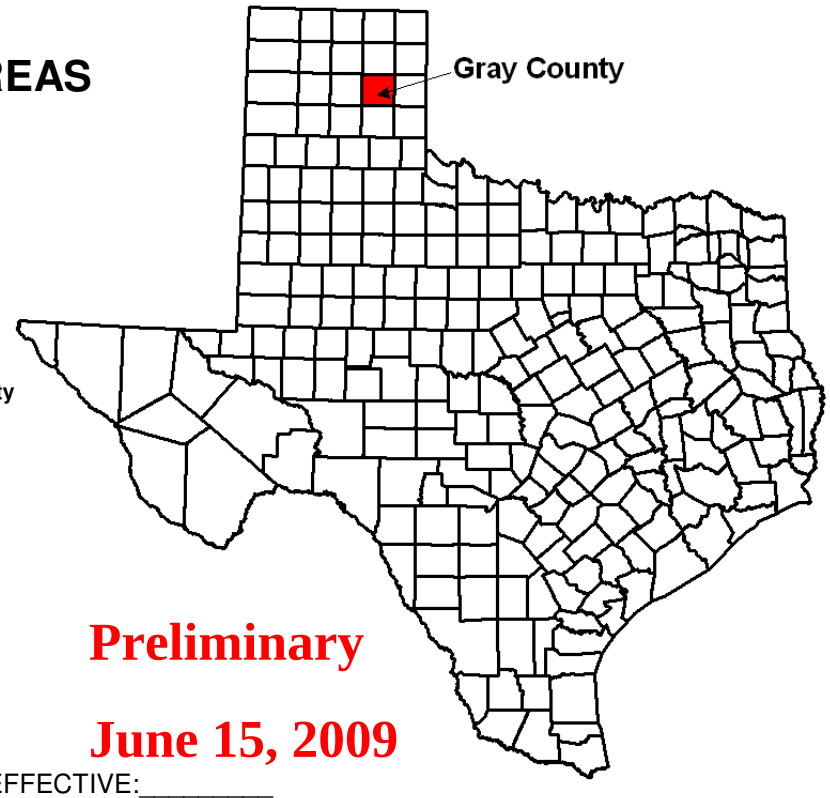
FLOOD INSURANCE STUDY

GRAY COUNTY, TEXAS
AND INCORPORATED AREAS



Community Name	Community Number
GRAY COUNTY	
(UNINCORPORATED AREAS)	481222
LEFORS, CITY OF	480256
MCLEAN, CITY OF	480257
PAMPA, CITY OF	480258

Preliminary

June 15, 2009

EFFECTIVE:_____

Federal Emergency Management Agency

FLOOD INSURANCE STUDY NUMBER
48179CV000A

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).

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

Initial Countywide FIS Effective date: _____

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FLOOD INSURANCE STUDY
GRAY COUNTY, TEXAS AND INCORPORATED AREAS

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study (FIS) revises and updates information on the existence and severity of flood hazards in the geographic area of Gray County, including the Cities of Lefors, McLean and Pampa, and the unincorporated areas of Gray County (referred to collectively herein as Gray 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 System (GIS) format requirements. The flood hazard information was created 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 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.

This FIS was prepared to include all jurisdictions within Gray County in a countywide FIS. Although there were effective A Zones delineated on the previous Flood Insurance Rate Maps (FIRMs) for the Cities of Lefors and Pampa, FIS reports were not developed.

For this first countywide study, MAPVI compiled existing data to convert the previous FIRMs for the City of Lefors and City of Pampa into digital format. MAPVI completed this work in April 2009, under Contract No. EMT-2002-CO-0052.

Base map information used to develop the FIRMs that correspond to this FIS was derived from multiple sources. This information was compiled from the U.S. Geological Survey (USGS), 1989; the National Geodetic Survey, 2004; the U.S. Census Bureau, 2003 and 2006; and the Texas Natural Resource Information System, 2007.

The projection used in the preparation of the FIRMs was the Texas State Plane Coordinate Grid System, North Zone (FIPS 4201). The horizontal datum is the North American Datum

1983 (NAD 83) and the vertical datum is the North American Vertical Datum 1988 (NAVD 88). Differences in datum, projection or State Plane zones used in the production of the FIRMs for adjacent jurisdictions may result in slight positional differences across jurisdictional boundaries. These differences do not affect the accuracy of these FIRMs.

1.3 Coordination

An initial Consultation Coordination Officer (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. All problems raised in the meeting have been addressed in this study.

For this countywide study, an initial CCO meeting was held on May 12, 2008, and was attended by representatives of the communities, the study contractor, and FEMA. A final CCO meeting was held on _____, and was attended by representatives of the communities, the study contractor, and FEMA.

2.0 AREA STUDIED

2.1 Scope of Study

This FIS report covers the entire geographic area of Gray County, Texas. The areas studied by approximate methods were selected with priority given to all known flood hazards and areas of projected development.

As part of this countywide study, new automated approximate analyses were conducted on all streams previously studied by approximate methods. New automated approximate analyses were also conducted for additional streams shown in Table 1, "Flooding Sources Studied by Approximate Methods." Approximate analyses were used to study those areas having a low development potential or minimal flood hazards. The scope and methods of study were proposed to, and agreed upon by, FEMA and Gray County.

Table 1 – Flooding Sources Studied by Approximate Methods

Cabin Creek	McClellan Creek Tributary 6
Cabin Creek Tributary 1	McClellan Creek Tributary 8
Cabin Creek Tributary 2	McClellan Creek Tributary 11
Deep Lake Stream	McClellan Creek Tributary 12
Dry Sandy Creek	McClellan Creek Tributary 13
Grapevine Creek	McClellan Creek Tributary 16
McClellan Creek Tributary 2	McClellan Creek Tributary 17

Table 1 – Flooding Sources Studied by Approximate Methods (continued)

McClellan Creek Tributary 19
Mitchell Creek
North Fork of the Red River
North Fork of the Red River Tributary 10
North Fork of the Red River Tributary 11
North Fork of the Red River Tributary 12
North Fork of the Red River Tributary 13
North Fork of the Red River Tributary 14
North Fork of the Red River Tributary 15
Parks Creek
Peterson Creek
Peterson Creek Tributary 1
Peterson Creek Tributary 2
Peterson Creek Tributary 3
Plum Creek
Plum Creek Tributary
Red Deer Creek
Red Deer Creek Tributary 3
Red Deer Creek Tributary 4
Red Deer Creek Tributary 5
Red Deer Creek Tributary 7
Red Deer Creek Tributary 8
Red Deer Creek Tributary 9
Red Deer Creek Tributary 10
Red Deer Creek Tributary 11
Red Deer Creek Tributary 12
Red Deer Creek Tributary 13
Rock Creek
Skillet Creek
South Long Dry Creek
South Long Dry Creek Tributary
Thut Creek
Thut Creek Tributary 1
Thut Creek Tributary 2
Tributary 1 to Red Deer Creek Tributary 9
Tributary 1 to White Deer Creek Tributary
Tributary 2 to Red Deer Creek Tributary 9
Tributary 3 to Red Deer Creek Tributary 9
Tributary 3 to White Deer Creek Tributary
Tributary 4 to White Deer Creek Tributary
Tributary to McClellan Creek Tributary 12
Tributary to North Fork of the Red River Tributary 10
Tributary to North Fork of the Red River Tributary 14
Tributary to Red Deer Creek Tributary 3
Tributary to Red Deer Creek Tributary 4
Tributary to Red Deer Creek Tributary 11
Tributary to Thut Creek Tributary 2
Tributary to Tributary 1 to White Deer Creek Tributary
Turkey Creek
Turkey Creek Tributary 2
White Deer Creek Tributary
Whitefish Creek
Whitefish Creek Tributary

There were no Letters of Map Change (LOMCs) that affected the mapping update of this county; therefore no LOMCs have been incorporated into this countywide study.

2.2 Community Description

Gray County is located in the middle of the Texas Panhandle, on the eastern side of the High Plains. The county has an area of approximately 930 square miles of level prairie and rolling river breaks. It is bordered by Carson County to the west, Donley County to the south, Wheeler County to the east, and Roberts County to the north. The population of Gray County is 22,744 with about 79 percent of the population residing in Pampa, the county seat (Reference 1). The economy in the county is comprised of ranching, farming, oil, and petrochemicals (Reference 2).

The county's sandy loam and black waxy soils support a variety of native grasses as well as abundant wheat, corn, grain sorghum, and hay crops. The river bottoms in this county support a variety of trees such as cottonwoods, hackberries, elms, walnuts and mesquite (Reference 2). The farmlands grow wheat, corn, grain, sorghum, and hay (Reference 3). The county has an annual average rainfall of 20.14 inches and temperatures range from a low of 23 degrees Fahrenheit in the winter to a high of 94 degrees Fahrenheit in the summer (Reference 2).

Lefors, City of: This city has a population of 559 based on the 2000 census (Reference 1).

McLean, City of: This city has a population of 830 based on the 2000 census (Reference 1).

2.3 Principal Flood Problems

There are no known flood problems within the unincorporated areas of Gray County and the City of McLean. Because the Cities of Lefors and Pampa did not have previously printed FIS reports, the principle flood problems that prompted the development of the effective A Zones are not known. According to the National Climatic Data Center, there were 6 flash flood events reported in Gray County between January 1, 1950 and November 30, 2008 (Reference 4).

2.4 Flood Protection Measures

The Panhandle Water Conservation Authority built a 5,005 acre-feet McClellan Creek Lake in Gray County, just south of Pampa, in 1949 for flood control as well as soil conservation, recreation, and wildlife promotion (Reference 5). There are no other known flood protection measures in place within the unincorporated areas of Gray County, or within the Cities of Lefors, McLean, and Pampa.

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-annual-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 FIS. 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 which affects the community. Because the Cities of Lefors and Pampa did not have previously printed FIS reports, the hydrologic analyses used to develop the prior effective A Zones shown on the FIRMs were not known.

For this countywide study, new automated analyses were conducted on all streams previously studied by approximate methods and all streams listed in Table 1. The alternative regression equations were applied for these analyses (Reference 6). These equations were derived based on minimization of the PRESS (Prediction Error Sum of Squares) statistics and power transformation of the drainage area.

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. Because the Cities of Lefors and Pampa did not have previously printed FIS reports, the hydraulic analyses used to develop the prior A Zones shown on the FIRMs were not known.

For this countywide study, the new approximate analyses were conducted using HEC-GeoRAS and HEC-RAS software (References 7 and 8) and were done in accordance with FEMA Guidelines and Specifications (Reference 9).

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

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 (NGVD29). With the completion of the North American Vertical Datum of 1988 (NAVD88), many FIS reports and FIRMs are now prepared using NAVD as the referenced vertical datum.

There are no detailed studies performed in Gray County; therefore, there were no flood elevations shown on the FIRM that required revision to reflect the new vertical datum.

For information regarding conversion between the NGVD29 and NAVD88, visit the National Geodetic Survey website at www.ngs.noaa.gov, or contact the National Geodetic Survey at the following address:

Vertical Network Branch, N/CG13
National Geodetic Survey, NOAA
Silver Spring Metro Center 3
1315 East-West Highway
Silver Spring, Maryland 20910
(301) 713-3191

4.0 FLOODPLAIN MANAGEMENT APPLICATIONS

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

4.1 Floodplain Boundaries

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

In this countywide study, 10-meter Digital Elevation Model (DEM) topographic data was provided by USGS which was used to determine the floodplain boundaries of the approximate study streams.

The 1-percent-annual-chance floodplain boundaries are shown on the FIRM (Exhibit 1). On this map, the 1-percent-annual-chance floodplain boundary corresponds to the boundary of the areas of special flood hazards (Zone A). Small areas within the floodplain boundaries may lie above the flood elevations, but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data.

For the streams studied by approximate methods in this countywide study, only the 1-percent-annual-chance floodplain boundary is shown on the FIRM. New approximate analyses were conducted to delineate the 1-percent-annual-chance floodplain boundaries and were delineated using the terrain data discussed previously.

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.

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.

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

The area between the floodway and 1-percent-annual-chance floodplain boundaries is termed the floodway fringe. The floodway fringe encompasses the portion of the floodplain that could be completely obstructed without increasing the water-surface elevation (WSEL) of the base flood more than 1 foot at any point. Typical relationships between the floodway and the

floodway fringe and their significance to floodplain development are shown in Figure 1, "Floodway Schematic." No floodways were calculated for the previous FIRMs or this first countywide study.

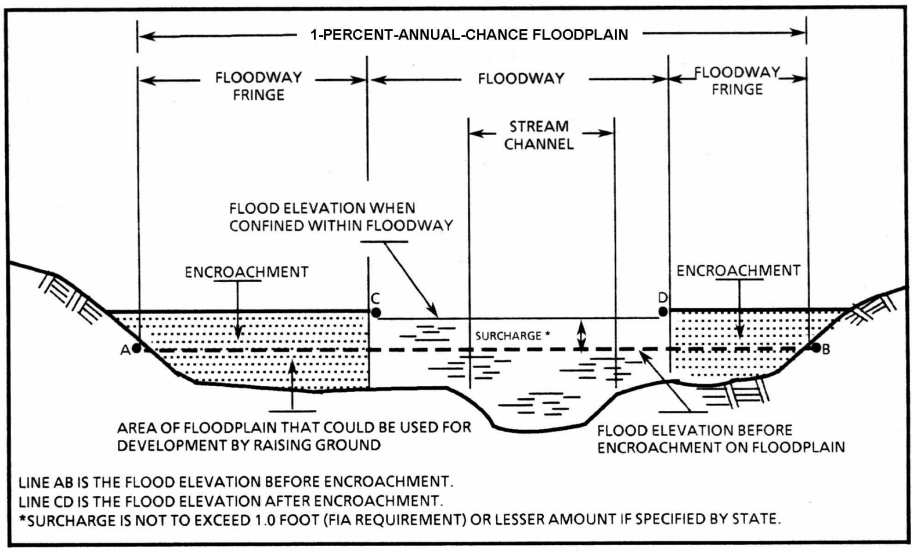

Figure 1 - Floodway Schematic

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 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 X

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

6.0 FLOOD INSURANCE RATE MAP

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

For flood insurance applications, the map designates flood insurance rate zones as described in Section 5.0 and, in the 1-percent-annual-chance floodplains that are 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 for detailed studies.

The current countywide FIRMs present flooding information for the entire geographic area of Gray County. These countywide FIRMs also include 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 2, "Community Map History."

COMMUNITY NAME	INITIAL IDENTIFICATION	FLOOD HAZARD BOUNDARY MAP REVISION DATE(S)	FLOOD INSURANCE RATE MAP EFFECTIVE DATE	FLOOD INSURANCE RATE MAP REVISION DATE(S)
Gray County (Unincorporated Areas)	--	NONE	--	NONE
Lefors, City of	May 10, 1974	January 16, 1976	August 1, 1987	NONE
McLean, City of	--	NONE	--	NONE
Pampa, City of	May 10, 1974	May 28, 1976	September 1, 1987	NONE

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

GRAY COUNTY, TX
AND INCORPORATED AREAS

COMMUNITY MAP HISTORY

7.0 OTHER STUDIES

The previous studies for the Cities of Lefors and Pampa resulted in published FIRMs for each community (References 10 and 11). No FIS was published for the Cities of Lefors and Pampa. No previous studies have been published for any other incorporated areas, or the unincorporated areas of Gray County.

This FIS report either supersedes or is compatible with all previous studies developed 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, FEMA Region VI, Federal Insurance and Mitigation Division, 800 North Loop 288, Denton, Texas 76209.

9.0 BIBLIOGRAPHY AND REFERENCES

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3. U.S. Department of Agriculture, National Agricultural Statistical Service, Texas Field Office, Gray County 2008 Agriculture Estimates, http://www.nass.usda.gov/Statistics_by_State/Texas/Publications/County_Estimates/cec_179.pdf accessed February 4, 2009.

4. U.S. Department of Commerce, National Climatic Data Center, Storm Event Database, http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwEvent~Storms accessed on March 6, 2009.

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7. U.S. Army Corps of Engineers, U.S. Army Corps of Engineers River Analysis System (HEC-GeoRAS) User's Manual and software version 4.1.1. Hydrologic Engineering Center. Davis, CA, September 2005.

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10. Federal Emergency Management Agency, Flood Insurance Rate Map, City of Lefors, Gray County, Texas, Washington, D.C., August 1, 1987.

11. Federal Emergency Management Agency, Flood Insurance Rate Map, City of Pampa, Gray County, Texas, Washington, D.C., September 1, 1987.