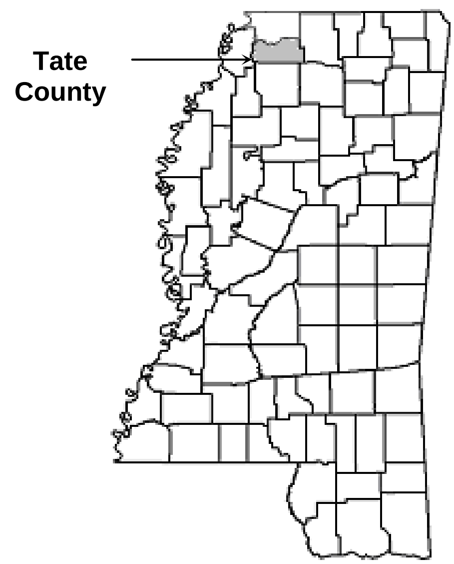
FLOOD INSURANCE STUDY

TATE COUNTY, MISSISSIPPI
AND INCORPORATED AREAS



COMMUNITY NAME	COMMUNITY NUMBER
COLDWATER, TOWN OF	280265
SENATOBIA, CITY OF	280171
TATE COUNTY (UNINCORPORATED AREAS)	280235

REVISED:

Federal Emergency Management Agency
FLOOD INSURANCE STUDY NUMBER
28137CV000B

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: January 2, 2009

Revised Countywide FIS Effective Date:

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FLOOD INSURANCE STUDY
TATE COUNTY, MISSISSIPPI AND INCORPORATED AREAS

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study (FIS) revises and supersedes the FIS reports and/or Flood Insurance Rate Maps (FIRMs) in the geographic area of Tate County, Mississippi, including the City of Senatobia, Town of Coldwater and the unincorporated areas of Tate County (hereinafter referred to collectively as Tate 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. This information will also be used by Tate County to update existing floodplain regulations as part of the Regular Phase of the National Flood Insurance Program (NFIP), and by local and regional planners to further promote sound land use and floodplain development. Minimum floodplain management requirements for participation in the 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 FIS report are the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

For the initial City of Senatobia FIS, the hydrologic and hydraulic analyses were performed by the U.S. Army Corps of Engineers (USACE), Vicksburg District, for the Federal Emergency Management Agency (FEMA) in May 1977 (U.S. Dept. of Housing and Urban Development, 1978) under Inter-Agency Agreement Nos. IAA-H-16-75 and IAA-H-7-76, and Project Order Nos. 20 and 1.

The hydrologic and hydraulic analyses for the January 2, 2009, countywide FIS were performed by the State of Mississippi for the FEMA, under Contract No. EMA-2003-GR-5370. This study was completed in March 2007.

The digital base map information files were provided by the State of Mississippi. This information was photogrammetrically compiled at a scale of 1:12000 from aerial photography dated September 2004.

The digital FIRM was produced using the Mississippi State Plane Coordinate System, West Zone, FIPSZONE 2302. The horizontal datum was the North American Datum of 1983, GRS 80 spheroid. Distance units were measured in U.S. feet.

1.3 Coordination

An initial Consultation Coordination Officer's (CCO) meeting is held with representatives from 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 held with representatives from FEMA, the community, and the study contractor to review the results of the study.

For the initial City of Senatobia FIS, a meeting was held on February 10, 1976, and attended by personnel of the USACE, Vicksburg District (the study contractor); Federal Insurance Administration; and the City of Senatobia. An intermediate coordination meeting was held on September 25, 1975, and was attended by representatives of the city, the Federal Insurance Administration, and the study contractor.

During the initial study, telephone conversations and visits were made with the City Engineer, local residents, National Weather Service, North Central Mississippi Planning and Economic Development District, U.S. Soil Conservation Service, and U.S. Geologic Survey. A final coordination meeting was held on August 15, 1977, to present the results of the study to local officials. Representatives from the study contractor, the Federal Insurance Administration, and the City of Senatobia attended the meeting. No changes or revisions were required as a result of this meeting.

For the January 2, 2009, countywide FIS, an initial Pre-Scoping Meeting was held on February 16, 2005. A Project Scoping Meeting was held on April 8, 2005. Attendees for these meetings included representatives from the Mississippi Department of Environmental Quality, Mississippi Emergency Management Agency, FEMA National Service Provider, Tate County, the City of Senatobia, Tate County Emergency Management Agency, the State, and the Study Contractor. 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. All problems raised in the meetings have been addressed.

2.0 AREA STUDIED

2.1 Scope of Study

This FIS covers the geographic area of Tate County, Mississippi.

For the March 1978, City of Senatobia FIS, the following flooding sources were studied by detailed methods: Senatobia Creek; Hickahala Creek Tributaries 1, 2, 2A, 3 and 3A; and Bonner Creek. The areas studied in detail were chosen with consideration given to all forecasted and proposed construction through 1982.

Several flooding sources within the county were studied by approximate methods. Approximate analyses are used to study those areas having a low developmental potential or minimal flood hazards. The scope and methods of study were proposed to, and agreed upon, by FEMA and the State of Mississippi.

For the January 2, 2009, countywide FIS revision, Table 1 lists the flooding sources incorporated from the June 4, 2007 DeSoto County, Mississippi FIS revision:

TABLE 1. STREAMS STUDIED BY DETAILED METHODS

Flooding Source	Limits of New Detailed Study
Arkabutla Reservoir	Entire shoreline within county.
Coldwater River	From a point approximately 5.6 miles upstream of Prichard Road to a point approximately 0.7 mile downstream of Arkabutla Reservoir dam; from a point approximately 4.2 miles upstream of Interstate 55 to the County Boundary.
Pigeon Roost Creek	From a point approximately 0.6 mile downstream of Pigeon Roost Road to a point approximately 400 feet downstream of Pigeon Roost Road.

Also, floodplain boundaries of stream that have been previously studied by detailed methods were redelineated based on best available topographic information (MARIS, 2004). These include: Senatobia Creek; Hickahala Creek Tributaries 1, 2, 2A, 3 and 3A; and Bonner Creek.

2.2 Community Description

Tate County is in northwest Mississippi and is bordered by DeSoto County, Mississippi, on the north; Marshall County, Mississippi, on the east; Panola County, Mississippi, and Lafayette County, Mississippi on the south; and Tunica County, Mississippi on the west. The county covers approximately 404 square miles, and has 2 strong municipalities. The county is served by Interstate Route 55, U.S. Highways 51 and 306, and State Highways 4 and 305. The county is also served by the Illinois Central Railroad.

The 2010 population of Tate County was reported to be 28,886 (U.S. Census Bureau, 2011).

The economy of Tate County is diverse with manufacturing, retail trade, and health care and social assistance being the largest industries (U.S. Census Bureau, 2011).

The topography of Tate County consists of rolling hills with large flat areas in creek and river bottoms. The climate of the county is generally mild and humid, with abundant rainfall that averages 55.52 inches annually (Mississippi State Climatologist, 2007). Temperatures range from monthly averages of 40 degrees Fahrenheit (°F) in January to 83°F in July (National Weather Service, 2007).

2.3 Principal Flood Problems

The principle flooding sources affecting Tate County are the Coldwater River (including Arkabutla Reservoir) and Senatobia Creek. Backwater flooding of low-lying areas is prevalent in the county due to low topographic relief. Flooding from Arkabutla Reservoir periodically affects the Town of Coldwater. Flooding effects from Senatobia and Hickahala Creeks are exacerbated by persistent beaver activity.

2.4 Flood Protection Measures

Arkabutla Reservoir, completed in 1943, is located on the Coldwater River in northern Tate County. The reservoir was built as part of the Yazoo Headwaters Project, aimed at reducing flood damage in the Yazoo River basin, and it is operated by the Vicksburg District of the U.S. Army Corps of Engineers. The reservoir greatly affects 1-percent annual chance discharges on the Coldwater River downstream, and controls much of the 1-percent annual flood elevations in the vicinity of the lake.

There are six small flood control reservoirs in southeastern Tate County built as part of the NRCS Greasy Creek Watershed Project. However, these are located outside the contributing drainage area of the study streams for this FIS.

3.0 ENGINEERING METHODS

For the flooding sources studied by detailed methods in the communities, 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.

March 1978, City of Senatobia FIS

For Senatobia Creek, floodflow-frequency data were based on statistical analysis of stage-discharge records, covering a 24-year period from 1943 to 1966, at the gaging station located at State Highway 4, approximately 3500 feet east of the corporate limits. The flow-frequency analysis was performed using standard log-Pearson Type III distribution techniques (U.S. Water Resources Council, 1976).

For all other streams studied in Senatobia, peak discharges for floods of 10-, 50-, and 100-year recurrence intervals were computed from synthetic unit hydrographs and rainfall information obtained from U.S. Weather Bureau Technical Paper No. 40, Rainfall Frequency Atlas of the United States (U.S. Department of Commerce, 1961). The synthetic unit hydrograph parameters were developed by a combination of Snyder's Method and U.S. Soil Conservation Service criteria outlined in the National Engineering Handbook (USDA, 1972). The base data for Snyder's Method were obtained from 35 years of record from the gaging station of Senatobia Creek in Senatobia and 23 years of record from the gaging station on Clear Creek at State Highway 6, 5 miles west of Oxford, Mississippi. The unit hydrographs were adjusted for urbanization by procedures developed by the U.S. Army Corps of Engineers and outlined in "Tulsa District Methods of Urban Hydrology" (USACE, 1990). Discharges for the 500-year floods of all streams, except Senatobia Creek, were computed from the synthetic unit hydrographs and the 500-year rainfall as determined by straight-line extrapolation of a single-log graph of rainfall amounts obtained for frequencies up to 100 years.

January 2, 2009, Tate County FIS

Peak discharges for Pigeon Roost Creek and Coldwater River upstream from Arkabutla Reservoir were taken from the report entitled "Hydrologic Analysis for the Coldwater River Watershed" (USACE, 1990). Peak discharges from this report were developed using the HEC-1 computer program. Peak discharges for Coldwater River downstream of Arkabutla Reservoir were developed from analysis of the Reservoir's state and discharge record.

A summary of the drainage area-peak discharge relationships for all the streams is shown in Table 2, "Summary of Discharges."

TABLE 2. SUMMARY OF DISCHARGES

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. mi.)	PEAK DISCHARGES (cfs)			
		10-percent	2-percent	1-percent	0.2-percent
SENATOBIA CREEK					
At State Highway 4	82.0	23,000	28,500	31,000	36,000

TABLE 2. SUMMARY OF DISCHARGES (Continued)

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. mi.)	PEAK DISCHARGES (cfs)			
		10-percent	2-percent	1-percent	0.2-percent
HICKAHALA CREEK TRIBUTARY 1					
At Cross Section A					
At Confluence With Unnamed Tributary	1.65	1,770	2,250	2,500	3,000
At Strayhorn Road	0.7	930	1,200	1,330	1,600
At Tate Street	0.3	580	750	840	1,000
	0.25	480	620	700	840
HICKAHALA CREEK TRIBUTARY 2					
At Quality Lane					
At West Street	0.60	830	1,080	1,200	1,430
	0.26	500	650	720	860
HICKAHALA CREEK TRIBUTARY 2A					
At Strayhorn Street					
	0.10	220	280	310	370
HICKAHALA CREEK TRIBUTARY 3					
At Norfleet Street					
At Heard Street	0.50	700	900	1,000	1,200
	0.21	400	520	580	690
HICKAHALA CREEK TRIBUTARY 3A					
At Main Street					
	0.08	150	200	230	270
BONNER CREEK					
At Mouth					
At Illinois Central Gulf Railroad	2.40	2,240	2,860	3,160	3,790
At U.S. Highway 51	1.65	1,680	2,150	2,400	2,870
	0.95	1,150	1,500	1,660	2,000
COLDWATER RIVER					
Below Arkabutla Reservoir					
At County Boundary	1000.9	*	*	17,292	*
	555.6	*	*	108,128	*
PIGEON ROOST CREEK					
At confluence with Red Banks Creek					
	223.1	43,000	63,500	74,500	97,000

*Data not available

Additional flood elevation data for selected recurrence intervals are shown in Table 3 – Summary of Stillwater Elevations.

TABLE 3. SUMMARY OF STILLWATER ELEVATIONS

	ELEVATION (NAVD 88)			
FLOODING SOURCE	10-percent	2-percent	1-percent	0.2-percent
Arkabutla Reservoir	*	*	244.6	*

*Data Not Available

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 table 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 report in conjunction with the data shown on the FIRM.

March 1978, City of Senatobia, FIS Analyses

Cross sections for the backwater analyses were field surveyed and located at close intervals above and below bridges and culverts in order to compute the significant backwater effects of these structures in the highly urbanized areas.

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 were also shown on the Flood Boundary and Floodway Info Map.

Channel roughness factors (Manning's "n") for these computations were assigned on the basis of field inspection of flood plain areas. These roughness values varied from 0.025 to 0.07 for channels and ranged from 0.02 to 0.08 for the overbanks throughout the study area.

Water-surface elevations of the floods of the selected recurrence intervals were computed through use of the USACE HEC-2 step-backwater computer program (USACE, 1976). Flood profiles were drawn showing the computed water-surface elevations for floods of the selected reoccurrence intervals (Exhibit 1). Starting elevations for the streams in this study were developed by the slope-area method.

Flood elevations in the city are often raised by debris jams at bridge openings. The hydraulic analyses for this study were based on the effects of unobstructed flow. The flood elevations as shown on the profiles are thus considered valid only if hydraulics structures, in general, remain unobstructed and do not fail.

January 2, 2009, Tate County FIS

Cross section geometries were obtained from a combination of terrain data and field surveys. Bridges and culverts located within the limited detailed study limits were field surveyed to obtain elevation data and structural geometry.

Downstream boundary conditions for the hydraulic models were set to normal depth using a starting slope calculated from values taken from topographic data, or where applicable, derived from the water-surface elevations. Water-surface profiles were computed through the use of the USACE HEC-RAS version 3.1.2 computer program (USACE, 2002). The model was run for the 1-percent annual chance storm for the limited detail and approximate studies.

Channel roughness factors (Manning's "n") values used in the hydraulic computations for both channel and overbank areas were based on recent digital orthophotography and field investigations.

Table 4, "Summary of Roughness Coefficients," shows the ranges of the channel and overbank roughness factors used in the computations for Coldwater River and Pigeon Roost Creek.

TABLE 4. SUMMARY OF ROUGHNESS COEFFICIENTS

Detailed Streams		
FLOODING SOURCE	CHANNEL "N"	OVERBANK "N"
COLDWATER RIVER	0.035-0.100	0.040-0.200
PIGEON ROOST CREEK	0.060	0.070-0.136

Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles (Exhibit 1) and on the FIRM (Exhibit 2).

The hydraulic analyses for this countywide FIS 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.

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

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

Stability A: Monuments of the most reliable nature, expected to hold position/elevation well (e.g., mounted in bedrock)

Stability B: Monuments which generally hold their position/elevation well (e.g., concrete bridge abutment)

Stability C: Monuments which may be affected by surface ground movements (e.g., concrete monuments below frost line)

Stability D: Mark of questionable or unknown vertical stability (e.g., concrete monument above frost line, or steel witness post)

In addition to NSRS benchmarks, the FIRM may also show vertical control monument established by a local jurisdiction; these monuments will be shown on the FIRM with the appropriate designations. Local monuments will only be placed on the FIRM if the community has requested that they be included, and if the monuments meet the aforementioned NSRS inclusion criteria.

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

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 NAVD88 as the referenced vertical datum.

All flood elevations shown in this Tate County FIS report and on the FIRM are referenced to NAVD88. Structure and ground elevations in the community must, therefore, be referenced to NAVD88. It is important to note that adjacent communities may be referenced to NGVD29. This may result in differences in Base Flood Elevations (BFEs) across the corporate limits between the communities.

Ground, structure, and flood elevations may be compared and/or referenced to NGVD29 by applying a conversion factor. To convert elevations from NAVD88 to NGVD29, add 0.03 feet to the NAVD88 elevation. The 0.03 feet value is an average for the entire county. The adjustment value was determined using the USACE Corpscon 6.0.1 computer program (USACE, 2004) and topographic maps (U.S. Department of the Interior, 1972). The BFEs shown on the FIRM represent whole-foot rounded values. For example, a BFE of 12.4 feet will appear as 12 feet on the FIRM, and 12.6 feet as 13 feet. Users who wish to convert the elevations in this FIS report to NGVD29 should apply the stated conversion factor to elevations shown on the Flood Profiles and supporting data tables in the FIS report, which are shown at a minimum to the nearest 0.1-foot.

For more information regarding conversion between the NGVD and the NAVD, see the FEMA publication entitled *Converting the National Flood Insurance Program to the*

North American Vertical Datum of 1988 or contact the NGS Information Services; NOAA, N/NGS12; National Geodetic Survey; SSMC-3, #9202; 1315 East-West Highway, Silver Spring, Maryland 20910-3282, (Internet address http://www.ngs.noaa.gov).

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. Interested individuals may contact FEMA to access this data.

4.0 FLOODPLAIN MANAGEMENT APPLICATIONS

The NFIP encourages State and local governments to adopt sound floodplain management programs. Therefore, each FIS provides 1-percent-annual-chance flood elevations and delineations of the 1- and 0.2-percent-annual-chance floodplain boundaries and 1-percent-annual-chance floodway to assist communities in developing floodplain management measures. This information is presented on the FIRM and in many components of the FIS report, including Flood Profiles, Floodway Data Table and Summary of Stillwater Elevations Table. Users should reference the data presented in the FIS report as well as additional information that may be available at the local 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-annual-chance floodplain boundaries have been delineated using the flood elevations determined at each cross section.

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 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 limited detailed and approximate methods, only the 1-percent-annual-chance floodplain boundary is shown on the FIRM (Exhibit 2). Floodplain boundaries for these streams, as well as those streams that have been previously studied by detailed methods, were generated using USGS 10-meter Digital Elevation Models (MARIS, 2004), then refined using detailed hydrographic data.

4.2 Floodways

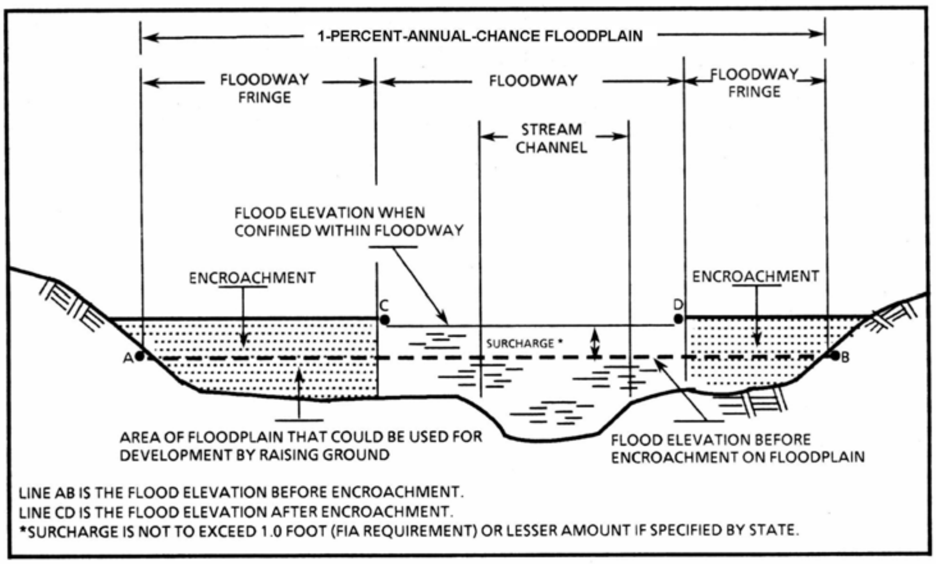
Encroachment on floodplains, such as structures and fill, reduces flood-carrying capacity, increases flood heights and velocities, and increases flood hazards in areas beyond the encroachment itself. One aspect of floodplain management involves balancing the economic gain from floodplain development 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 1.0 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 floodway presented in this FIS report and on the FIRM was 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 have been tabulated for selected cross sections of detailed study streams (Table 5). For detailed study streams, in cases where the floodway and 1-percent-annual-chance floodplain boundaries are either close together or collinear, only the floodway boundary is shown.

Near the mouths of streams studied in detail, floodway computations are made without regard to flood elevations on the receiving water body. Therefore, “Without Floodway” elevations presented in Table 5, “Floodway Data,” for certain downstream cross sections are lower than the regulatory flood elevations in that area, which must take into account the 1-percent-annual-chance flooding due to backwater from other sources.

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. For detailed study streams, a listing of stream velocities at selected cross sections is provided in Table 5. In order to reduce the risk of property damage in areas where the stream velocities are high, the county may wish to restrict development in areas outside the floodway.

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 of the 1-percent-annual-chance flood more than 1.0 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 Figure 1

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD 88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
HICKAHALA CREEK TRIBUTARY 2								
A	3,250	319	670	5.24	247.8	247.8	248.6	0.8
B	3,950	293	738	1.65	251.3	251.3	252.2	0.9
C	4,750	122	451	4.36	253.5	253.5	254.5	1.0
D	5,750	32	176	6.84	258.1	258.1	258.9	0.8
E	6,450	194	478	5.26	261.8	261.8	262.2	0.4
F	7,000	27	158	7.58	264.0	264.0	264.9	0.9
G	8,025	125	501	6.83	267.9	267.9	268.8	0.9
H	8,800	52	151	11.44	271.9	271.9	271.9	0.0
I	9,350	44	212	6.18	274.3	274.3	275.3	1.0
J	10,400	58	225	5.35	283.5	283.5	284.5	1.0
K	11,550	28	121	5.93	291.1	291.1	291.8	0.7
L	12,450	22	85	8.71	300.6	300.6	301.2	0.6
HICKAHALA CREEK TRIBUTARY 2A								
A	780	39	88	5.49	282.5	282.5	282.6	0.1
B	1,600	71	134	4.24	291.3	291.3	292.0	0.7

[1] FEET ABOVE MOUTH

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

TATE COUNTY, MS AND INCORPORATED AREAS

FLOODWAY DATA

HICKAHALA CREEK TRIBUTARY 2 & 2A

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD 88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
HICKAHALA CREEK TRIBUTARY 3								
A	3,500	352	1,046	2.45	243.4	243.4	244.4	1.0
B	4,400	622	1,371	2.11	245.5	245.5	246.4	0.9
C	6,000	352	516	4.21	250.6	250.6	251.5	0.9
D	7,500	17	72	8.05	260.4	260.4	261.3	0.9
E	8,400	24	97	6.61	267.2	267.2	267.6	0.4
HICKAHALA CREEK TRIBUTARY 3A								
A	300	352	516	4.21	250.6	250.6	251.5	0.9
B	1,900	38	132	2.12	260.0	260.0	260.5	0.5

[1] FEET ABOVE MOUTH

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

TATE COUNTY, MS AND INCORPORATED AREAS

FLOODWAY DATA

HICKAHALA CREEK TRIBUTARY 3 & 3A

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD 88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
BONNER CREEK								
A	1,300	816	2,651	2.47	252.5	250.0[3]	250.1	0.1
B	3,250	535	1,847	3.39	255.3	255.3	256.2	0.9
C	5,170	297	1,224	3.09	260.0	260.0	260.9	0.9
D	5,400	276	1,061	4.16	262.7	262.7	263.4	0.7
E	6,050	261	1,018	3.94	264.4	264.4	265.3	0.9
F	7,200	59	375	4.43	267.3	267.3	268.2	0.9
PIGEON ROOST CREEK								
A	36,300	3,650[2]	27,994	1.9	293.0	293.0	294.0	1.0
B	38,090	2,900[2]	20,643	2.4	295.1	295.1	296.1	1.0

[1] FEET ABOVE MOUTH
[2] WIDTH EXTENDS BEYOND COUNTY BOUNDARY
[3] ELEVATION COMPUTED WITHOUT CONSIDERATION OF BACKWATER EFFECTS FROM SENATOBIA CREEK

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

TATE COUNTY, MS AND INCORPORATED AREAS

FLOODWAY DATA

BONNER CREEK – PIGEON ROOST CREEK

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 risk zone that corresponds to the 1-percent annual chance floodplains that are determined in the FIS by approximate methods. Because detailed hydraulic analyses are not performed for such areas, no base (1-percent annual chance) flood elevations (BFEs), or base flood depths are shown within this zone.

Zone AE

Zone AE is the flood insurance risk zone that corresponds to the 1-percent annual chance floodplains that are determined in the FIS by detailed methods. In most instances, 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 risk 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 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 risk 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 Tate County. Previously, FIRMs were prepared for each incorporated community and the unincorporated areas of the County identified as flood-prone. This countywide FIRM also includes flood-hazard information that was presented separately on Flood Boundary and Floodway Maps (FBFMs), where applicable. Historical data relating to the maps prepared for each community, up to and including this countywide FIS are presented in Table 6, “Community Map History.”

COMMUNITY NAME	INITIAL IDENTIFICATION	FLOOD HAZARD BOUNDARY MAP REVISIONS DATE	FIRM EFFECTIVE DATE	FIRM REVISIONS DATE
Coldwater, Town of	April 12, 1974	January 16, 1976	August 1, 1986	----
Senatobia, City of	January 25, 1974	NONE	September 29, 1978	----
Tate County (Unincorporated Areas)	November 29, 1974	August 19, 1977	September 27, 1985	----

TABLE 6

FEDERAL EMERGENCY MANAGEMENT AGENCY

TATE COUNTY, MS

AND INCORPORATED AREAS

COMMUNITY MAP HISTORY

7.0 OTHER STUDIES

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

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, GA 30341.

9.0 BIBLIOGRAPHY AND REFERENCES

Interagency Advisory Committee on Water Data (1981), Bulletin No.17B, Guidelines for Determining Flood Flow Frequency.

Mississippi Automated Resource Information System (2004), Countywide Elevations Grid for Mississippi (Tate County), 10 meter (mstm), Jackson, MS, http://www.maris.state.ms.us/metadata/statewide/dem10m.htm.

Mississippi State Climatologist (2007), Website, Starkville, Mississippi, http://www.msstate.edu/dept/GeoSciences/climate/

National Weather Service (February 20, 2007). Website, Memphis, TN, monitoring station, http://www.srh.noaa.gov/meg

U.S. Army Corps of Engineers (August 2004), Topographic Engineering Center, Corpscon version 6.0.1, Alexandria, VA

U.S. Army Corps of Engineers, "Tulsa District Methods of Urban Hydrology," (Paper Presented in Proceedings of Seminar on Urban Hydrology, September 1970).

U.S. Army Corps of Engineers, Hydrologic Engineering Center, HEC-1 Flood Hydrograph Package, Davis, California, September 1990.

U.S. Army Corps of Engineers (November, 1976) Hydrologic Engineering Center, HEC-2 Water Surface Profiles Generalized Computer Program, Davis, California.

U.S. Army Corps of Engineers (May 2002). Hydrologic Engineering Center, HEC-RAS River Analysis System, User's Manual, version 3.1.2, Davis, California.

U.S. Army Corps of Engineers, Vicksburg District, Hydrologic Analysis of the Coldwater River Watershed, Final Report, August 1990.

U.S. Census Bureau (October 2011). Website–2010 Population.

U.S. Census Bureau (October 2011). Website–2010 Economic Fact Sheet.

U.S. Department of Agriculture, Soil Conservation Service, "Hydrology," National Engineering Handbook, Section 4, August 1972.

U.S. Department of Commerce, Weather Bureau, Technical paper No. 40, Rainfall Frequency Atlas of the United States, May 1961.

U.S. Department of Housing and Urban Development (March, 1978), Federal Insurance Administration, Flood Insurance Study, City of Senatobia, Mississippi.

U.S. Department of the Interior (1983). Geological Survey, Water-Supply Paper No. 2207, Flood Characteristics of Urban Watersheds in the United States, V.B. Sauer, W.O. Thomas, V.A. Stricker, and K.V. Wilson.

U.S. Department of the Interior (1991). Geological Survey, Flood Characteristics of Mississippi Streams, Water-Resources Investigations Report 91-4037, Jackson, MS.

U.S. Department of the Interior (1964-1996) Geologic Survey, 7.5 Minute Series Topographic Maps, Scale 1:24,000, Contour Interval 20 Feet: *Tate*, Reston, VA.

U.S. Water Resources Council, "Guidelines For Determining Floodflow Frequency," Bulletin 17, March 1976.

10.0 REVISIONS DESCRIPTION

This section has been added to provide information regarding significant revisions made since the original FIS report and DFIRM were printed. Future revisions may be made that do not result in the republishing of the FIS report.

10.1 First Revision (Revised Xxxxxxxxx, XX, 201X)

a. Acknowledgments

The hydrologic and hydraulic analyses for this revision were performed by the State of Mississippi for FEMA under Contract No. EMA-CA-5932. This study was completed in May 2011.

The digital base map information files were provided by the State of Mississippi. The digital orthophotography was acquired in March 2006, with the imagery processed to a 2-foot pixel resolution.

The digital topographic data source for Tate County is LIDAR flown in 2009 by the USACE (USACE, 2009).

The new maps reflect more detailed and up-to-date stream channel configurations than those shown on the previous FIRM for Tate County. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the FIS report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on the maps. Flood hazards associated with unstudied flooding sources have not been determined and should be investigated to ensure that existing or proposed development is relatively safe from flooding. Discounted-rate flood insurance is available and recommended for structures located in close proximity to these features.

b. Coordination

A Project Scoping Meeting was held on October 7, 2009. Attendees for this meeting included representatives from the Mississippi Department of Environmental Quality, Mississippi Emergency Management Agency, the Office of U.S. Senator Thad Cochran, the Office of U.S. Representative Travis Childers, Tate County, City of Senatobia, and the State Contractor. On Xxxxx, XX, 20XX, the results of this FIS revision were presented at a final coordination meeting attended by representatives of the State of Mississippi and its contractor, FEMA, and the community.

c. Scope

In this revision, the following table lists the flooding sources, which were newly studied by limited detailed methods.

TABLE 7. REVISED STREAMS STUDIED BY LIMITED DETAILED METHODS

Stream	Limits of New Detailed Study
Bonner Creek	From U.S Highway 51 to a point 3,900 feet upstream of Terry Lane.
Hickahala Creek Tributary 1	From Merry Hill Ranch Road to a point approximately 3,175 feet upstream of Merry Hill Ranch Road.
Senatobia Creek	From a point approximately 1,950 feet upstream of State Highway 4 to a point 12,100 feet upstream of State Highway 4.
West Ditch	From a point approximately 434 feet downstream of U.S. Interstate 55 to a point approximately 2,350 feet upstream of Country Club Road.

Floodplain boundaries for the previously mentioned streams and for effective AE zones were updated on the following panels:

28137C0150D 28137C0175D 28137C0200D 28137C0325D

The following are newly created panels and include newly created and updated boundaries for AE zones:

28137C0178D 28137C0179D 28137C0180D 28137C0186D 28137C0187D
28137C0188D 28137C0189D 28137C0301D 28137C0302D 28137C0303D
28137C0304D 28137C0310D

d. Hydrologic and Hydraulic Analyses

Hydrologic analyses were carried out to establish peak discharge-frequency relationships for each flooding source studied by limited detail methods affecting the communities. Peak discharges were calculated based on USGS regional regression equations (U.S. Department of the Interior, 1991). For the discharges calculated based on regional regression equations, the rural regression values were modified to reflect stream gage weighting and/or urbanization as necessary.

A summary of the drainage area-peak discharge relationships for all the streams is shown in Table 8, "Revised Summary of Discharges."

TABLE 8. REVISED SUMMARY OF DISCHARGES

		PEAK DISCHARGES (cfs)			
FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. mi.)	10-percent	2-percent	1-percent	0.2-percent
BONNER CREEK					
Approximately 1,150 feet upstream of U.S. Highway 51	0.90	*	*	1,172	*
Approximately 215 feet upstream of Terry Lane	0.46	*	*	802	*
Approximately 1,900 feet upstream of Terry Lane	0.16	*	*	292	*
HICKAHALA CREEK TRIBUTARY 1					
Approximately 3,255 feet upstream of Merry Hill Ranch Road	1.64	*	*	1819	*
		*	*		*
SENATOBIA CREEK					
Approximately 7,920 feet upstream of State Highway 4	65.0	*	*	24375	*
WEST DITCH					
At Shands Bottom Road	10.8	*	*	4297	*
Approximately 367 feet upstream of Country Club Road	8.56	*	*	4123	*

* Data not available

Cross section geometries were obtained from a combination of terrain data and field surveys. Bridges and culverts located within the limited detailed study limits were field surveyed to obtain elevation data and structural geometry. The Manning's "n" values used for the revised studies are 0.05 for the channel and 0.15 for the overbanks.

Downstream boundary conditions for the hydraulic models were set to normal depth using a starting slope calculated from values taken from topographic data, or where applicable, derived from the water-surface elevations. Water-surface profiles were computed through the use of the USACE HEC-RAS version 4.1.0 computer program (USACE, 2010). The model was run for the 1-percent annual chance storm for the limited detail studies.

e. Floodplain Boundaries

For the streams studied by the limited detailed method, only the 1-percent-annual-chance floodplain boundary is shown on the FIRM (Exhibit 2). Floodplain boundaries for these streams were generated using LiDAR flown in 2009 from the USACE (USACE, 2009).

f. Bibliography and References

U.S. Army Corps of Engineers, Mississippi Delta LiDAR Project, 2009.

U.S. Army Corps of Engineers (January 2010). Hydrologic Engineering Center, HEC-RAS River Analysis System, User's Manual, version 4.1.0, Davis, California.

U.S. Department of the Interior (1991). Geological Survey, Flood Characteristics of Mississippi Streams, Water-Resources Investigations Report 91-4037, Jackson, MS.