FLOOD INSURANCE STUDY

SUNFLOWER COUNTY, MISSISSIPPI
AND INCORPORATED AREAS

Community Name	Community Number
DODDSVILLE, TOWN OF	280162
DREW, CITY OF	280163
INDIANOLA, CITY OF	280164
INVERNESS, TOWN OF	280165
MOORHEAD, CITY OF	280166
RULEVILLE, TOWN OF	280167
SUNFLOWER COUNTY (UNINCORPORATED AREAS)	280195
SUNFLOWER, TOWN OF	280168

SUNFLOWER COUNTY
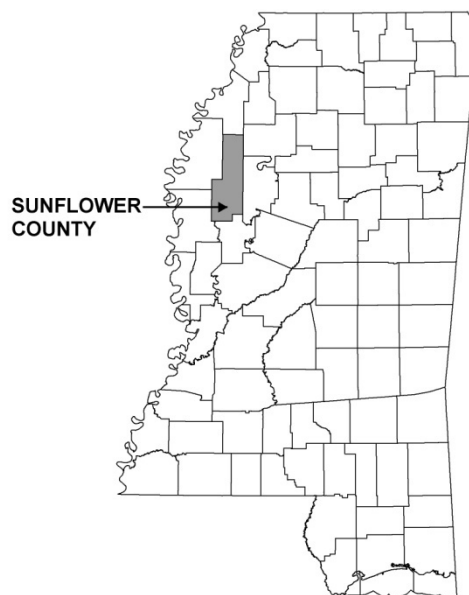
PRELIMINARY

EFFECTIVE: SEP 3 0 2010

Federal Emergency Management Agency
FLOOD INSURANCE STUDY NUMBER
28133CV000A

NOTICE TO
FLOOD INSURANCE STUDY USERS

Communities participating in the National Flood Insurance Program have established repositories of flood hazard data for floodplain management and flood insurance purposes. This Flood Insurance Study may not contain all data available within the repository. It is advisable to contact the community repository for any additional data.

Selected Flood Insurance Rate Map panels for the 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	New Zone
A1 through A30	AE
B	X
C	X

This preliminary Flood Insurance Study Report contains profiles presented at a reduced scale to minimize reproduction costs. All profiles will be included and printed at full scale in the final published report.

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

Initial Countywide FIS Effective Date:

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FLOOD INSURANCE STUDY
SUNFLOWER COUNTY, MISSISSIPPI AND INCORPORATED AREAS

1.0 INTRODUCTION

1.1 Purpose of Study

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

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.

The Digital Flood Insurance Rate Map (DFIRM) and FIS Report for this countywide study have been produced in digital format. Flood hazard information was converted to meet the Federal Emergency Management Agency (FEMA) DFIRM database specifications and Geographic Information and is provided in a digital format so that it can be incorporated into a local GIS and be accessed more easily by the community.

1.2 Authority and Acknowledgements

The sources of authority for this FIS report are the National Flood Insurance Act of 1968 and the Flood Disaster protection Act of 1973.

This FIS was prepared to compile the unincorporated areas and incorporated communities within Sunflower County into a countywide FIS. Information on the authority and acknowledgements for each jurisdiction is included in this countywide FIS, as compiled from their previously published FIS reports.

The hydrologic and hydraulic analyses for the November 1977 City of Drew FIS report were performed by the U.S. Army Corps of Engineers (USACE) for the Federal Insurance Administration (FIA), under Inter-Agency Agreement No. IAA-H-7-76, Project Order No. 6. This work, which was completed in June 1977, covered all significant flooding sources affecting the City of Drew, Mississippi.

The hydrologic and hydraulic analyses for the July 1978 City of Indianola FIS report were performed by the USACE, Vicksburg District, for the FIA, under Inter-Agency

Agreement No. IAA-H-7-76, Project Order No. 14 and Amendment 1 to Project Order No. 14. This work, which was completed in May 1977, covered all significant flooding sources affecting the City of Indianola.

The hydrologic and hydraulic analyses for the January 1982 Town of Inverness FIS report were performed by the USACE, for the FIA, under Inter-Agency Agreement No. IAA-H-7-76, Project Order No. 6. This work, which was completed in June 1977, covered all significant flooding sources affecting the Town of Inverness.

The hydrologic and hydraulic analyses for the October 1977 City of Moorhead FIS report were performed by the USACE, Vicksburg District, for the FIA, under Inter-Agency Agreement No. IAA-H-7-76, Project No. 6. This work, which was completed in June 1977, covered all significant flooding sources affecting the City of Moorhead.

The hydrologic and hydraulic analyses for the November 1977 Town of Ruleville FIS report were performed by the USACE, Vicksburg District, for the FIA, under Inter-Agency Agreement No. IAA-H-7-76, Project No. 6. This work, which was completed in June 1977, covered all significant flooding sources affecting the Town of Ruleville.

The hydrologic and hydraulic analyses for the March 1979 Sunflower County, Unincorporated Areas, FIS report were performed by the USACE, for the FIA, under Inter-Agency Agreement No. H-7-76, Project No. 6 and Amendment 1 to Project Order No. 6. This work, which was completed in October 1977, covered all significant flooding sources affecting the unincorporated areas of Sunflower County.

The hydrologic and hydraulic analyses for the January 1978 Town of Sunflower FIS report were performed by the USACE, Vicksburg District, for the FIA, under Inter-Agency Agreement No. IAA-H-7-76, Project Order No. 6. This work, which was completed in June 1977, covered all significant flooding sources affecting the Town of Sunflower.

For this initial countywide FIS, new hydrologic and hydraulic analyses were performed by the State of Mississippi for FEMA. This study was completed in _____ under Contract No. EMA-2008-CA-5883.

Base map information shown on this Flood Insurance Rate Map (FIRM) was provided in digital format by the State of Mississippi. This information was photogrammetrically compiled at a scale of 1:12,000 from aerial photography dated July 2009.

The digital FIRM was produced using the State Plane Coordinate System, Mississippi West, FIPS Zone 2302. Distance was measured in feet. The horizontal datum was NAD83, GRS1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

1.3   Coordination

An initial Consultation Coordination Officer (CCO) meeting (often referred to as the Scoping meeting) is held with representatives of the communities, FEMA, and the study contractors to explain the nature and purpose of the FIS and to identify the streams to be

studied. A final CCO meeting (often referred to as the Preliminary DFIRM Community Coordination, or PDCC, meeting) is held with representatives of the communities, FEMA, and the study contractors to review the results of the study.

The dates of the historical initial and final CCO meetings held for the jurisdictions within Sunflower County are shown in Table 1: CCO Meeting Dates:

Table 1: CCO Meeting Dates

Community Name	Initial CCO Date	Final CCO Date
City of Drew	April 1975	May 11, 1977
City of Indianola	April 1975	August 4, 1977
Town of Inverness	April 1975	May 12, 1977
City of Moorhead	April 1975	May 11, 1977
Town of Ruleville	April 1975	May 12, 1977
Sunflower County	April 1975	September 7, 1978
Town of Sunflower	April 1975	August 4, 1977

For this initial countywide FIS, the initial CCO meeting was held on August 28, 2008 and attended by representatives of Mississippi Department of Environmental Quality (MDEQ), Mississippi Emergency Management Agency (MEMA), Mississippi Geographic Information, LLC (MGI), the State study contractor, and Sunflower County and the incorporated communities within Sunflower County.

The final CCO meeting was held on _____ to review and accept the results of this FIS. Those who attended this meeting included representatives of Mississippi Department of Environmental Quality, Mississippi Emergency Management Agency, Mississippi Geographic Information, LLC, the State study contractor, and Sunflower County and the incorporated communities within Sunflower County. All problems raised at that meeting have been addressed in this study.

2.0 AREA STUDIED

2.1   Scope of Study

This FIS covers the geographic area of Sunflower County, Mississippi, including the incorporated communities listed in Section 1.1. The scope and methods of this study were proposed to, and agreed upon, by FEMA, Sunflower County, and the State of Mississippi.

The areas studied by detailed methods were selected with priority given to all known flood hazards and areas of projected development or proposed construction through November 1, 2009. The flooding sources studied by detailed methods are presented in Table 2: Flooding Sources Studied y Detailed Methods.

Table 2: Flooding Sources Studied by Detailed Methods

Flooding Source	Reach Length (miles)	Study Limits
Moorhead Bayou	5.2	From the confluence with Quiver River to a point approximately 2,700 feet upstream of Johnny Russell Drive.
Wixon Slough	0.3	From the confluence with Moorhead Bayou to a point approximately 1,500 feet upstream of the confluence with Moorhead Bayou.

The areas studied by enhanced approximate methods were selected for having low to moderate development potential or flood hazards. The flooding sources studied by enhanced approximate methods are presented in Table 3: Flooding Sources Studied by Enhanced Approximate Methods.

Table 3: Flooding Sources Studied by Enhanced Approximate Methods

Flooding Source	Reach Length (miles)	Study Limits
Bear Bayou 2	3.1	From a point approximately 0.1 mile downstream of Highway 49 West to a point approximately 0.6 mile upstream of highway 32.
Beaver Dam Bayou	1.6	From a point approximately 0.3 mile upstream of Faision Road to a point approximately 0.9 mile downstream of Highway 448.
Big Sunflower River	3.6	From the confluence with Big Sunflower River Tributary 40 to a point approximately 1.6 miles downstream of Dockery Road.
Big Sunflower River Tributary 40	0.8	From North Bolivar County Road to the confluence with Big Sunflower River.
East Prong	0.7	From a point approximately 0.2 mile downstream of Highway 49 West to a point approximately 0.9 mile downstream of Highway 49 West.
Mound Bayou	1.6	From a point approximately 400 feet downstream of Mound Road to a point approximately 940 feet downstream of Highway 49 West.

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Table 3: Flooding Sources Studied by Enhanced Approximate Methods

Flooding Source	Reach Length (miles)	Study Limits
Mound Bayou Tributary 3	1.6	From a point approximately 160 feet upstream of Southside Road to a point approximately 0.4 mile downstream of Highway 149.

Numerous streams were studied by approximate methods. Approximate analyses were used to study those areas having a low development potential or minimal flood hazards.

Floodplain boundaries for all flooding sources within the study area have been mapped based upon the most up-to-date topographic data available.

In this FIS, some streams have names other than those used in previously printed FISs. Details of these stream name changes are listed below in Table 4: Stream Name Changes.

Table 4: Stream Name Changes

Community	Old Name	New Name
City of Drew	Tributary 1	Powell Bayou Tributary 1
City of Indianola	Tributary 1	West Prong Tributary 1
Town of Inverness	Tributary 1	Mound Bayou Tributary 1
	Tributary 2	Mound Bayou Tributary 2
	Tributary 3	Mound Bayou Tributary 3

2.2   Community Description

Sunflower County, Mississippi is located in the west central delta area of Mississippi approximately 90 miles north of Vicksburg. Formed in 1844, Sunflower is named after the Big Sunflower River. The county seat was located in Indianola in 1886 after moving around for many years. Sunflower County covers an area of 707 square miles and is bordered to the north by Coahoma County, the east by Tallahatchie and Leflore Counties, the south by Humphries County, and to the east by Washington and Bolivar Counties. The 2008 population estimate for Sunflower County was 30,697 (Reference 1).

Natural ground elevations in Sunflower County range from 100 feet North American Vertical Datum 1988 (NAVD) in the south to 145 feet NAVD in the north. Because the soils of the alluvial plain are so fertile, the majority of the county has been converted for agricultural uses and a wide range of crops are produced in Sunflower County. Among those uses are the production of cotton, soybeans, wheat, rice, catfish and cattle.

Small and medium sized towns and specialized agricultural lands are located adjacent to the path of the Big Sunflower River, which flows through the county. While most of the county has been cleared for agriculture, a few small forests remain, comprised mostly of

sweet-gums, oaks, hackberry, elm, ash, butter pecan, willow, cypress and tupelo-gum (Reference 2).

The annual temperature for Sunflower County ranges from 43 degrees F to 80 degrees F, with a mean annual temperature of 62 degrees F. The annual rainfall averages 55.1 inches, with the majority of the rainfall occurring in the winter and spring seasons (Reference 3).

2.3   Principal Flood Problems

Low-lying and depressional areas are subject to seasonal saturation and periodic flooding is caused by the overflow of the Big Sunflower and Quiver Rivers as well as their tributaries. In 1958 and 1973, the area experienced some of the greatest flooding along the Big Sunflower and Quiver Rivers. It was determined that the floods were greater than the 1-percent-annual-chance-flood in the headwater reaches.

In the City of Drew, a low-lying area in the eastern part of town is affected by backwater on Powell Bayou. Heavy rainfall can cause ponding along Powell Bayou Tributary 1, where several houses were flooded in 1973. The Town of Inverness saw its greatest flooding in 1973 from Big Sunflower River. High water marks in the area ranged from 107.3 feet to 110.9 feet. The City of Moorhead experiences flooding in the northeast corner of town due to backwater flooding from Quiver River which prevents Moorhead Bayou from draining. The flooding experienced by the Town of Sunflower results from water backing up into storm-sewer drainage pipes. Flooding also occurs on the east side of town due to backup of the Sunflower Diversion Channel.

2.4   Flood Protection Measures

There are presently no planned or completed projects specifically designed to reduce flooding in Sunflower County. Channel improvements were made to the Big Sunflower River and the Quiver River between 1959 and 1962, mainly for agricultural purposes. Natural levees exist along the Big Sunflower River, the Quiver River, various bayous and their tributaries.

3.0 ENGINEERING METHODS

For the flooding sources studied by detailed methods in the community, standard hydrologic and hydraulic study methods were used to determine the flood-hazard data required for this study. Flood events of a magnitude that is expected to be equaled or exceeded once on the average during any 10-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for floodplain management and for flood insurance rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10-, 2-, 1-, and 0.2-percent chance, respectively, of being equaled or exceeded during any year. Although the recurrence interval represents the long-term, average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood that equals or exceeds the 1-percent-annual-chance flood in any 50-year period is approximately 40 percent (4 in 10); for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes

3.1   Hydrologic Analyses

3.1.1   Methods for Flooding Sources with New or Revised Analyses in Current Study

For this countywide study, hydrologic analyses were carried out to establish peak discharge frequency relationships for each flooding source affecting the community studied by enhanced approximate methods.

A gaging station on the Big Sunflower River, located at the Town of Sunflower, was the principal source of data for that river. While 73 years of stream gaging data are available, it was decided that only 54 years (1936-1983 and 2003-2008) reflect the current conditions in the watershed. The value for the 100 year peak discharge was determined from a log Pearson Type III distribution of annual peak flow data using the Flood Flow Frequency Analysis computer program for the flood frequency analysis.

Peak discharges for the 1-percent-annual-chance recurrence interval for Bear Bayou 2, Beaver Dam, Big Sunflower River Tributary 40, East Prong, Mound Bayou, Mound Bayou Tributary 3, and West Prong were determined using the Delta Region USGS regression equation for the Mississippi as described in the USGS Water-Resources Investigations report 91-4037 (Reference 4).

3.1.2   Methods for Flooding Sources Incorporated from Previous Studies

This section describes the methodology used in previous studies of flooding sources incorporated into this FIS that were not revised for this countywide study. Hydrologic analyses were carried out to establish peak discharge-frequency relationships for each flooding source affecting the community studied by detailed methods. A summary of peak discharge-drainage area relationships for streams studied by detailed methods is shown in Table 5: Summary of Discharges for Streams Studied by Detailed Methods.

Table 5: Summary of Discharges for Streams Studied by Detailed Methods

Flooding Source and Location	Drainage Area (Sq. Mi.)	Peak Discharges (CFS)			
		10-percent	2-percent	1-percent	0.2-percent
BIG SUNFLOWER RIVER At Sunflower	767	13,780	17,730	19,320	22,850
DOUGHERTY BAYOU At Mississippi Highway 8	14.20	3,347	4,076	4,091	4,969
EAST PRONG Above confluence of Short Bayou	1.81	350	460	510	710
INDIAN BAYOU Near mouth	9.64	2,088	2,718	3,096	3,782

Table 5: Summary of Discharges for Streams Studied by Detailed Methods

Flooding Source and Location	Drainage Area (Sq. Mi.)	Peak Discharges (CFS)			
		10-percent	2-percent	1-percent	0.2-percent
INDIAN BAYOU (continued)					
At Columbus and Greenville Railway bridge	6.39	763	997	1,100	1,419
LUTKEN BAYOU					
Above Powell Bayou Tributary 1	0.42	251	316	352	429
At Park Avenue	1.14	516	653	726	888
At South Boulevard	7.65	1,450	1,903	2,105	2,536
MOORHEAD BAYOU					
Near mouth	12.8	1,624	2,153	2,378	2,854
At northern corporate limit	8.17	1,182	1,572	1,730	2,075
At Washington Street	5.73	758	1,010	1,112	1,333
At Mississippi Highway 3	4.41	446	599	658	789
MOUND BAYOU					
At Baird Street	0.66	194	251	277	335
At Illinois Central Gulf Railroad	3.08	642	838	928	1,124
MOUND BAYOU TRIBUTARY 1					
At cross section A	0.70	249	320	354	428
MOUND BAYOU TRIBUTARY 2					
At cross section A	2.42	462	587	651	790
MOUND BAYOU TRIBUTARY 3					
At Airport Road	0.40	212	269	297	360
Cross section B	0.80	327	418	463	560
At Highway 49 West	0.90	355	455	503	609
POWELL BAYOU					
At FAS 604 bridge	8.48	1,435	1,891	2,089	2,572
At southeast corporate limit	7.46	1,263	1,660	1,846	2,253
POWELL BAYOU TRIBUTARY 1					
At cross section I	0.03	38	47	53	65
At Wilson Avenue	0.24	137	173	193	235
At U.S. Highway 49 West	0.49	234	297	332	404
SHORT BAYOU					
At mouth	0.44	282	355	395	481

Table 5: Summary of Discharges for Streams Studied by Detailed Methods

Flooding Source and Location	Drainage Area (Sq. Mi.)	Peak Discharges (CFS)			
		10-percent	2-percent	1-percent	0.2-percent
SUNFLOWER DIVERSION CHANNEL					
At mouth	6.15	1,830	2,300	2,606	3,149
At bridge to O'Neal Cemetery	2.26	727	900	1,019	1,234
At U.S. Highway 49 West	1.0	317	405	453	551
At Illinois-Central Gulf Railroad	0.5	257	325	362	441
TRIBUTARY 1					
700 feet above Tributary 3	0.22	121	153	170	211
At Floyce Street	0.10	98	122	136	167
TRIBUTARY 2					
At Floyce Street	0.82	388	491	547	678
TRIBUTARY 3					
At corporate limit	0.15	84	106	118	144
TRIBUTARY X					
At mouth	2.314	474	623	689	829
TRIBUTARY Y					
At mouth	0.86	273	349	391	475
TRIBUTARY Z					
At mouth	0.454	325	408	453	553
WEST PRONG					
At corporate limits	2.20	217	291	320	383
At mouth	3.82	592	771	862	1,047
WEST PRONG TRIBUTARY 1					
At mouth	1.06	290	370	420	510
WIXON SLOUGH					
At confluence with Moorhead Bayou	0.6	162	211	234	281

For Moorhead Bayou, Powell Bayou, Sunflower Diversion Channel, Tributary X, Tributary Y, and Tributary Z, values of the 10-, 50-, 100-, and 500-year peak discharges were obtained using the Hydrologic Engineering Center's "Flood Hydrograph Package" (HEC-1) (Reference 5). The computer program computes flood hydrographs utilizing a unit hydrograph defined by Snyder's method parameters. In order to use this program, the initial rainfall loss, a uniform loss

rate, the lag time (t_p), a peaking coefficient (C_p), the storm rainfall, and drainage areas had to be defined as input parameters.

Rainfall for the 10-, 50-, and 100-year return period storms was obtained from the U.S. Weather Bureau's Technical Paper 40 (Reference 6). The Technical Paper No. 40 data were plotted and extrapolated on log-log probability paper to obtain the 500-year rainfall.

The drainage areas of the streams studied in detail were drawn on USGS or USACE topographic maps (Reference 7). Drainage divides were determined by map inspection and field reconnaissance. The drainage areas were planimetered on the maps and the area determined in square miles.

Checks on the logic of calculations and the results obtained for the peak discharges calculated were deemed especially necessary due to the lack of hydrologic data in this region. Two regression analyses formulae were used. The first was found in "Flood Frequency of Mississippi Streams" (Reference 8). The second was a technical memorandum of the USGS dated August 3, 1970 which was obtained from the USGS in Jackson, Mississippi (Reference 9). A comparison was made between the results from HEC-1 and from each of the two regression formulae. Comparison was only made at stations where a simple one-basin runoff situation existed, i.e., not at stations which were the sum of two areas.

For the Big Sunflower River, a gaging station located at the Town of Sunflower was the principle source of data for defining discharge-frequency relationships for that river. While 40 years of stream gaging data were available at this station, it was decided that only the last 13 years (1963-1975) reflect current conditions in the watershed. Values of the 10-, 50-, 100-, and 500-year peak discharges were obtained from a log-Pearson Type III distribution of annual peak flow data (Reference 10).

Peak discharges for the 1-percent-annual-chance recurrence interval for Bear Bayou 2,Beaver Dam, Big Sunflower River Tributary 40, East Prong, Mound Bayou, Mound Bayou Tributary 3, and West Prong were determined using the Delta Region USGS regression equation for the Mississippi as described in the USGS Water-Resources Investigations report 91-4037 (Reference 4).

3.2   Hydraulic Analyses

Hydraulic analyses were performed to estimate the elevations of flooding during the base flood event. Users should be aware that flood elevations shown on the FIRM represent rounded whole-foot elevations and may not exactly reflect the elevations shown on the Flood Profiles or in the Floodway Data Tables in the FIS report. Flood elevations shown on the FIRM are primarily intended for flood insurance rating purposes. For construction and/or floodplain management purposes, users are cautioned to use the flood elevation data presented in this FIS in conjunction with the data shown on the FIRM.

3.2.1   Methods for Flooding Sources with New or Revised Analyses in Current Study

Analyses of the hydraulic characteristics of flooding from the sources studied by enhanced approximate and approximate methods were carried out to provide estimates of the elevations of floods of the selected recurrence intervals.

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

Downstream boundary conditions for the hydraulics 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 of existing effective flood elevations or recalculated flood elevations. Water-surface profiles were computed for enhanced approximate study streams through the use of the USACE HEC-RAS version 4.0.0 (Reference 11). Water-surface profiles were produced for the 1-percent-annual-chance storms for streams studied by enhanced approximate methods.

Manning's "n" values used in the hydraulic computations for both channel and overbank areas were based on recent digital photography and field investigations.

3.2.2   Methods for Flooding Sources Incorporated from Previous Studies

In the March 1979 Sunflower County FIS, cross section data were obtained by field survey. All bridges and culverts were surveyed to obtain elevation data and structural geometry. The locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles (Exhibit 1).

Roughness coefficients, Manning's "n", for the streams were estimated by field inspection at each cross section. Roughness values of streams studied in detail ranged from 0.045 to 0.110 in the channel section. The overbank "n" values ranged from 0.040 to 0.085, but were generally lower than the channel roughness values.

Water-surface profiles were developed using the Hydrologic Engineering Center HEC-2 computer program (Reference 5). Profiles were determined for the 10-, 2-, 1-, and .2-percent-annual-chance floods. Flood elevations of the selected recurrence intervals on the Quiver River determined starting water-surface elevations for profiles on Moorhead Bayou, Powell Bayou, and the Sunflower Diversion Channel. Water-surface elevations on these streams at the point of confluence with the tributaries determined the starting elevations on the tributaries. In some areas, backwater computations assuming steady flow conditions were inappropriate due to the storage of flood volumes in areas upstream from culverts. Reservoir routing procedures were used in these circumstances. Flood profiles were drawn showing computed water-surface elevations to an accuracy of 0.5 foot for floods of the selected recurrence intervals (Exhibit 1). All elevations are measured from NAVD; elevation reference marks used in this study are shown and described on the maps.

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For those parts of the county studied by approximate methods, past floods of the Big Sunflower River and Quiver River were considered in determining the approximate 1-percent-annual-chance flood boundaries. High water marks from the 1958 and 1973 floods were used for these studies and stage probabilities at the gages on the Big Sunflower River at Lombardy, Sunflower, and Moorhead supplemented 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 used for newly created or revised FIS reports and FIRMs was the National Geodetic Vertical Datum of 1929 (NGVD). With the completion of the North American Vertical Datum of 1988 (NAVD), many FIS reports and FIRMs are now prepared using NAVD as the referenced vertical datum.

Flood elevations shown in this FIS report and on the FIRM are referenced to the NAVD. These flood elevations must be compared to structure and ground elevations referenced to the same vertical datum. It is important to note that adjacent counties may be referenced to NGVD, which may result in differences in base flood elevations across county lines.

Ground, structure, and flood elevations may be compared and/or referenced to NGVD by adding 0.27 feet to the NAVD elevation. The -0.27 foot value is an average for the entire county. 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 the FIS report to NGVD 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 NAVD, see the FEMA publication entitled *Converting the National Flood Insurance Program to the North American Vertical Datum of 1988* (Reference 12), visit the National Geodetic Survey website at www.ngs.noaa.gov, or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

Temporary vertical monuments are often established during the preparation of a flood hazard analysis for the purpose of establishing local vertical control. Although these monuments are not shown on the FIRM, they may be found in the Technical Support Data Notebook associated with the FIS report and FIRM for this community. Interested individuals may contact FEMA to access these data.

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

4.0 FLOODPLAIN MANAGEMENT APPLICATIONS

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

4.1 Floodplain Boundaries

To provide a national standard without regional discrimination, the 1-percent-annual-chance flood has been adopted by FEMA as the base flood for floodplain management purposes. The 0.2-percent-annual-chance flood is employed to indicate additional areas of flood risk in the community. For each stream studied by detailed or limited detailed methods, the 1- and 0.2-percent-annual-chance floodplain boundaries have been delineated using the flood elevations determined at each cross section. Between cross sections, the boundaries were interpolated using topographic maps at a scale of 1:12,000 with contour interval of 2 feet.   For each stream studied by approximate methods, the 1-percent-annual-chance floodplain boundaries were interpolated using topographic maps at a scale of 1:12,000 with contour interval of 2 feet.

The 1- and 0.2-percent-annual-chance floodplain boundaries for streams studied by detailed methods are shown on the FIRM. On this map, the 1-percent-annual-chance floodplain boundary corresponds to the boundary of the areas of special flood hazards (Zones A and AE), and the 0.2-percent-annual-chance floodplain boundary corresponds to the boundary of areas of moderate flood hazards (Zone X). 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 streams studied by approximate methods, only the 1-percent-annual-chance floodplain boundary is shown on the FIRM (Exhibit 2).

4.2 Floodways

Encroachment on floodplains, such as structures and fill, reduces flood-carrying capacity, increases flood heights and velocities, and increases flood hazards in areas beyond the encroachment itself. One aspect of floodplain management involves balancing the economic gain from floodplain development against the resulting increase in flood hazard. For purposes of the NFIP, a floodway is used as a tool to assist local communities in this aspect of floodplain management. Under this concept, the area of the 1-percent-

annual-chance floodplain is divided into a floodway and a floodway fringe. The floodway is the channel of a stream, plus any adjacent floodplain areas, that must be kept free of encroachment so that the base flood can be carried without substantial increases in flood heights. Minimum Federal standards limit such increases to 1 foot, provided that hazardous velocities are not produced. The floodways in this study are presented to local agencies as minimum standards that can be adopted directly or that can be used as a basis for additional floodway studies.

The floodways presented in this study were computed for certain stream segments on the basis of equal-conveyance reduction from each side of the floodplain. Floodway widths were computed at cross sections. Between cross sections, the floodway boundaries were interpolated. The results of the floodway computations are tabulated for selected cross sections and provided in Table 6: Floodway Data Table. The computed floodway is shown on the FIRM (Exhibit 2). In cases where the floodway and 1-percent-annual-chance floodplain boundaries are either close together or collinear, only the floodway boundary is shown on the FIRM.

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. To reduce the risk of property damage in areas where the stream velocities are high, the community may wish to restrict development in areas outside the floodway.

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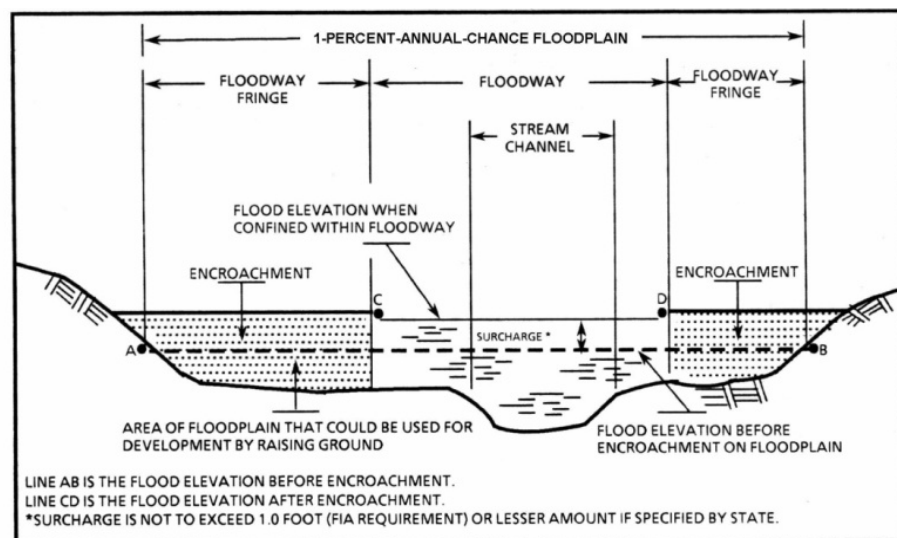
Figure 1: Floodway Schematic

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Indian Bayou								
A	8,780[1]	252	1,375	0.9	114.7	114.7	114.8	0.1
B	9,450[1]	167	1,158	1.0	114.7	114.7	114.9	0.2
C	10,380[1]	49	490	2.4	115.4	115.4	115.6	0.2
D	11,200[1]	151	415	2.7	115.5	115.5	115.7	0.2
E	12,500[1]	230	2,058	0.5	115.6	115.6	116.6	1.0
F	12,550[1]	81	999	1.0	115.6	115.6	116.6	1.0
Lutken Bayou								
A	0[2]	93	1,112	1.9	133.4	128.5[3]	129.2	0.7
B	465[2]	410	3,179	0.5	133.4	128.6[3]	129.3	0.7
C	2,360[2]	217	1,176	0.8	133.5	128.8[3]	129.4	0.6
D	3,695[2]	20	150	4.8	133.5	130.8[3]	131.6	0.8
E	4,380[2]	123	553	1.1	133.6	131.4[3]	132.1	0.7

[1] FEET ABOVE BRIDGE ON KINLOCK ROAD
[2] FEET ABOVE SOUTH BOULEVARD
[3] ELEVATION COMPUTED WITHOUT CONSIDERATION OF BACKWATER EFFECTS FROM BLUE LAKE

TABLE 6

FEDERAL EMERGENCY MANAGEMENT AGENCY
SUNFLOWER COUNTY, MS
AND INCORPORATED AREAS

FLOODWAY DATA

INDIAN BAYOU-LUTKEN BAYOU

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Moorhead Bayou								
A	8,380[1]	168	1,584	1.5	114.3	111.3[2]	112.1	0.8
B	9,500[1]	186	1,551	1.5	114.3	111.7[2]	112.5	0.8
C	10,940[1]	109	1,217	2.0	114.3	112.1[2]	113.1	1.0
D	12,240[1]	21	351	6.8	114.3	113.4[2]	114.4	1.0
Mound Bayou								
A	30[3]	125	192	4.8	111.2	111.2[4]	111.2	0.0
B	1,160[3]	23	152	6.1	115.1	113.8[4]	114.2	0.4
C	1,320[3]	300	1,252	0.7	115.1	115.1	116.1	1.0
D	3,100[3]	199	1,245	0.2	116.2	116.2	117.1	0.9
E	4,500[3]	159	617	0.4	116.2	116.2	117.2	1.0
Mound Bayou Tributary 1								
A	360[5]	84	197	1.8	118.7	118.7	119.4	0.7

[1] FEET ABOVE CONFLUENCE WITH QUIVER RIVER
[2] ELEVATION COMPUTED WITHOUT CONSIDERATION OF BACKWATER EFFECTS FROM QUIVER RIVER
[3] FEET ABOVE OLD HIGWAY 49W
[4] ELEVATION COMPUTED WITHOUT CONSIDERATION OF BACKWATER EFFECTS FROM LAKE DAWSON
[5] FEET ABOVE CONFLUENCE WITH MOUND BAYOU TRIBUTARY 2

TABLE 6

FEDERAL EMERGENCY MANAGEMENT AGENCY
SUNFLOWER COUNTY, MS
AND INCORPORATED AREAS

FLOODWAY DATA

MOORHEAD BAYOU- MOUND BAYOU- MOUND BAYOU TRIBUTARY 1

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Mound Bayou Tributary 2								
A	350[1]	77	226	2.9	116.1	115.9[2]	115.9	0.0
B	450[1]	85	275	2.4	116.5	116.5[2]	116.5	0.0
C	1,440[1]	248	337	1.8	117.4	117.4[2]	117.8	0.4
D	2,440[1]	197	486	0.8	117.7	117.7[2]	118.4	0.7
Mound Bayou Tributary 3								
A	3,080[3]	127	396	1.3	112.2	112.2	112.9	0.7
B	4,050[3]	187	335	1.4	112.7	112.7	113.5	0.8
Powell Bayou								
A	5,000[4]	62	442	4.7	129.7	129.7[5]	130.5	0.8
B	6,800[4]	106	819	2.3	131.5	131.5[5]	132.4	0.9
C	9,770[4]	368	1,929	0.8	133.4	133.4	134.0	0.6
D	10,850[4]	638	3,908	0.3	133.4	133.4	134.0	0.6
E	13,750[4]	627	3,417	0.3	133.4	133.4	134.1	0.7

[1] FEET ABOVE CONFLUENCE WITH MOUND BAYOU
[2] ELEVATION COMPUTED WITHOUT CONSIDERATION OF BACKWATER EFFECTS FROM MOUND BAYOU
[3] FEET ABOVE MOUTH
[4] FEET ABOVE FEDERAL AID SECONDARY HIGHWAY 604 BRIDGE
[5] ELEVATION COMPUTED WITHOUT CONSIDERATION OF BACKWATER EFFECTS FROM POWELL BAYOU

TABLE 6

FEDERAL EMERGENCY MANAGEMENT AGENCY
SUNFLOWER COUNTY, MS
AND INCORPORATED AREAS

FLOODWAY DATA

MOUND BAYOU TRIBUTARY 2-MOUND BAYOU TRIBUTARY 3-POWELL BAYOU

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Powell Bayou Tributary 1								
A	250[1]	91	266	1.2	133.2	128.3[2]	128.8	0.5
B	870[1]	147	490	0.7	133.2	129.0[2]	129.3	0.3
C	1350[1]	145	905	0.2	133.2	131.4[2]	131.7	0.3
D	2410[1]	124	540	0.4	133.2	132.1[2]	132.4	0.3
E	3120[1]	61	273	0.7	136.1	136.1[2]	136.3	0.2
F	3480[1]	106	393	0.5	136.1	136.1	136.6	0.5
G	4670[1]	162	486	0.4	136.1	136.1	136.6	0.5
H	6390[1]	365	1214	0.1	137.7	137.7	137.9	0.2
Short Bayou								
A	730[3]	225	452	0.9	118.0	112.9[4]	112.9	0.0
B	1,240[3]	74	462	0.9	118.0	116.0[4]	116.2	0.2
C	1,685[3]	29	137	2.4	118.0	116.1[4]	116.4	0.3
D	2,470[3]	55	129	2.5	118.0	117.6[4]	118.3	0.7
E	3,200[3]	125	175	1.9	118.3	118.3	119.3	1.0

[1] FEET ABOVE CONFLUENCE WITH POWELL BAYOU
[2] ELEVATION COMPUTED WITHOUT CONSIDERATION OF BACKWATER EFFECTS FROM POWELL BAYOU
[3] FEET ABOVE MOUTH
[4] ELEVATION COMPUTED WITHOUT CONSIDERATION OF BACKWATER EFFECTS FROM EAST PRONG

TABLE 6

FEDERAL EMERGENCY MANAGEMENT AGENCY
SUNFLOWER COUNTY, MS
AND INCORPORATED AREAS

FLOODWAY DATA

POWELL BAYOU TRIBUTARY 1- SHORT BAYOU

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Sunflower Diversion Channel								
A	450[1]	176	660	4.0	114.7	114.0[2]	114.0	0.0
B	4,980[1]	1,475	3,717	0.7	115.5	115.3[2]	115.7	0.4
C	7,980[1]	1,972	1,048	1.7	115.7	115.6[2]	116.1	0.5
D	11,100[1]	1,259	1,197	1.1	116.7	116.7	117.6	0.9
E	13,600[1]	54	422	2.5	119.0	119.0	119.8	0.8
F	16,250[1]	2,532	4,460	0.2	119.3	119.3	120.1	0.8
G	19,730[1]	1,721	4,698	0.1	119.3	119.3	120.1	0.8
Tributary 1								
A	2,325[3]	83	364	0.4	134.5	134.5	135.5	1.0
B	3,110[3]	65	94	1.4	135.0	135.0	136.0	1.0
Tributary 2								
A	0	*	*	*	129.7	*	*	*
B	1,355[4]	186	341	1.6	129.7	127.9[5]	128.8	0.9
C	1,970[4]	290	427	1.3	129.7	128.8[5]	129.4	0.6
D	2,610[4]	147	209	2.6	132.0	132.0	132.5	0.5
E	3,270[4]	300	720	0.8	132.5	132.5	133.3	0.8

[1] FEET ABOVE MOUTH
[2] ELEVATION COMPUTED WITHOUT CONSIDERATION OF BACKWATER EFFECTS FROM ROUNDAWAY BAYOU
[3] FEET ABOVE LIMIT OF DETAILED STUDY (LIMIT OF DETAILED STUDY IS APPROXIMATELY 2,300 FEET DOWNSTREAM OF WEST FLOYCE STREET)
[4] FEET ABOVE FLOYCE STREET CULVERT
[5] ELEVATION COMPUTED WITHOUT CONSIDERATION OF BACKWATER EFFECTS FROM QUIVER RIVER
*DATA NOT AVAILABLE

TABLE 6	FEDERAL EMERGENCY MANAGEMENT AGENCY **SUNFLOWER COUNTY, MS** AND INCORPORATED AREAS	**FLOODWAY DATA** **SUNFLOWER DIVERSION CHANNEL-TRIBUTARY 1-TRIBUTARY 2**

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Tributary 3								
A	340^1	71	176	0.7	134.2	134.2	134.8	0.6
B	$1,030^1$	30	108	1.1	134.5	134.5	135.1	0.6
Tributary X								
A	720^2	14	119	5.8	114.3	112.0^3	112.0	0.0
B	$1,900^2$	12	120	5.7	115.0	113.6^3	114.5	0.9
C	$4,450^2$	233	1,771	0.3	115.0	113.7^3	114.7	1.0
D	$7,280^2$	136	662	0.9	115.0	114.0^3	114.9	0.9
Tributary Y								
A	450^4	93	219	1.6	117.1	116.9^5	117.4	0.5
B	$2,390^4$	75	212	1.0	117.8	117.7^5	118.5	0.8
C	$6,730^4$	4	19	4.0	118.7	118.7	119.5	0.8
Tributary Z								
A	$1,600^6$	280	607	0.7	133.5	131.3^7	132.1	0.8

[1] FEET ABOVE LIMIT OF DETAILED STUDY (LIMIT OF DETAILED STUDY IS APPROXIMATELY 290 FEET DOWNSTREAM OF WEST HEAD CIRCLE)
[2] FEET ABOVE CONFLUENCE WITH MOORHEAD BAYOU
[3] ELEVATION COMPUTED WITHOUT CONSIDERATION OF BACKWATER EFFECTS FROM MOORHEAD BAYOU
[4] FEET ABOVE CONFLUENCE WITH SUNFLOWER DIVERSION CHANNEL
[5] ELEVATION COMPUTED WITHOUT CONSIDERATION OF BACKWATER EFFECTS FROM SUNFLOWER DIVERSION CHANNEL
[6] FEET ABOVE CONFLUENCE WITH POWELL BAYOU
[7] ELEVATION COMPUTED WITHOUT CONSIDERATION OF BACKWATER EFFECTS FROM POWELL BAYOU

TABLE 6

FEDERAL EMERGENCY MANAGEMENT AGENCY
SUNFLOWER COUNTY, MS
AND INCORPORATED AREAS

FLOODWAY DATA

TRIBUTARY 3-TRIBUTARY X-TRIBUTARY Y-TRIBUTARY Z

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
West Prong								
A	610[1]	40	267	3.2	115.7	109.9[2]	110.9	1.0
B	1,610[1]	224	706	1.2	115.8	110.8[2]	111.4	0.6
C	3,570[1]	165	589	1.5	115.8	113.1[2]	113.2	0.1
West Prong Tributary 1								
A	800[3]	148	573	0.7	116.2	115.6[4]	115.6	0.0
B	1,380[3]	9	50	8.4	116.5	116.5	116.5	0.0
C	1,680[3]	236	975	0.4	120.1	120.1	120.6	0.5

[1] FEET ABOVE CONFLUENCE WITH INDIAN BAYOU AND EAST PRONG
[2] ELEVATION COMPUTED WITHOUT CONSIDERATION OF BACKWATER EFFECTS FROM INDIAN BAYOU AND EAST PRONG
[3] FEET ABOVE CONFLUENCE WITH WEST PRONG
[4] ELEVATION COMPUTED WITHOUT CONSIDERATION OF BACKWATER EFFECTS FROM WEST PRONG

TABLE 6

FEDERAL EMERGENCY MANAGEMENT AGENCY
SUNFLOWER COUNTY, MS
AND INCORPORATED AREAS

FLOODWAY DATA

WEST PRONG-WEST PRONG TRIBUTARY 1

5.0 <u>INSURANCE APPLICATIONS</u>

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

Zone A

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

Zone AE

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

Zone AO

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

Zone X

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

6.0 <u>FLOOD INSURANCE RATE MAP</u>

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

For flood insurance applications, the map designates flood insurance rate zones as described in Section 5.0 and, in the 1-percent-annual-chance floodplains that were studied by detailed methods, shows selected whole-foot BFEs or average depths. Insurance agents use zones and BFEs in conjunction with information on structures and their contents to assign premium rates for flood insurance policies.

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

The countywide FIRM presents flooding information for the entire geographic area of Sunflower 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 are presented in Table 7: Community Map History.

7.0 OTHER STUDIES

FIS reports were previously prepared for the unincorporated and incorporated areas of Sunflower County (References 13-19).

This FIS report supersedes or is compatible with all previous studies published on streams studied in this report and should be considered authoritative for the purposes of the NFIP.

8.0 LOCATION OF DATA

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

9.0 BIBLIOGRAPHY AND REFERENCES

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5.   U.S. Army Corps of Engineers, Computer Program HEC-1, 1973, Computer Program HEC-2, 1973, Davis, California.

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8.   U.S. Department of the Interior, Geological Survey, Flood Frequency of Mississippi Streams, B.E. Colson and J.W. Hudson, 1976.

9.   U.S. Geological Survey, Memorandum, Jackson, Mississippi office, August 3, 1970.

COMMUNITY NAME	INITIAL IDENTIFICATION	FLOOD HAZARD BOUNDARY MAP REVISIONS DATE	FIRM EFFECTIVE DATE	FIRM REVISIONS DATE
Doddsville, Town of	November 8, 1974	---	July 17, 1986	---
Drew, City of	May 10, 1974	---	May 1, 1978	---
Indianola, City of	May 24, 1974	---	January 3, 1979	---
Inverness, Town of	May 31, 1974	---	May 15, 1978	January 15, 1982
Moorhead, City of	May 10, 1974	---	April 17, 1978	---
Ruleville, Town of	May 10, 1974	---	May 1, 1978	---
Sunflower County (Unincorporated Areas)	November 11, 1977	---	September 28, 1979	---
Sunflower, Town of	May 17, 1974	---	July 17, 1978	---

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

SUNFLOWER COUNTY, MS
AND INCORPORATED AREAS

COMMUNITY MAP HISTORY

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11. U.S. Army Corps of Engineers, Hydrologic Engineering Center, <u>HEC-RAS River Analysis System, Version 4.0</u>, Davis, California, April 2008.

12. Federal Emergency Management Agency. *Converting the national Flood Insurance Program to the North American Vertical Datum of 1988 – Guidelines for Community Officials, Engineers, and Surveyors.* 6/1/1992. 3-0170.

13. U.S. Department of Housing and Urban Development, Federal Insurance Administration. *Flood Insurance Study, City of Drew, Sunflower County, Mississippi*. Washington, D.C., November 1977.

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16. U.S. Department of Housing and Urban Development, Federal Insurance Administration. *Flood Insurance Study, City of Moorhead, Sunflower County, Mississippi*. Washington, D.C., October 1977.

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19. U.S. Department of Housing and Urban Development, Federal Insurance Administration. *Flood Insurance Study, Town of Sunflower, Sunflower County, Mississippi*. Washington, D.C., January 1978.

ELEVATION IN FEET (NAVD)

STREAM DISTANCE IN MILES ABOVE MOUTH

LIMIT OF DETAILED STUDY

TORREY STREET

LIMIT OF DETAILED STUDY

LEGEND

0.2% ANNUAL CHANCE FLOOD
1% ANNUAL CHANCE FLOOD
2% ANNUAL CHANCE FLOOD
10% ANNUAL CHANCE FLOOD
STREAM BED
Ⓐ CROSS SECTION LOCATION

FEDERAL EMERGENCY MANAGEMENT AGENCY

SUNFLOWER COUNTY, MS
AND INCORPORATED AREAS

FLOOD PROFILES

BIG SUNFLOWER RIVER

01P

ELEVATION IN FEET (NAVD)

STREAM DISTANCE IN FEET ABOVE MISSISSIPPI HIGHWAY 8

LIMIT OF DETAILED STUDY
MISSISSIPPI HIGHWAY 8

W FLOYCE STREET

LIMIT OF DETAILED STUDY

LEGEND

0.2% ANNUAL CHANCE FLOOD
1% ANNUAL CHANCE FLOOD
2% ANNUAL CHANCE FLOOD
10% ANNUAL CHANCE FLOOD
STREAM BED
CROSS SECTION LOCATION

FEDERAL EMERGENCY MANAGEMENT AGENCY

SUNFLOWER COUNTY, MS
AND INCORPORATED AREAS

FLOOD PROFILES

DOUGHERTY BAYOU

FLOOD PROFILES

EAST PRONG

FEDERAL EMERGENCY MANAGEMENT AGENCY

SUNFLOWER COIUNTY, MS
AND INCORPORATED AREAS

03P

ELEVATION IN FEET (NAVD)

STREAM DISTANCE IN FEET ABOVE BRIDGE ON KINLOCK ROAD

LIMIT OF DETAILED STUDY

LOW DAM

ALEXANDER AVENUE

RAILROAD

WESTSIDE AVENUE

CONFLUENCE OF
WEST AND EAST RPONGS

LEGEND

0.2% ANNUAL CHANCE FLOOD

1% ANNUAL CHANCE FLOOD

2% ANNUAL CHANCE FLOOD

10% ANNUAL CHANCE FLOOD

STREAM BED

CROSS SECTION LOCATION

FEDERAL EMERGENCY MANAGEMENT AGENCY

SUNFLOWER COUNTY, MS
AND INCORPORATED AREAS

FLOOD PROFILES

INDIAN BAYOU

04P

ELEVATION IN FEET (NAVD)

STREAM DISTANCE IN FEET ABOVE SOUTH BOULEVARD

LIMIT OF DETAILED STUDY
SOUTH BOULEVARD
LOMBARDY ROAD
LIMIT OF DETAILED STUDY

LEGEND
0.2% ANNUAL CHANCE FLOOD
1% ANNUAL CHANCE FLOOD
2% ANNUAL CHANCE FLOOD
10% ANNUAL CHANCE FLOOD
STREAM BED
CROSS SECTION LOCATION

FEDERAL EMERGENCY MANAGEMENT AGENCY

SUNFLOWER COUNTY, MS
AND INCORPORATED AREAS

FLOOD PROFILES

LUTKEN BAYOU

05P

ELEVATION IN FEET (NAVD)

STREAM DISTANCE IN FEET ABOVE CONFLUENCE WITH QUIVER RIVER

CONFLUENCE WITH QUIVER RIVER

LIMIT OF DETAILED STUDY

JOHN SHEFFIELD ROAD

U.S. 82
U.S. 82

CONFLUENCE OF TRIBUTARY X

WASHINGSTON STREET

RAILROAD

1% ANNUAL CHANCE BACKWATER EFFECTS FROM QUIVER RIVER

LEGEND

0.2% ANNUAL CHANCE FLOOD
1% ANNUAL CHANCE FLOOD
2% ANNUAL CHANCE FLOOD
10% ANNUAL CHANCE FLOOD
STREAM BED
CROSS SECTION LOCATION

FEDERAL EMERGENCY MANAGEMENT AGENCY

SUNFLOWER COUNTY, MS
AND INCORPORATED AREAS

FLOOD PROFILES

MOORHEAD BAYOU

06P

105   110   115   120

22,000

24,000

26,000

28,000

CONFLUENCE OF WIXON SLOUGH

OLIVE STREET

JOHNNY RUSSELL DRIVE

LIMIT OF DETAILED STUDY

STREAM DISTANCE IN FEET ABOVE CONFLUENCE WITH QUIVER RIVER

105   110   115   120

LEGEND

A   CROSS SECTION LOCATION

STREAM BED*

10% ANNUAL CHANCE FLOOD

2% ANNUAL CHANCE FLOOD

1% ANNUAL CHANCE FLOOD

0.2% ANNUAL CHANCE FLOOD

* DATA NOT AVAILABLE

07P

FEDERAL EMERGENCY MANAGEMENT AGENCY

SUNFLOWER COUNTY, MS
AND INCORPORATED AREAS

FLOOD PROFILES

MOORHEAD BAYOU

FLOOD PROFILES

MOUND BAYOU

08P

ELEVATION IN FEET (NAVD)

STREAM DISTANCE IN FEET ABOVE CONFLUENCE WITH MOUND BAYOU TRIBUTARY 2

CONFLUENCE WITH
MOUND BAYOU TRIBUTARY 2

LIMIT OF DETAILED STUDY

LEGEND

0.2% ANNUAL CHANCE FLOOD
1% ANNUAL CHANCE FLOOD
2% ANNUAL CHANCE FLOOD
10% ANNUAL CHANCE FLOOD
STREAM BED
CROSS SECTION LOCATION

FEDERAL EMERGENCY MANAGEMENT AGENCY

SUNFLOWER COUNTY, MS
AND INCORPORATED AREAS

FLOOD PROFILES

MOUND BAYOU TRIBUTARY 1

09P

ELEVATION IN FEET (NAVD)

STREAM DISTANCE IN FEET ABOVE CONFLUENCE WITH MOUND BAYOU

CONFLUENCE WITH MOUND BAYOU

MONTGOMERY DRIVE

CONFLUENCE OF
MOUND BAYOU TRIBUTARY 1

LIMIT OF STUDY

LEGEND

0.2% ANNUAL CHANCE FLOOD
1% ANNUAL CHANCE FLOOD
2% ANNUAL CHANCE FLOOD
10% ANNUAL CHANCE FLOOD
STREAM BED
CROSS SECTION LOCATION

FEDERAL EMERGENCY MANAGEMENT AGENCY

SUNFLOWER COUNTY, MS
AND INCORPORATED AREAS

FLOOD PROFILES

MOUND BAYOU TRIBUTARY 2

10P

FLOOD PROFILES

MOUND BAYOU TRIBUTARY 3

FEDERAL EMERGENCY MANAGEMENT AGENCY

SUNFLOWER COUNTY, MS
AND INCORPORATED AREAS

11P

ELEVATION IN FEET (NAVD)

STREAM DISTANCE IN FEET ABOVE FAS 604 BRIDGE

LIMIT OF DETAILED STUDY

CONFLUENCE OF
POWELL BAYOU TRIBUTARY 1

SWOOPE ROAD

CONFLUENCE OF TRIBUTARY Z

LIMIT OF DETAILED STUDY

LEGEND

0.2% ANNUAL CHANCE FLOOD
1% ANNUAL CHANCE FLOOD
2% ANNUAL CHANCE FLOOD
10% ANNUAL CHANCE FLOOD
STREAM BED
CROSS SECTION LOCATION

FEDERAL EMERGENCY MANAGEMENT AGENCY

SUNFLOWER COUNTY, MS
AND INCORPORATED AREAS

FLOOD PROFILES

POWELL BAYOU

12P

ELEVATION IN FEET (NAVD)

STREAM DISTANCE IN FEET ABOVE CONFLUENCE WITH POWELL BAYOU

1% ANNUAL CHANCE BACKWATER EFFEECTS FROM POWELL BAYOU

CONFLUENCE WITH POWELL BAYOU
EAST STREET
U.S. HIGHWAY 49W
BRIDGE AVENUE
EAST SHAW AVENUE
WILSON AVENUE
EAST PARK AVENUE
NORTH BOOTH STREET
SHURDEN AVENUE
EAST STREET
UNNAMED ROAD

LEGEND

0.2% ANNUAL CHANCE FLOOD
1% ANNUAL CHANCE FLOOD
2% ANNUAL CHANCE FLOOD
10% ANNUAL CHANCE FLOOD
STREAM BED
CROSS SECTION LOCATION

FEDERAL EMERGENCY MANAGEMENT AGENCY

SUNFLOWER COUNTY, MS
AND INCORPORATED AREAS

FLOOD PROFILES

POWELL BAYOU TRIBUTARY 1

ELEVATION IN FEET (NAVD)

STREAM DISTANCE IN FEET ABOVE MOUTH

CONFLUENCE WITH EAST PRONG

CHAPMAN STREET

U.S. HIGHWAY 82

LIMIT OF STUDY

1% ANNUAL CHANCE BACKWATER EFFECTS FROM EAST PRONG

LEGEND

0.2% ANNUAL CHANCE FLOOD
1% ANNUAL CHANCE FLOOD
2% ANNUAL CHANCE FLOOD
10% ANNUAL CHANCE FLOOD
STREAM BED
CROSS SECTION LOCATION

FEDERAL EMERGENCY MANAGEMENT AGENCY

SUNFLOWER COUNTY, MS
AND INCORPORATED AREAS

FLOOD PROFILES

SHORT BAYOU

ELEVATION IN FEET (NAVD)

STREAM DISTANCE IN FEET ABOVE MOUTH

LIMIT OF DETAILED STUDY

S TAYLOR ROAD

CONFLUENCE OF TRIBUTARY Y

ITTA BENA ROAD

HIGHWAY 49W

DWYER ROAD

RAILROAD

LIMIT OF STUDY

LEGEND

0.2% ANNUAL CHANCE FLOOD
1% ANNUAL CHANCE FLOOD
2% ANNUAL CHANCE FLOOD
10% ANNUAL CHANCE FLOOD
STREAM BED
CROSS SECTION LOCATION

FEDERAL EMERGENCY MANAGEMENT AGENCY

FLOOD PROFILES

SUNFLOWER COUNTY, MS
AND INCORPORATED AREAS

SUNFLOWER DIVERSION CHANNEL

ELEVATION IN FEET (NAVD)

STREAM DISTANCE IN FEET ABOVE LIMIT OF DETAILED STUDY (LIMIT OF DETAILED STUDY IS APPROXIMATELY 2,300 FEET DOWNSTREAM OF WEST FLOYCE STREET)

LIMIT OF DETAILED STUDY

WEST FLOYCE STREET

LIMIT OF STUDY

LEGEND

0.2% ANNUAL CHANCE FLOOD
1% ANNUAL CHANCE FLOOD
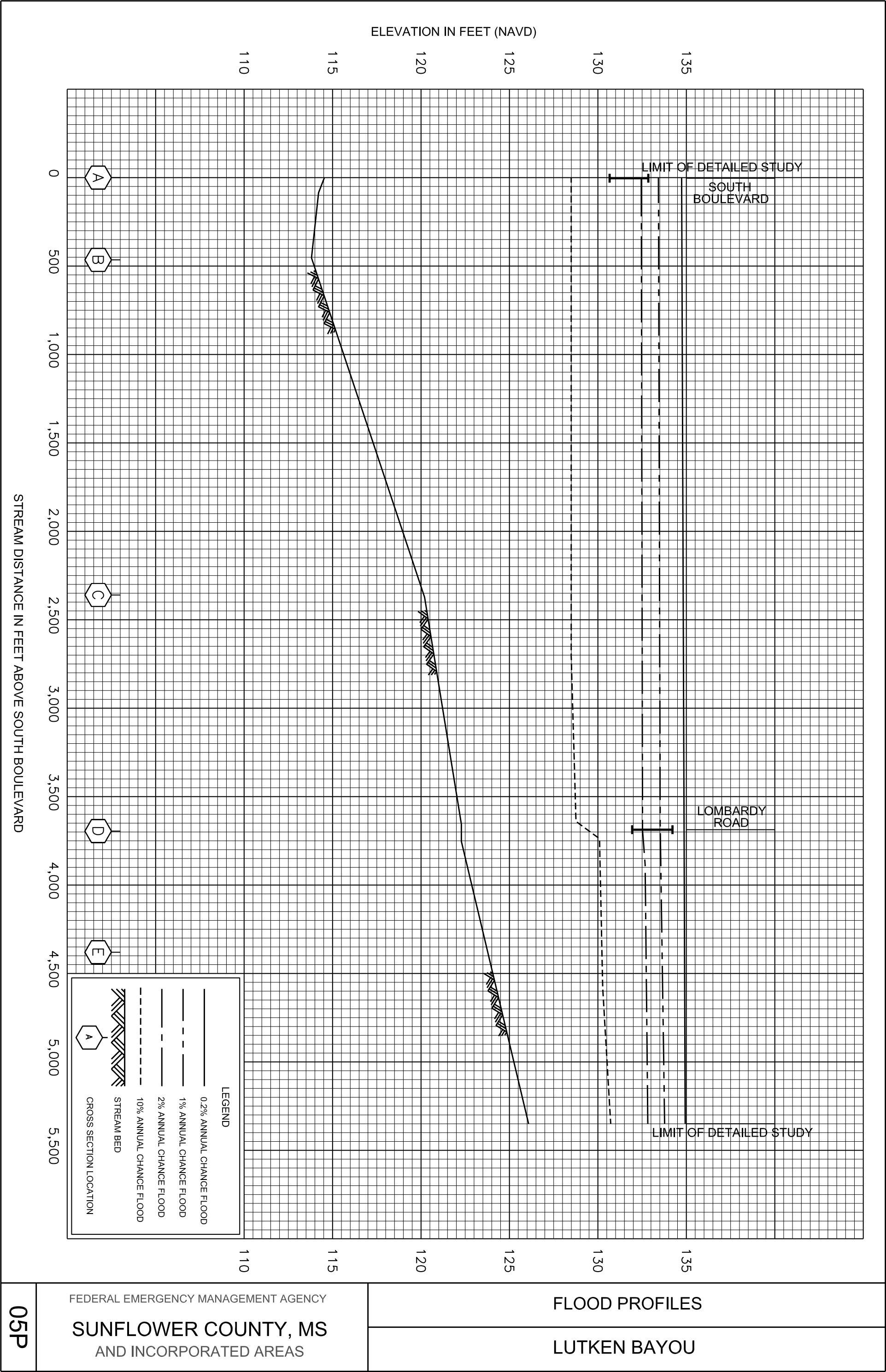2% ANNUAL CHANCE FLOOD
10% ANNUAL CHANCE FLOOD
STREAM BED
CROSS SECTION LOCATION

FEDERAL EMERGENCY MANAGEMENT AGENCY

SUNFLOWER COUNTY, MS
AND INCORPORATED AREAS

FLOOD PROFILES

TRIBUTARY 1

16P

ELEVATION IN FEET (NAVD)

STREAM DISTANCE IN FEET ABOVE TWINER STREET

LIMIT OF DETAILED STUDY
TWINER STREET

1% ANNUAL CHANCE BACKWATER EFFECTS FROM QUIVER RIVER

BRIDGE DEMOLISHED

CONNELL AVENUE
LIMIT OF STUDY

LEGEND

0.2% ANNUAL CHANCE FLOOD
1% ANNUAL CHANCE FLOOD
2% ANNUAL CHANCE FLOOD
10% ANNUAL CHANCE FLOOD
STREAM BED
CROSS SECTION LOCATION
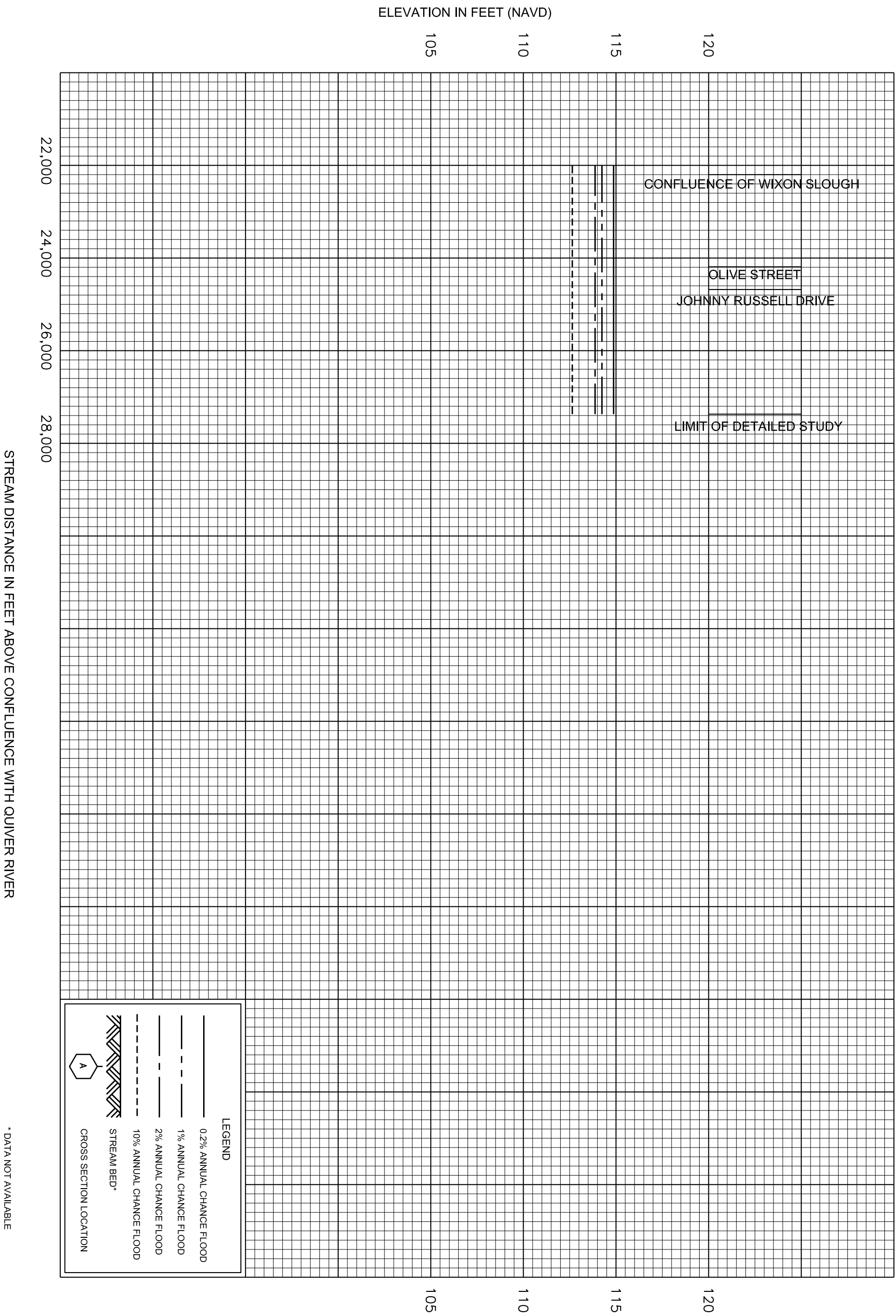
FEDERAL EMERGENCY MANAGEMENT AGENCY

SUNFLOWER COUNTY, MS
AND INCORPORATED AREAS

FLOOD PROFILES

TRIBUTARY 2

17P

ELEVATION IN FEET (NAVD)

STREAM DISTANCE IN FEET ABOVE LIMIT OF DETAILED STUDY (LIMIT OF DETAILED STUDY IS APPROXIMATELY 290 FEET DOWNSTREAM OF WEST HEAD CIRCLE)

LIMIT OF DETAILED STUDY

WEST HEAD CIRCLE

LIMIT OF STUDY

LEGEND

0.2% ANNUAL CHANCE FLOOD
1% ANNUAL CHANCE FLOOD
2% ANNUAL CHANCE FLOOD
10% ANNUAL CHANCE FLOOD
STREAM BED

Ⓐ CROSS SECTION LOCATION

FEDERAL EMERGENCY MANAGEMENT AGENCY
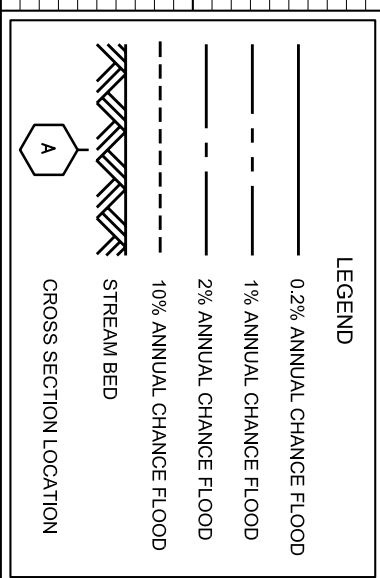
SUNFLOWER COUNTY, MS
AND INCORPORATED AREAS

FLOOD PROFILES
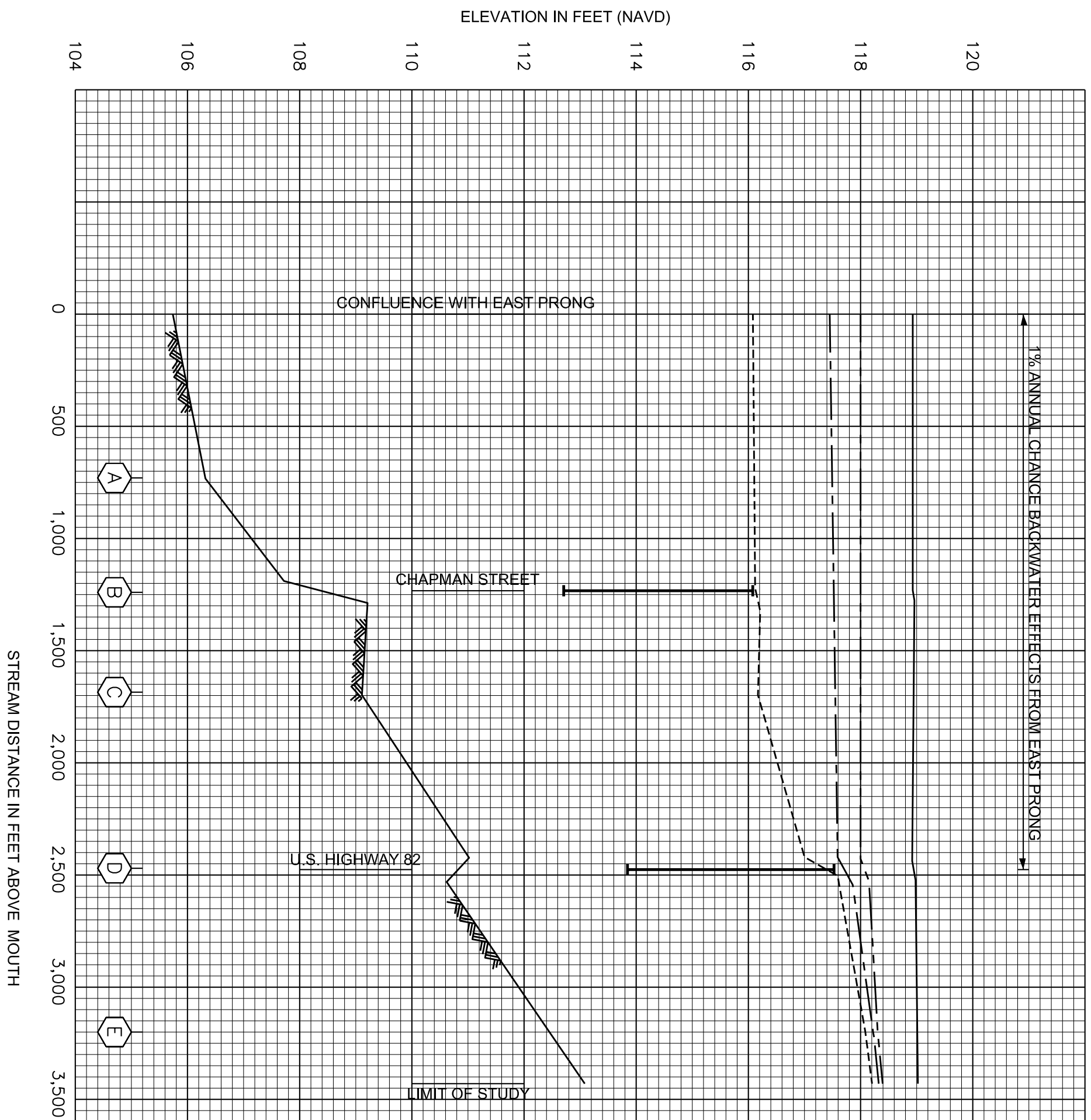
TRIBUTARY 3

ELEVATION IN FEET (NAVD)

104 106 108 110 112 114 116 118 120

CONFLUENCE WITH
MOORHEAD BAYOU

U.S. 82

RAILROAD

HIGHWAY 3

1% ANNUAL CHANCE BACKWATER EFFECTS FROM MOORHEAD BAYOU

UNNAMED ROAD

PREACHERS ROAD

LIMIT OF DETAILED STUDY

Ⓐ Ⓑ Ⓒ Ⓓ

0 2,000 4,000 6,000 8,000 10,000 12,000 14,000 16,000

STREAM DISTANCE IN FEET ABOVE CONFLUENCE WITH MOORHEAD BAYOU

106 108 110 112 114 116 118 120

FEDERAL EMERGENCY MANAGEMENT AGENCY
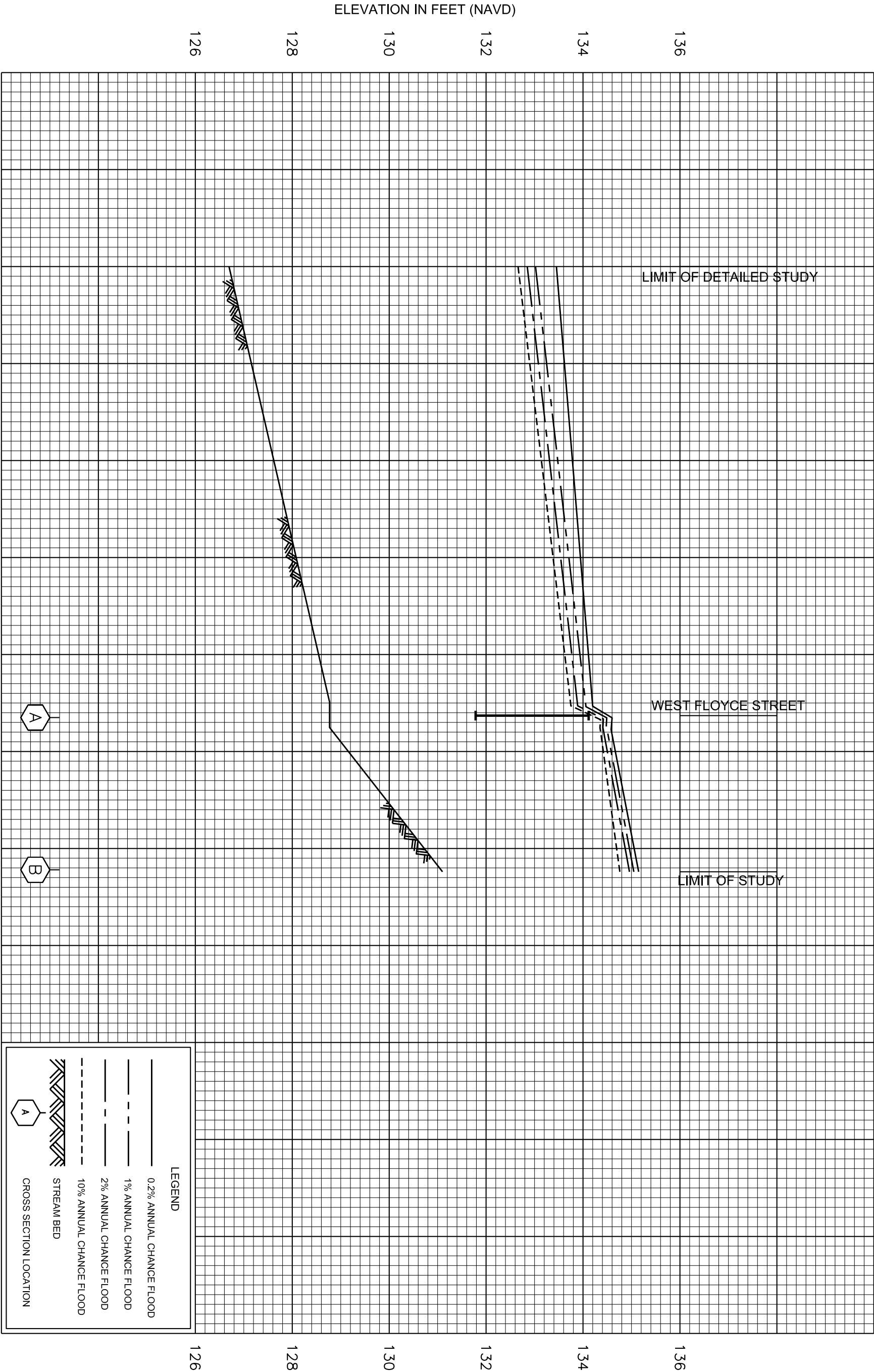
SUNFLOWER COUNTY, MS
AND INCORPORATED AREAS

FLOOD PROFILES

TRIBUTARY X

19P

ELEVATION IN FEET (NAVD)

STREAM DISTANCE IN FEET ABOVE CONFLUENCE WITH SUNFLOWER DIVERSION CHANNEL

CONFLUENCE WITH SUNFLOWER
DIVERSION CHANNEL

1% ANNUAL CHANCE BACKWATER EFFECTS FROM SUNFLOWER DIVERSION CHANNEL

ITTA BENA ROAD

LIMIT OF DETAILED STUDY

LEGEND

0.2% ANNUAL CHANCE FLOOD
1% ANNUAL CHANCE FLOOD
2% ANNUAL CHANCE FLOOD
10% ANNUAL CHANCE FLOOD
STREAM BED
CROSS SECTION LOCATION

FEDERAL EMERGENCY MANAGEMENT AGENCY

SUNFLOWER COUNTY, MS
AND INCORPORATED AREAS

FLOOD PROFILES

TRIBUTARY Y

20P

ELEVATION IN FEET (NAVD)

STREAM DISTANCE IN FEET ABOVE CONFLUENCE WITH POWELL BAYOU

CONFLUENCE WITH
POWELL BAYOU

1% ANNUAL CHANCE BACKWATER EFFECTS FROM POWELL BAYOU

LIMIT OF DETAILED STUDY

LEGEND

0.2% ANNUAL CHANCE FLOOD
1% ANNUAL CHANCE FLOOD
2% ANNUAL CHANCE FLOOD
10% ANNUAL CHANCE FLOOD
STREAM BED
CROSS SECTION LOCATION

FEDERAL EMERGENCY MANAGEMENT AGENCY

SUNFLOWER COINTY, MS
AND INCORPORATED AREAS

FLOOD PROFILES

TRIBUTARY Z

21P

ELEVATION IN FEET (NAVD)

STREAM DISTANCE IN FEET ABOVE CONFLUENCE WITH INDIAN BAYOU AND EAST PRONG

CONFLUENCE WITH INDIAN BAYOU
AND EAST PRONG

COLLEGE AVENUE

CONFLUENCE OF
WEST PRONG TRIBUTARY 1

LIMIT OF DETAILED STUDY

LEGEND
0.2% ANNUAL CHANCE FLOOD
1% ANNUAL CHANCE FLOOD
2% ANNUAL CHANCE FLOOD
10% ANNUAL CHANCE FLOOD
STREAM BED
CROSS SECTION LOCATION

FEDERAL EMERGENCY MANAGEMENT AGENCY

SUNFLOWER COUNTY, MS
AND INCORPORATED AREAS

FLOOD PROFILES

WEST PRONG

22P

ELEVATION IN FEET (NAVD)

STREAM DISTANCE IN FEET ABOVE CONFLUENCE WITH WEST PRONG

CONFLUENCE WITH WEST PRONG

U.S. HIGHWAY 82

AIRPORT ROAD

LIMIT OF DETAILED STUDY

LEGEND

0.2% ANNUAL CHANCE FLOOD
1% ANNUAL CHANCE FLOOD
2% ANNUAL CHANCE FLOOD
10% ANNUAL CHANCE FLOOD
STREAM BED
CROSS SECTION LOCATION

FEDERAL EMERGENCY MANAGEMENT AGENCY

SUNFLOWER COUINTY, MS
AND INCORPORATED AREAS

FLOOD PROFILES

WEST PRONG TRIBUTARY 1

ELEVATION IN FEET (NAVD)

STREAM DISTANCE IN FEET ABOVE CONFLUENCE WITH MOORHEAD BAYOU

1% ANNUAL CHANCE BACKWATER EFFECTS FROM MOORHEAD BAYOU

CONFLUENCE WITH
MOOREHEAD BAYOU

LIMIT OF DETAILED STUDY

LEGEND

0.2% ANNUAL CHANCE FLOOD
1% ANNUAL CHANCE FLOOD
2% ANNUAL CHANCE FLOOD
10% ANNUAL CHANCE FLOOD
STREAM BED*
CROSS SECTION LOCATION

A

* DATA NOT AVAILABLE

FEDERAL EMERGENCY MANAGEMENT AGENCY

SUNFLOWER COUNTY, MS
AND INCORPORATED AREAS

FLOOD PROFILES

WIXON SLOUGH

24P