

FLOOD INSURANCE STUDY



HUMPHREYS COUNTY, MISSISSIPPI AND INCORPORATED AREAS

HUMPHREYS
COUNTY



COMMUNITY NAME	COMMUNITY NUMBER
BELZONI, CITY OF	280080
HUMPHREYS COUNTY (UNINCORPORATED AREAS)	280192
ISOLA, TOWN OF	280190
LOUISE, TOWN OF	280208
SILVER CITY, TOWN OF	280323

EFFECTIVE:



Federal Emergency Management Agency

FLOOD INSURANCE STUDY NUMBER

28053CV000A

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) report 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 report may be revised and republished at any time. In addition, part of this FIS report 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 report components.

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

Old Zone(s)	New Zone
A1through A30	AE
B	X
C	X

Initial Countywide FIS Report Effective Date:

Revised Countywide FIS Report Dates:

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FLOOD INSURANCE STUDY

HUMPHREYS 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 Humphreys County, Mississippi, including the Towns of Isola, Louise, and Silver City, the City of Belzoni, and the unincorporated areas of Humphreys County (hereinafter referred to collectively as Humphreys 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 Humphreys 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.

January 5, 1989, FIS Humphreys County (Unincorporated Areas)

The hydrologic and hydraulic analyses for this study were performed by the Vicksburg District Corps of Engineers for the Federal Emergency Management Agency under Interagency Agreement No. (IAA)-H-7-76, Project Order No. 6. This work, which was completed in January 1978, covered all significant flooding sources in Humphreys County.

January 5, 1989, FIS City of Belzoni

The hydrologic and hydraulic analyses for this study were performed by the Vicksburg District Corps of Engineers for the Federal Emergency Management Agency under Interagency Agreement No. (IAA)-H-7-76, Project Order No. 14 and Amendment I thereto. This work, which was completed in January 1978, covered all significant flooding sources in the City of Belzoni.

January 1978, FIS Town of Isola

The hydrologic and hydraulic analyses for this study were performed by the United States Army Corps of Engineers (USACE), Vicksburg District, for the Federal Insurance Administration, under Interagency Agreement No. IAA-H-7-26, Project Order No. 6. This work, which was completed in June 1977, covered all significant flooding sources affecting the Town of Isola.

November 1978, FIS Town of Louise

The hydrologic and hydraulic analyses for this study were performed by the USACE, Vicksburg District, for the Federal Insurance Administration under Interagency Agreement Number H-7-76, Project Order No. 6. This work, which was completed in October 1977, covered all significant flooding sources in the Town of Louise.

This Countywide FIS

The hydrologic and hydraulic analyses for this countywide FIS were performed by the State of Mississippi for the Federal Emergency Management Agency (FEMA), under Contract No. EMA-2008-CA-5883. This study was completed in July 2010.

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 FIRM was produced using the Mississippi State Plane Coordinate System, West Zone, FIPS ZONE 2302. The horizontal datum was the North American Datum of 1983, GRS 1980 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.

January 5, 1989, FIS Humphreys County (Unincorporated Areas)

County base map selection and identification of streams requiring detailed study as well as regions requiring approximate studies were accomplished in meetings attended by personnel by the USACE, Vicksburg District, FEMA, and officials of Humphreys County, Mississippi in April 1975. Community officials and residents provided information regarding flooding problems, historical data on past floods, and other information concerning the county.

The results of the work were coordinated with pertinent records and studies performed by the U.S. Geological Survey (USGS), USACE, South Delta Planning and Development District, Inc., and officials of Humphreys County, Mississippi.

On January 16, 1979, the results of the work by the USACE were reviewed at the final coordination meeting attended by personnel of the USACE, FEMA, and officials of Humphreys County, Mississippi.

January 5, 1989, FIS City of Belzoni

Community base map selection and the identification of streams requiring detailed study were accomplished in meetings attended by personnel of the USACE, Vicksburg District, FEMA, South Delta Planning and Development District, Inc., and officials of the City of Belzoni, Mississippi in January 1975. Community officials and residents provided information regarding flooding problems, historical data on past floods, and other information concerning the community.

The results of the work were coordinated with pertinent records and studies performed by the U.S. Geological Survey (USGS), USACE, South Delta Planning and Development District, Inc., and officials of the City of Belzoni, Mississippi.

A final coordination meeting was held on January 16, 1979, to present the results of the study to local officials.

January 1978, FIS Town of Isola

Community base map selection and the identification of streams requiring detailed study were done in meetings attended by personnel of the USACE, Vicksburg District, the Federal Insurance Administration, and officials of the Town of Isola in April 1975. Community officials and residents provided information regarding flooding problems, historical data on past floods, and other information concerning the community.

The results of the work were coordinated with the USGS, USACE Vicksburg District, and the South Delta Planning and Development District, Inc.

On August 10, 1977, study results were reviewed at a final community coordination meeting attended by personnel of the USACE, the Federal Insurance Administration, and officials of the Town of Isola. No objections were raised.

November 1978, FIS Town of Louise

Community base map selection and the identification of streams requiring detailed study were done in meetings attended by personnel of the USACE, Vicksburg District, the Federal Insurance Administration, and officials of the Town of Louise in April 1975. Community officials and residents provided information regarding flooding problems, historical data on past floods, and other information concerning the community.

The results of the work were coordinated with the USGS, USACE Vicksburg District, and the South Delta Planning and Development District, Inc.

On June 6, 1978, the results of the work by the USACE Vicksburg District were reviewed at a final coordination meeting attended by personnel of that organization, the Federal Insurance Administration, and the officials of the Town of Louise.

This Countywide FIS

For this countywide FIS, the Project Scoping Meeting was held on August 18, 2008 in Belzoni, MS. Attendees for these meetings included representatives from the Mississippi Department of Environmental Quality, Mississippi Emergency Management Agency, FEMA National Service Provider, National Resource Conservation Service, USACE, Yazoo Mississippi Delta Levee Board, Humphreys County, the Town of Louise, the City of Belzoni, 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 Humphreys County, Mississippi, and its incorporated communities listed in Section 1.1

January 5, 1989, FIS Humphreys County (Unincorporated Areas)

The Yazoo River, Fisk Bayou, County Ditch Nos. 22 and 26, Burton Bayou, and an unnamed tributary of the Yazoo River east of Belzoni were studied in detail. In determining which areas were to be studied in detail, consideration was given to all development expected to occur through 1982.

January 5, 1989, FIS City of Belzoni

A decision was made by FEMA and local interests that the Yazoo River, Fisk Bayou, County Ditch No. 26, and Burton Bayou should be studied in detail. Fisk Bayou was evaluated from the confluence with the Yazoo River to the corporate boundary on First Street. County Ditch No. 26 was studied from the westerly corporate limits at Highway 49-W, to near the intersection of U.S. Highway 49-W, and Mississippi Highway 12. Burton Bayou was studied from its confluence with County Ditch 26, east to the west bank levee of the Yazoo River. In determining which areas were to be studied in detail, consideration was given to all development expected to occur through 1982.

January 1978, FIS Town of Isola

The Federal Insurance Administration and concerned local interests determined that Jackson Bayou and Jackson Bayou Lateral should be studied in detail.

Jackson Bayou was surveyed and evaluated from its confluence with Lake Dawson northwest of Isola to the town corporate limits at U.S. Highway 49-W. Jackson Bayou Lateral Channel, located in the southern portion of town, was studied from above Julia Street eastward to its confluence with Jackson Bayou.

Those areas studied by detailed methods were chosen with consideration given to all proposed construction and forecasted development through 1982.

November 1978, FIS Town of Louise

Determinations were made by the Federal Insurance Administration and concerned local interest that Silver Creek flowing through the Town of Louise be studied in detail. Other sources of flooding which have a major impact on Silver Creek flood elevations are the Mississippi, Yazoo, and Sunflower Rivers. The areas studied in detail were chosen with consideration given to all forecasted development and proposed construction until 1982.

This Countywide FIS

For this countywide FIS, the Steele Bayou Control Structure 1.0-percent annual-chance elevation was calculated. Much of the county north of the structure is below the calculated flood elevation.

The Yazoo River in the northern portion of the county has been previously studied by detailed methods in the May 1979, Leflore County Flood Insurance Study. The portion of this study that affects Humphreys County has been included in this countywide FIS.

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.

Floodplain boundaries of streams that have been previously studied by detailed methods were redelineated based on best available topographic information.

2.2 Community Description

Humphreys County, located in west-central Mississippi, is primarily a rural agricultural area. The principal communities of Humphreys County are Belzoni, Isola, Louise, and Silver City. The county is bordered by Holmes County, Mississippi to the east, Leflore and Carroll Counties, Mississippi to the north, Washington and Sharkey Counties, Mississippi to the west, and Yazoo County Mississippi to the south. The county population in 2009 was estimated to be 9,809 (U.S. Census Bureau, 2010).

Surface transportation in Humphreys County includes the Canadian National Railroad, U.S. Highway 49, and State Highways 7, 12, 14, 16, and 149. The county occupies a land area of approximately 431 square miles at altitudes ranging from 90 to 120 feet.

The climate of Humphreys County is influenced by its subtropical latitude, the extensive land mass to the north, and the Gulf of Mexico to the south. The mean annual precipitation is 58.3 inches. Temperatures range from a January average of 42.5 °F to a July average of 81.9 °F (National Oceanic and Atmospheric Administration, 2010).

2.3 Principal Flood Problems

The county suffers from flooding in relatively large areas. In the eastern part of the county the problem is acute enough to limit the use of large areas to woodland purposes only.

The Yazoo and Big Sunflower Rivers are the two major streams that cause flooding in Humphreys County. The Yazoo River flows through the northeastern part of the county and is part of the eastern border of the county. Along the Big Sunflower River, which forms part of the western boundary of the county, a few small tributaries overflow in most years. Numerous small streams traverse the entire county. The terrain is relatively flat, sloping gently from north to south. During major floods, widespread flooding occurs through the entire county.

During the flood of 1973, Humphreys County received considerable damage caused by flooding from the Yazoo and Big Sunflower Rivers and backwater flooding from the Mississippi River. A total of 98,550 acres were inundated during this flood in Humphreys County alone, with a total dollar value of damage reaching \$11,559,000 (USACE, 1973). Record stage and discharge measurements were recorded on the Yazoo and Big Sunflower Rivers. The maximum stage at Little Calloo on the Big Sunflower River in 1973 was 103.3 feet, NAVD. At Belzoni, Mississippi, the stage recorded on the Yazoo River at 111.4 feet NAVD has been estimated as a 60-year frequency event.

In May 1991, the worst flooding in recent history inundated approximately 1.5 million acres of property in the Delta (Delta Council, 2008).

2.4 Flood Protection Measures

Flood protection measures that have been undertaken consist of the installation of floodwater-retarding structures by the U.S. Soil Conservation Service, the installation of flood control levees by the USACE, Vicksburg District, and the installation of other levees by private individuals and drainage districts.

The Yazoo Headwater Project constructed by the USACE consists of four flood control reservoirs located in North Mississippi: Arkabutla, Sardis, Enid, and Grenada; about 800 miles of stream channel improvements and 600 miles of levees.

The USACE constructed the Will M. Whittington Channel, which is an auxiliary channel for the Yazoo River, extending from a point approximately ten miles downstream from Belzoni, Mississippi to near the confluence of the Yazoo and Big Sunflower Rivers. The auxiliary channel floodway traverses the area west of the Yazoo River in a generally northeast-southwest direction and provides the portion of the Yazoo backwater area west of the Yazoo River. This auxiliary channel lowers flood stages by diverting flow from the upper Yazoo River to near the confluence of the Big Sunflower and Yazoo Rivers.

The Yazoo Basin Backwater Project, protecting approximately 1,550 square miles in the lower Mississippi Delta, consists of approximately 100 miles of levees, a connecting channel between the Sunflower River and Steel Bayou and appurtenant drainage works. The backwater levees, a part of the Mississippi River valley flood protection system, are designed to be overtopped at an elevation of approximately 107 NGVD, which would occur during the Mississippi River Project Flood, which is used in lieu of the 0.2-percent annual-chance flood for this study. Protection is contingent on the use of storage in the backwater system to reduce flood peaks and ensure the integrity of the Mississippi River levee system (USACE, 1959).

The USACE has completed about 510 miles of channel improvements in the Big Sunflower River Basin consisting of channel clearing, enlargement, and realignment.

These channel improvements have resulted in increased channel capacities and lower flood levels in Humphreys County (USACE, 1971).

The Upper Yazoo Project (formerly Upper Auxiliary Channel) is the largest single feature of the Yazoo Headwater Project yet to be constructed. The Upper Yazoo Project will lower flood stages in the headwater reaches of the Yazoo Basin by increasing carrying capacities of the Yazoo River (USACE, 1971).

FEMA specifies that all levees must have a minimum of 3-foot freeboard against 1-percent annual chance flooding to be considered a safe flood protection structure. The criteria used to evaluate protection against the 1-percent annual chance flood are 1) adequate design, including freeboard, 2) structural stability, and 3) proper operation and maintenance. Levees that do not protect against the 1-percent annual chance flood are not considered in the hydraulic analysis of the 1-percent annual chance flood.

Provisionally Accredited Levee Notes to Users: Check with your local community to obtain more information, such as the estimated level of protection provided (which may exceed the 1-percent annual-chance level) and Emergency Action Plan, on the levee system(s) shown as providing protection for areas on this panel. To maintain accreditation, the levee owner or community is required to submit the data and documentation necessary to comply with Section 65.10 of the NFIP. If the community or owner does not provide the necessary data and documentation or if the data and documentation provided indicate the levee system does not comply with Section 65.10 requirements, FEMA will revise the flood hazard and risk information for this area to reflect de-accreditation of the levee system. To mitigate flood risk in residual risk areas, property owners and residents are encouraged to consider flood insurance and flood-proofing or other protective measures. For more information on flood insurance, interested parties should visit the FEMA Website at <http://www.fema.gov/business/nfip/index.shtm>.

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.

January 5, 1989, FIS Humphreys County (Unincorporated Areas)

The peak discharges for the Yazoo River were taken from the FIS for the City of Belzoni (FEMA, 1989).

Flood flow records were not available for the other streams, therefore, peak discharges for the floods of 10-, 2.0-, 1.0- and 0.2-percent annual recurrence intervals were developed by frequency rainfall analysis using U.S. Weather Service Technical Paper No. 40 (U.S. Dept. of Commerce, 1961) and Snyder's unit hydrograph method as utilized in the USACE program, HEC-1 (USACE, 1972). Peak discharges were not computed for Burton Bayou because Burton Bayou has a minimal drainage area and effectively serves as a sump area for Ditch No. 26.

The 0.2-percent annual-chance discharges were determined by extrapolation of the flood flow-frequency curve based on a log-Pearson Type III distribution.

January 5, 1989, FIS City of Belzoni

Hydrologic analyses were carried out to establish peak discharge-frequency relationships for floods of the selected recurrence intervals for the Yazoo River, Fisk Bayou, and County Ditch No. 26. Peak discharges for the Yazoo River at Belzoni, Mississippi for floods of the selected recurrence intervals were determined from a log-Pearson Type III frequency analysis as recommended in "Guidelines for Determining Flood Frequencies," U.S. Water Resources Council Bulletin No. 17 (U.S. Water Resources Council, 1976). The period of record used in this analysis was 1932-1975; however, the period of 1932-1954 was adjusted to consider the four Yazoo Basin headwater lakes in operation.

Stream flow records were not available for the other streams; therefore, peak discharges for the floods of 10-, 2.0-, 1.0- and 0.2-percent annual recurrence intervals were developed by frequency rainfall analysis using U.S. Weather Service Technical Paper No. 40 (U.S. Dept. of Commerce, 1961) and Snyder's unit hydrograph method as utilized in the USACE program, HEC-1 (USACE, 1972). Peak discharges were not computed for Burton Bayou because Burton Bayou has a minimal drainage area and effectively serves as a sump area for County Ditch No. 26 and water-surface profiles would be dependent on Ditch No. 26.

January 1978, FIS Town of Isola

Discharge-frequency relationships for Jackson Bayou were determined by relating unit hydrograph parameters from similar watersheds. Known precipitation runoff relationships for several similar watersheds were analyzed to determine Snyder unit hydrograph coefficients using the HEC-1 Computer Optimization Technique (USACE, 1973). Based on this analysis, coefficients for the Jackson Bayou watershed were determined using standard methods (USACE, 1959 and Chow, 1964).

The discharges for the 10-, 2.0-, 1.0- and 0.2-percent annual floods were then computed utilizing precipitation-frequency relationships from U.S. Weather Bureau Technical Paper No. 40 (U.S. Dept. of Commerce, 1961). A comparison of the results of this method was made with the relationships determined by the rational method (Chow, 1964), and by the U.S. Geological Survey method (U.S. Dept of Interior, 1976). This comparison substantiates the results of the analyses.

November 1978, FIS Town of Louise

The discharge-frequency relationships for Silver Creek were determined by relating the unit hydrograph parameters from similar watersheds. Known precipitation runoff relationships for several similar watersheds were analyzed to determine Snyder unit hydrograph coefficients for those watersheds (USACE, 1973). The 0.2-percent annual chance rainfall for Silver Creek was extrapolated on log-normal paper between 10- and 1.0-percent annual chance of return periods. Coefficients for the Silver Creek watershed were determined using the relationships expressed in Flood Hydrograph Analyses and Computations EM 1110-2-1405 (USACE, 1959).

The discharges for the 10-, 2.0-, 1.0- and 0.2-percent annual floods were then computed utilizing precipitation-frequency relationships from U.S. Weather Bureau Technical Paper No. 40 (Chow, 1964).

This Countywide FIS Analysis

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.

For the Yazoo River, the data used for the study in the northern portion of the county is from the Leflore County (unincorporated areas) Flood Insurance Study dated May 1979. The peak discharge for the 1-percent annual-chance flood was developed by frequency rainfall analysis using U.S. Weather Service Technical Papers Numbers 40 and 49 and Snyder's Unit Hydrograph Method (USACE, 1959).

A summary of the drainage area-peak discharge relationships for all the streams is shown in Table 1, "Summary of Discharges."

TABLE 1. SUMMARY OF DISCHARGES

<u>FLOODING SOURCE AND LOCATION</u>	<u>DRAINAGE AREA (sq. mi.)</u>	<u>PEAK DISCHARGES (cfs)</u>			
		<u>10- percent</u>	<u>2-percent</u>	<u>1-percent</u>	<u>0.2-percent</u>
COUNTY DITCH NO. 22 At State Highway 7 Bridge	3.71	799	1,034	1,154	1,388
COUNTY DITCH NO. 26 At Highway 49-W	1.00	381	485	537	648
FISK BAYOU At Confluence with Yazoo River	0.39	187	237	273	332
JACKSON BAYOU At Confluence with Lake Dawson	11.5	892	1,174	1,323	1,638
At Confluence with Jackson Bayou Lateral	11.0	932	1,225	1,381	1,709
JACKSON BAYOU LATERAL At Box Culvert on Belzoni Street	0.16	146	183	207	257
830 Feet Above Mouth	0.11	101	126	143	178
At Railroad Bridge	0.07	62	777	87	108
SILVER CREEK At South Corporate Limits (Town of Louise)	6.38	406*	540*	602*	746*
At old U.S. Highway 49	6.00	400*	532*	593*	734*
24 UNNAMED TRIBUTARY OF YAZOO RIVER At Pecan Street	1.11	396	501	583	834
YAZOO RIVER At Belzoni	7,830	36,000	43,000	46,000	53,000

*200 cfs used for Silver Creek Q's due to upstream obstruction of flow and overbank storage.

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.

January 5, 1989, FIS Humphreys County (Unincorporated Areas)

Cross-section data for streams in the area were obtained by field measurement. All bridges and culverts were surveyed to obtain elevation data and structural geometry.

Fisk Bayou is bound on the east and west by a high ridge extending its length; on the south by the Belzoni floodwall and levee system; and on the north by the spoil banks along County Ditch No. 22. The main outlets are the pumping plant and a four-foot diameter culvert under the Belzoni levee located at the confluence of Fisk Bayou and the Yazoo River. A sump analysis was performed to determine the flood profile elevations on Fisk Bayou for the 10-, 2.0-, 1.0, and 0.2-percent annual-chance floods. Flood profile elevations on County Ditch Nos. 22 and 26 and an Unnamed Tributary for the 10-, 2.0-, 1.0, and 0.2-percent annual-chance floods were determined with the USACE HEC-2 "Water Surface Profiles," computer program (USACE, 1972).

Roughness coefficients (Manning's "n") for County Ditch Nos. 22 and 26 and the Unnamed Tributary of the Yazoo River were estimated by field inspection of each cross-section. "N" values for County Ditch Nos. 22 and 26 ranged from 0.020 and 0.050 for the channel itself while the overbank "n" values ranged from 0.035 to 0.060. "N" values for the Unnamed Tributary of the Yazoo River ranged from 0.020 to 0.050 for the channel while overbank values ranged from 0.035 to 0.070. The flood profiles for the 10-, 2.0-, 1.0, and 0.2-percent annual-chance floods on Burton Bayou were chosen as the same elevations as County Ditch No. 26 at its confluence with Burton Bayou since the outlet to Burton Bayou into the Yazoo River will be closed due to backwater elevations. Starting water-surface elevations for Fisk Bayou were determined from flood routings.

The water-surface elevations for County Ditch No. 26 were determined by sump analyses of the area bounded on the east by the Canadian National Railroad tracks; the south by a country road; the west of U.S. Highway 49-W; and on the north by State Highway 12 (Sump Area No. 3). The shallow flooding criterion was appropriate for this area.

January 5, 1989, FIS City of Belzoni

Analyses of the hydraulic characteristics of the Yazoo River, Fisk Bayou, Burton Bayou, and County Ditch No. 26, were carried out to provide estimates of the elevations of floods of the selected recurrence intervals along each stream studied in detail.

Using the HEC-2, "Water-Surface Profiles," computer program (USACE, 1972), the 1973 high water flood profile for the Yazoo River was reproduced. Roughness coefficients (Manning's "n") were estimated by field inspection and adjusted as necessary to reproduce the 1973 flood profile. Roughness coefficients in the channel ranged from 0.024 to 0.038 while the overbank values ranged from 0.1 to 0.165. Once the 1973 high water profile was satisfactorily reproduced, the water-surface profiles for each of the selected recurrence intervals were computed. The computed water-surface elevations were checked by rating curves and stage-frequency curves at the Greenwood and Belzoni, Mississippi gages.

Since the 10-, 2.0-, 1.0, and 0.2-percent annual-chance floods on the Yazoo River at Belzoni were considered to be contained by the existing levees on high ground, associated flooding in Belzoni is due to local runoff only. Fisk Bayou is bound on the east and west by a relatively high ridge extending its length on the south by the Belzoni

floodwall and levee system; and on the north by the spoil banks along County Ditch No. 22. The main outlets are the pumping plant and a four-foot diameter culvert under the Belzoni levee located at the confluence of Fisk Bayou and the Yazoo River. A sump analysis was performed to determine the flood profile elevations on Fisk Bayou for the 10-, 2.0-, 1.0-, and 0.2-percent annual chance floods. Flood profile elevations on Ditch No. 25 for the 10-, 2.0-, 1.0-, and 0.2-percent annual chance floods were determined with the USACE HEC-2 "Water Surface Profiles," computer program. Roughness coefficients (Manning's "n") for County Ditch No. 26 were estimated by field inspection at each cross section. Roughness coefficients for County Ditch No. 26 ranged from 0.020 to 0.060. The flood profile elevation for the 10-, 2.0-, 1.0-, and 0.2-percent annual chance floods on Burton Bayou were chosen as the same elevations shown on County Ditch No. 26 at its confluence with Burton Bayou since the outlet on Burton Bayou into the Yazoo River will be closed due to backwater elevations.

Likewise, the area bounded by Fisk Bayou, the Belzoni floodwall and levee system, the Canadian National Railroad tracks, and the County highway north of Belzoni near Castleman was evaluated by sump analyses. Based on the study results and contour information, the use of shallow flooding criteria was appropriate for this area. The water-surface elevations for the 1.0-percent annual-chance flood on County Ditch No. 26 were determined by sump analyses of the area bounded on the east by the Canadian National Railroad tracks; the south by county roads; the west by U.S. Highway 49-W; and on the north by State Highway 12. The shallow flood criterion was also appropriate for this area.

The Mississippi River Project Flood (MRPF), used in lieu of the 0.2-percent annual-chance on the Mississippi River, would overtop the Yazoo River Backwater levees north of Vicksburg, Mississippi, and flood portions of Belzoni and Humphreys County. Recent studies made by the USACE, in conjunction with updating the Mississippi River Project Flood flow-line, indicate that the backwater elevation as a result of levee overtopping would be 114.2 NAVD.

January 1978, FIS Town of Isola

Roughness coefficients (Manning's "n") for the smaller streams were estimated by field inspection at each cross section. The "n" values for Jackson Bayou ranged from 0.030 to 0.100 in the channel itself, while values in the overbanks ranged from 0.050 to 0.120. Channel "n" values for Jackson Bayou Lateral ranged from 0.020 to 0.030, while overbank values ranged from 0.025 to 0.050. Actual backwater computations were made using the HEC-2 computer program (USACE, 1973). Starting flood elevations were developed from known water-surface elevations provided by the USACE based upon data developed for the Kinlock, Mississippi area (USACE, 1971).

November 1978, FIS Town of Louise

Roughness coefficients (Manning's "n") for the computations were estimated on the basis of field inspection for Silver Creek. The roughness coefficients ranged from 0.050 to 0.100 for the main channel and 0.030 to 0.120 for the overbank areas.

Cross-section data for Silver Creek was obtained by field measurement. All bridges and culverts were surveyed to obtain elevation data and structural geometry. Starting water-

surface elevations were based on data derived from the Big Sunflower River gage at Holly Bluff, Mississippi.

This Countywide FIS Analysis

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 4.0 computer program (USACE, 2008). The model was run for the 1-percent-annual-chance storm for the limited detail and approximate studies.

For the Yazoo River in the extreme northeast section of the county, the data used is from the Leflore County (unincorporated areas) Flood Insurance Study dated May 1979. Using the HEC-2, "Water Surface Profiles" computer program, the 1973 high water profile was reproduced from the Yazoo-Tallahatchie River (USACE, 1973). Once the 1973 high water profile was satisfactorily reproduced, the water-surface profiles for each of the selected recurrence intervals were computed. The computed water-surface elevations were checked by rating curves and stage-frequency curves at Swan Lake, Greenwood, and Belzoni, Mississippi gages. Roughness coefficients in the channel ranged from 0.024 to 0.038 while overbank values ranged from 0.010 to 0.016.

The 1.0-percent annual-chance flood elevation for the Steele Bayou Control Structure was determined by analysis of historical gage records. Much of the county north of the Control Structure is below the computed flood elevation. This elevation is presented in Table 2 – Summary of Stillwater Elevations.

TABLE 2. SUMMARY OF STILLWATER ELEVATIONS

<u>FLOODING SOURCE AND LOCATION</u>	<u>ELEVATION (Feet)</u>			
	<u>10-percent</u>	<u>2-percent</u>	<u>1-percent</u>	<u>0.2-percent</u>
Steele Bayou				
At Control Structure	*	*	100.1	*

* Data Not Available

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>.

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.

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 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 0.26 feet to the NAVD88 elevation. The -0.26 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. Dept. of the Interior, 1965). The BFE's 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 Vertical Network Branch, National Geodetic Survey, Coast and Geodetic Survey, National Oceanic and Atmospheric Administration, Rockville, Maryland 20910 (Internet address <http://www.ngs.noaa.gov>).

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. Between cross sections, the boundaries were interpolated using topographic data developed from the State of Mississippi digital orthophotography dated March 2006 with a contour interval of 5 feet (State of Mississippi, 2010).

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 5-foot contours generated from the March 2006 2-foot resolution digital orthophotography from the State of Mississippi (State of Mississippi, 2010).

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.

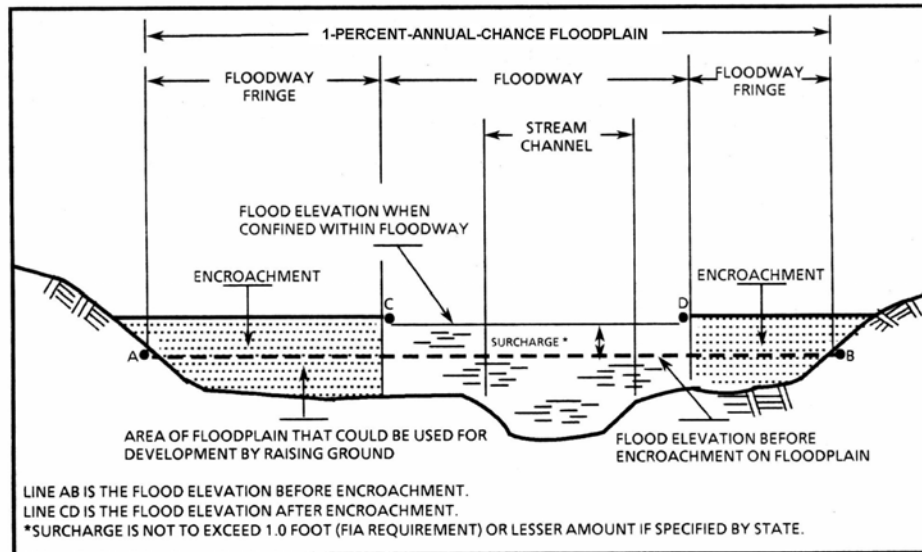
The floodway presented in this FIS report and on the FIRM was computed for certain stream segments on the basis of equal-conveyance reduction from each side of the floodplain. Floodway widths were computed at cross sections. Between cross sections, the floodway boundaries were interpolated. The results of the floodway computations have been tabulated for selected cross sections of detailed study streams (Table 3). 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 3, “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 3. 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.

Floodways were calculated for Silver Creek.



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
SILVER CREEK								
A	86,200	19	156	1.3	102.6	102.6	103.3	0.7
B	86,510	138	1,036	0.2	102.6	102.6	103.3	0.7
C	87,595	138	866	0.2	102.6	102.6	103.3	0.7
D	89,900	176	1,266	0.2	102.6	102.6	103.3	0.7
E	90,070	10	92	2.2	103.8	103.8	104.5	0.7

¹ FEET ABOVE MOUTH

TABLE 3	FEDERAL EMERGENCY MANAGEMENT AGENCY HUMPHREYS COUNTY, MS AND INCORPORATED AREAS
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FLOODWAY DATA	
SILVER CREEK	

5.0 **INSURANCE APPLICATION**

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 AH

Zone AH is the flood insurance rate zone that corresponds to the areas of 1-percent-annual-chance shallow flooding (usually areas of ponding) where average depths are between 1 and 3 feet. Whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within the zone.

Zone AO

Zone AO is the flood insurance rate zone that corresponds to the areas of 1-percent-annual-chance shallow flooding (usually sheet flow on sloping terrain) where the average depths are between 1 and 3 feet. Average whole-foot depths derived from the detailed hydraulic analyses are shown within the zone.

Zone A99

Zone A99 is the flood insurance rate zone that corresponds to areas of the 1-percent floodplain that will be protected by a Federal flood protection system where construction has reached specified statutory milestones. No base flood elevations or depths are shown within this zone.

Zone V

Zone V is the flood insurance rate zone that corresponds to the 1-percent coastal floodplains that have additional hazards associated with storm waves. Because approximate hydraulic analyses are performed for such areas, no base flood elevations are shown within this zone.

Zone VE

Zone VE is the flood insurance rate zone that corresponds to the 1-percent coastal floodplains that have additional hazards associated with storm waves. Whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

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.

Zone D

Zone D is the flood insurance rate zone that corresponds to unstudied areas where flood hazards are undetermined, but possible.

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 Humphreys 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 4, "Community Map History."

COMMUNITY NAME	INITIAL IDENTIFICATION	FLOOD HAZARD BOUNDARY MAP REVISIONS DATE	FIRM EFFECTIVE DATE	FIRM REVISIONS DATE
City of Belzoni	February 1, 1974	May 28, 1976	January 19, 1983	January 5, 1989
Humphreys County (Unincorporated Areas)	April 14, 1978	--	January 19, 1983	January 5, 1989
Town of Isola	June 21, 1974	--	July 3, 1978	--
Town of Louise	November 29, 1974	--	May 1, 1979	--
Town of Silver City	September 14, 1979	--	--	--

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY
HUMPHREYS COUNTY, MS
 AND INCORPORATED AREAS

COMMUNITY MAP HISTORY

7.0 OTHER STUDIES

Information pertaining to revised and unrevised flood hazards for each jurisdiction within Humphreys 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 Humphreys County and should be considered authoritative for 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, GA 30341.

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