave setup effects) to the total stillwater elevation.

5.3.3 Coastal Erosion

A single storm episode can cause extensive erosion in coastal areas. Storm-induced erosion was evaluated to determine the modification to existing topography that is expected to be associated with flooding events. Erosion was evaluated using the methods listed in Table 15. The post-event eroded profile was used for the subsequent transect-based onshore wave hazard analyses.

5.3.4 Wave Hazard Analyses

Overland wave hazards were evaluated to determine the combined effects of ground elevation, vegetation, and physical features on overland wave propagation and wave runup. These analyses were performed at representative transects along all shorelines for which waves were expected to be present during the floods of the selected recurrence intervals. The results of these analyses were used to determine elevations for the 1% annual chance flood.

Transect locations were chosen with consideration given to the physical land characteristics as well as development type and density so that they would closely represent conditions in their locality. Additional consideration was given to changes in the total stillwater elevation. Transects were spaced close together in areas of complex topography and dense development or where total stillwater elevations varied. In areas having more uniform characteristics, transects were spaced at larger intervals. Transects shown in Figure 9, “Transect Location Map,” are also depicted on the FIRM. Table 17 provides the location, stillwater elevations, and starting wave conditions for each transect evaluated for overland wave hazards. In this table, “starting” indicates the parameter value at the beginning of the transect.

Wave Height Analysis

Wave height analyses were performed to determine wave heights and corresponding wave crest elevations for the areas inundated by coastal flooding and subject to overland wave propagation hazards. Refer to Figure 6 for a schematic of a coastal transect evaluated for overland wave propagation hazards.

Wave heights and wave crest elevations were modeled using the methods and models listed in Table 18, “Summary of Coastal Analyses”.

Wave Runup Analysis

Wave runup analyses were performed to determine the height and extent of runup beyond the limit of stillwater inundation for the 1% annual chance flood. Wave runup elevations were modeled using the methods and models listed in Table 15.

Table 20, “Coastal Transect Parameters”

Table 20: Coastal Transect Parameters

Coastal Transect	Starting Wave Conditions for the 1% Annual Chance		Starting Stillwater Elevations (ft NAVD88) Range of Stillwater Elevations (ft NAVD88)				
	Significant Wave Height Hs (ft)	Peak Wave Period Tp (sec)	10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	.2% Annual Chance
Albemarle Sound		**From The Albermarle Sound**			**To The Boarder of Chowan County and Gates County**		
44	6.7	4.5	*	*	*	*	5.3
			*	*	*	4.2 - 4.2	*
45	6.0	4.5	*	*	*	*	5.3

Table 20: Coastal Transect Parameters

Coastal Transect	Starting Wave Conditions for the 1% Annual Chance		Starting Stillwater Elevations (ft NAVD88) Range of Stillwater Elevations (ft NAVD88)				
	Significant Wave Height Hs (ft)	Peak Wave Period Tp (sec)	10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	.2% Annual Chance
			*	*	*	4.2 - 4.2	*
46	5.7	4.3	*	*	*	*	5.3
			*	*	*	4.2 - 4.2	*
47	5.6	4.3	*	*	*	*	5.2
			*	*	*	4.2 - 4.2	*
48	5.5	4.2	*	*	*	*	5.2
			*	*	*	4.1 - 4.1	*
49	5.6	4.4	*	*	*	*	5.1
			*	*	*	4.1 - 4.1	*
50	5.6	4.6	*	*	*	*	5.1
			*	*	*	4.1 - 4.1	*
51	5.7	4.4	*	*	*	*	5.0
			*	*	*	4.0 - 4.0	*
52	5.5	4.7	*	*	*	*	5.0
			*	*	*	4.0 - 4.0	*
53	5.4	4.6	*	*	*	*	5.0
			*	*	*	3.9 - 3.9	*
54	4.9	5.1	*	*	*	*	4.9
			*	*	*	3.9 - 3.9	*
55	5.3	5.4	*	*	*	*	4.9
			*	*	*	3.9 - 3.9	*
56	5.8	5.3	*	*	*	*	4.9
			*	*	*	3.9 - 3.9	*
57	5.4	5.4	*	*	*	*	4.9
			*	*	*	3.8 - 3.8	*
58	5.4	5.4	*	*	*	*	4.8
			*	*	*	3.8 - 3.8	*
59	5.1	5.0	*	*	*	*	4.8
			*	*	*	3.8 - 3.8	*
1	1.5	2.0	*	*	*	*	5.7
			*	*	*	4.5 - 4.5	5.6 - 5.7
3	2.2	2.6	*	*	*	*	5.6
			*	*	*	4.5 - 4.5	*
4	2.1	2.5	*	*	*	*	5.5
			*	*	*	4.5 - 4.5	*
5	2.3	2.7	*	*	*	*	5.6
			*	*	*	4.5 - 4.5	*
6	2.5	3.0	*	*	*	*	5.6
			*	*	*	4.5 - 4.5	5.6 - 5.6
7	2.5	3.0	*	*	*	4.5	*
			*	*	*	4.5 - 4.5	5.6 - 5.6
9	3.3	3.5	*	*	*	*	5.6
			*	*	*	4.5 - 4.5	*
10	3.5	3.6	*	*	*	*	5.6
			*	*	*	4.5 - 4.5	*
11	3.9	3.8	*	*	*	*	5.6
			*	*	*	4.6 - 4.6	*
12	3.3	3.3	*	*	*	*	5.6
			*	*	*	4.6 - 4.6	*
13	3.4	3.4	*	*	*	*	5.6
			*	*	*	4.6 - 4.6	*
14	4.4	3.9	*	*	*	*	5.7
			*	*	*	4.6 - 4.6	*
15	3.9	3.8	*	*	*	*	5.7
			*	*	*	4.6 - 4.6	*
16	3.4	3.3	*	*	*	*	5.6
			*	*	*	4.5 - 4.5	*
17	3.4	3.3	*	*	*	*	5.6
			*	*	*	4.6 - 4.6	*

Table 20: Coastal Transect Parameters

Coastal Transect	Starting Wave Conditions for the 1% Annual Chance		Starting Stillwater Elevations (ft NAVD88) Range of Stillwater Elevations (ft NAVD88)				
	Significant Wave Height Hs (ft)	Peak Wave Period Tp (sec)	10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	.2% Annual Chance
18	3.6	3.4	*	*	*	*	5.6
			*	*	*	4.5 - 4.5	*
19	4.3	3.8	*	*	*	*	5.6
			*	*	*	4.5 - 4.5	*
20	4.2	3.8	*	*	*	*	5.6
			*	*	*	4.5 - 4.5	*
21	4.2	3.8	*	*	*	*	5.6
			*	*	*	4.5 - 4.5	*
22	3.6	3.4	*	*	*	*	5.6
			*	*	*	4.5 - 4.5	*
23	3.9	3.5	*	*	*	*	5.6
			*	*	*	4.5 - 4.5	*
24	4.2	3.8	*	*	*	*	5.6
			*	*	*	4.5 - 4.5	*
25	3.7	3.5	*	*	*	*	5.6
			*	*	*	4.5 - 4.5	*
26	4.4	4.1	*	*	*	*	5.6
			*	*	*	4.5 - 4.5	*
27	4.1	3.8	*	*	*	*	5.6
			*	*	*	4.5 - 4.5	*
28	4.7	4.0	*	*	*	*	5.6
			*	*	*	4.5 - 4.5	*
29	4.9	4.2	*	*	*	*	5.5
			*	*	*	4.5 - 4.5	*
30	5.7	4.4	*	*	*	*	5.5
			*	*	*	4.4 - 4.4	*
31	6.7	4.5	*	*	*	*	5.5
			*	*	*	4.4 - 4.4	*
32	5.6	4.3	*	*	*	*	5.4
			*	*	*	4.3 - 4.3	*
33	2.3	2.7	*	*	*	*	5.4
			*	*	*	4.3 - 4.3	*
34	1.8	2.4	*	*	*	*	5.4
			*	*	*	4.3 - 4.3	*
35	1.8	2.3	*	*	*	*	5.4
			*	*	*	4.3 - 4.3	*
36	1.1	1.7	*	*	*	*	5.4
			*	*	*	4.3 - 4.3	*
37	6.4	4.5	*	*	*	4.3	*
			*	*	*	4.3 - 4.3	5.4 - 5.4
39	1.0	1.7	*	*	*	*	5.3
			*	*	*	4.2 - 4.2	*
40	1.2	1.8	*	*	*	*	5.3
			*	*	*	4.3 - 4.3	*
41	1.8	2.4	*	*	*	*	5.3
			*	*	*	4.2 - 4.2	*
42	5.4	4.5	*	*	*	*	5.3
			*	*	*	4.2 - 4.2	*
43	6.7	4.5	*	*	*	*	5.3
			*	*	*	4.2 - 4.2	*
60	1.6	3.7	*	*	*	*	4.8
			*	*	*	3.8 - 3.8	*
61	0.9	3.0	*	*	*	*	4.8
			*	*	*	3.8 - 3.8	*
62	1.1	3.0	*	*	*	*	4.8
			*	*	*	3.8 - 3.8	*
63	1.0	3.0	*	*	*	*	4.8
			*	*	*	3.8 - 3.8	4.8 - 4.8
64	0.9	3.0	*	*	*	3.8	*

Table 20: Coastal Transect Parameters

Coastal Transect	Starting Wave Conditions for the 1% Annual Chance		Starting Stillwater Elevations (ft NAVD88) Range of Stillwater Elevations (ft NAVD88)				
	Significant Wave Height Hs (ft)	Peak Wave Period Tp (sec)	10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	.2% Annual Chance
			*	*	*	3.8 - 3.8	4.8 - 4.8
65	0.9	3.0	*	*	*	3.8	*
			*	*	*	3.8 - 3.8	4.8 - 4.8
66	0.9	3.0	*	*	*	3.8	*
			*	*	*	3.8 - 3.8	4.8 - 4.8
67	0.9	3.0	*	*	*	3.8	*
			*	*	*	3.8 - 3.8	4.8 - 4.8
Albemarle Sound		**From The Albermarle Sound**			**To The Boarder of Chowan County and Gates County**		
44	6.7	4.5	*	*	*	*	5.3
			*	*	*	4.2 - 4.2	*
45	6.0	4.5	*	*	*	*	5.3
			*	*	*	4.2 - 4.2	*
46	5.7	4.3	*	*	*	*	5.3
			*	*	*	4.2 - 4.2	*
47	5.6	4.3	*	*	*	*	5.2
			*	*	*	4.2 - 4.2	*
48	5.5	4.2	*	*	*	*	5.2
			*	*	*	4.1 - 4.1	*
49	5.6	4.4	*	*	*	*	5.1
			*	*	*	4.1 - 4.1	*
50	5.6	4.6	*	*	*	*	5.1
			*	*	*	4.1 - 4.1	*
51	5.7	4.4	*	*	*	*	5.0
			*	*	*	4.0 - 4.0	*
52	5.5	4.7	*	*	*	*	5.0
			*	*	*	4.0 - 4.0	*
53	5.4	4.6	*	*	*	*	5.0
			*	*	*	3.9 - 3.9	*
54	4.9	5.1	*	*	*	*	4.9
			*	*	*	3.9 - 3.9	*
55	5.3	5.4	*	*	*	*	4.9
			*	*	*	3.9 - 3.9	*
56	5.8	5.3	*	*	*	*	4.9
			*	*	*	3.9 - 3.9	*
57	5.4	5.4	*	*	*	*	4.9
			*	*	*	3.8 - 3.8	*
58	5.4	5.4	*	*	*	*	4.8
			*	*	*	3.8 - 3.8	*
59	5.1	5.0	*	*	*	*	4.8
			*	*	*	3.8 - 3.8	*
1	1.5	2.0	*	*	*	*	5.7
			*	*	*	4.5 - 4.5	5.6 - 5.7
3	2.2	2.6	*	*	*	*	5.6
			*	*	*	4.5 - 4.5	*
4	2.1	2.5	*	*	*	*	5.5
			*	*	*	4.5 - 4.5	*
5	2.3	2.7	*	*	*	*	5.6
			*	*	*	4.5 - 4.5	*
6	2.5	3.0	*	*	*	*	5.6
			*	*	*	4.5 - 4.5	5.6 - 5.6
7	2.5	3.0	*	*	*	4.5	*
			*	*	*	4.5 - 4.5	5.6 - 5.6
9	3.3	3.5	*	*	*	*	5.6
			*	*	*	4.5 - 4.5	*
10	3.5	3.6	*	*	*	*	5.6
			*	*	*	4.5 - 4.5	*
11	3.9	3.8	*	*	*	*	5.6
			*	*	*	4.6 - 4.6	*

Table 20: Coastal Transect Parameters

Coastal Transect	Starting Wave Conditions for the 1% Annual Chance		Starting Stillwater Elevations (ft NAVD88) Range of Stillwater Elevations (ft NAVD88)				
	Significant Wave Height Hs (ft)	Peak Wave Period Tp (sec)	10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	.2% Annual Chance
12	3.3	3.3	*	*	*	*	5.6
			*	*	*	4.6 - 4.6	*
13	3.4	3.4	*	*	*	*	5.6
			*	*	*	4.6 - 4.6	*
14	4.4	3.9	*	*	*	*	5.7
			*	*	*	4.6 - 4.6	*
15	3.9	3.8	*	*	*	*	5.7
			*	*	*	4.6 - 4.6	*
16	3.4	3.3	*	*	*	*	5.6
			*	*	*	4.5 - 4.5	*
17	3.4	3.3	*	*	*	*	5.6
			*	*	*	4.6 - 4.6	*
18	3.6	3.4	*	*	*	*	5.6
			*	*	*	4.5 - 4.5	*
19	4.3	3.8	*	*	*	*	5.6
			*	*	*	4.5 - 4.5	*
20	4.2	3.8	*	*	*	*	5.6
			*	*	*	4.5 - 4.5	*
21	4.2	3.8	*	*	*	*	5.6
			*	*	*	4.5 - 4.5	*
22	3.6	3.4	*	*	*	*	5.6
			*	*	*	4.5 - 4.5	*
23	3.9	3.5	*	*	*	*	5.6
			*	*	*	4.5 - 4.5	*
24	4.2	3.8	*	*	*	*	5.6
			*	*	*	4.5 - 4.5	*
25	3.7	3.5	*	*	*	*	5.6
			*	*	*	4.5 - 4.5	*
26	4.4	4.1	*	*	*	*	5.6
			*	*	*	4.5 - 4.5	*
27	4.1	3.8	*	*	*	*	5.6
			*	*	*	4.5 - 4.5	*
28	4.7	4.0	*	*	*	*	5.6
			*	*	*	4.5 - 4.5	*
29	4.9	4.2	*	*	*	*	5.5
			*	*	*	4.5 - 4.5	*
30	5.7	4.4	*	*	*	*	5.5
			*	*	*	4.4 - 4.4	*
31	6.7	4.5	*	*	*	*	5.5
			*	*	*	4.4 - 4.4	*
32	5.6	4.3	*	*	*	*	5.4
			*	*	*	4.3 - 4.3	*
33	2.3	2.7	*	*	*	*	5.4
			*	*	*	4.3 - 4.3	*
34	1.8	2.4	*	*	*	*	5.4
			*	*	*	4.3 - 4.3	*
35	1.8	2.3	*	*	*	*	5.4
			*	*	*	4.3 - 4.3	*
36	1.1	1.7	*	*	*	*	5.4
			*	*	*	4.3 - 4.3	*
37	6.4	4.5	*	*	*	4.3	*
			*	*	*	4.3 - 4.3	5.4 - 5.4
39	1.0	1.7	*	*	*	*	5.3
			*	*	*	4.2 - 4.2	*
40	1.2	1.8	*	*	*	*	5.3
			*	*	*	4.3 - 4.3	*
41	1.8	2.4	*	*	*	*	5.3
			*	*	*	4.2 - 4.2	*
42	5.4	4.5	*	*	*	*	5.3

Table 20: Coastal Transect Parameters

Coastal Transect	Starting Wave Conditions for the 1% Annual Chance		Starting Stillwater Elevations (ft NAVD88) Range of Stillwater Elevations (ft NAVD88)				
	Significant Wave Height Hs (ft)	Peak Wave Period Tp (sec)	10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	.2% Annual Chance
			*	*	*	4.2 - 4.2	*
43	6.7	4.5	*	*	*	*	5.3
			*	*	*	4.2 - 4.2	*
60	1.6	3.7	*	*	*	*	4.8
			*	*	*	3.8 - 3.8	*
61	0.9	3.0	*	*	*	*	4.8
			*	*	*	3.8 - 3.8	*
62	1.1	3.0	*	*	*	*	4.8
			*	*	*	3.8 - 3.8	*
63	1.0	3.0	*	*	*	*	4.8
			*	*	*	3.8 - 3.8	4.8 - 4.8
64	0.9	3.0	*	*	*	3.8	*
			*	*	*	3.8 - 3.8	4.8 - 4.8
65	0.9	3.0	*	*	*	3.8	*
			*	*	*	3.8 - 3.8	4.8 - 4.8
66	0.9	3.0	*	*	*	3.8	*
			*	*	*	3.8 - 3.8	4.8 - 4.8
67	0.9	3.0	*	*	*	3.8	*
			*	*	*	3.8 - 3.8	4.8 - 4.8
Atlantic Ocean		**From The entire shoreline within the Pasquotank River Basin**			**To The entire shoreline within the Pasquotank River Basin**		
Chowan River		**From The confluence with Pembroke Creek**			**To Approximately 250 feet downstream of Virginia Road/NC Highway 32**		

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 Chowan 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 Chowan 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 21, “Datum Conversion Locations and Values,” is shown below.

Table 21, “Datum Conversion Locations and Values.”

Table 21 - Datum Conversion Locations and Values

Latitude	Longitude	Conversion from NGVD29 to NAVD88 (feet)
36.25	-76.63	-1.05
36.12	-76.63	-1.08
36.00	-76.63	-1.11
36.00	-76.50	-1.09
Average conversion in Chowan County		

Table 21 - Datum Conversion Locations and Values

Latitude	Longitude	Conversion from NGVD29 to NAVD88 (feet)
from NGVD 29 to NAVD 88 = -1.08 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 Chowan 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.

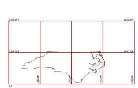


Figure 3 - North Carolina's State Plane Coordinate System

6.3 Floodplain and Floodway Delineation

Floodplain Boundaries

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.

For coastal floodplains, after analyzing wave heights along each transect, wave elevations were interpolated between transects. Various source data were used in the interpolation, including topographic data described above. Controlling features affecting the elevations were identified and considered in relation to their positions at particular transect and their variation between transects. •

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 22, "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 22 - 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
Filberts Creek								
065	6,523	25	99	4.3	4.6	4.6	5.1	0.5
067	6,735	22	77	5.5	6.8	6.8	7.4	0.6
074	7,392	40	177	1.9	11.4	11.4	12.0	0.6
077	7,707	26	138	2.4	12.6	12.6	13.0	0.5
079	7,908	33	158	2.1	14.2	14.2	14.6	0.4
Northeast Tributary of Pembroke Creek								
051	5,140	215	651	1.0	7.4	7.4	8.4	1.0
081	8,050	80	322	1.2	9.4	9.4	10.2	0.8
Northeast Tributary of Queen Anne Creek								
006	640	77	139	1.7	6.3[1]	4.7	4.8	0.0
013	1,281	77	143	1.0	6.3[1]	5.3	5.4	0.1

Table 22 - 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
025	2,469	26	82	1.3	11.2	11.2	11.5	0.3
Northwest Tributary of Queen Anne Creek								
003	274	92	224	3.1	6.7[1]	6.5	7.1	0.6
013	1,324	86	395	1.8	10.1	10.1	10.9	0.8
022	2,165	36	199	2.4	11.0	11.0	11.8	0.9
033	3,270	52	157	3.1	13.9	13.9	14.5	0.7
042	4,248	40	138	1.3	15.6	15.6	16.4	0.8
Pembroke Creek Tributary 1								
016	1,599	107	455	1.0	5.0[1]	4.8	5.8	1.0
020	1,995	93	398	1.1	5.4	5.4	6.4	1.0
022	2,236	60	249	1.8	6.1	6.1	7.0	0.9
024	2,395	80	345	1.3	6.7	6.7	7.6	0.9
027	2,687	27	80	4.7	7.6	7.6	8.3	0.7
029	2,893	27	78	4.8	11.1	11.1	11.6	0.5
031	3,101	46	315	1.2	12.6	12.6	13.5	0.9
035	3,500	40	263	1.4	13.0	13.0	13.9	1.0
040	3,975	57	222	1.7	13.4	13.4	14.4	1.0
044	4,428	58	212	1.8	13.8	13.8	14.8	1.0
052	5,164	87	179	2.1	14.9	14.9	15.8	0.9
057	5,699	161	379	1.0	15.7	15.7	16.7	1.0
061	6,097	195	506	0.6	15.8	15.8	16.8	1.0
066	6,571	135	303	1.0	16.1	16.1	17.0	1.0
Queen Anne Creek								
141	14,098	140	590	1.3	4.8	4.8	5.6	0.9
143	14,306	164	645	1.2	4.9	4.9	5.8	0.9
147	14,659	190	718	1.1	5.1	5.1	6.0	0.9
154	15,430	230	876	0.9	5.8	5.8	6.7	1.0
160	15,961	260	1,057	0.6	6.2	6.2	7.2	1.0
165	16,491	201	696	0.9	6.7	6.7	7.6	0.9
169	16,934	170	663	0.7	7.2	7.2	7.9	0.7
174	17,419	155	553	0.9	7.5	7.5	8.1	0.6
178	17,842	145	601	0.8	7.7	7.7	8.3	0.6
182	18,247	120	437	1.1	7.9	7.9	8.5	0.6
184	18,437	155	367	1.3	9.7	9.7	9.8	0.1
186	18,594	150	785	0.6	9.8	9.8	10.0	0.2
192	19,199	175	818	0.6	9.9	9.9	10.1	0.2
195	19,531	54	334	0.8	10.7	10.7	10.9	0.2
197	19,728	91	362	0.7	10.8	10.8	10.9	0.2
202	20,224	67	246	1.0	10.8	10.8	11.0	0.2
206	20,608	33	105	2.4	10.9	10.9	11.2	0.3
209	20,890	44	125	2.0	11.3	11.3	11.8	0.5
212	21,226	41	133	1.9	11.8	11.8	12.4	0.7
216	21,569	31	90	0.9	12.2	12.2	12.8	0.7
221	22,073	19	51	1.6	13.0	13.0	13.3	0.3

Table 22 - 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

[1]**Elevation includes backwater effects**

6.4 Coastal Flood Hazard Mapping

Flood insurance zones and BFEs including the wave effects were identified on each transect based on the results from the onshore wave hazard analyses. Between transects, elevations were interpolated using topographic maps, land-use and land-cover data, and knowledge of coastal flood processes to determine the aerial extent of flooding. Sources for topographic data are shown in Table 23.

Zone VE is subdivided into elevation zones and BFEs are provided on the FIRM.

The limit of Zone VE shown on the FIRM is defined as the farthest inland extent of any of these criteria (determined for the 1% annual chance flood condition):

- *The primary frontal dune* zone is defined in 44 CFR Section 59.1 of the NFIP regulations. The primary frontal dune represents a continuous or nearly continuous mound or ridge of sand with relatively steep seaward and landward slopes that occur immediately landward and adjacent to the beach. The primary frontal dune zone is subject to erosion and overtopping from high tides and waves during major coastal storms. The inland limit of the primary frontal dune zone occurs at the point where there is a distinct change from a relatively steep slope to a relatively mild slope.
- *The wave runup zone* occurs where the (eroded) ground profile is 3.0 feet or more below the 2-percent wave runup elevation.
- *The wave overtopping splash zone* is the area landward of the crest of an overtopped barrier, in cases where the potential 2-percent wave runup exceeds the barrier crest elevation by 3.0 feet or more.
- *The breaking wave height zone* occurs where 3-foot or greater wave heights could occur (this is the area where the wave crest profile is 2.1 feet or more above the total stillwater elevation).
- *The high-velocity flow zone* is landward of the overtopping splash zone (or area on a sloping beach or other shore type), where the product of depth of flow times the flow velocity squared (hv2) is greater than or equal to 200 ft3/sec2. This zone may only be used on the Pacific Coast.

The SFHA boundary indicates the limit of SFHAs shown on the FIRM as either “V” zones or “A” zones.

Table 23: Summary of Coastal Transect Mapping Considerations

Source	Coastal Transect	Primary Frontal Dune (PFD) Identified	Wave Runup Analysis	Wave Height Analysis	Zone VE Limit	SFHA Boundary
			Zone Designation and BFE (ft NAVD 88)	Zone Designation and BFE (ft NAVD 88)		
Albemarle Sound	44	*	VE 7-7	AE 6-7 VE 6-7	WAVE OVERTOPPING SPLASH ZONE	WHAFIS
	52	*	*	AE 5-6	*	WHAFIS
	54	*	*	AE 5-5	*	WHAFIS
	47	*	*	AE 6-6 VE 6-6	WHAFIS	WHAFIS
	48	*	VE 10	VE 6-6	WAVE OVERTOPPING SPLASH ZONE	WHAFIS

Table 23: Summary of Coastal Transect Mapping Considerations

Source	Coastal Transect	Primary Frontal Dune (PFD) Identified	Wave Runup Analysis	Wave Height Analysis	Zone VE Limit	SFHA Boundary
			Zone Designation and BFE (ft NAVD 88)	Zone Designation and BFE (ft NAVD 88)		
	51	*	AE 9 VE 7-9	AE 6-6 VE 6-6	RUNUP EXTENT	WHAFIS
	45	*	AE 10 VE 8-10	AE 6-6 VE 6-6	RUNUP EXTENT	WHAFIS
	56	*	*	AE 5-6	*	WHAFIS
	59	*	*	AE 5-5	*	WHAFIS
	46	*	VE 8	AE 6-6 VE 6-6	WHAFIS	WHAFIS
	49	*	VE 10	VE 6-6	WAVE OVERTOPPING SPLASH ZONE	WHAFIS
	50	*	*	AE 6-6	*	WHAFIS
	53	*	*	AE 5-5	*	WHAFIS
	55	*	*	AE 5-5	*	WHAFIS
	57	*	*	AE 5-5	*	WHAFIS
	58	*	*	AE 5-5	*	WHAFIS
Chowan River	1	*	*	AE 2-2	*	WHAFIS
	2	*	*	AE 1-1	*	WHAFIS
	4	*	*	AE 2-2	*	WHAFIS
	9	*	AE 6 VE 6-7	AE 3-4 VE 3-4	WHAFIS	WHAFIS
	16	*	*	AE 3-4 VE 3-4	WHAFIS	WHAFIS
	20	*	*	AE 4-4 VE 4-4	WHAFIS	WHAFIS
	19	*	*	AE 4-4 VE 4-4	WHAFIS	WHAFIS
	29	*	*	AE 5-5 VE 5-5	WHAFIS	WHAFIS
	3	*	*	AE 2-2	*	WHAFIS
	5	*	*	AE 2-3	*	WHAFIS
	6	*	*	AE 3-3	*	WHAFIS
	7	*	*	AE 3-3 VE 3-3	WHAFIS	WHAFIS
	8	*	*	AE 3-3 VE 3-3	WHAFIS	WHAFIS
	10	*	*	AE 4-4 VE 4-4	WHAFIS	WHAFIS
	11	*	*	AE 4-4 VE 4-4	WHAFIS	WHAFIS

Table 23: Summary of Coastal Transect Mapping Considerations

Source	Coastal Transect	Primary Frontal Dune (PFD) Identified	Wave Runup Analysis	Wave Height Analysis	Zone VE Limit	SFHA Boundary
			Zone Designation and BFE (ft NAVD 88)	Zone Designation and BFE (ft NAVD 88)		
	12	*	*	AE 3-4 VE 3-4	WHAFIS	WHAFIS
	13	*	*	AE 3-4 VE 3-4	WHAFIS	WHAFIS
	14	*	*	AE 4-4 VE 4-4	WHAFIS	WHAFIS
	15	*	*	AE 4-4 VE 4-4	WHAFIS	WHAFIS
	17	*	*	AE 3-4 VE 3-4	WHAFIS	WHAFIS
	18	*	*	AE 4-4 VE 4-4	WHAFIS	WHAFIS
	22	*	*	AE 4-4 VE 4-4	WHAFIS	WHAFIS
	23	*	*	AE 4-4 VE 4-4	WHAFIS	WHAFIS
	24	*	*	AE 4-4 VE 4-4	WHAFIS	WHAFIS
	25	*	*	AE 4-4 VE 4-4	WHAFIS	WHAFIS
	26	*	*	AE 4-5 VE 4-5	WHAFIS	WHAFIS
	27	*	*	AE 4-5 VE 4-5	WHAFIS	WHAFIS
	28	*	*	AE 5-5 VE 5-5	WHAFIS	WHAFIS
	30	*	*	AE 6-6 VE 6-6	WHAFIS	WHAFIS
	21	*	*	AE 4-4 VE 4-4	WHAFIS	WHAFIS
Edenton Bay	32	*	*	AE 6-6 VE 6-6	WHAFIS	WHAFIS
	33	*	*	AE 2-3	*	WHAFIS
	34	*	*	AE 2-2	*	WHAFIS
	42	*	*	AE 5-5 VE 5-5	WHAFIS	WHAFIS
	43	*	*	AE 6-7 VE 6-7	WHAFIS	WHAFIS
	35	*	*	AE 2-2	*	WHAFIS
	37	*	*	AE 6-6	*	WHAFIS

Table 23: Summary of Coastal Transect Mapping Considerations

Source	Coastal Transect	Primary Frontal Dune (PFD) Identified	Wave Runup Analysis	Wave Height Analysis	Zone VE Limit	SFHA Boundary
			Zone Designation and BFE (ft NAVD 88)	Zone Designation and BFE (ft NAVD 88)		
	39	*	*	AE 1-1	*	WHAFIS
	31	*	*	AE 6-7 VE 6-7	WHAFIS	WHAFIS
	40	*	*	AE 1-1	*	WHAFIS
	36	*	*	AE 1-1	*	WHAFIS
	38	*	*	AE 6-6	*	WHAFIS
	41	*	*	AE 2-2	*	WHAFIS
Yeopim River	60	*	*	AE 2-2	*	WHAFIS
	63	*	*	AE 1-2	*	WHAFIS
	61	*	*	AE 1-2	*	WHAFIS
	62	*	*	AE 1-2	*	WHAFIS
	64	*	*	AE 1-2	*	WHAFIS
	65	*	*	AE 1-2	*	WHAFIS
	66	*	*	AE 1-2	*	WHAFIS
	68	*	*	AE 1-2	*	WHAFIS
	67	*	*	AE 1-2	*	WHAFIS

A LiMWA boundary has also been added in coastal areas subject to wave action for use by local communities in safe rebuilding practices. The LiMWA represents the approximate landward limit of the 1.5-foot breaking wave. In areas where the Zone VE designation is based on the presence of a primary frontal dune the LiMWA was not delineated.

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 Chowan 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 10/16/2008 North Carolina Statewide FIRM, which includes Chowan County, are presented in Table 24, "Map Revision History."

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

Table 24 - Map Revision History

Community	Initial Identification Date	Initial FIRM Effective Date	FIS Revision Date
CHOWAN COUNTY	1/27/1978	7/3/1985	10/16/2008
TOWN OF EDENTON	2/15/1974	9/15/1977	10/16/2008

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 Chowan County and Incorporated Areas. Table 25, "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 25 — Authority and Acknowledgments

Community	FIS Dated	Study Contracted By	Data Source	Contract or IAA Number	Work Completed In
CHOWAN COUNTY	10/16/2008	NCFMP	NCFMP	286-000023	10/28/1014
CHOWAN COUNTY	10/16/2008	NCFMP	NCFMP	286-000022	10/29/2012
TOWN OF EDENTON	10/16/2008	NCFMP	NCFMP	286-000023	10/28/1014
TOWN OF EDENTON	10/16/2008	NCFMP	NCFMP	286-000022	10/29/2012

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 Chowan County were produced by NCFMP under contract with the State of North Carolina and issued on effective 11/30/2015.   For this revision, the hydrologic and hydraulic analyses and the FIRM panels were produced by NCFMP, under contract with the State of North Carolina.

8.2 Consultation Coordination Officer's Meetings/Scoping Meetings

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

The dates of the initial and final CCO meetings held for Chowan County and Incorporated Areas were compiled from the previous countywide FIS Report and are shown in Table 26, "Consultation Coordination Officer's Meetings

Table 26 — Consultation Coordination Officer's Meetings

Community	For FIS Dated	Initial CCO Date	Attended By	Final CCO Date	Attended By
CHOWAN COUNTY	1/3/1985	8/8/8888	NP	5/22/1984	Representatives of FEMA, Tetra Tech, Inc., and Perquimans County
CHOWAN COUNTY	1/3/1985	8/8/8888	NP	5/22/1984	Representatives of FEMA, Tetra Tech, Inc., and Town of Hertford
CHOWAN COUNTY	1/3/1985	8/8/8888	NP	5/22/1984	Representatives of FEMA, Tetra Tech, Inc., and Town of Winfall
CHOWAN COUNTY	1/3/1985	8/8/8888	NP	5/22/1984	Representatives of Tetra Tech Inc., FEMA, and the community
CHOWAN COUNTY	1/3/1985	8/8/8888	NP	5/22/1984	Representatives of Tetra Tech Inc., FEMA, and the county
TOWN OF EDENTON	1/3/1985	8/8/8888	NP	5/22/1984	Representatives of FEMA, Tetra Tech, Inc., and Perquimans County
TOWN OF EDENTON	1/3/1985	8/8/8888	NP	5/22/1984	Representatives of FEMA, Tetra Tech, Inc., and Town of Hertford
TOWN OF EDENTON	1/3/1985	8/8/8888	NP	5/22/1984	Representatives of FEMA, Tetra Tech, Inc., and Town of Winfall
TOWN OF EDENTON	1/3/1985	8/8/8888	NP	5/22/1984	Representatives of Tetra Tech Inc., FEMA, and the community
TOWN OF EDENTON	1/3/1985	8/8/8888	NP	5/22/1984	Representatives of Tetra Tech Inc., FEMA, and the county
TOWN OF EDENTON ETJ	1/3/1985	8/8/8888	NP	5/22/1984	Representatives of FEMA, Tetra Tech, Inc., and Perquimans County
TOWN OF EDENTON ETJ	1/3/1985	8/8/8888	NP	5/22/1984	Representatives of FEMA, Tetra Tech, Inc., and Town of Hertford
TOWN OF EDENTON ETJ	1/3/1985	8/8/8888	NP	5/22/1984	Representatives of FEMA, Tetra Tech, Inc., and Town of Winfall
TOWN OF EDENTON ETJ	1/3/1985	8/8/8888	NP	5/22/1984	Representatives of Tetra Tech Inc., FEMA, and the community
TOWN OF EDENTON ETJ	1/3/1985	8/8/8888	NP	5/22/1984	Representatives of Tetra Tech Inc., FEMA, and the 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 Chowan County are shown in Table 28, “Scoping Meetings.” Meetings held for the map maintenance revision are also included below for Chowan County.

Table 28 — Scoping Meetings

Community	Riverbasin	Initial Scoping Date	Attended By	Final Scoping Date	Attended By
CHOWAN COUNTY	CHOWAN	8/8/2003	Representatives of NCDEM, FEMA, Dewberry, and the county	5/17/2001	Representatives of NCDEM, FEMA, Dewberry, and the county
CHOWAN COUNTY	CHOWAN	8/8/2003	Representatives of NCDEM, FEMA, Dewberry, and the county	2/7/2007	Representatives of NCDEM, FEMA, Dewberry, and the county
CHOWAN COUNTY	PASQUOTANK	12/13/2000	Representatives of NCDEM, FEMA, Dewberry, and the county	5/17/2001	Representatives of NCDEM, FEMA, Dewberry, and the county
CHOWAN COUNTY	PASQUOTANK	12/13/2000	Representatives of NCDEM, FEMA, Dewberry, and the county	2/7/2007	Representatives of NCDEM, FEMA, Dewberry, and the county
TOWN OF EDENTON	CHOWAN	8/8/2003	Representatives of NCDEM, FEMA, Dewberry, and the county	8/8/8888	NP
TOWN OF EDENTON ETJ	CHOWAN	8/8/2003	Representatives of NCDEM, FEMA, Dewberry, and the county	8/8/8888	NP

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 30, “Preliminary and Public Participation Meetings.”

Table 30 — Preliminary and Public Participation Meetings

Community	For FIS Dated	Meeting Location	Preliminary Meeting Date	Attended By	Public Meeting Date	Attended By
CHOWAN COUNTY	10/16/2008	Edenton	11/21/2003	Representatives of the county, the State, Dewberry, and Watershed Concepts	11/7/2007	NP
CHOWAN COUNTY	10/16/2008	Edenton	10/9/2007	Representatives of the county, the State, Dewberry, and Watershed Concepts	11/7/2007	NP

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 Chowan 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
Chowan County	Chowan County Planning Department, 108 East King Street	Edenton	NC	27932
Town of Edenton	Edenton Town Hall, 400 South Broad Street	Edenton	NC	27932

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 29, "Additional Information" is not applicable in Chowan 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