FLOOD INSURANCE STUDY

WILLIAMSON COUNTY, TENNESSEE
AND INCORPORATED AREAS
VOLUME 1 OF 2

COMMUNITY NAME	COMMUNITY NUMBER
BRENTWOOD, CITY OF	470205
FAIRVIEW, CITY OF	470242
FRANKLIN, CITY OF	470206
NOLENSVILLE, TOWN OF	470425
THOMPSON'S STATION, TOWN OF	470424
WILLIAMSON COUNTY UNINCORPORATED AREAS	470204

REVISED: December 22, 2016

Federal Emergency Management Agency

FLOOD INSURANCE STUDY NUMBER
47187CV001C

NOTICE TO
FLOOD INSURANCE STUDY USERS

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

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

Initial Countywide FIS Effective Date: January 16, 2003

Revised Countywide FIS Date: September 29, 2006;
December 22, 2016

TABLE OF CONTENTS - Volume 1 – December 22, 2016

Page

1.0 INTRODUCTION 1

1.1 Purpose of Study 1

1.2 Authority and Acknowledgments 1

1.3 Coordination 3

2.0 AREA STUDIED 5

2.1 Scope of Study 5

2.2 Community Description 9

2.3 Principal Flood Problems 10

2.4 Flood Protection Measures 10

3.0 ENGINEERING METHODS 11

3.1 Hydrologic Analyses 11

3.2 Hydraulic Analyses 31

3.3 Vertical Datum 36

4.0 FLOODPLAIN MANAGEMENT APPLICATIONS 37

4.1 Floodplain Boundaries 37

4.2 Floodways 38

5.0 INSURANCE APPLICATION 76

6.0 FLOOD INSURANCE RATE MAP 77

7.0 OTHER STUDIES 79

8.0 LOCATION OF DATA 79

9.0 BIBLIOGRAPHY AND REFERENCES 79

TABLE OF CONTENTS - Volume 1 – continued – December 22, 2016

FIGURES Page

Figure 1 - Floodway Schematic 39

TABLES Page

Table 1 - CCO Meeting Dates 4
Table 2 - Streams Studied by Detailed Methods 5
Table 3 - Streams Studied by Limited Detail Methods 6-8
Table 4 - Scope of Study 9
Table 5 - Letters of Map Change 9
Table 6 - Summary of Discharges 15-30
Table 7 - Manning's "N" Values 33-36
Table 8 - Floodway Data 41-75
Table 9 - Community Map History 78

TABLE OF CONTENTS - Volume 2 – December 22, 2016

EXHIBITS

Exhibit 1 - Flood Profiles

Aenon Creek	Panel	01P
Arrington Creek	Panels	02P-05P
Beech Creek	Panels	06P-09P
Brush Creek	Panels	10P-13P
Cartwright Creek	Panels	14P-16P
Dry Branch	Panel	17P
East Fork Creek	Panels	18P-19P
Fivemile Creek	Panels	20P-22P
Grassy Branch	Panel	23P
Harpeth River	Panels	24P-31P
Harpeth River US-431 East Split	Panel	32P
Harpeth River US-431 West Split	Panel	33P
Harrison Branch Creek	Panels	34P-35P
Hunting Camp Creek	Panels	36P-39P
Hunting Camp Creek Tributary No. 2	Panels	40P-42P
Hunting Camp Creek Tributary No. 3	Panels	43P-46P
Hunting Camp Creek Tributary No. 4	Panels	47P-48P
Hunting Camp Creek Tributary No. 5	Panel	49P
Leipers Fork	Panels	50P-53P
Liberty Creek	Panel	54P

TABLE OF CONTENTS - Volume 2 – continued – December 22, 2016

EXHIBITS - continued

Exhibit 1 - Flood Profiles - continued

Little East Fork	Panels	55P-56P
Little Harpeth River	Panels	57P-59P
Little Harpeth River Tributary 4	Panels	60P-61P
Little Harpeth River Tributary 5	Panel	62P
Little Harpeth River Tributary 6	Panel	63P
Lynnwood Branch	Panels	64P-65P
McCutcheon Creek	Panel	66P
Mill Creek	Panels	67P-68P
Murfrees Fork	Panels	69P-72P
Owl Creek	Panels	73P-76P
Rutherford Creek	Panels	77P-79P
Sharps Branch	Panels	80P-81P
South Harpeth River	Panel	82P
South Prong Creek	Panels	83P-84P
Spencer Creek	Panels	85P-87P
Trace Creek	Panels	88P-89P
Unnamed Tributary to Mill Creek	Panel	90P
Unnamed Tributary to South Prong Creek	Panel	91P
Watson Branch	Panels	92P-94P
West Harpeth River	Panels	95P-100P

Exhibit 2 - Flood Insurance Rate Map Index
Flood Insurance Rate Map

FLOOD INSURANCE STUDY
WILLIAMSON COUNTY, TENNESSEE 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 Williamson County, Tennessee, including the Cities of Brentwood, Fairview, and Franklin; the Towns of Nolensville and Thompson's Station; and the unincorporated areas of Williamson County (referred to collectively herein as Williamson County). The FIS aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study has developed flood-risk data for various areas of the community that will be used to establish actuarial flood insurance rates. This information will also be used by Williamson County to update existing floodplain regulations as part of the Regular Phase of the National Flood Insurance Program (NFIP), and by local and regional planners to further promote sound land use and floodplain development. Minimum floodplain management requirements for participation in the NFIP are set forth in the Code of Federal Regulations at 44 CFR, 60.3.

Please note that the City of Spring Hill is geographically located in Williamson and Maury Counties, Tennessee. See the separately published FIS report and Flood Insurance Rate Maps (FIRMs) for Maury County, Tennessee and Incorporated Areas (Reference 1) for map dates and flood hazard information for the City of Spring Hill within Williamson County.

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

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

1.2 Authority and Acknowledgments

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

This FIS was prepared to include the unincorporated areas of, and incorporated communities within Williamson County in a countywide format. Information on the

authority and acknowledgments for each jurisdiction included in this countywide FIS, as compiled from their previously printed FIS reports, is shown below.

Brentwood, City of:	The hydrologic and hydraulic analyses for the June 1982 FIS report were performed by Clark, Dietz, and Associates-Engineers, Inc., Memphis, Tennessee, under the direction of the U.S. Army Corps of Engineers (USACE), Nashville District, for the Federal Insurance Administration (FIA), under Inter- Agency Agreement No. IAA-H-16-75, Project Order No. 17.
Franklin, City of:	The hydrologic and hydraulic analyses for the original FIS were prepared by the USACE, Nashville District, for FIA under Inter-Agency Agreement No. IAA-H-10-77, Project Order No. 12. That work was completed in April 1978. The hydrologic and hydraulic analyses for the FIS report dated July 15, 1988, were performed by Aubrey L. Fly and Associates for the Federal Emergency Management Agency (FEMA).
Williamson County (Unincorporated Areas):	For the original FIS report dated October 1, 1980, and the April 1, 1981, Flood Insurance Rate Map (FIRM) the hydrologic and hydraulic analyses for Mill Creek, and the Harpeth, Little Harpeth, and South Harpeth Rivers were performed by the USACE, Nashville District. That work was completed in April 1979. The hydrologic and hydraulic analyses for the FIS report dated November 3, 1989 were performed by the Tennessee Valley Authority (TVA) study contractor for FEMA, under Inter-Agency Agreement No. EMW-86-E2223, Project Order No. 1. That work was completed in July 1987. The hydrologic and hydraulic analyses for the August 16, 1993, FIS, for Little East Fork, were performed by the USACE, Nashville District, for FEMA, as part of the Limited Map Maintenance Program, under Task Order No. 1-N-S, Interagency Agreement No. E-W-90-E-3286, Project Order No. 2A. The hydrologic and hydraulic analyses for Lynnwood Branch were performed by the USACE, Nashville District, for Williamson County, Tennessee, under the authority of Section 22 of

Public Law 93-251, the Water Resources Department Act of 1974. The hydrologic and hydraulic analyses for Beech Creek and Cartwright Creek were performed by Pickering Alley, Inc., Brentwood, Tennessee, and Neel-Schaffer, Inc., Nashville, Tennessee, respectively, for Williamson County. FEMA reviewed and accepted these data for purposes of that revision.

The authority and acknowledgments for the City of Fairview is not available because a FIS report was not published for that community.

For the countywide FIS dated January 16, 2003, the hydraulic and hydrologic analyses for the upstream portion of Hunting Camp Creek and its tributaries were performed by AMEC Earth & Environmental, Inc. That work was completed in July 2001. The hydraulic and hydrologic analyses for the portion of South Prong Creek between Cool Springs Boulevard and Jordan Road were prepared by Ragan-Smith-Associates, Inc. That work was completed in December 1995. The hydraulic and hydrologic analyses for all other restudied streams were prepared by the USACE, Nashville District, for FEMA, under Inter-Agency Agreement No. EMW-96-IA-0294, Project Order No. 2. That work was completed in September 1997.

For the revision to the countywide FIS dated September 29, 2006, the hydrologic and hydraulic analyses for this study were performed by the Watershed IV Alliance, for the Federal Emergency Management Agency (FEMA), under Contract No. EMA-2002-C0-0011A. This work was completed in December 2004. Floodplain boundaries were redelineated based on more detailed and up-to-date topography submitted by Williamson County.

The hydrologic and hydraulic analyses for this December 22, 2016 revision were performed by BakerAECOM and the USACE, Nashville District, under Contract No. HSFEHQ-09-D-0368, Task Order Number HSFE04-10-J-0074. A new detailed study was performed along the Harpeth River, South Harpeth River, and several tributaries of the Little Harpeth River. This work was completed in June 2014.

Base map information shown on this FIRM was derived from multiple sources. Base map information for Williamson County and all incorporated communities within Williamson County was provided in digital format by the Williamson County Department of Geographic Information Systems. This information was compiled from tax maps and aerial photography.

The digital FIRMs were produced in Tennessee State Plane Zone (FIPS Zone 4100) coordinates referenced to the North American Datum of 1983 and the GRS 1980 spheroid.

1.3 Coordination

An initial Consultation Coordination Officer's (CCO) meeting is held typically with

representatives from FEMA, the community, and the study contractor to explain the nature and purpose of a FIS, and to identify the streams to be studied by detailed methods. A final CCO meeting is held typically with representatives from FEMA, the community, and the study contractor to review the results of the study. All problems raised in the meeting have been addressed in this study.

The dates of the initial and final CCO meetings held for the communities within the boundaries of Williamson County are shown in Table 1, "CCO Meeting Dates."

For the countywide FIS dated September 29, 2006, an initial CCO meeting was held with representatives of the impacted communities on January 28, 2004. A final CCO meeting was held March 23, 2005 to review the results of this study. The meeting was attended by USACE representatives, FEMA representatives, and community officials.

For this December 22, 2016 revision, a final CCO meeting was held on November 4, 2014, and attended by representatives of the State of Tennessee, the communities, FEMA, and BakerAECOM. All problems raised at that meeting have been addressed in the study.

Table 1 - CCO Meeting Dates

Community Name	Initial CCO Date	Final CCO Date
City of Brentwood	*	May 6, 1976
City of Brentwood (Revised January 16, 2003)	December 6, 1995	June 6, 1992
City of Franklin	*	May 24, 1979
City of Franklin (Revised January 16, 2003)	December 6, 1995	June 6, 1992
Unincorporated Areas of Williamson County	October 1, 1985	December 13, 1988
Unincorporated Areas of Williamson County (Revised August 16, 1993)	*	*
Unincorporated Areas of Williamson County (Revised January 16, 2003)	December 6, 1995	June 6, 1992

*Data Not Available

2.0 AREA STUDIED

2.1 Scope of Study

This FIS report covers the geographic area of Williamson County, Tennessee, including the incorporated communities listed in Section 1.1.

All or portions of the flooding sources listed in Table 2, "Streams Studied by Detailed Methods," were studied by detailed methods. Flood profiles are indicated on the Flood Profiles (Exhibit 1) and on the FIRM (Exhibit 2).

Table 2 - Streams Studied by Detailed Methods

Aenon Creek	Little Harpeth River
Arrington Creek	Little Harpeth River Tributary 4
Beech Creek	Little Harpeth River Tributary 5
Brush Creek	Little Harpeth River Tributary 6
Cartwright Creek	Lynnwood Branch
Dry Branch	McCutcheon Creek
East Fork Creek	Mill Creek
Fivemile Creek	Murfrees Fork
Grassy Branch	Owl Creek
Harpeth River	Rutherford Creek
Harpeth River US-431 East Split	Sharps Branch
Harpeth River US-431 West Split	South Harpeth River
Harrison Branch Creek	South Prong Creek
Hunting Camp Creek	Spencer Creek
Hunting Camp Creek Tributary No. 2	Trace Creek
Hunting Camp Creek Tributary No. 3	Unnamed Tributary to Mill Creek
Hunting Camp Creek Tributary No. 4	Unnamed Tributary to South Prong Creek
Hunting Camp Creek Tributary No. 5	Watson Branch
Leipers Fork	West Harpeth River
Liberty Creek	
Little East Fork	

The areas studied by detailed methods were selected with priority given to all known flood hazards and areas of projected development or proposed construction.

Limited detail 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 the Watershed IV Alliance. For the FIS dated September 29, 2006, limits of limited detail studies for the newly studied or revised streams are shown in Table 3, "Streams Studied by Limited Detail Methods."

Table 3 - Streams Studied by Limited Detail Methods

Stream	Extents of Limited Detail Study
Aden Camp Branch	Confluence with Little Turnbull Creek to a point approximately 0.1 mile upstream of Bethshears Road
Aenon Creek	Approximately 0.2 mile upstream of Spring Hill Duplex Rd to a point approximately 0.4 mile upstream of Spring Hill Duplex Road
Arkansas Creek	Confluence with South Harpeth River to a point approximately 1.8 miles upstream of Harpendene Branch
Arrington Creek Tributary 1	Confluence with Arrington Creek Tributary 2 to a point approximately 300 feet upstream of Osburn Road
Arrington Creek Tributary 2	Confluence with Arrington Creek to a point approximately 0.5 mile upstream of Osburn Road
Arrington Creek Tributary 3	Confluence with Arrington Creek to a point approximately 0.2 mile upstream of Arrington Creek Tributary 5
Arrington Creek Tributary 4	Confluence with Arrington Creek Tributary 3 to a point approximately 0.7 mile upstream of Arrington Creek Tributary 3
Arrington Creek Tributary 5	Confluence with Arrington Creek Tributary 3 to a point approximately 0.3 mile upstream of Arrington Creek Tributary 3
Big Turnbull Creek	At Williamson County boundary to a point approximately 0.3 mile upstream of Old Franklin Road
Brush Creek	At Williamson County boundary to a point approximately 0.4 mile upstream of Fairview Boulevard
Brush Creek Tributary 1	Confluence with Brush Creek to a point approximately 1.8 miles upstream of confluence with Brush Creek
Burke Branch	Confluence with Mayes Creek to a point approximately 0.4 mile upstream of Wilson Pike
Caney Fork Creek	Confluence with South Harpeth River to a point approximately 1.5 miles upstream of confluence with South Harpeth River
Dry Branch	Approximately 0.9 mile upstream of Aspen Grove Dr to a point approximately 200 feet upstream of Moores Lane
Fivemile Creek	Approximately 0.5 mile upstream of Goose Creek Bypass to a point approximately 0.2 mile upstream of Pratt Lane
Fivemile Creek Tributary 1	Confluence with Fivemile Creek to a point approximately 0.6 mile upstream of Interstate 65
Flat Creek	At Williamson County boundary to a point approximately 1.9 miles upstream of county boundary
Flat Rock Creek	At Williamson County boundary to a point approximately 0.3 mile upstream of Highway 96
Flat Rock Creek Tributary 1	Confluence with Flat Rock Creek to a point approximately 0.1 mile upstream of Highway 96
Goose Creek	Confluence with Fivemile Creek to a point approximately 1.3 miles upstream of Lewisburg Pike

Table 3 - Streams Studied by Limited Detail Methods - continued

Stream	Extents of Limited Detail Study
Grassy Branch	Approximately 0.5 mile upstream of Spring Hill Duplex Rd to a point approximately 0.8 mile upstream of Spring Hill Duplex Road
Grassy Branch Tributary 1	Confluence with Grassy Branch to a point approximately 0.3 mile upstream of confluence with Grassy Branch
Harpendene Branch	Confluence with Arkansas Creek to a point approximately 1.8 miles upstream of confluence with Arkansas Creek
Harpeth River Tributary 1	Confluence with Harpeth River to a point approximately 300 feet upstream of Murfreesboro Road Approximately
Harrison Branch Creek	3.0 miles upstream of confluence with Brush Creek to a point approximately 3.4 miles upstream of confluence with Brush Creek
Hickman Branch	Confluence with Little Turnbull Creek to a point approximately 1.0 mile upstream of confluence with Little Turnbull Creek
Kelley Creek	Confluence with South Harpeth Creek to a point approximately 1.3 miles upstream of confluence with South Harpeth Creek
Liberty Creek	Approximately 0.2 mile upstream of Daniels Drive to a point approximately 0.4 mile upstream of Cadet Lane
Lick Creek	At Williamson County boundary to a point approximately 0.2 mile upstream of South Lick Creek Road
Linton Branch	At Williamson County boundary to a point approximately 0.3 mile upstream of county boundary
Little Harpeth River	Approximately 0.1 mile upstream of Moores Lane to a point approximately 0.3 mile upstream of Carriage Hills Drive
Little Harpeth River Tributary 1	Confluence with Little Harpeth River to a point approximately 0.3 mile upstream of River Oaks Road
Little Harpeth River Tributary 2	Confluence with Little Harpeth River to a point approximately 0.2 mile upstream of Maryland Way
Little Harpeth River Tributary 3	Confluence with Little Harpeth River Tributary 2 to a point approximately 0.2 mile upstream of Franklin Road
Little Harpeth River Tributary 7	Confluence with Little Harpeth River to a point approximately 0.2 mile upstream of Wikle Road West
Little Harpeth River Tributary 8	Confluence with Little Harpeth River Tributary 7 to a point approximately 0.4 mile upstream of General Macarthur Drive
Little Harpeth River Tributary 9	Confluence with Little Harpeth River Tributary 7 to a point approximately 0.2 mile upstream of Ashby Drive

Table 3 - Streams Studied by Limited Detail Methods - continued

Stream	Extents of Limited Detail Study
Little Harpeth River Tributary 10	Confluence with Little Harpeth River Tributary 7 to a point approximately 0.2 mile upstream of Puryear Place
Little Harpeth River Tributary 11	Confluence with Little Harpeth River Tributary 10 to a point approximately 0.7 mile upstream of Interstate 65
Little Turnbull Creek	At Williamson County boundary to a point approximately 1.9 miles upstream of Dice Lampley Road Confluence
Little Turnbull Creek Tributary 1	with Little Turnbull Creek to a point approximately 0.5 mile upstream of confluence with Little Turnbull Creek
Mayes Creek	Confluence with Harpeth River to a point approximately 1.1 miles upstream of Tulloss Road
McCanless Branch	Confluence with Arrington Creek to a point approximately 0.8 mile upstream of Old Horton Highway
McCrory Creek	Confluence with Harpeth River to a point approximately 250 feet upstream of Arno College Grove Road
McCutcheon Creek	Approximately 1.3 miles upstream of Columbia Pike to a point approximately 300 feet upstream of Amacher Drive
Mill Creek	Approximately 200 feet upstream of Rocky Fork Rd to a point approximately 2.0 miles upstream of Rocky Fork Road
North Fork Lick Branch	Confluence with Lick Creek to a point approximately 0.5 mile upstream of Old Lick Creek Road
Overall Creek	Confluence with Harpeth River to a point approximately 0.1 mile upstream of Horton Highway
South Harpeth Creek	Confluence with Arkansas Creek to a point approximately 0.9 mile upstream of confluence with Arkansas Creek
South Harpeth River	At point approximately 2,500 feet of the first crossing with Old Harding road to a point approximately 300 feet upstream of South Harpeth Road
Starnes Creek	Confluence with Harpeth River to a point approximately 0.1 mile upstream of Old Harpeth-Peytonsville Road
South Fork Lick Branch	Confluence with Lick Creek to a point approximately 250 feet upstream of South Lick Creek Road
Unnamed Tributary 2 to Harpeth River	Confluence with Harpeth River to a point approximately 0.2 mile upstream of Jordan Road
Unnamed Tributary to Mill Creek	Approximately 0.2 mile upstream of confluence with Mill Creek to a point approximately 0.4 mile upstream of Clovercroft Road
West Fork Aenon	Confluence with Aenon Creek to a point approximately 1.2 miles upstream of confluence with Aenon Creek

For the 2006 revision, floodplain boundaries of streams that have been previously studied by detailed methods were redelineated based on more detailed and up-to-date topographic mapping.

For this December 22, 2016 revision, new detailed analyses were included for the Harpeth River, South Harpeth River, and several tributaries of the Little Harpeth River. The limits of the study are described below in Table 4 – "Scope of Study."

Table 4 - Scope of Study

Stream	Limits of New Study
Harpeth River	From the border of Davidson and Williamson Counties to approximately 3,150 feet upstream of the crossing with Interstate 65
Little Harpeth River Tributary 4	From the confluence with Little Harpeth River to approximately 450 feet upstream of the crossing with Shenandoah Drive
Little Harpeth River Tributary 5	From the confluence with Little Harpeth River Tributary 4 to approximately 540 feet upstream of the crossing with Old Smyrna Road
Little Harpeth River Tributary 6	From the confluence with Little Harpeth River Tributary 4 to approximately 960 feet upstream of the crossing with Old Smyrna Road
South Harpeth River	From the border of Davidson and Williamson Counties to approximately 2,500 feet upstream of the first crossing with Old Harding Road

This December 22, 2016 revision also incorporates the determination of letters issued by FEMA resulting in map changes as shown in Table 5, "Letters of Map Change."

Table 5 - Letters of Map Change

Community	Flooding Source / Project Identifier and Case Number	Effective Date	Type
Williamson County (Unincorporated Areas)	Cartwright Creek Restudy (11-04-4928P)	July 19, 2012	LOMR
Williamson County (Unincorporated Areas)	Lynwood Branch Restudy (12-04-6046P)	February 4, 2013	LOMR

2.2 Community Description

Williamson County is in central Tennessee and is bordered on the north by Cheatham and Davidson Counties; on the west by Dickson and Hickman Counties; on the south by Maury and Marshall Counties; and on the east by Rutherford County. Williamson County is served by CSX Transportation, Interstates 65 and 40; U.S. Routes 31, 41, and 431; and State Routes 96, 100, and 397. Williamson County encompasses an area of 582 square miles. According to the 2010 census, the population of Williamson County was 183,182 (Reference 2).

Williamson County has a warm continental climate with hot summers. Temperatures range from an average low of 38 degrees Fahrenheit (°F) in the winter to an average high of 78°F in the summer. The average annual precipitation of 52 inches is reasonably well distributed throughout the year, but noticeably less rain falls in the late summer and early fall (Reference 3).

2.3 Principal Flood Problems

The principal sources of flooding in Williamson County are the Harpeth, West Harpeth, Little Harpeth, and South Harpeth Rivers, Leipers and Murfrees Forks, Grassy Branch, and Fivemile, McCutcheon, Aenon, and Rutherford Creeks.

Flooding from the Harpeth River usually occurs in the winter and early spring. Well-defined profiles of past floods along the Harpeth River were obtained by the USACE following the floods of December 1926 - January 1927, March 1929, January 1937, January 1946, February 1948, December 1969, March 1975, and May 2010. Most of those floods caused severe damage, especially in the vicinity of the City of Franklin. During the March 1975 flood, which is estimated to have a recurrence interval of 50 years in the Franklin area, approximately $3.5 million damage was done to that area (Reference 4).

Information about past flooding on the West Harpeth River is available from stream gage records from 1955 to 1978 at the USGS gage (No. 03432500) located near Leipers Fork, and from one high-water mark for the May 1979 flood. At the gage, the stage-discharge relationship (rating curve) is uncertain. Consequently, flood elevations were used to establish the relative magnitude of past floods on the West Harpeth River. The largest flood on the West Harpeth River between 1955 and 1979 occurred on June 17, 1960. At the gage station, the flood reached an elevation of 649.33 feet National Geodetic Vertical Datum of 1929 (NGVD), with an estimated recurrence interval of 15 years. Other major flood occurred in March 1975 and March 1977.

Information about past flooding on Leipers Fork is limited to two high-water marks from a flood in May 1979 that reached an elevation of 660.32 feet NGVD upstream of Floyd Road, with an estimated recurrence interval of approximately 15 years.

There is a series of high-water marks on McCutcheon Creek obtained by the TVA following the December 1972 and march 1973 floods. The December 1972 flood reached an elevation of 708.7 feet NGVD upstream of U.S. Route 31 bridge. The recurrence interval of those floods is estimated to be approximately 2 years.

Although only a small amount of high-water data is available for the Little Harpeth River, it has been established that large floods occurred in 1929, 1948, 1955, 1960, 1962, 1973, and 1979. The May 4, 1979, flood is the highest known flood on the Little Harpeth River. The recurrence interval of that flood is estimated to be approximately 40 years. Significant flooding occurred on the South Harpeth River in 1948 and 1960. Damage was slight during those floods because land use in the area was primarily agricultural.

Information about flooding on the remaining studied streams is limited to high-water marks for within-banks floods of unknown dates.

2.4 Flood Protection Measures

There are no flood protection structures in Williamson County. However, land use regulations that control construction within areas that have a high risk of flooding (Reference 5) are being used to aid in the prevention of future flood damage.

3.0 ENGINEERING METHODS

For the flooding sources studied by detailed methods in the community, standard hydrologic and hydraulic study methods were used to determine the flood-hazard data required for this study. Flood events of a magnitude that is expected to be equaled or exceeded once on the average during any 10-, 25-, 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-, 25-, 50-, 100-, and 500-year floods, have a 10-, 4-, 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.

Pre-countywide Analyses

The peak discharge-frequency relationships for Sharps Branch and Unnamed Tributary to Harpeth River were determined by using the procedure outlined in the USGS publication, "Technique for Estimating Magnitude and Frequency of Floods in Tennessee" (Reference 4). This Multiple Regression Method uses drainage area as a parameter for deriving discharges, and is based upon relatively long-term records of flows for streams in similar hydrologic areas.

Flood-flow relationships for the watershed in the region were developed using the Gumbel theory based on stream gage record, following procedures outlined in Bulletin No. 17B (Reference 6).

Discharge-frequency determination and distribution that was used in "Flood Plain Information-Harpeth River, Mouth to Franklin, Tennessee" (Reference 7) was used for Harpeth River, Little Harpeth River, West Harpeth River, South Harpeth River, Murfrees Fork, Fivemile Creek, McCutcheon Creek, Aenon Creek, and Grassy Branch. This methodology involved prorating frequency discharges defined at Bellevue and Kingston Springs on a drainage area basis. For the reach upstream of Franklin, discharges were determined from a relationship based on drainage area used in conjunction with other reports. These discharges were used in lieu of a generalized frequency study technique that gives results significantly different from known Harpeth River frequency discharges.

For the West Harpeth River downstream of the confluence of Leipers Fork, the USGS gage (station No. 03432500) was the principal source of data for defining peak discharge- frequency relationships. Upstream and downstream estimates were made by transfer using a flow-drainage area relationship through the gage point and parallel to the regional relationship described in this section.

As previously mentioned, the stage-discharge relationship for West Harpeth River downstream of Leipers Fork is questionable. The lower end of the USGS rating curve is defined by one indirect measurement made in March 1955. The peak discharge-frequency estimates obtained from this rating curve significantly exceed regional experience. As a result, a new rating curve was developed by the USACE and verified by the TVA. The adopted peak discharge-frequency estimates are based on an analysis of annual peak discharge values obtained from this new rating curve.

Peak discharge-frequency relationships for West Harpeth River upstream of Leipers Fork and Mill Creek were determined using USGS procedures (Reference 6). This multiple regression method uses drainage area as a parameter for deriving discharges, and is based on relatively long-term records of flow for streams in similar hydrologic areas. The formula for the 0.2- percent-annual-chance flood was derived by the same multiple regression techniques that were used to define the formula for floods of lesser magnitudes.

Peak discharge-frequency relationships for Little Harpeth River were determined by relating U.S. Weather Bureau rainfall records near Brentwood to the geometric, physiographic and climatologic characteristics of the basin by an analytical method for the 2-, 1-, and 0.2-percent-annual-chance frequencies (Reference 8). This method was found to give unacceptable answers for the 10-percent-annual-chance frequency; therefore, the USGS procedures were used.

Regional relationships were developed to define peak discharge-frequency relationships for the remaining studied streams. The adopted relationships were determined from stream gage records on watersheds with hydrometeorologic characteristics similar to the studied streams.

Flood-frequency curves for those streams were computed using the procedure outlined in Bulletin No. 17B (Reference 6) including adjustments for historic flood information where available. The results of these analyses were combined to develop the regional relationships range from 6 percent lower to 10 percent higher than the estimates from the relationships developed using USGS methods for Tennessee.

Flow estimates based on the adopted regional relationships were compared to estimates using relationships developed by the USGS for Hydrologic Area 3 (Reference 4). For the drainage area studied, the discharges from the adopted regional relationships range from 6 percent lower to 10 percent higher than the estimates from the relationships developed using USGS methods for Tennessee.

Discharges for the Little East Fork were determined for the 10-, 2-, 1-, and 0.2-percent-annual chance floods using USGS regression equations for Tennessee.

Since no stream gage data exist for Lynnwood Branch, USGS regression equations for

Tennessee were used to determine discharges for the 10, 2, 1, and 0.2 percent annual chance recurrence intervals. The distribution of the discharges upstream of the mouth was determined with the HEC-1 computer model (Reference 9). This was accomplished by varying the total rainfall amounts input into the model until the regression-based discharges at the mouth were reproduced.

To check the reasonableness of the rainfall amounts required to reproduce the regression discharges, a comparison with rainfall probabilities was made. Rainfall values obtained from the U.S. Weather Bureau publication "Technical Paper No. 40," (TP-40) (Reference 10) were found to be reasonably similar to the rainfall values needed to reproduce the regression- based discharges.

A detailed study of the Beech Creek watershed upstream of North Berry's Chapel Road including catchment areas, soil types, slopes, and types of vegetation and developments, was performed by Pickering Alley, Inc., for use in modeling the 1 percent annual chance storm event with the HEC-1 computer model. USGS regression equations were used in conjunction with the HEC-1 model to further determine 1 percent annual chance discharges for reaches of Beech Creek downstream of North Berry's Chapel Road.

Discharges for the 10-, 2-, 1-, and 0.2-percent-annual-chance recurrence intervals for Cartwright Creek were determined by Neel-Schaffer, Inc., using a rainfall-runoff model. The HEC-1 computer model was used to compute flood hydrographs and peak discharges using the U.S. Soil Conservation Service methodology described in Technical Release 55 (Reference 11). Rainfall intensities, durations, and frequencies from TP-40 were input in the HEC-1 computer model to determine peak discharges.

Peak discharge values for the 50, 10, 2, 1, and 0.2 percent annual chance frequencies for Cartwright Creek were computed using USGS regression equations for Tennessee. The peak discharges for the 0.2 percent annual chance frequency were extrapolated graphically.

The 1 percent annual chance discharges from Spencer Creek and Dry Branch were calculated using the procedure outlined in the publication, "Technique for Estimating Magnitude and Frequency of Floods in Tennessee."(Reference 4).

Countywide Analyses

For the January 16, 2003 countywide study, discharge-frequency relationships for Beech Creek, Trace Creek, Brush Creek, Leipers Fork, Hunting Camp Creek and its tributaries, East Fork Creek, Harrison Branch Creek, South Prong Creek, Unnamed Tributary to South Prong Creek, Watson Branch, and Owl Creek were determined using the procedure outlined in the publication, "Flood Frequency of Streams in Rural Basins of Tennessee" (Reference 12). South Prong Creek discharges were changed due to a storage routing above the Interstate 65 culverts. Watson Branch hydrology was updated with additional information from the hydrologic analysis contained in a report entitled, "Drainage Calculations for First Baptist Church South Access Road across Watson's Branch" (Reference 13).

For the Mill Creek and Unnamed Tributary to Mill Creek analyses, an existing study

entitled "Regional Detention Study for the Mill Creek Basin, Williamson County, Tennessee" was used (Reference 14).

Discharge-frequency relationships for Mill Creek were developed by HEC-1, Flood Hydrograph Package model. For the remaining streams, USGS regression equations were used to determine appropriate stream flows.

For the September 29, 2006 revision, discharges for the 10-, 2-, 1-, and 0.2-percent-annual-chance recurrence intervals for all new or restudied detail study streams and discharges for the 1 percent annual chance recurrence interval for all new or restudied limited detail study streams in Williamson County were determined using the USGS regression equations for the H2 and H3 hydrologic regions of Tennessee as described in USGS Water Resource Investigation (WRI) Reports 03-4176 and 94-4002 (References 15 and 16).

For this December 22, 2016 revised countywide FIS, new hydrologic analyses were performed by the USACE, Nashville District, along the Harpeth River and South Harpeth River and BakerAECOM performed new hydrologic analyses along the Little Harpeth River Tributaries 4, 5 & 6.

For the Harpeth River, flood discharges for the 10-, 4-, 2-, 1- and 0.2-percent annual chance discharges were computed using the USACE's HEC-HMS model (Reference 17). The hydrologic modeling approach is described in the December 2012 report entitled "Harpeth River Watershed, HEC-HMS Analysis", and prepared by USACE, Nashville District (Reference 18).

The modeling approach consists of:

- Clark unit hydrograph method with initial estimates of the time of concentration (Tc) and the storage coefficient (R) estimated with regression equations developed by the Nashville District of USACE;
- Initial and Constant Loss method for infiltration with the initial estimates based on soil type and land use conditions; and
- Muskingum-Cunge channel routing method.

The model parameters described above were calibrated to observed rainfall and runoff data for the February 2004, May 2009, and May 2010 flood events at five gaging stations on the Harpeth River:

- Harpeth River at Kingston Springs, TN (03434500), drainage area = 681 square miles;
- Harpeth River at Bellevue, TN (03433500), drainage area = 408 square miles;
- Harpeth River below Franklin, TN (03432400), drainage area = 210 square miles;
- Harpeth River at Franklin, TN (03432350), drainage area = 191 square miles; and
- Harpeth River at McDaniel Street (03432100), drainage area = 66.6 square miles.

For calibration of the HEC-HMS model to the observed events, a combination of NEXRAD and recorded rainfall data were used. The May 2010 event was difficult to

calibrate at Kingston Springs and Bellevue due to lack of observed stream flow data when the gaging station was not functional during the extreme portions of the event. The calibrated model parameters and precipitation data from NOAA Atlas 14, Volume 2 (Reference 19), were used to estimate the 10-, 4-, 2-, 1-, and 0.2 percent annual chance discharges at several locations along the Harpeth River as shown in Table 2, "Summary of Discharges." The final flood discharges are documented in a January 17, 2014 Memorandum from the USACE, Nashville District (Reference 20). Bulletin 17B (Reference 6) type analyses were performed using the USACE HEC-SSP program (Reference 21) at the Harpeth River gaging stations at Kingston Springs, Bellevue, and Franklin, TN, and the flood discharges were compared to the HEC-HMS discharges. The gaging station estimates and HEC-HMS estimates were in close agreement.

For the South Harpeth River, the 10-, 4-, 2-, 1-, and 0.2-percent-annual-chance flood discharges were computed using the rural regression equations in U.S. Geological Survey Water Resources Investigations Report 03-4176 (Reference 15).

For the new hydrologic analyses along Little Harpeth River Tributaries 4, 5, & 6, BakerAECOM developed a rainfall-runoff model using the USACE's HEC-HMS Version 3.5 software for 10-, 4-, 2-, 1-, and 0.2-percent annual chance discharges (Reference 22). NRCS Curve Number approach was used to calculate the watershed loss and excess precipitation of runoff was determined using the SCS Unit Hydrograph method. The Muskingum-Cunge 8-point method was used to route and attenuate flood hydrographs through the sub-basins. This method was chosen because it relies on measureable physical input parameters such as channel slope, reach length, channel geometry, and Manning's "n" value. The channel geometry (eight point shape) for each reach was determined based on the channel field survey.

Along Little Harpeth River Tributary 5, the undersized culvert opening at the Railroad crossing creates a storage area upstream of the railroad. Because of this, known water-surface elevations were used upstream of the railroad, based on elevations calculated at the structure in the HEC-HMS rainfall-runoff model.

A summary of the drainage area-peak discharge relationships for all of the streams is shown in Table 6, "Summary of Discharges."

Table 6 - Summary of Discharges

Detailed Study Streams						
		Peak Discharges (cubic feet per second)				
Flooding Source and Location	Drainage Area (Sq Miles)	10-Percent-Annual-Chance	4-Percent-Annual-Chance	2-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
AENON CREEK						
Just 0.83 mile downstream of Duplex Road	7.15	2,770	*	4,180	4,630	6,300
Just downstream of confluence of West Fork Aenon Creek	5.75	2,350	*	3,550	3,930	5,360

*Data not available

Table 6 - Summary of Discharges - continued

Detailed Study Streams

Flooding Source and Location	Drainage Area (Sq Miles)	Peak Discharges (cubic feet per second) 10-Percent-Annual-Chance	4-Percent-Annual-Chance	2-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
ARRINGTON CREEK						
Just upstream of confluence with Harpeth River	15.1	4,523	*	6,488	7,334	9,279
At Murfreesboro Road	9.2	3,117	*	4,500	5,093	6,463
Approximately 0.61 mile upstream of Murfreesboro Road	8.1	2,825	*	4,085	4,626	5,875
At river mile 4.20	7.1	2,556	*	3,703	4,194	5,331
Just upstream of confluence of McCanless Branch	6.5	2,393	*	3,470	3,932	5,000
Just upstream of confluence of Arrington Creek Tributary 3	3.5	1,473	*	2,154	2,445	3,121
At river mile 6.92	2.2	1,029	*	1,514	1,721	2,203
At river mile 7.60	1.2	678	*	1,004	1,143	1,468
BEECH CREEK						
At the confluence with Little Harpeth River	5.12	2,160	*	3,255	3,745	4,915
At river mile 0.91	4.26	1,910	*	2,880	3,310	4,350
At river mile 1.42	3.80	1,765	*	2,665	3,065	4,030
At river mile 1.74	3.14	1,555	*	2,345	2,700	3,550
At river mile 2.11	2.84	1,450	*	2,190	2,525	3,550
BRUSH CREEK						
At river mile 3.30	7.96	2,150	*	3,400	3,950	5,300
At river mile 4.37	6.76	1,900	*	3,000	3,500	4,700
At river mile 5.57	4.56	1,450	*	2,300	2,650	3,600
At river mile 7.49	1.85	800	*	1,250	1,450	1,950
CARTWRIGHT CREEK						
At the confluence with Harpeth River	5.31	3,270	*	4,910	5,690	7,760
Just upstream of Hillsboro Road	4.34	2,860	*	4,260	4,930	6,690
Just downstream of Beech Road	1.30	860	*	1,280	1,490	2,030
Approximately 0.1 mile downstream of Log Cabin Trail	1.02	700	*	1,040	1,200	1,630
DRY BRANCH						
At the confluence with Spencer Creek	2.26	*	*	2,105	*	*

*Data not available

Table 6 - Summary of Discharges - continued

Flooding Source and Location	Drainage Area (Sq Miles)	Detailed Study Streams Peak Discharges (cubic feet per second) 10-Percent-Annual-Chance	4-Percent-Annual-Chance	2-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
EAST FORK CREEK						
At river mile 0.3	8.71	2,300	*	3,600	4,200	5,600
At river mile 2.15	7.14	2,000	*	3,150	3,650	4,900
At river mile 3.04	4.30	1,400	*	2,200	2,550	3,450
At river mile 4.86	2.10	850	*	1,350	1,550	2,100
FIVEMILE CREEK						
At confluence with Harpeth River	9.65	3,470	*	5,240	5,800	7,880
Just downstream of confluence of Goose Creek	7.51	2,880	*	4,340	4,800	6,530
Approximately 0.5 mile upstream of Goose Creek Bypass	4.90	2,100	*	3,170	3,510	4,780
GRASSY BRANCH						
Approximately 0.6 mile upstream of Duplex Road	2.15	1,120	*	1,700	1,880	2,570
HARPETH RIVER						
Approximately 900 feet upstream of SR-100 (Bellevue Gage)	408	23,155	29,110	33,660	39,550	54,240
Approximately 1,500 feet upstream of confluence of Little Harpeth River	361	22,260	27,850	32,100	37,570	51,010
Just downstream of US-431 (The below Franklin, TN Gage)	210	16,720	20,530	23,360	27,000	35,780
Just upstream of State Route 96/ Murfreesboro Road (The above Franklin, TN Gage)	190	16,500	20,200	22,910	26,400	34,820
Approximately 0.75 mile upstream of I-65	178	15,860	19,370	21,920	25,240	33,260
HARPETH RIVER US-431 EAST SPLIT						
At the divergence from the Harpeth River	NA[1]	70	1,290	2,840	5,370	12,080

[1] This is a split flow reach modeled with the Harpeth River

*Data not available

Table 6 - Summary of Discharges - continued

Flooding Source and Location	Drainage Area (Sq Miles)	Detailed Study Streams Peak Discharges (cubic feet per second) 10-Percent-Annual-Chance	4-Percent-Annual-Chance	2-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
HARPETH RIVER US-431 WEST SPLIT						
At the divergence from the Harpeth River	NA[1]	20	510	900	1,390	2,580
HARRISON BRANCH CREEK						
At confluence with Brush Creek	2.30	900	*	1,450	1,650	2,250
At river mile 0.81	1.70	750	*	1,150	1,350	1,850
At river mile 1.39	1.16	550	*	900	1,050	1,400
HUNTING CAMP CREEK						
At confluence with South Harpeth River	5.16	1,600	*	2,500	2,900	3,950
At river mile 0.98	4.32	1,400	*	2,400	2,550	3,500
At river mile 2.31	3.12	1,100	*	1,750	2,050	2,800
At river mile 3.32	0.94	480	*	770	900	1,230
At river mile 3.46	0.66	370	*	600	700	970
HUNTING CAMP CREEK TRIBUTARY NO. 2						
At confluence with Hunting Camp Creek	1.16	560	*	890	1,040	1,420
HUNTING CAMP CREEK TRIBUTARY NO. 3						
At confluence with Hunting Camp Creek	1.41	640	*	1,010	1,190	1,620
HUNTING CAMP CREEK TRIBUTARY NO. 4						
At confluence with Hunting Camp Creek Tributary No. 3	0.57	340	*	540	640	870
HUNTING CAMP CREEK TRIBUTARY NO. 5						
At confluence with Hunting Camp Creek Tributary No. 2	0.16	140	*	220	260	370

[1] This is a split flow reach modeled with the Harpeth River

*Data not available

Table 6 - Summary of Discharges - continued

Detailed Study Streams

Flooding Source and Location	Drainage Area (Sq Miles)	Peak Discharges (cubic feet per second) 10-Percent-Annual-Chance	4-Percent-Annual-Chance	2-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
LEIPERS FORK						
At confluence with West Harpeth River	28.40	7,830	*	11,780	13,050	17,600
Approximately 0.24 mile downstream of Floyd Road	26.00	7,330	*	11,030	12,210	16,480
At Bailey Road	22.30	6,530	*	9,830	10,880	14,700
At river mile 3.5	18.92	3,950	*	6,150	7,150	9,500
At river mile 4.4	16.11	3,550	*	5,500	6,400	8,550
At river mile 4.7	8.79	2,300	*	3,600	4,200	5,650
At river mile 6.0	6.24	1,800	*	2,850	3,300	4,450
LIBERTY CREEK						
At mile 87.4 of Harpeth River	0.60	450	*	675	780	1,000
LITTLE EAST FORK						
At mouth	4.25	1,324	*	2,090	2,450	3,990
At approximately 2.32 miles	2.32	860	*	1,360	1,590	2,700
At approximately 2.66 miles	1.17	520	*	820	970	1,720
LITTLE HARPETH RIVER						
At confluence with Harpeth River	46.70	10,500	*	16,800	18,800	24,000
Approximately 0.6 mile upstream of U.S. Route 431	27.40	6,980	*	11,100	12,500	16,100
LITTLE HARPETH RIVER TRIBUTARY 4						
At Mouth	2.6	930	1,360	1,720	2,100	3,090
Approximately 1,200 feet upstream of CSX Railroad (east crossing)	2.4	880	1,270	1,610	1,970	2,890
Just downstream of CSX Railroad (west crossing)	2.04	830	1,200	1,520	1,870	2,760
Just downstream of Interstate 65	2.02	820	1,200	1,510	1,860	2,740
Approximately 120 feet downstream of Shenandoah Drive	1.97	800	1,170	1,480	1,820	2,680
Just downstream of Shenandoah Drive	0.6	220	320	410	500	740
LITTLE HARPETH RIVER TRIBUTARY 5						
At Mouth	0.35	50	70	80	850	110

*Data not available

Table 6 - Summary of Discharges - continued

Detailed Study Streams

Flooding Source and Location	Drainage Area (Sq Miles)	Peak Discharges (cubic feet per second) 10-Percent-Annual-Chance	4-Percent-Annual-Chance	2-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
LITTLE HARPETH RIVER TRIBUTARY 5 (continued)						
Upstream of CSX Railroad[2]	0.33	140	210	260	310	450
LITTLE HARPETH RIVER TRIBUTARY 6						
At Mouth	0.6	300	430	530	640	920
LYNNWOOD BRANCH						
At confluence with Harpeth River	4.73	2,090	*	3,327	3,940	5,785
At approximately 0.831 mile	3.92	1,761	*	2,898	3,437	5,160
At approximately 1.577 miles	3.23	1,498	*	2,504	2,985	4,408
At approximately 2.144 miles	2.01	948	*	1,596	1,894	2,731
MCCUTCHEON CREEK						
400 feet downstream of private drive	3.05	1,460	*	2,210	2,440	3,340
MILL CREEK						
Just upstream of confluence of Owl Creek	21.90	8,823	*	14,037	16,437	24,293
At river mile 22.49	12.18	5,850	*	9,200	10,750	15,850
At river mile 23.72	11.31	5,500	*	8,750	10,250	15,050
At river mile 24.14	6.21	3,150	*	4,950	5,800	8,500
OWL CREEK						
At confluence with Mill Creek	13.01	4,050	*	6,100	7,000	9,150
At river mile 1.90	8.99	3,150	*	4,750	5,450	7,150
At river mile 2.53	4.72	2,050	*	3,100	3,550	4,650
At river mile 4.39	3.22	1,600	*	2,400	2,750	3,600
SHARPS BRANCH						
At confluence with Harpeth River	2.60	1,300	*	1,940	2,240	2,900
At 9th Avenue Bridge	2.20	1,150	*	1,720	1,980	2,570
At Highway 96 Bridge	1.92	1,040	*	1,560	1,800	2,330

[2]Due to storage upstream of CSX railroad, discharges decrease in the downstream direction

*Data not available

Table 6 - Summary of Discharges - continued

Detailed Study Streams

Flooding Source and Location	Drainage Area (Sq Miles)	Peak Discharges (cubic feet per second) 10-Percent-Annual-Chance	4-Percent-Annual-Chance	2-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
SHARPS BRANCH (continued)						
An Unnamed Tributary at river mile 0.8	1.25	770	*	1,150	1,320	1,710
At Natchez Trace bridge	1.00	650	*	980	1,130	1,460
SOUTH HARPETH RIVER						
Approximately 2,500 feet upstream of Old Harding Road	40.70	6,480	8,360	9,800	11,270	14,910
SOUTH PRONG CREEK						
At confluence with Spencer Creek	2.77	1,150	*	1,600	1,850	2,300
Above tributary at river mile 0.88	1.85	800	*	1,100	1,250	1,550
At river mile 1.43	1.05	750	*	1,100	1,300	1,700
SPENCER CREEK						
Just upstream of Mack Hatcher Bypass	10.10	*	*	*	6,960	*
Above confluence with Dry Branch	6.79	*	*	*	5,166	*
TRACE CREEK						
At mile 0.00	6.74	2,600	*	3,900	4,500	5,900
At mile 0.60	4.37	1,950	*	2,900	3,350	4,400
At mile 1.60	2.36	1,300	*	1,950	2,250	3,000
UNNAMED TRIBUTARY TO MILL CREEK						
At river mile 0.12	4.30	2,050	*	3,300	3,900	5,750
UNNAMED TRIBUTARY TO SOUTH PRONG CREEK						
At confluence with South Prong Creek	0.39	650	*	1,000	1,150	1,500
WATSON BRANCH						
At confluence with Harpeth River	4.67	1,520	*	2,120	2,300	2,640
At river mile 0.79	4.08	1,390	*	1,940	2,100	2,410
At river mile 1.55	3.31	1,210	*	1,690	1,830	2,100
At river mile 2.91	2.16	900	*	1,270	1,370	1,580

*Data not available

Table 6 - Summary of Discharges - continued

Detailed Study Streams

Flooding Source and Location	Drainage Area (Sq Miles)	Peak Discharges (cubic feet per second) 10-Percent-Annual-Chance	4-Percent-Annual-Chance	2-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
WEST HARPETH RIVER						
Just downstream of confluence of Leipers Fork	96.00	15,610	*	25,610	30,300	42,010
Approximately 400 feet downstream of Old Route 96	66.90	11,890	*	19,530	23,100	32,100
Just downstream of confluence of Murfrees Fork	66.70	11,860	*	19,490	23,050	32,030

*Data not available

Table 6. Summary of Discharges- continued

Limited Detail Study Streams

Flooding Source and Location	Drainage Area (sq. mi.)	Peak Discharges (Cubic Feet per Second) 10-Percent-Annual-Chance	2-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
ADEN CAMP BRANCH					
Just upstream of confluence with Little Turnbull Creek	2.3	*	*	1,429	*
At river mile 1.06	1.3	*	*	959	*
AENON CREEK					
Just upstream of confluence of West Fork Aenon Creek	3.9	*	*	2,661	*
ARKANSAS CREEK					
Just upstream of confluence with South Harpeth River	7.2	*	*	3,170	*
Just upstream of confluence of Harpendene Branch	4.1	*	*	2,131	*
ARRINGTON CREEK TRIBUTARY 1					
Just upstream of confluence with Arrington Creek	2.3	*	*	1,802	*
Just upstream of confluence with Arrington Creek Tributary 2	1.0	*	*	999	*
ARRINGTON CREEK TRIBUTARY 2					
Just upstream of Murfreesboro Road	0.7	*	*	757	*

*Data not available

Table 6. Summary of Discharges-continued

Limited Detail Study
Streams

Flooding Source and Location	Drainage Area (sq. mi.)	Peak Discharges (Cubic Feet per Second) 10-Percent-Annual-Chance	2-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
ARRINGTON CREEK TRIBUTARY 3					
Just upstream of confluence with Arrington Creek	3.0	*	*	2,219	*
Just upstream of confluence with Arrington Creek Tributary 4	1.7	*	*	1,431	*
At river mile 0.67	1.1	*	*	1,045	*
ARRINGTON CREEK TRIBUTARY 4					
Just upstream of confluence with Arrington Creek Tributary 3	1.3	*	*	1,156	*
ARRINGTON CREEK TRIBUTARY 5					
Just upstream of confluence with Arrington Creek Tributary 3	0.5	*	*	618	*
BIG TURNBULL CREEK					
Just upstream of Williamson County boundary	12.9	*	*	4,765	*
Approximately 0.67 mile upstream of Williamson County boundary	11.0	*	*	4,264	*
Just upstream of Old Franklin Road	7.9	*	*	3,376	*
BRUSH CREEK					
At river mile 3.93	1.8	*	*	1,188	*
At Horn Tavern Road	1.2	*	*	884	*
BRUSH CREEK TRIBUTARY 1					
Just upstream of confluence with Brush Creek	1.0	*	*	768	*
At river mile 0.57	0.5	*	*	489	*
BURKE BRANCH					
Just upstream of confluence with Mayes Creek	4.8	*	*	3,129	*
At river mile 1.44	3.4	*	*	2,422	*

* Data not available

Table 6. Summary of Discharges- continued

Limited Detail Study Streams

Flooding Source and Location	Drainage Area (sq. mi.)	Peak Discharges (Cubic Feet per Second) 10-Percent-Annual-Chance	2-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
CANEY FORK CREEK					
Just upstream of confluence with South Harpeth River	6.4	*	*	2,907	*
At river mile 1.06	5.4	*	*	2,565	*
DRY BRANCH					
At Mallory Station Road	1.7	*	*	1,460	*
FIVEMILE CREEK					
Just upstream of confluence of Fivemile Creek Tributary 1	2.8	*	*	2,064	*
At river mile 3.59	2.1	*	*	1,672	*
FIVEMILE CREEK TRIBUTARY 1					
Just upstream of confluence with Fivemile Creek	2.3	*	*	1,793	*
At Interstate 65	1.0	*	*	973	*
FLAT CREEK					
Just upstream of Williamson County boundary	9.9	*	*	5,343	*
Approximately 0.93 mile upstream of Williamson County boundary	6.3	*	*	3,847	*
FLAT ROCK CREEK					
Just upstream of Williamson County Boundary	5.3	*	*	2,545	*
Approximately 0.54 mile upstream of Williamson County boundary	4.0	*	*	2,077	*
Approximately 1.69 mile upstream of Williamson County boundary	2.9	*	*	1,651	*
Approximately 0.49 mile downstream of Horn Tavern Road	1.8	*	*	1,188	*
Just upstream of confluence of Flat Rock Creek Tributary 1	0.8	*	*	651	*
FLAT ROCK CREEK TRIBUTARY 1					
Just upstream of confluence with Flat Rock Creek	0.6	*	*	517	*

* Data not available

Table 6. Summary of Discharges- continued

Limited Detail Study Streams

Flooding Source and Location	Drainage Area (sq. mi.)	Peak Discharges (Cubic Feet per Second) 10-Percent-Annual-Chance	2-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
GOOSE CREEK					
Just upstream of confluence with Fivemile Creek	2.2	*	*	1,769	*
Just downstream of Lewisburg Pike	1.0	*	*	975	*
GRASSY BRANCH					
Just upstream of confluence of Grassy Branch Tributary 1	1.6	*	*	1,403	*
GRASSY BRANCH TRIBUTARY 1					
Just upstream of confluence with Grassy Branch	0.6	*	*	636	*
HARPENDENE BRANCH					
Just upstream of confluence with Arkansas Creek	2.8	*	*	1,614	*
At river mile 1.23	1.9	*	*	1,225	*
HARPETH RIVER TRIBUTARY 1					
Just upstream of confluence with Harpeth River	2.5	*	*	1,946	*
At river mile 1.37	2.0	*	*	1,618	*
HARRISON BRANCH CREEK					
At river mile 2.27	0.8	*	*	678	*
HICKMAN BRANCH					
Just upstream of confluence with Little Turnbull Creek	0.7	*	*	587	*
KELLEY CREEK					
Just upstream of confluence with South Harpeth Creek	5.8	*	*	2,708	*
LIBERTY CREEK					
Just downstream of Eddy Lane	0.8	*	*	1,023	*
At river mile 1.15	0.4	*	*	596	*

* Data not available

Table 6. Summary of Discharges - continued

Limited Detail Study Streams

Flooding Source and Location	Drainage Area (sq. mi.)	Peak Discharges (Cubic Feet per Second) 10-Percent-Annual-Chance	2-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
LICK CREEK					
Just upstream of Williamson County boundary	19.6	*	*	6,400	*
Approximately 0.46 mile upstream of Williamson County boundary	17.2	*	*	5,835	*
LINTON BRANCH					
Just upstream of Williamson County boundary	1.6	*	*	1,072	*
LITTLE HARPETH RIVER					
Just downstream of Moores Lane	6.0	*	*	3,680	*
Approximately 0.33 mile upstream of Moores Lane	5.0	*	*	3,213	*
Just downstream of Overcheck Lane	2.6	*	*	1,990	*
LITTLE HARPETH RIVER TRIBUTARY 1					
Just upstream of confluence with Little Harpeth River	1.4	*	*	1,219	*
LITTLE HARPETH RIVER TRIBUTARY 2					
Just upstream of confluence with Little Harpeth River	1.4	*	*	1,480	*
Just upstream of confluence of Little Harpeth River Tributary 3	0.4	*	*	583	*
LITTLE HARPETH RIVER TRIBUTARY 3					
Just upstream of confluence of Little Harpeth River Tributary 2	0.8	*	*	1,026	*

* Data not available

Table 6. Summary of Discharges- continued

Limited Detail Study Streams

Flooding Source and Location	Drainage Area (sq. mi.)	Peak Discharges (Cubic Feet per Second) 10-Percent-Annual-Chance	2-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent Annual-Chance
LITTLE HARPETH RIVER TRIBUTARY 7					
Just upstream of confluence of Little Harpeth River	2.5	*	*	1,893	*
Just upstream of confluence of Little Harpeth River Tributary 8	2.0	*	*	1,644	*
Just upstream of confluence of Little Harpeth River Tributary 10	1.4	*	*	1,217	*
Just upstream of confluence of Little Harpeth River Tributary 9	0.8	*	*	813	*
LITTLE HARPETH RIVER TRIBUTARY 8					
Just upstream of confluence with Little Harpeth River Tributary 7	0.3	*	*	408	*
LITTLE HARPETH RIVER TRIBUTARY 9					
Just upstream of confluence with Little Harpeth River Tributary 7	0.4	*	*	478	*
LITTLE HARPETH RIVER TRIBUTARY 10					
Just upstream of confluence with Little Harpeth River Tributary 7	0.7	*	*	717	*
Just upstream of confluence of Little Harpeth River Tributary 11	0.4	*	*	499	*
LITTLE HARPETH RIVER TRIBUTARY 11					
Just upstream of confluence with Little Harpeth River Tributary 10	0.4	*	*	502	*

* Data not available

Table 6. Summary of Discharges - continued

Limited Detail Study Streams

Flooding Source and Location	Drainage Area (sq. mi.)	Peak Discharges (Cubic Feet per Second) 10-Percent-Annual-Chance	2-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
LITTLE TURNBULL CREEK					
Just upstream of Williamson County boundary	5.6	*	*	2,641	*
Just upstream of Crow Cut Road	4.8	*	*	2,369	*
Just upstream of confluence of Aden Camp Branch	1.9	*	*	1,251	*
Just upstream of Dice Lampley Road	1.5	*	*	1,055	*
Just upstream of Little Turnbull Creek Tributary 1	0.6	*	*	544	*
LITTLE TURNBULL CREEK TRIBUTARY 1					
Just upstream of confluence with Little Turnbull Creek	0.2	*	*	257	*
MAYES CREEK					
Just upstream of confluence with Harpeth River	15.3	*	*	7,407	*
At river mile 1.48	13.5	*	*	6,762	*
At river mile 2.70	9.9	*	*	5,365	*
Just upstream of confluence of Burke Branch	2.5	*	*	1,901	*
At river mile 4.07	1.7	*	*	1,448	*
McCANLESS BRANCH					
Just upstream of confluence with Arrington Creek	3.9	*	*	2,659	*
At river mile 0.89	3.3	*	*	2,357	*
McCRORY CREEK					
Just upstream of confluence with Harpeth River	11.6	*	*	6,036	*
At river mile 1.42	10.9	*	*	5,747	*
At river mile 1.74	9.9	*	*	5,357	*
At river mile 2.57	9.4	*	*	5,142	*
At river mile 2.74	8.0	*	*	4,566	*
At river mile 3.26	7.1	*	*	4,164	*
Just downstream of Arno-College Grove Road	6.1	*	*	3,732	*

* Data not available

Table 6. Summary of Discharges- continued

Limited Detail Study Streams

Flooding Source and Location	Drainage Area (sq. mi.)	Peak Discharges (Cubic Feet per Second) 10-Percent-Annual-Chance	2-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
MCCUTCHEON CREEK					
Approximately 0.12 mile downstream of Amacher Drive	1.4	*	*	1,264	*
MILLCREEK					
Just upstream of Rocky Fork Road	6.7	*	*	4,016	*
At river mile 4.64	5.0	*	*	3,220	*
At river mile 5.02	3.9	*	*	2,657	*
At river mile 5.68	2.6	*	*	2,002	*
NORTH FORK LICK BRANCH					
Just upstream of confluence with Lick Creek	8.5	*	*	3,554	*
Approximately 450 feet upstream of Old Lick Creek Road	7.6	*	*	3,274	*
OVERALL CREEK					
Just upstream of confluence with Harpeth River	12.1	*	*	6,216	*
Just upstream of Bellenfant Road	11.3	*	*	5,917	*
At river mile 2.08	10.5	*	*	5,610	*
At river mile 2.76	8.6	*	*	4,813	*
At river mile 3.37	6.5	*	*	3,899	*
SOUTH FORK LICK BRANCH					
Just upstream of confluence with Lick Creek	7.7	*	*	3,306	*
Just downstream of South Lick Creek Road	6.7	*	*	2,994	*
SOUTH HARPETH CREEK					
Just upstream of confluence with South Harpeth River	11.1	*	*	4,272	*
SOUTH HARPETH RIVER					
Just upstream of Caney Fork Creek	19.4	*	*	6,353	*

* Data not available

Table 6. Summary of Discharges- continued

Limited Detail Study
Streams

Flooding Source and Location	Drainage Area (sq. mi.)	Peak Discharges (Cubic Feet per Second) 10-Percent-Annual-Chance	2-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
STARNES CREEK					
Just upstream of confluence with Harpeth River	7.0	*	*	4,161	*
Just upstream of Meeks Road	5.6	*	*	3,512	*
Approximately 1.11 miles Upstream of Meeks Road	4.7	*	*	3,084	*
Approximately 490 feet downstream of Peytonsville-Trinity Road	2.4	*	*	1,865	*
UNNAMED TRIBUTARY 2 TO HARPETH RIVER					
Just upstream of confluence with Harpeth River	1.7	*	*	1,811	*
UNNAMED TRIBUTARY TO MILLCREEK					
Just upstream of confluence with Mill Creek	4.2	*	*	2,846	*
At river mile 1.09	2.8	*	*	2,108	*
WEST FORK AENON CREEK					
Just upstream of confluence with Aenon Creek	2.7	*	*	2,041	*
At river mile 0.75	2.2	*	*	1,766	*

* 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.

Pre-countywide Analysis

Each community within Williamson County, with the exception of the City of Fairview, has a previously printed FIS report narrative. The hydraulic analyses described in those narratives have been compiled and are summarized below.

Water-surface elevations of floods for the following streams were computed through use of the USACE HEC-2 water-surface profiles computer program: Sharps Branch, Liberty Creek, Little Harpeth River, Harpeth River, West Harpeth River, South Harpeth River, Murfrees Fork, Leipers Fork, Fivemile Creek, McCutcheon Creek, Aenon Creek, Grassy Branch, Little East Fork, Lynnwood Branch, Beech Creek, and Cartwright Creek (References 23 and 24).

Cross sections for the backwater analyses of Little Harpeth River, Harpeth River, West Harpeth River, South Harpeth River, Murfrees Fork, Leipers Fork, Fivemile Creek, McCutcheon Creek, Aenon Creek, Grassy Branch, Little East Fork, Lynwood Branch, Beech Creek, and Cartwright Creek were field-surveyed at bridges and other strategic locations, and supplemented by valley cross sections taken using photogrammetric methods (Reference 25). Sections were located at close intervals above and below bridges and culverts in order to compute the significant backwater effects of these structures in the highly urbanized areas; additional valley sections were obtained between hydraulic structures as needed.

Existing cross sections used in previous hydrologic studies were supplemented with field surveyed cross sections and cross sections from the City of Franklin two-feet control maps to facilitate more precise computations of floodway limits.

Roughness coefficients (Manning's "n") used in the hydraulic computations were determined on the basis of field inspection of the channels and floodplain areas.

Starting water-surface elevations for the following streams were calculated using the slope/area method: Little East Fork, Lynnwood Branch, Beech Creek, Cartwright Creek, Sharps Branch, and Liberty Creek.

For Beech Creek, Cartwright Creek, Little East Fork, and Lynwood Branch, the 100-year and 500-year floodplain boundaries have been delineated using the flood

elevations determined at each cross section. Between cross sections, the boundaries were interpolated using topographic maps at scales of 1:24,000 and 1:1,200 with contour intervals of 20, 10, and 5 feet (References 26 and 27).

Countywide Analysis

For the January 16, 2003 countywide study, cross sections and geometry of hydraulic structures used in the study were obtained by field surveying methods.

Roughness factors were developed from field investigations and guidance provided in USGS Water-Supply Paper 2339 (Reference 28).

The Hydrologic Engineering Center's River Analysis System model (HEC-RAS) version 2.0 (Reference 29) was used to develop all water-surface profiles except for the upper portion of Hunting Camp Creek and its tributaries, and a portion of South Prong Creek. For these water-surface profiles, version 2.2 was used (Reference 30).

Flood profiles were drawn showing the computed water-surface elevations to an accuracy of 0.5 foot, for floods of the selected recurrence intervals.

For the September 26, 2006 revision, cross section geometries were obtained from a combination of digital terrain data provided by Williamson County and field surveys. For detail study streams, all bridges, dams, and culverts were field surveyed to obtain elevation data and structural geometry. Selected cross sections were field surveyed along the streams to determine channel geometries between bridges and culverts. For limited detail study streams, all structure openings were field measured.

Starting conditions for the hydraulic models were set to normal depth using a starting slope calculated from values taken from topographic data or, where applicable, derived from the water surface elevations of existing effective flood elevations. Water-surface profiles were computed through the use of the U.S. Army Corp of Engineers (USACE) HEC-RAS version 3.1 water-surface profiles computer program (Reference 31). The model was run for the 10, 2, 1, and 0.2 percent annual chance storms for detail study streams and run for the 1 percent annual chance storm for the approximate studies.

For this December 22, 2016 revised countywide FIS, new hydraulic analysis was performed by the USACE, Nashville District, along South Harpeth River, and BakerAECOM performed new hydraulic analyses along Harpeth River in Williamson County and the Little Harpeth River Tributaries 4, 5 & 6.

For Harpeth River and Little Harpeth River Tributaries 4, 5 & 6, water surface elevations were computed using the USACE's HEC-RAS computer program (Reference 32). Cross section elevations for all four streams were extracted from a Digital Elevation Model (DEM) developed from 2011 LiDAR (Reference 33) data and field surveyed channel geometry. The DTM was generated by combining overbank elevation data from LiDAR with data from traditional field survey of the stream channel and its immediate overbank areas. All bridges and culverts were field surveyed to provide data on elevation, orientation, and structural geometry. Thalweg survey shots were collected along the studied streams between the field surveyed cross

sections and structures. All field survey data for structures and stream channels was provided by BakerAECOM.

The HEC-RAS model along Harpeth River was calibrated to the May 2010 event using high-water marks collected by FEMA and USACE.

For South Harpeth River, cross section and bridge data was developed from field survey and existing models combined with overbank data from a 2011 LiDAR (Reference 33) DEM. Photos and measurements were taken at all bridges. Detailed survey was performed on structures that were significantly different or when they were not included in the existing model. Additional sections were added for model stability, definition, and HEC-GeoRAS floodplain delineation. HEC-GeoRAS was used to import the stream alignment, cross-section locations, cross-section station-elevation data, and reach lengths into HEC-RAS. The overbank station-elevation data was extracted and combined with the channel survey, existing HEC-2/HEC-RAS, and bridge survey data. At new cross-sections where no survey was performed, sections were extracted from the DEM geometry with channel geometry interpolated from bounding sections.

Normal depth slope starting water surface elevations were used for the South Harpeth River, and the Little Harpeth River Tributaries 4, 5, & 6. The Harpeth River model started with known water surface elevations taken from the downstream Harpeth River model developed by USACE in Cheatham, Dickson and Davidson.

For the September 29, 2006 revision, Manning's n-values used in hydraulic computations were field investigated and delineated on USGS Digital Orthophoto Quarter Quads (DOQQ) for both channel and overbank areas. For this revision, Manning's n-values were determined during field reconnaissance and using orthoimagery and photos. Table 7 – "Manning's 'N' Values", provides a listing of roughness coefficients used in the models.

Table 7 - Manning's "N" Values

Detailed Study Streams

Flooding Source	Channel "n"	Overbank "n"
Aenon Creek	0.045-0.050	0.060-0.070
Arrington Creek	0.040-0.052	0.070-0.200
Beech Creek	0.013-0.048	0.030-0.500
Brush Creek	0.030-0.040	0.080-0.400
Cartwright Creek	0.040-0.070	0.080-0.150
East Fork Creek	0.030-0.045	0.020-0.200
Fivemile Creek	0.045-0.050	0.070-0.150
Grassy Branch	0.045-0.055	0.055-0.075
Harpeth River	0.040-0.055	0.085-0.100
Harpeth River US-431 East Split	0.050	0.045-.050
Harpeth River US-431 West Split	0.050	0.035-0.045
Harrison Branch Creek	0.04	0.080-0.100

Table 7 - Manning's “N” Values - continued

Detailed Study Streams

Flooding Source	Channel "n"	Overbank "n"
Hunting Camp Creek	0.04	0.090-0.120
Hunting Camp Creek Tributary No. 2	0.04	0.060-0.100
Hunting Camp Creek Tributary No. 3	0.04	0.1
Hunting Camp Creek Tributary No. 4	0.04	0.1
Hunting Camp Creek Tributary No. 5	0.04	0.1
Leipers Fork	0.030-0.050	0.060-0.150
Little East Fork	0.05	0.1
Little Harpeth River	0.045-0.055	0.1
Little Harpeth River Tributary 4	0.035	0.06-0.15
Little Harpeth River Tributary 5	0.045	0.1
Little Harpeth River Tributary 6	0.045	0.1-0.12
Lynnwood Branch	0.045	0.1
McCutcheon Creek	0.055	0.065-0.075
Mill Creek	0.030-0.045	0.050-0.100
Murfrees Fork	0.045	0.070-0.150
Owl Creek	0.035-0.042	0.070-0.120
Rutherford Creek	0.045-0.055	0.065-0.100
South Harpeth River	0.045-0.060	0.060-0.085
South Prong Creek	0.028-0.045	0.050-0.150
Trace Creek	0.035-0.045	0.075-0.120
Unnamed Tributary to Mill Creek	0.04	0.065-0.070
Unnamed Tributary to South Prong Creek	0.04	0.080-0.090
Watson Branch	0.030-0.040	0.100-0.120
West Harpeth River	0.045-0.050	0.070-0.150

Table 7 - Manning's “N” Values - continued

Limited Detail Study Streams

Flooding Source	Channel "n"	Overbank "n"
Aenon Creek	0.045-0.050	0.060-0.070
Aden Camp Branch	0.05	0.12-0.15
Aenon Creek	0.05	0.15
Arkansas Creek	0.052	0.11-0.15
Arrington Creek Tributary 1	0.05	0.10-0.15
Arrington Creek Tributary 2	0.05	0.15
Arrington Creek Tributary 3	0.051	0.12-0.15
Arrington Creek Tributary 4	0.05	0.10-0.13
Arrington Creek Tributary 5	0.045	0.10-0.15
Big Turnbull Creek	0.05	0.13-0.15
Brush Creek	0.05	0.10-0.13
Brush Creek Tributary 1	0.049	0.15
Burke Branch	0.045	0.10-0.15

Table 7 - Manning's “N” Values - continued

Limited Detail Study Streams

Flooding Source	Channel "n"	Overbank "n"
Canery Fork Creek	0.05	0.12-0.15
Dry Branch	0.035-0.050	0.08-0.15
Fivemile Creek	0.049	0.12-0.15
Fivemile Creek Tributary 1	0.047	0.10-0.14
Flat Creek	0.05	0.10-0.15
Flat Rock Creek	0.035-0.050	0.10-0.15
Flat Rock Creek Tributary 1	0.045-0.050	0.12-0.15
Goose Creek	0.05	0.10-0.15
Grassy Branch	0.05	0.11-0.12
Grassy Branch Tributary I	0.05	0.1
Harpendene Branch	0.05	0.12-0.15
Harpeth River Tributary 1	0.05	0.035-0.15
Harrison Branch Creek	0.035-0.050	0.13-0.15
Hickman Branch	0.05	0.12-0.15
Kelley Creek	0.048	0.04-0.15
Liberty Creek	0.048	0.14-0.15
Lick Creek	0.045	0.10-0.15
Linton Branch	0.05	0.10-0.15
Little Harpeth River	0.05	0.10-0.13
Little Harpeth River Tributary 1	0.05	0.11
Little Harpeth River Tributary 2	0.05	0.1
Little Harpeth River Tributary 3	0.05	0.10-0.15
Little Harpeth River Tributary 7	0.05	0.10-0.15
Little Harpeth River Tributary 8	0.05	0.10-0.15
Little Harpeth River Tributary 9	0.050-0.065	0.1
Little Harpeth River Tributary 10	0.048	0.14
Little Harpeth River Tributary 11	0.045	0.11-0.15
Little Turnbull Creek	0.041-0.046	0.11-0.14
Little Turnbull Creek Tributary 1	0.046	0.12
Mayes Creek	0.049-0.050	0.13-0.15
McCanless Branch	0.052	0.10-0.15
McCrory Creek	0.05	0.10-0.15
McCutcheon Creek	0.045-0.055	0.1
Mill Creek	0.041-0.043	0.10-0.13
North Fork Lick Branch	0.045	0.10-0.15
Overall Creek	0.05	0.10-0.15
South Fork Lick Branch	0.045	0.10-0.14
South Harpeth Creek	0.05	0.12-0.15
South Harpeth River	0.05	0.11-0.15
Starnes Creek	0.05	0.10-0.15

Table 7 - Manning's “N” Values - continued

Limited Detail Study Streams

Flooding Source	Channel "n"	Overbank "n"
Unnamed Tributary 2 to Harpeth River	0.048	0.13-0.15
Unnamed Tributary to Mill Creek	0.040-0.050	0.10-0.13
West Fork Aenon	0.05	0.10-0.15

The Harpeth River model includes two split flow reaches, referred to as US-431 East Split and US-431 West Split. The East split flow reach diverges from Harpeth River just upstream of the crossing with US-431, and empties back into Harpeth River approximately 2.5 miles downstream of the same crossing. The West split flow reach diverges from Harpeth River just downstream of the crossing with US-431 and empties back into the Harpeth River approximately 2.3 miles downstream of the crossing.

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.

Locations of selected cross sections used in the detailed 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).

All elevations are referenced to the North American Vertical Datum of 1988 (NAVD 88). Elevation reference marks (ERMs) used in this study, and their descriptions, are shown on the FIRM. ERMs shown on the FIRM represent those used during the preparation of this and previous FISs. The elevations associated with each ERM were obtained and/or developed during FIS production to establish vertical control for determination of flood elevations and floodplain boundaries shown on the FIRM. Users should be aware that these ERM elevations may have changed since the publication of this FIS. To obtain up-to-date elevation information on National Geodetic Survey (NGS) ERMs 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. Map users should seek verification of non-NGS ERM monument elevations when using these elevations for construction or floodplain management purposes.

3.3 Vertical Datum

All FIS reports and FIRMs are referenced to a specific vertical datum. The vertical datum provides a starting point against which flood, ground, and structure elevations can be referenced and compared. Until recently, the standard vertical datum used for newly created or revised FIS reports and FIRMs was the National Geodetic Vertical Datum of 1929 (NGVD). With the completion of the North American Vertical Datum of 1988 (NAVD), many FIS reports and FIRMs are now prepared using NAVD as the referenced vertical datum.

Flood elevations shown in this FIS report and on the FIRM are referenced to NAVD 88. These flood elevations must be compared to structure and ground elevations

referenced to the same vertical datum. It is important to note that adjacent counties may be referenced to NGVD 29. This may result in differences in base flood elevations across county lines.

For information regarding conversion between the NGVD and NAVD, 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/NGS 12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, MD 20910-3282
(301) 713-3242

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

4.0 FLOODPLAIN MANAGEMENT APPLICATIONS

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

4.1 Floodplain Boundaries

To provide a national standard without regional discrimination, the 1-percent-annual-chance flood has been adopted by FEMA as the base flood for floodplain management purposes. The 0.2-percent-annual-chance flood is employed to indicate additional areas of flood risk in the community. For each stream studied by detailed methods, the 1- and 0.2-percent-annual-chance floodplain boundaries have been delineated using the flood elevations determined at each cross section. For each stream studied by limited detail methods, only the 1-percent-annual-chance floodplain boundaries have been delineated using the flood elevation determined at each cross section. Between cross sections, the boundaries were interpolated using topographic maps, photogrammetric methods and previously printed FISs (References 25, 26, 34-37).

For the January 16, 2003 countywide study, the floodplain boundaries for Hunting

Camp Creek and its tributaries, Mill Creek, Owl Creek, beech Creek, East Fork Creek, Trace Creek, Leipers Fork, Hunting Camp Creek, Brush Creek, and Harrison Branch were taken from USGS Quadrangle maps with contour intervals ranging from 10'-20' with most being 20'. These maps were enlarged to a scale of 1inch equals 500 feet.

Floodplain boundaries within the City of Franklin and portions of the unincorporated areas just outside the City of Franklin corporate limits were delineated using topographic mapping at a scale of 1"=100' with a contour interval of 2 feet (Reference 38). Between Cool Springs Boulevard and Jordan Road, along South Prong Creek, floodplain boundaries were delineated using topographic mapping at a scale of 1 "=50' with a contour interval of 1 foot (Reference 39).

The approximate Zone A floodplain boundaries for Flat Rock Creek were taken from USGS quadrangle maps with contour intervals ranging from 10-20 feet with most being 20 feet. These maps were enlarged to a scale of 1inch equals 500 feet.

For Watson Branch and South Prong of Spencer Creek, digital mapping with a contour interval of 2' was provided by the City of Brentwood.

For the revision dated September 29, 2006, the floodplain boundaries were taken from USGS Quadrangle maps with a scale of 1:6,000 or 1:12,000 and contour intervals of 2'.

For this December 22, 2016 revision, for the newly restudied reach of the Harpeth River, South Harpeth River, and Little Harpeth River Tributaries 4-6, the floodplain boundaries have been delineated using LiDAR for Davidson County/Nashville Metro area in 2011 (Reference 33).

The 1 and 0.2 percent annual chance floodplain boundaries are shown on the FIRM (Exhibit 2). On this map, the 1 percent annual chance floodplain boundary corresponds to the boundary of the areas of special flood hazards (Zones A, AE, and X) and 0.2 percent annual chance floodplain boundary corresponds to the boundary of areas of moderate flood hazards. In cases where the 1 and 0.2 percent annual chance floodplain boundaries are close together, only the 1 percent annual chance floodplain boundary has been shown. Small areas within the floodplain boundaries may lie above the flood elevations, but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data.

4.2 Floodways

Encroachment on floodplains, such as structures and fill, reduces flood-carrying capacity, increases flood heights and velocities, and increases flood hazards in areas beyond the encroachment itself. One aspect of floodplain management involves balancing the economic gain from floodplain development against the resulting increase in flood hazard. For purposes of the NFIP, a floodway is used as a tool to assist local communities in this aspect of floodplain management. Under this concept, the area of the 1-percent-annual-chance floodplain is divided into a floodway and a floodway fringe. The floodway is the channel of a stream, plus any adjacent floodplain areas, that must be kept free of encroachment so that the base flood can be carried without substantial increases in flood heights. Minimum Federal standards limit such

increases to 1 foot, provided that hazardous velocities are not produced. The floodways in this study are presented to local agencies as minimum standards that can be adopted directly or that can be used as a basis for additional floodway studies.

The floodways presented in this revised FIS were computed for certain stream segments on the basis of equal conveyance reduction from each side of the floodplain. Floodway widths were computed at cross sections. Between cross sections, the floodway boundaries were interpolated. The results of the floodway computations are tabulated for selected cross sections in Table 8, "Floodway Data." The computed floodways are shown on the FIRM (Exhibit 2). In cases where the floodway and 1-percent-annual-chance floodplain boundaries are either close together or collinear, only the floodway boundary is shown.

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

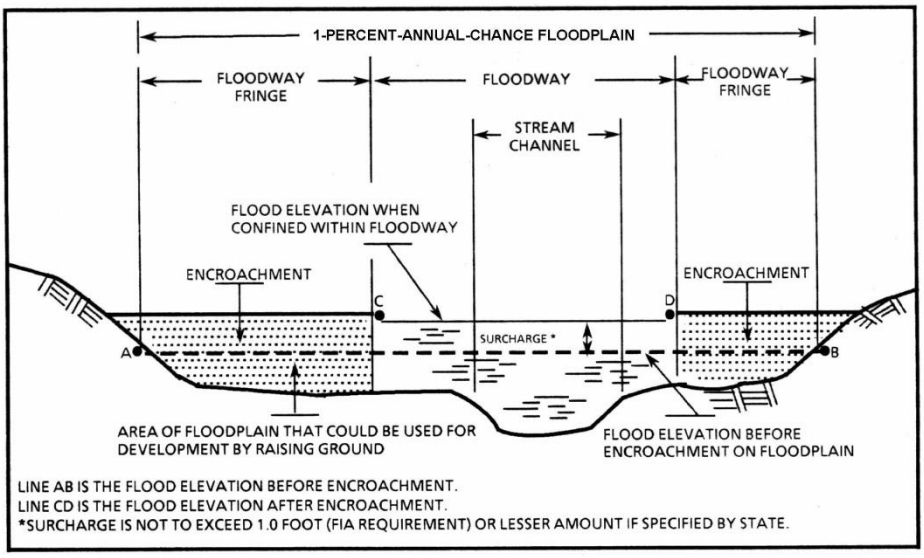

Figure 1 - Floodway Schematic

No floodway was computed for Cartwright Creek as part of this FIS. Portions of the floodways for the Harpeth River, Little Harpeth River, and Owl Creek extend beyond the county boundary.

For this December 22, 2016 revision, the floodways for the Harpeth River, South Harpeth River, and Little Harpeth River Tributaries 4, 5 & 6 have been added or revised.

Near the mouths of streams studied in detail, floodway computations are made without regard to flood elevations on the receiving water body. Therefore, "Without Floodway" elevations presented in Table 8 for certain downstream cross sections of Beech Creek,

Fivemile Creek, Hunting Camp Creek, Little Harpeth River, Owl Creek, Sharps Branch, South Prong Creek, Liberty Creek, and Watson Branch are lower than the regulatory flood elevations in that area, which must take into account the 100-year flooding due to backwater from other sources.

No floodways were computed for streams studied by limited detail methods.

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (NAVD)	WITHOUT FLOODWAY (NAVD)	WITH FLOODWAY (NAVD)	INCREASE
AENON CREEK								
A	26,075	210	1,176	3.5	696.1	696.1	697.1	1.0
B	29,300	140	1,063	3.8	702.3	702.3	703.3	1.0
C	30,600	50	475	8.3	704.2	704.2	705.0	0.8
ARRINGTON CREEK								
A	1,841	540	2,563	2.9	679.0[2]	676.4	677.3	0.9
B	3,189	445	2,945	2.4	679.0[2]	678.7	679.3	0.6
C	4,337	296	2,076	3.4	679.9	679.9	680.7	0.8
D	5,489	133	888	7.9	681.3	681.3	682.0	0.7
E	6,607	448	3,082	2.3	686.2	686.2	687.2	1.0
F	7,607	361	2,328	3.0	688.9	688.9	689.6	0.7
G	8,594	323	2,136	3.0	691.3	691.3	691.9	0.6
H	9,559	200	1,185	5.3	693.2	693.2	693.9	0.7
I	10,651	433	3,466	1.8	696.3	696.3	696.7	0.4
J	12,151	425	3,334	1.9	697.6	697.6	698.3	0.7
K	13,134	648	1,984	3.2	698.8	698.8	699.2	0.4
L	14,634	618	3,084	1.7	705.6	705.6	705.8	0.2
M	15,134	689	2,311	2.2	706.1	706.1	706.4	0.3
N	16,134	416	2,281	2.2	708.2	708.2	708.9	0.7
O	17,134	311	1,216	4.2	710.1	710.1	710.9	0.8
P	18,134	323	1,185	3.9	713.8	713.8	714.7	0.9
Q	19,209	420	1,684	2.8	718.0	718.0	718.5	0.5

[1] Feet above mouth
[2] Elevation includes backwater effects from Harpeth River

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY
WILLIAMSON COUNTY, TN
AND INCORPORATED AREAS

FLOODWAY DATA

AENON CREEK – ARRINGTON CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (NAVD)	WITHOUT FLOODWAY (NAVD)	WITH FLOODWAY (NAVD)	INCREASE
ARRINGTON CREEK								
R	19,817	301	1,171	4.0	719.2	719.2	720.1	0.9
S	20,498	328	1,661	2.8	721.3	721.3	722.0	0.7
T	21,146	336	1,775	2.6	722.1	722.1	723.0	0.9
U	22,202	360	1,945	2.4	724.2	724.2	725.2	1.0
V	23,052	546	2,133	2.2	725.6	725.6	726.5	0.9
W	24,134	220	1,328	3.2	726.9	726.9	727.9	1.0
X	25,134	168	689	6.1	730.6	730.6	730.7	0.1
Y	26,114	472	1,086	3.6	733.5	733.5	734.0	0.5
Z	27,134	690	1,716	2.3	735.7	735.7	736.2	0.5
AA	27,975	188	891	2.7	736.8	736.8	737.8	1.0
AB	28,603	121	428	5.7	738.6	738.6	738.8	0.2
AC	29,146	196	478	5.1	742.3	742.3	742.5	0.2
AD	29,634	201	774	3.2	745.6	745.6	745.9	0.3
AE	30,633	207	673	3.6	750.0	750.0	750.4	0.4
AF	31,133	219	689	3.6	753.1	753.1	753.2	0.1
AG	32,076	211	931	2.6	755.6	755.6	756.5	0.9
AH	33,133	211	992	2.5	760.3	760.3	761.0	0.7
AI	33,970	278	1,039	2.4	762.5	762.5	763.1	0.6
AJ	34,383	184	495	4.9	763.6	763.6	764.5	0.9
AK	35,133	190	1,006	2.4	768.4	768.4	768.9	0.5
AL	36,133	158	814	3.0	771.3	771.3	772.1	0.8
AM	37,133	213	540	3.2	774.5	774.5	774.5	0.0

[1] Feet above mouth

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

WILLIAMSON COUNTY, TN
AND INCORPORATED AREAS

FLOODWAY DATA

ARRINGTON CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (NAVD)	WITHOUT FLOODWAY (NAVD)	WITH FLOODWAY (NAVD)	INCREASE
ARRINGTON CREEK								
AN	38,133[1]	250	683	2.5	778.6	778.6	779.4	0.8
AO	39,022[1]	165	603	2.9	783.8	783.8	784.3	0.5
AP	40,106[1]	72	397	2.9	789.7	789.7	790.5	0.8
AQ	41,099[1]	61	139	8.2	795.8	795.8	795.8	0.0
BEECH CREEK								
A	422[2]	230	840	4.5	599.6	597.9[3]	598.8	0.9
B	1,247[2]	230	572	6.6	602.3	602.3	603.3	1.0
C	1,822[2]	76	519	7.4	609.5	609.5	609.5	0.0
D	2,872[2]	140	593	6.3	612.6	612.6	612.7	0.1
E	4,372[2]	140	513	7.3	618.9	618.9	619.4	0.5
F	4,847[2]	250	1,134	2.9	625.5	625.5	626.2	0.7
G	5,512[2]	175	629	5.3	627.2	627.2	627.2	0.0
H	6,852[2]	150	465	7.1	635.6	635.6	636.4	0.8
I	7,542[2]	210	1,007	3.0	644.5	644.5	645.3	0.8
J	8,182[2]	170	636	4.8	646.5	646.5	647.1	0.6
K	9,107[2]	170	420	7.3	654.6	654.6	655.0	0.4
L	9,277[2]	130	622	4.8	657.0	657.0	657.4	0.4
M	9,477[2]	160	744	3.6	658.1	658.1	658.1	0.0
N	11,177[2]	160	309	8.2	666.1	666.1	666.3	0.2
O-Z*								

[1] Feet above mouth
[2] Feet above confluence with Little Harpeth River
[3] Elevation computed without consideration of backwater effects from Little Harpeth River
* No floodway data computed

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

WILLIAMSON COUNTY, TN
AND INCORPORATED AREAS

FLOODWAY DATA

ARRINGTON CREEK – BEECH CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (NAVD)	WITHOUT FLOODWAY (NAVD)	WITH FLOODWAY (NAVD)	INCREASE
BRUSH CREEK								
A	19,378	100	738	5.4	548.1	548.1	549.0	0.9
B	19,585	52	435	9.1	549.0	549.0	549.3	0.3
C	20,250	150	789	5.0	552.0	552.0	552.0	0.0
D	21,235	150	722	5.5	554.2	554.2	555.2	1.0
E	23,085	140	727	4.8	563.6	563.6	563.6	0.0
F	23,685	104	417	8.4	566.1	566.1	566.3	0.2
G	24,535	110	585	6.0	569.8	569.8	570.1	0.3
H	25,139	110	700	5.0	572.8	572.8	573.1	0.3
I	26,174	110	450	7.8	576.4	576.4	576.8	0.4
J	27,704	110	654	5.4	587.6	587.6	588.6	1.0
K	28,699	105	586	6.0	593.2	593.2	593.6	0.4
L	29,379	100	699	5.0	596.0	596.0	597.0	1.0
M	30,377	60	420	6.3	600.4	600.4	600.7	0.3
N	30,417	70	463	5.7	601.3	601.3	601.4	0.1
O	31,321	161	542	4.9	607.8	607.8	607.8	0.0
P	31,776	110	341	7.8	608.2	608.2	608.2	0.0
Q	32,206	60	274	9.7	610.7	610.7	611.0	0.3
R	33,506	60	398	6.7	620.9	620.9	621.8	0.9
S	34,676	60	286	9.3	628.1	628.1	628.7	0.6
T	35,666	60	343	7.7	635.6	635.6	635.7	0.1
U	36,916	60	245	10.8	651.3	651.3	651.7	0.4
V	38,906	50	328	8.1	670.8	670.8	671.2	0.4
W	39,566	40	190	7.6	676.3	676.3	676.7	0.4

[1] Feet above confluence with Harpeth River

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

WILLIAMSON COUNTY, TN

AND INCORPORATED AREAS

FLOODWAY DATA

BRUSH CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (NAVD)	WITHOUT FLOODWAY (NAVD)	WITH FLOODWAY (NAVD)	INCREASE
CARTWRIGHT CREEK								
A	1,890	86	524	9.4	584.8	580.2[2]	580.2[2]	0.0
B	3,440	130	896	5.5	590.2	590.2	590.6	0.4
C	4,810	260	1234	2.7	593.8	593.8	594.7	0.9
D	5,710	300	939	3.6	597.9	597.9	598.2	0.3
E	7,310	53	325	8.9	608.3	608.3	609.2	0.9
F	8,820	166	551	3.8	617.3	617.3	618.1	0.8
G	9,660	125	397	5.2	625.7	625.7	626.0	0.3
H	11,200	132	655	2.7	639.3	639.3	640.2	0.9
I	12,090	130	845	1.8	650.0	650.0	650.0	0.0
J	13,100	35	182	6.6	656.3	656.3	656.4	0.1
K	14,220	43	186	6.5	670.3	670.3	670.4	0.1

[1] Feet above confluence with Harpeth River

[2] Elevation computed without consideration of backwater effects from Harpeth River

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

WILLIAMSON COUNTY, TN
(AND INCORPORATED AREAS)

FLOODWAY DATA

CARTWRIGHT CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (NAVD)	WITHOUT FLOODWAY (NAVD)	WITH FLOODWAY (NAVD)	INCREASE
DRY BRANCH								
A	0.17[1]	180	830	2.5	660.1	660.1	661.0	0.9
B	0.52[1]	180	648	3.3	671.0	671.0	671.6	0.6
C	0.68[1]	150	1,327	1.4	684.6	684.6	685.4	0.8
D	0.95[1]	143	324	5.9	685.9	685.9	686.3	0.4
EAST FORK CREEK								
A	7,255[2]	95	582	7.2	587.4	587.4	588.0	0.6
B	7,545[2]	95	713	5.9	588.7	588.7	589.4	0.7
C	8,280[2]	95	626	6.7	590.4	590.4	591.2	0.7
D	9,875[2]	85	558	7.5	596.4	596.4	596.8	0.4
E	10,435[2]	104	621	6.8	600.0	600.0	600.1	0.1
F	11,340[2]	92	479	7.6	603.1	603.1	603.1	0.0
G	12,825[2]	70	476	7.7	608.8	608.8	608.9	0.1
H	14,647[2]	262	979	3.7	617.9	617.9	618.9	1.0
I	15,582[2]	76	449	8.1	620.9	620.9	621.4	0.5
J	16,079[2]	76	540	4.7	623.4	623.4	624.2	0.8
K	16,569[2]	60	372	6.9	624.5	624.5	625.1	0.6
L	17,594[2]	60	327	7.8	628.9	628.9	629.1	0.2
M	18,048[2]	100	511	5.0	632.8	632.8	633.2	0.4
N	19,031[2]	60	275	9.3	637.3	637.3	637.6	0.3
O	20,005[2]	60	481	5.3	641.3	641.3	641.9	0.6
P	20,290[2]	52	285	8.9	642.2	642.2	642.6	0.4

[1] Miles above mouth
[2] Feet above confluence with South Harpeth River

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY
WILLIAMSON COUNTY, TN
AND INCORPORATED AREAS

FLOODWAY DATA

DRY BRANCH – EAST FORK CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (NAVD)	WITHOUT FLOODWAY (NAVD)	WITH FLOODWAY (NAVD)	INCREASE
EAST FORK CREEK								
Q	20,865[2]	42	203	12.5	648.9	648.9	648.9	0.0
R	22,040[2]	50	328	7.8	657.2	657.2	657.2	0.0
S	22,895[2]	55	295	8.6	661.5	661.5	661.6	0.1
T	24,410[2]	55	329	7.8	669.8	669.8	670.5	0.7
U	25,809[2]	36	197	7.6	679.0	679.0	679.0	0.0
V	26,694[2]	20	115	13.1	692.6	692.6	692.6	0.0
FIVEMILE CREEK								
A	60[1]	70	725	8.0	648.4	632.8[3]	633.2	0.4
B	3,600[1]	100	938	5.8	648.4	641.3[3]	641.9	0.6
C	5,950[1]	270	1,466	3.6	684.4	646.3[3]	647.3	1.0
D	7,925[1]	250	1,679	3.0	659.7	659.7	660.1	0.4
E	9,908[1]	60	418	11.5	663.4	663.4	664.3	0.9
F	11,900[1]	280	2,315	1.7	676.4	676.4	676.7	0.3
G	14,350[1]	80	458	7.7	679.4	679.4	680.3	0.9
GRASSY BRANCH								
A	8,660[1]	240	1,180	1.8	704.1	704.1	704.9	0.8
B	11,340[1]	100	403	4.7	711.1	711.1	711.9	0.8

[1] Feet above mouth
[2] Feet above confluence with South Harpeth River
[3] Elevation computed without consideration of backwater effects from Harpeth River

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY
WILLIAMSON COUNTY, TN
AND INCORPORATED AREAS

FLOODWAY DATA

EAST FORK CREEK – FIVEMILE CREEK – GRASSY BRANCH

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET/SEC)	REGULATORY (NAVD)	WITHOUT FLOODWAY (NAVD)	WITH FLOODWAY (NAVD)	INCREASE
HARPETH RIVER								
A	62.30	993	12,294	3.1	568.0	567.1	568.6	0.6
B	63.18	518	8,128	4.6	570.1	568.8	571.0	0.9
C	63.98	331	6,198	6.1	572.0	570.6	572.7	0.8
D	64.58	569	9,827	3.8	574.8	572.7	575.7	0.8
E	65.21	1,139	14,182	2.7	576.1	573.9	577.0	0.9
F	65.84	804	10,919	3.4	577.9	575.6	578.9	1.0
G	66.13	854	11,875	3.2	578.8	576.3	579.6	0.8
H	67.22	1,207	14,113	2.7	581.3	579.0	582.0	0.7
I	68.15	854	10,967	3.4	583.4	581.1	584.1	0.7
J	68.99	523	7,974	4.7	586.2	583.3	586.9	0.8
K	69.58	956	12,875	2.9	588.6	585.7	589.5	0.9
L	70.87	1,065	14,044	2.7	592.2	589.5	593.2	1.0
M	71.96	680	12,334	3.1	596.4	593.0	597.2	0.8
N	72.60	1,023	16,168	2.3	597.7	594.5	598.6	0.8
O	73.52	906	15,670	2.4	600.0	596.5	601.0	1.0
P	74.37	1,385	21,588	1.7	601.4	598.4	602.3	0.9
Q	75.64	342	6,905	5.4	606.6	602.7	607.1	0.5
R	76.29	631	10,411	3.6	608.5	605.0	609.3	0.8
S	77.02	1,020	16,286	2.3	610.7	607.5	611.4	0.7
T	77.48	728	11,535	3.3	611.3	608.2	612.1	0.9
U	78.04	1,491	21,407	1.8	612.7	610.0	613.5	0.8
V	78.70	914	14,503	2.6	613.4	610.7	614.2	0.8

[1] Miles above confluence with Cumberland River

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

WILLIAMSON COUNTY, TN
AND INCORPORATED AREAS

FLOODWAY DATA

HARPETH RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET/SEC)	REGULATORY (NAVD)	WITHOUT FLOODWAY (NAVD)	WITH FLOODWAY (NAVD)	INCREASE
HARPETH RIVER								
W	78.93	1,324	18,117	1.5	613.7	611.2	614.5	0.3
X	79.53	982	9,835	2.8	615.1	612.6	615.8	0.7
Y	80.31	1,176	12,986	2.1	617.1	615.3	617.9	0.8
Z	80.98	689	8,621	3.1	618.6	616.5	619.5	0.9
AA	81.27	780	9,903	2.7	619.6	617.8	620.5	0.9
AB	82.14	1,061	11,934	1.8	621.6	619.5	622.2	0.6
AC	82.98	590	7,240	2.8	622.9	621.1	623.5	0.6
AD	83.79	486	6,647	3.1	624.9	623.7	625.6	0.7
AE	84.74	625	8,701	3.1	628.9	628.2	629.6	0.7
AF	84.98	787	9,727	2.8	629.8	629.1	630.3	0.6
AG	85.59	414	7,530	3.5	632.9	632.2	633.5	0.6
AH	86.23	767	11,076	2.4	634.7	634.0	635.2	0.5
AI	86.78	706	11,071	2.4	636.1	635.3	636.5	0.4
AJ	87.35	490	7,874	3.4	637.6	637.2	638.1	0.5
AK	87.60	415	7,266	3.6	640.1	638.8	640.6	0.5
AL	87.77	447	9,238	2.9	642.0	640.8	642.4	0.4
AM	88.10	467	10,092	2.6	642.8	641.7	643.3	0.6
AN	88.70	476	10,502	2.4	644.3	643.2	644.8	0.5
AO	89.19	537	11,197	2.3	645.0	644.1	645.8	0.7
AP	89.73	794	13,554	1.9	645.5	644.6	646.3	0.8
AQ	89.98	558	10,970	2.3	645.9	645.1	646.6	0.7
AR	90.44	839	15,407	1.6	647.2	646.5	647.9	0.7
AS	90.88	859	14,481	1.7	647.5	646.8	648.2	0.8

[1] Miles above confluence with Cumberland River

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

WILLIAMSON COUNTY, TN
AND INCORPORATED AREAS

FLOODWAY DATA

HARPETH RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET/SEC)	REGULATORY (NAVD)	WITHOUT FLOODWAY (NAVD)	WITH FLOODWAY (NAVD)	INCREASE
HARPETH RIVER								
AT	91.68	726	12,158	2.1	648.3	647.7	649.1	0.8
AU	92.13	762	14,738	1.7	648.7	648.2	649.5	0.8
AV	93.07	943	15,533	1.6	651.3	651.3	652.2	0.9
AW	93.76	668	10,483	2.3	652.1	652.1	653.1	1.0
AX	94.59	417	6,952	3.6	654.2	654.2	655.1	0.9
AY	95.52	393	6,664	3.8	657.2	657.2	658.1	0.9
AZ	96.37	386	6,464	3.9	658.9	658.9	659.7	0.8
BA	96.76	706	10,989	2.3	660.8	660.8	661.7	0.9
BB	97.56	377	6,775	3.7	662.8	662.8	663.7	0.9
BC	97.94	473	8,944	2.8	664.0	664.0	664.9	0.9
BD	98.13	296	5,244	3.8	664.4	664.4	665.4	1.0
BE	99.22	866	12,289	1.6	666.9	666.9	667.7	0.8
BF	100.25	492	6,033	3.3	668.6	668.6	669.6	1.0
BG	100.76	561	8,264	2.4	670.5	670.5	671.3	0.8
BH	101.74	569	7,707	2.6	672.8	672.7	673.8	1.0
BI	102.66	444	5,991	3.3	675.8	675.8	676.8	1.0
BJ	103.13	503	6,903	2.9	677.8	677.8	678.6	0.8
BK	103.64	491	7,206	2.8	679.3	679.3	680.2	0.9
BL	104.55	380	5,208	3.0	682.0	682.0	683.0	1.0
BM	105.33	472	5,986	2.6	684.5	684.5	685.4	0.9
BN	105.95	596	7,545	2.1	685.9	685.9	686.9	1.0
BO	106.48	337	4,142	3.8	687.9	687.9	688.7	0.8
BP	107.05	650	8,091	2.8	690.0	690.0	690.7	0.8

[1] Miles above confluence with Cumberland River

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

WILLIAMSON COUNTY, TN
AND INCORPORATED AREAS

FLOODWAY DATA

HARPETH RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET/SEC)	REGULATORY (NAVD)	WITHOUT FLOODWAY (NAVD)	WITH FLOODWAY (NAVD)	INCREASE
HARPETH RIVER								
BQ	107.83[1]	235	3,004	5.3	692.4	692.4	693.3	0.9
BR	108.42[1]	293	4,304	3.7	696.1	696.1	697.0	0.9
BS	109.15[1]	485	6,007	2.6	699.7	699.7	700.4	0.7
BT	110.32[1]	549	6,941	2.3	703.2	703.2	704.2	1.0
BU	110.97[1]	337	4,180	3.8	705.1	705.1	706.0	0.9
BV	111.63[1]	507	6,029	2.6	708.7	708.7	709.6	0.9
HARPETH RIVER US-431 EAST SPLIT								
A	1268[2]	220	1,387	3.9	623.9	623.9	624.6	0.7
HARPETH RIVER US-431 WEST SPLIT								
A	872[2]	52	149	9.3	622.7	622.7	622.7	0.0
HARRISON BRANCH CREEK								
A	528[3]	40	139	11.9	560.0	560.0	561.0	1.0
B	1,323[3]	40	195	6.9	565.6	565.6	566.5	0.9
C	2,763[3]	40	155	8.7	576.5	576.5	576.7	0.2
D	2,878[3]	40	160	6.6	577.8	577.8	577.8	0.0
E	4,313[3]	40	139	7.6	592.5	592.5	593.3	0.8
F	6,218[3]	40	140	7.5	611.5	611.5	611.7	0.2
G	7,373[3]	40	125	8.4	623.4	623.4	624.2	0.8
H	9,098[3]	0	0	0.0	641.7	641.7	642.2	0.5
I	10,238[3]	0	0	0.0	652.5	652.5	652.9	0.4
J	11,603[3]	0	0	0.0	668.0	668.0	668.4	0.4

[1] Miles above confluence with Cumberland River

[2] Feet above confluence with Harpeth River

[3] Feet above confluence with Brush Creek

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

WILLIAMSON COUNTY, TN
AND INCORPORATED AREAS

FLOODWAY DATA

HARPETH RIVER - HARRISON BRANCH CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (NAVD)	WITHOUT FLOODWAY (NAVD)	WITH FLOODWAY (NAVD)	INCREASE
HUNTING CAMP CREEK								
A	1,162	147	547	5.3	605.2	605.2[2]	606.2	1.0
B	2,674	135	438	6.6	612.4	612.4	612.8	0.4
C	4,414	85	442	6.6	620.8	620.8	621.7	0.9
D	5,904	55	348	7.3	627.1	627.1	627.5	0.4
E	6,594	52	253	10.1	633.0	633.0	633.1	0.1
F	7,439	48	259	9.9	640.8	640.8	640.8	0.0
G	8,354	45	277	9.2	647.8	647.8	648.2	0.4
H	9,204	46	278	9.2	654.7	654.7	655.4	0.7
I	10,239	44	236	8.7	662.2	662.2	662.8	0.6
J	10,879	42	243	8.5	666.8	666.8	667.2	0.4
K	12,249	54	238	8.6	680.2	680.2	680.3	0.1
L	12,782	230	95	10.5	684.5	684.5	684.6	0.1
M	13,051	100	119	10.2	691.1	691.1	691.1	0.0
N	13,249	160	1,632	1.4	702.9	702.9	703.5	0.6
O	13,604	140	754	2.2	702.9	702.9	703.5	0.6
P	13,889	110	556	3.4	703.0	703.0	703.7	0.7
Q	14,367	50	100	10.0	705.8	705.8	705.9	0.1
R	14,862	70	168	5.4	710.7	710.7	710.7	0.0
S	15,402	70	133	9.5	721.2	721.2	721.2	0.0
T	16,105	80	127	9.8	732.8	732.8	732.8	0.0
U	16,835	60	88	10.8	743.6	743.6	744.2	0.6
V	17,345	50	113	8.0	750.3	750.3	751.2	0.9
W	17,765	50	94	9.7	755.2	755.2	755.6	0.4
X	17,981	150	436	3.0	760.0	760.0	760.5	0.5

[1] Feet above confluence with South Harpeth River
[2] Elevation computed without consideration of flooding controlled by South Harpeth River

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY
WILLIAMSON COUNTY, TN
AND INCORPORATED AREAS

FLOODWAY DATA

HUNTING CAMP CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (NAVD)	WITHOUT FLOODWAY (NAVD)	WITH FLOODWAY (NAVD)	INCREASE
HUNTING CAMP CREEK								
Y	18,511[1]	60	70	10.0	764.5	764.5	764.5	0.0
Z	18,991[1]	40	79	6.8	771.1	771.1	771.7	0.6
AA	19,508[1]	30	112	8.0	780.6	780.6	780.6	0.0
AB	20,048[1]	25	76	8.5	788.1	788.1	788.1	0.0
AC	20,498[1]	25	58	9.4	795.3	795.3	795.3	0.0
AD	21,368[1]	25	58	9.6	813.9	813.9	814.0	0.1
HUNTING CAMP CREEK TRIBUTARY N0. 2								
A	690[2]	60	117	11.0	697.0	697.0	697.0	0.0
B	958[2]	70	200	6.4	702.2	702.2	702.2	0.0
C	1,433[2]	80	107	10.0	708.5	708.5	708.5	0.0
D	2,033[2]	80	223	7.0	715.5	715.5	716.5	1.0
E	2,548[2]	60	90	9.1	727.2	727.2	727.3	0.1
F	3,153[2]	60	68	10.4	739.0	739.0	739.0	0.0
G	3,853[2]	40	105	6.8	748.3	748.3	748.8	0.5
H	4,423[2]	30	72	9.8	760.2	760.2	760.2	0.0
I	5,827[2]	50	142	11.8	786.8	786.8	787.7	0.9
J	6,177[2]	50	99	5.2	791.0	791.0	791.8	0.8

[1] Feet above confluence with South Harpeth River
[2] Feet above confluence with Hunting Camp Creek

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY
WILLIAMSON COUNTY, TN
AND INCORPORATED AREAS

FLOODWAY DATA

HUNTING CAMP CREEK – HUNTING CAMP CREEK TRIBUTARY NO. 2

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (NAVD)	WITHOUT FLOODWAY (NAVD)	WITH FLOODWAY (NAVD)	INCREASE
HUNTING CAMP CREEK TRIBUTARY NO. 3								
A	575	60	132	9.0	685.9	685.9	686.7	0.8
B	1,150	60	124	9.6	691.4	691.4	692.0	0.6
C	1,570	60	125	9.5	696.2	696.2	696.5	0.3
D	2,385	60	161	7.9	707.6	707.6	708.5	0.9
E	2,815	50	102	9.9	712.1	712.1	712.1	0.0
F	3,395	50	112	9.0	720.8	720.8	721.1	0.3
G	3,860	70	22	8.6	728.1	728.1	728.1	0.0
H	4,290	50	60	8.2	736.7	736.7	736.7	0.0
I	4,800	50	43	10.4	747.7	747.7	747.8	0.1
J	5,680	40	52	9.0	762.9	762.9	762.9	0.0
K	6,230	30	50	9.2	777.6	777.6	777.6	0.0
L	6,680	70	40	8.5	786.4	786.4	786.5	0.1
M	6,850	50	438	1.5	794.8	794.8	795.7	0.9
N	7,290	50	40	9.0	795.1	795.1	795.1	0.0

[1] Feet above confluence with Hunting Camp Creek

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

WILLIAMSON COUNTY, TN

AND INCORPORATED AREAS

FLOODWAY DATA

HUNTING CAMP CREEK TRIBUTARY NO. 3

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (NAVD)	WITHOUT FLOODWAY (NAVD)	WITH FLOODWAY (NAVD)	INCREASE
HUNTING CAMP CREEK TRIBUTARY NO. 4								
A	460[1]	60	66	10.4	729.0	729.0	729.1	0.1
B	975[1]	50	70	9.1	736.6	736.6	737.0	0.4
C	1,485[1]	40	91	9.2	750.9	750.9	750.9	0.0
D	1,900[1]	40	51	9.6	757.8	757.8	757.8	0.0
E	2,415[1]	40	51	9.2	767.2	767.2	767.2	0.0
F	3,198[1]	40	57	9.5	779.2	779.2	779.2	0.0
G	3,883[1]	50	29	8.0	792.3	792.3	792.3	0.0
HUNTING CAMP CREEK TRIBUTARY NO. 5								
A	120[2]	50	54	8.5	790.7	790.7	790.7	0.0

[1] Feet above confluence with Hunting Camp Creek Tributary No.3
[2] Feet above confluence with Hunting Camp Creek Tributary No.2

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY
WILLIAMSON COUNTY, TN
AND INCORPORATED AREAS

FLOODWAY DATA

HUNTING CAMP CREEK TRIBUTARY NO. 4 – HUNTING CAMP CREEK TRIBUTARY NO. 5

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (NAVD)	WITHOUT FLOODWAY (NAVD)	WITH FLOODWAY (NAVD)	INCREASE
LEIPERS FORK								
A	4,740	310	2,751	4.5	651.6	651.6	652.6	1.0
B	6,740	510[2]	3,896	3.2	655.3	655.3	656.2	0.9
C	10,340	580	3,991	3.0	659.4	659.4	660.3	0.9
D	12,200	580	4,133	2.8	662.0	662.0	663.0	1.0
E	14,000	450	2,239	5.0	665.2	665.2	665.8	0.6
F	16,245	601	4,075	2.7	670.0	670.0	670.7	0.7
G	18,525	563	3,826	1.9	671.7	671.7	672.5	0.8
H	21,365	462	1,721	4.2	675.5	675.5	672.5	0.0
I	23,195	420	2,093	3.1	679.2	679.2	680.2	1.0
J	25,010	300	1,792	2.3	681.3	681.3	682.2	0.9
K	27,249	230	1,303	3.2	691.5	691.5	692.2	0.7
L	27,931	260	1,507	2.8	695.7	695.7	696.3	0.6
M	28,476	250	1,014	4.1	696.4	696.4	696.8	0.4
N	29,428	240	1,093	3.8	699.2	699.2	700.2	1.0
O	30,138	238	830	5.1	701.2	701.2	701.8	0.6
P	31,168	200	1,068	3.9	706.6	706.6	706.7	0.1
Q	31,973	150	779	4.2	708.4	708.4	709.0	0.6
R	33,938	142	661	5.0	714.9	714.9	715.7	0.8
S	34,508	149	548	6.0	717.8	717.8	718.2	0.4
T	35,598	120	504	6.6	722.7	722.7	723.6	0.9
U	36,123	120	516	6.4	726.5	726.5	726.7	0.2

[1] Feet above confluence with West Harpeth River
[2] Width measured normal to direction of flow

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY
WILLIAMSON COUNTY, TN
AND INCORPORATED AREAS

FLOODWAY DATA

LEIPERS FORK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (NAVD)	WITHOUT FLOODWAY (NAVD)	WITH FLOODWAY (NAVD)	INCREASE
LIBERTY CREEK								
A	0.240	25	93	8.4	**640.0**	625.3[2]	626.3	1.0
B	0.370	32	129	6.0	**640.0**	629.4[2]	630.3	0.9
C	0.380	30	107	7.3	**640.0**	632.5[2]	632.5	0.0
D	0.385	30	117	6.7	**640.0**	632.3[2]	632.9	0.6
E	0.400	40	202	3.9	**640.0**	635.5[2]	635.7	0.2
F	0.510	34	81	9.6	640.2	640.2	640.2	0.0
G	0.560	32	107	7.3	644.6	644.6	644.8	0.2

[1] Miles above mouth
[2] Elevation computed without consideration of backwater effects from Harpeth River

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY
WILLIAMSON COUNTY, TN
AND INCORPORATED AREAS

FLOODWAY DATA

LIBERTY CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (NAVD)	WITHOUT FLOODWAY (NAVD)	WITH FLOODWAY (NAVD)	INCREASE
LITTLE EAST FORK								
A	0.950	84	399	6.1	597.9	597.9	598.6	0.7
B	1.220	188	495	5.0	606.6	606.6	606.6	0.0
C	1.622	179	643	3.8	618.1	618.1	618.5	0.4
D	1.802	239	520	4.7	624.8	624.8	624.9	0.1
E	1.842	274	683	3.6	626.7	626.7	627.1	0.4
F	1.920	368	522	4.7	629.3	629.3	629.5	0.2
G	2.360	44	18	8.0	642.9	642.9	643.1	0.2
H	2.660	40	121	5.6	662.1	662.1	662.1	0.0
LITTLE HARPETH RIVER								
A	0.05	1,300[2]	7,301	2.6	567.9	562.7[3]	563.1	0.4
B	0.68	1,008[2]	5,787	3.2	567.9	566.0[3]	566.5	0.5
C	1.33	746[2]	4,295	4.4	573.4	573.4	574.4	1.0
D	1.82	195	1,981	9.5	580.0	580.0	580.9	0.9
E	2.56	641	6,927	2.7	587.5	587.5	588.5	1.0
F	3.04	723	6,364	3.0	590.6	590.6	591.4	0.8
G	3.40	833	5,834	3.2	594.2	594.2	595.1	0.9
H	3.95	909	5,289	2.4	600.3	600.3	601.2	0.9
I	4.25	514	3,556	3.5	603.1	603.1	604.1	1.0
J	4.52	320	2,813	4.4	607.2	607.2	607.9	0.7
K	4.94	435	2,456	5.1	611.9	611.9	612.8	0.9
L	5.05	467	3,098	4.0	614.7	614.7	615.7	1.0

[1] Miles above mouth
[2] Floodway lies partially or totally outside community
[3] Elevation computed without consideration of backwater effects from Harpeth River

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY
WILLIAMSON COUNTY, TN
AND INCORPORATED AREAS

FLOODWAY DATA

LITTLE EAST FORK – LITTLE HARPETH RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (NAVD)	WITHOUT FLOODWAY (NAVD)	WITH FLOODWAY (NAVD)	INCREASE
LITTLE HARPETH RIVER								
M	5.25	493	3,555	3.5	616.4	616.4	617.4	1.0
N	5.52	387	2,812	4.4	619.3	619.3	620.3	1.0
O	5.75	487	3,965	3.2	622.0	622.0	623.0	1.0
P	6.12	732	5,247	2.4	625.1	625.1	626.1	1.0
Q	6.89	403	3,379	3.7	629.2	629.2	630.1	0.9
R	7.02	603	4,746	2.6	630.5	630.5	631.5	1.0
S	7.76	296	1,970	8.5	636.7	636.7	637.6	0.9
T	8.49	499	4,631	2.7	642.5	642.5	643.3	0.8
U	8.79	364	2,477	5.0	645.0	645.0	645.8	0.8
V	9.09	219	1,918	6.5	652.4	652.4	653.4	1.0
W	9.35	574	5,877	1.8	657.7	657.7	658.5	0.8
X	9.44	551	5,107	2.0	657.9	657.9	658.7	0.8
Y	9.91	655	5,381	1.9	660.3	660.3	661.2	0.9
Z	10.00	638	3,967	2.6	660.8	660.8	661.6	0.8
AA	10.46	826	8,411	1.2	668.3	668.3	669.2	0.9
AB	10.84	821	7,212	1.4	672.6	672.6	673.5	0.9
AC	11.11	314	3,128	3.3	673.8	673.8	674.8	1.0
AD	11.29	500	3,534	2.9	677.3	677.3	678.3	1.0
AE	11.94	573	3,338	3.1	686.5	686.5	687.5	1.0
AF	12.46	709	3,727	2.8	694.8	694.8	695.7	0.9
AG	12.82	453	3,187	3.3	699.9	699.9	700.9	1.0
AH	13.27	295	2,031	5.1	707.9	707.9	708.9	1.0

[1] Miles above mouth

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

WILLIAMSON COUNTY, TN

AND INCORPORATED AREAS

FLOODWAY DATA

LITTLE HARPETH RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE [1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
LITTLE HARPETH RIVER TRIBUTARY 4								
A	123	235	659	3.2	656.2 [2]	649.1	650.1	1.0
B	923	272	642	3.3	656.2 [2]	651.6	652.1	0.5
C	1,323	172	351	6.0	656.2 [2]	652.8	653.2	0.4
D	1,923	257	2,258	0.9	663.5	663.5	663.6	0.1
E	2,123	395	3,124	0.7	663.6	663.6	663.6	0.0
F	2,523	150	1,005	2.1	663.6	663.6	663.6	0.0
G	2,723	85	638	3.3	663.6	663.6	663.6	0.0
H	3,123	113	633	3.1	663.6	663.6	663.9	0.3
I	3,923	448	1237	1.9	666.5	666.5	666.5	0.0
J	4,047	150	638	4.6	666.5	666.5	666.5	0.0
K	4,323	499	4,385	0.5	673.5	673.5	673.5	0.0
L	4,923	505	3,270	0.6	677.8	677.8	677.8	0.0
M	5,123	392	1,929	0.9	677.8	677.8	677.8	0.0
N	5,323	298	1,098	1.7	677.8	677.8	677.8	0.0
O	5,523	310	1,006	1.8	677.9	677.9	677.9	0.0
P	5,723	150	587	3.1	677.9	677.9	678.0	0.1
Q	5,884	53	261	7.0	678.3	678.3	679.0	0.7
R	5,987	31	209	8.7	678.8	678.8	679.2	0.4
S	6,123	94	352	5.2	680.0	680.0	680.2	0.2
T	6,478	33	204	8.9	680.7	680.7	681.2	0.5
U	6,569	92	352	5.2	681.7	681.7	682.2	0.5
V	6,765	205	509	3.6	682.3	682.3	682.9	0.6
W	6,923	203	612	3.0	683.3	683.3	683.6	0.3
X	7,073	163	353	5.2	683.6	683.6	683.6	0.0
Y	7,370	30	167	3.0	685.7	685.7	686.1	0.4
Z	7,723	29	182	2.7	685.9	685.9	686.3	0.4

[1]Feet above confluence with Little Harpeth River

[2]Elevation computed without consideration of backwater effects from Little Harpeth River

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

WILLIAMSON COUNTY, TN

AND INCORPORATED AREAS

FLOODWAY DATA

LITTLE HARPETH RIVER TRIBUTARY 4

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE [1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
LITTLE HARPETH RIVER TRIBUTARY 4 (continued)								
AA	8,123	29	196	2.5	686.1	686.1	686.5	0.4
AB	8,523	28	178	2.8	686.3	686.3	686.7	0.4
AC	8,923	26	165	3.0	686.5	686.5	686.9	0.4
AD	9,123	26	163	3.1	686.6	686.6	687.0	0.4

[1]Feet above confluence with South Harpeth River

[2]Elevation computed without consideration of backwater effects from South Harpeth River

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

WILLIAMSON COUNTY, TN

AND INCORPORATED AREAS

FLOODWAY DATA

LITTLE HARPETH RIVER TRIBUTARY 4

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE [1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
LITTLE HARPETH RIVER TRIBUTARY 5								
A	10	13	18	4.6	663.7	653.0 [2]	653.0	0.0
B	810	8	19	4.5	665.5	665.5	666.2	0.7
C	1,610	278	1,152	0.3	679.4	679.4	680.4	1.0
D	2,210	131	533	0.6	684.0	684.0	684.0	0.0
E	2,540	111	311	1.0	684.6	684.6	685.0	0.4
F	2,810	17	51	6.1	684.6	684.6	685.0	0.4
G	3,010	13	43	7.2	686.9	686.9	686.9	0.0
H	3,210	20	56	5.5	689.0	689.0	689.5	0.5
I	3,410	20	53	5.8	691.0	691.0	691.4	0.4
J	3,696	23	73	4.2	695.9	695.9	696.7	0.8
K	3,841	36	71	4.4	697.7	697.7	698.5	0.8
L	4,080	43	81	3.8	700.3	700.3	700.9	0.6
M	4,610	28	102	3.0	707.0	707.0	707.7	0.7
N	4,810	39	147	2.1	707.5	707.5	708.0	0.5

[1]Feet above confluence with Little Harpeth River Tributary 4

[2]Elevation computed without consideration of backwater effects from Little Harpeth River Tributary 4

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

WILLIAMSON COUNTY, TN

AND INCORPORATED AREAS

FLOODWAY DATA

LITTLE HARPETH RIVER TRIBUTARY 5

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE [1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
LITTLE HARPETH RIVER TRIBUTARY 6								
A	146	26	92	7.0	684.9	682.5 [2]	682.6	0.1
B	592	20	93	6.9	686.4	686.4	686.8	0.4
C	1,189	33	148	4.3	691.1	691.1	691.8	0.7
D	1,588	60	132	4.9	694.7	694.7	695.4	0.7
E	1,986	44	132	4.8	697.3	697.3	697.9	0.6
F	2,187	42	97	6.6	699.3	699.3	699.7	0.4
G	2,384	48	195	3.3	700.5	700.5	701.5	1.0
H	2,581	27	72	8.9	702.1	702.1	702.1	0.0
I	2,789	39	128	5.0	704.7	704.7	704.8	0.1
J	3,189	41	183	3.5	710.6	710.6	711.5	0.9
K	3,390	20	80	8.0	711.0	711.0	711.5	0.5

[1]Feet above confluence with Little Harpeth River Tributary 4

[2]Elevation computed without consideration of backwater effects from Little Harpeth River Tributary 4

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

WILLIAMSON COUNTY, TN

AND INCORPORATED AREAS

FLOODWAY DATA

LITTLE HARPETH RIVER TRIBUTARY 6

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE [1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
LYNNWOOD BRANCH								
A	0.671 [1]	105	612	5.6	616.9	616.1 [4]	617.0	0.9
B	0.957 [1]	120	593	5.6	626.9	626.9	627.8	0.9
C	1.117 [1]	94	694	4.7	632.9	632.9	633.2	0.3
D	1.273 [1]	135	623	5.3	638.0	638.0	638.3	0.3
E	1.499 [1]	105	466	6.4	646.3	646.3	647.0	0.7
F	1.619 [1]	74	467	6.4	651.5	651.5	652.2	0.7
G	2.095 [1]	58	304	6.2	672.6	672.6	673.3	0.7
McCUTCHEON CREEK								
A	19,490 [2]	100	776	3.3	714.6	714.6	715.1	0.5
B	21,135 [2]	160	562	4.0	718.8	718.8	719.6	0.8
C	22,375 [2]	160	447	4.2	724.5	724.5	725.4	0.9
D	24,125 [2]	80	382	4.0	732.0	732.0	732.9	0.9
E	25,205 [2]	55	237	5.4	736.6	736.6	736.9	0.3
F	26,335 [2]	45	199	5.1	742.7	742.7	743.3	0.6
MILL CREEK								
A	21.00 [3]	495	3,421	4.8	557.2	557.2	557.8	0.6
B	21.11 [3]	471	3,914	4.2	558.9	558.9	559.2	0.3
C	21.21 [3]	560	3,282	5.0	559.3	559.3	560.2	0.9
D	21.34 [3]	500	4,573	3.6	561.8	561.8	560.2	0.4

[1]Miles above mouth
[2]Feet above mouth
[3]Miles above confluence with Harpeth River
[4]Elevation computed without consideration of backwater effects from Harpeth River

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY
WILLIAMSON COUNTY, TN
AND INCORPORATED AREAS

FLOODWAY DATA

LYNNWOOD BRANCH - McCUTCHEON CREEK - MILL CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (NAVD)	WITHOUT FLOODWAY (NAVD)	WITH FLOODWAY (NAVD)	INCREASE
MILL CREEK								
E	21.49	510	4,112	3.7	562.5	562.5	563.2	0.7
F	21.54	510	4,206	3.9	562.9	562.9	563.8	0.9
G	21.58	510	3,684	4.5	563.3	563.3	564.1	0.8
H	21.73	455	3,054	5.4	565.1	565.1	565.9	0.8
I	21.88	485	3,902	4.2	568.5	568.5	568.7	0.2
J	21.96	460	3,809	4.3	569.3	569.3	569.5	0.2
K	22.07	480	4,689	3.5	570.5	570.5	570.7	0.2
L	22.24	510	3,761	4.4	571.0	571.0	571.6	0.6
M	22.39	550	4,390	3.7	572.3	572.3	573.1	0.8
N	22.49	600	3,655	2.9	572.8	572.8	573.8	1.0
O	22.61	550	3,367	3.2	574.1	574.1	574.7	0.6
P	22.673	540	557	4.2	574.5	574.5	575.2	0.7
Q	22.678	540	2,096	5.1	575.0	575.0	575.5	0.5
R	22.78	560	3,129	3.4	576.8	576.8	577.3	0.5
S	22.89	590	2,361	4.6	578.2	578.2	578.6	0.4
T	23.07	710	2,120	5.1	581.5	581.5	581.7	0.2
U	23.34	650	3,045	3.5	586.1	586.1	586.9	0.8
V	23.51	600	2,191	4.9	588.5	588.5	589.1	0.6
W	23.75	540	2,350	4.4	592.6	592.6	592.6	0.0
X	23.92	445	1,995	5.1	595.4	595.4	595.8	0.4
Y	24.12	350	1,843	5.6	599.2	599.2	599.5	0.3
Z	24.17	80	807	7.2	600.0	600.0	600.3	0.3
AA	24.35	180	881	6.6	602.7	602.7	603.0	0.3
AB	24.50	260	1,090	5.3	607.9	607.9	608.0	0.1

[1] Miles above confluence with Harpeth River

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

WILLIAMSON COUNTY, TN

AND INCORPORATED AREAS

FLOODWAY DATA

MILL CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (NAVD)	WITHOUT FLOODWAY (NAVD)	WITH FLOODWAY (NAVD)	INCREASE
MILL CREEK								
AC	24.52[1]	260	1,443	4.0	611.1	611.1	611.6	0.5
AD	24.56[1]	260	1,720	3.4	611.7	611.7	612.2	0.5
MURFREES FORK								
A	360[2]	970[3]	9,172	2.5	658.2	658.2	659.2	1.0
B	2,025[2]	1,000	11,007	1.2	658.9	658.9	659.9	1.0
C	5,050[2]	750[4]	6,443	2.1	660.9	660.9	661.9	1.0
D	7,250[2]	590	4,701	2.8	662.6	662.6	663.6	1.0
E	9,785[2]	610	5,045	2.5	665.3	665.3	666.3	1.0
F	12,150[2]	580[4]	4,949	2.5	669.5	669.5	670.4	0.9
G	13,985[2]	590	4,760	2.6	670.9	670.9	671.8	0.9
H	17,640[2]	550	2,813	3.7	676.9	676.9	677.9	1.0
I	20,300[2]	180	1,027	8.7	686.8	686.8	686.8	0.0
J	21,450[2]	580[4]	4,245	1.9	687.4	687.4	688.4	1.0
K	24,000[2]	420[4]	2,551	3.2	691.1	691.1	692.1	1.0
L	27,450[2]	895	2,800	1.8	700.1	700.1	700.3	0.2
M	29,100[2]	250	1,119	4.5	703.3	703.3	703.9	0.6
N	31,375[2]	350	1,486	3.3	712.0	712.0	712.9	0.9
O	33,060[2]	330[4]	1,950	2.4	719.9	719.9	720.9	1.0
P	35,620[2]	70	364	8.4	729.9	729.9	730.7	0.8
Q	38,050[2]	160	706	3.8	740.6	740.6	741.6	1.0
R	39,080[2]	200	920	2.7	744.8	744.8	745.8	1.0
S	40,750[2]	120	315	6.9	752.3	752.3	752.6	0.3

[1] Miles above confluence with Harpeth River
[2] Feet above mouth
[3] Combined West Harpeth River/Murfreees Fork floodway
[4] Width measured normal to direction of flow

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY
WILLIAMSON COUNTY, TN
AND INCORPORATED AREAS

FLOODWAY DATA

MILL CREEK – MURFREES FORK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (NAVD)	WITHOUT FLOODWAY (NAVD)	WITH FLOODWAY (NAVD)	INCREASE
OWL CREEK								
A	1,468	290	1,817	3.9	554.1	550.0[2]	550.8	0.8
B	3,158	290	1,927	3.6	554.7	553.5	553.9	0.4
C	3,478	300	1,997	3.5	555.0	554.2	554.4	0.2
D	4,028	305	1,960	3.6	557.9	557.9	558.9	1.0
E	4,208	220	1,414	5.0	558.1	558.1	559.1	1.0
F	5,878	270	1,097	5.0	564.1	564.1	564.4	0.3
G	7,378	270	919	5.9	570.8	570.8	571.1	0.3
H	8,978	280	1,150	4.7	577.3	577.3	578.2	0.9
I	9,958	200	991	5.5	584.0	584.0	584.7	0.7
J	10,588	200	1,145	4.8	586.3	586.3	587.1	0.8
K	11,328	210	1,762	3.1	590.6	590.6	591.6	1.0
L	11,468	185	1,154	4.7	590.6	590.6	591.5	0.9
M	12,398	215	1,126	4.8	595.5	595.5	595.9	0.4
N	13,378	220	1,036	3.4	598.3	598.3	599.2	0.9
O	14,058	260	319	11.2	600.9	600.9	601.2	0.3
P	15,108	260	963	3.7	608.5	608.5	608.9	0.4
Q	15,368	215	827	4.3	609.1	609.1	609.7	0.6
R	15,608	230	698	5.1	609.7	609.7	610.3	0.6
S	15,908	245[3]	646	5.5	612.6	612.6	612.9	0.3
T	16,608	250	1,145	3.1	617.3	617.3	617.8	0.5
U	16,988	280	1,176	3.0	618.8	618.8	619.0	0.2
V	18,428	200	534	6.7	624.7	624.7	625.0	0.3
W	19,008	200	566	6.3	629.4	629.4	629.4	0.0
X	19,328	103	564	7.4	633.0	633.0	633.0	0.0

[1] Feet above confluence with Mill Creek
[2] Elevation computed without consideration of flooding controlled by Mill Creek
[3] Width extends beyond county boundary

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY
WILLIAMSON COUNTY, TN
AND INCORPORATED AREAS

FLOODWAY DATA

OWL CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (NAVD)	WITHOUT FLOODWAY (NAVD)	WITH FLOODWAY (NAVD)	INCREASE
OWL CREEK								
Y	19,568[1]	205	842	4.2	634.1	634.1	634.1	0.0
Z	21,328[1]	180	499	7.1	647.0	647.0	647.4	0.4
AA	23,188[1]	160	628	4.4	663.2	663.2	664.2	1.0
AB	23,688[1]	100	360	7.6	668.4	668.4	668.4	0.0
AC	24,008[1]	110	487	5.7	672.8	672.8	673.5	0.7
AD	24,248[1]	110	372	7.4	673.9	673.9	674.5	0.6
AE	24,608[1]	110	425	6.5	676.8	676.8	677.7	0.9
RUTHERFORD CREEK								
A	133,430[2]	450	2,334	3.4	722.9	722.9	723.9	1.0
B	137,028[2]	160	1,519	3.9	728.4	728.4	728.8	0.4
C	140,218[2]	200	1,372	4.1	740.2	740.2	740.8	0.6
D	142,144[2]	200	1,029	5.2	745.5	745.5	745.8	0.3
E	144,505[2]	330	1,619	3.1	752.6	752.6	753.5	0.9
F	146,635[2]	140	756	6.4	757.8	757.8	758.0	0.2
G	147,509[2]	140[3]	993	4.8	761.6	761.6	762.0	0.4
H	149,719[2]	140	583	6.0	766.4	766.4	766.4	0.0
I	152,363[2]	130	595	5.7	776.0	776.0	776.9	0.9
J	154,373[2]	75	539	6.1	783.0	783.0	783.8	0.8

[1] Feet above confluence with Mill Creek
[2] Feet above mouth
[3] Width extends beyond county boundary

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY
WILLIAMSON COUNTY, TN
AND INCORPORATED AREAS

FLOODWAY DATA

OWL CREEK – RUTHERFORD CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (NAVD)	WITHOUT FLOODWAY (NAVD)	WITH FLOODWAY (NAVD)	INCREASE
SHARPS BRANCH								
A	0.020	68	684	3.3	637.0	622.0[2]	622.8	0.8
B	0.058	81	760	2.9	637.0	622.9[2]	623.7	0.8
C	0.145	94	698	3.2	637.0	626.6[2]	627.4	0.8
D	0.203	80	896	2.5	637.0	628.2[2]	629.1	0.9
E	0.259	47	316	7.1	637.0	628.2[2]	629.2	1.0
F	0.317	57	567	4.0	637.0	629.9[2]	630.8	0.9
G	0.380	68	479	4.1	637.0	630.7[2]	631.7	1.0
H	0.435	112	1,150	1.7	637.0	634.7[2]	635.5	0.8
I	0.527	192	1,498	1.3	637.0	634.9[2]	635.8	0.9
J	0.610	83	634	3.1	638.4	638.4	639.3	0.9
K	0.660	198	1,478	1.2	638.7	638.7	639.6	0.9
L	0.682	179	1,222	1.5	638.8	638.8	639.7	0.9
M	0.732	147	609	3.0	639.2	639.2	640.1	0.9
N	0.815	160	571	2.3	641.8	641.8	642.8	1.0
O	0.894	45	2,205	6.4	644.3	644.3	645.2	0.9
P	0.960	108	448	2.9	647.4	647.4	648.4	1.0
Q	1.072	102	460	2.5	652.1	652.1	653.1	1.0
R	1.145	31	135	8.4	654.3	654.3	655.0	0.7

[1] Miles above mouth
[2] Elevation computed without consideration of backwater effects from Harpeth River

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY
WILLIAMSON COUNTY, TN
AND INCORPORATED AREAS

FLOODWAY DATA

SHARPS BRANCH

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET/SEC)	REGULATORY (NAVD)	WITHOUT FLOODWAY (NAVD)	WITH FLOODWAY (NAVD)	INCREASE
SOUTH HARPETH RIVER								
A	10.18[1]	512	6,040	5.0	573.5	573.5	573.8	0.3
B	10.69[1]	450	2,265	3.5	578.5	578.5	579.0	0.6
C	11.28[1]	464	3,436	4.8	586.0	586.0	586.9	0.9
D	11.86[1]	933	6,945	2.4	591.0	591.0	591.7	0.7
E	12.72[1]	632	5,120	2.4	598.8	598.8	599.5	0.7
F	13.42[1]	499	3,662	3.4	603.4	603.4	604.2	0.8
G	14.05[1]	638	4,740	2.6	608.8	608.8	609.5	0.7
H	14.89[1]	686	4,826	2.6	619.3	619.3	620.0	0.7
SOUTH PRONG CREEK								
A	211[2]	170	485	3.8	663.0	661.8[3]	662.5	0.7
B	1,091[2]	170	377	4.9	665.6	665.6	666.5	0.9
C	2,568[2]	150	406	4.6	670.3	670.3	670.3	0.0
D	2,863[2]	115	373	5.0	673.1	673.1	673.1	0.0
E	3,178[2]	120	293	6.3	673.3	673.3	673.6	0.3
F	3,808[2]	120	462	4.0	677.9	677.9	678.3	0.4
G	4,048[2]	110	642	2.9	680.9	680.9	681.3	0.4
H	4,428[2]	90	378	4.9	681.5	681.5	682.0	0.5
I	4,513[2]	80	356	5.2	681.7	681.7	682.2	0.5
J	5,578[2]	80	393	3.2	688.4	688.4	689.1	0.7
K	5,640[2]	80	202	15.0	688.6	688.6	688.6	0.0

[1] Miles above confluence with Harpeth River
[2] Feet above confluence with Spencer Creek
[3] Elevation computed without consideration of backwater effects from Spencer Creek

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

WILLIAMSON COUNTY, TN
AND INCORPORATED AREAS

FLOODWAY DATA

SOUTH HARPETH RIVER - SOUTH PRONG CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (NAVD)	WITHOUT FLOODWAY (NAVD)	WITH FLOODWAY (NAVD)	INCREASE
SOUTH PRONG CREEK								
L	5,950[1]	260	*	*	696.9	696.9	697.9	1.0
M	6,300[1]	240	*	*	697.2	697.2	698.2	1.0
N	7,650[1]	170	272	4.8	705.8	705.8	706.0	0.2
O	8,605[1]	170	471	2.8	711.3	711.3	711.8	0.5
P	9,655[1]	170	709	1.8	722.1	722.1	722.7	0.6
Q	10,765[1]	39	114	11.4	729.1	729.1	729.1	0.0
SPENCER CREEK								
A	0.91[2]	522	6,389	1.1	640.6	640.6	640.6	0.0
B	1.51[2]	370	2,100	3.3	648.6	648.6	648.7	0.1
C	1.72[2]	449	2,156	3.2	649.7	649.7	650.7	1.0
D	2.12[2]	290	1,581	4.4	656.7	656.7	657.0	0.3
E	2.32[2]	360	2,123	2.4	658.0	658.0	658.6	0.6
F	2.63[2]	210	898	5.8	662.9	662.9	663.2	0.3

[1] Feet above confluence with Spencer Creek
[2] Miles above mouth
* Data not available

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY
WILLIAMSON COUNTY, TN
AND INCORPORATED AREAS

FLOODWAY DATA

SOUTH PRONG CREEK – SPENCER CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (NAVD)	WITHOUT FLOODWAY (NAVD)	WITH FLOODWAY (NAVD)	INCREASE
TRACE CREEK								
A	5,207[1]	170	575	5.8	575.2	575.2	575.4	0.2
B	6,517[1]	165	481	7.0	584.9	584.9	585.0	0.1
C	7,457[1]	180	1,294	2.6	597.2	597.2	597.9	0.7
D	7,787[1]	205	922	3.6	598.6	598.6	598.7	0.1
E	8,487[1]	155	1,028	2.2	602.5	602.5	603.0	0.5
F	8,727[1]	127	310	7.3	602.5	602.5	603.0	0.5
G	9,457[1]	110	342	6.6	608.6	608.6	608.7	0.1
H	11,307[1]	110	386	5.8	621.2	621.2	621.9	0.7
I	12,777[1]	100	505	4.5	639.1	639.1	640.0	0.9
J	13,367[1]	100	401	5.6	642.1	642.1	642.9	0.8
UNNAMED TRIBUTARY TO MILL CREEK								
A	650[2]	300	1,182	3.3	601.3	601.3	602.2	0.9
B	1,150[2]	300	663	5.9	603.0	603.0	603.9	0.9
UNNAMED TRIBUTARY TO SOUTH PRONG CREEK CREEK								
A	715[3]	40	99	5.9	689.0	689.0	689.6	0.6

[1] Feet above confluence with Harpeth River
[2] Feet above confluence with Mill Creek
[3] Feet above confluence with South Prong Creek

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY
WILLIAMSON COUNTY, TN
AND INCORPORATED AREAS

FLOODWAY DATA

TRACE CREEK – UNNAMED TRIBUTARY TO MILL CREEK – UNNAMED TRIBUTARY TO SOUTH PRONG CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (NAVD)	WITHOUT FLOODWAY (NAVD)	WITH FLOODWAY (NAVD)	INCREASE
WATSON BRANCH								
A	370	40	254	9.1	**645.3**	623.5[2]	623.8	0.3
B	2,070	40	315	7.3	**645.3**	631.4[2]	631.8	0.4
C	2,970	37	482	5.0	**645.3**	641.7[2]	641.7	0.0
D	3,970	61	385	6.0	**645.3**	642.3[2]	642.5	0.2
E	5,895	80	337	6.2	650.2	650.2	650.7	0.5
F	6,955	80	300	7.0	656.1	656.1	656.2	0.1
G	7,555	48	421	5.0	661.6	661.6	661.6	0.0
H	10,095	50	242	7.6	672.3	672.3	672.7	0.4
I	10,960	54	562	3.3	682.1	682.1	682.1	0.0
J	11,220	80	650	4.0	684.0	684.0	684.0	0.0
K	11,765	105	707	2.6	684.3	684.3	684.3	0.0
L	12,490	80	313	5.8	684.9	684.9	685.5	0.6
M	14,085	80	375	4.9	692.9	692.9	693.7	0.8
N	15,370	96	321	4.3	698.7	698.7	698.7	0.0

[1] Feet above confluence with Harpeth River
[2] Elevation computed without consideration of backwater effects from Harpeth River

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY
WILLIAMSON COUNTY, TN
AND INCORPORATED AREAS

FLOODWAY DATA

WATSON BRANCH

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (NAVD)	WITHOUT FLOODWAY (NAVD)	WITH FLOODWAY (NAVD)	INCREASE
WEST HARPETH RIVER								
A	420	442	6,575	4.9	613.6	610.0[4]	611.0	1.0
B	1,740	816	9,399	3.4	613.6	611.6[4]	612.6	1.0
C	1,950	954	11,055	2.9	613.6	612.6[4]	613.6	1.0
D	4,270	717	9,423	3.4	614.2	614.2	615.1	0.9
E	8,180	1,226	14,705	2.2	616.7	616.7	617.7	1.0
F	11,620	1,239	12,945	2.5	618.5	618.5	619.5	1.0
G	14,570	1,290	13,046	2.4	620.8	620.8	621.8	1.0
H	18,060	807	7,094	4.0	623.9	623.9	624.9	1.0
I	20,280	1,721	15,771	2.0	629.6	629.6	630.6	1.0
J	24,760	759	8,838	3.6	632.7	632.7	633.7	1.0
K	28,780	1,375	13,506	2.4	635.8	635.8	636.8	1.0
L	33,420	1,099	12,925	2.5	638.1	638.1	639.0	0.9
M	37,120	1,015	10,825	2.9	640.1	640.1	641.1	1.0
N	37,280	983	10,831	2.9	640.4	640.4	641.4	1.0
O	40,760	1,022	11,637	2.7	643.9	643.9	644.9	1.0
P	44,720	1,355	13,376	2.3	646.8	646.8	647.8	1.0
Q	46,950	1,400	10,931	2.1	648.3	648.3	649.1	0.8
R	51,910	770	5,310	4.4	652.8	652.8	653.7	0.9
S	56,100	970[3]	9,172	2.5	658.2	658.2	659.2	1.0
T	58,150	1,100	11,245	1.3	659.0	659.0	660.0	1.0
U	59,350	1,060[2]	9,573	1.5	659.2	659.2	660.2	1.0
V	60,590	670	6,147	2.2	659.7	659.7	660.6	0.9
W	61,670	740[2]	6,067	2.2	660.3	660.3	661.3	1.0
X	62,640	310[2]	2,563	5.3	661.6	661.6	662.3	0.7

[1] Feet above mouth
[2] Width measured normal to direction of flow
[3] Combines West Harpeth River/Murfrees Fork floodway
[4] Elevation computed without consideration of backwater effects from Harpeth River

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY
WILLIAMSON COUNTY, TN
AND INCORPORATED AREAS

FLOODWAY DATA

WEST HARPETH RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (NAVD)	WITHOUT FLOODWAY (NAVD)	WITH FLOODWAY (NAVD)	INCREASE
WEST HARPETH RIVER								
Y	64,200	680	6,780	2.0	665.0	665.0	665.9	0.9
Z	67,560	600	4,020	3.2	667.9	667.9	668.6	0.7
AA	69,510	900	6,159	2.0	672.8	672.8	673.3	0.5
AB	71,640	890	7,075	1.7	673.9	673.9	674.5	0.6
AC	74,360	410	3,685	3.3	675.4	675.4	676.1	0.7
AD	76,700	940[2]	7,666	1.6	676.8	676.8	677.8	1.0
AE	80,700	800	5,491	2.1	678.9	678.9	679.9	1.0
AF	85,950	440[2]	2,934	3.8	685.8	685.8	686.5	0.7
AG	89,150	420	3,721	2.8	690.1	690.1	691.0	0.9
AH	92,520	750	4,960	2.0	692.5	692.5	693.5	1.0
AI	94,370	420	2,877	3.4	695.1	695.1	696.0	0.9
AJ	96,070	750[2]	7,241	1.3	700.4	700.4	701.0	0.6
AK	97,600	370[2]	2,984	2.7	700.6	700.6	701.3	0.7
AL	98,500	450	2,891	2.7	701.0	701.0	702.0	1.0
AM	101,570	180	1,473	5.0	705.4	705.4	706.4	1.0
AN	103,710	160	1,512	4.7	711.2	711.2	711.7	0.5
AO	105,680	220	1,652	4.1	713.2	713.2	714.2	1.0
AP	108,070	60	594	10.8	719.9	719.9	720.8	0.9
AQ	112,640	220	1,643	3.5	734.0	734.0	734.7	0.7
AR	116,190	200	933	5.7	740.7	740.7	741.5	0.8
AS	118,740	110	868	5.1	750.5	750.5	751.2	0.7
AT	119,630	70	719	4.8	753.4	753.4	753.9	0.5

[1] Feet above mouth
[2] Width measured normal to direction of flow
[3] Combined West Harpeth River/Murfrees Fork floodway

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY
WILLIAMSON COUNTY, TN
AND INCORPORATED AREAS

FLOODWAY DATA

WEST HARPETH RIVER

5.0 INSURANCE APPLICATION

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

Zone A

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

Zone AE

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

Zone AH

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

Zone AO

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

Zone AR

Zone AR is the flood insurance risk zone that corresponds to an area of special flood hazard formerly protected from the base flood event by a flood-control system that was subsequently decertified. Zone R indicates that the former flood-control system is being restored to provide protection from the 1-percent-annual-chance or greater flood event.

Zone A99

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

Zone V

Zone V is the flood insurance rate zone that corresponds to the 1-percent-annual-chance coastal floodplains that have additional hazards associated with storm waves. Because approximate

hydraulic analyses are performed for such areas, no BFEs are shown within this zone.

Zone VE

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

Zone X

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

Zone X (Future Base Flood)

Zone X (Future Base Flood) is the flood insurance risk zone that corresponds to the 1-percent-annual-chance floodplains that are determined based on future-conditions hydrology. No BFEs or base flood depths are shown within this zone.

Zone D

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

6.0 FLOOD INSURANCE RATE MAP

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

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

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

The countywide FIRM presents flooding information for the entire geographic area of Williamson County, Tennessee. Previously, separate Flood Hazard Boundary Maps and/or FIRMs were prepared for each incorporated community and the unincorporated areas of the County identified as flood-prone. Historical data relating to the maps prepared for each community are presented in Table 9, "Community Map History."

COMMUNITY NAME	INITIAL IDENTIFICATION	FLOOD HAZARD BOUNDARY MAP REVISIONS DATE	FIRM EFFECTIVE DATE	FIRM REVISIONS DATE
Brentwood, City of	November 30, 1973	None	February 1, 1978	June 5, 1981 June 11, 1982
Fairview, City of	April 11, 1975	None	September 1, 1990	
Franklin, City of	May 31, 1974	April 23, 1976	July 2, 1980	September 10, 1982 July 15, 1988
Nolensville, Town of [1]	December 6, 1974	December 30, 1977	April 1, 1981	November 3, 1989 August 16, 1993
Thompson's Station, Town of [1]	December 6, 1974	December 30, 1977	April 1, 1981	November 3, 1989 August 16, 1993
Williamson County (Unincorporated Areas)	December 6, 1974	December 30, 1977	April 1, 1981	November 3, 1989 August 16, 1993

[1]Dates for this community were taken from the Unincorporated Areas of Williamson County

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

WILLIAMSON COUNTY, TN
AND INCORPORATED AREAS

COMMUNITY MAP HISTORY

7.0 OTHER STUDIES

A report entitled "Hydraulic and Hydrologic Modeling, Lynnwood Branch Basin, Williamson County, Tennessee" includes information regarding the methods and techniques used for the Unincorporated Areas of Williamson County FIS report (Reference 34).

Flood hazard information for the City of Spring Hill within Williamson County can be found in the Maury County, Tennessee and Incorporated Areas FIS report dated April 16, 2007 (Reference 1).

Because it is based on more up-to-date analyses, this countywide FIS supersedes the previously printed FISs for all jurisdictions within Williamson County.

This is a multi-volume FIS. Each volume may be revised separately, in which case it supersedes the previously printed volume. Users should refer to the Table of Contents in Volume 1 for the current effective date of each volume; volumes bearing these dates contain the most up-to-date flood hazard information.

8.0 LOCATION OF DATA

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

9.0 BIBLIOGRAPHY AND REFERENCES

1. Federal Emergency Management Agency, Flood Insurance Study. Maury County, Tennessee and Incorporated Areas. Washington. D.C. April 16, 2007.

2. U.S. Department of Commerce, Bureau of the Census, "State & County Quickfacts, Tennessee Quicklinks, Williamson County, Tennessee." [Online] Revised February 20, 2009. Available at http://quickfacts.census.gov/, accessed on June 2014.

3. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Environmental Data Services, Climatologic Data for Tennessee. Asheville. North Carolina. 1956-1976.

4. U.S. Geological Survey, for the Tennessee Department of Transportation, Technique for Estimating Magnitude and Frequency of Floods in Tennessee. 1976.

5. U.S. Department of Housing and Urban Development, Federal Insurance Administration, Federal Register, Vol. 41, No. 207, Code of Federal Regulations. Title 24. Chapter 10. Parts 1910.3A and 3B. 1976.

6. U.S. Department of the Interior, Geological Survey, Interagency Advisory Committee on Water Data, Bulletin No.17B, Guidelines for Determining Flood Flow Frequency, Reston, Virginia, Revised September 1981, revised March 1982.

7. U.S. Army Corps of Engineers, Nashville District, Flood Plain Information-Harpeth River. Mouth to Franklin. Tennessee. June 1975.

8. University of Illinois, Bulletin No. 462, Hydrologic Determination of Waterway Areas for the Design of Drainage Structures in Small Drainage Basins, Yen Te Chow, March 1962.

9. U.S. Army Corps of Engineers, Hydrologic Engineering Center, HEC-1 Flood Hydrograph Package, Computer Program 723-X6-L2010, Davis, California, September 1981, revised August 1988.

10. U.S. Department of Commerce, National Weather Service, Technical Paper No. 40, Rainfall Frequency Atlas of the United States, Washington, D.C., January 1963.

11. U.S. Department of Agriculture, Soil Conservation Service, Technical Release No. 55, Urban Hydrology for Small Watersheds, January 1975.

12. U.S. Geological Survey, Flood Frequency of Stream in Rural Basins of Tennessee, 1993.

13. Stanford & Assoc., Inc., Drainage Calculations for First Baptist Church South Access Road Across Watson's Branch, March 1997.

14. U.S. Army Corps of Engineers, Nashville District, Regional Detention Study, Mill Creek Basin, Williamson County, Tennessee, November 1990.

15. U.S. Geological Survey, Flood Frequency Prediction Methods for Unregulated Streams of Tennessee, 2000, USGS Water Resources Investigations Report 03-4176.

16. U.S. Geological Survey, Nationwide Summary of USGS Regional Regression Equations for Estimating Magnitude and Frequency of Floods for Ungaged Sites, 1993, USGS Water Resources Investigations Report 94-4002.

17. U.S. Army Corps of Engineers, Hydrologic Engineering Center, HEC-HMS, Hydrologic Modeling System, Version 4.0, Davis, California, December 2013.

18. U.S. Army Corps of Engineers, Nashville District, Harpeth River Watershed, HEC-HMS Analysis, pg. 76, Nashville, Tennessee, December 2012.

19. National Oceanic and Atmospheric Administration, Precipitation-Frequency Atlas of the United States, *Volume 2, Version 3.0*, National Weather Service, Silver Spring, Maryland, 2004, revised 2006.

20. U.S. Army Corps of Engineers, Nashville District, Harpeth River, HEC-HMS Revisions, Memorandum for the Record, Nashville, Tennessee, January 17, 2014.

21. U.S. Army Corps of Engineers, Hydrologic Engineering Center, HEC-SSP Statistical Software Package, Version 2.0, Davis, California, January 2010.

22. BakerAECOM, Hydrologic & Hydraulic Analysis, Harpeth River Watershed (HUC 05130204), November 2013.

23. U.S. Army Corps of Engineers, HEC-2 Water Surface Profiles, Users Manual, October 1973.

24. U.S. Department of the Interior, Geological Survey, Open-File Report 76-499, Computer Program E431, Users Manual, Computer Applications for Step-Backwater and Floodway Analysis, J.O. Shearman, 1976, Washington, D.C.

25. Tennessee Valley Authority, Mapping Services Branch, Aerial Photographs, Williamson County, Tennessee, Scale 1:12,000, Chattanooga, Tennessee, 1986.

26. U.S. Geological Survey, 7.5 Minute Series Topographic Maps, Scale 1:24,000, Contour Interval 20 feet: Leipers Fork, Tennessee, 1981; Bellevue, Tennessee, 1968, photo revised 1983; Fairview, Tennessee, 1951, photo revised 1980; Contour Interval 10 feet: Franklin, Tennessee, 1981; Oak Hill, Tennessee, 1968, photo revised 1983.

27. Alley, Yaung & Baumgartner, Inc., Drainage Study and Plan for Beech Creek, Scale 1:1,200, Contour Interval 5 feet: Brentwood, Tennessee, February 1991.

28. U.S. Geological Survey, Water Supply Paper 2339.

29. U.S. Army Corps of Engineers, Hydrologic Engineering Center, HEC-RAS River Analysis System. April 1997.

30. U.S. Army Corps of Engineers, Hydrologic Engineering Center, HEC-RAS River Analysis System. Version 2.2, September 1998.

31. U.S. Army Corps of Engineers, Hydrologic Engineering Center, HEC-RAS River Analysis System. Version 3.1, November 2002.

32. U.S. Army Corps of Engineers, Hydrologic Engineering Center, HEC-RAS, River Analysis System, Version 4.1.0, Davis, California, January 2010.

33. Northrop Grumman Corporation, Nashville Tennessee 1.0 Meter LiDAR, Huntsville, Alabama, August, 2011.

34. Federal Emergency Management Agency, Flood Insurance Study. Williamson County, Tennessee (Unincorporated Areas), Washington, D.C., August 16, 1993.

35. Federal Emergency Management Agency, Flood Insurance Study, City of Brentwood, Williamson County, Tennessee, Washington, D.C., June 11, 1982.

36. Federal Emergency Management Agency, Flood Insurance Study, City of Franklin,

Williamson County, Tennessee, July 15, 1988, Washington, D.C.

37. Federal Emergency Management Agency, Flood Insurance Study. Williamson County. Tennessee and Incorporated Areas, January 16, 2003, Washington, D.C.

38. GRW Aerial Surveys, Inc., City of Franklin, Tennessee, Topographic Base Map, Lexington, Kentucky, photography dated February 24 and 25, 1995.

39. Ragan-Smith-Associates, Inc., South Prong Creek Relief Channel, Topographic Mapping at a scale of 1"=50', Contour Interval of 1 foot, December 5, 1995.