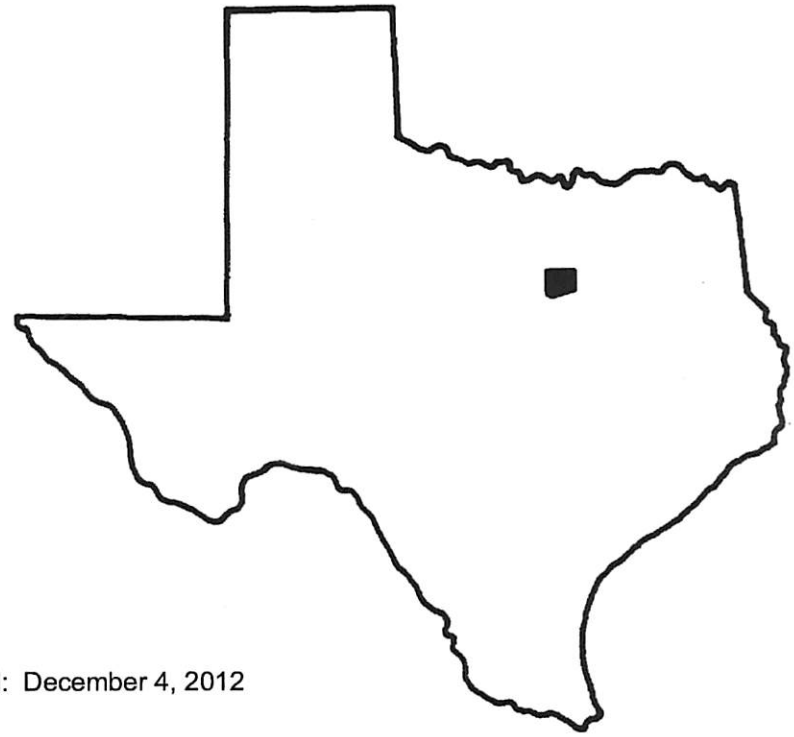
FLOOD INSURANCE STUDY

JOHNSON COUNTY, TEXAS
AND INCORPORATED AREAS

Community Name	Community Number
JOHNSON COUNTY UNINCORPORATED AREAS	480879
ALVARADO, CITY OF	480397
BRIAR OAKS, CITY OF	480398
BURLESON, CITY OF	485459
CLEBURNE, CITY OF	485462
CRESSON, CITY OF	480177
CROSS TIMBER, TOWN OF	481685
GODLEY, CITY OF	480880
GRANDVIEW, CITY OF	480881
JOSHUA, CITY OF	480882
KEENE, CITY OF	481107
MANSFIELD, CITY OF	480606
RIO VISTA, VILLAGE OF	481159
VENUS, CITY OF	480883



Revised: December 4, 2012

Federal Emergency Management Agency

FLOOD INSURANCE STUDY NUMBER
48251CV000A

NOTICE TO
FLOOD INSURANCE STUDY USERS

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

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

First Countywide FIS Effective Date: September 27, 1991
First Revised Countywide FIS Revision Date: January 6, 1993
Second Revised Countywide FIS Revision Date: January 6, 1999
Third Revised Countywide FIS Revision Date: December 4, 2012

TABLE OF CONTENTS

Page

1.0 INTRODUCTION 1

1.1 Purpose of Study 1
1.2 Authority and Acknowledgments 1
1.3 Coordination 3

2.0 AREA STUDIED 3

2.1 Scope of Study 3
2.2 Community Description 6
2.3 Principal Flood Problems 7
2.4 Flood Protection Measures 8

3.0 ENGINEERING METHODS 9

3.1 Hydrologic Analyses 9
3.1.1 Redelineated Detailed Study Streams 9
3.2 Hydraulic Analyses 16
3.2.1 New Detailed Study Streams 17
3.2.2 Redelineated Detailed Study Streams 17
3.3 Vertical Datum 19

4.0 FLOODPLAIN MANAGEMENT APPLICATIONS 20

4.1 Floodplain Boundaries 20
4.2 Floodways 21

5.0 INSURANCE APPLICATIONS 47

6.0 FLOOD INSURANCE RATE MAP 48

7.0 OTHER STUDIES 51

8.0 LOCATION OF DATA 51

9.0 BIBLIOGRAPHY AND REFERENCES 51

TABLE OF CONTENTS (Continued)

Page

FIGURES

Figure 1 – Floodway Schematic 47

TABLES

Table 1 – Scope of Study 4
Table 2 – Summary of Discharges 11
Table 3 – Summary of Roughness Coefficients 19
Table 4 – Floodway Data 22
Table 5 – Community Map History 49

EXHIBITS

Exhibit 1 – Flood Profiles

Bypass Creek	Panel	01P
East Buffalo Creek	Panels	02P-12P
East Buffalo Creek Tributary A	Panel	13P
East Buffalo Creek Tributary B	Panels	14P-15P
Hurst Creek	Panels	16P-17P
King Branch	Panels	18P-19P
Little Booger Creek	Panels	20P-22P
Lockett Branch	Panels	23P-24P
Low Branch	Panel	25P
McAnear Creek	Panels	26P-28P
North Creek	Panel	29P
Quil Miller Creek	Panels	30P-32P
Shannon Creek	Panels	33P-35P
South Shannon Creek	Panels	36P-39P
Stream 3	Panel	40P
Stream VC-8	Panels	41P-42P
Stream VC-8A	Panels	43P-44P
Unnamed Stream	Panels	45P-49P
Unnamed Tributary to Shannon Creek	Panel	50P
Valley Branch	Panels	51P-53P
Valley Branch Tributary A	Panels	54P-55P
Village Creek	Panels	56P-64P
Walnut Creek	Panels	65P-70P
Walnut Creek Tributary A	Panels	71P-73P
Walnut Creek Tributary B	Panels	74P-77P
West Buffalo Creek	Panels	78P-81P
Willow Creek	Panels	82P-83P

Exhibit 2 – Flood Insurance Rate Map Index
Flood Insurance Rate Maps

FLOOD INSURANCE STUDY
JOHNSON 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 Johnson County, including the Cities of Alvarado, Briar Oaks, Burleson, Cleburne, Cresson, Godley, Grandview, Joshua, Keene, Mansfield, and Venus; the Town of Cross Timber; the Village of Rio Vista, and the unincorporated areas of Johnson County (referred to collectively herein as Johnson County), and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study has developed flood risk data for various areas of the community that will be used to establish actuarial flood insurance rates and to assist the community in its efforts to promote sound floodplain management. Minimum floodplain management requirements for participation in the National Flood Insurance Program (NFIP) are set forth in the Code of Federal Regulations at 44 CFR, 60.3.

Please note that the City of Burleson is geographically located in Johnson and Tarrant counties; the City of Cresson is geographically located in Hood and Johnson counties; the City of Mansfield is geographically located in Ellis, Johnson and Tarrant counties; and the City of Venus is geographically located in Ellis and Johnson counties.

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.

Johnson County

In the original countywide study effective September 27, 1991, the hydrologic and hydraulic analyses were performed by the U.S. Department of Agriculture, Natural Resources Conservation Service (USDA-NRCS) (formerly known as Soil Conservation Service), for the Federal Emergency Management Agency (FEMA), for the portions of the following streams that lie within the unincorporated areas of the county: East Buffalo Creek, East Buffalo Creek Tributary A, East Buffalo Creek Tributary B, King Branch, Valley Branch, Valley Branch Tributary A, Walnut Creek, Walnut Creek Tributary A, and Walnut Creek Tributary B. This work was carried out under Interagency Agreement No. EMW-87-E-2511. That study was completed in October 1988 (Reference 1).

The original countywide study also included hydrologic and hydraulic analyses, performed during the preparation of the FIS for the City of Burleson, for the portions of the following streams that lie within the unincorporated areas of the county: Bypass

Creek, Quil Miller Creek, Shannon Creek, South Shannon Creek, Village Creek, and Willow Creek (Reference 1).

City of Burleson

The hydrologic and hydraulic analyses for the study effective June 24, 1977 were performed by the Fort Worth District of the U.S. Army Corps of Engineers (USACE), for FEMA, under Interagency Agreement No. IAA-H-16-75, Project Order No. 14 and Interagency Agreement No. IAA-H-7-76, Project Order No. 19. That study was completed in April 1976 (Reference 1).

The hydrologic and hydraulic analyses for the study effective December 3, 1987 were performed by the USACE, for FEMA, under Interagency Agreement No. EMW-E-1153, Project Order No. 1, Amendments No. 30 and No. 30a. That study was completed in September 1985 (Reference 2).

In the countywide study effective January 6, 1999, the hydrologic and hydraulic analyses for Hurst Creek, Little Booger Creek, and South Shannon Creek in the City of Burleson were performed by USDA-NRCS, for FEMA, under Interagency Agreement No. EMW-89-E-2995, Project Order No. 1. That study was completed in January 1992 (Reference 1).

City of Cleburne

The hydrologic and hydraulic analyses for the study effective September 30, 1980 were performed by Freese and Nichols, Inc./Randy and Associates, Inc., for FEMA, under Contract No. H-4570. That study was completed in April 1978 (Reference 1).

For the revision effective May 17, 1989, hydrologic and hydraulic analyses for West Buffalo Creek were performed by USDA-NRCS under agreement with FEMA. That study was completed in February 1987. The study also included a floodway analyses for West Buffalo Creek prepared by Dewberry & Davis and based on data developed by the USDA-NRCS as part of the existing hydraulic analysis. That study was completed in March 1988 (Reference 3).

In the countywide study effective January 6, 1993, hydrologic and hydraulic analyses for Unnamed Stream in the City of Cleburne were performed by USDA-NRCS, for FEMA, under Interagency Agreement No. EMW-89-2995, Project Order No. 1. That study was completed in April 1991 (Reference 1).

City of Mansfield

The hydrologic and hydraulic analyses for the study effective December 18, 1985, were performed by the USACE for FEMA, under Interagency Agreement No. EMW-E-0539, Project Order No. 6. That study was completed in January 1983. The hydraulic analyses for the revisions dated September 28, 1990, were performed by Carter & Burgess, Inc. FEMA reviewed and accepted those analyses for the purposes of that revision (Reference 1).

The Low Branch hydraulic study within the City of Mansfield was incorporated in this study as "Best Available" floodplain study data. Teague Nall & Perkins (TNP) prepared a

new detailed hydraulic model using the USACE Hydrologic Engineering Center (HEC) step-backwater computer program HEC-2 (Reference 4) as part of the City of Mansfield's Master Drainage Plan for Low Branch. Nave Engineering, Inc., in cooperation with Halff Associates, Inc., converted the TNP HEC-2 model to a HEC River Analysis System (HEC-RAS) model and updated the mapping, profiles, and floodway data information. The hydraulic analysis for this restudy was based on the prior effective FIS discharges.

1.3 Coordination

The initial Consultation Coordination Officer (CCO) meeting was held on May 4, 2007 and attended by representatives of FEMA; the Cities of Alvarado, Briar Oaks, Burleson, Cleburne, Joshua, and Mansfield; Halff Associates, Inc.; Johnson County; Johnson County Appraisal District; Texas Department of Transportation (TxDOT); and the Village of Rio Vista.

The results of the study were reviewed at the final CCO meeting held on May 6, 2010 and attended by representatives of FEMA; Childress Engineers; the Cities of Alvarado, Burleson, Cleburne, Cresson, Godley, Grandview, Joshua, and Venus; Dumas Lano Surveying; Halff Associates, Inc.; Johnson County; Keene Fire Department; and the Texas Water Development Board. All problems raised at that meeting have been addressed in this study.

2.0 AREA STUDIED

2.1 Scope of Study

This FIS report covers the geographic area of Johnson County, Texas, including the incorporated communities listed in Section 1.1. 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 June 2009.

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 community officials.

The flooding sources studied by detailed methods along with the limits of study are shown in Table 1, "Scope of Study."

Table 1 – Scope of Study
Stream Reaches Studied by Detailed Methods

Stream Name	Downstream Limit	Upstream Limit	Length (mi)
New Detailed Study Streams			
Low Branch	Tarrant County/ Johnson County	70 feet upstream of U.S. Business Highway 287	0.34
Redelineated Detailed Study Streams			
Bypass Creek	Confluence with Quil Miller Creek	Interstate Highway 35W Southbound Frontage Road	1.43
East Buffalo Creek	Confluence of Unnamed Stream	1.02 miles upstream of County Road 704 / F.M. 3048	11.23
East Buffalo Creek Tributary A	Confluence with East Buffalo Creek	0.76 miles upstream of confluence with East Buffalo Creek	0.76
East Buffalo Creek Tributary B	Confluence with East Buffalo Creek	0.58 miles upstream of F.M. 3048	1.96
Hurst Creek	Confluence with Quil Miller Creek	135 feet upstream of Interstate Highway 35W Northbound Frontage Road	2.17
King Branch	Confluence with Walnut Creek	1.08 miles upstream of County Road 519	1.93
Little Booger Creek	Confluence with Village Creek	730 feet upstream of Marcia Lane	3.08
Lockett Branch	Confluence with East Buffalo Creek	0.84 miles upstream of Henderson Street	1.45
McAnear Creek	Confluence with East Buffalo Creek	County Road 1216	4.82
North Creek	Confluence with Village Creek	Johnson County/ Tarrant County	1.07
Quil Miller Creek	Confluence with Village Creek	65 feet upstream of Interstate Highway 35W Southbound Frontage Road	5.36

Table 1 – Scope of Study (Continued)
Stream Reaches Studied by Detailed Methods

Stream Name	Downstream Limit	Upstream Limit	Length (mi)
Redelineated Detailed Study Streams			
Shannon Creek	Confluence with Village Creek	0.55 miles upstream of Burlington Northern Santa Fe Railroad	3.65
South Shannon Creek	Confluence with Shannon Creek	90 feet upstream of Burlington Northern Santa Fe Railroad	2.80
Stream 3	Confluence with South Shannon Creek	County Road 714	0.27
Stream VC-8	Confluence with Village Creek	0.51 miles upstream of County Road 802	1.48
Stream VC-8A	Confluence with Stream VC-8	100 feet upstream of County Road 802	1.40
Unnamed Stream	800 feet upstream of confluence with East Buffalo Creek	1,300 feet upstream of Hyde Park Boulevard	2.28
Unnamed Tributary to Shannon Creek	Confluence with Shannon Creek	0.94 miles upstream of confluence with Shannon Creek	0.94
Valley Branch	Confluence with Walnut Creek	0.67 miles upstream of confluence of Valley Branch Tributary A	2.98
Valley Branch Tributary A	Confluence with Valley Branch	County Road 529	1.59
Village Creek	Tarrant County/ Johnson County	1,995 feet upstream of Lakeaire Drive and Dam	9.72
Walnut Creek	20 feet downstream of confluence of Valley Branch	1.08 miles upstream of confluence of Walnut Creek Tributary B	6.42
Walnut Creek Tributary A	Confluence with Walnut Creek	County Road 528	2.41

Table 1 – Scope of Study (Continued)
Stream Reaches Studied by Detailed Methods

Stream Name	Downstream Limit	Upstream Limit	Length (mi)
Redelineated Detailed Study Streams			
Walnut Creek Tributary B	Confluence with Walnut Creek	Interstate Highway 35W Northbound Frontage Road	4.15
West Buffalo Creek	Confluence with East Buffalo Creek	0.40 miles upstream of County Road 900	4.69
Willow Creek	Confluence with Village Creek	10 feet upstream of Burlington Northern Santa Fe Railroad	2.06

2.2 Community Description

Johnson County is located in the north-central part of Texas. It is bordered by Tarrant County to the north, Ellis County to the east, Hill County to the south, Bosque County to the southwest, Hood and Somervell counties to the west, and Parker County to the northwest (Reference 1).

The Caddo Indians lived in the county and surrounding areas. In 1839, the first settlers built homes along Chambers Creek. During the 1850's other pioneer families settled along the Brazos River. In 1854, Johnson County was created from parts of Ellis, Hill, and Navarro counties. The county was named after Colonel Middleton T. Johnson, a famous confederate soldier (Reference 5).

According to U.S. Census 2000 figures, the population of Johnson County was 149,636. This represents an increase in population of 18% since the 1990 census. The January 2006 estimate of Johnson County population was 146,162. There are 13 incorporated communities in the county; their population estimates are as follows: City of Alvarado (3,919), City of Briar Oaks (488), City of Burleson (31,207), City of Cleburne (28,496), City of Cresson (443), Town of Cross Timber (297), City of Godley (1,040), City of Grandview (1,454), City of Joshua (5,231), City of Keene (6,089), City of Mansfield (37,213), Village of Rio Vista (759), and City of Venus (2,164) (References 6 and 7).

Johnson County is the leading dairy producer in the state of Texas. Cattle, hay, horses, cotton, sorghum, wheat, oats, and hogs are among the main agribusiness present in the county. Railroad, shops, manufacturing, distribution, and lake activities drive the economy of the county. Burleson has experienced rapid industrial, business, and residential growth in the past few years, and it is anticipated that this will continue at its present rate or accelerate in the foreseeable future (Reference 7). Development within the unincorporated areas of the county is limited to homes with small acreages (Reference 1).

Johnson County is composed of several soil formations. The Bolar-Brackett-Aledo soil association is composed of very shallow to moderately deep, moderately alkaline loamy, stony and gravelly soils that are susceptible to water erosion. It can be found on strongly

sloping to deep soils on uplands. The Minwells-Bastrop-Yahola soil association is composed of slightly acid to moderately alkaline loamy soils. It can be found on the Brazos River floodplains. The shrinking and swelling of the soil with changes in moisture and the slow permeability are the main limitations of the soil (Reference 5).

Johnson County lies in a region of temperate mean climatological conditions, experiencing occasional extremes of temperature, and rainfall of relatively short duration (Reference 1).

The average annual rainfall based on the City of Cleburne gage is 36.25 inches. The wettest month is May having an average of 5.11 inches. The driest month is January having an average of 1.90 inches (Reference 7).

The average annual temperature is 65.8 degrees Fahrenheit (°F). The hottest month of the year is July having an average temperature of 97.0 °F. The coldest month of the year is January having an average temperature of 34.0 °F. The recorded temperature extremes range from a maximum of 114 °F in 1939 to a minimum of -8 °F in 1899 (References 7 and 8).

2.3 Principal Flood Problems

Generally, major floods experienced in the area are produced by heavy rainfall from frontal storms that occur in the spring and the summer. Major floods, however, can also be caused by the intense rainfall usually associated with localized thunderstorms, which also occur mainly during the warm months (Reference 1).

Three major floods have occurred within the county in the past 30 years, in the spring of 1987; on May 3, 1979; and from May 6-7, 1989. The recurrence intervals of these floods were all estimated at the 4-percent-annual-chance flood (Reference 1).

Low-lying areas of the City of Burleson are subject to periodic flooding caused by overflow of Village Creek and its tributaries. There are no existing stream gaging stations in the Village Creek Watershed; however, there was a gage in the lower reaches of Village Creek during the period of June 1925 through March 1930 (Reference 9). The description for this gage indicates that the flood of April 1922 was the largest flood known at that time. Subsequent information obtained from residents and newspaper accounts indicates that the floods of May 1949 and April 1957 were approximately the same magnitude as the 1922 flood. Other floods of lesser magnitude occurred on Village Creek in 1916, 1962, 1964, 1965, 1968, 1969, 1970, 1976, 1977, 1979, and 1985 (Reference 1).

According to city officials, Little Booger Creek overflowed its banks on May 27, 1976, when 4 inches of rain fell in approximately two hours on the Little Booger Watershed. Also, 4 inches of rain fell on April 28 and 29, 1985, in the Shannon Creek Watershed. According to city officials, some structures were flooded (Reference 1).

The City of Cleburne has experienced several damaging floods in the past, most of them occurring along the streams studied by detailed methods. During May 1969, several days of flooding occurred. High-water marks have been established in the city by the USACE based upon the May 1969 flood. From measured discharges, this flood is estimated to have a 2-percent probability of occurring in any one-year period (Reference 1).

On May 3, 1979, Cleburne experienced a 6-inch rain that caused both branches of Buffalo Creek to flood. The storm lasted approximately eight hours and caused a total of $1,473,162.00 in damages (Reference 1).

Within the City of Mansfield, historical flood information for Walnut Creek has been documented since the turn of the century. The highest flood stage of this period is thought to have occurred on May 25, 1922, although the elevation is unknown. Another large flood occurred on September 26-27, 1936, when 7.47 inches of rain fell in two days. The United States Geological Survey (USGS) established a water-stage recording gage on Walnut Creek at County Road 2016 in September 1960. Since the installation of the gage, the highest stage of 559.1 feet was recorded during the floods of May 6-7, 1969, and June 4, 1973 (Reference 1).

On April 4, 1997, numerous roads were reported flooded throughout the county. An underpass on Highway 171 south of the City of Cleburne was flooded and barricaded (Reference 10).

On September 5, 2007, forty to fifty high water rescues were required between the Cities of Keene and Venus. Portions of Highway 171 in the City of Cleburne and Highway 287 were flooded, and a total of 17 roads were closed. The worst flooding was reported between Highway 67 and F.M. 917 near the unincorporated community of Lillian (Reference 11).

2.4 Flood Protection Measures

Within the City of Burleson, nonstructural measures of flood protection in the form of land use regulations are being used to aid in the prevention of future flood damages (Reference 1).

Channelization is one structural measure being used to help rectify flood problems on Hurst Creek, Little Booger Creek, North Creek, Shannon Creek, South Shannon Creek, and Village Creek. In addition, there are four dams within the City of Burleson. Mountain Valley Estates Dam and Lakeaire Dam are both located along Village Creek. Also, Mountain Valley Estates Dams are located on Streams VC-8 and VC-8A. These dams do not provide any flood control protection (Reference 1).

The City of Cleburne also administers flood protection measures. Once a year, designated areas along the creeks are cleared of underbrush and collected debris. City ordinances control development of the 1-percent-annual-chance floodplain. Unnamed Stream is an unlined channel. Sections of the stream channel have been changed with channelization, concrete weirs, and culverts. Some of these improvements will affect the base flood. All existing structures and improvements were considered when the hydrologic and hydraulic analyses were made (Reference 1).

Within the City of Mansfield, Low Branch, near old State Route 287, has undergone channel improvements. Land use regulations are also used by the City of Mansfield to aid in the prevention of future flood damage (Reference 1).

There are no structural flood protection measures within the unincorporated areas of Johnson County (Reference 1).

3.0 ENGINEERING METHODS

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

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish peak discharge-frequency relationships for each flooding source studied by detailed methods affecting the county.

3.1.1 Redelineated Detailed Study Streams

The redelineated streams were initially studied by detailed methods. These flooding sources include all those listed in Table 1, "Scope of Study."

Information on the methods used to determine peak discharge-frequency relationships for the streams studied by detailed methods is shown below. The incorporated communities with detailed studies are listed in alphabetical order; methodologies are described for each community. For streams that flow through two or more communities, each methodology described applies only to that portion of the stream studied by detailed methods within that particular community.

The previously printed FIS for the City of Burleson considered the following streams: Bypass Creek, Hurst Creek, Little Booger Creek, North Creek, Quil Miller Creek, Shannon Creek, South Shannon Creek, Stream 3, Stream VC-8, Stream VC-8A, Village Creek, and Willow Creek (Reference 2). During the preparation of that study, detailed hydrologic analyses were carried out for portions of Bypass Creek, Quil Miller Creek, Shannon Creek, South Shannon Creek, Village Creek, and Willow Creek that are located in the unincorporated areas of the county (Reference 1).

In that study, the computer program NUDALLAS was used to develop the hydrology (Reference 12). The watersheds were divided into sub-basins, and synthetic unit and flood hydrographs were developed at selected locations. U.S. Weather Bureau Technical Paper No. 40 and National Oceanic and Atmospheric Administration (NOAA) Technical

Memorandum National Weather Service (NWS) Hydro-35 were used in developing the 10-, 2-, and 1-percent-annual-chance storms (References 13 and 14). Discharges for the 0.2-percent-annual-chance flood were determined by straight-line extrapolation of the logarithmic probability graphs of flood discharges computed for frequencies up to the 1-percent-annual-chance. Peak discharge-frequency values were computed for selected locations. Routing of the flood hydrographs through each sub-basin reach on the detailed study streams was accomplished using a modified PULS reservoir routing. The HEC-2 step-backwater model provided the elevation-discharge-storage relationships for each reach on all streams (Reference 4). There are no stream gages to calibrate the hydrology on any of the streams studied (Reference 1).

The previously printed FIS for the City of Cleburne considered the following streams: East Buffalo Creek, Lockett Branch, McAnear Creek, Unnamed Stream, and West Buffalo Creek (Reference 3). In that study, discharges for East Buffalo Creek, Lockett Branch, McAnear Creek, and West Buffalo Creek, were determined by the USACE using unit hydrograph coefficients based on the May 1969 flood and on data developed in studies on adjacent streams. These coefficients, together with rainfall data published by the National Weather Service, were used to compute runoff hydrographs for the community. For the portions of West Buffalo Creek revised in the study effective May 17, 1989, the USDA-NRCS Technical Release No. 20 (TR-20) model was used to determine discharges for the selected recurrence intervals (References 1 and 15).

In the original countywide study, hydrologic analyses were carried out for the following streams, within the unincorporated areas of Johnson County: East Buffalo Creek, East Buffalo Creek Tributary A, East Buffalo Creek Tributary B, King Branch, Valley Branch, Valley Branch Tributary A, Walnut Creek, Walnut Creek Tributary A, and Walnut Creek Tributary B. The hydrologic evaluations were based on synthetic frequency methods. Rainfall frequency data were obtained from Technical Paper No. 40 (Reference 13). Values greater than the 1-percent-annual-chance frequency were determined by extrapolating data on standard log-log paper. For all streams within the county, peak discharge values for various frequencies were determined using the USDA-NRCS TR-20 computer program (Reference 15). In some cases, downstream discharges decrease because of overbank storage effects (Reference 1).

Also in the previous countywide study, hydrology for Low Branch within the City of Mansfield was developed using the computer program NUDALLAS (Reference 12). The watershed being studied was divided into sub-basins, and synthetic unit and flood hydrographs were developed at selected locations. Technical Paper No. 40 was used in developing the 10-, 2-, and 1-percent-annual-chance storms (Reference 13). The 0.2-percent-annual-chance flood was based on extrapolated data. Routing of the flood hydrographs through each sub-basin was accomplished using a modified PULS reservoir routing method. The USACE HEC-2 step-backwater model provided the elevation-discharge-storage relationships (References 1 and 4).

In the original countywide study, the USDA-NRCS provided data on the George Marti Dam on West Buffalo Creek within the City of Cleburne. This data supported a 1-percent-annual-chance water surface elevation of 834.8 feet North American Vertical Datum of 1988 (NAVD) for the lake formed by the dam (Reference 1).

For the hydrologic analyses for Unnamed Stream in the January 6, 1993, countywide revision, the rainfall frequency data were obtained from the U.S. Weather Bureau

Technical Paper No. 40 (Reference 13). The peak discharges were determined by routing various storm frequencies with a 24-hour rainfall duration using USDA-NRCS TR-20 (References 1 and 15).

In the previous countywide revision, the rainfall frequency data were obtained for Hurst Creek, Little Booger Creek, and South Fork Shannon Creek, from the U.S. Weather Bureau Technical Paper No. 40 (Reference 13). The peak discharges were determined by routing various storm frequencies with a 24-hour rainfall duration using the USDA-NRCS TR-20 (References 1 and 15).

Peak discharge-drainage area relationships for streams studied by detailed methods are shown in Table 2, "Summary of Discharges."

Table 2 – Summary of Discharges

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. mile)	PEAK DISCHARGES (cfs) 10% Annual Chance	2 % Annual Chance	1% Annual Chance	0.2% Annual Chance
BYPASS CREEK					
At confluence with Quil Miller Creek	3.72	3,600	4,950	5,500	6,750
EAST BUFFALO CREEK					
Approximately 550 feet downstream of confluence of West Buffalo Creek	48.10	13,700	24,000	30,700	55,800
Approximately 20 feet downstream of Watters Street	31.50	9,600	16,800	20,900	38,100
Approximately 1,400 feet upstream of confluence of Lockett Branch	25.30	8,100[1]	14,000	17,700	31,100
Approximately 5.7 miles upstream of confluence of Unnamed Stream	22.69	8,232[1]	13,351	16,193	30,520
Approximately 6.4 miles upstream of confluence of Unnamed Stream	21.63	8,243[1]	13,343	16,171	30,427
At County Road 700	21.08	8,257	13,335	16,146	30,320
At County Road 701	17.74	7,771	12,188	14,646	26,764
At County Road 801	5.57	2,305	3,594	4,315	8,108
At County Road 705	2.69	1,720	2,647	3,142	5,562
EAST BUFFALO CREEK TRIBUTARY A					
Approximately 0.47 miles upstream of confluence with East Buffalo Creek	1.40	1,047	1,606	1,907	3,384
Approximately 0.76 miles upstream of confluence with East Buffalo Creek	1.16	924	1,416	1,679	2,965

Table 2 – Summary of Discharges (Continued)

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. mile)	PEAK DISCHARGES (cfs) 10% Annual Chance	2 % Annual Chance	1% Annual Chance	0.2% Annual Chance
EAST BUFFALO CREEK TRIBUTARY B					
Approximately 1,150 feet upstream of confluence with East Buffalo Creek	3.28	2,330	3,551	4,218	7,321
At F.M. 3048	1.67	1,232	1,884	2,236	3,919
Approximately 1.96 miles upstream of confluence with East Buffalo Creek	0.94	716	1,098	1,303	2,302
HURST CREEK					
At confluence with Quil Miller Creek	1.19	1,650	2,250	2,550	3,100
At confluence of unnamed tributary, approximately 0.57 miles upstream of County Road 532	0.87	1,300	1,750	1,950	2,400
Approximately 430 feet downstream of County Road 601	0.50	562	1,152	1,387	1,937
At County Road 601	0.34	659	1,032	1,197	1,585
Approximately 825 feet below Interstate Highway 35W Northbound Frontage Road	0.10	230	337	388	509
Below Interstate Highway 35W Northbound Frontage Road	0.07	161	237	273	359
KING BRANCH					
Approximately 2,150 feet upstream of confluence with Walnut Creek	3.31	2,022[1]	2,932[1]	3,399[1]	6,150[1]
At County Road 519	3.19	2,029[1]	2,960[1]	3,440[1]	6,208[1]
At pipeline approximately 1.9 miles upstream of confluence with Walnut Creek	2.37	2,086	3,198	3,794	6,697
LITTLE BOOGER CREEK					
At confluence with Village Creek	2.26	2,700[1]	3,350[1]	3,650[1]	4,450[1]
At State Highway 174	1.77	2,900	3,600	3,950	4,950
Approximately 1,000 feet upstream of Southwest Thomas Road	0.97	1,650	2,150	2,400	2,950
Downstream side of Southwest Alsbury Boulevard	0.61	1,088	1,571	1,799	2,347
Approximately 1,500 feet upstream of Southwest Alsbury Boulevard	0.34	665	907	1,013	1,128
Approximately 3,150 feet upstream of Southwest Alsbury Boulevard	0.17	*	*	432	*

Table 2 – Summary of Discharges (Continued)

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. mile)	PEAK DISCHARGES (cfs) 10% Annual Chance	2 % Annual Chance	1% Annual Chance	0.2% Annual Chance
LOCKETT BRANCH					
Approximately 955 feet upstream of confluence with East Buffalo Creek	6.20	3,200	5,300	6,400	10,000
LOW BRANCH					
At State Highway 496	0.70	1,700	2,200	2,400	3,050
MCANEAR CREEK					
Approximately 740 feet upstream of confluence with East Buffalo Creek	6.60	3,600	6,000	7,100	11,100
At upstream side of U.S. Business Highway 67	5.40	3,300	5,200	6,400	9,200
At upstream side of Kilpatrick Avenue	2.80	2,700	4,200	4,800	6,200
NORTH CREEK					
At confluence with Village Creek	2.98	2,850	4,150	4,850	6,150
At confluence of unnamed tributary, approximately 0.85 miles downstream of Interstate Route 35W	2.05	1,750[1]	2,800[1]	3,200[1]	4,050[1]
At Interstate Route 35W	1.76	2,200	3,150	3,950	4,350
At Missouri-Kansas-Texas Railroad	1.27	1,650	2,100	2,350	2,800
At Northeast Alsbury Boulevard	0.73	1,350	1,850	2,050	2,550
Approximately 600 feet downstream of McAlister Road	0.47	1,100	1,450	1,600	2,050
QUIL MILLER CREEK					
At confluence with Village Creek	24.13	9,700[1]	15,350	18,300	24,200
Downstream of confluence of Hurst Creek	22.46	9,550[1]	14,950	17,700	23,050
Upstream of confluence of Hurst Creek	21.27	9,400[1]	14,600[1]	17,100[1]	22,150[1]
At confluence of unnamed tributary approximately 0.64 miles upstream of Old Alvarado Highway	20.89	9,850	14,850	17,350	22,250
Downstream of confluence of Bypass Creek	16.86	8,250	12,250	14,100	17,900
Upstream of confluence of Bypass Creek	13.14	6,450[1]	9,500[1]	11,000[1]	13,950[1]
Upstream of Interstate Highway 35W	11.65	6,750	9,700	11,100	14,000

Table 2 – Summary of Discharges (Continued)

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. mile)	PEAK DISCHARGES (cfs) 10% Annual Chance	2 % Annual Chance	1% Annual Chance	0.2% Annual Chance
SHANNON CREEK					
Immediately downstream of confluence of South Shannon Creek	8.33	6,750	9,550	11,000	13,950
Immediately upstream of confluence of South Shannon Creek	6.32	4,900	7,000	8,050	10,250
Downstream of confluence of unnamed tributary approximately 0.76 miles upstream of State Highway 174	5.13	4,400	6,200	7,050	8,850
Upstream of confluence of unnamed tributary, approximately 0.76 miles upstream of State Highway 174	3.76	3,450	4,850	5,550	6,900
SOUTH SHANNON CREEK					
At confluence with Shannon Creek	1.33	1,450	2,090	2,380	2,940
At headwaters of South Shannon Creek	0.86	1,150	1,560	1,750	2,120
Approximately 1,800 feet downstream of Burlington Northern Santa Fe Railroad	0.47	867	1,323	1,544	2,071
Downstream side of Burlington Northern Santa Fe Railroad	0.08	102	187	231	340
STREAM 3					
At confluence with South Shannon Creek	1.95	2,350	3,250	3,650	4,600
STREAM VC-8					
At confluence with Village Creek	3.62	3,550[1]	5,250[1]	6,100	7,650
Downstream of confluence of Stream VC-8A	3.35	3,600	5,250	5,950	7,350
At confluence of Stream VC-8A	1.69	2,150	2,950	3,300	4,000
Approximately 1,700 feet upstream of County Road 802	1.49	2,150	2,900	3,200	3,900
STREAM VC-8A					
At confluence with Stream VC-8	1.66	1,550	2,400	2,750	3,450
At Mountain Valley Estates Dam	1.46	1,350	2,050	2,400	2,950
At the first crossing of County Road 802	1.09	1,450	1,950	2,200	2,650
UNNAMED STREAM					
At Sewage Disposal	1.51	1,719	2,634	3,067	4,020
At Country Club Road	1.31	1,955	2,836	3,248	4,141
At Westhill Drive	0.69	993	1,445	1,660	2,128
Below U.S. Business Highway 67	0.40	567	828	954	1,229

Table 2 – Summary of Discharges (Continued)

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. mile)	PEAK DISCHARGES (cfs) 10% Annual Chance	2 % Annual Chance	1% Annual Chance	0.2% Annual Chance
UNNAMED TRIBUTARY TO SHANNON CREEK					
At confluence with Shannon Creek	1.23	1,640	2,400	2,690	3,490
Approximately 2,000 feet upstream of confluence with Shannon Creek	0.89	1,190	1,770	1,990	2,600
VALLEY BRANCH					
Approximately 1,580 feet upstream of confluence with Walnut Creek	6.26	3,130[1]	5,189[1]	6,092[1]	12,130[1]
At F.M. 2738	6.13	3,178[1]	5,236[1]	6,169[1]	12,175[1]
At County Road 528	5.28	3,417	5,460	6,522	12,282
At County Road 529	2.47	2,789	4,268	5,058	8,906
VALLEY BRANCH TRIBUTARY A					
At County Road 608	1.84	1,386	2,154	2,577	4,707
Approximately 0.57 miles upstream of County Road 529	0.88	1,093	1,669	1,977	3,474
VILLAGE CREEK					
At confluence of Quil Miller Creek	31.65	12,600[1]	18,750[1]	22,100[1]	30,600[1]
At confluence of Sewage Disposal Tributary	27.72	12,050[1]	18,250[1]	21,750[1]	29,900[1]
Downstream of confluence of Little Booger Creek	26.90	12,200[1]	18,650[1]	22,150[1]	30,150[1]
At confluence of Little Booger Creek	24.64	11,950[1]	18,050[1]	21,250[1]	28,600[1]
Downstream of confluence of Shannon Creek	22.49	13,000	20,750	24,400	30,850
At confluence of Shannon Creek	14.16	9,450	14,750	17,050	21,750
At F.M. 731	11.87	8,550	13,150	15,100	18,850
Downstream of confluence of Stream VC-8	10.66	8,250	12,050	13,900	17,500
At confluence of Stream VC-8	7.04	5,200[1]	7,500[1]	8,650[1]	10,900[1]
Downstream of confluence of Willow Creek	6.68	5,350	7,600	8,700	10,900
Upstream of confluence of Willow Creek	2.11	2,350	3,250	3,600	4,400
WALNUT CREEK					
At the confluence of Valley Branch	29.33	10,180	15,771	20,141	41,272
At F.M. 2738	20.98	7,720	11,728	14,652	29,412
Approximately 0.64 miles upstream of confluence of Walnut Creek Tributary A	17.04	6,501	9,758	12,025	23,834

Table 2 – Summary of Discharges (Continued)

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. mile)	PEAK DISCHARGES (cfs) 10% Annual Chance	2 % Annual Chance	1% Annual Chance	0.2% Annual Chance
WALNUT CREEK (Continued)					
At County Road 608	13.53	6,117	9,338	11,314	21,399
At County Road 519	5.43	4,364	6,693	7,940	14,029
WALNUT CREEK TRIBUTARY A					
Approximately 1,575 feet upstream of confluence with Walnut Creek	2.83	2,341[1]	3,685[1]	4,487[1]	8,491
At County Road 608	2.53	2,458	3,816	4,587	8,397
At County Road 528	0.84	1,176	1,799	2,132	3,754
WALNUT CREEK TRIBUTARY B					
At County Road 604	4.76	2,767	4,313	5,160	10,269
At County Highway 600	3.02	2,137	3,215	3,821	7,136
At Forgotten Lane	1.15	1,376	2,145	2,542	4,478
At Interstate Highway 35W	0.43	790	1,196	1,412	2,458
WEST BUFFALO CREEK					
Approximately 75 feet downstream of Country Club Road	11.88	*	*	6,007	9,118
Approximately 62 feet downstream of Westhill Drive	11.73	*	*	5,852	8,882
Approximately 78 feet downstream of Wilson Street	11.05	*	*	5,123	7,771
Approximately 63 feet downstream of Kilpatrick Street	9.78	*	*	3,631	5,499
Approximately 82 feet upstream of State Highway 171	8.46	*	*	2,048	3,089
WILLOW CREEK					
At confluence with Village Creek	4.57	3,550	5,050	5,800	7,300
Upstream of confluence of unnamed tributary located just downstream of Burlington Northern Santa Fe Railroad	2.92	2,950	4,050	4,600	5,650
At Burlington Northern Santa Fe Railroad	2.05	2,000	2,800	3,150	3,850

[1] Decreased because of storage routing effects
*Data not computed

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 Flood Insurance Rate Map (FIRM) represent rounded whole-foot elevations and may not exactly reflect the elevations shown on the Flood Profiles or in the Floodway Data tables in the FIS report. Flood elevations shown on the FIRM are primarily intended for flood insurance rating purposes. For construction and/or floodplain management purposes, users are cautioned to use the flood elevation data presented in this FIS in conjunction with the data shown on the FIRM.

Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles (Exhibit 1). For stream segments for which a floodway was computed (Section 4.2), selected cross-section locations are also shown on the FIRM.

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

3.2.1 New Detailed Study Streams

The Low Branch hydraulic study within the City of Mansfield was incorporated as "Best Available" floodplain study data. Water surface elevations were initially determined using the USACE HEC-2 step-backwater computer program (Reference 4). The HEC-2 model was converted to HEC-RAS for the FEMA Map Modernization Project. Cross sections were located at close intervals upstream and/or downstream of bridges and culverts in order to compute the significant backwater effects of those structures. The City of Mansfield master drainage study HEC-2 model was used to provide the channel geometry. The primary source of terrain data used for the overbank geometry was developed from the 2001 North Central Texas Council of Governments (NCTCOG) LiDAR data. Field survey data and "As-Built" plans were used to convert hydraulic structures from the HEC-2 model to the HEC-RAS model. Starting water surface elevations for Low Branch were taken from the FIS for the incorporated and unincorporated areas of Tarrant County, Texas (Reference 16).

3.2.2 Redelineated Detailed Study Streams

The analyses for the redelineated study stream were taken from the prior Flood Insurance Studies for Johnson County. The Base (1-percent-annual-chance) Flood Elevations (BFEs) from the profiles were plotted on the best available topographic data to better define the special flood hazard areas. The redelineated streams are identified in Section 2.1.

Information on the methods used to determine water surface elevations for the streams studied by detailed methods is shown below. The incorporated communities with detailed studies are listed in alphabetical order; methodologies used to develop cross sections and starting water surface elevations are described for each community. For streams that flow through two or more communities, each methodology described applies only to that portion of the stream studied by detailed methods within that particular community.

The previously printed FIS for the City of Burleson considered the following streams: Bypass Creek, Hurst Creek, Little Booger Creek, North Creek, Quil Miller Creek, Shannon Creek, South Shannon Creek, Stream 3, Stream VC-8, Stream VC-8A, Village

Creek, and Willow Creek (Reference 2). During the preparation of that study, detailed hydraulic analyses were carried out for portions of Bypass Creek, Quil Miller Creek, Shannon Creek, South Shannon Creek, Village Creek, and Willow Creek that are located in the unincorporated areas of the county; the original countywide study reflects those analyses (Reference 1).

In that study, cross sections for the streams studied by detailed methods were field surveyed and located at close intervals upstream and/or downstream of bridges and culverts in order to compute the significant backwater effects of those structures. Bridge data were obtained by field measurements and by bridge plans from TxDOT and from the City of Burleson. Water surface elevations were determined using the USACE HEC-2 step-backwater computer program (Reference 4). Starting water surface elevations for all streams studied by detailed methods except Village Creek were based on slope/area computations. Starting elevations for Village Creek were taken from the FIS for the incorporated and unincorporated areas of Tarrant County, Texas (Reference 16).

The previously printed FIS for the City of Cleburne considered the following streams: East Buffalo Creek, Lockett Branch, McAnear Creek, Unnamed Stream, and West Buffalo Creek (Reference 3). In that study, cross sections were field surveyed and located at close intervals above or below bridges and culverts in order to compute their significant backwater effects. Water surface elevations were computed using the USACE HEC-2 step-backwater computer program (Reference 4). Starting water surface elevations were determined using the slope/area method.

In the original countywide study, hydraulic analyses were carried out for the following streams, within the unincorporated areas of the county: East Buffalo Creek, East Buffalo Creek Tributary A, East Buffalo Creek Tributary B, King Branch, Valley Branch, Valley Branch Tributary A, Walnut Creek, Walnut Creek Tributary A, and Walnut Creek Tributaries B. Cross sections were obtained from field surveys. All bridges, dams, and culverts were field checked to obtain elevation data and structural geometry. Water surface elevations were computed using the USDA-NRCS WSP-2 step-backwater computer program (Reference 17). Starting water surface elevations for all streams studied, except East Buffalo Creek, were calculated using normal depth or critical depth, as appropriate. Starting elevations for East Buffalo Creek were taken from the previously printed FIS for the City of Cleburne (Reference 3).

In the January 6, 1993 revisions to the countywide FIS, cross sections for Unnamed Stream were obtained from field surveys. Water surface elevations of floods of the selected recurrence intervals were computed using the USDA-NRCS WSP-2 computer program (Reference 17). Starting water surface elevations were computed using the slope/area method.

In the countywide study effective January 6, 1999, cross sections for the revised streams within the City of Burleson were field surveyed at selected locations. Water surface elevations of floods of the selected recurrence intervals were computed using the USDA-NRCS WSP-2 computer program (Reference 17). Starting water surface elevations were obtained from the previously printed FIS for the City of Burleson (Reference 2).

Channel roughness coefficient (Manning's "n") used in the hydraulic computations were selected by engineering judgment and based on field observations of the streams and

floodplain areas. Channel and overbank "n" values for the streams studied by detailed methods are shown in Table 3, "Summary of Roughness Coefficients."

Table 3 – Summary of Roughness Coefficients
Stream Reaches Studied by Detailed Methods

Stream Name	Channel "n" Value	Overbank "n" Value
Bypass Creek	0.050 - 0.055	0.075 - 0.085
East Buffalo Creek	0.040 - 0.060	0.070 - 0.095
East Buffalo Creek Tributary A	0.050	0.075
East Buffalo Creek Tributary B	0.050	0.075
Hurst Creek	0.013 - 0.070	0.050 - 0.100
King Branch	0.050	0.085
Little Booger Creek	0.015 - 0.060	0.020 - 0.085
Lockett Branch	0.040 - 0.050	0.070 - 0.095
Low Branch	0.045	0.060
McAnear Creek	0.040 - 0.050	0.070 - 0.095
North Creek	0.025 - 0.080	0.025 - 0.080
Quil Miller Creek	0.050 - 0.080	0.045 - 0.070
Shannon Creek	0.065 - 0.080	0.050 - 0.060
South Shannon Creek	0.050 - 0.065	0.060 - 0.080
Stream 3	0.065 - 0.075	0.050
Stream VC-8	0.035 - 0.075	0.060 - 0.095
Stream VC-8A	0.015 - 0.080	0.050 - 0.095
Unnamed Stream	0.015 - 0.060	0.080 - 0.090
Valley Branch	0.050 - 0.065	0.075 - 0.085
Valley Branch Tributary A	0.045 - 0.060	0.075 - 0.085
Village Creek	0.055 - 0.085	0.045 - 0.070
Walnut Creek	0.055 - 0.060	0.075 - 0.085
Walnut Creek Tributary A	0.050 - 0.060	0.075 - 0.090
Walnut Creek Tributary B	0.050 - 0.060	0.075 - 0.085
West Buffalo Creek	0.040 - 0.050	0.070 - 0.095
Willow Creek	0.010 - 0.065	0.045 - 0.080

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. Some of the data used in this revision were taken from the prior effective FIS reports and FIRMs and adjusted to NAVD88. The datum conversion factor from NGVD29 to NAVD88 in Johnson County is +0.09 feet.

For information regarding conversion between the NGVD and NAVD, visit the National Geodetic Survey (NGS) 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
Silver Spring Metro Center 3
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- and 0.2-percent-annual-chance floodplains; and a 1-percent-annual-chance floodway. This information is presented on the FIRM and in many components of the FIS report, including Flood Profiles, Floodway Data tables, and Summary of Stillwater Elevation tables. Users should reference the data presented in the FIS report as well as additional information that may be available at the local community map repository before making flood elevation and/or floodplain boundary determinations.

4.1 Floodplain Boundaries

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

county, the boundaries between cross sections were interpolated using topographic maps at a scale of 1:24,000, with a contour interval of 10 feet (References 18, 19, 20, and 21).

The 1- and 0.2-percent-annual-chance floodplain boundaries are shown on the FIRM. On this map, the 1-percent-annual-chance floodplain boundary corresponds to the boundary of the areas of special flood hazards (Zones A and AE), and the 0.2-percent-annual-chance floodplain boundary corresponds to the boundary of areas of moderate flood hazards. In cases where the 1- and 0.2-percent-annual-chance floodplain boundaries are close together, only the 1-percent-annual-chance floodplain boundary has been shown. Small areas within the floodplain boundaries may lie above the flood elevations, but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data.

For the streams studied by approximate methods, only the 1-percent-annual-chance floodplain boundary is shown on the FIRM.

4.2 Floodways

Encroachment on floodplains, such as structures and fill, reduces flood-carrying capacity, increases flood heights and velocities, and increases flood hazards in areas beyond the encroachment itself. One aspect of floodplain management involves balancing the economic gain from floodplain development against the resulting increase in flood hazard. For purposes of the NFIP, a floodway is used as a tool to assist local communities in this aspect of floodplain management. Under this concept, the area of the 1-percent-annual-chance floodplain is divided into a floodway and a floodway fringe. The floodway is the channel of a stream, plus any adjacent floodplain areas, that must be kept free of encroachment so that the base flood can be carried without substantial increases in flood heights. Minimum Federal standards limit such increases to 1 foot, provided that hazardous velocities are not produced. The floodways in this study are presented to local agencies as minimum standards that can be adopted directly or that can be used as a basis for additional floodway studies.

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 (see Table 4, "Floodway Data"). In cases where the floodway and 1-percent-annual-chance floodplain boundaries are either close together or collinear, only the floodway boundary is shown.

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (NAVD)	WITHOUT FLOODWAY (NAVD)	WITH FLOODWAY (NAVD)	INCREASE
Bypass Creek								
A	1,380	450	1,493	3.7	704.5	704.5	705.5	1.0
B	3,500	350	1,924	2.9	709.6	709.6	710.6	1.0
C	4,375	350	2,223	2.5	711.2	711.2	712.2	1.0
D	5,550	299	1,219	4.5	715.4	715.4	716.1	0.7
E	7,550	450	2,837	1.9	724.8	724.9	725.8	0.9

[1] Stream distance in feet above confluence with Quil Miller Creek

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY

JOHNSON COUNTY, TX

AND INCORPORATED AREAS

FLOODWAY DATA

BYPASS CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (NAVD)	WITHOUT FLOODWAY (NAVD)	WITH FLOODWAY (NAVD)	INCREASE
East Buffalo Creek								
A	7,200	973	4,489	7.7	729.1	729.1	729.8	0.7
B	8,380	1,016	8,637	3.6	732.2	732.2	733.2	1.0
C	10,560	1,047	6,643	4.6	737.6	737.6	738.6	1.0
D	12,250	1,343	9,757	2.3	740.6	740.6	740.7	0.1
E	13,530	1,100	7,374	3.1	745.0	745.0	745.4	0.4
F	16,430	639	5,878	3.9	749.1	749.1	750.1	1.0
G	18,500	547	4,084	5.1	755.6	755.6	756.3	0.7
H	19,970	1,081	7,692	2.7	759.1	759.1	759.7	0.6
I	21,500	1,264	8,203	2.5	760.8	760.8	761.4	0.6
J	23,030	1,322	7,765	2.3	762.1	762.1	762.8	0.7
K	25,850	920	4,966	3.6	766.1	766.1	767.1	1.0
L	28,310	655	4,087	4.3	772.1	772.1	773.1	1.0
M	30,650	726	5,894	2.7	776.7	776.7	777.7	1.0
N	33,730	760	5,917	2.7	780.9	780.9	781.9	1.0
O	35,810	907	5,393	3.0	784.1	784.1	785.1	1.0
P	35,910	867	4,734	3.4	784.6	784.6	785.6	1.0
Q	41,500	528	3,914	3.7	795.1	795.1	796.1	1.0
R	47,650	470	326	13.2	805.6	805.6	806.6	1.0
S	47,750	255	1,409	3.1	806.5	806.5	807.4	0.9
T	53,900	247	1,118	3.9	821.0	821.0	822.0	1.0
U	54,000	347	1,836	2.4	822.1	822.1	823.1	1.0
V	59,300	234	979	3.2	837.1	837.1	838.1	1.0

[1]Stream distance in feet above confluence of Unnamed Stream

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY

JOHNSON COUNTY, TX

AND INCORPORATED AREAS

FLOODWAY DATA

EAST BUFFALO CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (NAVD)	WITHOUT FLOODWAY (NAVD)	WITH FLOODWAY (NAVD)	INCREASE
East Buffalo Tributary A								
A	2,250	111	471	4.0	833.0	833.0	834.0	1.0
B	4,000	182	493	3.4	842.8	842.8	843.8	1.0

[1]Stream distance in feet above confluence with East Buffalo Creek

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY

JOHNSON COUNTY, TX

AND INCORPORATED AREAS

FLOODWAY DATA

EAST BUFFALO CREEK TRIBUTARY A

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (NAVD)	WITHOUT FLOODWAY (NAVD)	WITH FLOODWAY (NAVD)	INCREASE
East Buffalo Tributary B								
A	1,150	304	1,150	3.7	807.2	807.2	808.2	1.0
B	2,490	171	854	4.8	813.5	813.5	814.5	1.0
C	2,590	222	1,258	3.3	815.4	815.4	816.4	1.0
D	7,250	76	418	5.3	831.2	831.2	832.2	1.0
E	7,350	109	543	4.1	832.6	832.6	833.6	1.0
F	10,350	196	513	2.5	844.2	844.2	845.2	1.0

[1]Stream distance in feet above confluence with East Buffalo Creek

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY

JOHNSON COUNTY, TX

AND INCORPORATED AREAS

FLOODWAY DATA

EAST BUFFALO CREEK TRIBUTARY B

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (NAVD)	WITHOUT FLOODWAY (NAVD)	WITH FLOODWAY (NAVD)	INCREASE
Hurst Creek								
A	1,830	118	385	6.6	679.1	679.1	679.3	0.2
B	2,360	71	369	6.9	682.0	682.0	682.0	0.0
C	3,950	50	352	7.2	692.3	692.3	692.8	0.5
D	5,513	95	394	4.9	704.6	704.6	705.4	0.8
E	7,023	250	583	2.2	711.2	711.2	711.5	0.3
F	8,352	141	369	3.8	724.6	724.6	725.2	0.6
G	8,672	151	476	2.5	727.0	727.0	727.5	0.5
H	8,796	253	429	2.8	728.3	728.3	728.5	0.2
I	9,596	168	457	2.5	732.6	732.6	733.2	0.6
J	10,546	62	109	3.6	739.6	739.6	740.1	0.5
K	11,326	60	69	4.0	750.3	750.3	751.0	0.7
L	11,453	45	102	2.7	751.2	751.2	752.1	0.9

[1]Stream distance in feet above confluence with Quil Miller Creek

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY

JOHNSON COUNTY, TX

AND INCORPORATED AREAS

FLOODWAY DATA

HURST CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (NAVD)	WITHOUT FLOODWAY (NAVD)	WITH FLOODWAY (NAVD)	INCREASE
King Branch								
A	2,150	91	510	6.7	648.0	648.0	649.0	1.0
B	4,452	91	600	5.7	658.0	658.0	659.0	1.0
C	4,524	96	714	4.8	660.1	660.1	661.1	1.0
D	7,300	103	591	6.1	674.2	674.2	675.2	1.0
E	10,200	242	1,013	3.7	686.7	686.7	687.7	1.0

[1]Stream distance in feet above confluence with Walnut Creek

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY

JOHNSON COUNTY, TX

AND INCORPORATED AREAS

FLOODWAY DATA

KING BRANCH

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (NAVD)	WITHOUT FLOODWAY (NAVD)	WITH FLOODWAY (NAVD)	INCREASE
Little Booger Creek								
A	1,350	130	550	6.6	691.7	691.7	692.1	0.4
B	2,900	180	1,248	2.9	702.2	702.2	703.2	1.0
C	3,500	90	490	7.4	702.8	702.8	703.6	0.8
D	4,600	128	740	4.9	708.7	708.7	709.4	0.7
E	6,950	100	690	5.7	723.9	723.9	724.7	0.8
F	8,825	123	353	6.8	730.6	730.6	730.7	0.1
G	10,805	101	479	3.5	738.6	738.6	738.6	0.0
H	11,905	89	343	5.4	743.5	743.5	743.5	0.0
I	13,110	34	199	9.0	752.2	752.2	752.2	0.0
J	14,202	83	300	3.8	760.0	760.0	760.0	0.0
K	16,247	42	111	3.9	768.8	768.8	768.8	0.0

[1]Stream distance in feet above confluence with Village Creek

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY

JOHNSON COUNTY, TX

AND INCORPORATED AREAS

FLOODWAY DATA

LITTLE BOOGER CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (NAVD)	WITHOUT FLOODWAY (NAVD)	WITH FLOODWAY (NAVD)	INCREASE
Lockett Branch								
A	955	800	2,235	2.9	760.9	760.7[2]	760.8	0.1
B	3,140	698	3,135	2.0	766.6	766.6	766.8	0.2
C	5,585	400	1,585	4.0	775.8	775.8	776.4	0.6
D	7,650	468	1,371	4.7	781.6	781.6	781.9	0.3

[1]Stream distance in feet above confluence with East Buffalo Creek
[2]Elevation computed without consideration of backwater effects from East Buffalo Creek

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY
JOHNSON COUNTY, TX
AND INCORPORATED AREAS

FLOODWAY DATA

LOCKETT BRANCH

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (NAVD)	WITHOUT FLOODWAY (NAVD)	WITH FLOODWAY (NAVD)	INCREASE
Low Branch A	40,113	291	1,080	2.2	622.4	622.4	622.6	0.2

[1]Stream distance in feet above confluence with Lake Joe Pool

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY

JOHNSON COUNTY, TX

AND INCORPORATED AREAS

FLOODWAY DATA

LOW BRANCH

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (NAVD)	WITHOUT FLOODWAY (NAVD)	WITH FLOODWAY (NAVD)	INCREASE
McAnear Creek								
A	740	470	4,332	1.6	731.4	731.4	731.9	0.5
B	3,600	236	2,036	3.5	746.2	746.2	747.2	1.0
C	5,570	150	860	8.3	750.4	750.4	750.5	0.1
D	6,700	200	1,048	6.8	758.1	758.1	758.1	0.0
E	8,110	406	1,686	4.2	761.7	761.7	762.0	0.3
F	9,740	246	1,201	5.3	767.6	767.6	768.5	0.9
G	11,420	148	873	7.3	776.2	776.2	776.8	0.6
H	12,760	102	603	10.6	784.8	784.8	785.8	1.0
I	16,200	343	2,018	3.2	796.9	796.9	797.9	1.0
J	20,125	207	1,393	3.4	810.9	810.9	811.8	0.9

[1]Stream distance in feet above confluence with East Buffalo Creek

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY

JOHNSON COUNTY, TX

AND INCORPORATED AREAS

FLOODWAY DATA

MCANEAR CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (NAVD)	WITHOUT FLOODWAY (NAVD)	WITH FLOODWAY (NAVD)	INCREASE
North Creek								
A	5,320	230	940	3.4	682.8	682.8	683.7	0.9

[1]Stream distance in feet above confluence with Village Creek

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY

JOHNSON COUNTY, TX

AND INCORPORATED AREAS

FLOODWAY DATA

NORTH CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (NAVD)	WITHOUT FLOODWAY (NAVD)	WITH FLOODWAY (NAVD)	INCREASE
Quil Miller Creek								
A	4,025	860	4,460	4.0	666.9	666.9	667.2	0.3
B	7,200	601	2,989	5.7	676.8	676.8	677.6	0.8
C	9,940	708	4,335	4.0	682.0	682.0	682.9	0.9
D	13,050	658	4,467	3.9	689.8	689.8	690.7	0.9
E	13,850	666	4,505	3.9	691.6	691.6	692.5	0.9
F	15,310	598	4,091	4.2	695.4	695.4	696.1	0.7
G	16,340	627	4,297	3.3	697.6	697.6	698.5	0.9
H	19,535	800	5,626	2.0	704.8	704.8	705.8	1.0
I	20,535	630	3,530	3.1	705.7	705.7	706.6	0.9
J	27,385	260	2,156	5.1	721.4	721.4	722.1	0.7
K	28,285	270	4,135	2.7	725.1	725.1	725.9	0.8

[1]Stream distance in feet above confluence with Village Creek

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY

JOHNSON COUNTY, TX

AND INCORPORATED AREAS

FLOODWAY DATA

QUIL MILLER CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (NAVD)	WITHOUT FLOODWAY (NAVD)	WITH FLOODWAY (NAVD)	INCREASE
Shannon Creek								
A	5,140	410	1,692	4.8	729.3	729.3	730.2	0.9
B	7,250	163	1,198	6.9	738.0	738.0	738.7	0.7
C	8,500	198	1,280	5.4	741.8	741.8	742.3	0.5
D	10,300	550	1,842	3.8	748.8	748.8	749.3	0.5

[1]Stream distance in feet above confluence with Village Creek

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY

JOHNSON COUNTY, TX

AND INCORPORATED AREAS

FLOODWAY DATA

SHANNON CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (NAVD)	WITHOUT FLOODWAY (NAVD)	WITH FLOODWAY (NAVD)	INCREASE
South Shannon Creek								
A	2,700	140	400	6.0	737.9	737.9	738.5	0.6
B	3,325	215	709	3.4	741.5	741.5	742.3	0.8
C	4,450	109	365	6.5	750.0	750.0	750.4	0.4
D	6,740	130	542	4.4	762.5	762.5	763.3	0.8
E	10,025	140	379	4.6	771.1	771.1	771.8	0.7
F	11,950	136	496	4.0	784.6	784.6	784.6	0.0
G	12,850	109	414	4.0	788.7	788.7	789.6	0.9
H	14,620	35	63	3.7	803.4	803.4	803.5	0.1
I	14,794	47	162	1.4	810.1	810.1	810.1	0.0

[1]Stream distance in feet above confluence with Shannon Creek

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY

JOHNSON COUNTY, TX

AND INCORPORATED AREAS

FLOODWAY DATA

SOUTH SHANNON CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (NAVD)	WITHOUT FLOODWAY (NAVD)	WITH FLOODWAY (NAVD)	INCREASE
Stream 3								
A	0.06	110	345	5.9	728.7	728.7	729.7	1.0
B	0.23	81	368	6.0	734.7	734.7	735.5	0.8

[1]Stream distance in miles above confluence with South Shannon Creek

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY

JOHNSON COUNTY, TX

AND INCORPORATED AREAS

FLOODWAY DATA

STREAM 3

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (NAVD)	WITHOUT FLOODWAY (NAVD)	WITH FLOODWAY (NAVD)	INCREASE
Stream VC-8								
A	815	160	889	6.9	761.1	761.1	762.1	1.0
B	1,410	350	2,192	2.8	764.2	764.2	765.2	1.0
C	3,370	300	2,920	2.0	775.4	775.4	776.4	1.0
D	4,005	150	718	4.6	778.0	778.0	779.0	1.0
E	5,020	171	898	3.7	782.7	782.7	783.6	0.9
F	5,280	170	959	3.4	784.4	784.4	785.4	1.0
G	5,690	141	711	4.6	786.3	786.3	786.9	0.6
H	6,190	130	651	5.1	789.0	789.0	789.9	0.9
I	6,500	110	529	6.1	791.1	791.1	792.0	0.9
J	7,185	160	768	4.2	795.3	795.3	796.3	1.0
K	7,815	80	449	7.1	800.0	800.0	800.8	0.8

[1]Stream distance in feet above confluence with Village Creek

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY

JOHNSON COUNTY, TX

AND INCORPORATED AREAS

FLOODWAY DATA

STREAM VC-8

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (NAVD)	WITHOUT FLOODWAY (NAVD)	WITH FLOODWAY (NAVD)	INCREASE
Unnamed Stream								
A	800	228	1,138	2.9	718.4	718.4	719.4	1.0
B	3,200	130	560	6.6	738.9	738.9	739.9	1.0
C	5,100	66	403	8.8	754.1	754.1	755.1	1.0
D	5,174	78	556	6.9	758.0	758.0	758.0	0.0
E	6,400	60	388	7.7	764.6	764.6	765.5	0.9
F	7,000	59	322	8.3	769.1	769.1	769.3	0.2
G	7,110	54	326	8.2	770.9	770.9	770.9	0.0
H	7,560	45	219	12.1	773.9	773.9	774.0	0.1
I	7,890	238	716	4.5	777.3	777.3	778.3	1.0
J	7,980	299	880	3.5	777.7	777.7	778.7	1.0
K	8,920	276	661	4.4	783.1	783.1	784.1	1.0
L	9,800	45	234	7.1	791.6	791.6	791.9	0.3
M	9,917	69	279	6.0	794.6	794.6	794.8	0.2
N	10,020	45	152	11.1	795.8	795.8	796.8	1.0
O	10,930	27	183	7.6	798.2	798.2	798.5	0.3
P	11,012	26	119	11.8	799.9	799.9	800.2	0.3
Q	11,480	109	331	4.8	803.9	803.9	804.9	1.0
R	11,565	90	294	5.3	804.2	804.2	805.2	1.0
S	12,440	62	220	4.7	810.3	810.3	810.6	0.3
T	12,820	60	180	5.3	813.0	813.0	813.8	0.8

[1]Stream distance in feet above confluence with East Buffalo Creek

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY

JOHNSON COUNTY, TX

AND INCORPORATED AREAS

FLOODWAY DATA

UNNAMED STREAM

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (NAVD)	WITHOUT FLOODWAY (NAVD)	WITH FLOODWAY (NAVD)	INCREASE
Valley Branch								
A	1,580	704	2,233	2.7	626.9	626.9	627.9	1.0
B	4,330	195	1,225	5.0	638.9	638.9	639.9	1.0
C	4,458	327	2,206	2.8	641.3	641.3	642.3	1.0
D	7,280	310	1,886	3.4	649.0	649.0	650.0	1.0
E	10,318	1,041	2,566	2.5	656.6	656.6	657.6	1.0
F	10,407	1,156	5,820	1.1	661.1	661.1	662.1	1.0
G	12,150	300	1,700	3.9	666.9	666.9	667.9	1.0
H	15,750	440	1,453	3.5	682.7	682.7	683.7	1.0

[1]Stream distance in feet above confluence with Walnut Creek

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY

JOHNSON COUNTY, TX

AND INCORPORATED AREAS

FLOODWAY DATA

VALLEY BRANCH

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (NAVD)	WITHOUT FLOODWAY (NAVD)	WITH FLOODWAY (NAVD)	INCREASE
Valley Branch Tributary A								
A	767	121	613	4.2	669.4	669.4	670.4	1.0
B	859	181	933	2.8	671.7	671.7	672.7	1.0
C	3,780	100	517	4.6	684.4	684.4	685.4	1.0
D	8,400	170	547	3.6	708.4	708.4	709.4	1.0

[1]Stream distance in feet above confluence with Valley Branch

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY

JOHNSON COUNTY, TX

AND INCORPORATED AREAS

FLOODWAY DATA

VALLEY BRANCH TRIBUTARY A

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (NAVD)	WITHOUT FLOODWAY (NAVD)	WITH FLOODWAY (NAVD)	INCREASE
Village Creek								
A	128,130	1,351	5,885	3.7	671.8	671.8	672.1	0.3
B	130,610	1,350	7,082	3.1	676.7	676.7	677.3	0.6
C	132,240	750	5,260	5.2	679.9	679.9	680.7	0.8
D	134,500	1,500	7,584	2.9	689.1	689.1	689.3	0.2
E	135,890	1,500	6,877	3.1	692.5	692.5	692.9	0.4
F	138,640	1,012	6,493	3.3	703.9	703.9	704.3	0.4
G	139,360	945	6,187	3.4	704.8	704.8	705.4	0.6
H	141,305	735	2,786	7.6	710.4	710.4	711.0	0.6
I	143,150	795	6,578	3.7	716.4	716.4	716.8	0.4
J	148,870	700	4,218	4.0	730.1	730.1	730.9	0.8
K	149,670	700	3,390	5.0	732.5	732.5	733.3	0.8
L	156,240	651	4,233	3.6	749.2	749.2	750.0	0.8
M	160,085	700	4,124	3.7	755.7	755.7	756.7	1.0
N	162,065	400	1,432	6.0	759.5	759.5	760.5	1.0
O	163,250	670	3,533	2.4	764.8	764.8	765.8	1.0
P	167,020	810	2,738	3.2	772.8	772.8	773.8	1.0
Q	168,520	134	517	7.0	785.5	785.5	785.6	0.1
R	168,860	190	835	4.3	788.2	788.2	788.7	0.5
S	170,685	450	3,908	0.9	805.3	805.3	806.3	1.0
T	170,860	425	3,829	0.9	806.5	806.5	807.1	0.6
U	171,680	350	2,020	1.8	806.6	806.6	807.2	0.6
V	172,300	112	503	7.2	812.4	812.4	813.1	0.7
W	172,835	112	552	6.5	817.2	817.2	818.2	1.0

[1]Stream distance in feet above confluence with West Fork Trinity River

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY

JOHNSON COUNTY, TX

AND INCORPORATED AREAS

FLOODWAY DATA

VILLAGE CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (NAVD)	WITHOUT FLOODWAY (NAVD)	WITH FLOODWAY (NAVD)	INCREASE
Walnut Creek								
A	11,780	1,154	6,244	3.2	626.8	626.8	627.8	1.0
B	15,950	741	3,783	3.9	635.9	635.9	636.9	1.0
C	16,276	890	5,370	2.7	638.0	638.0	639.0	1.0
D	16,320	149	1,178	12.4	638.1	638.1	639.1	1.0
E	16,500	764	6,233	2.3	640.4	640.4	641.4	1.0
F	21,550	765	3,874	3.1	647.8	647.8	648.8	1.0
G	26,450	445	3,232	3.7	658.8	658.8	659.8	1.0
H	28,700	266	2,254	5.0	664.8	664.8	665.8	1.0
I	28,862	238	1,931	5.9	665.7	665.7	666.7	1.0
J	31,300	317	2,792	4.0	670.3	670.3	671.3	1.0
K	39,950	411	2,958	4.0	691.3	691.3	692.3	1.0
L	45,700	193	1,458	5.4	709.8	709.8	710.8	1.0

[1]Stream distance in feet above Tarrant County/Johnson County boundary

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY

JOHNSON COUNTY, TX

AND INCORPORATED AREAS

FLOODWAY DATA

WALNUT CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (NAVD)	WITHOUT FLOODWAY (NAVD)	WITH FLOODWAY (NAVD)	INCREASE
Walnut Creek Tributary A								
A	1,580	193	964	4.6	661.6	661.6	662.6	1.0
B	3,415	219	1,044	4.4	669.7	669.7	670.7	1.0
C	3,515	157	800	5.7	670.3	670.3	671.3	1.0
D	6,850	92	733	6.5	688.8	688.8	689.8	1.0
E	12,700	133	495	4.3	718.8	718.8	719.8	1.0

[1]Stream distance in feet above confluence with Walnut Creek

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY

JOHNSON COUNTY, TX

AND INCORPORATED AREAS

FLOODWAY DATA

WALNUT CREEK TRIBUTARY A

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (NAVD)	WITHOUT FLOODWAY (NAVD)	WITH FLOODWAY (NAVD)	INCREASE
Walnut Creek Tributary B								
A	1,772	338	1,191	4.3	693.3	693.3	694.3	1.0
B	1,844	103	443	11.6	693.4	693.4	694.4	1.0
C	5,050	206	1,059	4.4	706.5	706.5	707.5	1.0
D	8,820	221	915	4.2	719.2	719.2	720.2	1.0
E	8,900	315	1,607	2.4	721.3	721.3	722.3	1.0
F	12,900	108	725	4.9	735.8	735.8	736.8	1.0
G	17,420	31	200	12.7	768.9	768.9	769.9	1.0
H	17,500	230	1,155	2.2	772.3	772.3	773.3	1.0
I	21,900	153	392	3.6	811.4	811.4	812.4	1.0

[1]Stream distance in feet above confluence with Walnut Creek

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY

JOHNSON COUNTY, TX

AND INCORPORATED AREAS

FLOODWAY DATA

WALNUT CREEK TRIBUTARY B

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (NAVD)	WITHOUT FLOODWAY (NAVD)	WITH FLOODWAY (NAVD)	INCREASE
West Buffalo Creek								
A	950	650	9,000	2.7	739.6	739.6	740.6	1.0
B	3,150	118	1,055	5.6	744.6	744.6	745.1	0.5
C	5,020	123	1,039	5.4	752.5	752.5	753.0	0.5
D	7,220	152	1,249	4.2	759.8	759.8	760.3	0.5
E	10,030	120	1,171	4.2	769.0	769.0	769.5	0.5
F	11,790	145	983	4.7	773.5	773.5	774.0	0.5
G	12,510	115	858	5.2	776.2	776.2	776.7	0.5
H	13,610	118	787	5.0	780.1	780.1	780.6	0.5
I	15,160	92	831	4.4	786.0	786.0	787.0	1.0
J	16,150	136	672	3.1	786.9	786.9	787.4	0.5
K	18,080	80	397	4.4	793.0	793.0	793.5	0.5
L	20,680	90	319	3.8	800.8	800.8	801.3	0.5

[1]Stream distance in feet above confluence with East Buffalo Creek

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY

JOHNSON COUNTY, TX

AND INCORPORATED AREAS

FLOODWAY DATA

WEST BUFFALO CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (NAVD)	WITHOUT FLOODWAY (NAVD)	WITH FLOODWAY (NAVD)	INCREASE
Willow Creek								
A	3,000	240	1,016	5.7	779.3	779.3	780.1	0.8
B	4,160	429	1,331	4.4	780.0	780.0	780.7	0.7
C	5,279	89	1,029	5.6	790.8	790.8	791.3	0.5
D	7,045	457	2,804	2.1	795.0	795.0	795.7	0.7
E	8,540	677	2,450	2.4	801.4	801.4	802.0	0.6
F	9,300	660	817	7.1	802.5	802.5	802.7	0.2
G	10,380	195	767	6.0	812.9	812.9	813.3	0.4

[1]Stream distance in feet above confluence with Village Creek

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY

JOHNSON COUNTY, TX

AND INCORPORATED AREAS

FLOODWAY DATA

WILLOW CREEK

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.

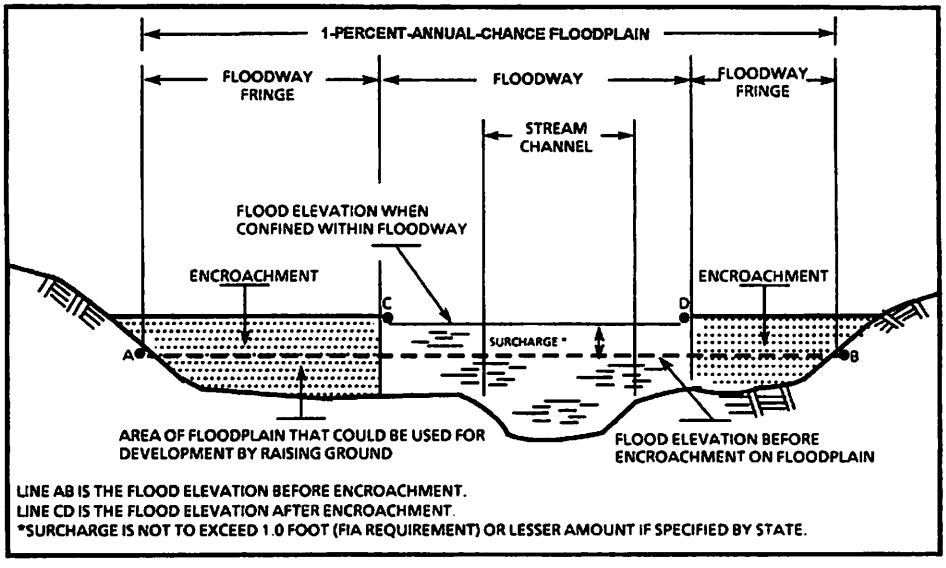


Figure 1: Floodway Schematic

No floodways were computed for Stream VC-8A and Unnamed Tributary to Shannon Creek.

In the case of redelineation, effort was made to maintain the prior effective regulatory floodway width and shape. However, due to updated topographic data, some modifications were made to contain the floodway within the limits of the 1-percent-annual-chance floodplain. Most modifications to the prior effective regulatory floodway boundaries are due to topographic changes that have occurred along the streams.

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 4 for certain downstream cross sections of Lockett Branch 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.

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 BFEs or depths are shown within this zone.

Zone AE

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

Zone X

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

6.0 FLOOD INSURANCE RATE MAP

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

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

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

The countywide FIRM presents flooding information for the entire geographic area of Johnson 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 5, "Community Map History."

COMMUNITY NAME	INITIAL IDENTIFICATION	FLOOD HAZARD BOUNDARY MAP REVISIONS DATE	FLOOD INSURANCE RATE MAP EFFECTIVE DATE	FLOOD INSURANCE RATE MAP REVISIONS DATE
Alvarado, City of	August 9, 1974	January 23, 1976	May 4, 1982	None
Briar Oaks, City of	March 29, 1974	June 18, 1976	September 27, 1991	None
Burleson, City of	November 2, 1973	None	November 2, 1973	July 1, 1974 July 25, 1975 April 16, 1976 June 24, 1977 December 3, 1987
Cleburne, City of	June 23, 1972	None	July 13, 1972	July 1, 1974 September 12, 1975 September 30, 1980 May 17, 1989
Cresson, City of*	May 17, 1977	None	September 27, 1991	None

*This community did not have its own FIRM prior to the first countywide FIS. The land area for this community was previously shown on the FIRM for the unincorporated areas of Johnson County, but was not identified as a separate NFIP community. Therefore, the dates for this community were taken from the Johnson County FIRM.

COMMUNITY NAME	INITIAL IDENTIFICATION	FLOOD HAZARD BOUNDARY MAP REVISIONS DATE	FLOOD INSURANCE RATE MAP EFFECTIVE DATE	FLOOD INSURANCE RATE MAP REVISIONS DATE
Cross Timber, Town of*	May 17, 1977	None	September 27, 1991	None
Godley, City of	August 22, 1975	None	September 27, 1991	None
Grandview, City of*	May 17, 1977	None	September 27, 1991	None
Johnson County, Unincorporated Areas	May 17, 1977	None	September 27, 1991	None
Joshua, City of	June 27, 1975	None	September 27, 1991	None
Keene, City of	June 4, 1976	None	September 27, 1991	None
Mansfield, City of	February 22, 1974	May 10, 1977	December 18, 1985	September 28, 1990
Rio Vista, Village of*	May 17, 1977	None	September 27, 1991	None
Venus, City of	July 11, 1975	None	September 27, 1991	None

*This community did not have its own FIRM prior to the first countywide FIS. The land area for this community was previously shown on the FIRM for the unincorporated areas of Johnson County, but was not identified as a separate NFIP community. Therefore, the dates for this community were taken from the Johnson County FIRM.

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

JOHNSON COUNTY, TX

AND INCORPORATED AREAS

COMMUNITY MAP HISTORY

7.0 OTHER STUDIES

The preparation of updated Flood Insurance Studies is on-going for the Incorporated and Unincorporated Areas of Bosque, Ellis, Hill, and Hood counties, Texas. An updated FIS has been prepared for the Incorporated and Unincorporated Areas of Parker and Tarrant counties. The Johnson County Study is in agreement with these studies.

This FIS report either 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 FEMA Region VI, Federal Insurance and Mitigation Division, 800 North Loop 288, Denton, Texas 76209.

9.0 BIBLIOGRAPHY AND REFERENCES

1. Flood Insurance Study Johnson County, Texas Incorporated and Unincorporated Areas. Federal Emergency Management Agency, Washington, D.C., January 6, 1999.

2. Flood Insurance Study City of Burleson, Johnson County. Federal Emergency Management Agency, Washington, D.C., December 3, 1987.

3. Flood Insurance Study City of Cleburne, Johnson County. Federal Emergency Management Agency, Washington, D.C., May 17, 1989.

4. U.S. Army Corps of Engineers, Hydrologic Engineering Center, HEC-2 Water Surface Profiles, Generalized Computer Program, Davis, CA, April 1984.

5. U.S. Department of Agriculture, Soil Conservation Service, Soil Survey of Johnson County, TX, October 1985.

6. U.S. Census Bureau; Census 2000, Summary File 1 (SF 1); using American Factfinder; <http://factfinder.census.gov/>; 24 January 2008.

7. Texas A&M University Press Consortium, Texas Almanac 2008 - 2009. 112. Dallas: The Dallas Morning News, 2008.

8. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Environmental Data Service, Monthly and Annual Climatological Data for Texas, Asheville, North Carolina, National Climatic Center, Published Annually.

9. U.S. Department of the Interior, Geological Survey, Stream Gaging Records, Washington, D.C.

10. National Oceanic and Atmospheric Administration's Storm Data and Unusual Weather Phenomena – April 1997, <http://www.srh.noaa.gov/images/fwd/pdf/sd0497.pdf>, December 2, 2009.

11. National Oceanic and Atmospheric Administration's Storm Data and Unusual Weather Phenomena – September 2007, <http://www.srh.noaa.gov/images/fwd/ pdf/sd0907.pdf>, December 2, 2009.

12. U.S. Army Corps of Engineers, Fort Worth District, Computer Program NUDALLAS, Fort Worth, TX, revised September 1982.

13. U.S. Department of Commerce, Weather Bureau, Technical Paper No. 40, Rainfall Frequency Atlas of the United States, Washington, D.C., 1961, Revised 1963.

14. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Weather Service, Technical Memorandum NWS Hydro-35, Five to 60 Minute Precipitation Frequency for the Eastern and Central United States, Asheville, NC, National Climatic Center, June 1977.

15. U.S. Department of Agriculture, Soil Conservation Service, Technical Release No. 20, Computer Program, Project Formulation, Hydrology, Washington, D.C., 1965.

16. Flood Insurance Study Tarrant County, Texas Incorporated and Unincorporated Areas. Federal Emergency Management Agency, Washington, D.C., September 25, 2009.

17. U.S. Department of Agriculture, Soil Conservation Service, Technical Release No. 61, WSP-2 Computer Program, Washington, D.C., May 1976.

18. City of Burleson, Topographic Map, Contour Interval 2 feet, 1999/2000.

19. City of Cleburne, Topographic Map, Contour Interval 2 feet, 2005.

20. North Central Texas Council of Government (NCTCOG), Topographic Maps Compiled from LiDAR, Contour Interval 2 feet, January 2001.

21. United States Geological Survey (USGS) Hypsography, Alvarado, Blum, Bono, Brazos Point, Britton, Burleson, Cleburne East, Cleburne West, Covington, Cresson, Files Valley, Godley, Grandview, Itasca, Joshua, Keen, Mansfield, Maypearl, Promrose, Venus Quadrangles, Texas; 7.5-Minute Series Topographic Map. Scale of 1:24,000. For 2007 Restudy, data (tagged vector lines\Digital Line Graph) downloaded from Texas National Resources Information Systems (TNRIS) website.