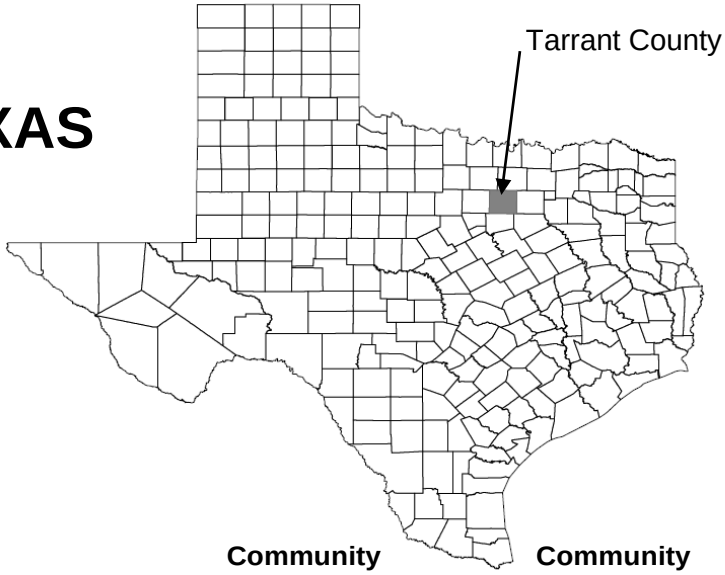
Notice

This preliminary FIS report includes only revised Flood Profiles and Floodway Data tables. See "Notice to Flood Insurance Users" page for additional details.

FLOOD INSURANCE STUDY



TARRANT COUNTY, TEXAS

AND INCORPORATED AREAS

VOLUME 1 OF 9

Community Name	Community Number
TARRANT COUNTY UNINCORPORATED AREAS	480582
ARLINGTON, CITY OF	485454
AZLE, CITY OF	480584
BEDFORD, CITY OF	480585
BENBROOK CITY OF	480586
BLUE MOUND, CITY OF	480587
BURLESON, CITY OF	485459
COLLEYVILLE, CITY OF	480590
CROWLEY, CITY OF	480591
DALWORTHINGTON GARDENS, CITY OF	481013
EDGECLIFF VILLAGE, TOWN OF	480592
EULESS, CITY OF	480593
EVERMAN, CITY OF	480594
FLOWER MOUND, TOWN OF	480777
FOREST HILL, CITY OF	480595
FORT WORTH, CITY OF	480596
GRAND PRAIRIE, CITY OF	485472
GRAPEVINE, CITY OF	480598
HALTOM CITY, CITY OF	480599
HASLET, CITY OF	480600
HURST, CITY OF	480601
KELLER, CITY OF	480602
KENNEDALE, CITY OF	480603
LAKE WORTH, CITY OF	480605
LAKESIDE, CITY OF	480604
MANSFIELD, CITY OF	480606
NORTH RICHLAND HILLS, CITY OF	480607
PANTEGO, TOWN OF	481116
PELICAN BAY, CITY OF	481653
RENO, TOWN OF	480969
RICHLAND HILLS, CITY OF	480608
RIVER OAKS, CITY OF	480609
ROANOKE, CITY OF	480785
SAGINAW, CITY OF	480610
SANSOM PARK, CITY OF	480611
SOUTHLAKE, CITY OF	480612
TROPHY CLUB, TOWN OF	481606
WATAUGA, CITY OF	480613
WESTLAKE, TOWN OF	480614
WESTOVER HILLS, TOWN OF	480615
WESTWORTH VILLAGE, CITY OF	480616
WHITE SETTLEMENT, CITY OF	480617

REVISED PRELIMINARY

October 30, 2015

REVISED: _____

Federal Emergency Management Agency

FLOOD INSURANCE STUDY NUMBER
48439CV001B

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: January 6, 1993

First Revised Countywide FIS Revision Date: August 2, 1995

Second Revised Countywide FIS Revision Date: August 23, 2000

Third Revised Countywide FIS Revision Date: Map revised September 25, 2009 to update corporate limits, to change Base Flood Elevations, to change Special Flood Hazards Areas, to change zone descriptions, to add roads and road names, to incorporate previously issued Letters of Map Revision, and to reflect updated topographic information.

Fourth Revised Countywide FIS Revision Date: _____

This preliminary revised Flood Insurance Study contains only Floodway Data tables or Flood Profiles added or revised as part of the revision. All other Floodway Data tables and Flood Profiles will appear in the final FIS report.

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VOLUME 9 - _____, 2016

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FLOOD INSURANCE STUDY
TARRANT 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 Tarrant County, including the Cities of Arlington, Azle, Bedford, Benbrook, Blue Mound, Burleson, Colleyville, Crowley, Dalworthington Gardens, Euless, Everman, Forest Hill, Fort Worth, Grand Prairie, Grapevine, Haltom City, Haslet, Hurst, Keller, Kennedale, Lake Worth, Lakeside, Mansfield, North Richland Hills, Pelican Bay, Reno, Richland Hills, River Oaks, Roanoke, Saginaw, Sansom Park, Southlake, Watauga, Westworth Village, White Settlement; the Towns of Edgecliff Village, Flower Mound, Pantego, Trophy Club, Westlake, and Westover Hills; and the unincorporated areas of Tarrant County (referred to collectively herein as Tarrant County).

Please note that the Cities of Burleson and Crowley are geographically located in Tarrant and Johnson Counties; the Cities of Azle and Reno are geographically located in Tarrant and Parker Counties; the Cities of Roanoke and Southlake and the Towns of Flower Mound, Trophy Club, and Westlake are geographically located in Tarrant and Denton Counties; the City of Grand Prairie is geographically located in Tarrant, Dallas, and Ellis Counties; the City of Grapevine is geographically located in Tarrant, Dallas, and Denton Counties; the City of Fort Worth is geographically located in Tarrant, Denton, Parker, and Wise Counties; and the City of Mansfield is geographically located in Tarrant, Ellis, and Johnson Counties. See these separately pubhlished FIS reports and Flood Insurance Rate Maps (FIRMs) for the countywide map dates and flood hazard information outside of Tarrant County.

This FIS aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This FIS has developed flood risk data for various areas of the county that will be used to establish actuarial flood insurance rates. This information will also be used by Tarrant County to update existing floodplain regulations as part of the Regular Phase of the National Flood Insurance Program (NFIP), and will also be used by local and regional planners to further promote sound land use and floodplain development. Minimum floodplain management requirements for participation in the NFIP are set forth in the Code of Federal Regulations at 44 CFR, 60.3.

In some states or communities, floodplain management criteria or regulations may exist that are more restrictive or comprehensive than the minimum Federal requirements. In such cases, the more restrictive criteria take precedence and the state (or other jurisdictional agency) will be able to explain them.

1.2 Authority and Acknowledgments

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

This FIS was prepared to include the unincorporated areas and incorporated communities within Tarrant County into a countywide FIS. The single-community FIS reports were incorporated into a countywide FIS report, effective January 6, 1993. Information on the authority and acknowledgments for each of these studies, compiled from their previous effective narratives, is shown below.

Tarrant County

In the study effective August 4, 1987, the hydrologic and hydraulic analyses for the following streams were prepared by the U. S. Army Corps of Engineers (USACE) for the Federal Emergency Management Agency (FEMA) under Inter-Agency Agreement No. EMW-E-0941, Project Order No. 12: Bear Creek 1, Briar Creek, Chambers Creek, Deer Creek, Elm Branch, Marys Creek, South Marys Creek, Stream VC-5, Stream VC-6, Stream VC-7, Village Creek, Walnut Creek 3, West Fork Trinity River, and Willow Branch. That work was completed in March 1984 (Reference 1). Additional information for streams studied by detailed methods in the August 4, 1987 effective study was taken from the FISs for the Cities of Azle (Reference 2), Benbrook, Crowley, Fort Worth, Haslet, Mansfield, and Southlake.

City of Arlington

The hydrologic and hydraulic analyses for the revised study effective February 4, 1988 were prepared by the USACE for FEMA under Inter-Agency Agreement No. EMW-E-l153, Project Order No.1, Amendment Nos. 4 and 4b. That work was completed in September 1985 (Reference 3).

City of Bedford

The hydrologic and hydraulic analyses for the study effective July 18, 1977 were prepared by Black & Veatch, Consulting Engineers for FEMA under Contract No. H-3814. The analyses for the revision effective April 17, 1984 were prepared by Threadgill, Dowdy, and Associates and Teague, Na11, and Perkins, Inc., for FEMA. The analyses for the revision dated March 18, 1987 were prepared by the USACE, Washington/Wallace, Inc., and Anderson Engineers, Inc. That work was completed in August 1984. The analyses for the revision dated June 4, 1990 were prepared by Goodwin and Marshall, Inc., for FEMA. That work was completed in May 1989 (Reference 4).

City of Benbrook

The hydrologic and hydraulic analyses for the study effective July 2, 1979 were prepared by the USACE for FEMA under Inter-Agency Agreement No. IAA-H-7-76, Project Order No. 9. That work was completed in January 1977. The analyses for the study effective September 18, 1986 were performed by Farrington & Associates at Country Day Estates in Benbrook, and by the USACE during the preparation of the Flood Insurance Study for the City of Fort Worth. That work was completed in May 1984. For the revision effective January 18, 1989, the analyses were performed by the USACE. The work for that revision was completed in November 1987. For the revision dated November 16, 1990, the analyses were performed by the USACE. That work was completed in April 1989 (Reference 5).

City of Blue Mound

The hydrologic and hydraulic analyses for the study effective January 1980 were performed by the USACE for FEMA, under Inter-Agency Agreement No. IAA-H-18-78, Project Order No. 44. That work was completed in April 1979 (Reference 6).

City of Burleson

The hydrologic and hydraulic analyses for the study effective June 24, 1977 were performed by the USACE for FEMA under Inter-Agency Agreement No. lAA-H-16-75, Project Order No. 14, and Inter-Agency Agreement No. IAA-H-7-76, Project Order No. 19. The work for that study was completed in April 1976. The analyses for the revision effective December 3, 1987 were prepared by the USACE for FEMA under Inter-Agency Agreement No. EMW-E-1153, Project Order No.1, Amendment Nos. 30 and 30a. That work was completed in September 1985 (Reference 7).

City of Colleyville

The hydrologic and hydraulic analyses for the study effective June 1, 1982 were performed by the USACE for FEMA, under Inter-Agency Agreement No. IAA-H-979, Project Order No. 8. That work was completed in November 1980 (Reference 8).

City of Crowley

The hydrologic and hydraulic analyses for the study effective October 15, 1980 were performed by the USACE for FEMA, under Inter-Agency Agreement No. IAA-H-18-78, Project Order No. 44. That work was completed in October 1979 (Reference 9).

City of Dalworthington Gardens

The hydrologic and hydraulic analyses for the study effective November 17, 1981 were performed by the USACE for FEMA under Inter-Agency Agreement No. lAA-H-9-79, Project Order No. 8. That work was completed in October 1980 (Reference 10).

Town of Edgecliff Village

The hydrologic and hydraulic analyses for the study effective August 19, 1986 were performed by the USACE for FEMA under Inter-Agency Agreement No. EMW-E-0539, Project Order No. 6. That work was completed in March 1982 (Reference 11).

City of Euless

The hydrologic and hydraulic analyses for the study effective October 3, 1984 were performed by the USACE for FEMA under Inter-Agency Agreement No. EMW-E-0539, Project Order No. 6. That work was completed in March 1983 (Reference 12).

City of Everman

The hydrologic and hydraulic analyses for the study effective in March 1980 were performed by the USACE for FEMA under Inter-Agency Agreement No. IAA-H-18-78, Project Order No. 44. That work was completed in June 1979 (Reference 13).

City of Forest Hill

The hydrologic and hydraulic analyses for the study effective in February 1978 were performed by the USACE for FEMA under Inter-Agency Agreement No. IAA-H-16-75, Project Order No. 19 (Reference 14).

City of Fort Worth

The hydrologic and hydraulic analyses for the study effective June 4, 1980 were performed by Lockwood, Andrews and Newman, Inc., for FEMA, under Contract No. H-3730, and by the USACE. That work was completed in April 1976 (Reference 15). The analyses for the revision dated November 18, 1988 were performed by the USACE for FEMA under Inter-Agency Agreement No. EMW-E-0539, Project Order No. 7 and amendments thereto. That work was completed in April 1984 (Reference 16).

City of Grapevine

The hydrologic and hydraulic analyses for the study effective August 15, 1989 were performed by the USACE for FEMA, under Inter-Agency Agreement No. lAA-H-9-79, Project Order No. 8. That work was completed in January 1981 (Reference 17).

City of Haltom City

The hydrologic and hydraulic analyses for the study effective February 1, 1978 were prepared by the USACE for FEMA under Inter-Agency Agreement No. IAA-H-19-74, Project Order No. 17, and Inter-Agency Agreement No. lAA-H-16-75, Project Order No. 6. The analyses for the revision dated January 6, 1988 were performed by the USACE during the preparation of the Flood Insurance Study for the City of Fort Worth; that work was completed in April 1984. In that revision additional analyses were prepared by Graham Associates, Inc.; that work was completed in June 1986. In the revision dated June 4, 1990, the analyses were performed by Everage, Smith, Farrington and Associates, Inc., under agreement with FEMA; that work was completed in June 1988. Also included in that revision were analyses performed by the USACE during the preparation of the Flood Insurance Study for the City of North Richland Hills (Reference 18).

City of Haslet

The hydrologic and hydraulic analyses for the study effective October 15, 1985 were performed by the USACE for FEMA under Inter-Agency Agreement No. EMW-E-0941, Project Order No. 12. That work was completed in May 1984 (Reference 19).

City of Hurst

The hydrologic and hydraulic analyses for the study effective October 15, 1985 were performed by the USACE for FEMA under Inter-Agency Agreement No. EMW-E-0941, Project Order No. 1. That work was completed in August 1983 (Reference 20).

City of Keller

The hydrologic and hydraulic analyses for the study effective March 30, 1982 were performed by the USACE for FEMA under Inter-Agency Agreement No. IAA-H-9-79, Project Order No. 8. That work was completed in January 1981 (Reference 21).

City of Kennedale

The hydrologic and hydraulic analyses for the study effective May 15, 1984 (FIRM dated November 15, 1984) were performed by the USACE for FEMA under Inter-Agency

Agreement No. EMW-E-0539, Project Order No. 6. That work was completed in December 1982 (Reference 22).

City of Mansfield

The hydrologic and hydraulic analyses for the study effective December 18, 1985 were performed by the USACE for FEMA under Inter-Agency Agreement No. EMW-E-0539, Project Order No. 6. That work was completed in January 1983. The hydraulic analyses for the revision dated September 28, 1990 were performed by Carter & Burgess, Inc. FEMA reviewed and accepted those analyses for the purposes of that revision (Reference 23).

City of North Richland Hills

The hydrologic and hydraulic analyses for the study effective April 1, 1981 were performed by the Soil Conservation Service (SCS) for FEMA. That work was completed in 1980. The analyses for the revision effective November 15, 1985 were performed by the USACE for FEMA, under Inter-Agency Agreement No. EMW-E-0941, Project Order No.1; that work was completed in December 1983. The analyses for the revision effective December 16, 1988 were performed by Anderson Engineers, Inc., and Knowlton-English-Flowers, Inc. That work was completed in October 1987 (Reference 24).

Town of Pantego

The hydrologic and hydraulic analyses for the study effective in January 1980 were performed by the USACE for FEMA under Inter-Agency Agreement No. IAA-H-18-78, Project Order No. 44. That work was completed in February 1979 (Reference 25).

City of Richland Hills

The hydrologic and hydraulic analyses for the study effective February 16, 1977 were performed by the SCS for FEMA. The analyses for the revision effective January 3, 1985 were performed by the USACE for FEMA under Inter-Agency Agreement No. EMW-E-0941, Project Order No. 1. That work was completed in June 1983 (Reference 26).

City of River Oaks

The hydrologic and hydraulic analyses for the study effective December 19, 1984 were performed by the USACE for FEMA under Inter-Agency Agreement No. EMW-E-0941, Project Order No. 12. That work was completed in July 1983 (Reference 27).

City of Saginaw

The hydrologic and hydraulic analyses for the study effective in March 1980 were performed by the USACE for FEMA under Inter-Agency Agreement No. lAA-H-18-78, Project Order No. 44. That work was completed in April 1979 (Reference 28).

City of Southlake

The hydrologic and hydraulic analyses for the study effective January 5, 1982 were performed by the USACE for FEMA under Inter-Agency Agreement No. lAA-H-9-79, Project Order No. 8. That work was completed in February 1981 (Reference 29).

City of Watauga

The hydrologic and hydraulic analyses for the study effective June 1, 1982 were performed by the USACE for FEMA under Inter-Agency Agreement No. lAA-H-9-79, Project Order No.8. That work was completed in May 1980. The revision effective August 15, 1989 incorporated analyses performed by Dunaway Associates, Inc., of Fort Worth, and by Everage, Smith, Farrington, and Associates, Inc. Those analyses were completed in June 1987 and December 1987, respectively (Reference 30).

Town of Westover Hills

The hydrologic and hydraulic analyses for the study effective December 5, 1984 were performed by the USACE for FEMA under Inter-Agency Agreement No. EMW-E-0941, Project Order No. 12. That work was completed in October 1983 (Reference 31).

City of Westworth Village

The hydrologic and hydraulic analyses for the study effective June 3, 1986 were performed by the USACE for FEMA under Inter-Agency Agreement No. EMW-E-0941, Project Order No. 12. The study was completed in November 1983 (Reference 32).

City of White Settlement

The hydrologic and hydraulic analyses for the study effective July 17, 1986 were performed by the USACE for FEMA under Inter-Agency Agreement No. EMW-E-0941, Project Order No. 12. That work was completed in March 1984 (Reference 33).

Countywide FIS Report Major Revisions

Three major revisions were made to the original countywide FIS report. The first revision, effective on August 2, 1995, digitized previously published FIRM data on United States Geological Survey (USGS) quad maps and plotted the Texas Department of Transportation (TxDOT) road and highway centerline with the floodplains to produce the countywide FIRM. Several Letters of Map Revision (LOMR) were incorporated into the first revision (Reference 34).

The second major revision to the original countywide FIS report, effective on August 23, 2000, incorporated modifications to the flood hazard information along West Fork and Clear Fork Trinity River within the Cities of Grand Prairie, Fort Worth, Arlington, Westworth Village, River Oaks, and Benbrook. In addition, this revision included a Limited Map Maintenance Program (LMMP) project which restudied flood hazard data along the Sulphur Branch and its tributary, Stream SB-1, within the Cities of Fort Worth, Hurst, Euless, and Bedford (Reference 34). Several LOMRs were incorporated into the second revision.

The third major revision to the FIS report, effective on September 25, 2009, incorporated several new hydrologic and hydraulic analyses. A new detailed study was prepared by Halff Associates, Inc. under contract EMT – 2002 CO – 0051 for Big Bear Creek. Halff Associates, Inc. also prepared new detailed hydrology and hydraulics for Stream HEN-2 for the City of Haslet. Halff Associates, Inc. prepared new detailed studies for North Fork Fish Creek, Johnson Creek, and Stream JC-1 within the City of Grand Prairie for the City of Grand Prairie as part of their Cooperating Technical Partner (CTP) agreement. Several existing studies within the City of Benbrook were incorporated as ‘Best Available’ floodplain study data.

Teague Nall & Perkins (TNP) prepared new detailed hydraulic analysis of Stream MSC-1A (Plantation West Creek), Plantation East Creek, Timber Creek, and Willow Bend Creek. Several LOMRs were incorporated into the third revision (Reference 35). Several existing studies within the City of Mansfield were incorporated as 'Best Available' floodplain study data. TNP prepared new detailed hydraulic models (HEC-2) as part of the City of Mansfield's Master Drainage Plan for the following flooding sources: Hogpen Branch, Low Branch, Nichols Branch, Pond Branch, Walnut Creek 3, and Watson Branch. Nave Engineering, Inc., in cooperation with Halff Associates, Inc., converted the TNP HEC-2 models to HEC-RAS models and updated the mapping, profiles, and floodway data information. The hydraulic analyses for these restudies were based on the prior effective FIS discharges.

PMR New Detailed Studies

As part of this most recent countywide revision, hydrologic and hydraulic analyses for Big Fossil Creek, Calloway Branch, Dry Branch, Sycamore Creek, and Walker Branch were prepared as a Physical Map Revision (PMR) by RAMPP, for FEMA, under contract No. HSFEHQ-09-D-0369. Under this same contract, a hydraulic analysis for West Fork Trinity River was also completed, and RAMPP incorporated the recently approved LOMR Case Number 11-06-1475P as another PMR, which revised the flood risk along the Fort Worth Floodway system within the City of Fort Worth. This work was completed in December 2011.

Additional hydrologic and hydraulic analyses within the City of Arlington were performed as part of the City of Arlington Cottonwood Creek and Fish Creek Watersheds Flood Protection Plan. The work was completed in January 2013.

As part of the recent stream study updates in Grand Prairie hydrologic and hydraulic analyses for the City of Grand Prairie CTP FY10 Risk MAP Study were performed by the City of Grand Prairie for FEMA, under Contract No. EMT-2010-CA-0013, Case No. 11-06-1592S. The work was completed in October 2011.

Additional hydrologic and hydraulic analyses of Johnson Creek were performed and incorporated as part of the City of Grand Prairie CTP FY12 Risk MAP Study, under Contract No. EMT-2012-CA-0006, Case No. 13-06-1185S. The work was completed in February 2014.

Base map information that was used for this PMR revision was derived from multiple sources. This information was compiled from the U.S. Geological Survey (USGS), 1989, the National Geodetic Survey, 2004, FEMA existing FIRM data, 2009, and the North Central Texas Council of Governments (NCTCOG), 2007 and 2010.

The projection used in the preparation of the FIRMs was North American Datum of 1983 (NAD 83), Texas State Plane, Zone North Central (FIPS 4202), in feet. The vertical datum was the North American Vertical Datum of 1988 (NAVD 88). Differences in datum, projection or State Plane zones used in the projection 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

The dates of the initial and final Consultation Coordination Officer (CCO) meetings held for Tarrant County and the incorporated communities within its boundaries prior to 2009 are not known because they were not documented in the 2009 countywide revision.

The initial CCO meeting for the September 25, 2009 revision was held in June 2004, and attended by representatives of FEMA, North Central Council of Governments (NCTCOG), Tarrant County, Tarrant Regional Water District (TRWD), TxDOT, Texas Commission on Environmental Quality (TCEQ), Michael Baker Jr., Inc., Belcheff & Associates, Halff Associates, Inc., the Cities of Arlington, Bedford, Benbrook, Burleson, Euless, Fort Worth, Grapevine, Haltom City, Haslet, Hurst, Mansfield, North Richland Hills, Southlake, Westworth Village and the Town of Westlake. The results of the study were reviewed at the final CCO meeting held on July 5, 2007, and attended by representatives of FEMA, the Communities and the Study Contractor. All problems raised at that meeting have been addressed in this study.

For the RAMPP Tarrant County PMR, an initial CCO meeting was held on October 27, 2009, and was attended by representatives of the community, the study contractor, and FEMA. A final CCO meeting was held on October 10, 2012, and attended by representatives of the community, the study contractor, and FEMA. All problems raised at that meeting have been addressed in this study.

For the Grand Praire Tarrant County PMR, the CCO meeting was held on October 13, 2015, and was attended by representatives of the community, the study contractor, and FEMA.

2.0 AREA STUDIED

2.1 Scope of Study

This FIS report covers the geographic area of Tarrant 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.

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 Method 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			
Arbor Creek	350 feet above Tarrant Road	390 feet below Randol Mill Road	0.91

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

Stream Name	Downstream Limit	Upstream Limit	Length (mi)
Big Fossil Creek	Confluence with West Fork Trinity River	500 feet upstream of Buffalo Hollow Court	21.4
Big Bear Creek	Tarrant County/ Dallas County	0.58 miles upstream of Old Denton Road	25.9
Calloway Branch	Confluence with Walker Branch	1,000 feet upstream of Windhaven Road	7.3
Cottowood Creek 2	1,900 feet below Union Pacific Railroad	665 feet above Craig Hanking Drive	2.76
Dry Branch	Confluence with West Fork Trinity River	600 feet upstream of Blandin Street	3.0
Fish Creek	2,000 feet below Great Southwest Parkway	30 feet above Bardin Road	8.20
Johnson Creek	Dallas County / Tarrant County Boundary	Just below State Highway 360	2.28
North Fork of Fish Creek (Prairie Creek)	3,200 feet below Great Southwest Parkway	Just below Mayfield Road	5.17
South Fork of Cottonwood Creek 2	1,450 feet below Pioneer Parkway	Just below New York Avenue	3.20
Stream HEN-2	Confluence with Henrietta Creek	Avondale-Haslet Road	1.6
Hogpen Branch	Confluence with Walnut Creek 3	84 feet upstream of U.S. Hwy 287 Business	4.9
Stream JC-1	Tarrant County/ Dallas County	Ducan Perry Road	0.2
Low Branch	Confluence with Lake Joe Pool	1.18 miles upstream of U.S. Hwy 287	7.3
Stream MSC-1A (Plantation West Creek)	Confluence with Marys Creek	Upstream Face of Chapin Road	0.8
Nichols Branch	Confluence with Walnut Creek 3	0.73 miles upstream of Newt Petterson Road	1.0
Plantation East Creek	Confluence with Marys Creek	158 feet upstream of Chapin Road Headwall	0.8
Pond Branch	Confluence with Walnut Creek 3	607 feet upstream of Dallas Street/Pond Street	0.8

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

Stream Name	Downstream Limit	Upstream Limit	Length (mi)
South Fork of Cottonwood Creek 2	1,450 feet below Pioneer Parkway	Just below New York Avenue	3.20
Stream CC-1	Confluence with Cottonwood Creek 2	740 feet above Timberlake Drive	0.22
Stream CC-2	Confluence with Cottonwood Creek 2	Just below Harriett Street	1.18
Stream CC-3	Confluence with Stream CC-2	Just below Mitchell Street	0.83
Stream CC-4	Confluence with Cottonwood Creek 2	70 feet below Sherry Street	0.22
Stream FC-1	Confluence with Fish Creek	150 feet below Interstate Highway 20 Access Road	2.28
Stream FC-2	Confluence with Fish Creek	7,050 feet above Green Oaks Boulevard	1.61
Stream FC-3	Confluence with Fish Creek	90 feet below Bardin Road	1.49
Stream FC-4	Confluence with Fish Creek	150 feet below Interstate Highway 20 Access Road	1.53
Stream NF-1	Confluence with North Fork of Fish Creek	30 feet below Overbrook Drive	0.48
Stream NF-2	Confluence with North Fork of Fish Creek	Just below Mayfield Road	0.18
Stream NF-3	Confluence with North Fork of Fish Creek	130 feet above Allen Avenue	1.00
Stream NF-4	Confluence with North Fork of Fish Creek	Just below Mayfield Road	0.66
Sycamore Creek	Confluence with West Fork Trinity River	600 feet upstream of McCart Avenue	15.5
Timber Creek	Confluence with Clear Fork Trinity River	35 feet upstream of Mckinley Street	2.5
Walker Branch	1,500 feet downstream of confluence of Calloway Branch	600 feet upstream of Brookview Drive	6.3
Walnut Creek 3	Confluence with Lake Joe Pool	Tarrant County/ Johnson County	11.6
Warrior Creek	1,280 feet above Waterwood Drive	975 feet above downstream limit	0.19

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

Stream Name	Downstream Limit	Upstream Limit	Length (mi)
Watson Branch	Confluence with Walnut Creek 3	160 feet upstream of FM 157	2.4
West Fork Trinity River	Dallas County/ Tarrant County	1.6 miles upstream of North Collins Street	10.5
Willow Bend Creek	Confluence with Marys Creek	Williams Road	1.3
Enhanced Approximate Methods Type I Streams			
Garden Branch	Confluence with Fish Creek	Just below Camp Wisdom Road	1.39
Willis Branch	3,450 feet below Great Southwest Parkway	Just below Parking Lot at Great Southwest Parkway and Bardin Road (SE Corner)	0.59
Redelineation Detailed Study Streams			
Ash Creek	1.14 miles upstream of Confluence of West Fork Trinity River	Tarrant County/ Parker County	3.7
Tributary BB-1	Confluence with Big Bear Creek	1900 feet upstream of Glade Road	0.6
Tributary BB-2	Confluence with Big Bear Creek	0.4 miles upstream of Trigg Road	1.2
Tributary BB-3	Confluence with Big Bear Creek	180 feet upstream of Pavestone Drive	0.5
Tributary BB-5	Confluence with Big Bear Creek	1185 feet upstream of Private Road	1.3
Tributary BB-6	Confluence with Big Bear Creek	0.64 miles upstream of Longford Drive	1.5
Tributary BB-7	Confluence with Big Bear Creek	0.51 miles upstream of Eagle Bend	0.7
Tributary BB-8	Confluence with Big Bear Creek	0.45 miles upstream of Continental Boulevard	1.1

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

Stream Name Redelineation Detailed Study Streams	Downstream Limit	Upstream Limit	Length (mi)
Tributary BB-9	Confluence with Big Bear Creek	1775 feet upstream of FM 1709	1.8
Tributary BB-10	Confluence with Big Bear Creek	1050 feet upstream of Dana Drive	2.1
Tributary BB-11	Confluence with Big Bear Creek	1140 feet upstream of J.T. Ottinger Road	1.0
Tributary BB-12	Confluence with Big Bear Creek	1400 feet upstream of FM 1709	1.2
Unnamed Tributary to Big Bear Creek	Keller-Hicks Road	0.44 miles upstream of Park Vista Boulevard	0.7
Stream BFC-1	Confluence with Big Fossil Creek	North Beach Street	2.1
Stream BFC-2	Confluence with Big Fossil Creek	725 feet upstream of U.S. Route 287/81	3.9
Stream BFC-2	9500 feet upstream U.S. Route 287	1070 feet upstream of Harmon Road	0.2
Stream BFC-2A	Confluence with Stream BFC-2	1.29 miles upstream of Confluence with Stream BFC-2	1.3
Stream BFC-3	Confluence with Big Fossil Creek	450 feet upstream of Harmon Road	1.8
Stream BFC-4	Confluence with Big Fossil Creek	400 feet upstream of U.S. Route 287/81	3.3
Stream BFC-4A	Confluence with Stream BFC-4	350 feet upstream of U.S. Route 287/81	1.5
Stream BFC-4B	Confluence with Stream BFC-4	1.05 miles upstream of BNSF Railroad	1.5
Stream BFC-5	Confluence with Big Fossil Creek	Hardisty Street	2.3
Stream BFC-5A	Confluence with Stream BFC-5	80 feet upstream of State Route 183	0.5
Stream BFC-5B	Confluence with Stream BFC-6	1715 feet upstream of Allena Lane	0.8

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

Stream Name Redelineation Detailed Study Streams	Downstream Limit	Upstream Limit	Length (mi)
Stream BFC-6	Confluence with Big Fossil Creek	985 feet upstream of Diamondback Oaks Drive	0.7
Stream BFC-7	Confluence with Big Fossil Creek	1130 feet upstream of Confluence with Big Fossil Creek	0.2
Blessing Branch	0.14 miles downstream of Fuller Wiser Road	75 feet upstream of North Main Street	1.1
Boaz Creek	Confluence with Walnut Creek 2	0.38 miles upstream of Confluence with Walnut Creek 2	0.4
Bowman Branch	Confluence with Lake Joe Pool	Matlock Road	5.2
Stream BB-1	Confluence with Bowen Branch	0.95 miles upstream of Confluence with Bowen Branch	0.9
Boyd Branch	1750 feet downstream of South Main Street	930 feet upstream of Villa Road	4.7
Briar Creek	0.69 miles above Confluence with Eagle Mountain Lake	Tarrant County/ Parker County	1.9
Buffalo Creek	Confluence with Henrietta Creek	2.75 miles upstream of Harmon Road	3.6
Old Buffalo Creek	Confluence with Henrietta Creek	150 feet upstream of Interstate Route 35W	0.7
Bunker Hill Creek	Confluence with Singing Hills Creek	740 feet upstream of North Park Drive	2.6
Stream CB-1 (New)	Confluence with Calloway Branch	1915 feet upstream of Chapman Drive	1.3
Stream CB-1 (Old)	Confluence with Calloway Branch	400 feet upstream of Confluence of Stream CB-1 (Old) Diversion Channel	0.4
Stream CB-1 (Old) Diversion	Confluence with Calloway Branch	Diversion from Stream CB-1 (Old)	0.2
Stream CB-2	Confluence with Calloway Branch	Starnes Road	1.4
Cement Creek	Confluence with Marine Creek	1260 feet upstream of Private Road	2.4

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

Stream Name	Downstream Limit	Upstream Limit	Length (mi)
Redelineation Detailed Study Streams			
West Fork Cement Creek	1340 feet above Confluence with Cement Creek	1600 feet upstream of Longhorn Road	0.8
Chambers Creek	Confluence with Village Creek	Confluence of North Fork Chambers Creek and South Fork Chambers Creek	2.6
North Fork Chambers Creek	Confluence with Chambers Creek	1970 feet upstream of Oak Grove Road	3.2
South Fork Chambers Creek	Confluence with Chambers Creek	1250 feet upstream of Oak Grove Road	2.8
Clear Fork Trinity River	Confluence with Trinity River	2.34 miles upstream of Confluence of Stream CF-6	12.3
Stream CF-2	Confluence with Clear Fork Trinity River	0.8 miles upstream of Vickery Boulevard	1.1
Stream CF-3	Confluence with Clear Fork Trinity River	300 feet upstream of Trail Lake Drive	2.6
Stream CF-3A	Confluence with Stream CF-3	0.52 miles upstream of Overton Park West	0.5
Stream CF-3B	Confluence with Stream CF-3	80 feet upstream of Bilgrade Road	0.8
Stream CF-3C	Park Place Drive	Warner Street	1.1
Stream CF-4	Confluence with Clear Fork Trinity River	0.61 miles upstream of Clayton Road East	1.7
Stream CF-4A	West Vickery Boulevard	700 feet upstream of Clayton Road	1.2
Stream CF-4A Diversion	Confluence with Stream CF-4	0.47 miles upstream of Confluence with Stream CF-4	0.5
Stream CF-5	Confluence with Clear Fork Trinity River	1.22 miles upstream of Overton Ridge Boulevard	3.2
Stream CF-6	Confluence with Clear Fork Trinity River	0.46 miles upstream of Byrant Irvin Road	1.8
Cottonwood Branch	Tarrant County/ Dallas County	0.88 miles upstream of DART(St. Louis & Southwestern Railway)	2.7

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

Stream Name Redelineation Detailed Study Streams	Downstream Limit	Upstream Limit	Length (mi)
Cottonwood Creek 1	Confluence with Village Creek	1000 feet upstream of Milam Street	4.7
Cottonwood Creek 2	Tarrant County/ Dallas County	1800 feet upstream of Susan Drive	1.1
Unnamed Tributary to Cottonwood Creek 2	Confluence with Cottonwood Creek 2	780 feet upstream of Timberlake Drive	0.2
South Fork of Cottonwood Creek 2	Tarrant County/ Dallas County	1590 feet upstream of State Route 360 Right-Frontage Road	2.6
South Fork of Cottonwood Creek 2	40 feet downstream of Brazos Drive	900 feet upstream of Brazos Drive	0.2
Crowley Branch	Confluence with Stream SC-7	80 feet upstream of Chance Boulevard	0.6
Cub Creek	300 feet downstream of Cheek Sparger Road	0.4 miles upstream of Cheek Sparger Road	0.5
Deer Creek	Confluence with Village Creek	0.45 miles upstream of Hampton Road	7.7
North Branch of Deer Creek	Confluence with Deer Creek	0.67 miles upstream of Confluence of South Fork of North Branch of Deer Creek	2.7
Unnamed Tributary to North Branch of Deer Creek	Confluence with North Branch of Deer Creek	1030 feet upstream of Old Cleburne Crowley Junction	1.3
Unnamed Tributary to an Unnamed Tributary to North Branch of Deer Creek	Confluence with Unnamed Tributary to North Branch of Deer Creek	1160 feet upstream of Confluence with Unnamed Tributary to North Branch of Deer Creek	0.2
Northwest Branch of Deer Creek	Confluence with Deer Creek	1.53 miles upstream of Confluence with Deer Creek	1.5
North Fork of Deer Creek	BNSF Railroad	1740 feet upstream of BNSF Railroad	0.3
South Fork of Deer Creek	Confluence with Deer Creek	1.44 miles upstream of BNSF Railroad	1.7
South Fork of North Branch of Deer Creek	Confluence with North Branch of Deer Creek	1.07 miles upstream of Confluence with North Branch of Deer Creek	1.1

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

Stream Name	Downstream Limit	Upstream Limit	Length (mi)
Redelineation Detailed Study Streams			
Denton Creek	Tarrant County/ Dallas County	Grapevine Dam	2.3
Dove Creek	195 feet downstream of Park Road 4	230 feet upstream of West Highland Street	2.6
Dutch Branch	675 feet downstream of U.S. Highway 377	600 feet upstream of Confluence with Tributary DB-3	1.1
Tributary DB-3	475 feet upstream confluence with Dutch Branch	0.45 miles upstream of Confluence with Dutch Branch	0.4
Edgecliff Branch	Confluence with Sycamore Creek	0.42 miles upstream of Woodway Drive	4.6
Stream EB-1	Edgecliff Road	575 feet upstream of Crowley Road	0.5
Elm Branch	Confluence with Village Creek	150 feet upstream of Rendon-New Hope Road	1.9
Farmers Branch	Confluence with West Fork Trinity River	1690 feet upstream of Little Fox Lane	6.9
Unnamed Tributary to Farmers Branch	Interstate Loop 820	0.41 miles upstream of Settlement Plaza Drive	0.7
Stream FB-1	Confluence with Farmers Branch	60 feet upstream of George Street	0.3
Stream FB-1	0.66 miles upstream of Confluence with Farmers Branch	195 feet upstream of West Point Boulevard	0.5
Unnamed Tributary to Stream FB-1	Confluence with Stream FB-1	Upstream Face of West Point Boulevard Culvert	0.3
Farris Branch	0.40 miles downstream of Dove Road	725 feet upstream of West Wall Street	1.2
Farris Branch East	Confluence with Farris Branch	1125 feet upstream of West Wall Street	0.6
Fish Creek	Tarrant County/ Dallas County	0.41 miles upstream of Matlock Road	7.2
Stream FC-1	Confluence with Fish Creek	1.11 miles upstream of New York Avenue	1.6

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

Stream Name Redelineation Detailed Study Streams	Downstream Limit	Upstream Limit	Length (mi)
Stream FC-2	Confluence with Fish Creek	1.8 miles upstream of Confluence with Fish Creek	1.8
North Fork Fish Creek	100 feet Downstream of State Hwy 360 Access Road	Collins Street	1.4
Hawkwood Branch	Confluence with Crowley Branch	1850 feet upstream of Crowley Road	0.4
Henrietta Creek	Confluence with Elizabeth Creek	0.45 miles upstream of Keller-Haslet Road	9.1
Henrietta Creek 6	1050 feet upstream of Confluence with Henrietta Creek	0.68 miles upstream of Diamondback Lane	1.4
Henrietta Creek 6A	Confluence with Henrietta Creek 6	0.41 miles upstream of Sendera Ranch Boulevard	0.5
Stream HEN-1	Confluence with Henrietta Creek	0.59 miles upstream of Confluence with Henrietta Creek	0.6
Stream HEN-2A	Confluence with Stream Hen-2	0.45 miles upstream of Private Dam	1.5
Unnamed Tributary to Henrietta Creek	1400 feet upstream with Henrietta Creek	330 feet upstream of Keller-Haslet-Roanoke Road	1.2
Higgins Branch	Confluence with Kirkwood Branch	1650 feet upstream of Plantation Drive	1.3
Howards Branch	Confluence with West Fork Trinity River	0.38 miles upstream of Lynncrest Drive	1.2
Stream HB-1	Confluence with Howards Branch	75 feet upstream of North Bellaire Drive	0.9
Hurricane Creek	Confluence with West Fork Trinity River	0.78 miles upstream of Bedford Road	5.1
Stream HC-1	Confluence with Hurricane Creek	0.45 miles upstream of Bedford Road	2.2
Hurricane Creek Tributary 1	Confluence with Hurricane Creek	1.21 miles upstream of Confluence with Hurricane Creek	1.2
East Fork Hurricane Creek	Confluence with Hurricane Creek	760 feet upstream of Park Avenue	0.8

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

Stream Name	Downstream Limit	Upstream Limit	Length (mi)
Redelineation Detailed Study Streams			
North Fork West Branch Hurricane Creek	Confluence with West Branch Hurricane Creek	1100 feet upstream of Confluence with West Branch Hurricane Creek	0.2
West Branch Hurricane Creek	Confluence with Hurricane Creek	650 feet upstream of Parkplace Avenue	1.0
Johnson Creek	25 feet Downstream of State Hwy 360 Access Road	20 feet upstream of High Point Road	8.9
Stream JC-1	Duncan Perry Road	0.83 miles upstream of Duncan Perry Road	0.8
Stream JC-2	Confluence with Johnson Creek	300 feet upstream of East Tucker Boulevard	0.6
Stream JC-3	Confluence with Johnson Creek	300 feet upstream of Access Road	1.2
Kee Branch	Confluence with Rush Creek	50 feet upstream of Swiney Heitt Road	5.4
Stream KB-1	Confluence with Kee Branch	530 feet upstream of Green Oaks Boulevard	0.9
Kings Branch	Confluence with Farmers Branch	400 feet upstream of Ridgemar Mall Exit/Entrance	2.5
Kirby Creek	Tarrant County/ Dallas County	0.42 miles upstream of Kirbywood Trail	0.5
Kirkwood Branch	Denton County/ Tarrant County	1820 feet upstream of Dove Street	2.9
Kirkwood Branch Tributary	Confluence with Kirkwood Branch	215 feet upstream of Village Access Drive	0.2
South Fork Kirkwood Branch	Confluence with Kirkwood Branch	0.53 miles upstream of Dove Street	2.0
Little Bear Creek	900 feet upstream of Big Gear Creek	1.47 miles upstream of Keller-Smithfield Road	14.7
Stream LB-1	Confluence with Little Bear Creek	360 feet upstream of Starnes Road	1.4
Stream LB-2	Confluence with Little Bear Creek	1600 feet upstream of North Tarrant Parkway	1.1

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

Stream Name Redelineation Detailed Study Streams	Downstream Limit	Upstream Limit	Length (mi)
Stream LB-3	Confluence with Little Bear Creek	1200 feet upstream of North Tarrant Parkway	0.5
Stream LB-6	Confluence with Little Bear Creek	1300 feet upstream of Confluence with Little Bear Creek	0.2
Tributary Little Bear 1	Confluence with Little Bear Creek	805 feet upstream of Private Dam	0.6
Tributary Little Bear 2	Confluence with Little Bear Creek	435 feet upstream of Quails Path	1.8
Little Fossil Creek	Confluence with Big Fossil Creek	70 feet upstream of Abandoned Railroad	11.9
Little Fossil Creek Split Flow	Confluence with Big Fossil Creek	Divergence from Little Fossil Creek	1.3
Stream LFC-1	Confluence with Little Fossil Creek	0.44 miles upstream of Middleton Drive	2.3
Stream LFC-2	Confluence with Little Fossil Creek	0.86 miles upstream of Quorum Drive	1.1
Live Oak Creek	Confluence with Lake Worth	75 feet upstream of Unnamed Road	4.2
Lorean Branch	Confluence with Walker Branch	75 feet upstream of Martin Road	5.5
Unnamed Tributary to Lorean Branch	Confluence with Lorean Branch	0.38 miles upstream of Confluence with Lorean Branch	0.4
Lynn Creek	Confluence with Lake Joe Pool	950 feet upstream of Matlock Road	6.3
Mackey Creek	Confluence with Big Fossil Creek	1170 feet upstream of Victoria Avenue	2.4
Mackey Creek Diversion North	Confluence with Big Fossil Creek	150 feet upstream of Richland Plaza Drive	0.7
Marine Creek	Confluence with West Fork Trinity River	1.38 miles upstream of Marine Creek Lake Dam	6.6
Marine Creek	Cromwell Marine Creek Road	0.39 miles upstream of Cromwell Marine Creek Road	0.4

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

Stream Name	Downstream Limit	Upstream Limit	Length (mi)
Redelineation Detailed Study Streams			
Marine Creek Split Flow	Confluence with Marine Creek	Origin of split flow into Commerce Street from Marine Creek	0.4
MC-4 Creek	1875 feet upstream of Confluence with Marine Creek	0.94 miles upstream of Confluence with Marine Creek	0.6
Stream MC-1	Confluence with Marine Creek	1800 feet upstream of Long Avenue	1.9
Stream MC-2	Confluence with Marine Creek	1.14 miles upstream of Confluence with Marine Creek	1.1
Marshall Branch	Denton County/ Tarrant County	1.55 miles upstream of Roanoke Road	1.9
Marys Creek	Confluence with Clear Fork Trinity River	0.66 miles upstream of North Access Road Interstate 30	7.8
South Marys Creek	Confluence with Marys Creek	Tarrant County/ Parker County	3.5
Stream MSC-1	Interstate Loop 820	0.41 miles upstream of Santa Clara Drive	1.7
Unnamed Tributary to Stream MSC-1	Confluence with Stream MSC-1	1690 feet upstream of Confluence with Stream MSC-1	0.3
Stream MSC-1A (Plantation West Creek)	Upstream Face of Chapin Road	500 feet upstream of Chamita Lane	1.3
Stream MSC-2	Confluence with Marys Creek	465 feet upstream of Chapin Road	1.4
Stream MSC-2A	Confluence with Stream MSC-2	U.S. Route 80	0.8
Stream MSC-3	Confluence with Marys Creek	0.48 miles upstream of Interstate Route 30	0.6
Mesquite Branch	Confluence with Lorean Branch Culvert	70 feet upstream of Precinct Line Road	0.03
North Creek	Tarrant County/ Johnson County	75 feet upstream of McAlister Road	2.3
Pantego Branch	Confluence with Rush Creek	1860 feet upstream of Smith-Barry Road	1.8

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

Stream Name Redelineation Detailed Study Streams	Downstream Limit	Upstream Limit	Length (mi)
Paschal Branch	Confluence with Ash Creek	70 feet upstream of Silver Creek Azle Road	0.7
Plantation East Creek	158 feet upstream of Chapin Road Headwall	1375 feet upstream of Bangor Drive	0.6
Ragland Branch	Confluence with Walnut Creek 3	1360 feet upstream of Ragland Road	0.9
Reynolds Branch	Confluence with Ash Creek	Tarrant County/ Parker County	0.4
Robertson Branch	1000 feet above Confluence with Big Fossil Creek	1.04 miles upstream of Confluence of Big Fossil Creek	0.9
Rush Creek	Confluence with Village Creek	0.53 miles upstream of Willow Oak Lane	14.0
Forest Park Tributary of Rush Creek	290 feet upstream of confluence with Rush Creek	510 feet upstream of Forest Park Drive	0.1
Northeast Tributary of Rush Creek	270 feet upstream of confluence with Rush Creek	195 feet upstream of Forest Park Drive	0.1
Rush Creek Relief Channel	Convergence with Village Creek	Divergence From Rush Creek	0.7
Stream RC-1	Confluence with Rush Creek	110 feet upstream of Bowen Road	1.7
Stream RC-1(A)	Confluence with Stream RC-1	65 feet upstream of Bowen Road	0.7
Stream RC-2	Confluence with Rush Creek	50 feet upstream of Arkansas Lane	1.0
Ryan's Branch	Confluence with Rush Creek	315 feet upstream of Roosevelt Drive	0.9
Silver Creek	Confluence with West Fork Trinity River	90 feet upstream of Silver Creek Road	0.6
Singing Hills Creek	Confluence with Big Fossil Creek	125 feet upstream of Starnes Road	4.2
South Creek	Confluence with Village Creek	25 feet upstream of Wichita Street	3.2

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

Stream Name	Downstream Limit	Upstream Limit	Length (mi)
Redelineation Detailed Study Streams			
North Branch of North Fork of South Creek	Confluence with North Fork of South Creek	85 feet upstream of Wichita Street	0.4
North Branch of North Fork of South Creek Split Flow	Confluence with North Fork of South Creek	Divergence From North Branch of North Fork of South Creek	0.9
North Fork of South Creek	Confluence with South Creek	75 feet upstream of Wichita Street	1.0
Sublett Creek	Confluence with Rush Creek	1.29 miles upstream of U.S. Route 287	4.4
Sulphur Branch	Confluence with Walker Branch	1600 feet upstream of Spring Lake Drive	4.9
Stream SB-1	Confluence with Sulphur Branch	Parkwood Drive	1.6
Unnamed Tributary to Sulphur Branch	Confuence with Sulphur Branch	East Hurst Boulevard	0.4
Stream SC-1	Confluence with Sycamore Creek	930 feet upstream of Collard Street	1.4
Stream SC-2	Confluence with Sycamore Creek	100 feet upstream of Union Pacific Railroad	1.0
Stream SC-3	Confluence with Sycamore Creek	40 feet upstream of Glen Gardens Avenue	1.0
Stream SC-4	Confluence with Sycamore Creek	1450 feet upstream of Yuma Avenue	0.7
Stream SC-5	Confluence with Sycamore Creek	1360 feet upstream of Drew Street	1.3
Stream SC-6	Confluence with Sycamore Creek	160 feet upstream of Gravel Road	1.0
Stream SC-6	1.37 miles upstream of Confluence with Sycamore Creek	1.61 miles upstream of Confluence with Sycamore Creek	0.2
Stream SC-7	Confluence with Sycamore Creek	275 feet upstream of Risinger Road	4.3
Stream SC-7A	Confluence with Stream SC-7	0.4 miles upstream of Hulen Park Circle	0.5

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

Stream Name Redelineation Detailed Study Streams	Downstream Limit	Upstream Limit	Length (mi)
Timber Creek Diversion	500 feet downstream Winscott Plover Road	Cozby West Storm Drain Outlet	0.3
South Timber Creek	Cozby West Storm Drain Inlet	565 feet upstream of Cozby West Storm Drain Inlet	0.1
Tributary B	Confluence with Big Fossil Creek	1295 feet upstream of Union Pacific Railroad	1.0
Tributary C	Confluence with Little Fossil Creek	405 feet upstream of DART(St. Louis & Southwestern Railway)	1.1
Twin Springs Draw	Confluence with Rush Creek	60 feet upstream of Bowen Road	0.5
Valley View Branch	Confluence with Walker Branch	1875 feet upstream of Louella Drive	4.0
Stream VVB-1	Confluence with Valley View Branch	1020 feet upstream of Yates Avenue	0.4
Village Creek	Confluence with West Fork Trinity River	Tarrant County/ Johnson County	23.0
Village Creek	Tarrant County/ Johnson County	Tarrant County/ Johnson County	0.3
Stream VC(A)-1	Confluence with Village Creek	50 feet upstream of Fielder Road	2.0
Stream VC(A)-2	Confluence with Village Creek	1200 feet upstream of Lake Arlington Road	0.7
Stream VC-1	Confluence with Lake Arlington	70 feet upstream of Freshfield Road	2.3
Stream VC-2	Confluence with Lake Arlington	190 feet upstream of U.S. Business 287	3.5
Stream VC-2A	Confluence with Stream VC-2	225 feet upstream of Martin Street	0.6
Stream VC-3	Confluence with Village Creek	County Road 2056	1.7
Stream VC-4	Confluence with Village Creek	1.11 miles upstream of Averett Road	2.4

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

Stream Name Redelineation Detailed Study Streams	Downstream Limit	Upstream Limit	Length (mi)
Stream VC-4A	Confluence with Stream VC-4	1650 feet upstream of County Road 2025	0.6
Stream VC-5	Confluence with Village Creek	1095 feet upstream of Oak Grove Road	4.9
Stream VC-6	Confluence with Village Creek	75 feet upstream of Old Grove Road	3.0
Stream VC-7	Confluence with Village Creek	1675 feet upstream of Airport Road	2.5
Walker Branch*	Confluence with West Fork Trinity River	530 feet upstream of Brookview Lane	11.2
Stream WKB-1	Confluence with Walker Branch	1025 feet upstream of Mid-Cities Boulevard	0.5
Tributary W-4	Confluence with Walker Branch	1300 feet upstream of Confluence with Walker Branch	0.2
Walnut Creek 1	Confluence with West Fork Trinity River	Tarrant County/ Parker County	1.7
Walnut Creek 2	Confluence with Marys Creek	2.55 miles upstream of Union Pacific Railroad	4.3
West Fork Trinity River*	Dallas County/ Tarrant County	Confluence with Eagle Mountain Lake	58.4
Stream WF(A)-1	Confluence with West Fork Trinity River	65 feet upstream of Ball Park Way	2.7
Stream WF(A)-2	Confluence with West Fork Trinity River	125 feet upstream of North Cooper Street	1.9
Stream WF-1	Confluence with West Fork Trinity River	0.49 miles upstream of Randol Mill Road	1.9
Stream WF-1A	Confluence with Stream WF-1	1410 feet upstream of Confluence with Stream WF-1	0.3
Stream WF-1B	Confluence with Stream WF-1	0.76 miles upstream of Confluence with Stream WF-1	0.8

*Portions of these reaches were studied in detail as part of this PMR.

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

Stream Name Redelineation Detailed Study Streams	Downstream Limit	Upstream Limit	Length (mi)
Stream WF-2	Confluence with West Fork Trinity River	1.27 miles upstream of Brentwood Stair Road	2.7
Stream WF-2A	Confluence with Stream WF-2	1550 feet upstream of Confluence with Stream WF-2	0.3
Stream WF-3	Confluence with West Fork Trinity River	1000 feet upstream of Forest Lake Dam	1.8
Stream WF-4	Confluence with West Fork Trinity River	85 feet upstream of Deridder Street	3.7
Stream WF-4	470 feet downstream of OK & T Railroad	1240 feet upstream of OK & T Railroad	0.3
Stream WF-5	Confluence with West Fork Trinity River	700 feet upstream of Long Avenue	1.8
Stream WF-7	Confluence with West Fork Trinity River	505 feet upstream of Nine Mile Bridge Road	1.4
Stream WF-7A	Confluence with Stream WF-7	0.87 miles upstream of Confluence with Stream WF-7	0.9
Stream WF-7B	Confluence with Lake Worth	950 feet upstream of Joe Elle Lane	0.6
Stream WF-9	Confluence with West Fork Trinity River	510 feet upstream of State Route 183	1.6
Stream WF-10	Confluence with West Fork Trinity River	60 feet upstream of Indian Creek Drive	1.7
Stream WF-10A	Confluence with Stream WF-10A	75 feet upstream of Springs Road	0.3
Stream WF-11	Confluence with Lake Worth	0.55 miles upstream of Las Vegas Trail	2.1
Unnamed Tributary to West Fork Trinity River	60 feet above Pipeline Road	1655 feet upstream of Summerbrook Drive	0.4
West Jones Branch	900 feet downstream of Dove Road	75 feet upstream of Kimball Avenue	1.1
Whites Branch	Confluence with Big Fossil Creek	875 feet upstream of Shriver Road	7.1

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

Stream Name	Downstream Limit	Upstream Limit	Length (mi)
Redelineation Detailed Study Streams			
Stream WB-1	Confluence with Whites Branch	1.21 miles upstream of Heritage Glen Drive	2.2
Unnamed Tributary to Stream WB-1	1100 feet above Confluence with Stream WB-1	0.58 miles upstream of Heritage Trace Parkway	0.7
Stream WB-2	750 feet above Shriver Road	0.8 miles upstream of Shiver Road	0.7
Stream WB-3	Confluence with Whites Branch	325 feet upstream of North Tarrant Parkway	1.0
Wildcat Branch	Confluence with Lake Arlington	0.49 miles upstream of Village Creek Road	2.2
Stream WC-1	Confluence with Wildcat Branch	650 feet upstream of Ramey Avenue	1.3
Willow Bend Creek	Williams Road	1580 feet upstream of Chapin Road	0.4
Willow Branch	Confluence with Walnut Creek 3	2.12 miles upstream of Confluence with Walnut Creek 3	2.1

Table 2, "Stream Name Changes" lists those streams whose name has changed or differs from those published in the previous FIS for Tarrant County or any of the communities within.

This FIS also incorporates, where applicable, the determinations of letters issued by FEMA resulting in map changes (Letter of Map Revision [LOMR], and Letter of Map Revision Based on Fill [LOMR-F]). Letters of Map Revision incorporated as part of this PMR have been shown in Table 3, Letters of Map Revision," and are reflected in Table 2, "Floodway Data," and Exhibit 1, "Flood Profiles."

Table 2 – Stream Name Changes

Community Name	Old Stream Name	New Stream Name
City of Grand Prairie	North Fork of Fish Creek	North Fork of Fish Creek (Prairie Creek)

Table 3 – Letters of Map Revision

Case Number	Effective Date	Flooding Sources	Community Name	Panel Number
09-06-1017P*	7/20/2009	Kings Branch	City of Fort Worth	48439C0280K and 48439C0285L
09-06-1669P	10/28/2009	Little Fossil Creek	Cities of Blue Mound and Fort Worth	48439C0180L
09-06-2005P	8/19/2010	Stream LB-3	City of Keller	48439C0090L
09-06-3519P	10/13/2010	Unnamed Tributary to Singing Hills Creek	City of Watauga	48439C0205L
10-06-0163P	4/1/2010	Big Bear Creek	City of Keller	48439C0090L
10-06-0318P	1/25/2010	Tributary BB-12	City of Keller	48439C0090L
10-06-0337P	6/18/2010	Unnamed Tributary to Sycamore Creek	City of Fort Worth	48439C0320L
10-06-0355A	12/23/2009	Stream WF-9, West Fork Trinity River	City of Fort Worth	48439C0215L
10-06-0419P	2/5/2010	Stream SC-7 and Hawkwood Branch	City of Fort Worth	48439C0315L and 48439C0430L
10-06-0960P*	5/19/2011	Little Fossil Creek	City of Saginaw	48439C0045L, 48439C0065L, 48439C0160K, 48439C0180L
10-06-1011P*	7/28/2010	Mesquite Branch	City of North Richland Hills	48439C0205K and 48439C0210L
10-06-1224P*	5/5/2010	Tributary BB-9	City of Southlake	48439C0080K, 48439C0090L, 48439C0095K
10-06-1411P	4/14/2010	LB4 Tributary and Little Bear Creek	City of North Richland Hills	48439C0090L
10-06-1455P	8/26/2010	Mesquite Branch	City of North Richland Hills	48439C0205L

*LOMR was partially incorporated.

Table 3 – Letters of Map Revision (continued)

Case Number	Effective Date	Flooding Sources	Community Name	Panel Number
10-06-1517X	3/16/2010	Robertson Branch	City of Fort Worth	48439C0065L
10-06-1675P	11/17/2010	Stream BFC-2 and Stream BFC-2A	City of Fort Worth	48439C0065L
10-06-1790P	10/03/2011	Kirby Creek	City of Grand Praire	48439C0360L
10-06-1863P	5/24/2010	Little Fossil Creek	City of Fort Worth	48439C0180L
10-06-1946P	6/10/2010	West Fork Trinity River	City of Fort Worth	48439C0215L and 48439C0220L
10-06-1954P	2/9/2011	Unnamed Tributary 1 to West Fork Trinity River	City of Fort Worth	48439C0195L and 48439C0310L
10-06-2029P	7/15/2010	Unnamed Tributary 5 to Sycamore Creek and Unnamed Tributary 6 to Sycamore Creek	City of Fort Worth	48439C0315L
10-06-2537P	8/31/2010	Little Fossil Creek	City of Fort Worth	48439C0180L
10-06-2633P	8/24/2010	Hurricane Creek	City of Euless	48439C0230L
10-06-2635P	8/17/2010	Little Bear Creek	Cities of Bedford and Euless	48439C0230L
10-06-2742P*	8/30/2010	Unnamed Tributary 7 to Sycamore Creek and Unnamed Tributary to Unnamed Tributary 7 to Sycamore Creek	Tarrant County (Unincorporated Areas)	48439C0410K and 48439C0430L
10-06-2761P	9/12/2011	Stream WF-4	Cities of Fort Worth and Saginaw	48439C0180L

*LOMR was partially incorporated.

Table 3 – Letters of Map Revision (continued)

Case Number	Effective Date	Flooding Sources	Community Name	Panel Number
10-06-2936P	8/20/2010	Stream SC-7	City of Fort Worth	48439C0315L
10-06-2938P	10/13/2010	Henrietta Creek	City of Fort Worth and Tarrant County (Unincorporated Areas)	48439C0035L
10-06-2944P	10/14/2010	Unnamed Tributary to Stream LFC-2	City of Fort Worth	48439C0185L
10-06-2947P	9/28/2010	Henrietta Creek 6A, Henrietta Creek 6	City of Fort Worth and Tarrant County (Unincorporated Areas)	48439C0035L
10-06-2950P	10/15/2010	Stream SC-4	City of Fort Worth	48439C0310L
10-06-3064P	7/11/2011	Boyd Branch	City of Euless	48439C0230L
10-06-3286P	01/20/2012	Johnson Creek	City of Grand Praire	48439C0355L
10-06-3318P	10/26/2010	Tributary BB-12	City of Keller	48439C0090L
10-06-3346A	9/24/2010	Little Bear Creek	City of Euless	48439C0230L
10-06-3379P*	11/2/2010	West Fork Cement Creek	City of Fort Worth	48439C0160k and 48439C0180L
11-06-0089P	12/29/2010	South Fork Chambers Creek	City of Fort Worth	48439C0315L and 48439C0320L
11-06-0198P	3/8/2011	Stream BFC-2 and Stream BFC-2A	City of Fort Worth	48439C0065L
11-06-0431A	12/28/2010	Little Bear Creek	City of Euless	48439C0230L
11-06-0468X	1/18/2011	Mesquite Branch	City of North Richland Hills	48439C0205L

*LOMR was partially incorporated.

Table 3 – Letters of Map Revision (continued)

Case Number	Effective Date	Flooding Sources	Community Name	Panel Number
11-06-0636P	7/7/2011	Little Bear Creek	Cities of Keller and North Richland Hills	48439C0090L
11-06-1407P*	11/2/2011	Henrietta Creek, Henrietta Creek 5	City of Fort Worth	48439C0035L, 48439C0065L, and 48121C0610G
11-06-1457P	8/12/2011	Clear Fork Trinity River, Stream CF-3, and West Fork Trinity River	City of Fort Worth	48439C0170L, 48439C0190L, 48439C0285L, and 48439C0305L
11-06-1741P	3/29/2011	Henrietta Creek 6	City of Fort Worth	48439C0035L
11-06-2181P*	10/31/2011	Big Bear Creek	City of Keller	48439C0090L and 48439C0095K
11-06-2290P	6/21/2011	Stream BFC-2A	City of Fort Worth	48439C0065L
11-06-2332P	6/21/2011	Stream BFC-2A	City of Fort Worth and Tarrant County (Unincorporated Areas)	48439C0065L
11-06-2943P	8/11/2011	Stream CB-1 (New)	City of North Richland Hills	48439C0205L
11-06-4292X	10/7/2011	Little Bear Creek	City of North Richland Hills	48439C0090L
12-06-0679P	1/4/2012	Stream BFC-3	City of Fort Worth	48439C0065L
10-06-3286P*	1/20/2012	Johnson Creek Tributary V to Johnson Creek Tributary W to Johnson Creek Unnamed Tributary 1 to Johnson Creek	City of Arlington	48439C0240L 48439C0355K
11-06-1037P*	3/9/2012	South Fork Deer Creek	City of Crowley	48439C0420K 48439C0430L 48439C0440K

*LOMR was partially incorporated.

Table 3 – Letters of Map Revision (continued)

Case Number	Effective Date	Flooding Sources	Community Name	Panel Number
12-06-1037P	3/16/2012	Unnamed Tributary to Sulphur Branch	City of Fort Worth	48439C0220L
12-06-3303P	05/20/2013	Stream BFC-2A	City of Fort Worth	48439C0065L
12-06-3084P	07/11/2013	Boyd Branch	City of Fort Worth	48439C0230L
13-06-1283P	09/05/2013	Stream BFC-3	City of Fort Worth	48439C0065L
12-06-1456P*	10/31/2013	West Fork Cement Creek	City of Saginaw and City of Fort Worth	48439C0160K 48439C0180L
13-06-1913P	12/09/2013	North Branch of North Fork of South Creek	City of Forest Hill	48439C0320L
13-06-3009P	05/29/2014	Stream BFC-2	City of Fort Worth	48439C0065L
13-06-3819P	09/29/2014	Unnamed Tributary 1 to Little Fossil Creek Unnamed Tributary 2 to Little Fossil Creek Unnamed Tributary of Unnamed Tributary 2 to Little Fossil Creek	City of Fort Worth	48439C0180L
14-06-1000P	12/17/2014	Unnamed Tributary of Hurricane Creek	City of Fort Worth	48439C0240L
14-06-2425P	03/06/2015	Unnamed Tributary to Stream BFC-4A	City of Fort Worth	48439C0065L
14-06-4247P	05/22/2015	Stream BFC-2A	City of Fort Worth	48439C0065L
14-06-3505P	07/29/2015	Stream BFC-4B	City of Fort Worth	48439C0065L
14-06-3506P*	08/03/2015	Big Bear Creek	City of Fort Worth	48439C0065L, and 48439C0070K
15-06-0295P	08/25/2015	Stream BFC-2	City of Fort Worth	48439C0065L
15-06-2903X	11/10/2015	North Branch of North Fork of South Creek	City of Forest Hill	48439C0320L

*LOMR was partially incorporated.

2.2 Community Description

Tarrant County is located in north central Texas. It is bordered by Parker County to the west; Johnson County to the south; Dallas County to the east; Denton and Wise Counties to the north; and Ellis County to the southeast.

Tarrant County, which is comprised principally of the City of Fort Worth and its suburbs, is one of the great metropolitan counties within Texas. It has an area of approximately 898 square miles, with 75.2 square miles in the Big Fossil Creek Watershed. The population of Tarrant County was 1,446,219 in 2000; and 1,809,034 in 2010 (References 36 and 37). These figures include all the incorporated communities in the county.

Tarrant County has terrain characteristics of the Blackland Prairie. The topography throughout most of the county ranges from gently rolling to almost level, and elevations range from approximately 535 feet to approximately 850 feet.

The soils in the vicinity of Watauga, Blue Mound, Saginaw, Crowley, and Everman are generally deep and clayey with underlying limestone. The native vegetation in these areas consists of bunch and short grasses with scattered mesquite trees.

Around Southlake, Da1worthington Gardens, and Colleyville, the soils are generally deep loamy surface soils with clayey subsoils. The soils in the City of Keller are predominantly sandy loam except for the upper portion of Bear Creek, which is clay. The native vegetation in these areas consists of bunch and short grasses with scattered oak and mesquite trees.

The climate in the area is generally mild with a large range of annual and daily temperatures. Average rainfall is 32.30 inches. The maximum rainfall occurring during past years was 51.03 inches in 1932 and the minimum was 17.91 inches in 1921. The mean relative humidity is 65 percent, and the average temperature is 65.8 degrees Fahrenheit (°F) (Reference 38). Freezing temperatures and snowfall are occasionally experienced during the winter months. Summer temperatures are hot with moderately warm nights. The maximum recorded temperature extremes recorded in the county were 113°F and -8°F.

Big Fossil Creek originates in Tarrant County and flows southeast through the northeastern corporate limits of Fort Worth, through Haltom City, North Richland Hills, Richland Hills and Fort Worth to its confluence with the West Fork Trinity River. Little Fossil Creek is the major tributary to Big Fossil Creek and drains a large portion of the developed areas within the city. It originates near the northern corporate limits of Saginaw and flows southeast through Blue Mound, Fort Worth, Haltom City, and Fort Worth before joining Big Fossil Creek near its mouth. Whites Branch, a left bank tributary of Big Fossil Creek, originates north of Watauga and flows south through Watauga and northeast Fort Worth to its confluence with Big Fossil Creek just upstream of U.S. Route 377. Big Fossil Creek lies within the Grand Prairie and East Cross Timbers sections of the West Gulf Coastal Plain physiographic province.

Farmers Branch flows east through the City of White Settlement and into the West Fork Trinity River in the northern part of the City of Westworth Village. It has a drainage area of approximately 11.4 square miles.

The West Fork Trinity River is a major water course in Tarrant County. The West Fork Trinity River flows from the northwestern limits of the county to the eastern extent of the county. It flows though the Cities of Pelican Bay, Azle, Lakeside, Lake Worth, Fort Worth,

River Oaks, Westworth Village, Haltom City, Arlington, Grand Prairie, and the Town of Westover Hills. At the Fort Worth gage the West Fork Trinity River has a drainage area of approximately 2,615 square miles.

The City of Forth Worth, which is located in Tarrant, Denton, Parker, and Wise Counties, is the county seat of Tarrant County. The estimated 2009 population of the City of Fort Worth was 727,577, a 33.9 percent increase from the 2000 population (Reference 37). Fort Worth is located near the confluence of the Clear Fork Trinity River and the West Fork Trinity River. Fort Worth is on the eastern edge of the Fort Worth Prairie or Grand Prairie. Rolling blackland, with some rocky channels and steep slopes, are the dominant natural topographic features of the region, especially near and alongside streambeds. The main types of trees in the area include oak, pecan, elm, mesquite, and juniper.

2.3 Principal Flood Problems

Generally, the major floods experienced in Tarrant County are produced by heavy rainfall from frontal type storms which occur in the spring and summer months. Major flooding can be produced by the intense rainfall usually associated with localized thunderstorms. These thunderstorms may occur at any time during the year but are more prevalent in the spring and summer months.

Tarrant County has experienced a number of major flood events since its settlement in 1849. The following are brief descriptions of past flood events on several streams in Tarrant County. Although most of these descriptions relate to the incorporated areas of Tarrant County, they are indicative of the flood potential of the entire county.

Large floods occurred in the Bear Creek Watershed in 1935, 1942, 1949, 1957, 1962, 1964, and 1966 (Reference 39). Other lesser floods have occurred, such as those on May 7, 1969, and June 1961, but little definite information is available on them. The USGS has maintained a stream gaging station on Bear Creek at State Route 26 (Old Highway 121) since 1966. The historical flood information on Big Bear and Little Bear Creeks was obtained from the Bear Creek floodplain information report published in 1971 (Reference 39).

Significant floods occurred in the Little Bear Creek Watershed seven times during the period from 1935 to 1966. The most substantial flood in this period occurred in September 1964.

Large floods occurred in the Big Fossil Creek Watershed in September 1900, May 1908, April 1922, September 1932, April 1942, May 1949, May 1957, October 1959, June 1961, September 1962, September 1964, March 1968, and October 1981. Heavy rains on April 26, 1958, resulted in flash flooding on Little Fossil Creek and caused a death by drowning at a low water crossing. Another flood-related drowning occurred on March 20, 1968 on Little Fossil Creek downstream of the City of Blue Mound.

Floodwaters from Calloway Branch caused damage to structures in October 1971, September 20, 1974, and in October 1981.

Little specific flood data for Chambers Creek are available. Records show that damage-causing floods have occurred on Chambers Creek in 1922, 1949, 1952, and 1969 (Reference 40).

Some records of overbank flooding of Cottonwood Creek 2 in the City of Arlington were obtained from the Dallas Power and Light Company (DP&L), which operates the electric power plant at Mountain Creek Lake. Water from Mountain Creek Lake is used in the power plant, and the lake is kept at or near a set level. In order to operate the reservoir efficiently, DP&L maintains a system of stream flow and rainfall gages in the Mountain Creek Watershed that is used to predict the amount of water entering the reservoir. A staff gage was installed in 1937 just downstream of the Southwest Third Street bridge over Cottonwood Creek 2 and has been used by DP&L since that time to predict runoff based on flood heights from the Cottonwood Creek 2 Watershed. Data at the Cottonwood Creek 2 (Southwest Third Street) staff gage have only been collected during periods when Cottonwood Creek 2 flood flows were of real concern to reservoir operation. Data were gathered at the Southwest Third Street gage by DP&L that gave indications of moderate to major flooding at that point during 1949, 1957, 1962, 1964, 1965, and 1966. Evidence also shows that floods occurred twice in April 1942 and on April 26, 1957. Little specific data are available due to the lack of damageable structures in this portion of the floodplain.

The stream gage on Denton Creek located at State Route 121 in the City of Grapevine was established by the USGS in October 1947 (Reference 41). According to local resident interviews, historical data for Denton Creek begin in 1908 with a major flood which is the maximum known in the lower basin. However, no high water marks or related stage heights have been recorded. A flood in April 1942 reached 35.9 stage feet (from highwater marks) at the gage and is thought to be the second largest. Grapevine Dam, completed in 1952, regulates flow at the gage except from a 10.3 square mile local area between the dam and the gage.

Based on information from several nearby basins, it appears that floods occurred on Fish Creek in the following years: April 1942; May 1949; April 1957, 1962, and 1964; May 1965 and 1966; March 1968, 1971, 1974, and 1977; and April 1979.

Five inches of rain were measured in the Hogpen Branch Watershed in a 45-minute period on May 22, 1982. Storm data logs from the National Weather Service indicate probable flooding on October 6, 1982.

Historical flood information on Marine Creek began in 1907; however, no stage elevation data are available. Large floods occurred on Marine Creek in 1908, April 1922, February 1938, April 1942, and 1957. The largest known flood occurred in April 1942, with an estimated discharge of 22,300 cubic feet per second (cfs).

Large floods are known to have occurred in April 1922 and May 1949 in the Marys Creek Watershed. No estimate of the recurrence intervals of these floods is available.

Records indicate that flooding occurred on Rush Creek in 1922, 1949, 1957, and 1968; however, no structural flood damages were recorded for the City of Dalworthington Gardens (Reference 42).

The USGS has maintained a gaging station on Sycamore Creek at the upstream side of Interstate Route 35W since 1969. From this source and the State Department of Highways and Public Transportation, it is known that major floods occurred in 1938, 1977, and 1979.

Flooding problems occurred along the upper portion of Timber Creek in the City of Benbrook on a regular basis prior to 1982; the area is relatively flat, and natural drainage

patterns were poorly defined. In 1982, the city completed a concrete-lined drainage channel, which has alleviated flooding from smaller storms.

A similar problem exists on Plantation East Creek, where encroachments on the floodplain have caused frequent flooding of streets and houses. Floods occurred on Plantation East Creek in August 1974, July 1975, May 1989, and May 1990. The estimated recurrence intervals of these floods ranged from 10 to 25 years.

A search of the historical information indicates that large flows occurred on the West Fork Trinity River in May 1866, May 1908, April 1922, June 1941, May 1949, May 1957, and November 1981. The May 1866 flood caused considerable damage along the Trinity River, but no specific data related to this flood are available. The May 1908 flood produced a peak discharge of 184,000 cfs in Dallas County. Based on present conditions, a flood of this magnitude would have a recurrence interval of approximately 500 years. No major floods have occurred on the Clear Fork of Trinity River in the Benbrook area since Lake Benbrook was put into operation in 1952.

There are no existing stream gaging stations in the Village Creek Watershed; however, there was a gage in the lower portion of Village Creek during from June 1925 through March 1930 (Reference 41). 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 of approximately the same magnitude as the 1922 flood. The recurrence interval for these floods was between 20 and 40 years. The 1949 flood was observed to have overtopped the New Orleans (Southern Pacific) Railroad bridge in Kennedale by at least one foot. Other floods of lesser magnitude occurred on Village Creek in 1916, 1945, 1962, 1964, 1965, 1968, 1969, 1979, 1970, 1976, 1977, 1979, 1980, and 1985. Estimates of frequencies of these floods are unavailable.

Historical flood information on Walnut Creek 3 has been documented since about 1900. Since that date, the highest stage probably occurred on May 25, 1922 (stage unknown). Another large flood occurred on September 26 and 27, 1936, when 7.47 inches of rain fell in two days. The USGS established a water-stage recording gage on Walnut Creek 3 at County Road 2016 in September 1960. Since the installation of the gage, the highest stage, 559.1 feet. was recorded during the floods of May 6 and 7, 1969, and June 4, 1973.

It is seldom possible to determine the conditions that existed at the sites of the historical high-water marks or discharge estimate. The hydrologic determinations for this study are based on existing stream and watershed conditions which may differ from the conditions that existed at the time of the historic flood. Additionally, the frequency of occurrence estimates that were mentioned previously may not be valid because the watersheds have changed from the time of historic floods.

2.4 Flood Protection Measures

Lake Joe Pool is a reservoir that is located primarily in the City of Grand Prairie. It does, however, affect the following streams: Bowman Branch within the City of Arlington; Low Branch in the City of Mansfield and in the unincorporated areas of the county; and Lynn Creek and Walnut Creek 3 within the unincorporated areas of the county. This reservoir was designed for the purposes of water supply and also to provide flood protection.

A detailed master drainage plan was developed for the Sulphur Branch Watershed in the Bedford area. The preliminary report for the plan was published in March 1975 (Reference 43).

Benbrook Dam is the only major flood control project in the City of Benbrook. Benbrook Lake and Benbrook Dam are operated by the USACE. The plan for regulation of this lake limits l00-year discharges to the Clear Fork Trinity River to 6,000 cfs. Numerous small channel dams in the city have no effect in reducing flooding.

Man-made reservoirs have significantly altered flood flows in the vicinity of the City of Fort Worth. The major reservoirs in this region are Lake Worth, Eagle Mountain Lake, and Lake Bridgeport on the West Fork Trinity River; Benbrook Lake on the Clear Fork Trinity River; and Lake Arlington on Village Creek. Flood control reservoirs on Marine Creek and Cement Creek also have a substantial impact on local runoff. There are numerous minor dams within the city.

Lake Worth is owned by the City of Fort Worth. Eagle Mountain Lake and Lake Bridgeport are owned and operated by Tarrant Regional Water District. These reservoirs do not contain storage space specifically allocated for flood control. They are primarily designed and operated for water supply but do significantly reduce peak flows on the West Fork Trinity River.

Lake Arlington is owned and operated by the City of Arlington. This reservoir and its structure are intended to provide a reliable water supply and minimize storm flows in the lower portions of Village Creek.

Grapevine Dam on Denton Creek is the only major flood control project affecting the City of Grapevine. The reservoir, which provides flood control, water supply, and recreation, began operation in 1952. Grapevine Lake also affects the City of Southlake.

There are no significant flood damage prevention measures along Little Fossil Creek in the vicinity of Haltom City. There have been several studies made of the flood problems along the stream, with recommended improvements to alleviate the flooding (Reference 44). A study prepared by Rady & Associates, Inc., proposed channel improvements from the Missouri-Kansas-Texas Railroad upstream to Haltom Road (Reference 45).

FEMA specifies that all levees meet and continue to meet, minimum design, operation, and maintenance standards consistent with the level of protection sought though the comprehensive flood plain management criteria established by 44 CFR 65.10. The levees described below meet these requirements.

A series of levees was constructed along the West Fork Trinity River and the Clear Fork Trinity River. The levees in Fort Worth minimize the flood hazard from the 1-percent-annual-chance flood with a minimum of 10 feet of freeboard above the 1-percent-annual-chance flood elevation. These levees were constructed by the USACE. The local sponsor of the project, the TRWD operates and maintains these levees. These levees are inspected annually by the USACE and TRWD. The natural ground elevation at the landside toe of the levee on the right bank of the West Fork Trinity River in the North Park Drive area just downstream of Interstate Highway 35, the left bank of the Clear Fork Trinity River in the area of West Lancaster Avenue and Stayton Street, the right bank of the Clear Fork Trinity River in the Holly Water Treatment Plant area near West Lancaster Avenue just north of Interstate Highway 30, and the right bank of the Clear Fork Trinity River just downstream of

the confluence with Stream CF-3 near South Hulen Street and Riverglen Drive is higher than the 1-percent-annual-chance flood elevation.

Work on a flood control project on Big Fossil Creek was completed on January 5, 1967. This improvement involved new channel alignment, channel enlargement, and a levee with interior drainage facilities behind and through the levee system. The area behind the levee on the east bank of Big Fossil Creek, however, is still subject to some flooding from interior drainage sources. This flooding would result from heavy rainfall on the 1.5 square miles that drain into the levee sump area and would be primarily only nuisance flooding up to 1-percent-annual-chance flood. The levee is constructed along the southwestern boundary of Richland Hills from Baker Boulevard to State Route 121. Haltom City lies on the right bank of this improvement project. Floodwaters either drain by gravity or are pumped into Big Fossil Creek. This project was designed and constructed to provide protection against a standard project flood on Big Fossil Creek (Reference 44). The standard project flood has been defined as the largest flood that can be expected from the most severe storm. The local sponsor of the project is the City of North Richland Hills and maintains the levees as part of overall project operation.

This FIS reflects the construction of three separate levees on Village Creek owned and maintained by the City of Fort Worth Water Department. The City of Fort Worth provides continuous maintenance and improvement on the levees. The levees are located in the Vicinity of Greenbelt and Green Oaks Boulevard. The sites are the wastewater treatment plant, the sludge only landfill and the sludge drying bed site. The levee system exceeds the 1-percent-annual-chance protection level with the required freeboard. In 1993, the treatment plant levee was raised to elevation 488 feet msl. The sludge only landfill levee is elevation 487.7 feet msl, and the sludge drying bed levee is at elevation 484 feet msl.

The Riverbend levee is located on West Fork Trinity River in the vicinity of Randol Mill Road and Interstate Loop 820. The Riverbend levee is owned and maintained by the TRWD. The City of Fort Worth maintains and operates the pump station at this location. This levee meets minimum design, operation, and maintenance standards consistent with the level of protection sought though the comprehensive flood plain management criteria established by 44CFR65.10.

Channelization projects have been used to help alleviate flooding problems on many streams within the county, especially as they pass through developed areas.

Non-structural measures of flood protection in the form of land-use regulations are being used to aid in the prevention of future flood damage in Tarrant County and its incorporated areas.

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 community.

3.1.1 New Detailed Study Streams

2009 Countywide Revision

Hydrologic methods used for the 2009 revision are in accordance with FEMA Guidelines and Specifications for Flood Hazard Mapping Partners dated April 2003 (Reference 46). The analytical approach generally followed the Natural Resources Conservation Service (NRCS), formerly the SCS, procedures as outlined in Technical Release Number 55 (TR-55) (Reference 47). The hydrologic rainfall/runoff model developed by the USACE Hydrologic Engineering Center (HEC), HEC-HMS Version 2.2.2 (May 2003), was used to estimate peak discharges in Tarrant County (Reference 48).

The primary source of terrain data used for this study was provided from the NCTCOG. NCTCOG provided the 2001 Light Detection and Ranging (LIDAR) topographical data for stream corridors in Tarrant County, TX. Additional topographical data sources were provided by National Geospatial-Intelligence Agency (NGA), and the Cities of Burleson, Grand Prairie, Haltom City, Hurst, and Keller. Each of these datasets was provided as best available data for their locations. The terrain data was used along with the HEC-GeoHMS extension to generate the sub-basin delineations.

Tarrant County rainfall totals for the frequency floods were obtained from the USGS Atlas of Depth-Duration Frequency of Precipitation Annual Maxima for Texas, Scientific Investigations Report 2004-5041. A 24-hour duration triangular balance distributed hypothetical storm was used for the various frequency event simulations in HEC-HMS.

Soils information was obtained from the U.S. Department of Agriculture, NRCS Soil Survey Geographic (SSURGO) database for Tarrant County published in September 2002 (Reference 49). Hydrologic Soil type D is generally the dominant soil in the study watersheds. An existing 2000 land use map was obtained from the NCTCOG and confirmed using the 2003 digital orthophotos.

Runoff losses were computed using the NRCS Loss Rate Method. Composite, soil based curve numbers were computed for each sub-basin using GIS Tools. Percent impervious values were computed based on the composite land use for each sub-basin.

The NRCS dimensionless unit hydrograph was selected to compute the unit hydrograph. The time of concentration calculations were split into three sections including overland, shallow, and channel flow. Overland flow was calculated using the coefficient of velocity. Times of concentration (t_c) were computed using a modified velocity method outlined in the NRCS Technical Release 55 for shallow, and channel flow (Reference 47). Lag time (t_{lag}) for each watershed was calculated by using the equation $t_{lag} = (0.6)t_c$.

The Modified PULS method was selected to route the hydrographs for most reaches. Discharge-storage relationships were computed using the HEC-RAS models developed for the hydraulic studies for Tarrant County. The RAS models were generated using HEC-GeoRAS and the Triangular Irregular Network (TIN) developed specifically for this study from available topography.

New detailed hydrologic analyses were prepared for Big Bear Creek and Stream HEN-2. Many aspects of these new detailed analyses are the same as the general discussion in Section 3.1.1, with the following exceptions.

Big Bear Creek

In preparation of a new hydrologic model for the Big Bear Creek, the primary source of terrain data was developed from the NCTCOG 2001 LIDAR. The NCTCOG 2001 LIDAR terrain data was supplemented with 2005 topographic data provided by the City of Keller, 2003 LIDAR data acquired by NGA and 2 foot contour interval topography terrain data provided by the city of Grand Prairie, Texas.

Areal reduction of point rainfall was estimated for selected storm areas using the method outlined in the National Weather Service (NWS) Technical Paper No. 40 (TP-40) (Reference 50), which is incorporated in the HEC-HMS model. This method was only applied to contributing drainage areas greater than 10 sq. mi. Simulations were computed for each storm event with varying storm areas. Adjustments were automatically made to the frequency storm by HEC-HMS based on exceedance probability. The resulting peak flow rates were tabulated and each design point was interpolated to the closest storm area to determine the peak discharge for each subbasin.

The new detailed hydrologic modeling of Big Bear Creek calculated new hydrology for several tributaries of Big Bear Creek, including Little Bear Creek, for Big Bear Creek hydrology purposes only. The hydrology calculated for the Big Bear Creek tributaries, including Little Bear Creek, in this detailed study does not update or substitute the prior effective hydrology for these tributaries.

Stream HEN-2

The primary source of terrain data used for this hydrologic study was developed from the NCTCOG 2001 LIDAR data obtained from the City of Haslet. The terrain data was used along with the HEC-GeoHMS extension to generate the sub-basin delineations.

The new detailed hydrologic modeling of Stream HEN-2 calculated new hydrology for several tributaries of Stream HEN-2, including Stream HEN-2A, for Stream HEN-2 hydrology purposes only. The hydrology calculated for the Stream HEN-2 tributaries, including Stream HEN-2A, in this detailed study does not update or substitute the prior effective hydrology for these tributaries.

PMR New Detailed Studies

2010 RAMPP Study

The hydrologic analyses of discharges for this study were based on design storms computed using HEC-HMS Version 3.5 (August 2010), was used to estimate peak discharges in Tarrant County for Big Fossil Creek, Calloway Branch, Dry Branch, Sycamore Creek, and Walker Branch (Reference 51). The HEC-HMS computer program computes flood hydrographs using a unit hydrograph defined by the SCS method parameters. The estimated SCS Curve Number, the lag time (t_p), drainage basin characteristics coefficient, the storm rainfall, and drainage areas were defined as input parameters. The SCS Curve Number method and the Snyder's Unit Hydrograph method were used to determine the loss-rate and to transform rainfall excess into surface runoff. The Modified Puls method was used to route the flow through the channel of the streams being studied. The Mukingum-Cunge method was used to route the flow through the streams which contribute to the study streams, but were not studied. Rainfall data was obtained from the NCTCOG Integrated Stormwater Policy Guidebook & Design Manual for Development/Redevelopment (Reference 52) and is based on the USGS Depth-Duration Frequency of Precipitation for Texas, Water Resource Investigations Report 98-40441.

Areal reduction of point rainfall was estimated for selected storm areas using the method outlined in the National Weather Service (NWS) Technical Paper No. 40 (TP-40) (Reference 50), which is incorporated in the HEC-HMS models for Big Fossil Creek and Sycamore Creek. This method was only applied to contributing drainage areas greater than 10 sq. mi. Simulations were computed for each storm event with varying storm areas. Adjustments were automatically made to the frequency storm by HEC-HMS based on exceedance probability. The resulting peak flow rates were tabulated and each design point was interpolated to the closest storm area to determine the peak discharge for each subbasin.

The primary source of terrain data used for this study was the 2009 LIDAR topographical data for Tarrant County, Texas, which was provided from the Texas Natural Resources Information System (TNRIS). The terrain data was used along with the HEC-GeoHMS extension to generate the sub-basin delineations.

New detailed hydrologic modeling was not performed for West Fork Trinity River and will not substitute the prior effective hydrology for this reach.

City of Arlington Cottonwood Creek and Fish Creek Watersheds Flood Protection Plan Study

Peak discharges for all reaches in this study were computed using HEC-HMS Version 3.4. Hydrologic parameters for the models used in this study were obtained from the following sources:

The terrain data used for this study was the 2001 NCTCOG LiDAR topographical data. This terrain data, along with digital storm sewer information, USGS survey data, and current aerial photography, was used to generate the sub-basin delineations.

Rainfall data for the streams in this study was obtained from the *U.S. Department of Commerce, Technical Paper No. 40* (May, 1961) and *National Oceanic and Atmospheric Administration, Technical Memorandum Hydro-35* (June, 1977).

Soil data for this study was obtained from the NRCS SSURGO database for Tarrant County, dated October 2009.

Runoff losses were computed using NRCS curve numbers. Soil and land use data were used to compute the curve numbers for each watershed.

The Modified Puls method was selected to route the hydrographs for all reaches in this study.

City of Grand Prairie CTP FY10 Risk MAP Study

Peak discharges for all reaches in this study were computed using HEC-HMS Version 3.5. Hydrologic parameters for the models used in this study were obtained from the following sources:

The terrain data used for this study was the 2009 LiDAR topographical data provided by the City of Grand Prairie, Texas. This terrain data, along with digital storm sewer information and current aerial photography, was used to generate the sub-basin delineations.

Rainfall data for the streams in this study was obtained from the *City of Grand Prairie Drainage Design Manual* dated November 2008.

Soil data for this study was obtained from the NRCS SSURGO database for Tarrant and Dallas Counties, dated October 2009.

Runoff losses were computed using NRCS curve numbers. Soil and land use data were used to compute the curve numbers for each watershed.

The Modified Puls method was selected to route the hydrographs for all reaches in this study.

City of Grand Prairie CTP FY12 Risk MAP Study

Peak discharges for all reaches in this study were computed using HEC-HMS Version 3.5. Hydrologic parameters for the models used in this study were obtained from the following sources:

The terrain data used for this study was the 2009 LiDAR topographical data provided by the City of Grand Prairie, Texas. This terrain data, along with digital storm sewer information and current aerial photography, was used to generate the sub-basin delineations.

Rainfall data for this study was obtained from the *City of Grand Prairie Drainage Design Manual* dated November 2008.

Soil data for this study was obtained from the NRCS SSURGO database for Tarrant and Dallas Counties, dated October 2009.

Runoff losses were computed using NRCS curve numbers. Soil and land use data were used to compute the curve numbers for each watershed.

The Modified Puls method was selected to route the hydrographs for all reaches in this study.

3.1.2 Redelineation Detailed Study Streams

The redelineated streams were initially studied by detailed methods. These flooding sources include all those listed in the redelineation section of Table 1 unless identified otherwise below.

The effective and revised hydrologic analyses in the previous FIS reports for Tarrant County and its incorporated areas were derived from a variety of methods. In general the synthetic unit hydrograph method, the rational method, NUDALLAS, SCS TR-20, and HEC-1 computer programs were used to compute the peak discharges in the watersheds of each stream studied by detailed methods (Reference 53). Routing of the flood hydrographs through each sub-basin reach was accomplished using a Modified PULS reservoir routing. The HEC-2 backwater model provided the elevation-discharge storage relationships for each reach (References 54 and 55).

In order to ensure continuity across jurisdictional boundaries in the countywide FIS, hydrologic data was adjusted or added in some areas in the vicinity of the jurisdictional boundaries.

NWS TP-40, National Oceanic and Atmospheric Administration (NOAA) Technical Memorandum NWS Hydro-35, and USACE Civil Engineer Bulletin No. EM 1110-2-1411 were used in developing the 10-, 2-, and 1-percent-annual-chance flood events (Reference 50). The 0.2-percent-annual-chance flood event was based on extrapolated data from these sources.

For the City of Fort Worth, the hydrologic analyses for Stream BFC-4B, Stream CF-3C, Stream CF-4, Stream CF-4A, Stream MSC-1A, Stream MSC-2A, Stream SC-4, Stream EB-1, Stream WF-2A, Stream WF-7B, and Stream VC-2A were developed by semi-log graphic extrapolation of frequency equations from 2 to 100 years. The 10-, 2-, 1-, and 0.2-percent-annual-chance discharges were determined by this method for selected points on each stream. Discharge-frequency curves for these streams are presented in Figure 1.

The new detailed studies included in the 2009 revision for North Fork Fish Creek, Hogpen Branch, Johnson Creek, Stream JC-1, Low Branch, Stream MSC-1A (Plantation West Creek), Nichols Branch, Plantation East Creek, Pond Branch, Timber Creek, Walnut Creek 3, Watson Branch, West Fork Trinity River, and Willow Bend Creek use the previous effective FIS discharges and do not update or substitute the prior effective hydrology.

Peak discharge-drainage area relationships for the streams studied by detail methods are shown in Table 4, “Summary of Discharges”.

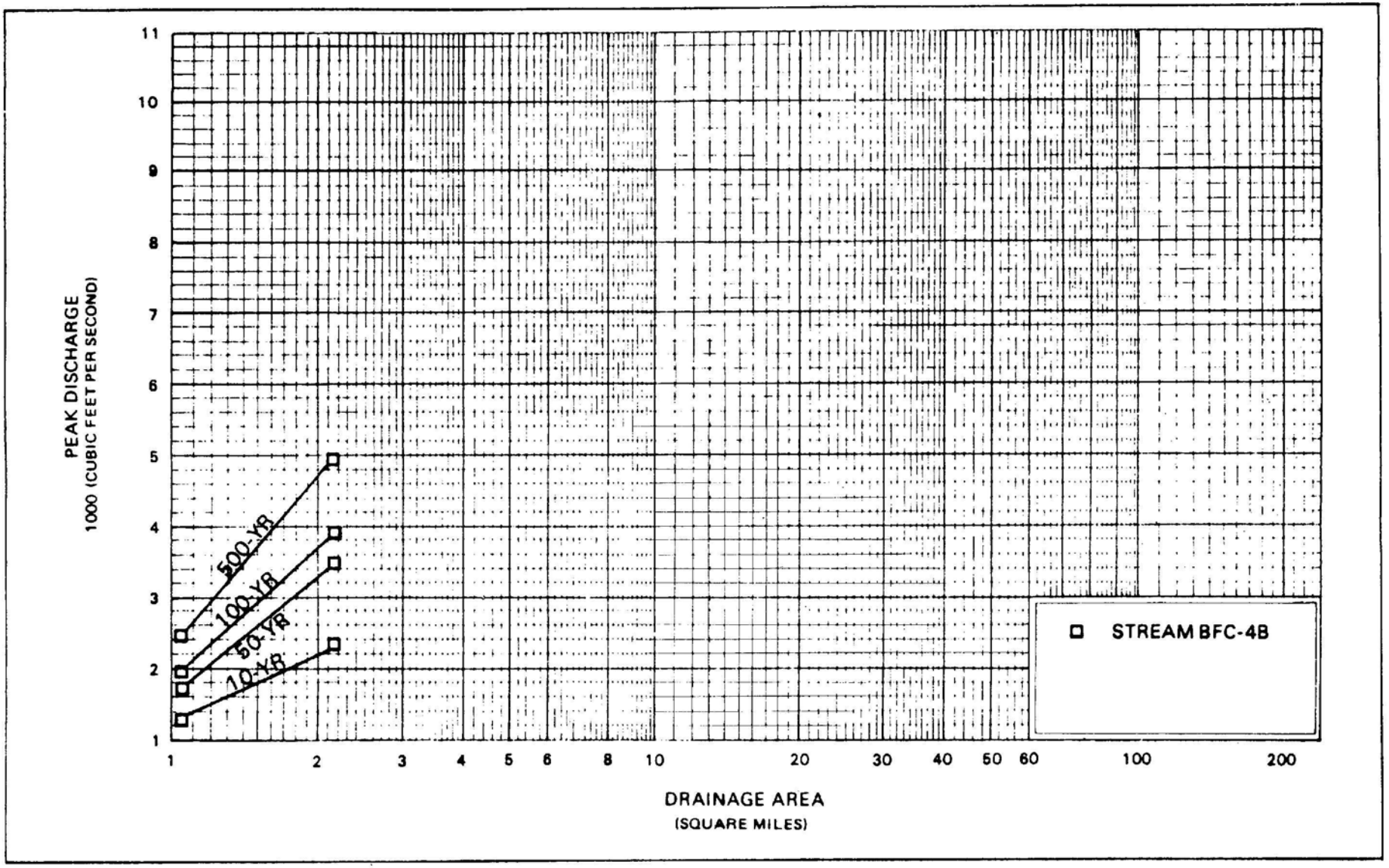

FIGURE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

TARRANT COUNTY, TX
AND INCORPORATED AREAS

FREQUENCY-DISCHARGE, DRAINAGE AREA CURVES

STREAM BFC-4B

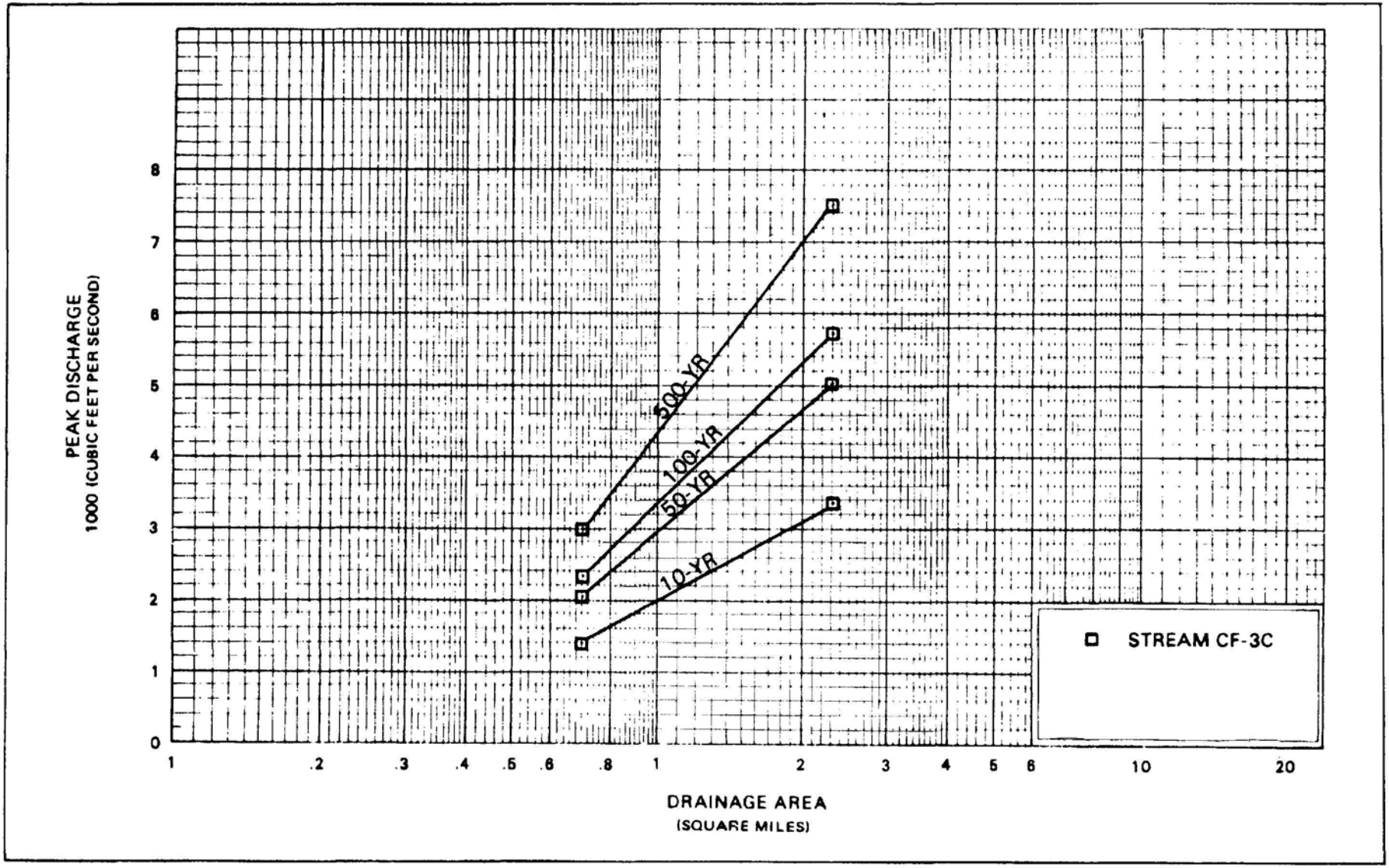

FIGURE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

TARRANT COUNTY, TX
AND INCORPORATED AREAS

FREQUENCY-DISCHARGE, DRAINAGE AREA CURVES

STREAM CF-3C

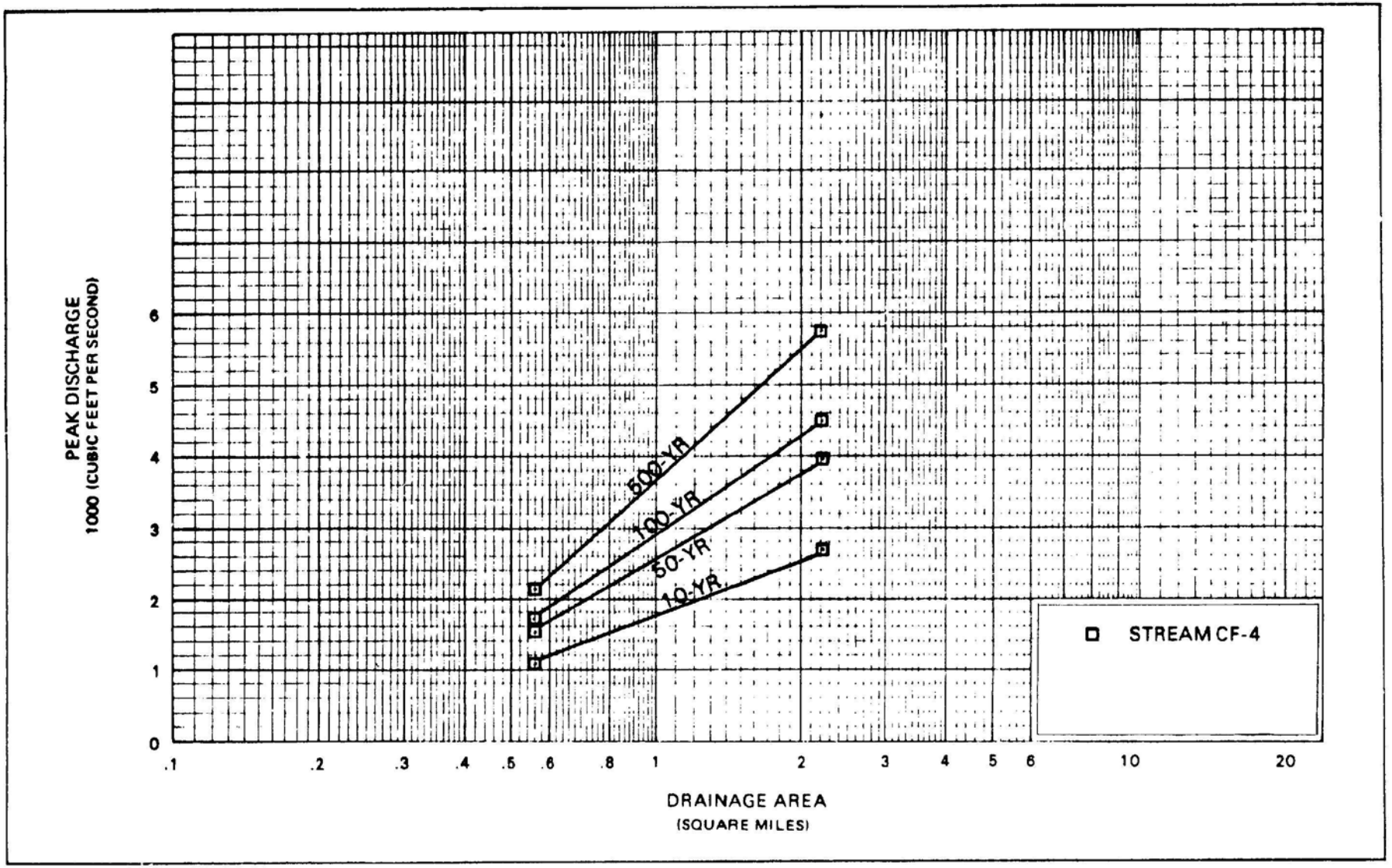

FIGURE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

TARRANT COUNTY, TX
AND INCORPORATED AREAS

FREQUENCY-DISCHARGE, DRAINAGE AREA CURVES

STREAM CF-4

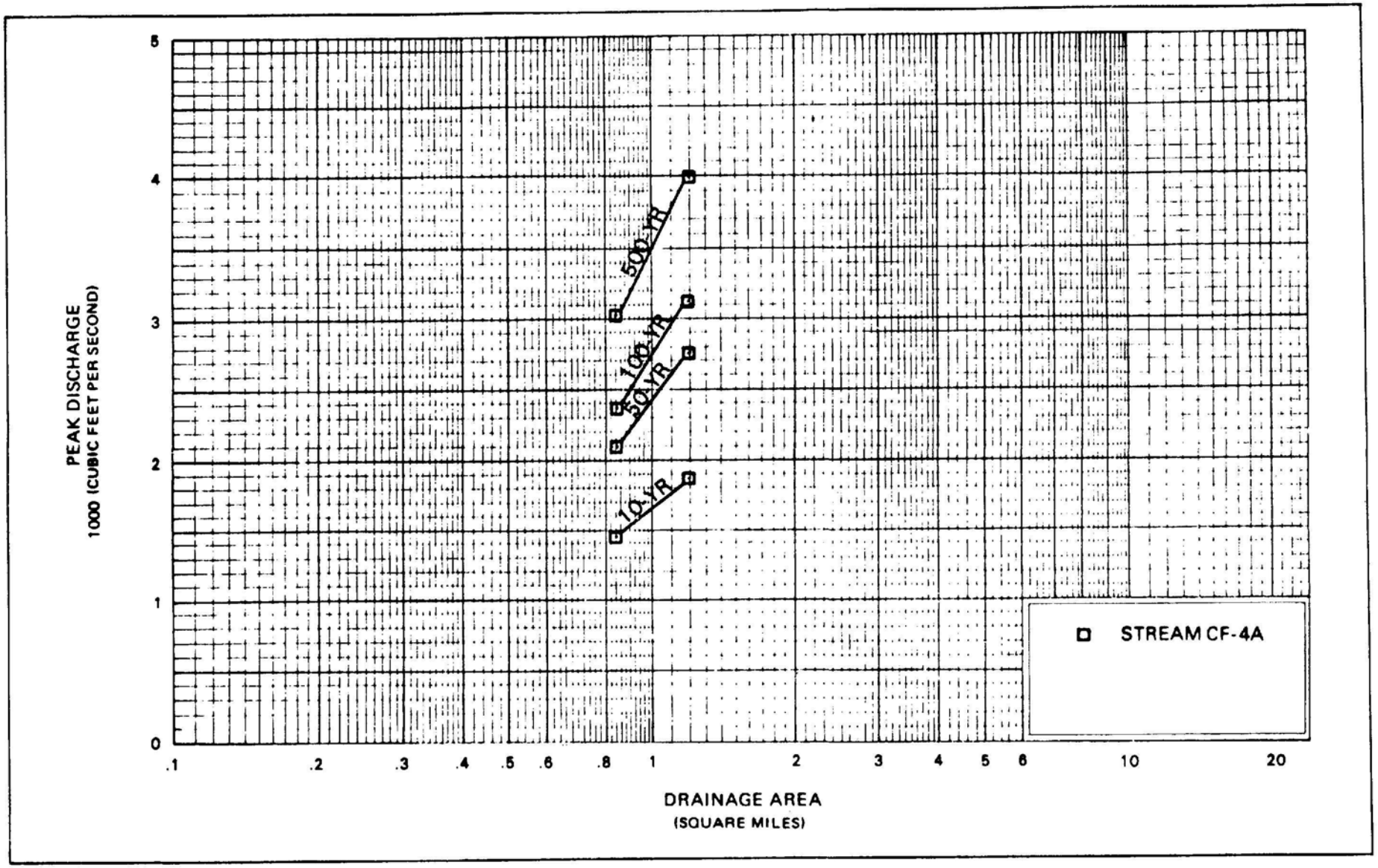

FIGURE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

TARRANT COUNTY, TX
AND INCORPORATED AREAS

FREQUENCY-DISCHARGE, DRAINAGE AREA CURVES

STREAM CF-4A

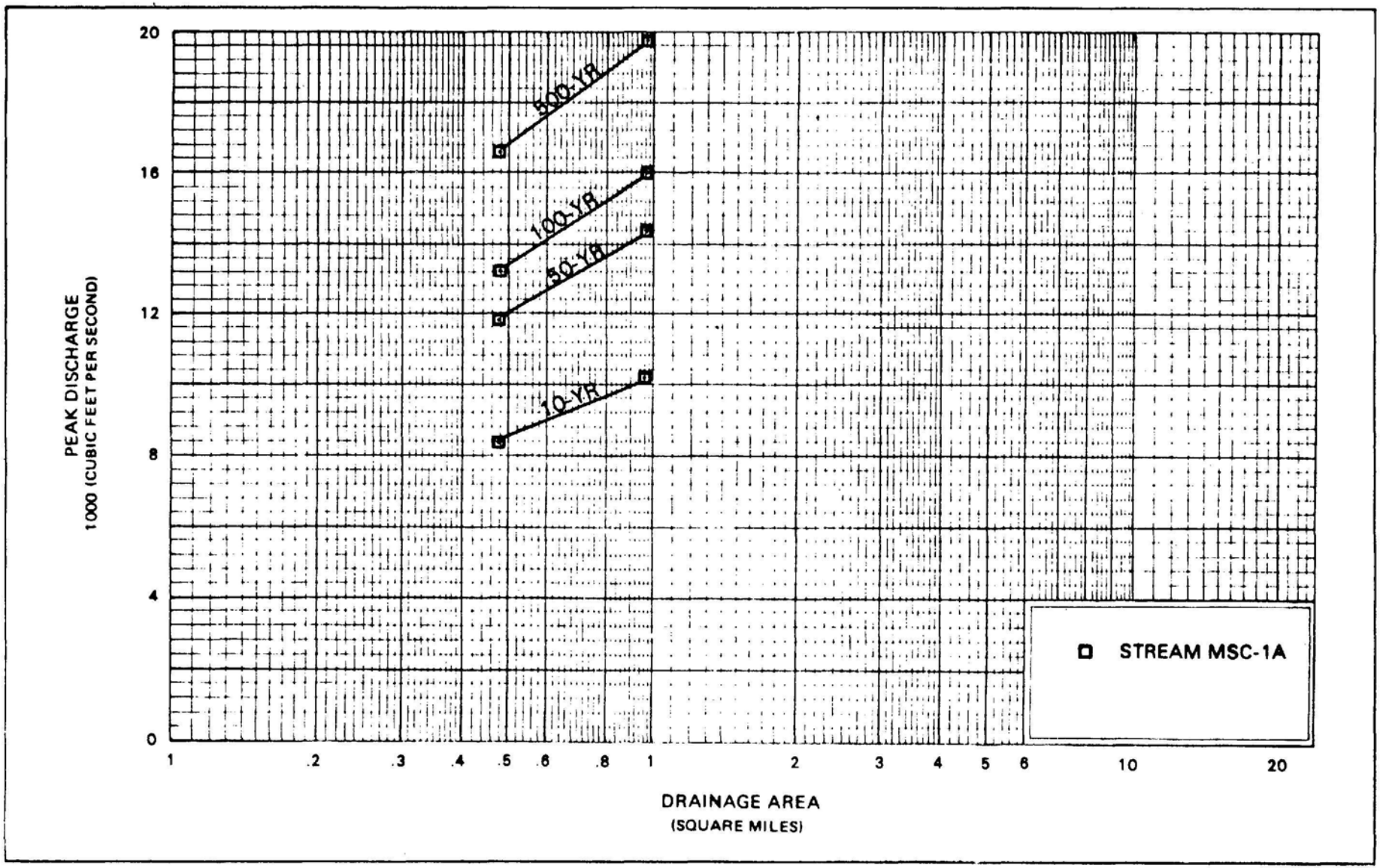

FIGURE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

TARRANT COUNTY, TX
AND INCORPORATED AREAS

FREQUENCY-DISCHARGE, DRAINAGE AREA CURVES

STREAM MSC-1A

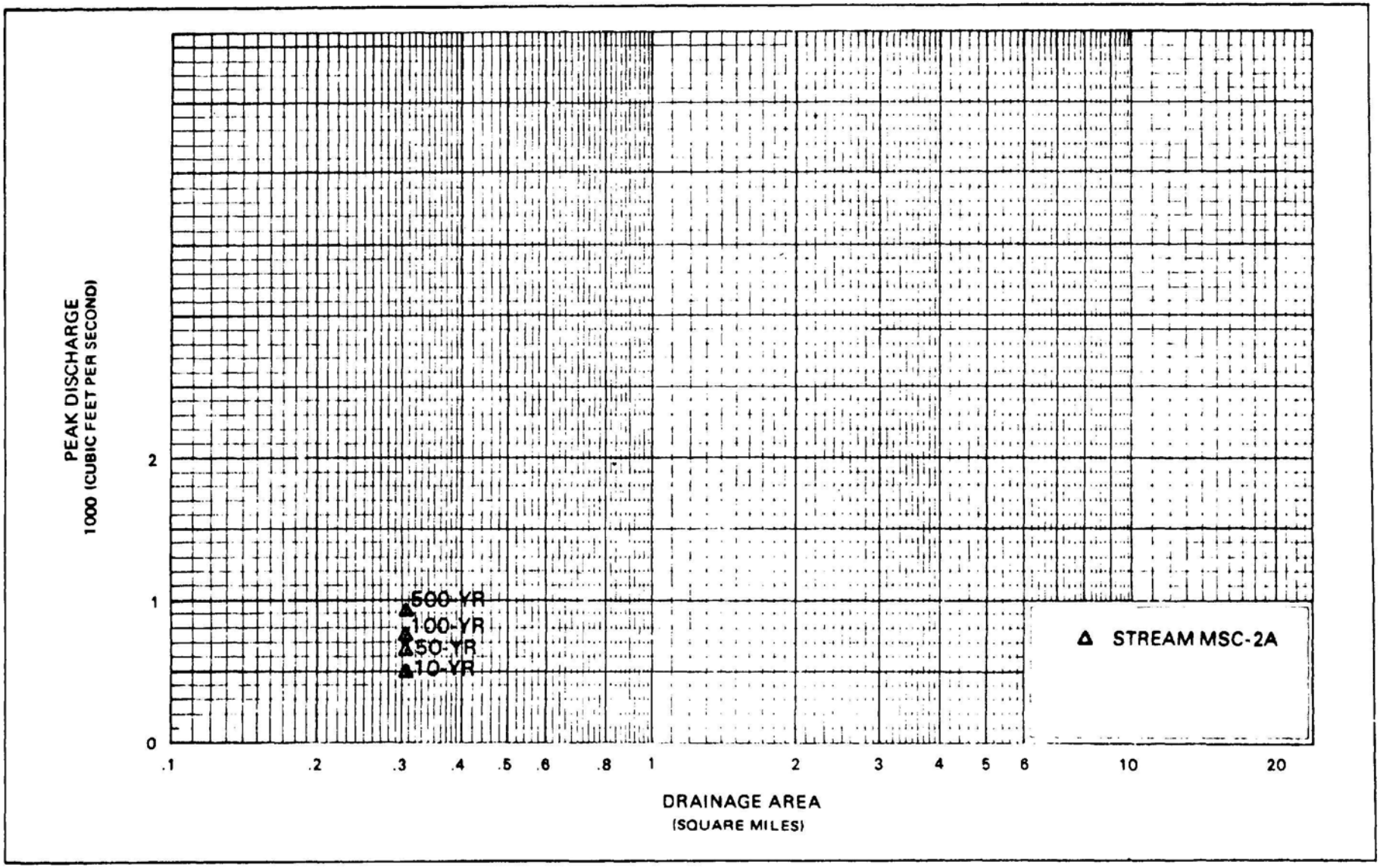

FIGURE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

TARRANT COUNTY, TX
AND INCORPORATED AREAS

FREQUENCY-DISCHARGE, DRAINAGE AREA CURVES

STREAM MSC-2A

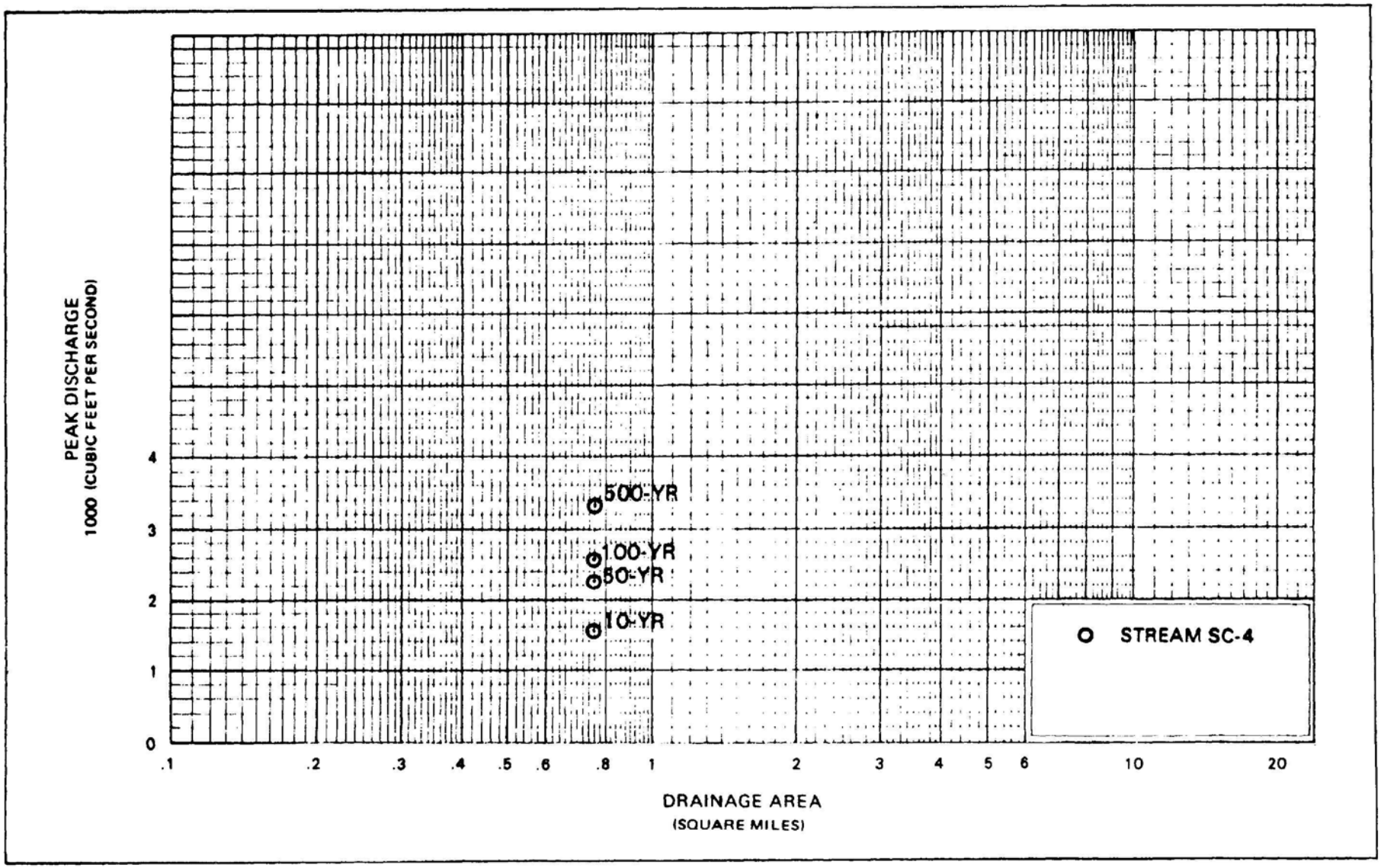

FIGURE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

TARRANT COUNTY, TX
AND INCORPORATED AREAS

FREQUENCY-DISCHARGE, DRAINAGE AREA CURVES

STREAM SC-4

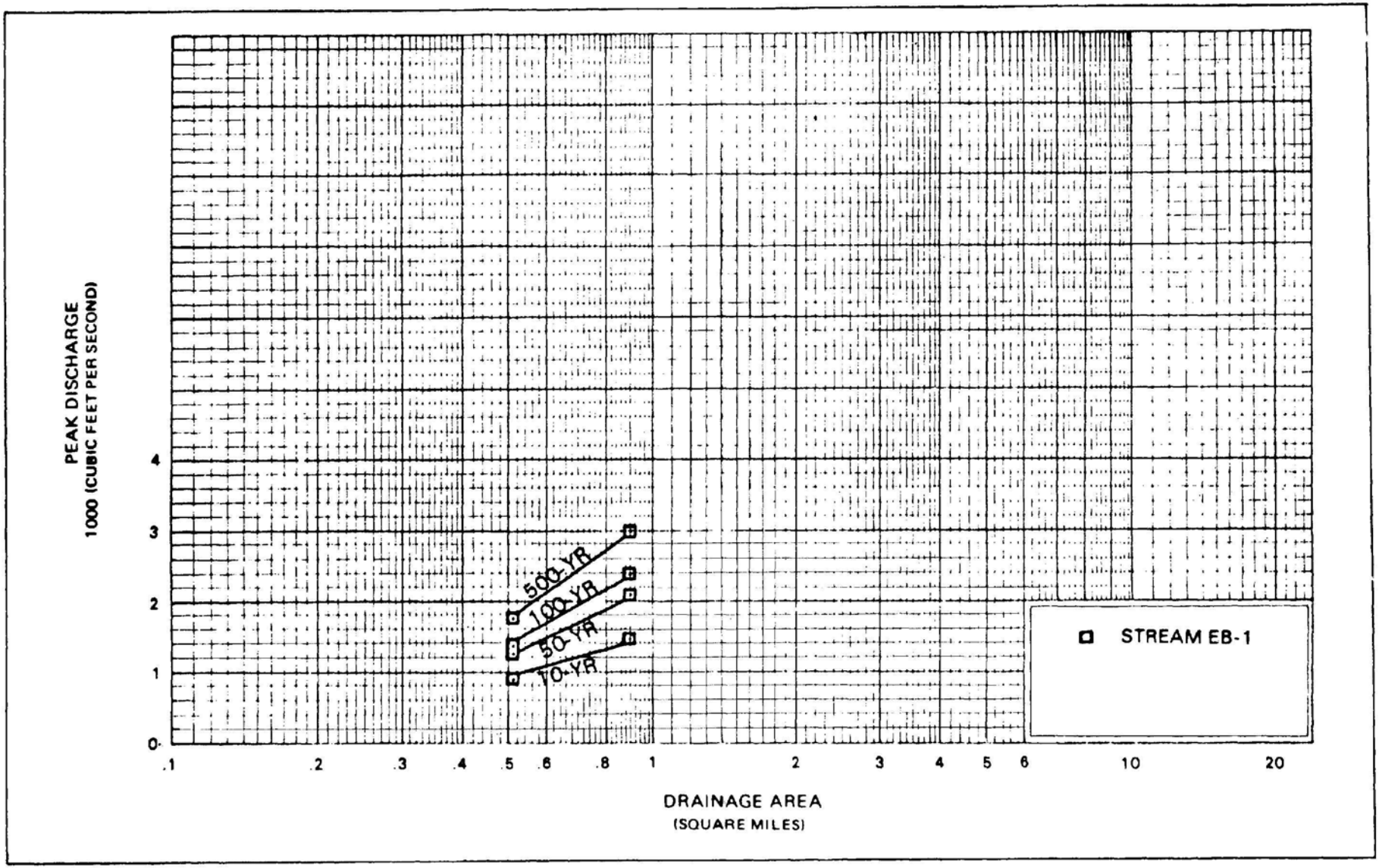

FIGURE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

TARRANT COUNTY, TX
AND INCORPORATED AREAS

FREQUENCY-DISCHARGE, DRAINAGE AREA CURVES

STREAM EB-1

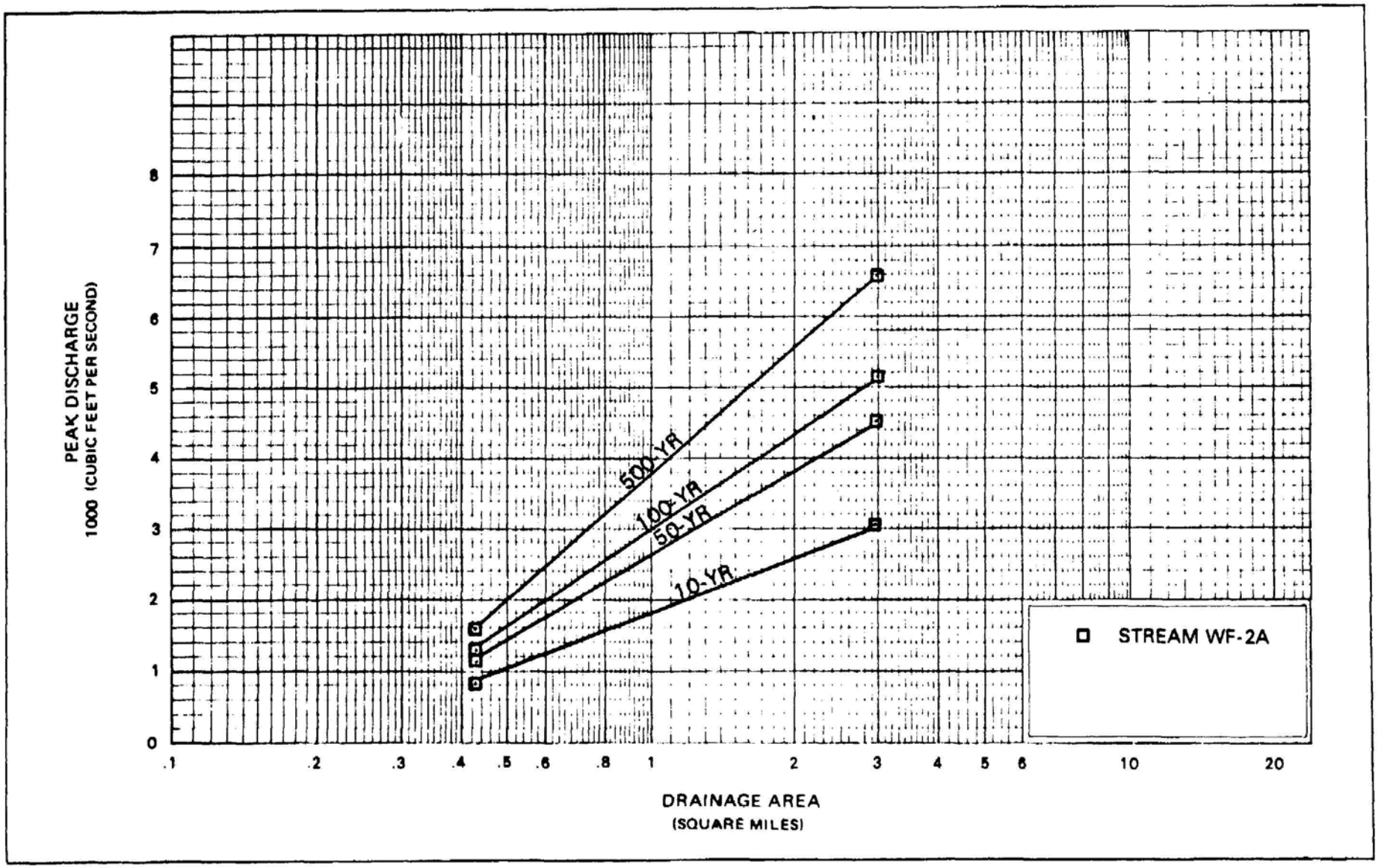

FIGURE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

TARRANT COUNTY, TX
AND INCORPORATED AREAS

FREQUENCY-DISCHARGE, DRAINAGE AREA CURVES

STREAM WF-2A

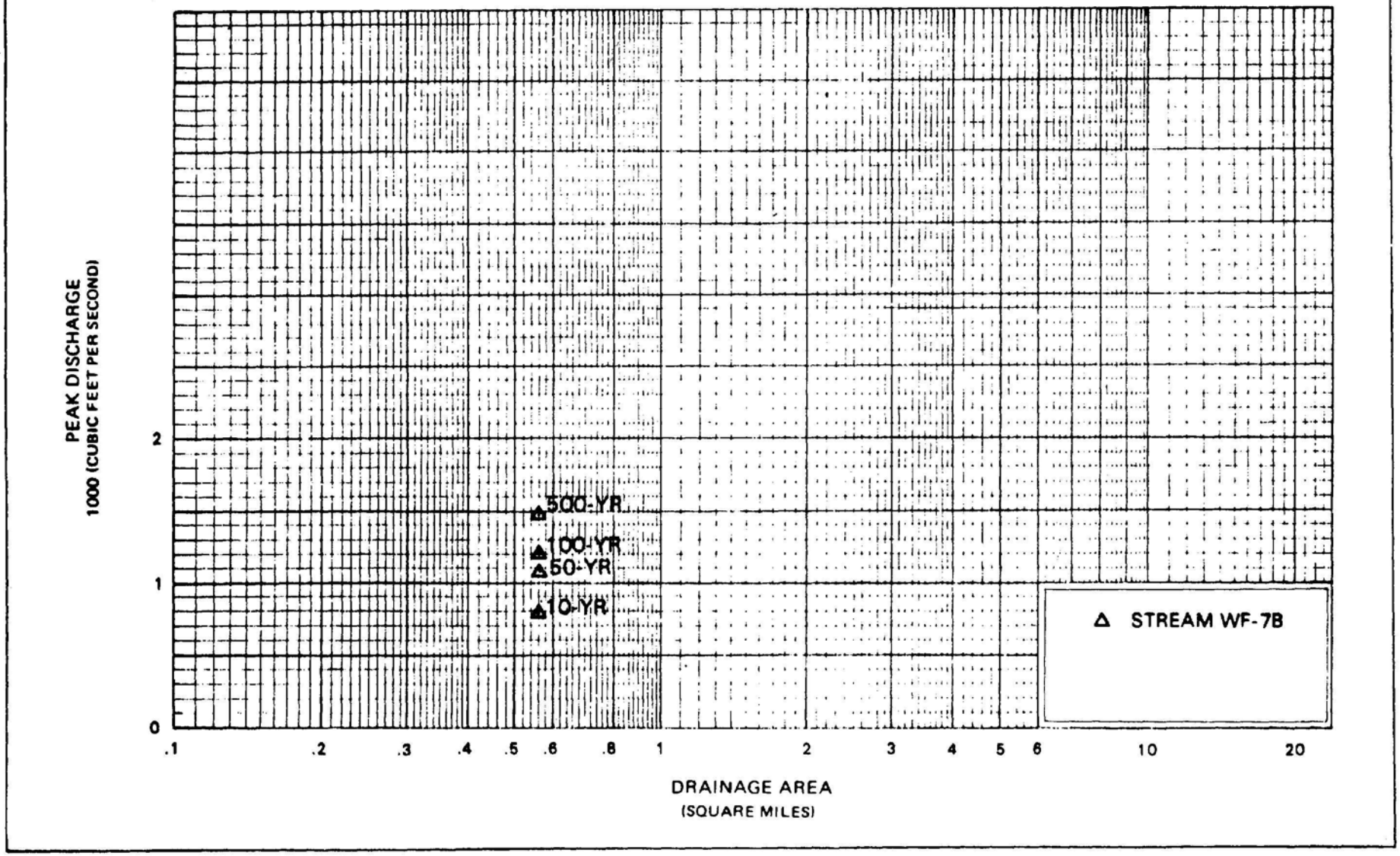

FIGURE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

TARRANT COUNTY, TX
AND INCORPORATED AREAS

FREQUENCY-DISCHARGE, DRAINAGE AREA CURVES

STREAM WF-7B

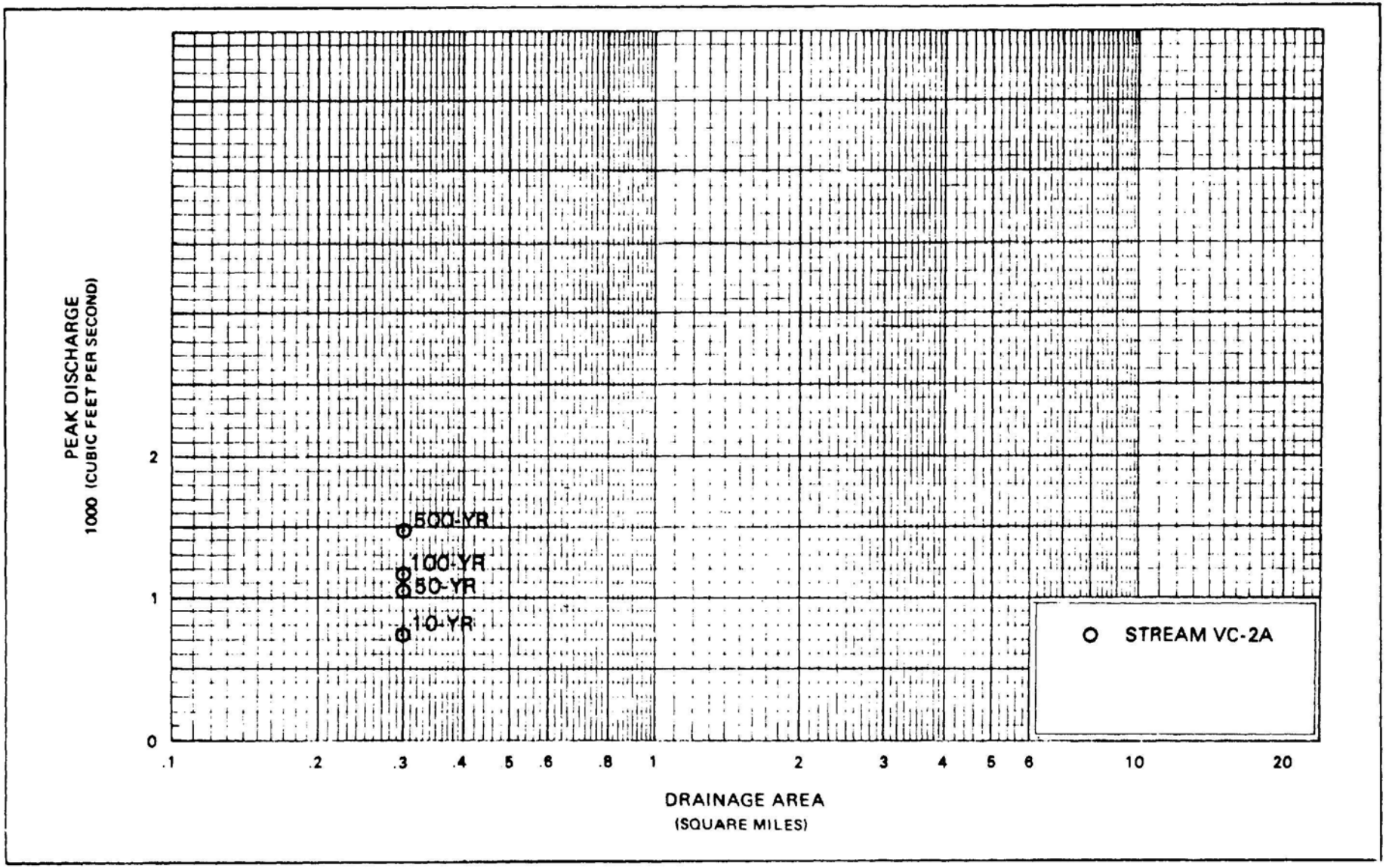

FIGURE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

TARRANT COUNTY, TX
AND INCORPORATED AREAS

FREQUENCY-DISCHARGE, DRAINAGE AREA CURVES

STREAM VC-2A

TABLE 4 – 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
New Detailed Study Streams					
ARBOR CREEK					
At Duncan Perry Road	1.14	2,600	3,200	3,500	4,000
Below Tarrant Road	1.32	2,500	3,700	4,000	4,800
BIG BEAR CREEK					
At State Route 183	77.13	15,500	25,270	31,080	46,330
At the confluence with Tributary BB-1	43.20	9,850	16,740	19,920	29,800
Approximately 2,800 feet downstream of State Highway 26	30.26	9,750	16,080	18,530	28,480
Approximately 800 feet downstream of the confluence with Tributary BB-15	25.03	9,310	14,820	17,410	26,280
Approximately 500 feet downstream of Davis Boulevard	17.90	8,220	12,580	14,810	22,710
At US Highway 377	6.89	3,870	6,130	7,270	10,330
BIG FOSSIL CREEK					
At confluence with West Fork Trinity River	76.63	21,040	34,780	41,050	59,590
Upstream of confluence of Little Fossil Creek	56.34	18,520[2]	27,810	30,970[2]	43,590
Upstream of confluence of Stream BFC-5	54.35	18,550[2]	27,660[2]	31,370[2]	43,190[2]
Upstream of confluence of Mackey Creek	52.80	18,670	27,690	31,570	43,490
Upstream of confluence of Singing Hills Creek	44.03	18,150	26,390	30,160	40,700
Upstream of confluence of Whites Branch	32.37	12,920	20,200	23,550	33,460
Upstream of confluence of Stream BFC-2	22.42	10,230	15,970	18,590	24,810
Upstream of confluence of Stream BFC-3	18.12	9,210	13,700	15,750	20,170
Upstream of confluence of Stream BFC-4	9.18	4,800	6,490	7,200	10,740
Approximately 2,200 feet upstream of BNSF Railroad	6.63	3,830	5,770	6,730	9,090
Approximately 800 feet downstream of Wagley Robertson Road	4.69	3,050	4,450	5,160	6,990
Approximately 3,000 feet downstream of Hicks Road	2.76	2,070	3,010	3,470	4,670

TABLE 4 – 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
New Detailed Study Streams					
COTTOWOOD CREEK 2					
640 feet above Craig Hanking Drive	0.29	750	1,050	1,150	1,500
At Chicory Lane	0.38	750	1,050	1,150	1,500
100 feet above Carter Drive	0.53	1,000	1,450	1,600	2,000
170 feet above long culverts under State Highway 360	0.93	1,900	2,600	2,900	3,600
70 feet below State Highway 360	1.06	1,950	2,600	3,000	3,900
650 feet above Susan Drive	1.14	2,000	2,700	3,200	4,200
800 feet above the confluence with Stream CC-2	1.18	2,100	2,800	3,200	4,300
1,100 feet above Timberlake Drive	2.39	4,400	5,700	6,400	7,800
300 feet above Timberlake Drive	2.49	4,500	5,900	6,600	8,100
At Timberlake Drive	2.78	4,900	6,600	7,400	9,200
At the confluence with Stream CC-1	3.00	5,200	7,000	7,900	10,000
30 feet above Great Southwest Parkway	3.13	5,400	7,300	8,200	10,300
100 feet below Great Southwest Parkway	3.71	6,400	8,800	9,800	12,400
4,700 feet above the confluence with Daniels Branch	3.93	6,500	9,000	10,000	12,600
UNNAMED TRIBUTARY TO STREAM BFC-4A					
Downstream of US Highway 81	0.22	312	467	540	754
At confluence with Stream BFC-4A	0.39	345	505	589	814
STREAM BFC-4B					
Approximately 960 feet upstream of BNSF Railroad	0.80	1,247	1,947	2,299	3,426
Approximately 5,630 feet upstream of BNSF Railroad	0.36	568	874	1,026	1,510
CALLOWAY BRANCH					
At its confluence with Walker Branch	6.94	3,400	5,660	6,870	10,890
Immediately downstream of I-820	4.71	3,600	5,650	6,680	10,120
Downstream of confluence of Stream CB-1 (Old) Diversion Channel	2.10	2,040	3,280	3,910	5,890
Immediately upstream of confluence with Stream CB-2	1.07	1,040	1,670	1,990	3,000
At Hightower Drive	0.42	410	670	780	1,180
At Starnes Road	0.23	220	360	430	650

TABLE 4 – 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
New Detailed Study Streams					
DRY BRANCH					
At its confluence with West Fork Trinity River	3.69	2,530	4,370	5,360	8,060
Approximately 600 feet downstream of Haltom Road	3.40	2,470[2]	4,270[2]	5,230[2]	8,200[2]
Approximately 700 feet downstream of SH121	3.28	2,960	4,710	5,550	8,210
Immediately downstream of Robinwood Drive	1.53	1,930	3,110	3,580	4,710
FISH CREEK					
At Bardin Road	0.13	275	375	425	500
At Embercrest Drive	0.19	375	500	600	750
At Wimbledon Drive	0.39	850	1,150	1,300	1,600
At Green Oaks Boulevard	0.57	1,300	1,800	2,000	2,500
At Nathan Lowe Road	0.82	1,850	2,500	2,700	3,500
At Matlock Road	1.31	2,400	3,300	3,700	4,800
At Silo Road	2.05	3,100	4,400	5,000	6,400
1430 above Stream FC-2	2.50	3,700	5,300	6,000	7,700
330 below Stream FC-2	4.05	5,800	8,500	9,700	12,600
At Collins Street	4.18	5,900	8,500	9,800	12,700
250 feet above New York Avenue	4.76	5,700	8,400	9,600	12,800
1,050 feet above confluence with Stream FC-1	4.97	5,600	8,300	9,500	12,700
360 feet below confluence with Stream FC-1	7.31	7,200	11,200	13,000	17,300
280 feet above State Highway 360	7.63	7,100	11,100	12,900	17,300
At confluence with Stream FC-3	8.43	7,400	11,500	13,400	18,000
At confluence with Stream FC-4	9.71	8,000	12,300	14,400	19,500
5,250 feet above Great Southwest Parkway	10.22	8,300	12,500	14,500	19,700
2,870 feet above Great Southwest Parkway	11.24	9,300	13,600	15,500	21,200
40 feet above Great Southwest Parkway	12.17	10,500	14,800	16,800	22,500
40 feet below Great Southwest Parkway	12.36	10,600	14,900	16,900	22,700
STREAM HEN-2					
At confluence with Henrietta Creek	8.45	4,270	6,790	7,900	10,730
At confluence of Stream HEN-2A	6.68	3,570	5,600	6,540	8,500

TABLE 4 – 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
New Detailed Study Streams					
STREAM HEN-2 (CONTINUED)					
Approximately 750 feet upstream of Burlington Northern and Santa Fe Railroad	5.97	3,400	5,370	6,310	8,830
HOGPEN BRANCH					
At confluence with Walnut Creek	5.80	3,400	4,900	5,850	7,650
At FM 157	2.90	2,750	3,850	4,350	5,450
JOHNSON CREEK					
2,800 feet above Carrier Parkway	18.26	12,700	17,100	18,400	22,300
Just above Duncan Perry Road	17.70	12,600	16,900	18,200	22,300
3,650 feet above Duncan Perry Road	17.00	12,400	16,700	18,000	22,100
Just above Railroad	16.35	12,300	16,600	17,900	22,000
Just below upstream State Highway 360 Access Road	16.07	12,300	16,500	17,900	22,000
STREAM JC-1					
At confluence with Johnson Creek	1.79	2,210	2,970	3,060	3,210
At Interstate Route 30	1.37	2,170	2,480	2,570	2,770
UNNAMED TRIBUTARY OF HURRICANE CREEK					
Approximately 1,290 feet upstream of the confluence with Hurricane Creek	0.14	255	373	429	640
Approximately 600 feet upstream of the confluence with Hurricane Creek	0.18	346	507	581	872
UNNAMED TRIBUTARY 1 TO LITTLE FOSSIL CREEK					
Approximately 1,360 feet upstream of the confluence with Little Fossil Creek	0.20	497	729	839	1,137
UNNAMED TRIBUTARY 2 TO LITTLE FOSSIL CREEK					
Approximately 540 feet upstream of the confluence with Little Fossil Creek	0.29	691	1,019	1,175	1,599
Approximately 1,780 feet upstream of the confluence with Little Fossil Creek	0.16	369	551	637	827
UNNAMED TRIBUTARY OF UNNAMED TRIBUTARY 2 TO LITTLE FOSSIL CREEK					

TABLE 4 – 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
New Detailed Study Streams					
Approximately 900 feet upstream of the confluence with Unnamed Tributary 2 to Little Fossil Creek	0.11	319	458	522	696
LOW BRANCH					
At the confluence with Lake Joe Pool	6.90	5,150	7,200	8,200	10,250
At Seeton Road	4.30	4,950	6,750	7,600	9,550
At Mitchell-Mansfield Road	2.80	4,300	5,750	6,400	8,100
At U.S. Route 287	0.70	1,700	2,200	2,400	3,050
STREAM MSC-1A (PLANTATION WEST CREEK)					
At confluence with Marys Creek	0.94	1,790	2,370	2,630	3,200
At Chapin Road	0.81	1,790	2,350	2,600	3,160
At Guadalupe Road	0.64	1,660	2,160	2,380	2,900
At U.S. Highway 80	0.54	1,500	1,950	2,150	2,620
At South Normandale Street	0.44	1,240	1,610	1,780	2,160
Downstream of left bank tributary approximately 500 feet upstream of Chamita Lane	0.25	1,020	1,310	1,440	1,750
MESQUITE BRANCH					
Approximately 120 feet upstream of Mid Cities Boulevard	0.18	**	**	478	**
Approximately 150 feet downstream of Martin Drive	0.13	**	**	390	**
Approximately 490 feet upstream of Martin Drie	0.07	**	**	229	**
NORTH FORK OF FISH CREEK (PRAIRIE CREEK) / NORTH FORK OF FISH CREEK					
At Mayfield Road	0.22	600	800	900	1,100
At Collins Street	0.50	1,150	1,600	1,800	2,200
At Allen Avenue	0.95	2,200	3,000	3,200	4,100
760 feet above confluence with Stream NF-4	1.26	2,800	3,800	4,200	5,300
At confluence with Stream NF-3	2.17	4,300	5,900	6,600	8,400
At confluence with Stream NF-2	2.52	5,000	6,900	7,700	9,800
430 feet below confluence with Stream NF-2	2.57	5,100	7,000	7,800	9,900
260 feet below the confluence with Stream NF-1	2.92	5,800	8,100	9,000	11,300

TABLE 4 – 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
New Detailed Study Streams					
NORTH FORK OF FISH CREEK (PRAIRIE CREEK) / NORTH FORK OF FISH CREEK (CONTINUED)					
230 feet above State Highway 360	3.11	6,000	7,900	9,000	11,500
1,400 feet below State Highway 360	3.66	6,700	8,700	9,900	12,800
3,485 feet above Great Southwest Parkway	4.06	6,700	9,000	10,200	13,300
192 feet above Great Southwest Parkway	4.44	6,300	8,800	10,200	13,500
SOUTH FORK OF COTTONWOOD CREEK 2					
At New York Avenue	0.27	650	900	1,000	1,200
At Park Avenue	0.38	900	1,200	1,350	1,700
65 feet above Springcrest Drive	0.41	950	1,300	1,450	1,800
330 feet above Brazos Drive	0.58	1,300	1,850	2,000	2,500
At Sherry Street	0.62	1,350	1,950	2,100	2,600
200 feet above Carter Drive	0.68	1,450	2,100	2,300	2,900
At State Highway 360	0.96	2,000	2,800	3,200	3,700
1,670 feet above Forum Drive	1.36	2,700	3,800	4,300	5,200
At Forum Drive	1.49	2,800	4,000	4,600	5,600
610 feet below Forum Drive	1.66	2,900	4,200	4,900	6,100
At Great Southwest Parkway	1.86	3,100	4,700	5,400	6,800
75 feet above State Highway 303	1.91	2,800	4,500	5,300	6,800
75 feet below State Highway 303	2.01	2,900	4,600	5,400	7,100
850 feet below State Highway 303	2.09	2,900	4,600	5,400	7,300
STREAM CC-1					
700 feet above Timberlake Drive	0.22	500	700	800	1,000
STREAM CC-2					
At Harriett Street	0.05	100	150	175	225
140 feet above Carter Drive	0.32	650	900	1,000	1,250
At the confluence with Stream CC-3	0.80	1,550	2,100	2,300	2,700
450 feet above State Highway 360	0.96	1,900	2,500	2,800	3,300
380 feet above Plaza Street	1.13	2,200	2,900	3,300	3,900
STREAM CC-2 (CONTINUED)					
At Buena Vista Drive	1.14	2,200	2,900	3,300	3,800
135 feet above Susan Drive	1.16	2,300	2,900	3,300	3,900

TABLE 4 – 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
New Detailed Study Streams					
STREAM CC-3					
At Mitchell Street	0.21	425	600	650	850
At Hillcrest Drive	0.28	550	750	850	1,100
At Sherry Street	0.35	700	950	1,000	1,200
At Greenway Street	0.44	850	1,200	1,300	1,550
At Carter Drive	0.47	900	1,250	1,350	1,550
STREAM CC-4					
1,130 feet above confluence with Cottonwood Creek 2	0.15	350	500	550	700
STREAM FC-1					
At Interstate Highway 20	1.26	2,000	2,800	3,200	4,100
At Bardin Road	1.26	2,000	2,800	3,200	4,100
2,150 feet above New York Avenue	1.63	2,400	3,500	4,000	5,200
At New York Avenue	1.84	2,600	3,700	4,200	5,500
800 feet above Green Oaks Boulevard	2.34	3,300	4,700	5,400	7,100
STREAM FC-2					
5,950 feet above Green Oaks Boulevard	0.82	1,800	2,500	2,800	3,500
1,400 feet above Green Oaks Boulevard	1.55	2,700	3,800	4,300	5,500
STREAM FC-3					
At Bardin Road	0.44	950	1,300	1,450	1,850
320 feet above Creek Crossing Lane	0.66	1,200	1,700	1,900	2,400
160 feet above State Highway 360	0.80	1,350	1,950	2,200	2,800
STREAM FC-4					
At Interstate Highway 20	0.38	800	1,100	1,250	1,600
At Bardin Road	0.38	800	1,100	1,250	1,600
100 feet above State Highway 360	0.92	1,800	2,600	2,900	3,600
200 feet below State Highway 360	0.97	1,750	2,500	2,900	3,700
STREAM NF-1					
81 feet below Overbrook Drive	0.16	450	600	700	850
At Mayfield Road	0.32	800	1,050	1,200	1,450

TABLE 4 – 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
New Detailed Study Streams					
STREAM NF-2					
At Mayfield Road	0.29	650	900	1,000	1,250
STREAM NF-3					
115 above Allen Avenue	0.22	450	600	700	900
At Overbrook Drive	0.50	1,000	1,400	1,600	2,000
At New York Avenue	0.64	1,250	1,750	2,000	2,500
At Mayfield Road	0.70	1,350	1,900	2,100	2,700
STREAM NF-4					
At Mayfield Road	0.16	350	475	550	700
At Chesapeake Drive	0.18	375	550	600	750
At Doolittle Drive	0.19	400	550	600	800
At Allen Avenue	0.23	450	650	700	900
WARRIOR CREEK					
At upstream limit of study	0.38	750	1,000	1,100	1,400
NICHOLS BRANCH					
At confluence with Walnut Creek	1.00	1,150	1,600	1,800	2,250
PLANTATION EAST CREEK					
Approximately 500 feet above confluence with Marys Creek	1.10	2,200	2,900	3,300	4,200
At U.S. Route 80	0.50	1,600	2,100	2,400	3,000
POND BRANCH					
At confluence with Walnut Creek	1.00	1,330	1,680	1,850	2,260
At Dallas Road	0.70	1,390	1,830	2,030	2,550
UNNAMED TRIBUTARY TO SINGING HILLS CREEK					
At confluence with Singing Hills Creek	0.28	**	**	1,428	**
SYCAMORE CREEK					
At its confluence with West Fork Trinity River	37.00	16,910	24,540[2]	28,870[2]	39,480[2]
Upstream of confluence of Stream SC-1	33.40	16,860	24,640	29,140	39,790
Upstream of E. Maddox Avenue	31.47	16,500	24,370	28,690	38,680

TABLE 4 – 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
New Detailed Study Streams					
Upstream of confluence of SC Unnamed Tributary 2	28.45	15,570	23,100	27,160	36,520
Upstream of confluence of Stream SC-3	27.15	15,280	22,650	26,610	35,780
Upstream of confluence of Stream SC-5	22.20	13,910	20,800	24,640	33,600
SYCAMORE CREEK (continued)					
Approximately 400 feet upstream of E. Seminary Drive	19.64	13,240	19,560	23,030	32,020
Upstream of confluence of Stream SC-6	16.10	11,930	17,750	20,720	29,000
Upstream of confluence of Edgecliff Branch	9.47	6,610	9,920	11,550	17,400
Upstream of confluence of Stream SC-7	2.84	1,890	3,090	3,600	5,030
Approximately 3,100 feet downstream of W. Risinger Road	1.28	1,260	1,960	2,310	3,280
Approximately 300 feet downstream of N. Crowley Cleburne Road	1.06	1,110	1,720	2,040	2,930
Upstream of confluence of Unnamed Tributary 7 to Sycamore Creek	0.61	780	1,210	1,430	2,050
Approximately 300 feet downstream of Poynter Street	0.51	720	1,100	1,290	1,900
Approximately 1,300 feet downstream of McCart Avenue	0.28	460	690	810	1,180
Approximately 50 feet downstream of McCart Avenue	0.22	420	620	720	1,090
UNNAMED TRIBUTARY 5 TO SYCAMORE CREEK					
At confluence with Sycamore Creek	0.33	570	840	950	1,240
UNNAMED TRIBUTARY 6 TO SYCAMORE CREEK					
At confluence with Sycamore Creek	0.90	1,580	2,240	2,490	3,170
UNNAMED TRIBUTARY 7 TO SYCAMORE CREEK					
At confluence with Sycamore Creek	0.37	599	881	1,043	1,340
UNNAMED TRIBUTARY TO UNNAMED TRIBUTARY 7 TO SYCAMORE CREEK					
Approximately 300 feet upstream of confluence with Unnamed Tributary to Sycamore Creek	0.17	251	372	442	571
TIMBER CREEK					
Upstream of confluence with Clear Fork of Trinity River	2.10	3,830	5,060	5,590	6,870

TABLE 4 – 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
New Detailed Study Streams					
TIMBER CREEK(CONTINUED)					
Approximately 745 feet downstream of Timber Creek Drive	1.01	2,520	3,080	3,320	4,170
At downstream face of Timber Creek Drive	0.72	1,715	2,050	2,180	2,670
At downstream face of Warden Street	0.46	1,110	1,420	1,540	2,020
Approximately 101 feet upstream of Childers Street	0.21	610	780	840	1,090
Approximately 187 feet downstream of Bryant Street	0.14	470	590	640	900
WALKER BRANCH					
Approximately 1,850 feet downstream confluence of Calloway Branch	12.34	6,440	10,470	12,580	19,680
Upstream of confluence of Calloway Branch	5.34	3,030	4,820	5,720	8,730
Approximately 800 feet downstream of West Pipeline Road	4.56	2,590	4,120	4,880	7,460
Approximately 100 feet downstream of Harwood Road	2.46	1,620	2,560	3,040	4,540
Approximately 700 feet downstream of Main Street	0.95	630	1,000	1,190	1,770
WALNUT CREEK 3					
At Holland Watson Britton Road	65.7	11,700[2]	22,000[2]	27,500[2]	38,300[2]
At the confluence of Ragland Branch	62.6	13,200[2]	22,400[2]	28,000[2]	38,700[2]
Downstream of confluence of Hogpen Branch	61.3	14,300	23,100	28,300	39,000
At the confluence of Watson Branch	54.2	12,500	22,400	27,600	37,700
Upstream of confluence of Willow Branch	38.5	11,100	19,000	22,800	29,800
WATSON BRANCH					
At confluence with Walnut Creek	1.50	1,650	2,350	2,700	3,400
At a point 0.76 mile below FM 157	1.00	1,350	1,850	2,050	2,650
At FM 157	0.50	960	1,300	1,400	1,800
WEST FORK TRINITY RIVER					
Approximately 1,000 feet upstream of County Line Road	2,572	33,800[2]	66,800[2]	87,100[2]	147,900[2]
UNNAMED TRIBUTARY 1 TO WEST FORK TRINITY RIVER					
Just upstream of Interstate 30	0.06	75	118	137	196

TABLE 4 – 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
New Detailed Study Streams					
WILLOW BEND CREEK					
At confluence with Marys Creek	0.80	1,755	2,315	2,535	3,050
At Meadowside Drive	0.68	1,575	2,055	2,250	2,720
At Pinewood Drive	0.36	1,035	1,340	1,470	1,785
At Ferndale Drive	0.27	855	1,095	1,205	1,465
At Chapin Road	0.19	635	815	890	1,080
Approximately 1,300 feet upstream of Chapin Road	0.12	430	545	600	730
Redelineation Detailed Study Streams					
ASH CREEK					
At Eagle Mountain	25.92	11,200	17,100	20,200	28,000
Upstream of confluence of Paschal Branch	24.01	11,200	17,000	19,900	27,000
Upstream of confluence of Reynolds Branch	21.26	11,000	16,600	19,400	26,100
Approximately 2,500 feet downstream of FM 730[1]	20.78	11,200	17,000	19,900	26,200
TRIBUTARY BB-1					
Upstream of confluence with Big Bear Creek	1.17	1,200	1,700	1,900	2,400
TRIBUTARY BB-2					
Upstream of confluence with Big Bear Creek	1.26	1,400	1,950	2,200	2,750
At Trigg Street	1.11	1,400	1,950	2,200	2,750
TRIBUTARY BB-3					
Upstream of confluence with Big Bear Creek	1.72	2,000	2,800	3,150	3,950
Downstream of confluence of Tributary BB-3A	1.66	2,000	2,800	3,150	3,950
Upstream of confluence of Tributary BB-3A	1.03	1,250	1,750	1,950	2,500
TRIBUTARY BB-5					
Upstream of confluence with Big Bear Creek	1.86	2,050	2,900	3,250	4,150
Downstream of confluence of Tributary BB-5A	1.81	2,050	2,900	3,250	4,150
Upstream of confluence of Tributary BB-5A	0.93	900	1,300	1,450	1,850

TABLE 4 – 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
Redelineation Detailed Study Streams					
TRIBUTARY BB-6					
Upstream of confluence with Big Bear Creek	1.87	1,950	2,750	3,100	3,950
At Continental Boulevard	1.30	1,700	2,400	2,650	3,400
TRIBUTARY BB-7					
At Eagle Bend	0.32	**	**	987	**
TRIBUTARY BB-8					
Upstream of confluence with Big Bear Creek	2.25	2,550	3,500	3,950	5,000
Upstream of left bank tributary 500 feet upstream of Continental Boulevard	1.22	1,450	2,000	2,250	2,900
TRIBUTARY BB-9					
Upstream of confluence withBig Bear Creek	1.97	1,950	2,750	3,100	3,950
At Southlake corporate limits	1.33	1,700	2,350	2,650	3,400
TRIBUTARY BB-10					
At confluence with Big Bear Creek	**	3,050	4,250	4,800	6,100
TRIBUTARY BB-10 (continued)					
Downstream of confluence of left bank tributary (approximately 1,900 feet downstream of the Johnson Road crossing	**	2,500	3,450	3,900	4,950
Upstream of confluence of left bank tributary approximately 1,900 feet downstream of the Johnson Road crossing	**	1,450	2,000	2,250	2,850
TRIBUTARY BB-11					
At confluence with Big Bear Creek	1.18	2,700	3,375	4,302	5,225
TRIBUTARY BB-12					
At confluence with Big Bear Creek	**	2,400	3,300	3,700	4,600
At FM 1709	**	2,000	2,700	3,000	3,750
TRIBUTARY BB-13					
Approximately 1,500 feet upstream of its confluence with Big Bear Creek	0.45	755	,105	1,276	1,651

TABLE 4 – 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
Redelineation Detailed Study Streams					
UNNAMED TRIBUTARY TO BIG BEAR CREEK					
Approximately 800 feet upstream of Keller-Hicks Road	0.35	**	**	521	**
STREAM BFC-1					
At confluence with Big Fossil Creek	2.34	4,070	5,420	6,010	7,320
At North Beach Street	2.26	4,070	5,410	6,000	7,310
At Western Center Boulevard	2.00	3,830	5,080	5,630	6,860
Downstream of right bank tributary approximately 1,200 feet upstream of Western Center boulevard	1.58	3,340	4,410	4,880	5,940
Upstream of right bank tributary approximately 2,700 feet upstream of Western Center Boulevard	1.27	2,660	3,520	3,890	4,740
At Basswood Boulevard	1.10	2,390	3,150	3,480	4,240
At Prewitt Road	0.77	1,820	2,390	2,650	3,220
STREAM BFC-2					
At confluence with Big Fossil Creek	6.45	5,350	7,500	8,400	10,600
Downstream of confluence of Stream BFC-2A	4.55	4,450	6,050	6,750	8,450
Upstream of confluence of Stream BFC-2A	1.93	2,000	2,850	3,150	3,950
STREAM BFC-2 (continued)					
At North Tarrant Parkway	0.97	1,450	2,130	2,460	2,540
Just upstream of Presido Vista Drive	0.56	880	1,280	1,470	1,510
At Harmon Road	0.32	**	**	355	**
STREAM BFC-2A					
At confluence with Stream BFC-2	2.62	2,500	3,400	3,800	4,750
At North Tarrant Parkway	1.89	1,350	1,820[17]	2,100[17]	2,590
Approximately 1,300 feet upstream of Presidio Vista Drive	1.42	1,290	1,900	2,210	2330
Approximately 1,100 feet downstream of Heritage Trace Parkway	1.32	1,850	2,730	3,060	3,960
At Heritage Trace Parkway	1.14	1,450	2,160	2,440	3,180
Approximately 1.8 miles upstream of Heritage Trace Parkway	0.41	680	990	1,100	1,420
STREAM BFC-3					
At confluence with Big Fossil Creek	1.19	1,653	2,299	2,596	3,177

TABLE 4 – 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
Redelineation Detailed Study Streams					
STREAM BFC-4					
At confluence with Big Fossil Creek	6.62	7,100[2]	9,900	11,200	14,200
Downstream of confluence of Stream BFC-4A	6.28	7,150	9,800	11,000	13,850
Upstream of confluence of Stream BFC-4A	4.36	4,900[2]	6,800	7,600	9,650[2]
Downstream of confluence of unnamed tributary approximately 1.57 miles upstream of confluence with Big Fossil Creek	4.17	4,950	6,750	7,600	9,700
Upstream of confluence of unnamed tributary, approximately 1.57 mile upstream of confluence with Big Fossil Creek	3.09	3,550[2]	4,900[2]	5,500[2]	7,050[2]
Approximately 10 feet downstream of Hicks Road	2.49	4,050	5,400	5,950	7,500
Approximately 10 feet upstream of Hicks Road	1.85	3,000	4,000	4,400	5,550
Approximately 10 feet upstream of unnamed tributary	0.90	1,350	1,800	2,000	2,500
STREAM BFC-4A					
At confluence with Stream BFC-4	1.92	2,600	3,500	3,900	4,900
STREAM BFC-5					
Downstream of confluence of Stream BFC-5A	0.89	2,100	2,700	2,900	3,800
Upstream of confluence of Stream BFC-5A	0.69	1,600	2,100	2,300	2,900
At Baker Boulevard	0.47	1,200	1,500	1,700	2,100
At Hovenkamp Avenue	0.38	950	1,200	1,350	1,700
At Dover Lane	0.26	650	850	950	1,200
At Richlynn Terrace	0.20	510	660	720	910
At Glen Hills Road	0.14	360	470	520	650
At Hardisty Street	0.10	260	330	370	460
STREAM BFC-5A					
At confluence with Stream BFC-5	0.20	510	660	720	900
At Kings Court	0.17	440	560	620	780
At Baker Boulevard	0.14	360	470	520	650
STREAM BFC-5B					
Approximately 1,000 feet upstream of confluence with Stream BFC-5	0.19	260	340	370	460

TABLE 4 – 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
Redelineation Detailed Study Streams					
STREAM BFC-5B(CONTINUED)					
Approximately 1,550 feet upstream of confluence with Stream BFC-5	0.12	210	270	300	370
Approximately 0.46 mile upstream of confluence with Stream BFC-5	0.06	150	190	210	260
Approximately 0.51 mile upstream of confluence with Stream BFC-5	0.05	140	180	200	250
Approximately 0.66 mile upstream of confluence with Stream BFC-5	0.03	110	140	155	195
Approximately 0.84 mile upstream of confluence with Stream BFC-5	0.01	40	50	55	65
STREAM BFC-6					
At confluence with Big Fossil Creek	0.95[3]	2,300	2,980	3,280	4,220
Approximately 1,090 feet downstream of Diamond Oaks Road	0.67	1,690	2,180	2,400	3,100
Approximately 1,000 feet upstream of Diamond Oaks Road	0.35	940	1,210	1,330	1,740
STREAM BFC-7					
At confluence with Big Fossil Creek	0.60	1,380	1,870	2,090	2,460
BLESSING BRANCH					
At Minters Chapel Road	1.70	3,090	4,100	4,560	5,750
At Fuller Wiser Road	1.10	2,420	3,190	3,540	4,460
At Main Street	0.70	1,630	2,120	2,340	2,940
BOAZ CREEK					
Approximately 500 feet upstream of confluence with Walnut Creek 2	2.60	3,300	4,500	5,100	6,300
Approximately 1,500 feet upstream of confluence with Walnut Creek 2	1.63	2,200	3,100	3,500	4,300
BOWMAN BRANCH					
At confluence with Walnut Creek 3	5.89	4,800[2]	6,950	8,050	10,150
Downstream of Arlington-Webb Britton Road	5.19	4,600[2]	6,650	7,600	9,450
Approximately 2,000 feet downstream of confluence of Stream BB-1	3.50	4,850	6,600	7,350	9,000
Downstream of Mansfield Webb Road	2.45	3,400	4,600	5,150	6,250
STREAM BB-1					
At confluence with Bowman Branch	1.05	1,994	2,755	3,129	4,379

TABLE 4 – 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
Redelineation Detailed Study Streams					
BOYD BRANCH					
At confluence with West Fork Trinity River	4.11	4,410	6,340	6,790	8,520
At Trinity Railroad Express	2.78	3,950	5,330	5,950	7,500
At South Pipeline Road	1.85	3,640	4,810	5,340	6,720
At South Pipeline Road	1.85	3,640	4,810	5,340	6,720
At State Route 10	1.30	2,980	3,870	4,300	5,400
Approximately 800 feet upstream of State Route 10[18]	1.00	227	927	1,237	2,107
At a point approximately 800 feet upstream of Villa Road[18]	0.60	0.01	47	267	857
BRIAR CREEK					
Approximately 1,900 feet downstream of Liberty School Road	7.72	6,150	8,850	10,150	12,900
Approximately 1,600 feet upstream of Liberty School Road	6.66	5,700	8,050	9,200	11,650
Approximately 1,300 feet upstream of FM 730 (Boyd Road)	5.34	5,400	7,700	8,700	10,750
BUFFALO CREEK					
At confluence with Henrietta Creek	4.70	4,300	6,200	7,050	8,850
Approximately 800 feet upstream of divergence of Old Buffalo Creek	2.48	2,550	3,700	4,200	5,350
Downstream of confluence of left and right bank tributaries located approximately 1.06 miles upstream of Harmon Road	1.87	2,450	3,400	3,900	4,800
Approximately 100 feet upstream of tributaries located approximately 1.06 miles upstream of Harmon Road	0.96	1,150	1,650	1,850	2,350
Approximately 100 feet downstream of confluence of left bank tributary located approximately 0.57 mile downstream of Blue Mound Road	0.71	1,500	1,950	2,150	2,700
OLD BUFFALO CREEK					
At confluence with Henrietta Creek	**	900	1,200	1,350	1,700
At downstream face of Interstate Route 35W	**	250	300	350	450
BUNKER HILL CREEK					
At confluence with Singing Hills Creek	1.79	2,350	3,250	3,600	4,500

TABLE 4 – 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
Redelineation Detailed Study Streams					
BUNKER HILL CREEK(CONTINUED)					
Approximately 500 feet upstream of Chapman Road	1.34	2,050	2,800	3,100	3,850
Approximately 1,400 feet upstream of Hightower Road	1.07	1,750	2,350	2,600	3,250
STREAM CB-1(NEW)					
At DART Railroad	0.38	750	990	1,100	1,380
At Chapman Drive	0.29	560	740	820	1,040
At Storm Drain Outlet	0.20	360	480	540	590
Upstream of Frankie Street	0.15	0.01[11]	0.01[11]	0.01[11]	76[11]
STREAM CB-1 (OLD)					
At confluence with Calloway Branch	0.75	560	780	880	1,130
At Bogart Drive	0.75	1,090	1,500	1,670	2,120
STREAM CB-1 (OLD) DIVERSION					
At confluence with Stream CB-1	**	530	720	790	990
STREAM CB-2					
At Hightower Drive	0.45	890	1,170	1,290	1,630
At Starnes Road	0.11	220	290	330	410
CEMENT CREEK					
At confluence with Marine Creek	4.90	1,300	2,280	2,740	3,440
Approximately 1,800 feet upstream-of NY 35th Street	4.70	1,090	1,900	2,280	2,860
Downstream of cement plant reservoir	4.40	830	1,440	1,730	2,160
Upstream of cement plant reservoir	3.70	580	720	790	930
Approximately 2,000 feet upstream of cement plant reservoir dam	3.60	460	570	620	730
At Cement Creek Reservoir dam	3.50	100	110	120	130
WEST FORK CEMENT CREEK					
At Longhorn Road	1.08	1,650	2,200	2,500	3,100
CHAMBERS CREEK					
At confluence with Village Creek	7.02	6,450	9,000	10,150	13,250
At Anglin Drive	6.56	6,400	8,700	9,750	12,650
At Stead Road	6.54	6,100	8,400	9,400	11,900
Downstream of confluence of North and South Forks	5.40	6,000	8,200	9,200	11,500

TABLE 4 – 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
Redelineation Detailed Study Streams					
NORTH FORK CHAMBERS CREEK					
At confluence with Chambers and South Fork Chambers Creeks	2.65	3,050	4,200	4,700	5,900
At Wichita Street	1.66	2,500	3,400	3,750	4,750
Approximately 0.42 mile downstream of Oak Grove Road	0.95	1,800	2,550	2,820	3,570
At Oak Grove Road	0.69	1,260	1,690	1,880	2,380
SOUTH FORK CHAMBERS CREEK					
At confluence with Chambers and North Fork Chambers Creeks	2.75	3,050[2]	4,450[2]	4,950[2]	6,400[2]
At Everman Parkway	1.96	3,450	4,600	5,150	6,500
At Oak Grove Road	0.68	1,390	1,850	2,050	2,600
CLEAR FORK TRINITY RIVER					
At confluence with West Fork Trinity River	91.7	15,100	25,000	30,000	46,000[3]
At Interstate Route 30	87.7	13,800	24,600	29,800	46,000[3]
Downstream of confluence of Marys Creek	63.2	11,700	20,700	25,400	46,000[3]
Upstream of confluence of Marys Creek	8.50	6,000[3]	8,400	13,000[3]	46,000[3]
STREAM CF-2					
At confluence with Clear Fork Trinity River	2.15	2,800	4,500	5,150	6,500
Downstream of Vickery Boulevard	1.58	2,000	3,200	3,650	4,500
At Lake Como Darn	1.17	1,700	2,600	2,950	3,600
STREAM CF-3					
At confluence with Clear Fork Trinity River	4.28	6,090	8,090	9,070	11,500
At Overton Park West	4.02	5,810	7,610	8,540	10,910
Approximately 0.40 mile upstream of Ranch View Road	3.75	5,920	7,930	8,800	11,030
At confluence of Stream CF-3B	2.44	4,250	5,590	6,200	7,850
At Burlington Northern and Santa Fe Railroad	1.00	2,150	2,810	3,100	3,900
At Granbury Road (Tidal Lake Drive)	0.78	1,620	2,120	2,340	2,940
STREAM CF-3A					
At confluence with Stream CF-3	1.22	1,810	2,430	2,710	3,410
STREAM CF-3B					
At confluence with Stream CF-3	1.07	1,600	2,150	2,390	3,010
STREAM CF-5					
At confluence with old Clear Fork Trinity River streambed	3.83	4,700	6,250	6,800	7,800

TABLE 4 – 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
Redelineation Detailed Study Streams					
STREAM CF-5					
Approximately 400 feet downstream of Bellaire Drive	3.62	4,000[2]	5,300[2]	5,700[2]	6,500[2]
At Interstate Route 20	2.48	4,100	5,700	6,450	7,300
Approximately 1.04 mile downstream of Hulen Street	1.80	3,650	5,000	5,550	6,750
Approximately 0.49 mile downstream of Hulen Street	1.34	2,200	3,000	3,300	4,200
STREAM CF-6					
At confluence with Clear Fork Trinity River	2.76	3,000	4,100	4,600	5,800
Approximately 1.04 mile upstream of confluence with Clear Fork Trinity River	1.43	2,600	3,500	4,000	5,000
Approximately 1.69 mile upstream of confluence with Clear Fork Trinity River	0.51	2,200	3,000	3,300	4,200
COTTONWOOD BRANCH					
At State Road	4.69	3,600	5,000	5,600	7,100
At Bethel Road	3.64	3,600	5,000	5,600	7,100
COTTONWOOD CREEK 1					
At confluence with Village Creek	5.12	4,400	6,450	7,400	9,400
Downstream of Bentley Village Parkway	4.40	4,550	6,500	7,100	8,950
Downstream of Inter-state Route 30	3.87	3,900	5,450	6,100	7,700
Upstream of Interstate Route 30	3.46	3,750	5,250	5,900	7,500
Upstream of Edervi11e Road	2.72	2,950	4,100	4,650	5,900
Downstream of Shady Lane	1.23	2,200	2,950	3,300	4,150
COTTONWOOD CREEK 2					
Approximately 1,100 feet downstream of Carrier Parkway	10.31	10,800	15,000	17,100	21,600
Downstream of Carrier Parkway	5.65	5,700[2]	8,200[2]	9,300[2]	11.600[2]
Upstream of West Freeway	5.15	5,600[2]	7,950[2]	8,900[2]	11,000[2]
Upstream of unnamed north bank tributary	4.50	5,150[2]	7,300[2]	8,200[2]	10,150[2]
Downstream of Greater Southwest Parkway	3.27	6,660	8,920	9,780	12,150
Downstream of confluence of North Fork Cottonwood Creek	2.52	5,600	7,300	8,050	10,100
Upstream of confluence of North Fork Cottonwood Creek	1.21	2,600	3,400	3,750	4,700
At State Route 360	0.88	2,400	3,100	3,400	4,400

TABLE 4 – 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
Redelineation Detailed Study Streams					
UNNAMED TRIBUTARY TO COTTONWOOD CREEK 1					
Downstream of Ederville Road	0.69	**	**	2,144	**
UNNAMED TRIBUTARY TO COTTONWOOD CREEK 2					
At the confluence with Cottonwood Creek 2	0.27	**	**	914	**
SOUTH FORK COTTONWOOD CREEK 2					
Approximately 1,650 feet downstream of Greater Southwest Parkway	1.95	3,650	4,900	5,450	6,900
Approximately 860 feet upstream of Forum Drive	0.90	2,200	2,850	3,100	4,000
CROWLEY BRANCH					
Approximately 100 feet downstream of Burlington Northern and Santa Fe Railroad	0.47	1,034	1,427	1,542	2,075
CUB CREEK					
Approximately 250 feet downstream of Cheek-Sparger Road	0.31	**	**	784	**
Approximately 2,075 feet upstream of Cheek-Sparger Road	0.18	**	**	532	**
DEER CREEK					
At confluence with Village Creek	21.43	15,200	21,600	24,700	30,400
Approximately 0.66 mile upstream of Forest Hill-Everman County Line Road	20.08	15,000	20,400	23,500	28,900
At Interstate Route 35W	18.12	13,500	18,900	21,400	26,000
Approximately 1,800 feet upstream of Union Pacific Railroad	16.99	12,900[2]	18,100[2]	20,400[2]	24,700[2]
Downstream of Northwest Branch	16.86	13,500	19,000	21,500	27,500
Approximately 2,000 feet upstream of Missouri-Kansas-Texas Railroad	15.29	11,800[2]	16,500[2]	18,700[2]	22,800[2]
Upstream of Northwest Branch	15.23	12,500[2]	17,600[2]	19,800[2]	25,300[2]
Downstream of North Branch	14.31	13,000	18,200	20,500	26,100
Upstream of North Branch	8.28	7,400	10,300	11,600	14,800
Upstream of Farm Road 731	7.54	7,900	10,900	12,200	15,500
Downstream of confluence of North Fork Deer Creek	7.16	7,000	9,700	10,900	13,900
Upstream of confluence of North Fork Deer Creek	6.38	6,500	9,100	10,200	12,900

TABLE 4 – 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
Redelineation Detailed Study Streams					
DEER CREEK(CONTINUED)					
Downstream of confluence of South Fork Deer Creek	5.45	6,400	8,900	10,000	12,600
Upstream of confluence of South Fork Deer Creek	1.13	1,700	2,300	2,600	3,250
Upstream of Tarrant County boundary	0.91	1,400	1,900	2,100	2,550
NORTH BRANCH OF DEER CREEK					
At confluence with Deer Creek	6.09	6,000	8,400	9,400	12,000
Upstream of Burlington Northern and Santa Fe Railroad	5.53	6,300	8,700	9,800	12,400
Downstream of confluence of South Fork of North Branch of Deer Creek	4.80	6,400	8,900	9,900	12,500
Upstream of confluence of South Fork of North Branch of Deer Creek	1.98	2,800	3,900	4,350	5,500
AN UNNAMED TRIBUTARY TO NORTH BRANCH OF DEER CREEK					
Just upstream of the confluence with North Branch of Deer Creek	0.97	1,836	2,629	3,082	3,902
AN UNNAMED TRIBUTARY TO AN UNNAMED TRIBUTARY TO NORTH BRANCH DEER CREEK					
Just upstream of the confluence with an unnamed tributary to an unnamed tributary to North Branch of Deer Creek	0.42	665	952	1,116	1,414
NORTHWEST BRANCH OF DEER CREEK					
At confluence with Deer Creek	1.63	2,350	3,200	3,600	4,500
NORTH FORK OF DEER CREEK					
Just upstream of Burlington Northern and Santa Fe Railroad	0.65	**	**	700	**
SOUTH FORK OF DEER CREEK					
At confluence with Deer Creek	4.32	5,100	7,000	7,800	9,900
Downstream of confluence of North Tributary of South Fork of Deer Creek	4.19	5,400	7,400	8,300	10,500
Upstream of confluence of North Tributary of South Fork of Deer Creek	3.61	4,600	6,300	7,100	9,000

TABLE 4 – 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
Redelineation Detailed Study Streams					
SOUTH FORK OF NORTH BRANCH OF DEER CREEK					
At confluence with North Branch of Deer Creek	2.82	3,750	5,100	5,700	7,200
DENTON CREEK					
At Tarrant County boundary[4]	3.96	6,000	8,300	9,400	36,200
Below Tributary D-l[4]	3.61[5]	5,900	8,000	9,400	36,200
Above Tributary D-1[4]	2.42[5]	4,050	5,500	9,400	36,200
Above Tributary D-2[4]	1.60	2,550	3,500	3,900	4,900
Above Grapevine Lake outlet channel	1.19	2,050	2,800	3,100	3,900
DOVE CREEK					
At Grapevine Lake	3.22	2,650	3,750	4,250	5,500
At Dove Street	2.14	2,150	3,000	3,400	4,350
DOVE CREEK (continued)					
At Carroll Avenue	1.51	1,850	2,600	2,900	3,700
DUTCH BRANCH					
At Benbrook Lake	7.30	6,900	9,500	10,900	13,800
Approximately 1.52 miles upstream of Benbrook Lake	4.90	5,700	7,900	9,000	11,300
TRIBUTARY DB-3					
Approximately 480 feet upstream of the confluence with Dutch Branch	0.52	917	1,366	1,479	2,059
EDGECLIFF BRANCH					
Above its confluence with Sycamore Creek	6.52	5,800	8,250	9,300	11,400
Downstream of left bank tributary located east of Chelsea Drive	5.92	5,750	8,250	9,300	11,850
Upstream of left bank tributary located east of Chelsea Drive	5.04	5,050	7,250	8,150	10,400
Above Burlington Northern and Santa Fe Railroad	4.51	5,700	7,800	8,700	11,100
At McCart Street crossing	1.96	3,100	4,250	4,750	6,100
ELM BRANCH					
At confluence with Village Creek	2.63	3,200	4,350	4,950	6,350
Approximately 1,900 feet upstream of Wilson Road	2.34	2,850	3,900	4,400	5,600
Approximately 0.40 mile upstream of Wilson Road	0.99	1,300	1,750	2,000	2,600
At Rendon-New Hope Road	0.58	950	1,250	1,400	1,750

TABLE 4 – 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
Redelineation Detailed Study Streams					
FARMERS BRANCH					
At confluence with West Fork Trinity River	11.4	11,200	14,400	15,900	20,350
Upstream of confluence of Kings Branch	6.70	5,870	6,870	7,430	9,540
At Grant Lane	5.14	5,010	6,450[2]	7,100[2]	8,540[2]
Approximately 420 feet upstream of Las Vegas Trail	3.69	4,990	6,740	7,510	9,450
Approximately 460 feet upstream of Las Vegas Trail	3.11	4,400	5,970	6,650	8,370
Approximately 50 feet upstream of Loop 820	3.02	1,090[2]	1,440[2]	1,600[2]	2,000[2]
Upstream of Redford Road	2.21	2,400	3,200	3,550	4,500
At Alameda Boulevard	1.30	2,050	2,700	3,000	3,800
FARMERS BRANCH (continued)					
Approximately 50 feet upstream of Little Fox Lane	0.50	1,500	2,000	2,200	2,800
UNNAMED TRIBUTARY TO FARMERS BRANCH					
Approximately 200 feet upstream of Loop 820	0.46	**	**	2,309	**
STREAM FB-1					
At confluence with Farmers Branch	0.58	1,090	1,440	1,600	2,000
Approximately 2,500 feet downstream of West Point Boulevard	0.29	405	623	758	934
UNNAMED TRIBUTARY TO STREAM FB-1					
At West Point Boulevard	0.12	217	329	389	488
FARRIS BRANCH					
At Dove Road	0.70	780	1,140	1,370	**
Upstream of confluence of Farris Branch East	0.34	440	670	820	**
FARRIS BRANCH EAST					
At confluence with Farris Branch	0.34	360	510	580	**
FISH CREEK					
Approximately 0.42 mile downstream of Watson Road, which is at confluence of unnamed north bank tributary	9.76	9,900	14,100	16,100	20,100

TABLE 4 – 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
Redelineation Detailed Study Streams					
Approximately 990 feet downstream of Watson Road, which is at confluence of unnamed north bank tributary	8.48	8,650[2]	12,200[2]	13,900[2]	17,400[2]
Approximately 950 feet downstream of Watson Road, which is above confluence of unnamed north bank tributary	7.73	7,950[2]	11,300[2]	12,800[2]	16,000[2]
At confluence of Stream FC-l	7.42	8,960	12,400	13,900	17,400
At confluence of Stream FC-2	4.08	5,400	7,350	8,250	10,100
Above confluence of Stream FC-2	2.55	3,500	4,700	5,250	6,300
At Matlock Road	1.44	3,150	4,100	4,550	5,750
STREAM FC-l					
At confluence with Fish Creek	2.33	3,960	5,260	5,910	7,350
At Allen Waggoner Road	1.92	3,450	4,560	5,110	6,370
STREAM FC-l (continued)					
Approximately 400 feet downstream of Collins Avenue (below unnamed north bank tributary)	1.19	2,540	3,320	3,680	4,630
STREAM FC-2					
At confluence with Fish Creek	1.53	2,120	2,970	3,340	4,190
Approximately 0.95 mile upstream of confluence with Fish Creek	0.93	1,780	2,380	2,640	3,400
Approximately 1.80 miles upstream of confluence with Fish Creek	0.59	1,590	2,040	2,250	2,950
HAWKWOOD BRANCH					
At confluence with Crowley Branch	0.77	758	1,072	1,254	1,600
HENRIETTA CREEK					
Approximately 100 feet downstream of confluence of Buffalo Creek	24.50	16,600	24,200	27,850	35,250
Approximately 100 feet downstream of confluence of Stream HEN-1	18.96	13,650	19,650	22,600	28,300
Approximately 100 feet upstream of confluence of Stream HEN-l	17.55	13,050[2]	18,750[2]	21,400[2]	26,750[2]
Approximately 100 feet downstream of confluence of right bank tributary located approximately 0.83 miles upstream of Harmon Road	17.02	13,350	19,150[2]	21,800[2]	26,850[2]
Approximately 100 feet upstream of right bank tributary	16.69	13,300[2]	19,050[2]	21,650[2]	26,700[2]
Approximately 100 feet downstream of confluence of Stream HEN-2	16.31	13,350	19,200	21,850	26,950

TABLE 4 – 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
Redelineation Detailed Study Streams					
HENRIETTA CREEK(CONTINUED)					
Approximately 100 feet upstream of confluence Stream HEN-2	7.91	6,900[2]	10,150[2]	11,300[2]	13,850[2]
Approximately 100 feet downstream of confluence of left bank tributary located approximately 0.51 mile upstream of Keller-Haslet Road	7.21	7,450	10,450	11,850	14,650
Approximately 1,190 feet upstream of Diamond Back Lane	4.56	4,938	7,450	8,391	10,974
Approximately 1,040 feet upsteam of confluence of Henrietta Creek 6	2.06	2,027	3,069	3,463	4,543
HENRIETTA CREEK 5					
Approximately 890 feet upstream of confluence with Henrietta Creek	0.53	907	1,284	1,418	1,875
HENRIETTA CREEK 6					
Approximately 1,060 feet upstream of confluence with Henrietta Creek	1.53	2,002	2,957	3,305	4,289
Approximately 900 feet downstream of Diamond Back Lane	0.69	1,023	1,512	1,678	2,188
Approximately 3,120 feet upstream of Diamond Back Lane	0.49	758	1,119	1,256	1,628
HENRIETTA CREEK 6A					
At confluence with Henrietta Creek 6	0.60	837	1,227	1,374	1,813
STREAM HEN-l					
At confluence with Henrietta Creek	1.41	1,800	2,400	2,700	3,300
UNNAMED TRIBUTARY TO HENRIETTA CREEK					
At 1,400 feet upstream of confluence with Henrietta Creek	1.96	**	**	3,333	**
HIGGINS BRANCH					
Upstream of confluence with Kirkwood Branch	1.68	1,750	2,400	2,750	3,500
At unimproved road approximately 0.95 mile above confluence with Kirkwood Branch	1.20	1,700	2,350	2,650	3,350
HOWARDS BRANCH					
At confluence with Clear Fork Trinity River	3.11	2,800	3,800	4,200	5,300

TABLE 4 – 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
Redelineation Detailed Study Streams					
HOWARDS BRANCH(CONTINUED)					
At Mockingbird Lane	0.95	1,700	2,300	2,600	3,200
Approximately 550 feet upstream from Lynncrest Drive	0.73	1,300	1,700	1,900	2,400
STREAM HB-1					
At confluence with Howards Branch	1.95	2,050	2,950	3,600	4,250
Approximately 100 feet downstream of North Bellaire Drive	1.39	1,600	2,300	2,700	3,350
HURRICANE CREEK					
Upstream of Trinity Railroad Express	5.50	5,150	7,200	8,100	9,900
Downstream of State Route 183	3.80	4,600	6,050	6,600	7,900
At State Route 183	2.55	3,050	3,950	4,300	5,100
Downstream of State Route 121	1.63	2,450[2]	2,950[2]	3,100[2]	3,450[2]
Upstream of State Route 121	1.63	2,700	3,600	4,000	5,100
Approximately 500 feet upstream of State Route 121	1.06	1,850	2,500	2,750	3,500
At Bedford Road	0.71	1,500	1,950	2,150	2,750
Approximately 0.4 mile upstream of Bedford Road	0.48	1,000	1,300	1,450	1,800
Approximately 0.2 mile downstream of Harwood Road	0.22	550	700	750	1,000
STREAM HC-l					
At confluence with Hurricane Creek	1.30	1,600	2,150	2,400	3,000
At a point approximately 700 feet upstream of Kynette Drive	1.20	1,250	1,700	1,950	2,450
At a point approximately 800 feet downstream of Airport Freeway	0.90	950	1,300	1,500	1,900
At the upstream corporate limits	0.50	750	1,000	1;100	1,350
HURRICANE CREEK TRIBUTARY 1					
At confluence with Hurricane Creek	0.20	425	545	590	705
EAST FORK HURRICANE CREEK					
At confluence with Hurricane Creek	0.57	1,050	1,400	1,550	1,950
At Bedford Road	0.43	850	1,150	1,300	1,600
NORTH FORK OF WEST BRANCH OF HURRICANE CREEK					
At confluence with West Branch Hurricane Creek	0.15	320	420	460	590

TABLE 4 – 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
Redelineation Detailed Study Streams					
WEST BRANCH HURRICANE CREEK					
At confluence with Hurricane Creek	0.32	650	900	950	1,200
Approximately 50 feet upstream of the confluence of North Fork West Branch Bedford Creek	0.17	350	450	500	650
STREAM JC-2					
At confluence with Johnson Creek	0.65	1,800	2,470	2,750	3,460
At headwaters	0.09	1,640	2,120	2,330	2,990
STREAM JC-3					
At confluence with Johnson Creek	0.84	1,620	2,140	2,370	2,880
At Station Drive	0.58	1,340	1,740	1,910	2,410
Approximately 0.45 mile upstream of Station Drive	0.41	940	1,220	1,340	1,680
Approximately 0.60 mile upstream of Station Drive	0.30	680	880	970	1,220
KEE BRANCH					
At confluence with Rush Creek	7.23	6,810	9,490	10,920	13,900
Downstream of confluence of Stream KB-1	6.96	6,210	8,720	9,970	12,470
At Interstate Route 20	4.44	4,360	6,400	7,300	9,070
Downstream of confluence of Tributary K-2	3.55	3,680	4,660	6,420	7,880
Upstream of confluence of Tributary K-2	2.85	2,980	4,400	5,020	6,190
Downstream of confluence of Tributary K-3	1.40	1,340	1,880	2,140	2,650
At U. S. Route 287	1.09	1,030[2]	1,450[2]	1,640[2]	2,020[2]
At Kennenda1e Sublett Road	0.89	1,230	1,650	1,840	2,230
STREAM KB-1					
At confluence with Kee Branch	1.52	2,500	3,310	3,670	4,440
At Oak Springs Road	1.26	2,160	2,890	3,120	3,750
KINGS BRANCH					
At confluence of Farmers Branch	4.52	5,300	6,460	7,030	8,270
Just upstream of Roaring Spring Road	4.35	6,258	7,647	8,369	12,028
Just upstream of Green Oaks Boulevard	3.21	4,270	5,057	5,503	7,818
Approximately 960 feet upstream of Ridgmar Meadow Road	3.21	4,170	4,950	5,440	6,470
Approximately 800 feet downstream of A1ta Mere Drive	2.72	3,590	4,380	4,810	5,770

TABLE 4 – 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
Redelineation Detailed Study Streams					
KIRBY CREEK					
At confluence with Fish Creek[1]	2.99	4,200	5,800	6,500	8,100
Approximately 1,000 feet above Tarrant/Dallas County boundary	0.52	1,050	1,400	1,550	1,900
KIRKWOOD BRANCH					
At Grapevine Lake	8.41	6,000	8,500	9,700	12,600
Downstream of South Fork Kirkwood Branch	6.40	5,300	7,500	8,400	10,900
Upstream of South Fork Kirkwood Branch	4.89	3,950	5,600	6,400	8,200
At State Route 114	4.21	4,300	6,000	6,800	8,700
Downstream of Higgins Branch	3.56	3,850	5,400	6,100	7,700
Upstream of Higgins Branch	1.88	2,150	3,000	3,400	4,350
KIRKWOOD BRANCH TRIBUTARY					
At confluence with Kirkwood Branch	0.43	863	1,133	1,250	1,553
SOUTH FORK KIRKWOOD BRANCH					
Upstream of Kirkwood Branch	1.52	1,450	2,000	2,300	2,950
At State Route1l4	1.06	1,350	1,850	2,050	2,650
LITTLE BEAR CREEK					
At confluence with Big Bear Creek	24.10	6,800	11,300	13,700	18,400
At State Route 121	20.20	6,400	10,400	12,500	16,500
Downstream of Little Bear Tributary 1	18.02	6,400	10,400	12,400	16,700
At Cheshire Road	13.57	5,100	8,000	9,600	12,500
At State Route 26	11.16	4,400	6,400	7,500	9,500
At DART Railroad	8.20	4,400	6,400	7,400	9,400
At confluence of Stream LB-1	6.10	3,450	5,100	5,800	7,600
At FM 1938 (Davis Boulevard)	4.60	2,750	4,000	4,500	5,900
STREAM LB-1					
At confluence with Little Bear Creek	0.72	1,170	1,560	1,740	2,190
Just downstream of Davis Boulevard	0.53	915	1,250	1,410	1,833
STREAM LB-2					
At confluence with Little Bear Creek	0.70	1,094	1,577	1,799	2,343
Approximately 2,740 feet upstream of the confluence with Little Bear Creek	0.45	674	972	1,109	1,448
STREAM LB-2					
Approximately 0.78 mile upstream of confluence with Little Bear Creek	0.53	790	1,080	1,200	1,520

TABLE 4 – 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
Redelineation Detailed Study Streams					
STREAM LB-2(CONTINUED)					
Approximately 4,370 feet upstream of the confluence with Little Bear Creek	0.38	576	829	945	1,231
Approximately 5,120 feet upstream of the confluence with Little Bear Creek	0.25	369	533	608	794
STREAM LB-3					
At confluence with Little Bear Creek	1.11	1,357	2,035	2,350	3,187
STREAM LB-6					
Approximately 210 feet upstream of confluence with Little Bear Creek	0.26	**	**	720	**
Approximately 1,300 feet upstream of confluence with Little Bear Creek	0.20	**	**	510	**
TRIBUTARY LITTLE BEAR 1					
At confluence with Little Bear Creek	1.40	1,900	2,650	3,000	3,800
TRIBUTARY LITTLE BEAR 2					
Upstream of DART Railroad	0.72	1,100	1,500	1,650	2,100
Downstream of DART Railroad	0.72	500	650	700	890
At confluence with Little Bear Creek	1.26	1,000	1,500	1,750	2,250
LITTLE FOSSIL CREEK					
Upstream with confluence of Big Fossil Creek	18.26	8,970	11,910	13,470	17,190
Approximately 0.38 mile downstream of Trinity Railroad Express	17.35	9,070	11,960	13,450	17,150
Approximately 300 feet downstream west bound Frontage Road State Route 121	17.35	7,970[6]	9,450[6]	9,970[6]	11,030[6]
Approximately 130 feet upstream east bound Frontage Road State Route 121	17.35	9,550[6]	13,140[6]	15,000[6]	19,220[6]
Approximately 1,255 feet upstream of Thomas Road	15.65	10,670	14,840	17,410	22,060
Approximately 545 feet upstream of Haltom Road	13.76	10,530	14,400	16,980	21,020
Approximately 1,000 feet downstream Beach Street	12.16	9,750[2]	13,680[2]	15,800[2]	19,070[2]
Downstream of confluence of Stream LFC-1	11.45	10,650	14,300	15,850	19,400
Upstream of confluence of Stream LFC-1	10.28	9,200	12,300	13,600	16,600

TABLE 4 – 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
Redelineation Detailed Study Streams					
LITTLE FOSSIL CREEK(CONTINUED)					
Downstream of confluence of Stream LFC-2	8.94	8,100	10,600	11,750	14,450
Upstream of confluence of Stream LFC-2	7.70	6,450	8,650	9,650	11,950
Downstream of confluence of unnamed tributary, approximately 500 feet upstream from Mark IV Parkway crossing	6.83	6,050	8,150	9,150	11,750
Upstream of confluence of unnamed tributary, approximately 500 feet upstream from Mark IV crossing	6.38	5,700	7,800	8,850	11,420
Downstream of confluence of unnamed tributary, approximately 1,000 feet downstream from NE Loop 820 crossing	5.65	4,900	6,750	7,700	10,100
Upstream of confluence of unnamed tributary, approximately 1,000 feet downstream from NE Loop 820 crossing	5.15	4,450	6,300	7,300	9,600[2]
Downstream of confluence of unnamed tributary, approximately 1,000 feet upstream from Cantre1 Sansom Road crossing	4.43	4,200	6,000	7,100	9,700
At Blue Mound Road	3.12	2,950	4,420	5,130	7,000
At East Watauga Avenue (McLeroy Boulevard)	2.25	1,950	3,550	4,150	5,800
At Burlington Northern and Santa Fe Railroad	1.19	1,750	3,150	3,700	5,000
At Jarvis Road	0.76	1,274	1,733	1,984	2,567
At US Highway 81	0.58	844	1,149	1,315	1,702
At Park Center Boulevard	0.34	650	885	1,013	1,311
LITTLE FOSSIL CREEK SPLIT FLOW					
Upstream of confluence with Big Fossil Creek	17.35	15[7]	1,300[7]	2,030[7]	3,180[7]
Approximately 860 feet upstream of Minnis Drive	17.35	15[7]	1,405[7]	2,535[7]	5,175[7]
Approximately 1,335 feet downstream of Moneda Street	17.35	935[7]	2,975[7]	4,280[7]	7,300[7]
At Moneda Street	17.35	1,580	3,690	5,030	8,190
STREAM LFC-1					
At confluence with Little Fossil Creek	1.17	1,650	2,200	2,450	3,050

TABLE 4 – 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
Redelineation Detailed Study Streams					
STREAM LFC-2					
At confluence with Little Fossil Creek	1.24	2,050	2,700	3,000	3,750
Just upstream of Northern Cross Boulevard	0.47	838	1,143	1,275	1,524
LIVE OAK CREEK					
Approximately 0.49 mile downstream of Silver Creek Road	8.36	9,900	13,900	15,600	19,800
Approximately 0.45 mile upstream of Silver Creek Road	7.14	8,800	12,150	13,650	17,350
Approximately 2.03 miles upstream of Silver Creek Road	5.70	7,850	10,700	12,000	15,150
Approximately 2.04 miles upstream of Silver Creek Road	4.40	6,050	8,300	9,300	11,800
LOREAN BRANCH					
At Trinity Railroad Express	4.00	4,100	5,200	5,700	7,000
At Redbud Drive	3.70	4,000	5,100	5,650	6,900
At Pipeline Road	3.40	3,850	4,800	5,300	6,600
At Bedford-Euless Road	2.90	3,300	4,400	4,900	6,150
At Airport Freeway	2.30	2,550	3,450	3,850	4,850
At Harwood Drive	2.00	2,450	3,300	3,700	4,650
At Cannon Drive	1.50	2,200	2,950	3,300	4,150
Approximately 600 feet downstream of State Route 26	0.65	975	1,300	1,450	1,850
Above confluence of Mesquite Branch	0.28	425	575	650	800
At Martin Road	0.14	215	290	320	390
UNNAMED TRIBUTARY TO LOREAN BRANCH					
Approximately 1,479 feet upstream of confluence with Lorean Branch	0.58	**	**	1,955	**
UNNAMED TRIBUTARY TO STREAM LFC-2					
Upstream of the confluence with Stream LFC-2	0.43	949	1,329	1,477	1,758
LYNN CREEK					
At confluence with Walnut Creek	5.43	3,600	5,500	6,450	8,300
Approximately 1,750 feet downstream of Ragland Road extension	4.62	3,300	4,850	5,650	7,350
Immediately downstream of Webb Lynn Road	2.95	2,600[2]	3,700	4,200	5,300
Approximately 0.74 mile downstream of Nathan Lane Road	1.56	2,750	3,600	4,000	4,900

TABLE 4 – 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
Redelineation Detailed Study Streams					
Approximately 100 feet downstream of end of concrete channel	1.14	2,100	2,800	3,200	3,700
Approximately 400 feet upstream of end of concrete channel	0.72	1,700	2,200	2,400	3,050
MACKEY CREEK					
At Baker Boulevard	0.98	880[8]	980[8]	1,010[8]	1,100[8]
At State Route 26 (Grapevine Highway)	0.85	530[9]	520[9]	510[9]	470[9]
Just upstream of Richland Plaza Drive	0.97	1,910	2,620	2,930	3,550
Just downstream of Glenview Drive	0.41	760	1,020	1,140	1,380
MACKEY CREEK DIVERSION NORTH					
At Richland Plaza Drive	**	280	470	570	780
MARINE CREEK					
At confluence with West Fork Trinity River	22.20	9,290	14,700	17,200	20,700
Downstream of confluence of Stream MC-1	22.00	9,100	14,400	16,800	20,400
At North Main Street	19.00	5,890	9,640	11,200	13,900
At NW 28th Street	18.50	5,520	9,080	10,800	13,400
Downstream of confluence of Cement Creek	17.30	4,600	7,280	8,580	10,700
Upstream of confluence of Cement Creek	12.43	3,450	5,270	6,130	7,620
Downstream of confluence with unnamed tributary near Old Decatur Road	11.70	3,170	4,630	5,330	6,590
Upstream of confluence of unnamed tributary near Old Decatur Road	10.70	2,590	3,560	4,030	4,990
At Sherman Avenue	10.40	2,160	2,940	3,330	4,100
Approximately 0.44 mile upstream of Sherman Avenue	10.20	1,960	2,660	3,000	3,690
Approximately 0.66 mile upstream of Sherman Avenue	9.90	1,530	2,040	2,290	2,800
Approximately 0.76 mile upstream of Sherman Avenue	9.70	1,240	1,630	1,820	2,210
Approximately 200 feet downstream of private road	9.50	980	1,260	1,400	1,680
At Marine Creek Lake dam	9.10	364[10]	377[10]	390[10]	404[10]
Upstream of Marine Creek Lake	4.80	6,100	8,810	10,200	12,800
At Cromwell-Marine Creek Road	**	6,097	8,808	10,166	12,767
Approximately 0.44 mile upstream of Cromwell-Marine Creek Road	**	4,256	6,166	7,123	8,950
MARINE CREEK SPLIT FLOW					
For entire stream length	**	**	**	930	1,480

TABLE 4 – 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
Redelineation Detailed Study Streams					
MC-4 CREEK					
Approximately 350 feet upstream of W J Boaz Road	0.74	**	**	1,700	**
STREAM MC-l					
At NE 28th Street	1.62	1,860[11]	2,970[11]	3,510[11]	4,660[11]
At NE 28th Street	1.62	2,480	3,620	4,160	5,320
At NE 35th Street	1.13	2,250	3,100	3,510	4,400
STREAM MC-2					
At confluence of Marine Creek	2.11	2,610	3,790	4,380	5,500
Approximately 0.79 mile south of Cromwell Marine Creek Road	1.59	1,970	2,860	3,300	4,140
Approximately 0.75 mile south of Cromwell Marine Creek Road	1.38	1,710	2,480	2,860	3,600
MARSHALL BRANCH					
Downstream of confluence of unnamed tributary approximately 410 feet upstream, of State Route 114	13.40	6,650	9,950	11,700	14,950
Upstream of confluence of unnamed tributary	11.93	6,350	9,500	11,050	14,100
Downstream of confluence of unnamed tributary approximately 1,500 feet downstream of Trophy Club Drive	11.09	6,750	9,750	11,300	14,200
Upstream of confluence of unnamed tributary	10.63	6,750	9,700	11,200	14,100
At South Frontage State Route 114	9.81	6,130	9,840	11,330	15,490
Downstream of confluence of Paigebrook Creek approximately 1,040 feet downstream of South Frontage State Route 114	9.54	6,040	9,670	11,150	15,210
At Main Street	7.31	5,000	7,700	8,760	11,640
At Roanoke Street	5.14	3,960	5,910	6,680	8,610
Downstream of confluence of Tributary MB-7 approximately 5,110 feet downstream of Roanoke Street	4.22	3,470	3,170	5,850	7,610
MARYS CREEK					
At confluence with the Clear Fork of Trinity River	56.04	25,600	36,600	42,800	55,000
Approximately 1,800 feet downstream of Old Benbrook Road	54.03	25,700	36,900	43,400	56,300
Approximately 1,100 feet upstream of Old Benbrook Road	43.31	22,300[2]	32,200[2]	37,500[2]	47,900[2]

TABLE 4 – 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
Redelineation Detailed Study Streams					
MARYS CREEK(CONTINUED)					
Approximately 0.95 mile downstream of Loop 820	41.98	22,900[2]	33,000[2]	38,100[2]	42,200[2]
Approximately 0.76 mile downstream of Loop 820	40.83	22,900[2]	32,900[2]	37,900[2]	47,900[2]
Approximately 1,000 feet upstream of Chapin School Road	35.54	25,600	35,300	40,400	50,800
MARYS CREEK (continued)					
Approximately 0.47 mile upstream of U.S. Route 80	26.21	19,400	26,900	30,700	38,400
Approximately 1,200 feet upstream of U.S. Route 80	25.01	18,900	26,300	30,000	37,700
SOUTH MARYS CREEK					
At confluence with Marys Creek	9.33	8,900	12,600	14,200	17,600
At Link Hill Drive	6.27	8,100	10,900	12,200	l5,400
Approximately 1.06 miles upstream of Link Hill Drive	3.38	4,400	5,900	6,600	8,400
STREAM MSC-1					
At confluence with Marys Creek	0.93	1,600	2,l50	2,400	3,050
At Interstate Route 20	0.69	1,500	2,000	2,200	2,750
Approximately 300 feet upstream of Highway 80-180	0.60	948	1,396	1,562	2,058
Upstream of Santa Clara Drive	0.45	708	1,055	1,183	1,558
STREAM MSC-2					
At confluence with Marys Creek	1.23	1,900	2,600	2,900	3,750
At Interstate Route 30	0.81	1,250	1,650	1,850	2,450
STREAM MSC-3					
Approximately 10 feet downstream of Interstate Route 30	1.60	1,820[2]	1,930[2]	1,970[2]	4,550
Upstream of Interstate Route 30	1.60	2,400	3,250	3,600	4,550
UNNAMED TRIBUTARY TO STREAM MSC-1					
At confluence with Stream MSC-1	0.21	314	466	522	696
MESQUITE BRANCH					
At confluence with Lorean Branch	0.37	550	725	800	1,050
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 mile downstream of Interstate Route 35W	2.05	1,750[2]	2,800[2]	3,200[2]	4,050[2]

TABLE 4 – 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
Redelineation Detailed Study Streams					
NORTH CREEK(CONTINUED)					
At Interstate Route 35W	1.76	2,200	3,150	3,950	4,350
At Union Pacific Railroad	1.27	1,650	2,100	2,350	2,800
At Alsbury Street	0.73	1,350	1,850	2,050	2,550
Redelineation Detailed Study Streams					
Approximately 600 feet downstream of McAllister Road	0.47	1,100	1,450	1,600	2,050
PANTEGO BRANCH					
At confluence with Rush Creek	1.68	2,460	3,320	3,710	4,490
At West Park Row	1.43	2,190	2,940	3,310	4,030
At Smith-Barry Road	0.94	1,550	2,070	2,290	2,840
PASCHAL BRANCH					
At confluence with Ash Creek	1.91	2,650	3,650	4,100	5,000
At Silver Creek Road	1.58	2,400	3,250	3,600	4,450
RAGLAND BRANCH					
At confluence with Walnut Creek	1.20	1,960	2,750	3,140	4,090
At a point approximately 1,100 feet upstream of Ragland Road	0.54	1,100	1,350	1,500	1,850
REYNOLDS BRANCH					
At confluence with Ash Creek	1.94	2,800	3,900	4,350	5,400
Downstream of confluence of Stream RB-l[1]	1.33	2,300	3,150	3,500	4,350
Upstream of confluence of Stream RB-1[1]	0.82	1,400	1,900	2,150	2,700
At dirt road (headwaters)[1]	0.65	1,350	1,800	1,950	2,500
ROBERTSON BRANCH					
At confluence with Big Fossil Creek	0.56	961	1,331	1,498	1,622
Approximately 3,000 feet upstream of confluence with Big Fossil Creek	0.45	849	1,150	1,288	1,872
RUSH CREEK					
At confluence of Pantego Branch	29.01	3,670[12]	4,233[12]	4,704[12]	5,799[12]
At State Route 303	28.77	15,400[2]	23,280[2]	27,060[2]	34,770[2]
At Woodland Park Boulevard	27.59	15,240[2]	22,990[2]	26,670[2]	34,170[2]
At Arkansas Lane	27.17	15,540	23,460	27,180	34,770
Below confluence of Kee Branch	25.24	14,680	21,904	25,280	32,290
At confluence of Kee Branch	18.01	9,920[2]	14,550[2]	16,850[2]	21,650[2]
Below confluence of Tributary R-8	17.83	9,980	14,690	16,950	21,730
Above Kee Branch	17.52	9,600	15,000	17,600	25,000
At confluence of Tributary R-8	16.57	9,710[2]	14,150	16,350	20,900
Below confluence of Tributary R-7	16.30	9,770	14,140	16,340	20,800
At confluence of Tributary R-7	15.16	9,350[2]	13,590[2]	15,700[2]	19,980[2]

TABLE 4 – 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
Redelineation Detailed Study Streams					
RUSH CREEK(CONTINUED)					
Downstream of confluence of Tributary R-5 and R-6	14.74	9,400	13,670	15,780	20,010
At Interstate Route 20	13.07	8,860[2]	12,820[2]	14,770[2]	18,680[2]
Downstream of confluence of Tributary R-4	12.78	9,000	13,170	15,190	19,130
At confluence of Tributary R-4	11.51	8,380	12,250	14,010	17,510
At Green Oaks Boulevard	10.82	8,350	12,179	13,890	17,260
Downstream of confluence of Sublett Creek	9.51	8,210	11,620	13,179	16,340
At confluence of Sublett Creek	4.22	4,000	5,560	6,270	7,740
Downstream of confluence of Tributary R-11	3.04	3,520	4,880	5,490	6,820
At confluence of Tributary R-11	2.54	2,990	4,120	4,610	5,690
Below confluence with Tributary R-10	1.90	2,520	3,440	3,850	4,720
At confluence of Tributary R-l	1.00	1,290	1,770	1,980	2,450
FOREST PARK TRIBUTARY OF RUSH CREEK					
At confluence with Rush Creek	0.18	**	**	610	**
NORTHEAST TRIBUTARY OF RUSH CREEK					
At confluence with Rush Creek	0.11	**	**	361	**
RUSH CREEK RELIEF CHANNEL					
Upstream of convergence with Village Creek	**	15,728	25,147	30,374	40,972
STREAM RC-1					
At confluence with Rush Creek	3.56	4,810	6,220	6,850	8,130
Immediately upstream of Union Pacific Railroad	1.95	2,640	3,310	3,630	4,280
STREAM RC-1(A)					
At confluence with Stream RC-l	1.36	2,210	2,870	3,180	3,810
At headwaters	0.93	1,710	2,240	2,480	3,010
STREAM RC-2					
At confluence with Rush Creek	1.18	1,970	2,520	2,790	3,370
At headwaters	0.64	1,350	1,750	1,930	2,410
RYAN'S BRANCH					
At confluence with Rush Creek	1.29	2,000	2,750	3,100	3,900
At Roosevelt Drive	0.99	1,850	2,500	2,800	3,550

TABLE 4 – 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
Redelineation Detailed Study Streams					
SILVER CREEK					
At Silver Creek Road	49.2	18,400	27,900	32,400	41,100
SINGING HILLS CREEK					
At confluence with Big Fossil Creek	5.60	6,550	9,400	10,550	13,450
At southern corporate limits of North Richland Hills	4.32	5,900	8,000	8,900	11,200
Below confluence of Bunker Hill Creek	4.19	5,900	8,100	9,000	11,200
Above confluence of Bunker Hill Creek	2.40	3,900	5,200	5,800	7,200
At Chapman Road	1.51	2,650	3,550	3,950	4,900
Below right bank tributary approximately 3.58 miles above mouth	1.05	1,850	2,500	2,750	3,400
SOUTH CREEK					
Above confluence with Village Creek	5.35	6,460	9,040	9,730	12,445
Approximately 890 feet downstream of Anglin Drive	5.05	6,390	8,880	9,500	12,150
Approximately 0.51 mile downstream of Forest Hill Drive	3.93	5,865	7,960	8,400	10,520
Approximately 475 feet downstream of Forest Hill Drive	2.27	3,320	4,545	4,815	6,000
NORTH BRANCH OF NORTH FORK OF SOUTH CREEK					
Above confluence with North Fork of South Creek	0.58	1,210[13]	1,771[13]	2,058[13]	2,898[13]
Approximately 290 feet upstream of westbound Southeast Loop 820 access road	0.58	1,210	1,800	2,093	3,026
Approximately 177 feet downstream of Wichita Street	0.43	870	1,165	1,220	1,360
NORTH BRANCH OF NORTH FORK OF SOUTH CREEK - SPLIT FLOW					
Upstream of confluence with North Fork of South Creek	0.37	885	1,205	1,260	1,525
Approximately 700 feet downstream of Forest Hill Circle	0.29	725	975	1,020	1,285
Approximately 250 feet upstream of Southeast Loop 820 along westbound access road	**	20	40	90	345
NORTH FORK OF SOUTH CREEK					
Upstream of confluence with South Creek	1.66	2,850	3,770	3,930	4,800

TABLE 4 – 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
Redelineation Detailed Study Streams					
NORTH FORK OF SOUTH CREEK(CONTINUED)					
Approximately 88 feet upstream of Forest Hill Drive	1.29	2,130	2,780	2,900	3,340
Approximately 830 feet downstream of confluence of North Branch of North Fork	1.16	2,120	2,760	2,860	3,150
Approximately 1,422 feet downstream of Wichita Street	0.41	860	1,145	1,195	1,310
SUBLETT CREEK					
At confluence with Rush Creek	5.29	4,620	6,630	7,500	9,100
At Calendar Road	4.57	4,520	6,310	7,060	8,320
Downstream of U.S. Route 287	3.66	3,790	5,230	5,790	6,620
At U.S. Route 287	2.99	3,520	4,790	5,170	5,790
Downstream of Tributary 1	1.83	2,510	3,400	3,800	4,610
SULPHUR BRANCH					
At Trinity Railroad Express	5.92	2,500[2]	3,950[2]	4,650[2]	6,100[2]
Approximately 50 feet downstream of State Route 10	4.52	4,150	5,850	6,800	8,750
At State Route 183	3.70	3,550	4,950	5,700	7,250
At Pipeline Road	3.22	3,550	4,850	5,450	6,700
Downstream of the confluence of Stream SB-1	2.85	3,500	4,700	5,200	6,400
Approximately 2200 feet upstream of the confluence of Stream SB-1	1.93	2,920	3,620	3,910	4,670
At State Route 121	1.38	2,220[2]	2,700[2]	2,850[2]	3,230[2]
Downstream of Shady Lane	1.22	2,190	3,200	3,660	5,500
At Shady Lane	0.91	1,600	2,330	2,640	4,100
At Harwood Road	0.39	720	1,110	1,300	1,820
At Simpson Terrace	0.09	170	250	300	410
STREAM SB-l					
At confluence with Sulphur Branch	0.88	1,200	1,600	1,800	2,300
At State Route 121	0.50	800	1,050	1,150	1,450
At Forest Ridge Drive	0.29	550	700	800	1,000
UNAMMED TRIBUTARY TO SULPHUR BRANCH					
At confluence with Sulphur Branch	**	**	**	**	**
STREAM SC-1					
At confluence with Sycamore Creek	0.97	1,600	2,150	2,350	3,000
STREAM SC-2					
At confluence with Sycamore Creek	1.34	1,650	2,100	2,350	2,950

TABLE 4 – 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
Redelineation Detailed Study Streams					
STREAM SC-3					
At confluence with Sycamore Creek	1.30	1,950	2,750	3,100	4,050
Downstream of Berry Street crossing	0.99	1,700	2,400	2,700	3,550
At Glen Garden Country Club dam	0.51	1,200	1,700	1,950	2,500
STREAM SC-4					
At approximately 50 feet downstream of Missouri Kansas Texas Railroad	0.50	591	822	911	962
Flow into Culvert at Riverside Drive	0.59	510	536	552	587
Split flow at approximately 150 feet upstream of Riverside Drive	0.59	198	357	472	658
STREAM SC-5					
At confluence with Sycamore Creek	2.22	3,100[2]	4,050[2]	4,400[2]	5,500[2]
Downstream of confluence of unnamed tributary, approximately 1,500 feet downstream from Interstate Route 35W crossing	1.93	3,050	4,100	4,600	5,850
Upstream of confluence of unnamed tributary, approximately 1,500 feet downstream from Interstate Route 35W crossing	1.24	2,000	2,750	3,050	3,900
STREAM SC-6					
At confluence with Sycamore Creek	1.72	2,100	2,400	2,550	2,950
At James Avenue crossing	0.51	**	**	1,392	**
STREAM SC-7					
At confluence with Sycamore Creek	3.59	2,477	3,607	4,138	5,910
At Atchison, Burlington Northern and Santa Fe Railroad crossing	2.21	1,920	3,000	3,450	4,680
STREAM SC-7A					
At confluence with Sycamore Creek	**	**	**	799	**
TIMBER CREEK DIVERSION					
Approximately 50 feet downstream of Winscott Plover, combined with diverted pipe flow	0.22	840	1,080	1,180	1,580
SOUTH TIMBER CREEK					
At Mildred Drive	0.13	380	490	530	710
TRIBUTARY B					
At confluence with Big Fossil Creek	0.71	1,180	1,430	1,540	1,770

TABLE 4 – 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
Redelineation Detailed Study Streams					
Approximately 1,000 feet upstream of Haltom Road	0.51	970	1,230	1,350	1,650
Approximately 1,050 feet upstream of Haltom Road	0.26	420	520	550	620
TRIBUTARY C					
At confluence with Little Fossil Creek	0.97	1,300	1,790	2,000	2,510
Approximately 50 feet downstream of Stanley-Keller Road	0.68	1,120	1,500	1,680	2,070
Approximately 50 feet upstream of Stanley-Keller Road	0.35	540	730	800	960
Approximately 50 feet downstream of DART Railroad	0.18	470	610	670	880
TWIN SPRINGS DRAW					
At confluence with Rush Creek	1.17	1,850	2,550	2,850	3,550
VALLEY VIEW BRANCH					
At Trinity Railroad Express	3.10	2,970[11]	3,540[11]	3,810[11]	4,530[11]
At Brown Trail Road	2.70	3,350	3,900	4,200	4,950
At Pipeline Road	2.00	2,540	3,180	3,460	4,230
At Airport Freeway	1.20	2,060	2,540	2,770	3,380
STREAM VVB-l					
At confluence with Valley View Branch	0.40	750	1,000	1,100	1,350
VILLAGE CREEK					
At confluence with West Fork Trinity River11	188.70	17,600[2]	29,000[2]	35,300[2]	47,000[2]
At confluence of Cottonwood Creek[11]	183.30	16,300[2]	26,600[2]	32,200[2]	46,300[2]
Approximately 450 feet downstream of confluence of Rush Creek[11]	180.50	19,400	29,400	35,100	46,800
Approximately 0.70 mile upstream of Division Street	146.16	3,350	15,450[2]	23,700[2]	45,950[2]
Approximately 200 feet downstream of State Route 303	145.14	3,350	16,050[2]	24,350[2]	47,750[2]
Approximately 1,700 feet upstream of State Route 303	143.06	3,350[14]	16,500[14]	25,000[14]	49,350[14]
Approximately 1,600 feet upstream of confluence of Stream VC(A)-2	143.06	3,350	3,400	3,400	3,500
At confluence with Lake Arlington	123.09	28,500	45,100	57,000	79,700
At Union Pacific	113.59	28,500	44,900	56,100	77,400
Approximately 0.68 mile downstream of Everman-Kennedale-Burleson Road	100.77	28,100	44,300	54,450	73,950

TABLE 4 – 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
Redelineation Detailed Study Streams					
VILLAGE CREEK(CONTINUED)					
Approximately 0.85 mile downstream of Oak Grove Road	63.78	20,050	33,350	39,800	52,750
Approximately 1.93 miles upstream of Hargrove	55.78	19,400	30,950	36,700	48,100
Approximately 1.21 miles upstream of Hargrove	31.65	10,700	15,600	18;450	25,000
STREAM VC(A)-l					
At confluence with Village Creek	2.84	4,290[2]	6,130	6,820	8,160
At dam	2.76	4,370[2]	5,920	6,650	8,060
Downstream of Village Creek	2.49	4,430	5,800	6,400	7,810
Upstream of Village Creek	1.59	2,840	3,720	4,109	5,000
STREAM VC(A)-2					
At confluence with Village Creek	143.1	3,350	16,500	25,000	49,300
Upstream of confluence with Village Creek	143.1	0[15]	13,100	21,600	45,800
STREAM VC-1					
Approximately 1,200 feet downstream of Cravens Road	2.02	1,940	2,980	3,430	4,460
At Village Creek Road	1.27	2,590	3,410	3,780	4,760
STREAM VC-2					
Approximately 0.54 mile downstream from East Loop 820 South	3.99	3,040	4,500	5,350	7,580
At Parker-Henderson Road	2.86	3,450	4,790	5,460	7,060
At Shackleford Road	1.16	2,020	2,700	3,010	3,800
STREAM VC-2A					
At confluence with Stream VC-2	0.40	677	910	1,251	1.610
STREAM VC-3					
At confluence with Village Creek	1.90	2,220	3,040	3,415	4,300
At a point approximately 800 feet upstream of northern Kennedale corporate limits	1.10	1,400	2,010	2,240	2,860
At Kennedale Sublett Road	0.70	950	1,285	1,440	1,815
At a point approximately 100 feet upstream of confluence of Stream VC-4A	3.10	2,860	3,990	4,500	5,660
STREAM VC-4					
At confluence with Village Creek	5.40	3,970	5,830	6,820	8,810

TABLE 4 – 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
Redelineation Detailed Study Streams					
STREAM VC-4(CONTINUED)					
At a point approximately 100 feet downstream of confluence of Stream VC-4A	4.40	3,970	5,570	6,290	7,910
STREAM VC-4A					
At confluence with Stream VC-4	1.40	2,070	2,790	3,115	3,940
At a point approximately 800 feet upstream of Kennedale-New Hope Road	1.20	1,780	2,405	2,670	3,395
STREAM VC-5					
At confluence with Village Creek	3.66	2,650[2]	3,850[2]	4,400[2]	5,500[2]
At abandoned railroad bed	2.83	2,850	3,950	4,450	5,550
At Oak Grove Road	1.53	2,700	3,550	4,000	4,850
STREAM VC-6					
At confluence with Village Creek	2.08	2,240	3,170	3,590	4,570
At East Oak Grove Road	1.66	2,020	2,810	3,160	4,010
At Stone Road	1.05	1,700	2,290	2,550	3,100
STREAM VC-7					
At confluence with Village Creek	1.90	1,800	2,500	2,950	3,800
WALKER BRANCH					
Approximately 50 feet downstream of confluence with Valley View Branch	20.76	16,450	21,650	23,750	28,800
Approximately 50 feet upstream of confluence with Valley View Branch	16.49	14,900	19,000	20,650	25,000
STREAM WKB-1					
At confluence with walker Branch	0.40	660	880	980	1,240
WALNUT CREEK 1					
At Eagle Mountain Lake	80.72	22,500	37,200	44,900	61,800
At State Route 730	76.01	22,400[2]	36,800[2]	44,300[2]	60,600[2]
Downstream of confluence Stream WC-5	73.53	23,100	37,400	44,800	60,700
WALNUT CREEK 2					
Approximately 500 feet upstream of confluence with Marys Creek	10.10	7,900	11,000	12,600	16,100
Approximately 1.42 miles upstream of confluence with Marys Creek	7.00	5,700	8,000	9,100	11,700

TABLE 4 – 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
Redelineation Detailed Study Streams					
WEST FORK TRINITY RIVER					
Downstream of confluence with Village Creek	2,543	34,900	74,200	94,900	153,300
At confluence with Village Creek	2,351	28,900[2]	61,000[2]	78,000[2]	127,100[2]
Downstream of confluence with Big Fossil Creek	2,340	38,000	65,500	82,800	132,300
At confluence with Big Fossil Creek	2,267	25,600[2]	47,700[2]	60,600[2]	97,500[2]
Downstream of confluence with Sycamore Creek	2,248	33,800	60,500	71,700	110,400
At confluence with Sycamore Creek	2,211	21,400[2]	39,800	47,900	81,100
Downstream of confluence with Marine Creek	2,200	22,300	37,700	46,000	80,900
At confluence with Marine Creek	2,177	18,600[2]	35,700	44,400[2]	80,900
At Fort Worth gage	2,177	18,900	35,700	47,000	77,900
Downstream of Lake Worth Dam	2,064	14,300	28,400	35,200	54,600[2]
Downstream of Eagle Mountain Dam	1,970	9,200	21,900	31,900	56,300
STREAM WF(A)-l					
At confluence with West Fork Trinity River	1.79	2,700	3,600	4,000	4,900
Approximately 600 feet downstream of Burney Road	1.17	1,850	2,500	2,800	3,400
Approximately 500 feet upstream of Forest Oak	0.65	1,600	2,100	2,300	2,900
STREAM WF(A)-2					
At confluence with West Fork Trinity River	2.54	3,350[2]	4,400[2]	4,850[2]	5,800[2]
Approximately 1,800 feet downstream of Green Oaks Boulevard	2.16	3,450	4,550	5,050	6,200
STREAM WF(A)-2 (continued)					
Approximately 1,450 feet downstream of Beady Road	1.74	2,900	3,800	4,200	5,150
Upstream of Beady Road	1.04	1,700	2,250	2,500	3,000
STREAM WF-l					
At confluence with West Fork Trinity River	1.72	2,270	3,110	3,460	4,400
Approximately 800 feet upstream from Randol Mill Road	1.46	2,010	2,700	3,020	3,940
Downstream of confluence with Stream WF-1A	1.17	1,840	2,470	2,760	3,560
STREAM WF-1A					
Upstream of confluence of Stream WF-l	0.32	810	1,040	1,150	1,440

TABLE 4 – 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
Redelineation Detailed Study Streams					
STREAM WF-1B					
Upstream of confluence of Stream WF-1A	0.85	1,340	1,820	2,040	2,650
Approximately 0.63 mile downstream from John T. White Road	0.78	1,210	1,660	1,860	2,380
Approximately 0.62 mile downstream from John T. White Road	0.62	970	1,340	1,490	1,930
At John T. White Road	0.30	670	880	970	1,220
STREAM WF-2					
At Randol Mill Road crossing	3.48	5,300[2]	6,750[2]	7,400[2]	9,400[2]
At Interstate Route 30 crossing	2.86	5,050	6,850	7,650	9,550
Approximately 0.54 mile downstream of Meadowbrook Drive	1.79	3,350	4,450	5,000	6,050
Downstream of Meadowbrook Drive	1.10	2,150	2,850	3,150	3,950
STREAM WF-3					
At outlet from White Lake dam	0.71	450[2]	660[2]	750[2]	960
At outlet from Interstate Route 30	0.50	680	780	840	940
STREAM WF-4					
At confluence with West Fork Trinity River	4.06	4,650	6,400	7,200	9,050
Upstream of NE 28th Street	3.65	4,550	6,400	7,150	9,050
Upstream of DART Railroad	2.78	3,500	4,800	5,350	6,850
Upstream of Terminal Road	1.75	2,005	2,920	3,329	4,372
Approximately 160 feet upstream of Blue Mound Road	0.97	865	1,354	1,581	2,151
STREAM WF-5					
Upstream of River Oaks Boulevard	1.7	2,900	3,850	4,300	5,400
Downstream of Long Avenue	1.0	1,800	2,400	2,700	3,400
STREAM WF-7					
Downstream of Shoreline Road	3.04	4,270	5,750	6,430	8,100
Upstream of Shoreline Road	1.69	2,520	3,380	3,770	4,760
Approximately 450 feet downstream of Jacksboro Highway	1.20	2,090	2,780	3,090	3,900
Approximately 400 feet downstream of Jacksboro Highway	0.84	1,640	2,050	2,280	2,870
STREAM WF-7A					
Approximately 50 feet upstream of Shoreline Road	1.35	1,800	2,430	2,720	3,430
Approximately 1,450 feet upstream of Shoreline Road	1.00	1,440	1,930	2,160	2,720

TABLE 4 – 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
Redelineation Detailed Study Streams					
STREAM WF-9					
Upstream of Trinity Express Railroad	0.62	1,570	2,030	2,230	2,790
STREAM WF-10					
Approximately 2,000 feet downstream of Ansley Drive	1.34	3,290	4,350	4,790	5,820
Just downstream of right bank tributary located approximately 1,000 feet downstream of Roaring Springs Drive	0.96	2,130	2,830	3,120	3,800
Just upstream of Roaring Springs Drive	0.75	2,030	2,650	2,920	3,550
Just upstream of confluence with Stream WF-10A	0.47	1,220	1,600	1,760	2,140
STREAM WF-10A					
Just upstream of confluence with Stream WF-10	0.28	840	1,080	1,190	1,450
Approximately 1,145 feet upstream of confluence with Stream WF-10	0.17	490	640	700	860
STREAM WF-11					
At Shoreview Drive	1.50	2,040	2,790	3,130	3,810
Approximately 600 feet upstream of Las Vegas Trail[16]	1.13	1,510	2,020	2,240	2,740
STREAM WF-11 (continued)					
Approximately 50 feet upstream of Loop 820	0.46	840	1,110	1,240	1,520
WEST JONES BRANCH					
Downstream of Shady Lane	1.35	2,300	3,150	2,050	2,600
Upstream of Shady Lane	0.83	1,350	1,850	2,050	2,600
WHITES BRANCH					
At confluence with Big Fossil Creek	10.39	7,980[2]	11,560[2]	13,320[2]	17,140[2]
At Watauga Road	9.53	8,340	12,040	13,860	17,580
Downstream of confluence of unnamed tributary, approximately 0.76 mile upstream of Prewitt Road crossing	7.54	9,100	12,450	13,850	17,700
Upstream of confluence of unnamed tributary, approximately 0.76 mile upstream of Prewitt Road crossing	4.85	5,950	8,200	9,100	11,700
Just upstream of confluence with Stream WB-3	4.85	5,510	7,750	8,750	10,750

TABLE 4 – 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
Redelineation Detailed Study Streams					
WHITES BRANCH(CONTINUED)					
Downstream of confluence of unnamed tributary, approximately 1,500 feet downstream of Alta Vista Road crossing	4.59	5,950	8,200	9,100	11,550
Approximately 60 feet downstream of Alta Vista Road Crossing	3.81	4,4750	6,550	7,350	9,045
Upstream of confluence of unnamed tributary, approximately 1,500 feet downstream of A1ta Vista Road crossing	3.81	4,900[2]	6,800[2]	7,550[2]	9,650[2]
Approximately 470 feet upstream of the confluence of Stream WB-1	1.30	1,850	2,500	2,674	3,390
Downstream of confluence of Stream WB-1	3.56	5,150	6,900	7,600	9,550
Upstream of confluence of Stream WB-1	1.30	1,850	2,500	2,750	3,450
STREAM WB-1					
At confluence with Whites Branch	2.26	3,400	4,550	5,050	6,550
At an unnamed tributary, approximately 0.74 mile upstream from confluence with Whites Branch	1.81	2,900	3,850	4,250	5,400
Approximately 1.79 miles upstream from confluence with Whites Branch	1.50	**	**	3,861	**
Approximately 1.93 miles upstream from confluence with Whites Branch	0.76	**	**	1,975	**
UNNAMED TRIBUTARY TO STREAM WB-1					
Approximately 400 feet downstream of Heritage Trace Parkway	0.65	1,259	1,662	1,842	**
Approximately 1,900 feet upstream of Heritage Trace Parkway	0.39	840	1,104	1,222	**
STREAM WB-2					
Approximately 750 feet upstream of Shriver Road	0.41	**	**	1,533	**
STREAM WB-3					
At confluence with Whites Branch	2.69	3,680	4,960	5,600	6,720
WILDCAT BRANCH					
Downstream of confluence of Stream WC-l	3.15	3,950	5,200	5,800	6,950
Upstream of confluence of Stream WC-1	1.82	2,250	3,000	3,300	3,950
At Village Creek Road	1.08	2,200	2,900	3,200	4,000

TABLE 4 – 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
Redelineation Detailed Study Streams					
STREAM WC-1					
At confluence with Wildcat Branch	1.33	1,700	2,250	2,550	3,050
At Ramey Street	0.65	1,200	1,600	1,800	2,200
WILLOW BRANCH					
At confluence with Walnut Creek 3	9.8	4,690	7,190	8,360	10,650
At a point 0.64 mile downstream of Rendon Bloodworth Road	8.9	4,700	6,970	8,030	10,190

[1] Located outside county boundary
[2] Decreases due to storage routing effects
[3] Outflow from Benbrook Lake
[4] Discharges from Denton Creek below Grapevine Dam are controlled by outflows from Grapevine Lake
[5] Drainage area below Grapevine Lake
[6] Discharge decreases due to split flow at State Route 121
[7] Decreased discharges due to split flow into culverts
[8] Based on discharges at State Route 26 plus localized inflow discharges Route 183
[9] Based on total computed discharges upstream of State Route 26 minus diverted flow across Richland Plaza Shopping Center parking lot
[10] Reduced due to Marine Lake
[11] Excludes flow carried within storm sewer
[12] Flow decrease due to diversion into Rush Creek Relief Channel
[13] Discharge decreases due to split flow
[14] Decreases due to Lake Arlington
[15] The 10% annual chance flood does not overtop the emergency spillway of Lake Arlington
[16] Discharges were computed using a ratio of drainage area versus discharge for the upper drainage area for Stream WF-11 and applied to a side tributary for drainage; both of these discharges were added.
[17] Decrease due to lateral weir diversion
[18] Excludes flow carried within storm sewer
**Data not available

The stillwater elevations for the 10-, 2-, 1-, and 0.2-percent-annual-chance flood have been determined for Benbrook Lake, Cement Creek Reservoir, Eagle Mountain Lake, Fossil Lake, Grapevine Lake, Lake Arlington, Lake Joe Pool, Lake Worth, Marine Creek Lake, West Fork Trinity River Sumps, Crowley Pond, and Hawkwood Pond and are summarized in Table 5, "Summary of Reservoir Elevations". The analyses reported herein reflect the stillwater elevations and do not include the contributions from wave action effects. The additional hazard due to wave action effects should be considered in future development.

Table 5 – Summary of Reservoir Elevations

FLOODING SOURCE AND LOCATION	Elevation in Feet (NAVD 88)			
	10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
BENBROOK LAKE				
At Dam	704.8	712.2	715.0	727.0
CEMENT CREEK RESERVIOR				
At Dam	676.1	683.0	684.6	688.7
Upstream of Interstate 820	682.2	685.5	690.7	692.0
CROWLEY POND				
At Burlington Northern and Santa Fe Railroad	761.1	762.4	763.3	764.9
EAGLE MOUNTAIN LAKE				
At Dam	653.0	655.9	657.4	665.4
FOSSIL LAKE				
At Dam	581.7	583.8	584.0	585.0
GRAPEVINE LAKE				
At Dam	554.0	562.3	564.0	568.4
HAWKWOOD POND				
At Burlington Northern and Santa Fe Railroad	760.2	760.3	760.4	760.4
LAKE ARLINGTON				
At Dam	558.6	562.5	563.8	566.6
LAKE JOE POOL				
At Dam	527.5	536.0	537.5	543.5

Table 5 – Summary of Reservoir Elevations (continued)

FLOODING SOURCE AND LOCATION	10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
LAKE WORTH				
At Dam	596.5	598.8	599.9	602.7
MARINE CREEK LAKE				
At Dam	691.6	695.0	698.4	702.3
WEST FORK TRINITY RIVER SUMPS				
14W	*	*	537.3	538.1
15W	*	*	537.3	538.1
16W	*	*	538.3	*
17C	*	*	564.1	*
25C	*	*	538.3	*
5W	542.4	545.2	546.0	548.0
7/8W	542.5	546.6	548.3	551.0

*Data not available

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of flooding from the sources studied were carried out to provide estimates of the elevations of floods of the selected recurrence intervals. Users should be aware that flood elevations shown on the FIRM represent rounded whole-foot elevations and may not exactly reflect the elevations shown on the Flood Profiles or in the Floodway Data 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 (Exhibit 2).

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

New detailed study streams are listed in Section 1.2 and shown in Table 1. Hydraulic methods used for this study are in accordance with the Guidelines and Specifications for Flood Hazard Mapping Partners dated April 2003 (Reference 46). The following is a summary of data sources, assumptions, and procedures used to create the hydraulic models for the study streams.

2009 Countywide Revsion

The primary source of terrain data used for this hydraulic study was developed from NCTCOG 2001 LIDAR data. Roughness coefficients (Manning's "n" values) used in the hydraulic computations were estimated on the basis of field inspection, NCTCOG 2003 aerial photography, and photographs. The channel and overbank "n" values are shown in Table 5, "Summary of Roughness Coefficients."

A TIN was created utilizing the 2001 LIDAR mass points and break lines in order for HEC-GeoRAS 8.1 to extract cross-section geometry data for use in HEC-RAS. All floodplains were mapped using the 2001 LIDAR data.

Water surface profiles for the 10-, 2-, 1- and 0.2-percent-annual-chance-flood events were computed using the River Analysis System HEC-RAS Version 3.1.2., dated April 2004, unless noted otherwise (Reference 56). The downstream slopes for each reach were used for the steady flow boundary conditions at normal depth. Cross-sections, taken from the TIN's generated using the 2001 LIDAR, were supplemented with field surveys conducted as part of this study. Bridge data used for the hydraulic models were taken from field surveys.

Profiles (Exhibit 1) were generated using RAS-PLOT. Profiles were generally plotted at a similar scale as the previous FIS profiles; typically 1"=1000' horizontal scale and 1"= 10' vertical scale.

New detailed hydraulic analyses were prepared for Big Bear Creek, Stream HEN-2, Hogpen Branch, Johnson Creek, Stream JC-1, Low Branch , Stream MSC-1A(Plantation West Creek), Nichols Branch, North Fork Fish Creek, Plantation East Creek, Pond Branch, Timber Creek, Walnut Creek 3, Watson Branch, and Willow Bend Creek. Many aspects of these new detailed analyses are the same as the general discussion in Section 3.2.1, with the following exceptions.

Big Bear Creek

The primary source of terrain data used for this hydraulic study was developed from NCTCOG 2001 LIDAR data. The NCTCOG 2001 LIDAR terrain data was supplemented with 2005 topographic data provided by City of Keller, 2003 LIDAR data acquired by NGA and 2 foot contour interval topography terrain data provided by the City of Grand Prairie. Field surveys of bridges/culverts were conducted from November 2004 through January 2005.

Stream HEN-2

The primary source of terrain data used for this hydraulic study was developed from 2 foot contour interval NCTCOG 2001 LIDAR data. Field surveys of bridges/culverts were conducted in December 2005 and March 2006. Roughness coefficients (Manning's "n" values) used in the hydraulic computations were estimated on the basis of field inspection and NCTCOG 2003 aerial photography.

Johnson Creek, Stream JC-1, and North Fork Fish Creek

The current re-studies for the flooding sources of North Fork Fish Creek, Johnson Creek, and Stream JC-1 were prepared by Halff Associates, Inc. for the City of Grand Prairie FEMA Map Modernization Project. Discharges from the prior effective FIS were used in the HEC-RAS models. The source of terrain data used for this hydraulic study was developed from spot elevations and 2 foot contour interval topography provided by the City of Grand Prairie. The topography was flown by Dallas Aerial in 1999. Field surveys of bridges and culverts were conducted from February 2005 through May 2005.

Stream MSC-1A (Plantation West Creek), Plantation East Creek, Timber Creek, and Willow Bend Creek

Several existing studies within the City of Benbrook were incorporated as 'Best Available' floodplain study data. The most recent re-studies for the flooding sources of Stream MSC-1A (Plantation West Creek), Plantation East Creek, Timber Creek and Willow Bend Creek were prepared by Teague Nall and Perkins (TNP) for the City of Benbrook. Discharges from the prior effective FIS were used in the HEC-RAS models. The primary source of terrain data used for these hydraulic studies was developed from 2001 NCTCOG LIDAR data for the overbank topography and detailed field surveys conducted by TNP in 2004 of the channels and hydraulic structures.

Hogpen Branch, Low Branch, Nichols Branch, Pond Branch, Walnut Creek 3, and Watson Branch

Several existing studies within the City of Mansfield were incorporated as 'Best Available' floodplain study data. TNP prepared new detailed hydraulic models (HEC-2) for the following flooding sources: Hogpen Branch, Low Branch, Nichols Branch, Pond Branch, Walnut Creek 3, and Watson Branch. Nave Engineering, Inc., in cooperation with Halff Associates, Inc., converted the City of Mansfield master drainage study HEC-2 models to HEC-GeoRas for the FEMA Map Modernization Project. The Mansfield master drainage study HEC-2 models were used to provide the channel geometry and the primary source of terrain data used for the overbank topography was developed from 2001 NCTCOG LIDAR data. Field survey data and "As-Built" plans were used to convert hydraulic structures from HEC-2 to HEC-RAS. Discharges from the prior effective FIS were used in the HEC-RAS models.

PMR New Detailed Studies

2010 RAMPP Study

The primary source of terrain data used for this hydraulic study was developed from TNRIS 2009 LIDAR data. Roughness coefficients (Manning's "n" values) used in the hydraulic computations were estimated on the basis of field inspection and NCTCOG 2009 aerial photography. For many of the studies in urban areas, the channels were found to overgrown with tall vegetation while areas in the overbanks were well maintained short grasses or paved surfaces. This has resulted in higher roughness coefficients assigned to the channel for these areas. The channel and overbank "n" values are shown in Table 5, "Summary of Roughness Coefficients."

A TIN was created utilizing the 2009 LIDAR mass points and break lines in order for RAMPP's GeoRAMPP Version 5.0 to extract cross-section geometry data for use in HEC-RAS. All floodplains were mapped using the 2009 LIDAR data.

Water surface profiles for the 10-, 2-, 1- and 0.2-percent-annual-chance-flood events were computed using the River Analysis System HEC-RAS Version 4.0, dated March 2008 (Reference 57) with steady-state conditions. XPSWMM Version 12.31 was used to model a culvert system at the North East Mall for Walker Branch. HEC-RAS Version 5.0 was used to model shallow overbank flooding along a portion of Dry Branch which was more accurately represented in this two-dimensional model. The downstream slopes for most reaches were used for the steady flow boundary conditions at normal depth. For West Fork Trinity River and Walker Branch, the downstream boundary conditions were set at a known water surface elevations as these streams were continuous with the existing detailed studies downstream. Cross-sections, taken from the TIN's generated using the 2009 LIDAR, were supplemented with field surveys conducted as part of this study. Bridge data used for the hydraulic models were taken from field surveys.

Profiles (Exhibit 1) were generated using RAS-PLOT. Profiles were generally plotted at a similar scale as the previous FIS profiles; typically 1"=1000' horizontal scale and 1"= 10' vertical scale.

Many aspects of these new detailed analyses are the same as the general discussion in Section 3.2.1, with the following exceptions.

Dry Branch

The hydraulic model shows non-containment at the Trinity Railway Express towards the downstream limit of study for the 1- and 0.2-percent annual chance flood events. A lateral weir was modeled at the point of non-containment and a limit of study delineation was added at this location.

Walker Branch

There is a segment of approximately 1,000 feet where flooding in Calloway Branch is controlled by the flooding in Walker Branch. In this area, the 0.2-percent-annual-chance flood event is not contained within the Walker Branch basin. The overflow exits the basin to the southeast and is documented with a Limit of Study boundary.

Sycamore Creek

The hydraulic model shows non-containment just downstream of North Crowley Cleburne Road and just upstream of an Atchison, Topeka, and Santa Fe Railway crossing for the 1- and 0.2-percent annual chance flood events. A lateral weir was modeled at the point of non-containment and a limit of study delineation was added at this location.

City of Grand Prairie CTP FY10 Risk MAP Study

The hydraulic analysis for this study was conducted using the USACE HEC-RAS computer modeling software, version 4.1.0. Cross sections for these models were determined using a TIN created from the terrain data and field surveys.

The terrain data used for this study was the 2009 LiDAR topographical data provided by the City of Grand Prairie, Texas.

Roughness coefficients used in the hydraulic computations for this study were estimated based on field inspection and aerial photography.

Water surface elevations for the 10-, 4-, 2-, 1- and 0.2-percent-annual-chance-flood events were computed in HEC-RAS using steady-state conditions.

Bridge and culvert data used for the hydraulic models was taken from field surveys.

Water surface profiles (Exhibit 1) were generated using RASPLOT. Where available, profiles were plotted at a scale similar to the previous FIS profiles. Where previous FIS profiles were not available, profiles were plotted at a scale similar to other streams of equivalent length and discharge.

City of Grand Prairie CTP FY12 Risk MAP Study

The hydraulic analysis for this study was conducted using the USACE HEC-RAS computer modeling software, version 4.1.0. Cross sections for these models were determined using a TIN created from the terrain data and field surveys.

The terrain data used for this study was the 2009 LiDAR topographical data provided by the City of Grand Prairie, Texas.

Roughness coefficients used in the hydraulic computations for this study were estimated based on field inspection and aerial photography.

Water surface elevations for the 10-, 4-, 2-, 1- and 0.2-percent-annual-chance-flood events were computed in HEC-RAS using steady-state conditions.

Bridge and culvert data used for the hydraulic models was taken from field surveys.

Water surface profiles (Exhibit 1) were generated using RASPLOT. The vertical scale for these profiles was adjusted from 5 feet per inch in the previous study to 10 feet per inch in this study because elevation data around State Highway 161 made the effective profile's scale inadequate to show the structure.

3.2.2 Redelineated Detailed Study Streams

The analyses for the redelineated study stream were taken from the prior Flood Insurance Studies for Tarrant County. The Base (1-percent-annual-chance) Flood Elevations (BFEs) from the profiles were plotted on the same topographic data as described in Section 3.2.1 to better define the special flood hazard areas. The redelineated streams are identified in Section 2.1.

For the prior analyses, cross-section data for channels were taken from field surveys. Cross sections were located at close intervals above or below bridges and culverts in order to compute the significant backwater effects of these structures. Information on bridges and culverts was obtained from TxDOT bridge plans or surveyed to obtain elevation data and structural geometry.

Roughness coefficients (Manning's "n") values used in the hydraulic computations were estimated on the basis of field inspection, aerial photography, and photographs. The USACE HEC-2 step-backwater and LRD-1 computer models were used to determine water-surface elevations. Starting water-surface elevations were determined by coincident condition elevation from the larger streams, slope/area method, elevation-discharge curve, or a known water-surface elevation.

In order to ensure continuity across jurisdiction boundaries in the countywide FIS, hydraulic data was adjusted or added in some areas in the vicinity of jurisdiction boundaries.

The channel and overbank "n" values are shown in Table 6, "Summary of Roughness Coefficients".

TABLE 6 – SUMMARY OF ROUGHNESS COEFFICIENTS

Stream Reaches Studied by Detailed Methods

Stream Name	Channel "n" Value	Overbank "n" Value
New Detailed Study Streams		
Arbor Creek	0.020-0.065	0.020-0.080
Big Fossil Creek	0.020-0. 132	0.020-0.132
Big Bear Creek	0.040-0.060	0.035-0.100
Calloway Branch	0.023-0.05	0.02-0.06
Cottowood Creek 2	0.013-0.065	0.015-0.090
Dry Branch	0.015-0.097	0.015-0.097
Fish Creek	0.015-0.060	0.015-0.990
North Fork Fish Creek	0.025-0.060	0.065-0.100
Stream HEN-2	0.040-0.045	0.060-0.070
Hogpen Branch	0.055-0.065	0.065
Johnson Creek	0.018-0.070	0.050-0.110
Johnson Creek	0.025-0.060	0.020-0.110
Stream JC-1	0.050-0.060	0.065-0.080
North Fork of Fish Creek (Prairie Creek) / North Fork of Fish Creek	0.015-0.080	0.013-0.990
South Fork of Cottonwood Creek 2	0.035-0.065	0.035-0.100
Stream CC-1	0.020-0.080	0.060-0.100
Stream CC-2	0.015-0.055	0.030-0.080
Stream CC-3	0.015-0.060	0.015-0.080
Stream CC-4	0.015-0.055	0.035-0.080
Stream FC-1	0.015-0.080	0.015-0.990
Stream FC-2	0.015-0.015	0.040-0.040
Stream FC-3	0.015-0.060	0.040-0.990
Stream FC-4	0.015-0.050	0.040-0.990
Stream NF-1	0.015-0.040	0.015-0.990
Stream NF-2	0.015-0.060	0.015-0.080
Stream NF-3	0.040-0.060	0.040-0.990
Stream NF-4	0.015-0.050	0.030-0.990
Low Branch	0.035-0.065	0.045-0.070
Stream MSC-1A (Plantation West Creek)	0.015-0.050	0.030-0.070
Nichols Branch	0.050-0.075	0.050-0.100
Plantation East Creek	0.015-0.150	0.040-0.070
Pond Branch	0.015-0.075	0.040-0.100
Sycamore Creek	0.025-0.065	0.018-0.080

TABLE 6 – SUMMARY OF ROUGHNESS COEFFICIENTS (continued)
Stream Reaches Studied by Detailed Methods

Stream Name	Channel "n" Value	Overbank "n" Value
New Detailed Study Streams		
Timber Creek	0.015-0.070	0.055-0.085
Warrior Creek	0.015-0.060	0.040-0.990
Walker Branch	0.015-0.097	0.015-0.097
Walnut Creek 3	0.035-0.065	0.035-0.070
Watson Branch	0.055	0.065
West Fork Trinity River	0.052-0.132	0.015-0.132
Willow Bend Creek	0.015-0.065	0.050-0.085
Redelineation Detailed Study Streams		
Ash Creek	0.035-0.060	0.055-0.080
Tributary BB-1	*	*
Tributary BB-2	*	*
Tributary BB-3	0.055-0.065	0.065-0.075
Tributary BB-5	0.015-0.065	0.025-0.085
Tributary BB-6	0.070	0.070
Tributary BB-7	*	*
Tributary BB-8	0.070	0.070
Tributary BB-9	0.070	0.060
Tributary BB-10	0.040-0.060	0.060-0.085
Tributary BB-11	0.045-0.050	0.050-0.065
Tributary BB-12	0.040-0.055	0.050-0.075
Unnamed Tributary to Big Bear Creek	*	*
Stream BFC-l	0.015-0.050	0.050-0.080
Stream BFC-2	0.055	0.075-0.085
Stream BFC-2A	0.060	0.080
Stream BFC- 3	0.065	0.080-0.085
Stream BFC-4	0.050	0.075
Stream BFC-4A	0.050	0.075
Stream BFC-4B	0.025-0.045	0.035-0.100
Stream BFC-5	0.015-0.100	0.030-0.100
Stream BFC-5A	0.025-0.075	0.065-0.075
Stream BFC-5B	0.045-0.055	0.060-0.070
Stream BFC-6	0.050-0.060	0.075-0.085
Stream BFC-7	0.050	0.060-0.065
Blessing Branch	0.030-0.065	0.070-0.085

TABLE 6 – SUMMARY OF ROUGHNESS COEFFICIENTS (continued)
Stream Reaches Studied by Detailed Methods

Stream Name	Channel "n" Value	Overbank "n" Value
Redelineation Detailed Study Streams		
Boaz Creek	0.065	0.080
Bowman Branch	0.045-0.075	0.065-0.075
Stream BB-1	0.055-0.060	0.060
Boyd Branch	0.030-0.075	0.045-0.095
Briar Creek	0.050-0.055	0.070-0.080
Buffalo Creek	0.020-0.060	0.040-0.065
Old Buffalo Creek	0.045-0.060	0.065
Bunker Hill Creek	0.030-0.050	0.075-0.085
Stream CB-1 (New)	*	*
Stream CB-l (Old)	0.020-0.050	0.060-0.090
Stream CB (Old) Diversion	0.035	0.060-0.080
Stream CB-2	0.040-0.055	0.070-0.090
Cement Creek	0.035-0.070	0.050-0.090
West Fork Cement Creek	0.048-0.060	0.060-0.085
Chambers Creek	0.020-0.055	0.055-0.095
North Fork Chambers Creek	0.045	0.060-0.080
South Fork Chambers Creek	0.045-0.050	0.055-0.075
Clear Fork Trinity River	0.035-0.055	0.055-0.085
Stream CF-2	0.035-0.060	0.055-0.085
Stream CF-3	0.030-0.050	0.060-0.080
Stream CF-3A	0.025	0.040-0.050
Stream CF-3B	0.020-0.040	0.040-0.055
Stream CF-3C	0.025-0.045	0.035-0.100
Stream CF-4	0.025-0.045	0.035-0.100
Stream CF-4A	0.025-0.045	0.035-0.100
Stream CF-4A Diversion	*	*
Stream CF-5	0.013-0.065	0.045-0.100
Stream CF-6	0.065	0.045-0.100
Cottonwood Branch	0.030-0.060	0.060-0.075
Cottonwood Creek 1	0.020-0.065	0.060-0.090
Cottonwood Creek 2	0.018-0.090	0.050-0.085
Unnamed Tributary to Cottonwood Creek 2	*	*
South Fork Cottonwood Creek 2	0.065-0.070	0.070-0.080
Crowley Branch	*	*
Cub Creek	*	*
Deer Creek	0.015-0.065	0.055-0.100

TABLE 6 – SUMMARY OF ROUGHNESS COEFFICIENTS (continued)
Stream Reaches Studied by Detailed Methods

Stream Name	Channel "n" Value	Overbank "n" Value
Redelineation Detailed Study Streams		
North Branch of Deer Creek	0.015-0.060	0.060-0.100
Unnamed Tributary to North Branch of Deer Creek	*	*
Unnamed Tributary to An Unnamed Tributary to North Branch of Deer Creek	*	*
Northwest Branch of Deer Creek	0.015-0.060	0.060-0.100
North Fork of Deer Creek	*	*
South Fork of Deer Creek	0.015-0.060	0.060-0.100
South Fork of North Branch of Deer Creek	0.015-0.060	0.060-0.100
Denton Creek	0.045	0.040-0.060
Dove Creek	0.050-0.060	0.075-0.080
Dutch Branch	0.050-0.055	0.070-0.080
Edgec1iff Branch	0.015-0.060	0.050-0.080
Stream EB-1	0.025-0.045	0.035-0.100
Elm Branch	0.060-0.075	0.075-0.085
Farmers Branch	0.020-0.065	0.040-0.088
Unnamed Tributary to Farmers Branch	*	*
Stream FB-1	0.040-0.060	0.055-0.080
Unnamed Tributary to Stream FB-1	*	*
Farris Branch	0.050-0.070	0.080-0.120
Farris Branch East	0.050-0.070	0.080-0.120
Fish Creek	0.035-0.060	0.050-0.100
Stream FC-1	0.035-0.050	0.070-0.075
Stream FC-2	0.055	0.070
Hawkwood Branch	*	*
Henrietta Creek	0.020-0.065	0.020-0.080
Henrietta Creek 6	*	*
Henrietta Creek 6A	*	*
Stream HEN-1	0.055-0.065	0.065-0.075
Stream HEN-2	*	*
Stream HEN-2A	0.050-0.065	0.050-0.065
Unnamed Tributary to Henrietta Creek	*	*
Higgins Branch	0.050-0.055	0.070-0.075
Howards Branch	0.040-0.045	0.060-0.075
Stream HB-1	0.015-0.025	0.045
Hurricane Creek	0.020-0.075	0.045-0.090

TABLE 6 – SUMMARY OF ROUGHNESS COEFFICIENTS (continued)
Stream Reaches Studied by Detailed Methods

Stream Name	Channel "n" Value	Overbank "n" Value
Redelineation Detailed Study Streams		
Stream HC-1	0.020-0.070	0.075-0.095
Hurricane Creek Tributary 1	0.050-0.060	0.055-0.070
East Fork Hurricane Creek	0.050-0.065	0.070-0.085
North Fork West Branch Hurricane Creek	0.045-0.050	0.070-0.080
West Branch Hurricane Creek	0.045-0.065	0.075-0.085
Stream JC-2	0.022-0.068	0.040-0.072
Stream JC-3	0.022-0.065	0.055-0.075
Kee Branch	0.035-0.056	0.045-0.073
Stream KB-l	0.025-0.055	0.045-0.075
Kings Branch	0.025-0.060	0.045-0.075
Kirby Creek	0.045-0.050	0.060-0.090
Kirkwood Branch	0.045-0.070	0.045-0.090
Kirkwood Branch Tributary	0.075-0.050	0.080
South Fork Kirkwood Branch	0.050-0.055	0.060-0.075
Little Bear Creek	0.030-0.065	0.030-0.090
Stream LB-l	0.015-0.070	0.040-0.090
Stream LB-2	0.040-0.070	0.040-0.090
Stream LB-3	0.055	0.070
Tributary Little Bear 1	0.030-0.065	0.065-0.085
Tributary Little Bear 2	0.040-0.070	0.065-0.090
Little Fossil Creek	0.020-0.060	0.050-0.090
Little Fossil Creek Split Flow	0.030-0.055	0.040-0.095
Stream LFC-1	0.055	0.070-0.075
Stream LFC-2	0.035-0.055	0.070
Live Oak Creek	0.045-0.075	0.060-0.070
Lorean Branch	0.015-0.065	0.030-0.095
Lynn Creek	0.025-0.065	0.060-0.075
Mackey Creek	0.014-0.070	0.025-0.100
Mackey Creek Diversion North	0.030-0.050	0.030-0.060
Marine Creek	0.035-0.060	0.050-0.090
Marine Creek Split Flow	0.030	0.030-0.075
Stream MC-1	0.025-0.070	0.050-0.070
Stream MC-2	0.045-0.050	0.070
MC-4 Creek	*	*
Marshall Branch	*	*
Marys Creek	0.050-0.065	0.060-0.085

TABLE 6 – SUMMARY OF ROUGHNESS COEFFICIENTS (continued)
Stream Reaches Studied by Detailed Methods

Stream Name	Channel "n" Value	Overbank "n" Value
Redelineation Detailed Study Streams		
South Marys Creek	0.045-0.070	0.070-0.090
Stream MSC-1	0.060	0.065-0.090
Unnamed Tributary to Stream MSC-1	*	*
Stream MSC-2	0.045-0.060	0.050-0.075
Stream MSC-2A	0.025-0.045	0.035-0.100
Stream MSC-3	0.045-0.060	0.050-0.075
Mesquite Branch	0.060	0.090
North Creek	0.025-0.080	0.025-0.080
Pantego Branch	0.015-0.065	0.035-0.150
Paschal Branch	0.045-0.075	0.070-0.095
Ragland Branch	0.065	0.055-0.080
Reynolds Branch	0.045-0.070	0.065-0.080
Robertson Branch	*	*
Rush Creek	0.032-0.073	0.054-0.075
Forest Park Tributary of Rush Creek	0.050	0.070
Northeast Tributary of Rush Creek	0.028-0.050	0.030-0.080
Rush Creek Relief Channel	*	*
Stream RC-l	0.025-0.063	0.063-0.075
Stream RC-l(A)	0.055-0.063	0.070-0.077
Stream RC-2	0.050-0.085	0.040-0.063
Ryan's Branch	0.035-0.070	0.070-0.100
Silver Creek	0.045-0.075	0.060-0.070
Singing Hills Creek	0.015-0.060	0.050-0.090
South Creek	0.045-0.060	0.070-0.090
North Branch of North Fork of South Creek	0.015-0.060	0.050-0.090
North Branch of North Fork of South Creek Split Flow	0.030-0.035	0.035-0.050
North Fork of South Creek	0.045 -0.050	0.050-0.080
Sublett Creek	0.040-0.063	0.050-0.073
Sulphur Branch	0.025-0.070	0.055-0.090
Stream SB-l	0.040-0.070	0.065-0.085
Unnamed Tributary to Sulphur Branch	*	*
Stream SC-l	0.025-0.065	0.055-0.090
Stream SC-2	0.025-0.065	0.075-0.085
Stream SC-3	0.055-0.060	0.070-0.090
Stream SC-4	0.025-0.045	0.035-0.100
Stream SC-5	0.055-0.060	0.070-0.080

TABLE 6 – SUMMARY OF ROUGHNESS COEFFICIENTS (continued)
Stream Reaches Studied by Detailed Methods

Stream Name	Channel "n" Value	Overbank "n" Value
Redelineation Detailed Study Streams		
Stream SC-6	0.020-0.065	0.050-0.085
Stream SC-7	0.045-0.060	0.070
Stream SC-7A	0.015-0.035	0.050
Timber Creek Diversion	0.025-0.060	0.045-0.055
South Timber Creek	0.018-0.025	0.035-0.065
Tributary B	0.040-0.075	0.040-0.090
Tributary C	0.015-0.065	0.065-0.085
Twin Springs Draw	0.035-0.070	0.070-0.100
Valley View Branch	0.015-0.060	0.020-0.085
Stream VVB-l	0.014-0.030	0.030-0.090
Village Creek	0.030-0.070	0.040-0.100
Stream VC(A)-l	0.045-0.065	0.050-0.075
Stream VC(A)-2	0.030-0.050	0.050-0.065
Stream VC-l	0.040-0.060	0.070-0.085
Stream VC-2	0.045-0.050	0.060-0.080
Stream VC-2A	0.025-0.045	0.035-0.100
Stream VC-3	0.050-0.060	0.055-0.070
Stream VC-4	0.055-0.060	0.065-0.080
Stream VC-4A	0.050-0.055	0.060-0.065
Stream VC-5	0.050-0.060	0.060-0.085
Stream VC-6	0.040-0.065	0.050-0.090
Stream VC-7	0.050-0.060	0.070-0.080
Walker Branch	0.025-0.065	0.025-0.100
Stream WKB-l	0.050	0.060
Walnut Creek 1	0.040-0.085	0.050-0.090
Walnut Creek 2	0.040-0.055	0.075-0.085
West Fork Trinity River	0.035-0.065	0.030-0.120
Stream WF(A)-1	0.018-0.065	0.050-0.070
Stream WF(A)-2	0.020-0.060	0.050-0.075
Stream WF-l	0.040-0.055	0.060-0.080
Stream WF-1A	0.050-0.055	0.050-0.080
Stream WF-1B	0.040-0.055	0.065-0.090
Stream WF-2	0.035-0.070	0.070-0.080
Stream WF-2A	0.025-0.045	0.035-0.100
Stream WF-3	0.035-0.070	0.040-0.080
Stream WF-4	0.020-0.055	0.050-0.080
Stream WF-5	0.055-0.060	0.065-0.075

TABLE 6 – SUMMARY OF ROUGHNESS COEFFICIENTS (continued)
Stream Reaches Studied by Detailed Methods

Stream Name	Channel "n" Value	Overbank "n" Value
Redelineation Detailed Study Streams		
Stream WF-7	0.055-0.060	0.075-0.080
Stream WF-7A	0.055	0.070
Stream WF-7B	0.025-0.045	0.035-0.100
Stream WF-9	0.030-0.055	0.055-0.080
Stream WF-10	0.035-0.060	0.050-0.085
Stream WF-10A	0.060-0.070	0.090
Stream WF-11	0.020-0.065	0.030-0.085
Unnamed Tributary to West Fork Trinity River	*	*
West Jones Branch	0.065-0.075	0.060-0.095
Whites Branch	0.050-0.065	0.050-0.085
Stream WB-1	0.055	0.075
Unnamed Tributary to Stream WB-1	*	*
Stream WB-2	*	*
Stream WB-3	*	*
Wildcat Branch	0.030-0.060	0.060-0.085
Stream WC-1	0.030-0.065	0.055-0.090
Willow Branch	0.030-0.055	0.085

* Data not available

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 29). With the completion of NAVD 88, many FIS reports and FIRMs are now prepared using NAVD 88 as the referenced vertical datum.

Flood elevations shown in this FIS report and on the FIRM are referenced to the NAVD 88. 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 NAVD 88. The datum conversion factor from NGVD 29 to NAVD 88 in Tarrant County is 0.02 feet.

For information regarding conversion between the NGVD 29 and NAVD 88, visit the National Geodetic Survey website at www.ngs.noaa.gov, or contact the National Geodetic Survey at the following address:

NGS Information
Services NOAA,
N/NGS12
SSMC-3, #9202
National Geodetic Survey
1315 East West Highway
Silver Spring, MD 20910-3282
(301) 713-3191

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.

For FIRM panels dated July 16, 2004, or later, qualifying bench marks within a given jurisdiction that are cataloged by NGS and entered into the National Spatial Reference System (NSRS) as First or Second Order Vertical and have a vertical stability classification of A, B, or C are shown and labeled on the FIRM with their 6-character NSRS Permanent Identifier.

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

- Stability A: Monuments of the most reliable nature, expected to hold position/elevation well (e.g., mounted in bedrock);
- Stability B: Monuments which generally hold their position/elevation well (e.g., concrete bridge abutment);
- Stability C: Monuments which may be affected by surface ground movements (e.g., concrete monument below the frost line); and

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

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

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