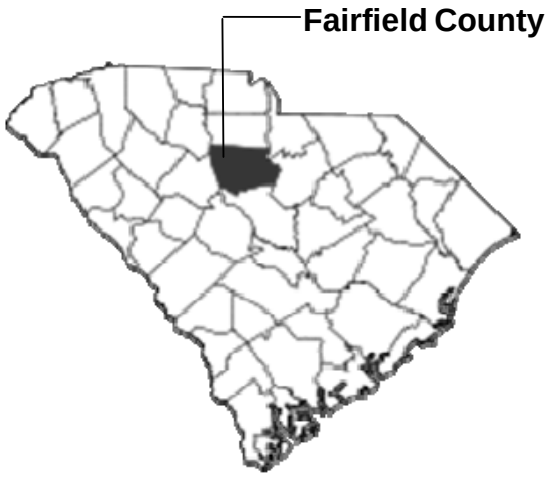
FLOOD INSURANCE STUDY

FAIRFIELD COUNTY, SOUTH CAROLINA
AND INCORPORATED AREAS

Community Name	Community Number
BLYTHEWOOD, TOWN OF	450258
FAIRFIELD COUNTY (UNINCORPORATED AREAS)	450075
RIDGEWAY, TOWN OF*	450293
WINNSBORO, TOWN OF	450292

*No Special Flood Hazard Areas Identified



This Preliminary FIS report does not include Limited Detailed Base Flood Elevation data as they were not revised as part of this study. The unrevised Limited Detailed Base Flood Elevation Data will appear in the final FIS report.

REVISED:

REVISED PRELIMINARY
JULY 15, 2016

Federal Emergency Management Agency

FLOOD INSURANCE STUDY NUMBER
45039CV000B

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

Initial Countywide FIS Effective Date: May 3, 2011

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 does not include Limited Detailed Base Flood Elevation Data as they were not revised as part of this study. The unrevised Limited Detailed Base Flood Elevation Data will appear in the final FIS report.

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FLOOD INSURANCE STUDY

FAIRFIELD 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 Fairfield County, including the Towns of Blythewood, Ridgeway and Winnsboro; and the unincorporated areas of Fairfield County (referred to collectively herein as Fairfield County), and 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.

Please note that the Town of Ridgeway does not have any mapped Special Flood Hazard Areas (SFHAs). This does not preclude future determinations of the SFHAs that might be necessitated by changed conditions affecting the community (ie. Annexation of new lands) or the availability of new scientific or technical data about flood hazards.

Please note that the Town of Blythewood is geographically located in Fairfield and Richland Counties. Only the portion of the Town of Blythewood located in Fairfield County is included in this FIS. Other information can be found in the Richland County, South Carolina FIS (FEMA, 2002).

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 FIS report are the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

The May 3, 2011, FIS was prepared to include all jurisdictions within Fairfield County into a countywide format FIS. Information on the authority and acknowledgements for each jurisdiction with a previously printed FIS report included in this countywide FIS is shown below.

Fairfield County Unincorporated Areas

The hydrologic and hydraulic analyses for the FIS report for the unincorporated areas of Fairfield County were performed by the Charleston District of the U.S. Army Corps of Engineers (USACE) for the Federal Emergency Management Agency (FEMA) under Interagency Agreement No. (IAA)-H-9 79 Project Order No. 29. Field surveys and mapping for that study were performed by Landmark Engineering Company, Inc. (mapping and control), and Moorman and Little Inc., Engineers and Surveyors (cross-section surveys), under supervision of the USACE. Hydrographic surveys in Wateree Lake were performed by the USACE (FEMA, 1982).

The hydrologic and hydraulic analyses for the May 3, 2011, countywide study were performed by Watershed Concepts, a part of AECOM Water, for FEMA, under Contract No. SCDNR MAS 07.09. This study was completed in September 2009.

For the [TBD], countywide FIS, the hydrologic and hydraulic analyses were prepared by AECOM for the State of South Carolina, Department of Natural Resources (SCDNR) under Mapping Activity Statement FY10.17. This work is a part of the larger Wateree Watershed study and is based on the Discovery Report for Wateree Watershed dated December 20, 2012 (FEMA, 2012). 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 Fairfield County, the 1-percent annual chance floodplain boundary for Lake Wateree was updated using more-to-date topographic information. This work was completed in March 2015.

Additionally, for the [TBD], countywide FIS, revised hydrologic and hydraulic analyses, and revised floodplain mapping for an approximately 21.5 mile stretch of the Catawba-Wateree river system extending from the Lake Wateree Dam in Kershaw County upstream to Rocky Creek Lake Dam near the Fairfield/Chester county boundaries were included. This work was completed in support of Letter of Map Revision (LOMR), case number 15-04-5896P, February 1, 2016.

Base map information shown on the Flood Insurance Rate Map (FIRM) was provided in digital format by Fairfield 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.

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 Officer's (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 then held with the same representatives to review the results of the study.

Streams requiring detailed study for the Fairfield County Unincorporated Areas FIS report were identified at a meeting attended by representatives of the USACE, FEMA, and Fairfield County in November 1978. The Duke Power Company and various State, Federal, and local agencies were contacted to obtain existing data and previously published flood information. Results of the hydraulic analyses were coordinated with the U.S. Geological Survey (USGS).

On August 20, 1981, the results of that study were reviewed at the final meeting attended by representatives of the USACE, FEMA, and county officials. The study was acceptable to the county.

For the May 3, 2011, countywide FIS the initial CCO meeting was held on May 1, 2008, and attended by representatives of AECOM Watershed Concepts, community officials, and SCDNR.

The results of the study were reviewed at the final CCO meeting held on March 3, 2010, and attended by representatives of AECOM Watershed Concepts, community officials, and SCDNR. All problems raised at that meeting have been addressed in this study.

For the [TBD], countywide FIS, an initial Discovery meeting for the Wateree Watershed study was held on April 5, 2011, and attended by representatives from Kershaw, Lancaster, Lee, Sumter Counties; as well as representatives from FEMA, SCDNR, USGS, and the study contractors. The Discovery Report, Wateree Watershed, 03050104, dated December 20, 2012, describes and summarizes the Discovery tasks that were conducted for the Wateree Watershed and forms the basis for this countywide FIS revision.

The results of the [TBD], countywide FIS were reviewed at the final CCO meeting, referred to as the Preliminary DFIRM Community Coordination (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 Fairfield County, South Carolina and includes part of the Wateree Watershed, Hydrologic Unit Code 03050104.

The Wateree Watershed is located in central-northern South Carolina and covers portions of Fairfield, Lancaster, Lee, Kershaw, Richland and Sumter Counties. The southern section of the watershed is approximately 80 miles away from the Atlantic Ocean and the north portion is approximately 90 miles southeast of the Blue Ridge Mountains in North Carolina. The ground elevation ranges between 650 feet and 150 feet within the watershed (FEMA, 2012).

The Wateree River, the main stem of the Wateree Watershed, is a continuation of the Catawba River. The headwaters originate in the Blue Ridge Mountains in North Carolina. The name changes from Catawba to Wateree at Lake Wateree, which is formed by the hydroloelectric dam located in Kershaw County. The Wateree River generally flows southward joining the Congaree River to form the Santee River located about 35 miles southeast of the City of Columbia. The watershed drains 1,256 square miles with a total of 482.3 stream miles within the watershed. Fairfield County, the Wateree Watershed covers the northeastern portion of the county. The Wateree Watershed encompasses approximately 269 sq.mi. (approximately 21.4 percent) of Fairfield County (FEMA, 2012).

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

The streams studied by detailed methods are presented in Table 1, "Streams Studied by Detailed Methods."

Table 1: Streams Studied by Detailed Methods

Flooding Source	Reach Length (miles)	Study Area
Wateree Lake (Wateree River / Catawba River)	16.2	From the downstream limit of the Fairfield/Kershaw county boundary to Rocky Creek Lake Dam

For the May 3, 2011, countywide FIS, 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 Chester County. A summary of limits studied in limited detail is shown in Table 2, "Limited Detail Study Scope."

Table 2: Limited Detail Study Scope

Flooding Source	Reach Length (miles)	Study Area
McCulley Creek	1.2	From Approximately 4.0 miles upstream of its confluence with Horse Creek to approximately 0.11 mile downstream of
Sand Creek	3.3	From approximately 2.8 miles upstream of its confluence with Jackson Creek to approximately 0.04 mile downstream of US
Sand Creek Tributary 10	0.7	From its confluence with Sand Creek to approximately 0.7 mile upstream of its confluence with Sand Creek

Table 2: Limited Detail Study Scope – continued

Flooding Source	Reach Length (miles)	Study Area
Sand Creek Tributary 11	0.9	From its confluence with Sand Creek to approximately 0.28 mile upstream of US Highway 321

For the May 3, 2011, countywide FIS, numerous streams were studied by approximate methods. 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, Fairfield County, and AECOM Watershed Concepts.

The May 3, 2011, mapping for Fairfield County, South Carolina, and incorporated areas was prepared using digital data. Previously published FIRM and Flood Boundary and Floodway Map data produced manually have been converted to vector digital data by a digitizing process.

For the [TBD], countywide FIS, revised hydrologic and hydraulic analyses and floodplain mapping for Wateree Lake were updated as part of LOMR 15-04-5896P, February 1, 2016.

2.2 Community Description

Fairfield County is located in the north central portion of South Carolina, approximately 20 miles north of the City of Columbia, South Carolina. Fairfield County is bordered by Chester County to the north; Lancaster County to the northeast; Kershaw County to the east; Richland County to the south; Newberry County to the west; and Union County to the northwest. The county encompasses an area of 711 square miles which includes 23 square miles of water.

The climate of Fairfield County is humid subtropical. The Appalachian Mountains to the west block many cold air masses arriving from the northwest, making the winters somewhat milder. The mountains also cause the areas leeward of the mountains to experience slightly higher temperatures and decreased precipitation compared to surrounding areas. Average daytime temperatures in the Town of Winnsboro range from a maximum of 90.8 degrees Fahrenheit (°F) in July to a minimum of 32.5 °F in January.

The annual average rainfall is 45.14 inches. Rainfall is fairly evenly distributed in South Carolina throughout the year with slight maxima occurring in March and July and minima occurring in May and November. Average seasonal snowfall in the Town of Winnsboro is 1.5 inches (South Carolina State Climatology Office, 2009).

Fairfield County is located in the Piedmont Region of South Carolina. Soils in Fairfield County are generally well drained to moderately well drained in upland areas and poorly drained in low areas and depressions. In the river and creek bottoms, soils generally consist of alluvial sands and silts blanketed with finer (clay) soils with local deposits of sands and gravels.

In 2007 manufacturing was the largest of 20 major economic sectors in Fairfield County. The population of Fairfield County at the 2010 U.S. Census was estimated to be 23,956 (U.S. Census Bureau, 2010[a]). This represents a growth in the overall population of Fairfield County of 2.1 percent from the 2000 U.S. Census. The population for the county grew by 17.3 percent in the last three decades of the 1900s.

Fairfield County is served by the Norfolk Southern railroad and by Interstate 77, U.S. Highways 21 and 321, and State Highways 21, 34, 41, 200, 213, 215, 269, and 901.

The Town of Winnsboro, located in the central portion, is the county seat of Fairfield County. The population of the Town of Winnsboro at the 2010 U.S. Census was estimated to be 3,550 (U.S. Census Bureau, 2010[b]). The census designated place of Winnsboro Mills is located south of Winnsboro and is the next largest community, with an estimate population at the 2010 U.S. Census of 1,898 (U.S. Census Bureau, 2010[b]). Fairfield County also includes the Town of Ridgeway (population 319) (U.S. Census Bureau, 2010[b]).

Fairfield County lies between the Broad River and the Catawba River and Wateree Lake. The Broad River makes up the western boundary of the county while the Catawba River and Wateree Lake make up the northeastern boundary. The Broad River arises in the Blue Ridge Mountains of North Carolina, flowing approximately 150 miles southward into South Carolina to join the Saluda River in forming the Congaree River. The Catawba River originates in the same area of western North Carolina and flows easterly for about 80 miles, then southeasterly for about 120 miles to the confluence with Big Wateree Creek in Fairfield County. After its confluence with Big Wateree Creek in Wateree Lake, the Catawba River is called the Wateree River, which flows southerly for 93 miles into the Congaree River. The Congaree River is tributary to the Santee River, which enters the Atlantic Ocean at Charleston, South Carolina.

The western half of Fairfield County lies within the basin of the Broad River. West of State Highway 18 and 215, the basin includes the small tributary streams of Beaver Creek, Rocky Creek, Terrible Creek and the Monticello Reservoir. The Monticello Reservoir was built on Frees Creek to provide water for the Summer Nuclear Generating Station and discharges directly into Parr Reservoir on the Broad River. The area between State Highways 18 and 215 and U.S. 321 contains the Little River and its tributary streams, West Fork Little River, East Fork Mobley Creek, Dumpers Creek, Jackson Creek, Mill Creek, and Morris Creek. Little Cedar Creek originates near Winnsboro Mills and flows southward into Richland County to join the Broad River.

The eastern half of Fairfield County lies within the Catawba-Wateree basin. Wateree Dam, located about 7 miles upstream from the City of Camden in Kershaw County, forms Wateree Lake. The lake is approximately 13 miles long, with the upper 8 mile reach (detailed study reach) forming the northeastern boundary of Fairfield County. The drainage area of Wateree River at Wateree Dam is 4,750 square miles.

The major tributaries to Wateree Lake in Fairfield County are Big Wateree Creek; Little Wateree Creek with its tributaries Beaver Dam Fork Creek, Ready Creek, and McCulley Creek; Dutchmans Creek; Rochelle Creek; Colonel Creek; and Sawneys Creek, which enters the lake in Kershaw County.

2.3 Principal Flood Problems

October 6, 2015, Major Disaster Declaration (FEMA-4241-DR) for the State of South, including Fairfield County, after an unprecedented rain event set rainfall records across the state and flooded entire towns. For some locations, the rainfall was historic and qualified as a 1,000-year rain event, resulting in deadly and disastrous flooding with damages that could top $1 billion (Beam and Kinnard, 2015). Rainfall was severe enough to close a 75-mile stretch of Interstate 95 between Interstates 20 and 26. Flooding from this event was pervasive throughout Fairfield County, creating accessibility problems for first responders to many areas in the county.

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 was one flood event impacting Fairfield County resulting in property damages of $10,510. No additional details regarding this event were available in the HMP (The State of South Carolina, 2013). There were no additional flooding issues identified for Fairfield County in the Hazard Mitigation Plan for the Central Midlands Region of South Carolina.

As complied from the previous FIS reports, the past history of flooding on Catawba River and Wateree Lake indicates that floods may occur during any season of the year but are more likely to occur from June through November as a result of tropical cyclones.

Flood data for Wateree River at Camden, South Carolina, has been collected and published by the USGS and the National Weather Service. According to the 1979 USGS Water Data Report for South Carolina (USGS, 1978), maximum discharge for the period of record 1904-1910, 1929-1978 was 366,000 cubic feet per second (cfs) on August 26, 1908. The publication lists the July 1916 flood (400,000 cfs) as the largest known event of that time. Since both of these events occurred before any of the Duke Power dams were constructed, the discharges cannot be directly related to frequency of occurrence under present conditions. However, the frequency analyses based on actual and fabricated records covering the period 1892 to 1978 show the approximate recurrence intervals for the 1908 and 1916 events to be 0.7-percent and 0.5-percent annual chance respectively. If these floods occurred under existing conditions the discharges at Wateree Lake and Camden would probably be lower because of flood storage in upstream reservoirs.

Lake stage records furnished by Duke Power Company show lake elevations reaching 234 and 235 feet above the National Geodetic Vertical Datum of 1929 (NGVD29), 233 and 234 feet above the North American Vertical Datum 1988 (NAVD88), in 1928 and 1929, respectively. Since 1930, the records indicate no lake elevations over 231 feet (NAVD88); however, from 1930 to 1978 lake elevations exceeded 229 feet (NAVD88) at least 14 times (Duke Power Company, Date Unknown[a]).

Flood problems in Fairfield County have typically been limited to occasional damages to structures located along the shore of Wateree Lake. Lakeshore development consists mostly of weekend cabins and mobile homes with a few permanent homes and commercial structures. Damages at lake elevations below elevation 229 feet (NAVD88) are mostly limited to boat docks and storage structures. The majority of the living units

are located between elevation 229 and 239 feet (NAVD88). The 1-percent annual chance flood elevation for Wateree Lake varies from 238 feet (NAVD88) at the dam to 241 feet (NAVD88) at the upstream study limits. There are approximately 1130 structures within the 1-percent annual chance flood plain of Wateree Lake; about 920 of these are in Fairfield County.

The October 13, 1994, storm caused widespread flooding across South Carolina, with eight million dollars of property damage and substantial crop damage (National Oceanic and Atmospheric Administration [NOAA], 2009). On August 26, 2008, flooding of streams including Wateree Creek 11 miles east of Winnsboro caused flooding of secondary roads and five thousand dollars in property damage (NOAA, 2009).

2.4 Flood Protection Measures

There are presently no planned or completed projects specifically designed to reduce flooding on the Wateree River. However, there are nine Duke Power Company hydropower dams in the Catawba-Wateree basin above the study area. These dams are operated for hydropower generation and are subject to regulations prescribed by the Federal Energy Regulatory Commission. During periods of flooding, hydropower dams are generally operated in a manner designed to spill as little water as possible without endangering the structure or making releases which exceed maximum inflow discharges. If lake levels happen to be low at the time a flood occurs, some of the flood water may be stored, resulting in reduced flooding downstream. Incidental flood control benefits are more likely to occur during the spring and winter when reservoirs are normally drawn down anticipating heavy rainfall. If a major flood occurred during the summer or early fall when water levels are at or above normal pool elevations, very little attenuation would occur.

No other flood protection measures are known to exist within the study area.

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 is 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 and the information regarding the methods used is shown below.

During the May 3, 2011, countywide analyses discharge-frequency relationships were computed on streams studied by limited detailed methods using methods described in a USGS Scientific Investigations report published in 2009 (USGS, 2009).

For the [TBD], countywide FIS, hydrologic analysis was performed in support of LOMR, 15-04-5896P, February 1, 2016 (ESP Associates, P.A., 2015). The hydrologic model is based on gage analysis using USGS stream gage Catawba River at Rock Hill (02146000) developed as part of a 2014 study of the Catawaba River in North Carolina. The peak flows at USGS stream gage 02146000 were transposed downstream using the transposition formation provided in the 2014 Catawba River Study (State of North Carolina, 2014). The hydrologic discharges used were based on regional regression equations.

Peak discharge-drainage area relationships for streams studied by detailed methods are shown in Table 3, "Summary of Discharges."

Table 3: Summary of Discharges

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) Percent Annual Chance			
		10-percent	2-percent	1-percent	0.2-percent
WATEREE LAKE (WATEREE RIVER/CATAWBA RIVER)					
Approximately 1 mile upstream of Kershaw/Lancaster county boundary	4,400	65,000	106,600	128,200	189,800

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 cautioned to use the flood elevation data presented in this FIS in conjunction with the data shown on the FIRM.

Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles (Exhibit 1). 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.

Cross sections for streams studied in detail and were surveyed in the field at appropriate intervals. All bridges and culverts were surveyed to obtain elevation data and structural geometry on both detailed and limited detailed streams. Cross sections across Wateree Lake were obtained by conducting hydrographic surveys. Structural data on Wateree Dam was furnished by Duke Power Company (Duke Power Company, Date Unknown[b]).

For the [TBD], countywide FIS, all model cross section geometry was updated based on Light Detection and Ranging (LiDAR) derived digital elevation models. Channel geometry was verified and/or adjusted by blending information from the effective hydraulic models, LiDAR, and aerial imagery. The spillway information was updated based on Duke Energy documents, LiDAR, and aerial imagery, but is similar to what is the previous model. Flow from the power turbines was accounted for using a gate rating curve in the in-line weir using data provided by Duke Energy, Federal Energy Regulatory Commission documents, and stakeholders knowledge on lake operations.

Water-surface elevations were computed using the USACE HEC, Riverine Analysis System (HEC-RAS) software, version 4.1. Ground elevation information used in the model was based on LiDAR base data supplemented with information from the effective FISs for channel/lake invert elevations. Information related to hydraulic parameters and coefficients (ie. hydraulic roughness, weir coefficients, etc.) was based on aerial base data, information from the effective FISs, and information from Duke Energy documents (ESP Associates, P.A., 2015).

Channel roughness factors (Manning's “n” values) used in the hydraulic computations were chosen by engineering judgment after field reconnaissance of the watershed. Channel and over bank “n” values for the streams studied by detailed methods are shown in Table 4, “Summary of Roughness Coefficients.”

Table 4: Summary of Roughness Coefficients

Flooding Source	Roughness Coefficients	
	Channel	Overbanks
Wateree Lake (Wateree River/Catawaba River)	0.04-0.06	0.07-0.10

During the May 3, 2011, countywide analysis the hydraulic model used to compute water-surface elevations of the selected recurrence intervals on the streams studied by limited detailed methods was the USACE HEC, software, HEC-RAS, version 3.1.2

(USACE, 2004).

Starting conditions for the limited detail hydraulic models were set to normal depth using starting slopes calculated from stream invert elevation values. These values were taken from the LIDAR data, or where applicable, from 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.

Channel roughness factors used for the limited detail streams were chosen by engineering judgment. Channel and over bank "n" values for these streams are shown in Table 5, "Summary of Roughness Coefficients for Limited Detail Streams."

During the May 3, 2011, countywide analysis the hydraulic model used to compute water-surface elevations of the selected recurrence intervals on the streams studied by limited detailed methods was the USACE computer program, HEC-RAS, version 3.1.2 (USACE, 2014).

Starting conditions for the limited detail hydraulic models were set to normal depth using starting slopes calculated from stream invert elevation values. These values were taken from the LIDAR data, or where applicable, from water- surface elevations of existing effective flood elevations.

Channel roughness factors used for the limited detail streams were chosen by engineering judgment. Channel and over bank "n" values for these streams are shown in Table 5, "Summary of Roughness Coefficients for Limited Detail Streams."

There was no new hydraulic analyses performed for the [TBD], countywide FIS.

Table 5: Summary of Roughness Coefficients for Limited Detail Streams

Flooding Source	Roughness Coefficients	
	Channel	Overbanks
McCulley Creek	0.04	0.045–0.15
Sand Creek	0.035–0.04	0.035–0.15
Sand Creek Tributary 10	0.04	0.12–0.15
Sand Creek Tributary 11	0.04	0.05–0.15

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 used for newly created or revised FIS reports and FIRMs was NGVD29. With the completion of the NAVD88, many FIS reports and FIRMs are now prepared using NAVD88 as the referenced vertical datum.

Flood elevations shown in this FIS report and on the FIRM are referenced to the NAVD88. 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 effective FIS reports and FIRMs and adjusted to NAVD88. The datum conversion factor from NGVD29 to NAVD88 in Fairfield County is negative 0.744 feet.

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 Web site 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 report 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, Floodway Data tables, and Summary of Stillwater Elevation 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 10-foot Digital Elevation Model (DEM) for the floodplain mapping for Wateree Lake. The 10-foot DEMs were mosaicked for the entire Wateree Watershed and were resampled to a 30-foot cell size to obtain manageable DEM size for processing with ESRI's ArcHydro software. For Fairfield County, the LiDAR was collected for SCDNR by Furgro EarthData, Inc. in January and February 2008 (SCDNR, 2013). The data is available from SCDNR LiDAR Data Products website at:

http://www.dnr.sc.gov/GIS/lidar.html

For all May 3, 2011, studied streams in Fairfield County, the floodplain boundaries were interpolated between cross sections using 2008 LiDAR information. Between cross sections, the boundaries were interpolated using topographic maps at a scale of 1:6,000 with contour interval of 4 feet (Fugro EarthData, Inc., 2008).

The 1- and 0.2-percent annual chance floodplain boundaries are shown on the FIRM. On this map, the 1-percent annual chance floodplain boundary corresponds to the boundary of the 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 cases 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.

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 base 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.

Along streams where a floodway has 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 BFE in any part within the county.

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.

No floodway has been calculated for Wateree River in Fairfield County.

For the 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. It should also be noted that a floodway was not computed for the detailed studied streams contained in this report.

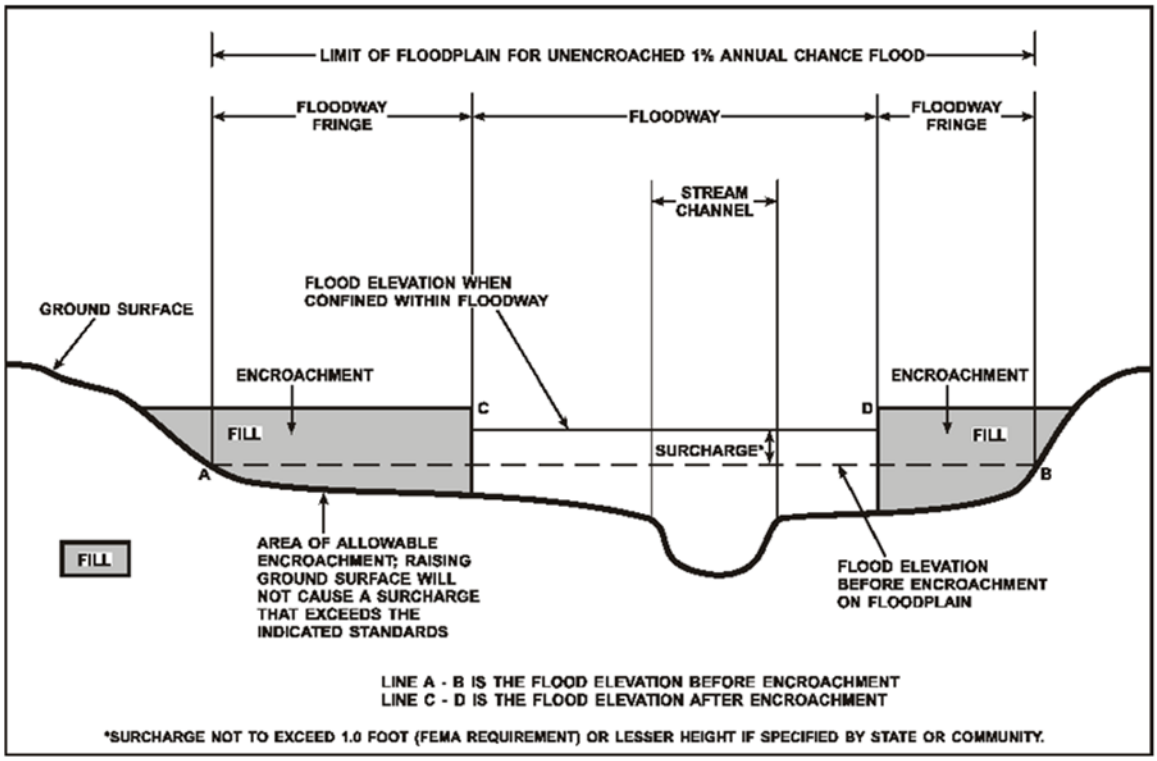

Figure 1: Floodway Schematic

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, 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 (sq. mi.), and areas protected from the base 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 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 Fairfield County. Historical data relating to the pre-countywide 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
Blythewood, Town of[1,3]	N/A	N/A	N/A	
Fairfield County (Unincorporated Areas)	November 25, 1977	None	July 19, 1982	
Ridgeway, Town of[2,3]	N/A	N/A	N/A	
Winnsboro, Town of[3]	N/A	N/A	N/A	

[1]Multi-county Community: dates for this community taken from the Richland County, South Carolina and Incorporated Areas
[2]No Special Flood Hazard Areas Identified
[3]This community did not have a map history prior to the first countywide mapping

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

FAIRFIELD COUNTY, SC AND INCORPORATED AREAS

COMMUNITY MAP HISTORY

7.0 OTHER STUDIES

A search and review of previously published reports and studies was conducted to determine if flood information generated for this report conflicts with previously published information. No other reports or studies containing flood elevation information were found. The previously mentioned Santee River Basin studies (USACE, 1975) performed by the USACE in 1975 contained rainfall-runoff model information that was used in this study.

The [TBD], countywide FIS, is a part of the larger Wateree Watershed study covering flooding sources in Fairfield, Kershaw, Lancaster, Richland and Sumter Counties, South Carolina. Additional materials related to the entire Wateree Watershed study may be obtained by accessing the Technical Support Data Notebook.

Information pertaining to revised and unrevised flood hazards for each jurisdiction within Kershaw 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 Fairfield County and should be considered authoritative for the purposes of the NFIP.

8.0 LOCATION OF DATA

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

9.0 BIBLIOGRAPHY AND REFERENCES

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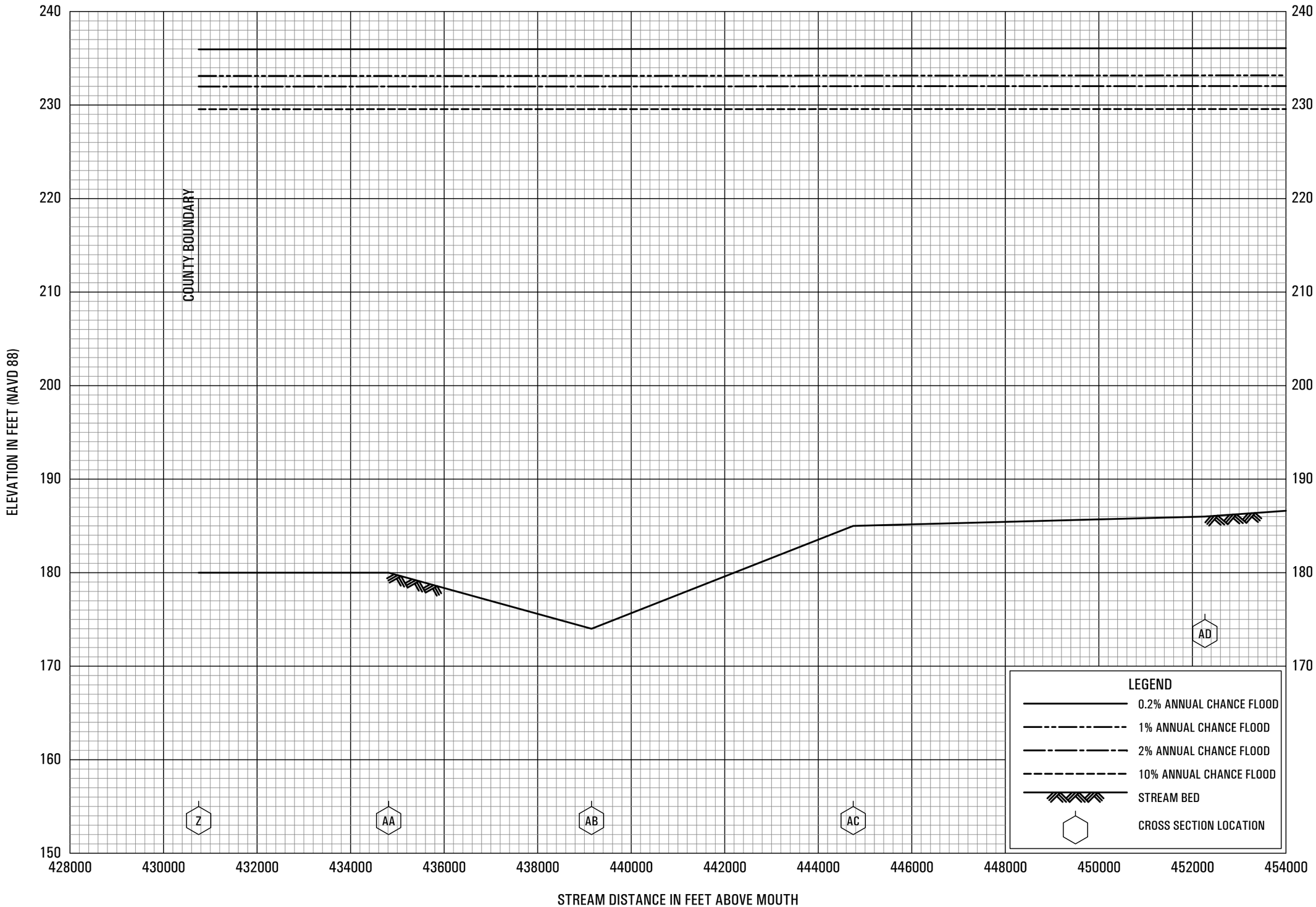

FLOOD PROFILES

WATEREE LAKE (WATEREE RIVER)

FEDERAL EMERGENCY MANAGEMENT AGENCY

FAIRFIELD COUNTY, SC

AND INCORPORATED AREAS

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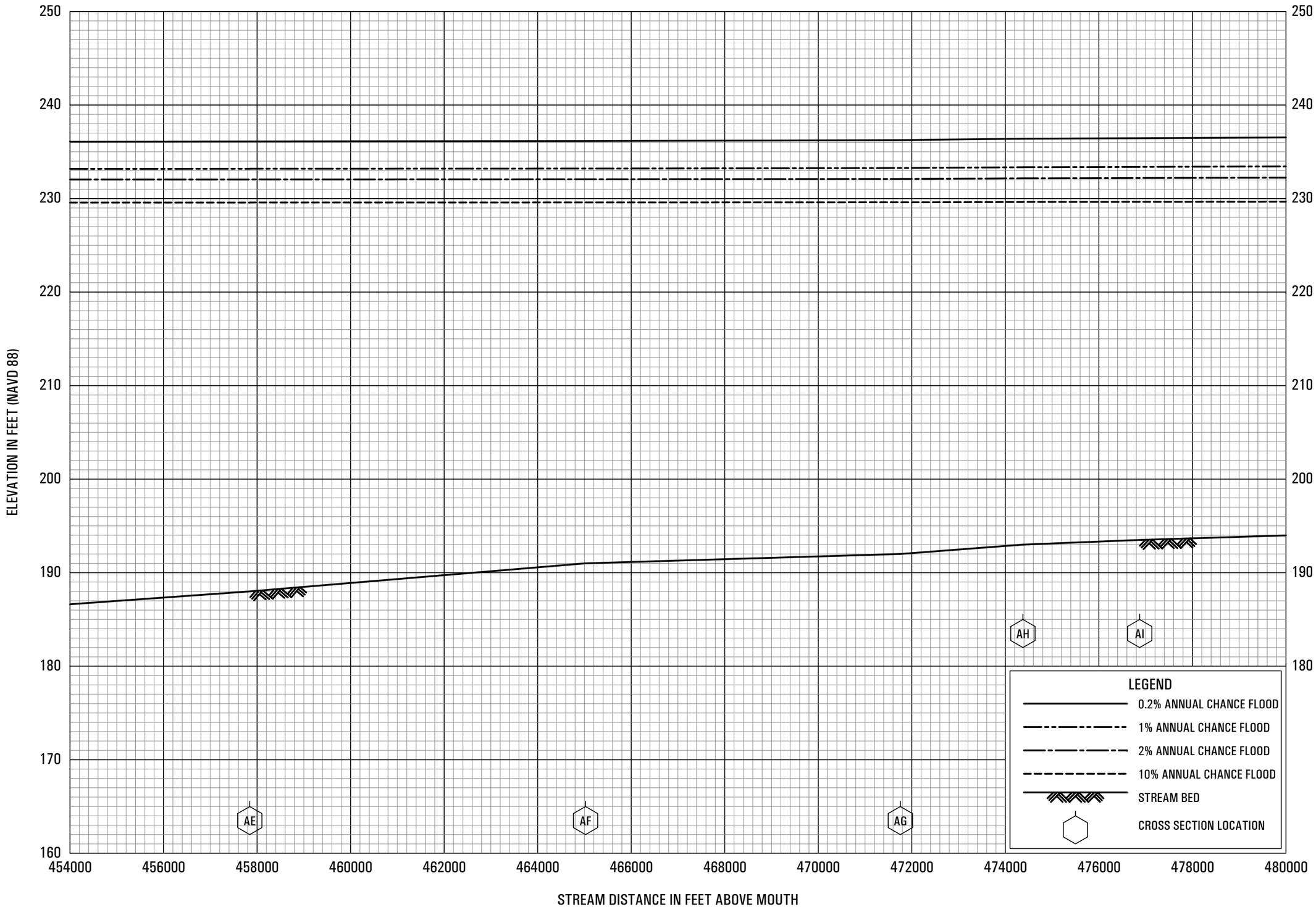

FLOOD PROFILES

WATEREE LAKE (WATEREE RIVER)

FEDERAL EMERGENCY MANAGEMENT AGENCY

FAIRFIELD COUNTY, SC

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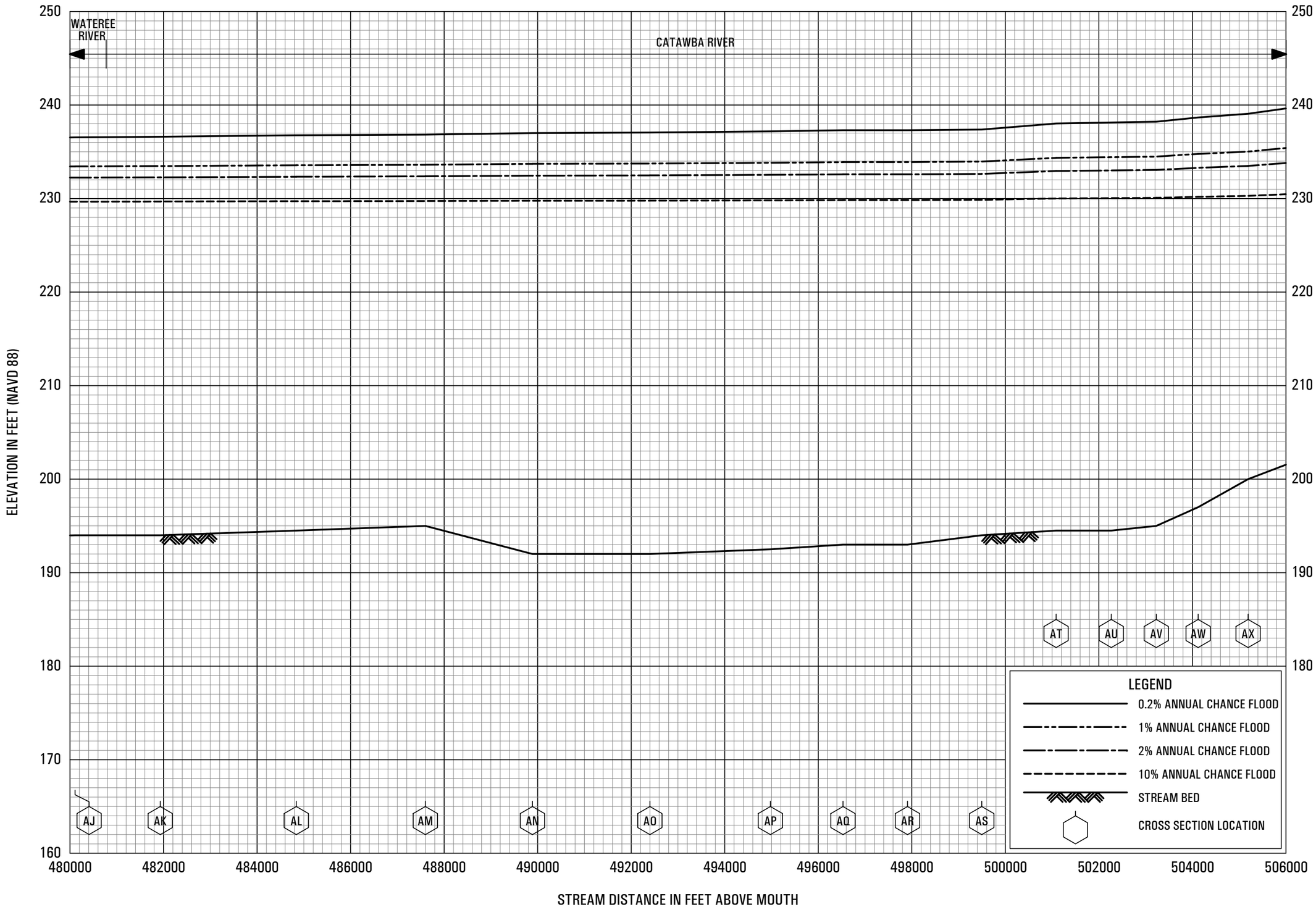

FLOOD PROFILES

WATEREE LAKE (CATAWBA RIVER)

FEDERAL EMERGENCY MANAGEMENT AGENCY

FAIRFIELD COUNTY, SC

AND INCORPORATED AREAS

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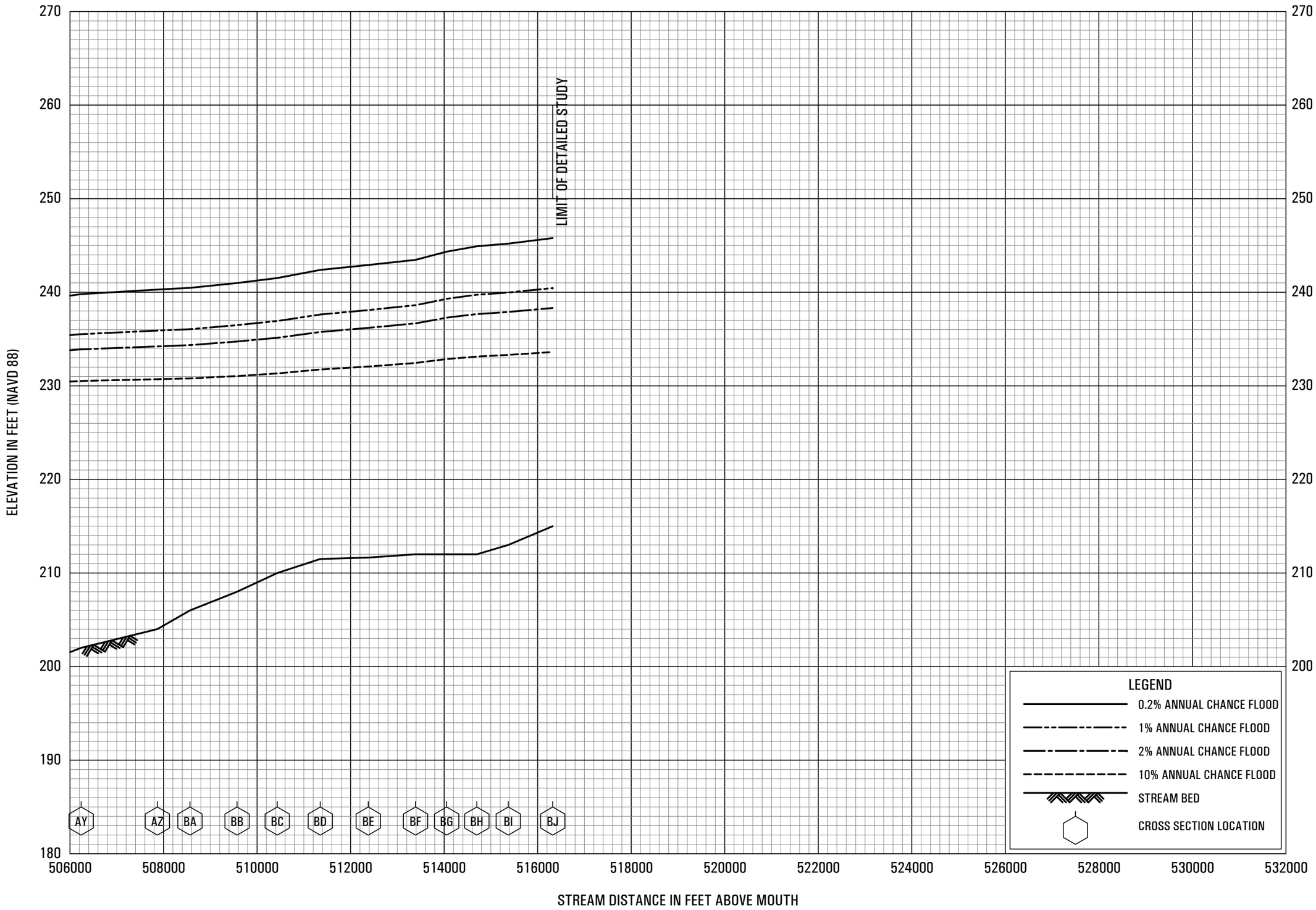

FLOOD PROFILES

WATEREE LAKE (CATAWBA RIVER)

FEDERAL EMERGENCY MANAGEMENT AGENCY

FAIRFIELD COUNTY, SC

AND INCORPORATED AREAS