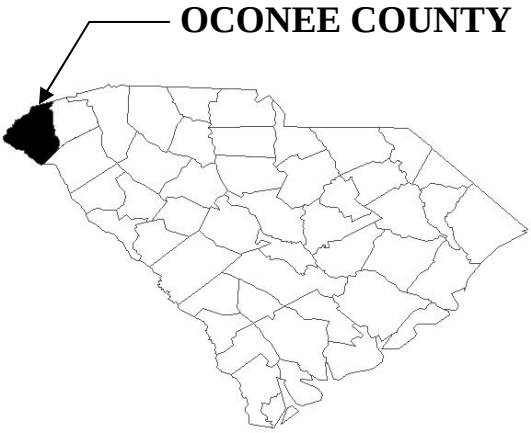
FLOOD INSURANCE STUDY

OCONEE COUNTY, SOUTH CAROLINA
AND INCORPORATED AREAS



Community Name	Community Number
OCONEE COUNTY	
(UNINCORPORATED AREAS)	450157
SALEM, TOWN OF	450212
SENECA, CITY OF	450158
WALHALLA, CITY OF	450159
WEST UNION, TOWN OF	450278
WESTMINSTER, CITY OF	450223

This Preliminary FIS report only includes revised Limited Detailed Flood Hazard Data. The unrevised Floodway Data, Limited Detailed Flood Hazard Data and Flood Profiles will appear in the final FIS report.

REVISED:

PRELIMINARY
DECEMBER 18, 2015

Federal Emergency Management Agency

FLOOD INSURANCE STUDY NUMBER
45073CV000B

NOTICE TO
FLOOD INSURANCE STUDY USERS

Communities participating in the National Flood Insurance Program (NFIP) 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.

Part or all of this FIS may be revised and republished at any time. In addition, part of this FIS may be revised by the Letter of Map Revision process, which does not involve republication or redistribution of the FIS. It is, therefore, the responsibility of the user to consult with community officials and to check the community repository to obtain the most current FIS components.

Initial Countywide FIS Effective Date: September 11, 2009

Revised Countywide FIS Effective Date: [TBD] – to add and change Base Flood Elevations and Special Flood Hazard Areas; to change zone designations; to update corporate limits and roads and road names; and to reflect updated topographic information.

This Preliminary FIS report only includes revised Limited Detailed Flood Hazard Data. The unrevised Floodway Data, Limited Detailed Flood Hazard Data and Flood Profiles will appear in the final FIS report.

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FLOOD INSURANCE STUDY
OCONEE COUNTY, SOUTH CAROLINA AND INCORPORATED AREAS

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study (FIS) revises and updates information on the existence and severity of flood hazards in the geographic area of Oconee County, South Carolina, including the Cities of Seneca, Walhalla, and Westminster; the Towns of Salem, and West Union; and the unincorporated areas of Oconee County (referred to collectively herein as Oconee County). This FIS aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study has developed flood-risk data for various areas of the community that will be used to establish actuarial flood insurance rates and to assist the community in its efforts to promote sound floodplain management. Minimum floodplain management requirements for participation in the National Flood Insurance Program (NFIP) are set forth in the Code of Federal Regulations at 44 CFR, 60.3.

In some states or communities, floodplain management criteria or regulations may exist that are more restrictive or comprehensive than the minimum Federal requirements. In such cases, the more restrictive criteria take precedence and the State (or other jurisdictional agency) will be able to explain them.

1.2 Authority and Acknowledgments

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

For the September 11, 2009, countywide FIS, the hydrologic and hydraulic analyses were performed by Watershed Concepts (the Study Contractor) for the Federal Emergency Management Agency (FEMA), and the State of South Carolina (Cooperating Technical Partner), under the South Carolina Flood Map Modernization Initiative Project No. P24-N085-MJ. This study was completed in January 2008.

Base map information shown on the September 11, 2009, Flood Insurance Rate Map (FIRM) was provided in digital format by Oconee County, South Carolina. Additional information may have been derived from other sources. Users of the FIRM should be aware that minor adjustments may have been made to specific base map features.

For the [TBD], countywide FIS, the hydrologic and hydraulic analyses were prepared by AECOM for the South Carolina Department of Natural Resources (SCDNR) under Mapping Activity Statement FY12.22. The work in Oconee County was performed as a part of the larger Seneca Watershed study and is based on the Discovery Report for Seneca Watershed dated January 18, 2013 (FEMA, 2013). However, it should be noted some of the existing Zone A areas were updated and the

reach lengths noted in the Discovery Report may have changed to take into account backwater conditions and streamline refinement. In Oconee County, limited detailed study methods were performed for approximately 32.7 miles on portions of Cheohee Creek, Knox Creek, Little River, Oconee Creek, Perkins Creek, Tamassee Creek, and West Fork Townes Creek. The extents of these analyses can be found in Table 1, "Limited Detailed Study Scope," in Section 2.1, "Study Scope," of this FIS Report. Additionally, the 1-percent annual chance floodplain boundaries for Lake Jocasse and Lake Keowee were updated based on more up-to-date topographic data. This work was completed in March 2015.

Base map information shown on the [TBD], FIRMs was provided in digital format by Oconee County, South Carolina.

The coordinate system used for the production of this FIRM is South Carolina State Plane (FIPSZONE 3900), North American Datum of 1983 (NAD 83). Corner coordinates shown on the FIRM are in latitude and longitude referenced to the South Carolina State Plane (FIPSZONE 3900) projection, NAD 83. Differences in the datum and spheroid used in the production of FIRMs for adjacent counties may result in slight positional differences in map features at the county boundaries. These differences do not affect the accuracy of information shown on the FIRM.

1.3 Coordination

An initial Consultation Coordination Officer (CCO) meeting is typically held with representatives of FEMA, the community, and the study contractor to explain the nature and purpose of a FIS and to identify the streams to be studied by detailed methods. A final CCO meeting is typically held with the same representatives to review the results of the study.

For the September 11, 2009, countywide FIS, an initial CCO meeting was held with representatives of South Carolina Department of Natural Resources (SCDNR), FEMA, delegates of Oconee County, and Watershed Concepts on April 27, 2006. Coordination with county officials and Federal, State, and regional agencies produced a variety of information pertaining to floodplain regulations, available community maps, flood history, and other hydrologic data.

The final CCO meeting for the September 11, 2009, countywide FIS, referred to as the Preliminary DFIRM Community Coordination (PDCC) meeting, was held on July 31, 2008, wherein the results of this FIS were reviewed and accepted. Those who attended this meeting included representatives of the SCDNR, Study Contractor, FEMA, and the communities. All problems raised at that meeting have been addressed in this study.

For the [TBD], countywide FIS, an initial Discovery meeting for the Seneca Watershed study was held on July 11, 2012, and attended by representatives from Anderson, Oconee, and Pickens Counties; as well as representatives from FEMA, SCDNR, United States (U.S.) Geological Survey (USGS), U.S. Army Corps of

Engineers (USACE), the National Weather Service – Southeast River Forecast Center and the study contractors. The Discovery Report, Seneca, 03060101, dated January 18, 2013, describes and summarizes the Discovery tasks that were conducted for the Seneca Watershed.

The results of the [TBD], countywide FIS were reviewed at the final CCO meeting, referred to as the PDCC meeting, held on [TBD], wherein the results of this FIS were reviewed and accepted. Those who attended this meeting included [attendee list to be inserted after preliminary stage of study]. All comments and issues raised at that meeting have been addressed.

2.0 AREA STUDIED

2.1 Scope of Study

This FIS covers the geographic area of Oconee County, South Carolina and includes part of the Seneca Watershed, Hydrologic Unit Code 03060101.

The Seneca River is formed at the confluence of the Keowee River and the Little River in northern South Carolina, just downstream of Lake Keowee and flows into Lake Hartwell. Seneca River joins the Tugaloo River just downstream of Lake Hartwell to form the Savannah River. The Seneca watershed is located in the Blue Ridge and Piedmont physiographic regions along the Northwest border of South Carolina and North Carolina. Parts of the watershed are located in Anderson, Oconee and Pickens Counties in South Carolina and a small portion of the watershed is located in Jackson and Transylvania Counties in North Carolina. The watershed is largely rural with a small portion of urban area along Hembree Creek. In Oconee County, the Seneca Watershed covers approximately 353 square miles (sq.mi.) of the county (approximately 34 percent) and includes portions of the Cities of Seneca, Walhalla, and Westminster; and the Towns of Salem, and West Union (FEMA, 2013).

For Oconee County Perkins Creek Tributary 1 was studied by detailed methods from the confluence with Perkins Creek to approximately 0.4 miles upstream of Hawk Boulevard. Limits of detailed study are included on the Flood Profiles (Exhibit 1) and on the FIRM (Exhibit 2).

The areas studied by detailed methods were selected with priority given to all known flood hazards and areas of projected development or proposed construction.

Numerous flooding sources were studied by limited detail methods. Limited detail analyses were used to study those areas outside of municipalities or with minimal development. Base Flood Elevations (BFE's) have been placed on the FIRM panel for flooding sources studied by limited detail methods. The scope and methods of study were proposed to, and agreed upon, by FEMA and Oconee County. A summary of limits studied in limited detail is shown in Table 1, "Limited Detail Study Scope".

Table 1 – Limited Detail Study Scope

Stream Name	Limit of Study
Barton Creek	From confluence with Tugaloo River to approximately 0.3 miles upstream of Barton Creek Road
Beaverdam Creek	From the Oconee County boundary with Anderson County to approximately 0.8 mi upstream of State Highway 59
Beaverdam Creek Tributary 3	From the confluence with Beaverdam Creek to approximately 0.8 miles upstream of the confluence with Beaverdam Creek
Boones Creek	From the confluence with Keowee River to approximately 0.9 miles upstream of confluence with Keowee River
Cane Creek	From approximately 0.2 miles upstream of confluence with Little Cane Creek to approximately 0.5 miles upstream of Rocky Knoll Road
Cheohee Creek	At the confluence with Flat Shoals River and Tamassee Creek to approximately 1.7 miles upstream of Cherokee Lake Road
Choestoea Creek	From the confluence with Tugaloo River to approximately 0.5 miles upstream of Winkler Drive
Cleveland Creek	From the confluence with Beaverdam Creek to approximately 1.5 miles upstream of Feltman Road
Colonels Fork Creek	From the confluence with Coneross Creek to approximately 0.3 miles upstream of Bennett Road
Coneross Creek	From approximately 6.7 miles upstream of the Oconee County boundary with Anderson County to approximately 0.5 miles upstream of Coneross Farm Road

Table 1 – Limited Detail Study Scope (continued)

Stream Name	Limit of Study
Coneross Creek Tributary 1	From approximately 1.8 miles upstream of confluence with Coneross Creek to approximately 2.7 miles upstream of the confluence with Coneross Creek
Coneross Creek Tributary 2	From the confluence with Coneross Creek to approximately 0.6 miles upstream of Bear Swamp Road
Coneross Creek Tributary 3	From the confluence with Coneross Creek to approximately 0.2 miles upstream of State Highway 11
Cornhouse Creek	From approximately 0.3 miles downstream of Stamp Creek Road to approximately 0.4 miles upstream of Stamp Creek Road
Fair Play Creek	From the confluence with Tugaloo River to approximately 1.4 miles upstream of the confluence with Keowee River
Fall Creek	From the confluence with Keowee River to approximately 1.4 miles upstream of the confluence with Keowee River
Hartwell Lake Tributary 1	From the confluence with Hartwell Lake to approximately 270 feet upstream of Spring Valley Road
Hartwell Lake Tributary 2	From the confluence with Hartwell Lake to approximately 1.2 miles upstream of the confluence with Lake Hartwell
Hartwell Lake Tributary 3	From the confluence with Hartwell Lake to approximately 1.8 miles upstream of Singing Pine Road
Keowee River 2 Tributary 7	From the confluence with Keowee River 3 to approximately 0.4 miles upstream of Maple Avenue
Keowee River 2 Tributary 7 Tributary 1	From the confluence with Keowee River 2 Tributary 7 to approximately 0.4 miles upstream of Seneca Drive

Table 1 – Limited Detail Study Scope (continued)

Stream Name	Limit of Study
Keowee River 2 Tributary 7 Tributary 1 Tributary 1	From the confluence with Keowee River 2 Tributary 7 Tributary 1 to approximately 170 feet upstream of North Pine Street
Keowee River 2 Tributary 7 Tributary 1 Tributary 2	From the confluence with Keowee River 2 Tributary 7 Tributary 1 to approximately 1.5 miles upstream of the confluence with Keowee River 2 Tributary 7 Tributary 1
Knox Creek	At the confluence with Cheohee Creek to approximately 0.64 mile upstream of Jumping Branch Road
Little Beaverdam Creek	From the Oconee County boundary with Anderson County to approximately 270 feet upstream of Donald Road
Little Beaverdam Creek Tributary 1	From the Oconee County boundary with Anderson County to approximately 0.6 miles upstream of the Oconee County boundary with Anderson County
Little Cane Creek	From approximately 0.2 miles upstream of the confluence of Cane Creek to approximately 0.2 miles upstream of Pickens Highway
Little Choestoea Creek	From the confluence with Choestoea Creek to approximately 0.8 miles upstream of Little Choestoea Road
Little River	Approximately 3.3 miles downstream of Burnt Tanyard Road to the confluence with Mill Creek and Burgress Creek
Martin Creek	From approximately 0.4 miles upstream of confluence of Hartwell Lake Tributary 3 to approximately 0.5 miles upstream of East South 6th Street
Martin Creek Tributary 1	From the confluence with Martin Creek to approximately 160 feet upstream of East South 6th Street
Martin Creek Tributary 2	From the confluence with Martin Creek to approximately 0.2 miles upstream of Moores Road

Table 1 – Limited Detail Study Scope (continued)

Stream Name	Limit of Study
Martin Creek Tributary 3	From the confluence with Martin Creek to approximately 340 feet upstream of Railroad
Martin Creek Tributary 6	From the confluence with Martin Creek Tributary 3 to approximately 0.4 miles upstream of Palmer Drive
McKinneys Creek	From the confluence with Keowee River to approximately 1.9 miles upstream of the confluence with Keowee River
Mill Creek 3 Tributary 1	From the confluence with Mill Creek 3 to approximately 0.8 miles upstream of the confluence with Mill Creek 3
Mill Creek 3 Tributary 2	From the confluence with Mill Creek 3 to approximately 0.7 miles upstream of the confluence with Mill Creek 3
Mud Creek	From the confluence with Beaverdam Creek to approximately 1.2 miles upstream of Cedar Lane Road
Mud Creek Tributary 1	From the confluence with Mud Creek to approximately 630 feet upstream of Cody Road
Oconee Creek	At the confluence with Little River to approximately 0.55 mile upstream of Todd Bridge Road
Perkins Creek	From the confluence with Coneross Creek to approximately 1.0 miles upstream of Wells Highway
Perkins Creek Tributary 1 Tributary 1	From the confluence with Perkins Creek Tributary 1 to approximately 0.3 miles upstream of Rolling Hills Drive
Perkins Creek Tributary 1 Tributary 2	From the confluence with Perkins Creek Tributary 1 to approximately 0.4 miles upstream of Dalton Road
Perkins Creek Tributary 1 Tributary 2 Tributary 1	From the confluence with Perkins Creek Tributary 1 Tributary 2 to approximately 0.3 miles upstream of West Quincy Road

Table 1 – Limited Detail Study Scope (continued)

Stream Name	Limit of Study
Perkins Creek Tributary 1 Tributary 3	From the confluence with Perkins Creek Tributary 1 to approximately 450 feet upstream of Emerald Road
Richland Creek	From the confluence with Coneross Creek to approximately 0.6 miles upstream of Boundylands Road
Seneca Creek	From approximately 0.2 miles downstream of Davis Creek Road to approximately 0.6 miles upstream of Meadow Brook Drive
Seneca Creek Tributary 1	From the confluence with Seneca Creek to approximately 1.1 miles upstream of the confluence with Seneca Creek
Shiloh Branch	From approximately 1.1 miles upstream of confluence with Seneca River to approximately 1.4 miles upstream of the confluence with the Seneca River
Snow Creek	From the confluence with Coneross Creek to approximately 300 feet upstream of Snow Creek Road
Speeds Creek	From the confluence with Coneross Creek to approximately 0.7 miles upstream of Wells Highway
Tamassee Creek	At the confluence with Cheohee Creek and Flat Shoals River to approximately 1.3 miles upstream of Tamassee Knob Road
Tugaloo River	From the Oconee County boundary with Anderson County to approximately 190 feet upstream of Dam 2
West Fork Townes Creek	At the confluence with Knox Creek to approximately 0.38 mile upstream of Jumping Branch Road

Numerous flooding sources were studied by approximate analyses. Approximate analyses were used to study those areas having a low development potential or minimal flood hazards. The scope and methods of study were proposed to, and agreed upon by FEMA, the communities, and Oconee County.

2.2 Community Description

Oconee County is located in northwestern South Carolina, on the edge of the Blue Ridge Mountains. The county borders nine other counties; Franklin, Habersham, Hart, Rabun, and Stephens in Georgia, Jackson and Transylvania in North Carolina, and Anderson and Pickens in South Carolina. The incorporated areas in the county include the Cities of Seneca, Walhalla, and Westminster, and the Towns of Salem, and West Union.

Oconee County is located in what was previously scenic Cherokee Indian country. In 1800, a portion of the Indian country was separated into an area that contained the present Anderson, Oconee, and Pickens Counties. After the American Revolution, settlers from other parts of the state began moving in, including Germans from Charleston who founded the town of Walhalla, the county seat, in 1850 (South Carolina Appalachian Council of Governments, 2007).

Data released by the U.S. Census Bureau for the 2010 U.S. Census estimated the total population of Oconee County to be approximately 74,273 (U.S. Census Bureau, 2010[a]). This is county growth of 12% from the 2000 U.S. Census which had a total population of approximately 66,215 in Oconee County.

Major streams include Tugaloo River, running along the southwestern Georgia – South Carolina border; Chattooga River along the northwestern border both where Georgia and North Carolina encounter Oconee County; Keowee River, which runs between Pickens and Oconee. Coneross Creek is a substantial tributary of Lake Hartwell and courses through the country between Seneca, Walhalla, and Westminster. Cane Creek is another stream of concern because it flows directly through the city of Walhalla. The city of Seneca also has several streams of note; namely Keowee River tributaries, Perkins Creek tributaries, and Martin Creek which all originate within the city limits.

Soils in Oconee County are predominately well drained sandy-loams with some clay-loam areas. These soils belong to eight basic associations (U.S. Department of Agriculture, 2006 [a,b, and c]):

1. Saluda-Hayesville-Evard-Brevard-Bradson
2. Tusquitee-Tallapoosa-Saluda-Evard-Edneytown
3. Hiwassee-Cecil
4. Chester-Ashe
5. Wilkes-Hiwassee-Cecil
6. Cecil
7. Pacolet-Madison-Davidson-Cecil
8. Pacolet-Hiwassee-Cecil

Income within the county is mainly derived from industrial manufacturing and retail trade. However, geographically, there is still a large zone of the county engaged in agriculture. Major products of the county are mechanical parts involved in motors and engines. It is also important to remark that Oconee County is the largest apple-

producing county in the state of South Carolina. Public health care and schools occupations provide vital services which offer jobs for a large amount of the work force. Similarly Duke Energy Corporation utilizes a nuclear power plant in the county which is labor intensive (South Carolina Employment Security Commission, 2007).

The climate of Oconee County is directly affected by the Blue Ridge Mountains to the north. The mean summer temperature is approximately 74.8 degrees Fahrenheit (°F). The winters are reasonably mild, with a mean temperature of approximately 41.1 °F. Most precipitation is recorded during the winter months, with the annual average amount for the area measured at approximately 62.7 inches (National Oceanic and Atmospheric Administration, 2002 and 2004). According to climatological records, winter and spring generally have the most precipitous conditions.

Most development is occurring in central and southern Oconee County. Floodplain areas are predominantly undeveloped.

Lake Hartwell is the largest of the three major reservoirs in Oconee County. It is formed by Hartwell Dam, built by the USACE between 1955 and 1963 on the Savannah River at the border of Anderson County, South Carolina and Hart County, Georgia. Normal pool elevation of Lake Hartwell is 660 feet mean-sea-level (msl). Initial reasons for building Hartwell Dam were flood control, hydropower, and navigation. Lake Hartwell is now vital for recreational activities, water supply, and fish and wildlife management purposes.

Along the Oconee and Pickens County boundary lays Lake Keowee. Lake Keowee is created by the Keowee Dam on the Keowee River and the Little River Dam on the Little River. The principal utilization of Lake Keowee is for the cooling system of Oconee Nuclear Generating Station in Seneca. Lake Keowee, which opened in 1971, is managed by Duke Energy Corporation which also owns the nuclear facility. In addition the reservoir is sometimes used for hydroelectric power generation at the Keowee Hydro Station which mainly serves as a backup power supply to the nuclear station. The design of Lake Keowee is for the flood-pool elevation to reach a height of 800 feet msl.

Just upstream of Lake Keowee is Lake Jocassee, which is also owned by Duke Energy Corporation. However the lake is not used for cooling a nuclear reactor, but rather solely as a hydroelectric power supply at the Jocassee Pumped Storage Hydroelectric Station built in 1973. Several streams feed Lake Jocassee; primarily Horsepasture, Thompson, Toxaway, and Whitewater Rivers, and would contribute to raised elevations during floods. Similarly, Duke Energy also controls the nearby Bad Creek Generation Station, another water storage facility used for generating electricity. The design of Lake Jocassee is for the flood-pool elevation to reach a maximum height of 1,110 feet msl.

City of Seneca

The City of Seneca is located in the southeastern portion of Oconee County situated between Lake Keowee and Lake Hartwell, with northern city limits on the southern shore of Lake Keowee. Seneca is surrounded by unincorporated areas of Oconee County. Major highways serving the City of Seneca are U.S. Routes 76 and 123, and State Routes 28, 59, and 130. The Norfolk Southern Railway also serves Seneca. The City of Seneca lies approximately four miles west of the City of Clemson in Pickens County, South Carolina.

The 2010 Census population of Seneca was reported at 8,102 a net change of 6 percent from the 2000 Census statistics of 7,652, and also put the official size of the city at 7.6 square miles (U.S. Census Bureau, 2010[b]). The economy base for Seneca has recently tended toward a more industrial manufacturing from agriculture.

Several streams originate within the city's corporate limits. The most prominent are Seneca, Martin, and Perkins Creek, as well as Perkins Creek Tributary 1. Various other minor tributaries branch off from Perkins Creek Tributary 1, and there are several Keowee River 2 tributaries which flow into Lake Keowee.

City of Walhalla

Walhalla is the county seat and is located in the central region of Oconee County. The Town of West Union shares a part of its eastern boundary, while the rest is bordered by unincorporated areas of Oconee County. Only South Carolina State Highways 28 and 183 service the city. Additionally the Norfolk Southern Railway terminates a route in Walhalla. The City of Walhalla lies approximately six miles northwest of the City of Seneca, also in Oconee County.

Estimates from the 2010 Census put inhabitants of Walhalla at approximately 4,263 an increase of 1.5 percent from the 2000 Census population of 3,801 (U.S. Census Bureau, 2010[c]).

Cane Creek, a tributary to Lake Keowee, originates just west of Walhalla and flows east through Walhalla toward the lake. Within the study area, the creek drains an approximate area of 15.6 square miles.

City of Westminster

The City of Westminster is located in the south-central portion of Oconee County. U.S. Routes 76 and 123 access the city, as do State Routes 24 and 183. Norfolk Southern Railway also provides contact to Westminster as a route passes through it. The city lies roughly six miles south of Walhalla and six miles west of Seneca.

2010 U.S. Census data estimated the population of the City of Westminster at 2,418, a decrease from the 2000 U.S. Census at which the population of the City of Westminster was estimated to be at 2,743, a drastic decrease of 12.1% from 1990 Census level 3,120 (U.S. Census Bureau, 2010[c]). The City of Westminster is

known for its annual South Carolina Apple Festival in September.

2.3 Principal Flood Problems

A review of the South Carolina Hazard Mitigation Plan (HMP) summarizes the notable flood events that took place across the state which included flash flooding due to summer storms, as well as flood events due to heavy rains. The HMP notes that from 2009 to 2011 there were five flood events affecting Oconee County, with one event resulting in property damages of $10,510. No additional details regarding this event were available in the HMP (The State of South Carolina, 2013).

As compiled from the previous FIS reports, historical records indicate that most occurrences take place primarily in early summer and autumn seasons, and are of a flash-flood nature. This is anticipated as a result of quick runoff from the nearby Blue Ridge Mountains.

Earliest accounts of serious fiscal damage attributed to flooding are mentioned January 11, 1993; and the most recent was June 26, 2006. Total damages are approximately $2 million, but include resulting damages also caused in downstream counties adjacent to Oconee County. Crop destruction accounts for only $9,000 of the total monetary loss.

The greatest incident on record happened September 7, 2004, when widespread flooding occurred on multiple sources across the county. Several community sewer systems were washed out, causing $1.3 million in damages.

Another widespread event transpired on June 26, 2006. Considerable damage was noted in each city. In Seneca Debra Lane was washed out. Levi Lane just south of Walhalla was destroyed, and Seed Farm Road near Westminster was washed away.

Several incidents have taken place in the southern reaches of Oconee County. On March 20, 2003, Fair Play and Coneross Creeks near Seneca were observed as flooded without dire outcome. Also the Tugaloo River once flooded about September 16, 2004, and caused the needed rescue of some trapped families. Shortly thereafter around September 27, 2004, floodwaters incurred minor damages to some businesses in the south end of Oconee.

Several USGS gaging stations are in operation in Oconee County. One is located by Return Church Road, south of Seneca on Coneross Creek, just upstream of the confluence of Perkins Creek. It is official station No. 02186645 given the location name Coneross Creek Near Seneca, South Carolina. Gaging stations are fundamental instruments for measuring and further understanding flood events. Station No. 02186645 operated between April 1989 and September 2003. The largest flow recorded came August 17, 1994, with a maximum flow of 3,590 cubic feet per second (cfs) and gage height of 15.26 feet. On March 20, 2003, a prior mentioned flood had the second-highest flows observed at this gaging station with a maximum 3,370 cfs and gage height of 14.86 feet.

Because Seneca has many small tributaries which drain the city drastic flooding rarely happens. However, Meadowbrook Rd. was noted to have flooded June 25, 2004, due to a summer storm.

For small towns the only distinctive event came on June 25, 2004, when Little River overflowed its banks without harsh consequence near Salem. The Town of West Union does not appear to suffer from severe flooding. Less-extreme flooding events are typically confined to low-lying pasturelands and woodlands bordering the creeks. Usually floodwaters recede within 24-48 hours and resultant damage is negligible.

2.4 Flood Protection Measures

The three major man-made lakes contribute to flood protection in Oconee County. Hartwell Dam was initially intended to be a crucial flood control structure. Lake Hartwell's maximum pool-flood elevation was designed to reach 665 feet msl. Utilization of Lake Hartwell's capacity has already accounted for the prevention of millions of dollars in flood damage.

Although the other two reservoirs, Lake Jocassee and Lake Keowee, were built for power generation purposes, they can also be employed as flood protection measures to manage excess runoff in the event of an extreme storm. Maximum flood-pool elevations for the reservoirs were measured at 800 feet msl for Lake Keowee, and 1,110 feet msl for Lake Jocassee.

The City of Westminster was recently awarded funding from the Oconee County Council allowing for the replacement of a culvert for a highly traveled road to aid in flood control. Efforts to alleviate flooding problems will continue to be addressed as needed.

3.0 ENGINEERING METHODS

For the flooding sources studied by detailed methods 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 once on the average during any 10-, 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- , 50-, 100-, and 500-year floods, have a 10-, 2-, 1-, and 0.2-percent 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 1- percent-annual-chance flood in any 50-year period is approximately 40 percent (4 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.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish peak discharge-frequency relationships for each flooding source studied by detailed methods affecting the community.

For the streams studied in the September 11, 2009, countywide FIS, USGS rural regression equations for South Carolina were used to determine peak-flow discharge values. These equations were established in USGS Water-Resources Investigations Report 02-4140 (USGS, 2004). In South Carolina the USGS regression equations are classified into four distinct physiographic regions. Oconee County lies within two of these, the Blue Ridge and Piedmont regions. For Blue Ridge the rural flood-frequency equations are:

$$Q_{10} = 281*(DA)^{0.720}$$
$$Q_{50} = 491*(DA)^{0.695}$$
$$Q_{100} = 595*(DA)^{0.688}$$
$$Q_{500} = 868*(DA)^{0.675}$$

And for the Piedmont region the equations are:

$$Q_{10} = 262*(DA)^{0.647}$$
$$Q_{50} = 426*(DA)^{0.631}$$
$$Q_{100} = 503*(DA)^{0.626}$$
$$Q_{500} = 698*(DA)^{0.615}$$

Where: Q_x = flood discharge of recurrence interval *x* years in cfs
DA = drainage area in square miles

Several of the limited detailed studied streams in Oconee County contained sufficient urban development to merit use of a method to account for urbanization effects on peak discharges. The alternative urban regression equations explained in USGS Scientific Investigations Report 2004-5030 (USGS, 2004) are:

$$Q_{10} = 69.9*L^{1.51}*(1^{0.0192*IA})$$
$$Q_{50} = 90.3*L^{1.55}*(10^{0.0185*IA})$$
$$Q_{100} = 97.2*L^{1.56}*(10^{0.0185*IA})$$
$$Q_{500} = 111*L^{1.60}*(10^{0.0187*IA})$$

Where: Q_x = flood discharge of recurrence interval *x* years in cfs
L = main channel length in miles
IA = impervious area in percent

In a few circumstances streams in urbanized areas resulted in discharge estimates less than those computed for rural areas with an equivalent drainage area. Also, some limited detailed streams contained drainage from basins outside those of physiographic regions of South Carolina. The flows for the following flooding sources were improved by weighted value methods described in USGS Water-Resources Investigations Report 02-4140 (USGS, 2002):

Cane Creek
Coneross Creek
Cornhouse Creek
Fall Creek
Little Cane Creek
Mill Creek 3 Tributary 1
Mill Creek 3 Tributary 2
Tugaloo River

Cane, Coneross, Cornhouse, Fall, and Little Cane Creek are weighted using the two South Carolina physiographic regions of Blue Ridge and Piedmont. Mill Creek 3 Tributary 1 and Tributary 2 incorporate the North Carolina Blue Ridge-Piedmont and the South Carolina Blue Ridge regions. Tugaloo River weighted flows include the South Carolina Blue Ridge and Piedmont physiographic regions, as well as Georgia Region 1 and 2, and also North Carolina Blue Ridge-Piedmont region.

Perkins Creek Tributary 1 is located in the vicinity of Seneca, which has significant urbanized neighborhoods. Using the urban regression equations indicated above, Perkins Creek Tributary 1 discharges were calculated which seemed inappropriately lower than those of the rural. Further research indicated flood-peak discharge regression equations for small urban basins correlating rural discharge estimates into urban flow volume (USGS, 2000). The equations used are:

$$U_{10} = 3.77*A^{0.536}*IA^{1.115}*Q_{10}^{0.291}$$
$$U_{50} = 7.76*A^{0.514}*IA^{0.987}*Q_{10}^{0.283}$$
$$U_{100} = 10.4*A^{0.506}*IA^{0.932}*Q_{10}^{0.28}$$
$$U_{500} = 18.8*A^{0.484}*IA^{0.800}*Q_{10}^{0.281}$$

Where: U_x = flood discharge of recurrence interval *x* years in cfs
A = drainage area in square miles
IA = impervious area in percent
Q_x = rural equivalent peak discharge in cfs

All streams studied by approximate methods used the rural equations. For Chattooga River, weighted discharge estimates were calculated using USGS rural regression equations from Georgia Region 1 and North Carolina Blue Ridge-Piedmont physiographic regions.

The flood-pool elevation of Lake Hartwell, Lake Keowee, and Lake Jocassee are regulated at a design capacity of 665 feet, 800 feet, and 1,110 feet msl respectively. These reservoirs have been mapped based on these measurements.

The [TBD], countywide FIS, is the first-time watershed wide hydrologic analyses for Seneca Watershed have been conducted; there are no existing watershed-wide hydrologic analyses available. However, for counties within this Watershed Study, covered by the current scope, countywide and precountywide hydrologic analyses exist. In the September 29, 2011, FIS for Anderson County, South Carolina and

Incorporated Areas (FEMA, 2011), the discharges were determined using rural and urban regression equations developed by the USGS, rainfall runoff models (HEC-1 and HEC-723-X6-L2350) and records from USGS stream gages. In the September 11, 2009, FIS for Oconee County, South Carolina and Incorporated Areas (FEMA, 2009), discharges were determined using rural and urban regression equations developed by the USGS and records from USGS stream gages. In April 16, 2008, FIS for Pickens County, South Carolina and Incorporated Areas (FEMA, 2008), discharges were determined using rural and urban regression equations developed by the USGS, rainfall runoff models (HEC-1 and HEC-723-X6-L2350) and records from USGS stream gages.

Discharges for the 10-, 2-, 1-, and 0.2-percent annual chance recurrence intervals for all streams studied by detailed and limited detailed methods were determined using USGS regression analyses. The calculations used the most recent edition of equations for both rural (USGS, 2009) and urban (USGS, 2004) streams.

The rural regression equations used in this study are presented below.

Magnitude and Frequency of Rural Floods in the Southeastern United States, 2006: Volume 3, South Carolina

$$Q_{50\%} = 10^{[0.0220(PCT_1)+0.0204(PCT_2)+0.0141(PCT_3)+0.0178(PCT_4)+0.0196(PCT_5)]} DA^{[0.649+0.00130(PCT_2)+0.00109(PCT_3)]} \quad (7)$$

$$Q_{20\%} = 10^{[0.0247(PCT_1)+0.0232(PCT_2)+0.0165(PCT_3)+0.0209(PCT_4)+0.0230(PCT_5)]} DA^{[0.627+0.00122(PCT_2)+0.00117(PCT_3)]} \quad (8)$$

$$Q_{10\%} = 10^{[0.0260(PCT_1)+0.0246(PCT_2)+0.0177(PCT_3)+0.0224(PCT_4)+0.0247(PCT_5)]} DA^{[0.617+0.00119(PCT_2)+0.00123(PCT_3)]} \quad (9)$$

$$Q_{4\%} = 10^{[0.0273(PCT_1)+0.0260(PCT_2)+0.0189(PCT_3)+0.0239(PCT_4)+0.0265(PCT_5)]} DA^{[0.606+0.00118(PCT_2)+0.00130(PCT_3)]} \quad (10)$$

$$Q_{2\%} = 10^{[0.0282(PCT_1)+0.0268(PCT_2)+0.0196(PCT_3)+0.0249(PCT_4)+0.0276(PCT_5)]} DA^{[0.600+0.00118(PCT_2)+0.00135(PCT_3)]} \quad (11)$$

$$Q_{1\%} = 10^{[0.0289(PCT_1)+0.0276(PCT_2)+0.0202(PCT_3)+0.0258(PCT_4)+0.0286(PCT_5)]} DA^{[0.594+0.00119(PCT_2)+0.00139(PCT_3)]} \quad (12)$$

$$Q_{0.5\%} = 10^{[0.0295(PCT_1)+0.0282(PCT_2)+0.0208(PCT_3)+0.0265(PCT_4)+0.0295(PCT_5)]} DA^{[0.589+0.00120(PCT_2)+0.00144(PCT_3)]} \quad (13)$$

$$Q_{0.2\%} = 10^{[0.0303(PCT_1)+0.0290(PCT_2)+0.0214(PCT_3)+0.0274(PCT_4)+0.0306(PCT_5)]} DA^{[0.583+0.00121(PCT_2)+0.00149(PCT_3)]} \quad (14)$$

Where:

$Q_{50\%}$, $Q_{20\%}$, . . .,$Q_{0.2\%}$ are the flows for floods with percent chance of exceedance of 50 percent, 20 percent, . . . , and 0.2 percent, in cubic feet per second;

PCT1, PCT2, PCT3, PCT4, and PCT5 are the basin percentages in hydrologic regions 1(Piedmont), 2(Blue Ridge), 3(Sand hills), 4(Coastal), and 5(Undefined) in percent; and DA is the drainage area, in square miles.

South Carolina's urban regression equations were used for basins that had more than 10 percent impervious area. These alternative USGS urban regression equations are valid for basins with a main channel length from 0.51 mile to 11.2 miles and impervious area from 10 to 40 percent. The equations used are shown below.

Urban flood recurrence interval (years)	Alternative urban regional regression equation
2	$41.6L^{1.47}\ 10^{0.0213IA}$
5	$58.8L^{1.50}\ 10^{0.0198IA}$
10	$69.9L^{1.51}\ 10^{0.0192IA}$
25	$82.3L^{1.53}\ 10^{0.0187IA}$
50	$90.3L^{1.55}\ 10^{0.0185IA}$
100	$97.2L^{1.56}\ 10^{0.0185IA}$
200	$103L^{1.58}\ 10^{0.0185IA}$
500	$111L^{1.60}\ 10^{0.0187IA}$

Where:

L = main channel length (miles) and IA = impervious area (percent)

For Little River, peak-flow data is available from 1967-2011 at the gage station 02185200 near Walhalla, SC, with contributing drainage area of 72 square miles. A gage analysis was performed at this location for the basins upstream and downstream of the gage as per Bulletin 17B guidelines (WRC, 1981).

Peak discharge-drainage area relationships for Oconee County are shown in Table 2, "Summary of Discharges" on the following page.

Table 2 – Summary of Discharges

		Peak Discharges (cfs)			
Flooding Source and Location	Drainage Area (Square Miles)	10 % Annual Chance	2 % Annual Chance	1 % Annual Chance	0.2 % Annual Chance
PERKINS CREEK TRIBUTARY 1					
About 1,690 feet downstream of Cross Creek Drive	4.60	750	1,203	1,436	2,036
About 3,270 feet upstream of Cross Creek Drive	4.14	695	1,118	1,337	1,900
About 2,950 feet downstream of Wells Highway	3.49	614	992	1,189	1,697

Table 2 – Summary of Discharges (continued)

Flooding Source and Location	Drainage Area (Square Miles)	Peak Discharges (cfs) 10 % Annual Chance	2 % Annual Chance	1 % Annual Chance	0.2 % Annual Chance
PERKINS CREEK TRIBUTARY 1 (continued)					
About 610 feet upstream of Wells Highways	2.08	421	693	835	1,207
About 800 feet downstream of Perkins Creek Road	1.42	320	533	644	940
About 400 feet upstream of East Perkins Creek Road	0.68	188	320	391	581
About 480 feet downstream of Hawk Boulevard	0.14	61	109	136	209

Stream gages are also used in the process of hydrological analysis. Oconee County has a limited number of active stations. The studied creeks and rivers in this study do not have adequate location coverage for individual flood frequency analysis. The available stations (USGS, 2006) are listed below in Table 3, "USGS Gaging Stations."

Table 3 – USGS Gaging Stations

Gage Station No.	Location	Drainage Area (square miles)	Period of Record
02177000	Chattooga River Near Clayton Georgia	207	1939-Present
02184500	Whitewater River Near Jocassee	47.3	1951-1968
02185000	Keowee River Near Jocassee	148	1950-1968
02185200	Little River Near Walhalla	72.0	1967-2003
02185500	Keowee River Near Newry	455	1939-1961
02186645	Coneross Creek Near Seneca South Carolina	65.4	1989-2003

Compiled data from these and numerous other stations on similar watershed basins were applied to formulate the USGS regression equations used to calculate peak discharge flows. USGS gaging stations and methodology are described in USGS Scientific Investigations Report 2004-5030 and USGS Water-Resources Investigations Report 02-4140 (USGS, 2002 and 2004).

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of flooding from the sources studied were carried out to provide estimates of the elevations of 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 or in the Floodway Data tables in the FIS report. Flood elevations shown on the FIRM are primarily intended for flood insurance rating purposes. For construction and/or floodplain management purposes, users are encouraged to use the flood elevation data presented in this FIS in conjunction with the data shown on the FIRM.

Flood Profiles (Exhibit 1) were drawn showing the water-surface elevations for the selected recurrence interval events for all flooding sources studied by detailed methods. Locations of selected cross-sections used in the hydraulic analyses are shown on the flood profiles. For stream segments for which a floodway was computed (Section 4.2), selected cross-section locations are also shown on the FIRM (Exhibit 2).

The hydraulic analyses for this study were based on unobstructed flow. The flood elevations shown on the Flood Profiles (Exhibit 1) are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

For the September 11, 2009, countywide FIS, the hydraulic model used to compute water-surface elevations of the selected recurrence interval floods was HEC-RAS, version 3.1.2 (USACE, 2004).

Starting conditions for the hydraulic models were set to normal depth using starting slopes calculated from stream invert elevation values taken from the Light Detection and Ranging (LIDAR) data, or where applicable derived from the water-surface elevations of existing effective flood elevations.

Cross section geographic data for streams in the study area were also obtained from the LIDAR elevation data.

For all flooding sources studied by detailed and limited detailed methods, field surveys were conducted to obtain elevation data and structural geometry for all bridges, dams and culverts, to model conveyance, and compute the significant backwater effects of such structures (USACE, 2002 [a, b, and c]).

The [TBD], countywide FIS, is the first-time watershed-wide hydraulic analyses for Seneca Watershed have been conducted; there are no existing watershed-wide hydraulic analyses available. However, for counties within this Watershed Study covered by current scope of study, countywide and pre-countywide hydraulic analyses exist. Anderson County, South Carolina and Incorporated Areas FIS (FEMA, 2011), Oconee County, South Carolina and Incorporated Areas FIS (FEMA, 2009) and Pickens County, South Carolina and Incorporated FIS (FEMA, 2008) are available for reference.

Cross section geometries were obtained from Light Detection and Ranging (LiDAR) data provided by SCDNR and field surveyed for Enhanced Study streams. For Six and Twenty Creek and West Twenty Six Mile Creek, all structure openings were field measured.

For streams studied by limited detailed methods the water surface elevations for the 1- percent annual chance flood events were computed using USACE Hydrologic Engineering Center's (HEC) computer program, River Analysis System (HEC-RAS), version 4.1 (USACE, 2010). The hydraulic models were developed using recently acquired LiDAR land data, field measurements of hydraulic structure information, and updated hydrologic data.

Starting conditions for the hydraulic models were set to normal depth using starting slopes calculated from energy slope, or derived from the water surface elevations of existing effective hydraulic models.

Roughness coefficients (Manning's "n") used in the hydraulic computations for Perkins Creek Tributary 1 were based on field observations. For the streams studied by limited detail methods, roughness coefficients (Manning's "n") were chosen based on field survey photos and aerial imagery. The channel and overbank "n" values for the streams studied by detailed and limited detailed methods are shown in Table 4, "Manning's "n" Values."

Table 4 – Manning's "n" Values

Stream	Channel "n"	Overbank "n"
Detailed Study Stream		
Perkins Creek Tributary 1	0.050 – 0.055	0.070 – 0.150
Limited Detail Study Streams		
Cheohee Creek	0.045 – 0.05	0.1 – 0.14
Knox Creek	0.04 – 0.045	0.1 – 0.14
Little River	0.035 – 0.045	0.1 – 0.145
Oconee Creek	0.045 – 0.05	0.1 – 0.145
Perkins Creek	0.045	0.1 – 0.14
Tamassee Creek	0.045 – 0.05	0.1 – 0.14
West Fork Townes Creek	0.043 – 0.045	0.1 – 0.145

3.3 Vertical Datum

All FIS reports and FIRMs 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. Until recently, the standard vertical datum in use for newly created or revised FIS reports and FIRMs was the National Geodetic Vertical Datum of 1929 (NGVD29). With the finalization of the North American Vertical Datum of 1988 (NAVD88), many FIS reports and FIRMs are being prepared using NAVD as the referenced vertical datum.

Flood elevations shown in this FIS report and on the FIRM are referenced to the NAVD. These flood elevations must be compared to structure and ground elevations referenced to the same vertical datum. Some of the data used in this revision were taken from the prior FIRMs and adjusted to NAVD 88. The datum conversion factor from NGVD29 to NAVD88 in Oconee County is -0.120 feet.

It is important to note that adjacent counties may be referenced to NGVD29. This may result in differences in BFEs across county lines.

For supplementary information regarding conversion between the NGVD and NAVD, visit the National Geodetic Survey website at www.ngs.noaa.gov, or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS 12
National Geodetic Survey
SSMC-3 #9202
1315 East-West Highway
Silver Spring, Maryland 20910
(301) 713-3242

Temporary vertical monuments 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, they may be found in the Technical Support Data Notebook associated with the FIS report and FIRM for this community. Interested individuals may contact FEMA to access these data.

To obtain current elevation, description, and/or location information for benchmarks shown on this map, please contact the Information Services Branch of the NGS at (301) 713-3242, or visit their website at www.ngs.noaa.gov.

4.0 FLOODPLAIN MANAGEMENT APPLICATIONS

The NFIP encourages State and local governments to adopt sound floodplain management programs. To assist in this endeavor each FIS provides 1- percent-annual-chance floodplain data, which may include a combination of the following: 10-, 2-, 1-, and 0.2-percent annual chance flood elevations; delineations of the 1- and 0.2- percent annual chance floodplains; and a 1- percent annual chance floodway. This information is presented on the FIRM and in many components of the FIS report, including Flood Profiles, and Floodway Data tables. Users should reference the data presented in the FIS report as well as additional information that may be available at the local community map repository before making flood elevation and/or floodplain boundary determinations.

4.1 Floodplain Boundaries

To provide a national standard without regional discrimination, the 1- percent-annual-chance flood has been adopted by FEMA as the base flood for floodplain management purposes. The 0.2- percent annual chance flood is employed to indicate additional areas of flood risk in the community. For each stream studied by detailed methods, the 1- and 0.2-percent annual chance floodplain boundaries have been delineated using the flood elevations determined at each cross section.

For the [TBD], countywide FIS, LiDAR was provided by SCDNR and was used to develop the Digital Terrain Model for the hydraulic analysis and floodplain mapping for the study streams. The LiDAR was collected for SCDNR in 2011 (SCDNR, 2013). The data is available from SCDNR LiDAR Data Products website at:
http://www.dnr.sc.gov/GIS/lidar.html.

For the September 29, 2011, countywide FIS, for each stream studied by detailed methods, the 1- and 0.2- percent annual chance floodplain boundaries have been delineated using the flood elevations determined at each cross section. Between cross sections, the boundaries were interpolated using LIDAR generated DEM set at 50’ x 50’ grid size.

The 1- and 0.2- percent annual chance floodplain boundaries are shown on the FIRM (Exhibit 2). On this map, the 1- percent annual chance floodplain boundary corresponds to the boundary of areas of special flood hazards (Zones A and AE), and the 0.2- percent annual chance floodplain boundary corresponds to the boundary of areas of moderate flood hazards. In circumstances where the 1- and 0.2- percent annual chance floodplain boundaries are close together, only the 1- percent annual chance floodplain boundary has been shown. Small areas within the floodplain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data.

For the streams studied by approximate methods, only the 1- percent annual chance floodplain boundary is shown on the FIRM (Exhibit 2).

4.2 Floodways

Encroachment on floodplains, such as 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, a floodway is used as a tool to assist local communities in this aspect of floodplain management. Under this concept, the area of the 1- percent annual chance 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-percent annual chance flood can be carried without substantial increases in flood heights. Minimum Federal standards limit such increases to 1 foot, provided that hazardous velocities are not produced. The floodways in this study are presented to local agencies as minimum standards that can be adopted directly or that can be used as a basis for additional floodway studies.

The floodways presented in this study 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 in Table 5, “Floodway Data”. In cases where the floodway and 1-percent-annual-chance floodplain boundaries are either close together or collinear, only the floodway boundary is shown.

Encroachment into areas subject to inundation by floodwaters having hazardous velocities aggravates the risk of flood damage and heightens potential flood hazards by further increasing velocities. A listing of stream velocities at selected cross-sections is provided in Table 5, “Floodway Data”. To reduce the risk of property damage in areas where the stream velocities are high, the community may wish to restrict development in areas outside the floodway.

Along streams where floodways have not been computed, the community must ensure that the cumulative effect of development in the floodplains will not cause more than a 1.0-foot increase in the BFEs at any point within the community.

The area between the floodway and 1- percent annual chance floodplain boundaries is termed the floodway fringe. The floodway fringe encompasses the portion of the floodplain that could be completely obstructed without increasing the water-surface elevation (WSEL) of the base flood more than 1 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to floodplain development are shown in Figure 1, “Floodway Schematic”.

For limited detailed studied streams, BFE computations have been compiled in Table 6, “Limited Detailed Base Flood Elevation Data”. No floodways were computed for streams studied by limited detailed methods.

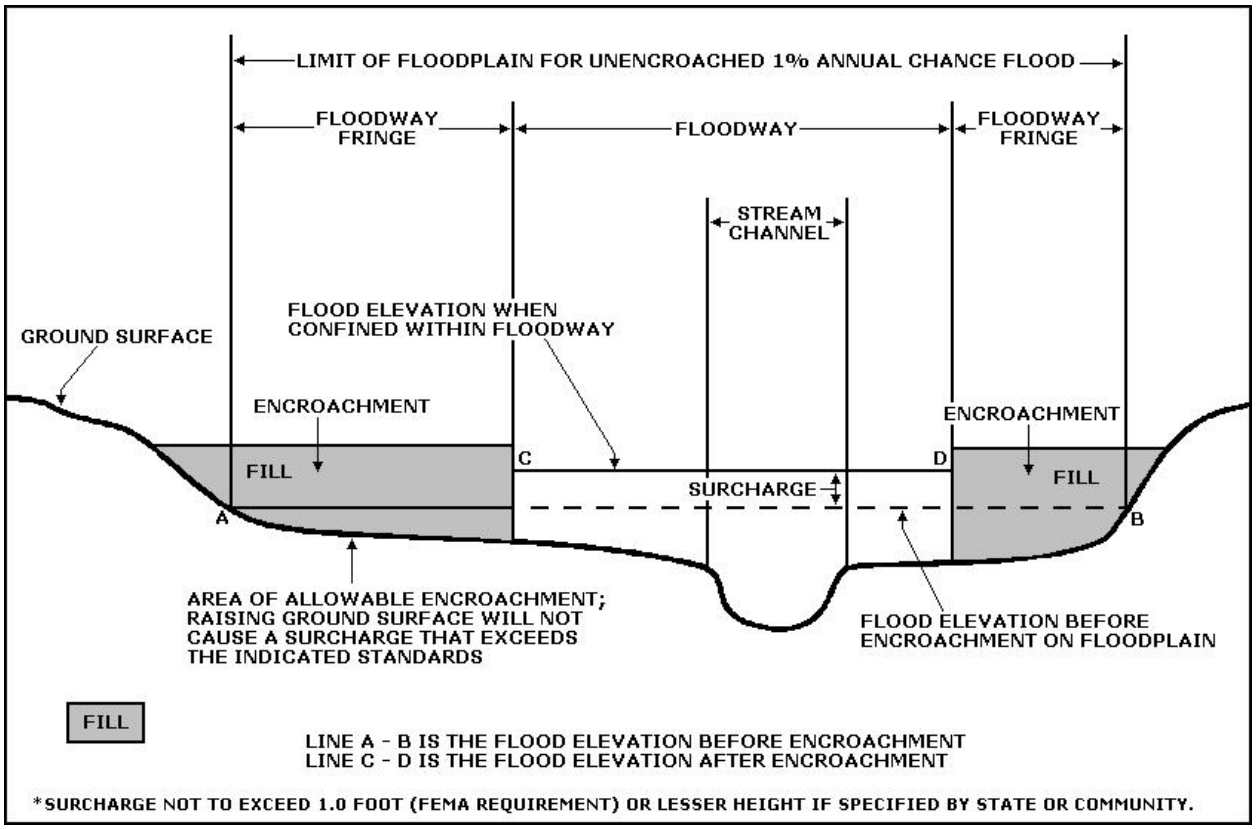

Figure 1 – Floodway Schematic

TABLE 6—Limited Detailed Flood Hazard Data

Cross Section[1]	Stream Station[2]	Flood Discharge (cfs)	1% Annual Chance Water-Surface Elevation (feet NAVD 88)
CHEOHEE CREEK			
001	57	5,726	1015.6
005	532	5,726	1016.5
012	1,213	5,726	1017.3
018	1,768	4,900	1018.0
025	2,483	4,648	1018.8
027	2,734	4,648	1019.1
034	3,359	4,643	1021.0
038	3,762	4,643	1022.3
044	4,371	4,643	1023.1
051	5,091	4,643	1024.1
060	5,986	4,643	1024.9
070	7,029	4,643	1027.2
076	7,648	4,643	1030.1
079	7,913	4,643	1030.6
086	8,559	4,643	1032.1
092	9,200	4,408	1033.7
098	9,775	4,408	1035.0
102	10,212	4,408	1036.3
108	10,758	4,408	1038.4
113	11,317	4,408	1040.0
122	12,215	4,408	1040.9
133	13,252	2,551	1041.2
138	13,780	2,551	1041.5
147	14,656	2,551	1042.7
154	15,385	2,551	1044.5
160	15,998	2,521	1046.3
168	16,779	2,521	1047.0
175	17,477	2,521	1048.2
182	18,220	2,521	1050.0
190	18,972	2,521	1052.5
195	19,508	2,521	1053.5
203	20,315	2,521	1057.8
210	21,007	2,521	1059.6
216	21,568	2,521	1061.7
222	22,170	2,521	1063.0
231	23,109	2,307	1069.0
239	23,935	2,140	1070.1
243	24,326	2,140	1072.2
250	25,024	2,140	1076.9
256	25,644	2,140	1079.6
261	26,087	2,140	1081.2
267	26,749	2,140	1083.4

[1] This table reflects all modeled cross sections. Some cross sections shown in this table may not appear on map.

[2] Feet above mouth.

TABLE 6—Limited Detailed Flood Hazard Data

Cross Section[1]	Stream Station[2]	Flood Discharge (cfs)	1% Annual Chance Water-Surface Elevation (feet NAVD 88)
CHEOHEE CREEK (continued)			
273	27,273	2,140	1086.1
279	27,856	2,140	1089.5
285	28,498	2,140	1093.9
292	29,164	2,140	1098.8
297	29,695	2,140	1103.8
305	30,524	1,938	1112.5
312	31,229	1,938	1120.9
318	31,770	1,938	1129.4

[1] This table reflects all modeled cross sections. Some cross sections shown in this table may not appear on map.

[2] Feet above mouth.

TABLE 6—Limited Detailed Flood Hazard Data

Cross Section[1]	Stream Station[2]	Flood Discharge (cfs)	1% Annual Chance Water-Surface Elevation (feet NAVD 88)
KNOX CREEK			
007	692	2,893	1041.0[3]
015	1,455	2,893	1041.0[3]
021	2,123	2,874	1049.1
029	2,915	2,874	1081.2
035	3,533	2,874	1081.2
047	4,692	2,874	1081.2
057	5,673	2,874	1081.2
072	7,184	2,874	1081.2
084	8,402	3,871	1081.3
091	9,108	3,871	1081.3
098	9,821	1,332	1084.7
102	10,242	1,332	1085.5
108	10,807	1,332	1087.8
113	11,248	1,332	1090.3
122	12,159	1,332	1096.0
130	13,003	1,332	1101.6

[1] This table reflects all modeled cross sections. Some cross sections shown in this table may not appear on map.

[2] Feet above mouth.

[3] Elevation includes backwater effects.

TABLE 6—Limited Detailed Flood Hazard Data

Cross Section[1]	Stream Station[2]	Flood Discharge (cfs)	1% Annual Chance Water-Surface Elevation (feet NAVD 88)
LITTLE RIVER			
013	1,326	13,750	800.3
022	2,168	13,750	800.9
028	2,824	13,750	801.6
037	3,735	13,750	805.9
043	4,306	13,750	806.8
050	5,027	13,750	807.2
064	6,361	13,750	807.6
073	7,328	13,715	807.8
084	8,375	13,715	808.5
094	9,396	13,715	808.8
103	10,254	13,715	809.9
110	11,036	13,715	810.0
123	12,341	13,715	810.7
132	13,161	13,715	811.5
138	13,752	13,715	812.1
145	14,547	13,715	812.5
155	15,525	13,715	813.1
159	15,934	13,715	815.0
166	16,573	13,715	821.0
176	17,564	13,663	824.4
185	18,465	13,663	826.8
193	19,263	13,496	833.0
201	20,151	10,437	838.9
208	20,820	10,437	841.2
216	21,587	10,437	841.8
222	22,182	10,437	842.8
227	22,695	10,437	845.0
235	23,521	10,437	847.1
244	24,360	10,356	849.7
249	24,901	10,356	850.3
262	26,184	10,356	854.8
270	26,974	10,356	858.0
281	28,059	10,356	860.6
286	28,561	10,356	861.9
303	30,305	10,356	866.6
306	30,629	10,356	866.7
311	31,078	4,776	869.4
321	32,115	4,776	870.8
332	33,215	4,776	873.8
340	33,992	4,776	875.7
347	34,660	4,776	878.3
357	35,673	4,776	881.6

[1] This table reflects all modeled cross sections. Some cross sections shown in this table may not appear on map.
[2] Feet above mouth.

TABLE 6—Limited Detailed Flood Hazard Data

Cross Section[1]	Stream Station[2]	Flood Discharge (cfs)	1% Annual Chance Water-Surface Elevation (feet NAVD 88)
LITTLE RIVER (continued)			
362	36,234	4,776	883.2
368	36,820	4,776	885.2
375	37,528	4,776	887.8
381	38,118	4,776	889.1
387	38,689	4,776	890.7
392	39,219	4,776	891.6
397	39,732	4,776	892.9
404	40,441	4,776	894.5
409	40,885	4,776	895.0
418	41,768	4,582	897.8
423	42,278	4,582	898.4
428	42,795	4,582	899.8
434	43,377	4,582	901.8
441	44,119	4,582	903.6
452	45,191	4,582	905.8
459	45,853	4,500	907.1
469	46,886	4,500	910.7
478	47,816	4,500	913.0
490	48,966	4,500	914.2
498	49,821	4,500	915.1
507	50,733	4,500	916.7
513	51,273	4,500	918.8
520	51,957	4,500	921.8
527	52,663	4,500	924.0
534	53,430	4,500	931.1
541	54,120	4,500	932.8
550	54,962	4,500	935.2
557	55,717	4,500	937.5
566	56,555	4,275	940.9
573	57,316	4,275	941.9
583	58,263	4,275	943.8
590	58,991	4,275	945.5
599	59,913	4,275	948.0
606	60,649	4,275	949.5
615	61,467	4,275	951.9
625	62,528	4,275	954.7
633	63,307	4,275	957.5
639	63,928	4,275	963.2
645	64,525	4,147	965.3
655	65,518	4,147	966.6
662	66,249	4,147	967.7
670	66,958	4,147	969.3

[1] This table reflects all modeled cross sections. Some cross sections shown in this table may not appear on map.

[2] Feet above mouth.

TABLE 6—Limited Detailed Flood Hazard Data

Cross Section[1]	Stream Station[2]	Flood Discharge (cfs)	1% Annual Chance Water-Surface Elevation (feet NAVD 88)
LITTLE RIVER (continued)			
677	67,676	4,147	970.7
688	68,762	3,884	973.0
695	69,453	3,884	974.0
703	70,279	3,153	977.1
714	71,365	3,148	979.7
722	72,235	3,148	979.9
732	73,196	3,148	980.0
745	74,486	3,148	980.9
754	75,381	2,659	981.4
762	76,237	2,659	982.5
773	77,269	2,659	985.4

[1] This table reflects all modeled cross sections. Some cross sections shown in this table may not appear on map.

[2] Feet above mouth.

TABLE 6—Limited Detailed Flood Hazard Data

Cross Section[1]	Stream Station[2]	Flood Discharge (cfs)	1% Annual Chance Water-Surface Elevation (feet NAVD 88)
OCONEE CREEK			
006	565	4,003	838.2
011	1,089	4,003	841.2
019	1,926	4,003	843.1
026	2,602	3,992	846.7
039	3,880	3,992	847.5
046	4,634	3,992	849.2
053	5,340	3,992	853.0
062	6,198	3,992	856.0
068	6,815	3,992	859.5
071	7,123	3,992	860.1
080	7,960	3,992	863.1
085	8,511	3,992	864.7
093	9,331	3,992	867.5
100	9,971	3,992	869.7
101	10,135	3,992	869.8
104	10,362	3,992	870.2
105	10,541	3,992	870.9
108	10,825	3,992	871.7
110	11,050	3,992	871.9
120	12,040	3,992	874.9
125	12,456	3,992	876.1
129	12,938	3,992	877.4
137	13,695	3,783	879.1
145	14,501	3,783	882.0
153	15,316	3,783	884.8
162	16,206	3,783	887.8
169	16,943	3,783	890.0
175	17,516	3,783	891.9
185	18,477	3,783	895.0
195	19,492	3,783	897.9
206	20,600	3,783	901.0
217	21,696	3,783	903.9
224	22,363	3,500	906.3
234	23,360	3,500	917.6
242	24,249	3,500	920.4
251	25,124	3,500	921.3
259	25,892	3,500	921.8
267	26,669	3,500	923.3
274	27,401	3,500	924.2
280	28,029	3,500	926.0
286	28,601	3,109	927.7
296	29,572	3,109	930.8

[1] This table reflects all modeled cross sections. Some cross sections shown in this table may not appear on map.
[2] Feet above mouth.

TABLE 6—Limited Detailed Flood Hazard Data

Cross Section[1]	Stream Station[2]	Flood Discharge (cfs)	1% Annual Chance Water-Surface Elevation (feet NAVD 88)
OCONEE CREEK (continued)			
301	30,091	3,109	935.1
307	30,728	3,109	936.5
315	31,469	3,109	951.5
323	32,268	3,109	965.5
329	32,875	3,077	972.8
337	33,691	3,077	973.8
343	34,321	3,077	975.7
348	34,814	3,077	977.1
357	35,655	3,077	978.9
362	36,183	3,077	980.4
368	36,752	3,077	981.5
378	37,818	3,077	983.5
384	38,411	3,077	985.1
394	39,419	3,077	986.3
404	40,361	3,077	987.5
412	41,181	3,077	988.6
419	41,908	2,615	990.1
430	42,973	2,615	991.8
438	43,776	2,615	992.9
443	44,301	2,615	994.6
451	45,132	2,615	996.7
460	45,974	2,072	998.1
470	46,958	2,072	999.6
478	47,753	2,012	1001.5
483	48,329	2,012	1003.1
491	49,051	2,012	1004.8
496	49,601	2,012	1006.1
502	50,174	2,012	1007.5

[1] This table reflects all modeled cross sections. Some cross sections shown in this table may not appear on map.
[2] Feet above mouth.

TABLE 6—Limited Detailed Flood Hazard Data

Cross Section[1]	Stream Station[2]	Flood Discharge (cfs)	1% Annual Chance Water-Surface Elevation (feet NAVD 88)
PERKINS CREEK			
012	1,189	1,138	745.0
017	1,664	1,138	751.9
022	2,234	1,138	754.8
027	2,726	1,138	756.2
031	3,111	1,138	758.6
035	3,501	1,138	760.2
038	3,800	1,138	761.6
045	4,477	912	766.3
050	4,997	912	768.6
054	5,404	912	770.4
058	5,760	912	772.2
068	6,752	912	777.3
075	7,470	912	781.0
082	8,198	912	785.0
087	8,733	684	788.8
092	9,220	684	792.4
096	9,631	684	795.9
101	10,068	684	798.8
103	10,271	684	799.3
109	10,931	546	809.7
114	11,397	546	809.8
119	11,926	546	814.1
124	12,438	546	815.6
132	13,205	546	822.6
137	13,726	546	830.6
141	14,106	546	834.6
145	14,470	546	847.0
148	14,839	546	856.2
153	15,339	546	865.5
157	15,656	546	869.5
160	15,955	546	877.6

[1] This table reflects all modeled cross sections. Some cross sections shown in this table may not appear on map.
[2] Feet above mouth.

TABLE 6—Limited Detailed Flood Hazard Data

Cross Section[1]	Stream Station[2]	Flood Discharge (cfs)	1% Annual Chance Water-Surface Elevation (feet NAVD 88)
TAMASSEE CREEK			
024	2,389	2,086	1017.8
030	3,001	2,086	1019.1
035	3,503	2,086	1020.6
045	4,453	2,086	1022.8
051	5,130	2,086	1024.4
055	5,506	2,086	1025.3
063	6,334	1,973	1029.2
070	7,037	1,812	1032.1
081	8,107	1,812	1036.7
092	9,160	1,812	1041.9
098	9,766	1,812	1044.0
107	10,708	1,754	1048.4
114	11,365	1,754	1054.0
124	12,445	1,754	1062.7

[1] This table reflects all modeled cross sections. Some cross sections shown in this table may not appear on map.
[2] Feet above mouth.

TABLE 6—Limited Detailed Flood Hazard Data

Cross Section[1]	Stream Station[2]	Flood Discharge (cfs)	1% Annual Chance Water-Surface Elevation (feet NAVD 88)
WEST FORK TOWNES CREEK			
010	1,000	1,596	1081.2[3]
025	2,500	1,596	1081.2[3]
033	3,349	1,579	1085.1
042	4,186	1,377	1093.1
050	4,969	1,377	1101.5

[1] This table reflects all modeled cross sections. Some cross sections shown in this
[2] Feet above mouth.
[3] Elevation includes backwater effects.

5.0 INSURANCE APPLICATIONS

For flood insurance rating purposes, flood insurance zone designations are assigned to a community based on the results of the engineering analyses. These zones are as follows:

Zone A

Zone A is the flood insurance rate zone that corresponds to the 1- percent annual chance floodplains that are determined in the FIS report by approximate methods. Because detailed hydraulic analyses are not performed for such areas, no BFEs or depths are shown within this zone.

Zone AE

Zone AE is the flood insurance rate zone that corresponds to the 1- percent annual chance floodplains that are determined in the FIS report by detailed methods. Whole-foot BFEs derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone X

Zone X is the flood insurance rate zone that corresponds to areas outside the 0.2- percent-annual-chance floodplain, areas within the 0.2- percent-annual-chance floodplain, areas of 1-percent annual chance flooding where average depths are less than 1 foot, areas of 1- percent annual chance flooding where the contributing drainage area is less than 1 square mile, and areas protected from the 1- percent annual chance flood by levees. No BFEs or depths are shown within this zone.

6.0 FLOOD INSURANCE RATE MAP

The FIRM is designed for flood insurance and floodplain management applications.

For flood insurance applications, the map designates flood insurance rate zones as described in Section 5.0 and, in the 1- percent 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.

For floodplain management applications, the map shows by tints, screens, and symbols, the 1- and 0.2- percent annual chance floodplains, floodways, and the locations of selected cross sections used in the hydraulic analyses and floodway computations.

The countywide FIRM presents flooding information for the entire geographic area of Oconee County. Historical data relating to the precountywide maps prepared for each community are presented in Table 7, “Community Map History”.

COMMUNITY NAME	INITIAL IDENTIFICATION	FLOOD HAZARD BOUNDARY MAP REVISIONS DATE	FIRM EFFECTIVE DATE	FIRM REVISIONS DATE
Oconee County (Unincorporated Areas)	November 25, 1977	None	September 1, 1987	
Salem, Town of	November 8, 1974	None	N/A	
Seneca, City of	June 14, 1974	April 2, 1976	December 16, 1977	
Walhalla, City of	June 28, 1974	June 4, 1976	June 17, 1986	
Westminster, City of*	N/A	N/A	N/A	
West Union, Town of*	N/A	N/A	N/A	

*This community does not have a map history prior to the first countywide mapping

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

OCONEE COUNTY, SC AND INCORPORATED AREAS

COMMUNITY MAP HISTORY

7.0 OTHER STUDIES

Information pertaining to revised and unrevised flood hazards for each jurisdiction within Oconee County has been compiled into this FIS. Therefore, this FIS supersedes all previously printed FIS reports and FIRMs for all of the incorporated and unincorporated jurisdictions within Oconee County and should be considered authoritative for the purposes of the NFIP.

The [TBD], countywide FIS, is a part of the larger Seneca Watershed study covering flooding sources in Anderson, Oconee and Pickens Counties, South Carolina. Additional materials related to the entire Seneca Watershed study may be obtained by accessing the Technical Data Support Notebook.

8.0 LOCATION OF DATA

Information concerning the pertinent data used in the preparation of this FIS can be obtained by contacting FEMA, Mitigation Division, Koger Center – Rutgers Building, 3003 Chamblee Tucker Road, Atlanta, Georgia 30341.

9.0 BIBLIOGRAPHY AND REFERENCES

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