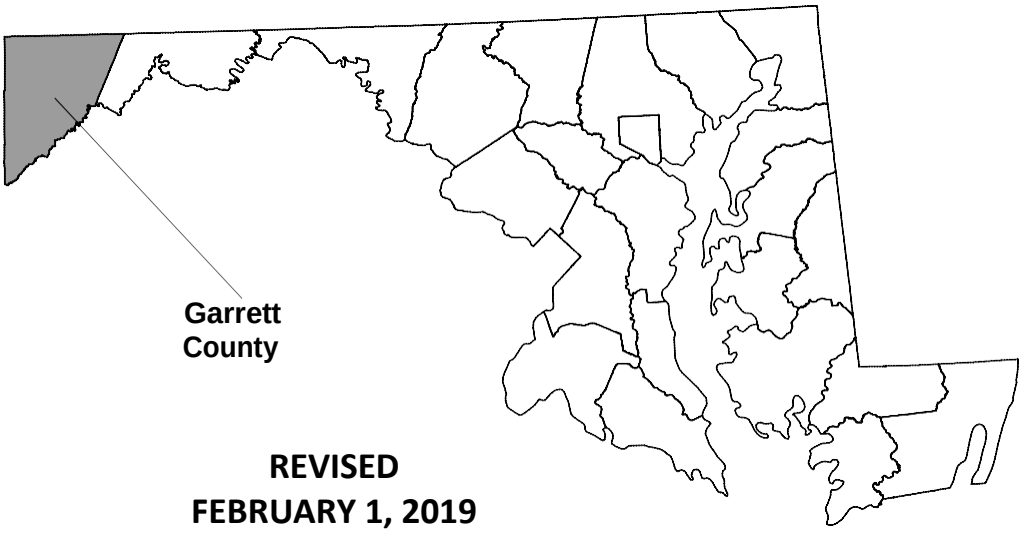
FLOOD INSURANCE STUDY

VOLUME 1 OF 2

GARRETT COUNTY, MARYLAND AND INCORPORATED AREAS

COMMUNITY NAME	COMMUNITY NUMBER	COMMUNITY NAME	COMMUNITY NUMBER
ACCIDENT, TOWN OF	240093	GRANTSVILLE, TOWN OF	240165
DEER PARK, TOWN OF	240102	KITZMILLER, TOWN OF	240036
FRIENDSVILLE, TOWN OF	240035	LOCH LYNN HEIGHTS, TOWN OF	240037
GARRETT COUNTY (UNINCORPORATED AREAS)	240034	MOUNTAIN LAKE PARK, TOWN OF	240038
		OAKLAND, TOWN OF	240039



REVISED
FEBRUARY 1, 2019

Federal Emergency Management Agency

FLOOD INSURANCE STUDY NUMBER
24023CV001B

NOTICE TO
FLOOD INSURANCE STUDY USERS

Communities participating in the National Flood Insurance Program have established repositories of flood hazard data for floodplain management and flood insurance purposes. This Flood Insurance Study (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:	October 2, 2013
Revised Countywide FIS Date:	February 1, 2019 - to add Base Flood Elevations and floodway; to change Special Flood Hazard Areas; and to reflect updated topographic information.

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FLOOD INSURANCE STUDY
GARRETT COUNTY, MARYLAND AND INCORPORATED AREAS

1.0 INTRODUCTION

1.1 Purpose of Study

This countywide Flood Insurance Study (FIS) investigates the existence and severity of flood hazards in, or revises and updates previous FIS's / Flood Insurance Rate Maps (FIRMs) in the geographic area of Garrett County, Maryland, including the Towns of Accident, Deer Park, Friendsville, Grantsville, Kitzmiller, Loch Lynn Heights, Mountain Lake Park and Oakland, and the unincorporated areas of Garrett County (referred to collectively herein as Garrett County) and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This FIS has developed flood-risk data for various areas of the community that will be used to establish actuarial flood insurance rates. This information will also be used by Garrett County to update existing floodplain regulations as part of the Regular Phase of the National Flood Insurance Program (NFIP), and will also be used by local and regional planners to further promote sound land use and floodplain development. Minimum floodplain management requirements for participation in the NFIP are set forth in the Code of Federal Regulations at 44 CFR, 60.3.

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

1.2 Authority and Acknowledgements

The sources of authority for this FIS 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, Garrett County in a countywide format FIS. Information on the authority and acknowledgments for each jurisdiction included in this countywide FIS, as compiled from their previously printed FIS reports, is noted as follows.

Accident, Town of:	No FIS report was prepared, however a FIRM was prepared for this town in September 1, 1978 (conversion of FHBM to FIRM).
Deer Park, Town of:	For the August 16, 1994, FIS study, the hydrologic and hydraulic analyses for Block Run and the Little Youghiogheny River were prepared by GEO-Technical Services, Inc., for the Federal Emergency Management Agency (FEMA), under Contract No. EMW-90-C-3128. The hydrologic analysis prepared by Toups and Loiederman in August 1977 was verified and revised by GEO-Technical Services, Inc. This work was completed in October 1992.
Friendsville, Town of:	Hydrologic analyses for the streams studied were coordinated with those developed by the Pittsburgh District of the U. S. Army Corps of Engineers (USACE). Analysis of the effect of Youghiogheny Reservoir on the flooding of the Youghiogheny River was also coordinated with the USACE. Other agencies included in the coordination of hydrological results were the U.S. Geological Survey (USGS), the Soil Conservation Service, and the Maryland DNR. The hydrologic and hydraulic analyses for the March 1979 study were prepared by Toups and Loiederman for the Federal Insurance Administration, under Contract Number H- 3928. This work, which was completed in August 1977, covered all significant flooding sources affecting the Town of Friendsville.
Garrett County: (Unincorporated Areas)	In the original December 5, 1984, study, the hydrologic and hydraulic analyses were prepared by Greiner Engineering Sciences, Inc., for the Federal Emergency Management Agency (FEMA), under Contract No. EMW-C-0691. That work was completed in March 1983. In the August 16, 1994 revision, the hydrologic and hydraulic analyses for the Little Youghiogheny River were prepared by GEO-Technical Services Inc., for FEMA, under Contract No. EMW-90-C-3128. The hydrologic analyses performed by Greiner Engineering Services, Inc., were verified and revised by GEO-Technical Services, Inc. This work was completed in October 1992.

Kitzmiller, Town of:	The hydrologic and hydraulic analyses for the October 15, 1985, study were performed by Greiner Engineering Sciences, Inc., during the course of the Flood Insurance Study for Garrett County. The Garrett County study was completed in March 1983.
Loch Lynn Heights, Town of:	In the original February 1979 study, the hydrologic and hydraulic analyses for the Little Youghiogheny River were prepared by Toups and Loiederman for the Federal Insurance Administration (FIA), under Contract No. H- 3928. That work was completed in August 1977. In the August 16, 1984 revision, the hydrologic and hydraulic analyses for the Little Youghiogheny River were prepared by GEO-Technical Services, Inc., for Federal Emergency Management Agency (FEMA), under Contract No. EMW-90-C-3128. The hydrologic analyses performed by Greiner Engineering Sciences, Inc., were verified and revised by GEO-Technical Services, Inc. This work was completed in October 1992.
Mountain Lake Park, Town of:	In the original April 16, 1984, study, the hydrologic analysis was prepared by Toups and Loiederman for the Federal Emergency Management Agency (FEMA), under Contract No. H-3928. That work was completed in August 1977. The hydraulic analysis was prepared by Dewberry & Davis, under agreement with FEMA. That work was completed in December 1983. In the August 16, 1994 revision, the hydrologic and hydraulic analyses for the Little Youghiogheny River were prepared by GEO-Technical Services, Inc., for FEMA, under Contract No. EMW-90-C-3128. The hydrologic analysis performed by Greiner Engineering Sciences, Inc., were verified and revised by GEO-Technical Services, Inc. This work was completed in October 1992.

Oakland, Town of:	In the original January 1979 FIS, the hydrologic and hydraulic analyses for the Little Youghiogheny River and Bradley Run were prepared by Toups and Loiederman for the Federal Insurance Administration (FIA), under Contract No. H-3928. That work was completed in August 1977. In the October 18, 1995 revision, the hydrologic and hydraulic analyses for the Little Youghiogheny River wereprepared by GEO-Technical Services, Inc., (GTS) for the Federal Emergency Management Agency (FEMA), under Contract No. EMW-90- C-3128. This work was completed in October 1992. Updated hydrologic and hydraulic analyses for Bradley Run were obtained from Morgan C. France, P.E. In addition, the corporate limits were revised to include areas annexed by the town from Garrett County (Reference 51).

There are no previous FISs for the Towns of Accident and Grantsville; therefore the previous authority and acknowledgement information for these communities is not included in this FIS.

For the October 2, 2013, countywide FIS new hydrologic and hydraulic analyses were performed for portions of Bear Creek, Big Shade Run, Block Run, Bradley Run, Little Laurel Run, Little Shade Run, Little Youghiogheny River, Mill Run, Minnow Creek, North Branch Potomac River, Nydegger Run, Piney Creek, Savage River, Snowy Creek, Sough Branch Casselman River, Unnamed Tributary to Little Youghiogheny River, Youghiogheny River (Lower Reach), and Youghiogheny River (Upper Reach). New approximate floodplains were also mapped for Garrett County and its incorporated areas. The criteria for these floodplains can be found in Section 2.0 of this Flood Insurance Study.

For the February 1, 2019, FIS revision, new hydrologic and hydraulic analyses were performed for a portion of North Branch Potomac River from approximately 1,700 feet downstream of the confluence with Buffalo Creek to approximately 900 feet upstream of Corona Bayard Road. This work was completed for FEMA by joint venture, RAMPP, under Contract No. HSFEHQ-09-D-0369, Task Order No. HSFE03-14-J-0016, as part of the Bayard and Petersburg Levee systems FIS for Grant County, West Virginia. This work was completed in July 2016.

Base map information shown on the October 2, 2013, FIRM was provided in digital format. The digital files, including road centerlines, political boundaries, and streamlines, were provided by Garrett County. Two foot elevation contours derived from 2005 LiDAR data also were obtained from the county.

Base map information shown on the February 1, 2019, FIRM was derived from the October 2, 2013, FIS.

The coordinate system used for the production of this FIRM is Universal Transverse Mercator (UTM), Zone 17 North, North American Datum of 1983 (NAD 83), GRS 80 spheroid. Corner coordinates shown on the FIRM are in latitude and longitude referenced to the UTM projection, NAD 83. Differences in the datum and spheroid used in the production of FIRMs for adjacent counties may result in slight positional differences in map features at the county boundaries. These differences do not affect the accuracy of information shown on the FIRM.

The Digital Flood Insurance Rate Map (DFIRM) production for the October 2, 2013, study was performed by AMEC, Earth & Environmental, Inc. for FEMA, under Contract No. HSFE03-07-D-0030, Task Order HSFE03-08-J-0012.

The DFIRM production for the February 1, 2019, FIS revision was performed by the joint venture, Compass, for FEMA, under Contract No. HSFE60-15-D-0003.

1.3 Coordination

An initial Consultation Coordination Officer (CCO) meeting is held typically with representatives of Federal Emergency Management Agency (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 of FEMA, the community, and the study contractor to review the results of the study.

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

Table 1 – Precountywide Initial and Final CCO Meeting Dates

Community Name	Initial CCO Date	Final CCO Date
Accident, Town of	N/A	N/A
Deer Park, Town of	December 3, 1992	June 16, 1993
Friendsville, Town of	December 1975	August 9, 1978
Garrett County (Unincorporated Areas)	June 1, 1979 & December 3, 1992	June 12, 1984 & June 16, 1993
Grantsville, Town of	N/A	N/A
Kitzmiller, Town of	N/A	N/A
Loch Lynn Heights, Town of	December 1975 & December 3, 1992	August 9, 1978 & June 16, 1993
Mountain Lake Park, Town of	N/A & December 3, 1992	September 13, 1978 & June 16, 1993
Oakland, Town of	December 1975 & December 3, 1992	July 9, 1978 & June 16, 1993

For the October 2, 2013, countywide study, Garrett County and the Towns of Accident, Deer Park, Friendsville, Grantsville, Kitzmiller, Loch Lynn Heights, Mountain Lake Park, and Oakland were notified by phone in July 2008 that the FIS would be updated and converted to countywide format.

For the October 2, 2013, countywide study, a final CCO meeting was held on December 20, 2011. The meeting was attended by representatives of Garrett County, the Towns of Accident, Deer Park, Friendsville, Grantsville, Kitzmiller, Loch Lynn Heights, Mountain Lake Park, and Oakland, AMEC, and FEMA.

For the February 1, 2019, FIS revision, an initial meeting was held on April 23, 2015, with representatives from the Town of Bayard in Grant County, West Virginia, the U.S. Army Corps of Engineers Baltimore Division, FEMA and the study contractor.

For the February 1, 2019, FIS revision, a final CCO meeting was held on February 22, 2017, with representatives from Garrett County, Maryland, Grant County, West Virginia, the Town of Bayard, West Virginia, FEMA, and the study contractor.

2.0 AREA STUDIED

2.1 Scope of Study

This FIS covers the geographic area of Garrett County, Maryland, including the Towns of Accident, Deer Park, Friendsville, Grantsville, Kitzmiller, Loch Lynn Heights, Mountain Lake Park, and Oakland.

All or portions of the flooding sources listed in Table 2 "Flooding Sources Studied by Detailed Methods" were studied by detailed methods. Limits of detailed study are indicated on the Flood Profiles (Exhibit 1) and on the FIRMs (Exhibit 2). The areas studied by detailed methods were selected with priority given to all known flood hazard areas and areas of projected development and proposed construction.

Table 2 – Flooding Sources Studied by Detailed Methods

Bear Creek	Nydegger Run
Big Shade Run	Piney Creek
Block Run	Savage River
Bradley Run	Snowy Creek
Little Laurel Run	South Branch Casselman River
Little Shade Run	Unnamed Tributary to Little Youghiogheny River
Little Youghiogheny River	Youghiogheny River (Lower Reach)
Mill Run	Youghiogheny River (Upper Reach
Minnow Creek	
North Branch Potomac River	

In the August 16, 1994 revision of Garrett County, the Little Youghiogheny River was restudied from the confluence with the Youghiogheny River to a point approximately 3,500 feet upstream of the Town of Deer Park corporate limits. In addition, the corporate limits for the Town of Oakland were updated, which resulted in Bradley Run now falling entirely within Oakland.

In the Town of Deer Park, Block Run and the Little Youghiogheny River were studied by detailed methods.

In the Town of Friendsville, because of the existing development between the two streams, the Youghiogheny River and Bear Creek were studied in detail. The scope and methods of study were proposed to and agreed upon by the FIA. While there is, at present, relatively little development along the west bank of the Youghiogheny River, it was agreed upon by the FIA, the study contractor, and officials of the Town of Friendsville that the improvements which have been made to U. S. Route 48 (now Interstate 68, completed in 1991) will result in an increase in the rate of development along Minnow Creek; this stream was, therefore, also studied in detail.

In the Town of Kitzmiller, the North Branch Potomac River was studied by detailed methods for the entire length affecting the community.

In the original study and in the August 16, 1994 revision for the Town of Loch Lynn Heights, the Little Youghiogheny River was studied by detailed methods for its entire length within the community.

In the original study of the Town of Mountain Lake Park, the Little Youghiogheny River and Unnamed Tributary to Little Youghiogheny River were studied by detailed methods. In the August 16, 1994 revision, the Little Youghiogheny River was restudied for its entire length within the community.

In the original FIS of the Town of Oakland, the Little Youghiogheny River and Bradley Run were studied by detailed methods. In the October 18, 1995 revision, the Little Youghiogheny River was restudied by detailed methods from approximately 1.9 miles upstream of the railroad to the upstream western corporate limits. In addition, Bradley Run was restudied by detailed methods from the confluence with the Little Youghiogheny River to approximately 1.0 mile upstream of the confluence with the Little Youghiogheny River.

Approximate methods of analysis were used to study those areas having low development potential and minimal flood hazards as identified at the initiation of the study. The scope and methods of study were proposed to and agreed upon by FEMA and Garrett County.

All or portions of the following streams listed in Table 3, “Flooding Sources Studied by Approximate Methods,” were studied by approximate methods.

Table 3 –Flooding Sources Studied by Approximate Methods

Aaron Run
Ambrose Run
Arronhalt Fork
Bear Creek
Bear Pen Run
Big Laurel Run
Big Run
Big Shade Run
Blacklick Run
Block Run
Bluelick Run
Broad Ford Run (Broadford Lake) (Mountain Lake)
Bucks Run
Buffalo Run
Casselman River
Cherry Creek (Deep Creek Lake)
Cherry Creek (Youghiogheny River)
Cherry Glade Run
Chestnut Ridge Run
Church Run
Clark Run
Cove Run (Bear Creek)
Cove Run (Mill Run)
Crabtree Creek
Crooked Run
Deep Creek
Deep Creek Lake
Douglass Run
Dunkard Lick Run
Elk Lick Run
Elklick Run
Fikes Run
Fork Run
Fox Run Creek
Frozen Camp Run
Gap Run
Glade Run (Bloomington Lake)
Glade Run (Buffalo Run)
Green Glade Cove
Herrington Creek (Herrington Lake)
Hoyes Run
Jennings Run
Koontz Run
Piney Creek (Frostburg Reservoir)
Piney Run
Poplar Lick Run
Potomac River
Puzzley Run (Lake Louise)
Red Oak Run
Red Run
Red Run 1
Red Run 2
Red Run 3
Red Run Cove
Right Prong
Salt Block Run
Sand Run
Sand Spring Run
Sang Run
Savage River (Savage River Reservoir)
Shields Run
Short Run
Smith Fork
Snowy Creek
South Branch Bear Creek
South Branch Casselman River
South Branch Laurel Run
South Fork
South Fork Crabtree Creek
South Prong Lostland Run
Spiker Run
Springs Run
Steyer Run
Stony Brook
Stony Run
Swamp Run
Tarklin Run
Three Forks Run
Toliver Run
Tributary 1 to South Branch Bear Creek
Tributary No. 1 to Bear Creek
Tributary No. 1 to North Branch Casselman River
Tributary No.1 to Piney Creek
Tributary No. 2 to North Branch Casselman River
Tributary No. 2 to Piney Creek

Table 3 – Flooding Sources Studied by Approximate Methods – continued

Laurel Run (Allegany County, MD)
Laurel Run (Bloomington Lake)
Laurel Run (Buffalo Run)
Laurel Run (North Branch Potomac River at RR near MD HWY 135 & Lee Road)
Laurel Run (North Branch Potomac River at Kempton Road)
Laurel Run (Snowy Creek)
Laurel Run (Youghiogheny River)
Left Prong
Little Bear Creek
Little Laurel Run
Little Savage River
Little Shade Run
Little Youghiogheny River
Lostland Run
Marsh Run Cove
McMilan Fork
Meadow Run
Mill Run (Allegany County, MD)
Mill Run (Youghiogheny River Lake)
Millers Run
Monroe Run
Muddy Creek
Mudlick Run
Murley Run
Ned Run
North Branch Casselman River
North Branch Laurel Run
North Branch Potomac River (Bloomington Lake)
North Branch Potomac River
North Fork
North Fork Crabtree Creek
North Glade Cove
North Prong Lostland Run
Nydegger Run
Pawn Run
Perry's Glad Run
Pine Swamp Run
Tributary No. 3 to Bear Creek
Tributary No. 1 to Broad Ford Run
Tributary No. 1 to Glade Run
Tributary No. 1 to Little Youghiogheny River
Tributary No. 1 to Mill Run
Tributary No. 1 to Youghiogheny River
Tributary No. 1A to Glade Run
Tributary No. 2 to Bear Creek
Tributary No. 2 to Glade Run
Tributary No. 2 to Mill Run
Tributary No. 2 to Youghiogheny River
Tributary No. 3 to Youghiogheny River
Tributary No. 4 to Youghiogheny River
Tributary to Big Laurel Run
Tributary to Big Run
Tributary to Block Run
Tributary to Cherry Creek
Tributary to Dunkard Lick Run
Tributary to Frostburg Reservoir
Tributary to Herrington Creek
Tributary to Laurel Run
Tributary to Murley Run
Tributary to Red Run
Tributary to Springs Run
Tributary to Toliver Run
Tributary to White Rock Run
Trout Run
Trout Run 1
Trout Run 2
Twomile Run
Unnamed Tributary to Cherry Creek
Unnamed Tributary to North Branch Potomac River
Unnamed Tributary to Wolfden Run
Unnamed Tributary to Little Youghiogheny River
West Branch Bluelick Run
White Rock Run
Wolfden Run
Youghiogheny River (Youghiogheny Lake)

For the October 2, 2013, countywide FIS, Letter of Map Revision (LOMR), Case No. 97-03-037P, dated September 22, 1997, and issued to the Town of Oakland, has been superseded by revised hydrologic and hydraulic analyses and has not

been reflected on the FIRM panels. The following tabulation presents the Letter of Map Revision (LOMR) incorporated into the October 2, 2013, countywide study:

LOMR	Community Name	Case Number	Date Issued	Project Identifier
102	Town of Mountain Lake Park	93-03-063P	02/20/1998	Little Youghiogheny River – Liston Property

For the February 1, 2019 FIS revision, there were no LOMRs that needed incorporation on the revised FIRM panels.

2.2 Community Description

Garrett County is the western-most county in Maryland. It is bordered by the State of Pennsylvania to the north, the State of West Virginia to the west and south, and Allegany County, Maryland, to the east.

Garrett County consists of 662 square miles located entirely within the Allegheny Plateau which is strongly dissected by a natural drainage pattern. Land character ranges from steep slopes to gently sloping and moderately sloping summits to valleys and floodplains. The county has over 76,000 acres of parks, lakes, and publicly accessible forestland. Considered Maryland's "Mountaintop Playground," the county boasts the state's highest elevation (3,360 feet) as well as its largest inland body of water (Deep Creek Lake). Garrett County is home to the state's only sub- arctic wetlands and is the only county in the state to produce natural gas or peat. Central, Northern, and Southern Garrett Industrial Parks, as well as the Keyser's Ridge Business Park located off Interstate-68, are State Enterprise Zones. The McHenry Business Park, a technology-based business park to be located on county property adjacent to the Garrett County Airport, is in the design phase and is on track for infrastructure construction to begin in spring 2009 (Reference 59).

The population for Garrett County as determined by the 2000 Census was 29,846, and the 2010 Census population was 30,097, a change of 0.8% (Reference 57).

The climate of the county is humid and temperate, although it generally records the most precipitation, the heaviest snowfall, and the coldest temperatures of all the Maryland counties. The mean annual temperature is 48 degrees Fahrenheit (^{o}F), with a summer temperature of 66.6^{o}F and a winter temperature of 29.1^{o}F. The mean annual precipitation is 47.6 inches. Snowfall averages 85.7 inches during the winter season (Reference 59).

Interstate 68 is an east-west freeway that links the western Maryland panhandle to northeast West Virginia. It is known as "The National Freeway" because its Maryland portion generally follows the Old National Road of the early nineteenth century. I-68 extends from the I-70 junction in Hancock, Maryland to the I-79 junction near Morgantown, West Virginia. It generally ties the Mid-Atlantic region (Baltimore/Washington metropolitan area via I-70) to the Midwest (through western Pennsylvania via I-79). I-68 does not enter a major metropolitan statistical area; the largest city between the endpoints is Cumberland, Maryland (Reference 62).

The Interstate 68 corridor was the site of pioneering transportation improvement projects linking the Atlantic Seaboard and Middle West in the wagon road, canal, and railroad eras of the 19th century, but the region was left out of the 20th century's greatest transportation project - the Interstate Highway System - until recently. The completion of I-68 in 1991 has allowed western Maryland to reach its potential in the automobile age. The freeway has facilitated access to an economically depressed region that continues to reel from manufacturing plant closures. Western Maryland is re-orienting from a focus on Pittsburgh towards Baltimore and Washington. Residents of the Baltimore-Washington metropolitan area are increasingly visiting western Maryland for tourism and recreation. Freeway access and tax incentives have attracted manufacturers and other tenants to industrial parks along I-68 (Reference 62).

The town of Accident is located near Deep Creek Lake in northern Garrett County, the westernmost county of Maryland. According to the U.S. Bureau of the Census, the population of Accident was 353 in 2000 (Reference 57). The 2010 Census population was 325 (Reference 67).

The Town of Deer Park is located in the southwestern portion of Garrett County in western Maryland, approximately 45 miles west of the City of Cumberland. According to the U.S. Bureau of the Census, the population of the town was 405 in 2000 (Reference 57). The 2010 Census population was 399 (Reference 67).

There have been recent developments upstream of the Deer Park corporate limits along the floodplain of the Little Youghiogheny River. Presently, there is little development along the floodplain of Block Run.

The town and its surrounding area receive approximately 46 inches of rainfall per year, averaging 150 to 160 rainy days annually. Snowfall usually ranges between 50 and 60 inches per year. Average minimum and maximum temperatures range from 19 degrees Fahrenheit (^{o}F) and 39^{o}F, respectively, in January to 55^{o}F and 80^{o}F, respectively in July. Below freezing temperatures occur approximately 150 days annually, and the growing season is approximately 122 days. Prevailing winds are from the northwest.

The Town of Friendsville is located in Garrett County, Maryland, approximately 40 miles west of Cumberland and just upstream of the Youghiogheny Reservoir. According to the U.S. Bureau of the Census, the population of Friendsville was 539 in 2000 (Reference 57). The 2010 Census population was 491 (Reference 67). Major highways serving the community are U.S. Route 48, Maryland Route 42, and Garrett County Route 53.

The streams that flow through the Town of Friendsville - the Youghiogheny River, Bear Creek, and Minnow Creek, lie in the Appalachian Plateau and belong to the Ohio River Basin. The soils of the drainage basin around Friendsville are of Calvin-Gilpin association formed over acid, red to gray shale, and sandstone (Alleghany and Conemaugh formations) (Reference 25). Vegetation consists of oak, yellow poplar, pine, hay, and corn.

Friendsville has a humid, continental climate because of its mean annual precipitation, which ranges from 44 to 48 inches, and its location in the middle latitudes where the general atmospheric flow is from west to east. Topographic elevations in the community range from 1,900 to 1,500 feet. According to the U.S. Bureau of the Census, the population of Grantsville was 619 in 2000 (Reference 57). The 2010 Census population was 766 (Reference 67).

The Town of Kitzmiller is located in the southern portion of Garrett County in western Maryland. It is bordered by unincorporated areas of Garrett County to the north, east, south, and west and by unincorporated areas of Mineral County, West Virginia, to the south. According to the U.S. Bureau of the Census, the population of Kitzmiller was 302 in 2000 (Reference 57). The 2010 Census population was 321 (Reference 67).

Kitzmiller is situated entirely within the Allegheny Plateau, which is strongly dissected by natural drainage patterns. The land ranges from steep slopes to gently sloping and moderately sloping summits to valleys and flood plains.

The Town of Loch Lynn Heights is located in Garrett County, in western Maryland, approximately 40 miles west of Cumberland. According to the U.S. Bureau of the Census, the town had a population of 469 in 2000 (Reference 57). The 2010 Census population was 552 (Reference 67). Major highways that serve the community are State Routes 135 and 560. The railroad also supplements these highways.

The soils of the community and its surrounding area belong to the Calvin- Gilpin-DeKalb soil association (Reference 25). This association contains gently sloping to steep and moderately deep, well drained soils formed over red to gray acid shale and sandstone rocks and is predominantly non- stony. The area consists mainly of moderately sloping soils with some steep areas; on crests and broad summits, the soils are gently sloping. This soil association supports most of the intensive farming in the county, using row crops alternated with strips of hay or

other close-growing crops. The steeper slopes are ideal for grazing animals and growing forage crops. Other vegetation consists of pine and oak trees. Topographic elevations in the community range from 2,400 to 2,500 feet above sea level.

The Town of Mountain Lake Park is located in the southwestern portion of Garrett County in western Maryland, approximately 40 miles west of the City of Cumberland. According to the U.S. Bureau of the Census, the population of Mountain Lake Park was 2,248 in 2000 (Reference 57). The 2010 Census population was 2,092 (Reference 67). Major highways serving the community include State Routes 135 and 560; the railroad supplements the highways.

The soils of the town and surrounding area are similar to those described for the Town of Loch Lynn Heights.

Mountain Lake Park and its surrounding area have a climate very similar to the Town of Deer Park.

The Town of Oakland is the Garrett County seat, and is located approximately 40 miles west of Cumberland. According to the U.S. Bureau of the Census, the population of Oakland was 1,930 in 2000 (Reference 57). The 2010 Census population was 1,925 (Reference 67). The town is traversed by a major highway, U.S. 219, and is the focus of a variety of State and local roads (MD 135, MD 39, Sang Run Road, and Underwood Road). The railroad also serves the community.

All the soils of Oakland and surrounding area belong to the Calvin-Gilpin- Dekalb soil association, as previously described. Most soils in this association provide very good building sites. Therefore, Oakland's dominant land use characteristic is residential.

Residential and commercial development along the banks of the Little Youghiogheny River is extensive. Wilson Run flows through a sewer beneath the business district of Oakland. Bradley Run travels through the Country Club of Oakland.

Topographic elevations within Oakland vary from approximately 2,370 to 2,540 feet. The town and its surrounding area have a climate similar to that described for the Town of Deer Park.

2.3 Principal Flood Problems

Major flooding throughout Garrett County is minimal; however, heavy localized storms do contribute to flash flooding, which results in damage to roads, bridges, and some private property. Areas experiencing flood damage in recent times include the portion of the Savage River between Merrill's Bridge and Big Run State Park, the upper Youghiogheny River at the community of Crellin, Mill Run

at the community of Mineral Spring, and the Casselman River between Jennings and Maple Grove Road. The entire southern boundary of the county is formed by the North Branch Potomac River, which historically has caused flooding.

Garrett County streams are well gaged, probably owing to the historic record of floods in this region. The North Branch Potomac River is particularly well documented by eight gaging stations, beginning at the City of Cumberland and extending just upstream of the Town of Kitzmiller. The Savage River has several gaging stations, and there are stations on the other rivers and streams in the region. A review of the gage records for the North Branch Potomac River at Cumberland (USGS No. 01603000), which cover the period of 1924 to 1996, show major floods occurred as listed below:

Date	Stage (feet)	Discharge (cfs)	Recurrence Interval (years)
1924	29.20	82,000	100
1936	29.10	88,200	100
1937	24.20	51,700	25
1938	25.10	57,400	40
1943	24.04	50,500	25
1955	23.85	38,500	10
1961	18.84	25,300	-
1964	19.48	26,600	-
1967	18.91	25,400	-
1978	17.85	23,500	-
1985	18.85	25,500	-
1993	19.05	25,900	-
1996	25.56	59,200	-

For the Towns of Deer Park, Loch Lynn Heights, Mountain Lake Park, and Oakland, there is no stream gaging station on the Little Youghiogheny River; therefore, no accurate record exists of magnitudes of past floods on the river. However, since 1942, flow records of a U.S. Geological Survey (USGS) gaging station (No. 03075500) on the Youghiogheny River have been kept. The highest flood, as recorded by this gage, occurred in 1996. Its magnitude was 14,100 cubic feet per second (cfs), with a gage height of 13.06 feet.

Prior to construction of floodwater retarding structures in the Little Youghiogheny River watershed by the Soil Conservation Service (SCS, now Natural Resources Conservation Service, NRCS), low-lying areas of Deer Park were subjected to periodic flooding caused by overflow of the Little Youghiogheny River and Block Run due to severe snowmelt and heavy rains.

Low-lying areas along the banks of the Youghiogheny River in the Town of Friendsville are subject to periodic flooding caused by the river's overflow.

There is a USGS gaging station (No. 03076500) on the Youghiogheny River, located near the southern town limit of Friendsville. This gage has been in operation since 1898; however, flow records were not collected from 1905 to 1922 and from 1926 to 1940. The most severe flood recorded by this gage occurred in 1996. Its magnitude was 16,100 cfs with a gage height of 9.54 feet. Other major floods and their estimated return periods occurred as listed below:

Date	Stage (feet)	Discharge (cfs)	Recurrence Interval (years)
1902	-	10,800	6.5
1923	-	11,600	8.3
1924	-	15,600	25
1948	-	10,400	5.8
1954	-	13,000	12.7
1956	-	11,800	8.9
1963	-	11,600	8.3
1967	-	10,500	6.0
1985	8.59	13,000	-
1994	8.25	12,000	-
1996	9.54	16,100	-
2000	8.63	13,100	-

Major flooding throughout Kitzmiller is minimal. The entire southern boundary of the town is formed by the North Branch Potomac River, which historically has caused flooding. A review of the gage (USGS No. 01603000) records for the river at Cumberland was given above for Garrett County.

Prior to the construction of six floodwater retarding structures in the Little Youghiogheny River watershed by the Soil Conservation Service (SCS, now Natural Resources Conservation Service, NRCS), low-lying areas of Loch Lynn Heights were subjected to periodic flooding caused by overflow of the Little Youghiogheny River due to severe snowmelt and heavy rains. This flooding was aggravated in areas near the railroad crossing, due to the narrow constrictions to the natural flow.

Broad Ford Run used to be one of the major causes of severe flooding in Mountain Lake Park. In 1975, the SCS (now Natural Resources Conservation Service, NRCS) built a multipurpose dam across Broad Ford Run, which has reduced the probability of flooding from that stream.

Mountain Lake has been effectively filled with sediment, thereby reducing its capacity to control peak floods (Reference 54). Low-lying areas of the town are now subject to periodic flooding caused by the overflow of the Little Youghiogheny River. This is aggravated by the railroad crossing, three abandoned piers at the Old Bridge Road bridge, and three other bridge structures on the river. Flooding on Unnamed Tributary to Little

Youghiogheny River is aggravated by four constrictions and by inadequate culverts.

Low-lying areas of Oakland were subjected to periodic flooding caused by overflow of the Little Youghiogheny River prior to construction of flood retarding structures in the Little Youghiogheny River watershed by the Soil Conservation Service (SCS, now Natural Resources Conservation Service, NRCS). Floods occurred in 1936, October 1954 (Hurricane Hazel), and 1955. On January 19, 1996, Oakland experienced a flash flood event. Moderate rains and a melting snow cover (15-25 inches in the Maryland mountains) on saturated soil released an estimated 3.50 to 4.50 inches of runoff into area streams. The runoff also caused major flooding on the Casselman River in Garrett County. The Casselman River flows into the Youghiogheny River, in southwest Pennsylvania and subsequently caused near record flooding downstream on the Youghiogheny River. Damages in the county totaled around $3 million. Seventy-five to 100 homes were damaged, as well as, bridges, roads, and water treatment plants (Reference 62).

2.4 Flood Protection Measures

The Bloomington Dam affords flood relief for many downstream communities. The Savage River Dam and the Deep Creek Dam also provide flood control. The Youghiogheny River is controlled by a dam in Pennsylvania, with a portion of the reservoir extending into Garrett County. There are also reservoirs at Mountain Lake Park and on Meadow Run east of Grantsville, and the Frostburg Reservoir Dam is located on Piney Creek.

State laws govern activities within nontidal waterways and the associated 1-percent annual chance floodplains. Environmental Article §5-503 requires a permit from the Maryland Department of the Environment (MDE) for activities that permanently or temporarily change the course, current, or cross section of waterways and floodplains. The 1-percent annual chance floodplain is determined using ultimate development based on existing zoning. State regulations require hydraulic analysis of all floodplain encroachments.

The MDE also regulates activities that impact nontidal wetlands. Avoidance of wetlands and buffers is required unless there are no practicable alternatives. Where nontidal wetlands are impacted, steps must be taken to minimize impacts, and mitigation of permanent losses of area and functions is required.

Standards for erosion and sediment control during construction activities and management of stormwater runoff quality and quantity are found in regulations administered by the MDE.

Under Public Law 566, the SCS (now Natural Resources Conservation Service, NRCS) has built six floodwater retarding structures in the Little Youghiogheny

River watershed at an estimated cost of about $2 million. This impacts the Towns of Deer Park, Loch Lynn Heights, Mountain Lake Park, and Oakland. Only two of the structures are upstream of Loch Lynn Heights. One reservoir is located on Broad Ford Run just upstream of Mountain Lake. This reservoir also serves as a municipal and recreational facility in addition to floodwater storage. Three structures are north of Oakland. There have been no serious storms in the immediate area since six dams were completed; however, the heavy snowmelt in the spring of 1972, as well as the relatively high runoff associated with Hurricane Agnes in June 1972, would have caused some damage without the presence of the dams. No damage occurred in either instance. Twelve business establishments in areas formerly subject to flood damage have made major improvements since the dams were built.

The effect of these dams in the Little Youghiogheny River watershed on stream discharges, and subsequently on flood heights, is given below:

Dam No.	Inflow (cfs)	Outflow (cfs)
1	1,962	103
2	1,431	343
4	2,149	145
5	672	61
6	847	99
7	898	58

Youghiogheny Reservoir, located just downstream of Friendsville's town limit, is believed to have no effect on the elevations of the peak discharges of Bear Creek and the Youghiogheny River (Reference 26). However, after the rivers have peaked, the reservoir poo1 starts to rise, creating a backwater effect.

Under Section 212 of the Flood Control Act of 1950, the USACE under- took a project in 1957 to excavate the channel of Bear Creek for a length of approximately 2,000 feet, providing protection at the bridges and clearing the natural channel from the downstream end of the channel improvements (Reference 27).

Garrett County administers and enforces a countywide building permitting and inspection program and has a countywide subdivision ordinance (Reference 70).

In the Town of Kitzmiller, there is a levee located along the northern bank of the North Branch Potomac River which has been provisionally accredited with providing the 1-percent annual chance flood protection.

3.0 ENGINEERING METHODS

For the flooding sources studied in detail in the county, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required

for this study. Flood events of a magnitude which are expected to be equaled or exceeded once on the average during any 10-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for floodplain management and for flood insurance rates. These events, commonly termed the 10-, 2-, 1-, and 0.2-percent annual chance floods, have a 10-, 2-, 1-, and 0.2-percent chance, respectively, of being equaled or exceeded during any year. Although the recurrence interval represents the long term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood which equals or exceeds the 1-percent annual chance flood in any 50-year period is approximately 40 percent (4 in 10), and, 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 the peak discharge- frequency relationships for each flooding source studied in detail affecting the county.

Pre-countywide Analyses

The examinations of stream gage records in and surrounding Garrett County showed a wide variation in flows. Accordingly, a series of three peak discharge curves were prepared for the streams studied by detailed methods.

Records from eight gages on the North Branch Potomac River were analyzed by the U.S. Geological Survey (USGS) J407 computer program (Reference 1). This computer program followed the log-Pearson Type III flood-frequency analysis as outlined by the Water Resources Council (Reference 2). The adjusted values for each station for the 10-, 2-, 1-, and 0.2-percent annual chance discharges were plotted, and representative curves were then selected for each frequency.

Records from four gages for the Savage River were analyzed using the method described for the North Branch Potomac River. Two of these gages are on the Savage River in the vicinity of the study area, and the other two are located on Crabtree Creek at Swanton, Maryland, and on Georges Creek at Franklin, Maryland. Both streams are tributaries to the Savage River.

Discharges for Nydegger Run were determined using regional frequency curves.

The remaining streams studied by detailed methods are in the Ohio River drainage basin. Accordingly, a number of records from stream gages in the Ohio River drainage basin that are located in Maryland, Pennsylvania, West Virginia, and in

the immediate area of Garrett County were analyzed by the USGS J407 computer program (Reference 1). Also, previously established peak discharges for stream studies in Garrett County were reviewed. The Pittsburgh District of the U.S. Army Corps of Engineers (USACE) has established runoff formulas (unpublished data) for ungagged streams, and these were used to help determine peak discharge values. All data were plotted and curves selected for each frequency.

Backwater elevations from the Youghiogheny River that affect the Little Youghiogheny River were taken from USGS gage data. Backwater elevations from the Youghiogheny River Lake that affect Mill Run were determined from a reservoir storage frequency curve supplied by the Pittsburgh District of the USACE.

In the August 16, 1994 revision, discharges for the Little Youghiogheny River were verified and revised using the Soil Conservation Service TR-20 computer program (Reference 3).

For the Town of Deer Park, peak discharge-drainage area relationships for the Little Youghiogheny River and Block Run were determined by Toups and Loiederman in 1977. These analyses were verified and revised by GEO-Technical Services, Inc., to reflect existing hydrologic conditions for the Little Youghiogheny River using the TR-20 computer program (Reference 3). Flows computed in the original analyses for Block Run were considered appropriate for this study.

A USGS gaging station (No. 03076500) on the Youghiogheny River, located near the southern town limit of Friendsville, was the principal source of data for defining discharge-frequency relationships for the river. Values of the 10-, 2-, 1-, and 0.2-percent annual chance peak discharges were obtained from a log-Pearson Type III distribution of annual peak flow data, as described by Water Resources Council (Reference 6).

There is another USGS gaging station (No. 03076600) on Bear Creek, located 1.2 miles upstream from the confluence with the Youghiogheny River. However, this gage has been in operation only since 1965. Therefore, it is not possible to effectively estimate the magnitudes of the various frequency floods by log-Pearson Type III analysis. The USACE has developed regional relationships correlating basin characteristics with streamflow characteristics. These relationships were used to define discharge-frequency data for Bear Creek.

Peak discharges for the 10-, 2-, 1-, and 0.2-percent annual chance floods of Minnow Creek were determined from precipitation estimates through the use of the SCS TR-20 computer program (Reference 3).

For the Town of Kitzmiller, hydrologic analyses for the North Branch Potomac River were obtained from the Flood Insurance Study for Garrett County

(Reference 44). In the county study, records from eight gages on the river were analyzed by the U. S. Geological Survey (USGS) J407 computer program (Reference 1). This computer program followed the log-Pearson Type III flood-frequency analysis as outlined by the Water Resources Council (Reference 2). The adjusted values for each station for the 10-, 2-, 1-, and 0.2-percent annual chance discharges were plotted, and representative curves were then selected for each frequency.

For the Towns of Loch Lynn Heights, Mountain Lake Park and Oakland, hydrology was verified, revised, and updated using the SCS TR-20 computer program (References 3). Hydrographs were generated by assuming that Type II, 24 hour-storms would occur (Reference 39). The total precipitations for 10-, 2-, and 1-percent annual chance storms for Garrett County are 4.3 inches, 5.4 inches, and 5.9 inches, respectively (Reference 41). The precipitation for the 0.2-percent annual chance frequency was estimated by fitting a Gumbel distribution to the rainfall data, and its value was calculated to be 7.1 inches. The "CN" values were estimated from the soil survey and land-use maps. The hydrographs were routed through reservoirs whose stage-storage and stage-discharge relationships were determined by the SCS (Reference 22).

Initial Countywide FIS

New hydrologic analyses were developed for the October 2, 2013, countywide FIS. The new hydrologic analysis calculated revised 10-, 2-, 1-and 0.2-percent annual chance flows. For this FIS update, flows were also established for streams studied using approximate methods.

The Maryland Department of Environment contracted Dr. Glenn Moglen of the Department of Civil and Environmental Engineering at the University of Maryland to perform the updated hydrologic calculations for this FIS (Reference 64).

The previous regional regression equations being used by the Maryland State Highway Administration were developed by Jonathan Dillow, a hydrologist for the USGS. Dillow defined regression equations for five hydrologic fixed regions: Appalachian Plateau and Allegheny Ridges, Blue Ridge and Great Valley, Piedmont, Western Coastal Plain and Eastern Coastal Plain (Reference 65).

Dr. Moglen developed a new set of regression equations, called the fixed region regression equations, for the State of Maryland. The fixed region method used in his study is based on the predefined regions of Dillow since these regions are based on physiographic regions. Garrett County is located within the Appalachian Plateau region.

The region regression equations for the Appalachian Plateau Region (Table 4) are based on 23 stations in Maryland with drainage area (DA) ranging from 0.52 to

293.7 square miles and land slope (LSOPE) ranging from 0.06632 to 0.22653 ft/ft. One station, 03076505, was an outlier and eliminated from the regression analysis. Basin relief, channel slope and basin shape have relatively high correlations with drainage areas of 0.78, -0.77 and 0.62, respectively, and were not statistically significant in the regression equations.

The standard errors range from 20.7 percent (0.089 log units) for Q_2 to 48.0 percent (0.198 log units) for Q_{500}.

All calculations using the fixed region regression equations were performed with GISHydro2000. GISHydro is a computer program used to assemble and evaluate hydrologic models for watershed analysis. Originally developed in the mid-1980s, the program combines a database of terrain, land use, and soils data with specialized GIS tools for assembling data and extracting model parameters. The primary purpose of the GISHydro program is to assist engineers in performing watershed analyses in the State of Maryland. In the fall of 1997, a new collaborative project between the Department of Civil and Environmental Engineering at the University of Maryland and the Maryland State Highway Administration began to update and enhance GISHydro into GISHydro2000. Table 4, "Appalachian Plateau Fixed Regional Regression Equations," shows the fixed regression equation, the standard error, and the equivalent years of record.

Table 4 – Appalachian Plateau Fixed Region Regression Equations

Appalachian Plateau

Fixed Regression Equation	Standard Error (Percent)	Equivalent Years of Record
$Q_{1.25} = 70.25\ DA^{0.837}\ LSLOPE^{0.327}$	23.6	5.7
$Q_{1.50} = 87.42\ DA^{0.837}\ LSLOPE^{0.321}$	21.9	5.9
$Q_{1.75} = 96.37\ DA^{0.836}\ LSLOPE^{0.307}$	21.2	6.4
$Q_{2} = 101.41\ DA^{0.834}\ LSLOPE^{0.300}$	20.7	7.1
$Q_{5} = 179.13\ DA^{0.826}\ LSLOPE^{0.314}$	21.6	12
$Q_{10} = 255.75\ DA^{0.821}\ LSLOPE^{0.340}$	24.2	14
$Q_{25} = 404.22\ DA^{0.812}\ LSLOPE^{0.393}$	29.1	15
$Q_{50} = 559.80\ DA^{0.806}\ LSLOPE^{0.435}$	33.1	16
$Q_{100} = 766.28\ DA^{0.799}\ LSLOPE^{0.478}$	37.4	15
$Q_{200} = 1046.9\ DA^{0.793}\ LSLOPE^{0.525}$	41.8	15
$Q_{500} = 1565.0\ DA^{0.784}\ LSLOPE^{0.589}$	48.0	15

These equations were endorsed for use in Maryland by the Maryland Hydrology Panel as documented in their report (Second Edition, Revised August 2006) which can be obtained from the Maryland State Highway Administration or from the following URL (Reference 69):

http://www.gishydro.umd.edu/HydroPanel/panel_report_103106.pdf

February 1, 2019 FIS Revision

For the February 1, 2019 FIS revision, for the study of North Branch Potomac River, West Virginia rural regression equations obtained from the USGS 2010 Scientific Investigations Report, "Estimation of Flood-Frequency Discharges for Rural, Unregulated Streams in West Virginia," (SIR 2010-5033) were used to determine discharges. In this FIS revision, discharges along North Branch Potomac River were weighted based upon USGS stream gage 01595000.

A summary of the peak discharge-drainage area relationships for the selected recurrence intervals for the streams studied by detailed methods is shown in Table 5, "Summary of Discharges."

Table 5 - Summary of Discharges

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cubic feet per second) 10-Percent-Annual-Chance	2-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
BEAR CREEK					
At confluence with Youghiogheny River	49.56	3,440	6,000	7,420	11,700
Approximately 1,006 feet downstream of Accident Friendsville Road crossing	49.13	3,400	5,940	7,350	11,600
Approximately 246 feet downstream of the confluence of South Branch Bear Creek	48.85	3,390	5,910	7,310	11,600
Approximately 410 feet upstream of the confluence of South Branch Bear Creek	31.93	2,430	4,280	5,320	8,500
Approximately 5,146 feet upstream of the confluence of South Branch Bear Creek	30.92	2,360	4,160	5,170	8,260
At the confluence of Fikes Run	24.46	1,910	3,350	4,160	6,620
At the confluence of Tributary to Bear Creek	21.70	1,710	3,010	3,740	5,940
At the confluence of Cove Run	18.67	1,510	2,650	3,290	5,240
BIG SHADE RUN					
At its confluence with the South Branch Casselman River	7.05	594	1,020	1,250	1,940
At the confluence of Little Shade Run	6.78	571	982	1,210	1,860
Approximately 3,828 feet upstream of National Pike crossing	4.00	367	634	780	1,210
Approximately 374 feet upstream of the confluence of Little Shade Run	4.38	398	688	846	1,310

Table 5 - Summary of Discharges - continued

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cubic feet per second) 10-Percent-Annual-Chance	2-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
BLOCK RUN					
At the confluence with Little Youghiogheny River	3.68	398	719	902	1,470
At Garrett Road crossing	2.99	342	621	782	1,290
Approximately 463 feet downstream of the confluence of unnamed tributary	2.81	325	591	744	1,230
BRADLEY RUN					
At Railroad crossing	0.96	120	214	267	431
Approximately 387 feet upstream of Bradley Lane	0.48	72	132	167	278
LITTLE LAUREL RUN					
At its confluence with the South Branch Casselman River	2.39	253	447	556	885
Approximately 662 feet downstream of the intersection of Jennings Road and Smith Drive	2.15	227	399	494	782
LITTLE SHADE RUN					
At the confluence with Big Shade Run	2.36	241	421	521	819
Approximately 2,063 feet upstream of National Pike	2.16	220	382	472	738
LITTLE YOUGHIOGHENY RIVER					
At the confluence with Youghiogheny River	40.82	2,230	3,645	4,389	6,424
At the confluence of Wilson Run	36.76	2,030	3,325	3,999	5,864
At the confluence of Unnamed Tributary	36.59	2,010	3,295	3,959	5,794

Table 5 - Summary of Discharges - continued

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cubic feet per second) 10-Percent-Annual-Chance	2-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
LITTLE YOUGHIOGHENY RIVER (continued)					
Approximately 696 feet upstream of the confluence of Unnamed Tributary	35.87	1,980	3,245	3,909	5,734
Approximately 1,741 feet downstream from Garrett Highway US 219	34.79	1,930	3,165	3,809	5,574
At the confluence of Trout Run	33.98	1,900	3,115	3,749	5,504
At the confluence of Tributary to Little Youghiogheny River	26.49	1,550	2,555	3,089	4,574
Approximately 368 feet upstream of the confluence of Broad Ford Run	20.40	1,200	1,965	2,379	3,504
At the tributary crossing Garrett Road	11.06	703	1,175	1,439	2,174
Approximately 545 feet upstream of Fricks Crossing Road	9.12	587	985	1,209	1,844
Approximately 166 feet downstream of the confluence of Block Run	7.58	494	835	1,029	1,584
At the confluence of Block Run	3.68	208	354	441	684
Approximately 190 feet upstream of the confluence of the tributary crossing Edgewood Drive	2.60	92	138	166	224
At Little Youghiogheny River Dam	2.11	49	63	74	78
MILL RUN					
At the intersection of Mill Run Road and Collier Run Road	17.95	1,410	2,470	3,050	4,810

Table 5 – Summary of Discharges – continued

Flooding Source and Location	Drainage Area (sq. miles)	Peak Discharges (cfs) 10-percent annual chance	2-percent annual chance	1-percent annual chance	0.2-percent annual chance
MILL RUN (continued)					
At Chet Kelly Road	15.47	1,240	2,170	2,680	4,230
At Friendsville-Addison Road	15.17	1,220	2,130	2,630	4,150
At the confluence of Cove Run	12.90	1,070	1,860	2,300	3,640
Approximately 558 feet upstream of Mill Run Road	10.11	879	1,540	1,920	3,040
Approximately 892 feet upstream of Mill Run Road	7.80	722	1,280	1,590	2,550
MINNOW CREEK					
At confluence with Youghiogheny River	1.66	221	411	522	881
NORTH BRANCH POTOMAC RIVER					
Approximately 334 feet downstream of the intersection of Shallmar Road and North Hill Road	206.86	15,602	31,289	41,557	78,600
NORTH BRANCH POTOMAC RIVER					
At a point approximately 700 feet downstream of the CSX Railroad Crossing	52.6	5,230	8,850	10,800	16,500
At a point approximately 400 feet updated of the CSX Railroad Crossing	42.4	4,480	7,610	9,260	14,300
NYDEGGER RUN					
At the confluence with North Branch Potomac River	5.21	503	889	1,110	1,760
Approximately 155 feet upstream of Gorman Road	5.10	493	871	1,080	1,730

Table 5 – Summary of Discharges – continued

Flooding Source and Location	Drainage Area (sq. miles)	Peak Discharges (cfs) 10-percent annual chance	2-percent annual chance	1-percent annual chance	0.2-percent annual chance
PINEY CREEK					
Approximately 1,040 feet upstream of Frostburg Reservior Dam	11.64	893	1,520	1,870	2,860
Approximately 668 feet upstream of Piney Run Road	9.08	726	1,240	1,520	2,340
Approximately 1,245 feet upstream of Piney Run Road	8.46	685	1,170	1,440	2,210
Approximately 1,585 feet upstream of Piney Run Road	6.32	530	908	1,110	1,710
Approximately 3,371 feet upstream of Frostburg Reservoir	6.16	518	886	1,090	1,670
SAVAGE RIVER					
At Savage River Reservoir	55.25	4,060	7,230	9,020	14,600
At the confluence of Bear Pen Run	49.27	3,650	6,490	8,100	13,100
Approximately 712 feet downstream of the confluence of Poplar Lick Run	46.50	3,450	6,120	7,620	12,300
At Westernport Road	36.64	2,910	5,170	6,440	10,400
At the confluence of Blacklick Run	33.85	2,800	4,970	6,190	9,970
Approximately 428 feet upstream of the confluence of Bluelick Run	23.95	1,900	3,350	4,160	6,650
SNOWY CREEK					
At Crellin Underwood Road	34.19	2,280	3,890	4,760	7,300
Approximately 299 feet downstream of the confluence of Laurel Run	34.11	2,280	3,880	4,750	7,290
At Crellin Mine Road	23.10	1,660	2,850	3,500	5,420
SOUTH BRANCH CASSELMAN RIVER					
Approximately 1,485 feet upstream of National Freeway (I-68/US 219)	62.19	3,490	5,780	6,990	10,400
At the confluence of Big Shade Run	57.95	3,270	5,420	6,540	9,730

Table 5 - Summary of Discharges - continued

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cubic feet per second) 10-Percent-Annual-Chance	2-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
SOUTH BRANCH CASSELMAN RIVER (continued)					
At Maple Grove Road	48.12	2,800	4,640	5,610	8,360
At the confluence of North Branch Casselman River	26.32	1,630	2,700	3,260	4,830
Approximately 374 feet upstream of the confluence of North Branch Casselman River	20.47	1,450	2,460	3,010	4,600
At the confluence of Big Laurel Run	13.33	1,010	1,730	2,120	3,270
UNNAMED TRIBUTARY TO LITTLE YOUGHIOGHENY RIVER					
At the confluence with Little Youghiogheny River	0.31	36	61	74	111
YOUGHIOGHENY RIVER (LOWER REACH)					
At the confluence of Bear Creek	346.43	13,800	19,500	21,900	27,200
Approximately 497 feet upstream of the confluence of Bear Creek	296.84	12,200	17,100	19,300	24,000
Approximately 801 feet upstream of the confluence of Bear Creek	296.83	12,100	17,000	19,200	23,900
Approximately 2,410 feet upstream of Friendsville Road	293.96	12,100	17,000	19,100	23,800
YOUGHIOGHENY RIVER (UPPER REACH)					
Approximately 826 feet downstream of the confluence of Snowy Creek	89.67	5,030	8,450	10,300	15,500
At the confluence of Snowy Creek	55.47	3,390	5,740	7,000	10,700
At the confluence of Cherry Creek	35.18	2,420	4,170	5,120	7,950

3.2 Hydraulic Analyses

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

During periods of peak flow, flood elevations in the vicinity of bridges and culverts are often increased by ice jams, debris blockage, and other obstructions to flow. The hydraulic analyses for this study, however, are based on the effects of unobstructed flow. The flood elevations shown on the profiles are valid only if hydraulic structures remain unobstructed, and dams and other flood control structures operate properly and do not fail.

Flood profiles were drawn showing computed water-surface elevations to an accuracy of 0.5 foot for floods of the selected recurrence intervals. Locations of the selected cross sections used in the hydraulic analyses are shown on the Flood Profiles (Exhibit 1). For stream segments for which a floodway was computed (Section 4.2), selected cross section locations are also shown on the FIRM (Exhibit 2).

For each community within Garrett County that has a previously printed FIS report, the hydraulic analyses described in those reports have been compiled and are summarized below

Pre-countywide Analyses

Garrett County (Unincorporated Areas)

Cross sections were located on the detailed studied streams at intervals ranging from approximately 20 to 2,000 feet, depending on stream alignment, roadway structures, and overbank topography. Channel invert, top, and bottom bank cross sections were obtained from field surveys. The remaining cross sections were obtained using topographic maps compiled from aerial photographs (Reference 4). The waterway opening dimensions and roadway elevations of structures and culverts were obtained by field surveys.

Water-surface elevations of floods of the selected recurrence intervals were computed using the USAGE HEC-2 step-backwater computer program (Reference 5). Starting water-surface elevations for all streams studied by detailed methods except Little Shade Run were determined using normal depth calculations. Starting water-surface elevations for Little Shade Run were

determined using coincident peak flows at its confluence with Big Shade Run. Flood profiles were drawn showing computed water-surface elevations for floods of the selected recurrence intervals.

For the streams studied by approximate methods, the extent of the 1- percent annual chance flood was developed using depths determined from USGS Open File Report 78-171 (Reference 6).

Town of Deer Park

Cross sections for the flooding sources studied by detailed methods were obtained from aerial photographs flown in May 1992 (Reference 19). All bridges, dams, and culverts were field surveyed to obtain elevation data and structural geometry.

Water-surface elevations of floods of the selected recurrence intervals were computed using the U.S. Army Corps of Engineers HEC-2 step- backwater computer program (Reference 5). Starting water-surface elevations were determined by the slope/area method. Flood profiles were drawn showing computed water-surface elevations for floods of the selected recurrence intervals.

Channel roughness factors (Manning's “n”) used in the hydraulic computations were chosen by engineering judgment based on field observations of the stream channel areas. For the Little Youghiogheny River, the channel “n” value was 0.038, and the overbank “n” values ranged from 0.015 to 0.090. For Block Run, the channel “n” values ranged from 0.035 to 0.038, and the overbank "n" values ranged from 0.050 to 0.085.

Town of Friendsville

Cross-section data for the streams in Friendsville were obtained from aerial photographs and topographic maps at a scale of l"=200', with a contour interval of 5 feet (Reference 30). The below-water cross sections were obtained by field measurements. In order to compute the significant backwater effects of bridges and culverts, cross sections were located upstream and downstream of these structures, which were field surveyed to obtain elevation data and structural geometry. Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles (Exhibit 1). For stream segments for which a floodway was computed (Section 4.2), selected cross section locations are also shown on the FIRM (Exhibit 2).

Channel roughness factors (Manning's “n”) for these computations were assigned on the basis of field inspection and previously published guidelines (Reference 31). The roughness coefficients for the Youghiogheny River varied from 0.025 to 0.040 for the channel, and from 0.055 to 0.075 for the overbank areas. For Bear Creek, the range of “n” values in the channels was 0.03 to 0.04, while in the overbank areas the range was 0.06 to 0.07. For Minnow Creek, the channel "n" value was 0.035, and overbank "n" values ranged from 0.035 to 0.045.

The location of Youghiogheny Reservoir seems to have no effect on the water elevations of peak discharges of Bear Creek and the Youghiogheny River. The time lag between the peak pool level of the reservoir and the peak discharge of the rivers is believed to be about three days (Reference 26). However, after the rivers have peaked, the reservoir pool starts to rise creating a backwater effect. Therefore, the starting elevations are computed by the slope-area method.

Water-surface elevation profiles for floods of the selected recurrence intervals were computed through the use of the USACE HEC-2 step- backwater computer program (Reference 5). Flood profiles of the Youghiogheny River and Minnow Creek were obtained by running the program in subcritical mode. However, the program was run in super- critical mode to obtain the profiles for Bear Creek. Improved channel condition was the cause of the supercritical nature of the flood flow in Bear Creek.

Flood profiles were drawn showing computed water-surface elevations to an accuracy of 0.5 foot for floods of the selected recurrence intervals. Although the Youghiogheny Reservoir pool does not affect the water- surface elevations of the peak discharges of the Youghiogheny River and Bear Creek, the pool level rises to the plotted elevations.

Town of Kitzmiller

Cross sections were located at intervals ranging from approximately 20 feet to 2,000 feet, depending on stream alignment, roadway structures, and overbank topography, channel invert, top, and bottom bank cross were obtained using topographic maps compiled from aerial photographs (Reference 4). The waterway opening dimensions and roadway elevations of structures and culverts were obtained by field surveys.

Water-surface elevations of floods of the selected recurrence intervals were computed using the U. S. Army Corps of Engineers (USACE) HEC- 2 step-backwater computer program (Reference 5). Flood profiles were drawn showing computed water-surface elevations for floods of the selected recurrence intervals. Starting water-surface elevations for the North Branch Potomac River were determined by normal depth calculations.

Channel and overbank roughness factors (Manning's “n”) used in the hydraulic computations were chosen on the basis of field observation. The channel “n” value for the North Branch Potomac River was 0.030, and the overbank “n” values ranged from 0.030 to 0.080.

Town of Loch Lynn Heights

Cross sections for the Little Youghiogheny River were obtained from aerial photographs and topographic maps, at a scale of l"=200', with a contour interval of 5 feet (Reference 50); the below-water cross sections were obtained by field measurements. All bridges, dams, and culverts were field surveyed to obtain

elevation data and structural geometry.

Water-surface elevations of floods of the selected recurrence intervals were computed using the U.S. Army Corps of Engineers HEC-2 step- backwater computer program (Reference 5). Starting water-surface elevations for the Little Youghiogheny River were calculated using the slope/area method. Flood profiles were drawn showing computed water- surface elevations for floods of the selected recurrence intervals.

Channel roughness factors (Manning's “n”) used in the hydraulic computations were assigned on the basis of field inspections and previously published guidelines (Reference 31). The roughness coefficients for the Little Youghiogheny River were 0.035 for the channel and 0.080 for the overbank areas.

Town of Mountain Lake Park

Cross sections for the flooding sources studied by detailed methods were obtained from topographic maps compiled from aerial photographs (Reference 19). Below water sections were obtained by field measurement. In order to compute the significant backwater effects of bridges and culverts, cross sections were located upstream and downstream of these structures. All bridges, dams, and culverts were field surveyed to obtain elevation data and structural geometry.

Water-surface elevations of floods of the selected recurrence intervals were computed using the USACE HEC-2 step-backwater computer program (Reference 5). Starting water-surface elevations for the Little Youghiogheny River were determined by the slope/area method. Starting water-surface elevations for Unnamed Tributary to Little Youghiogheny River were obtained from the FIS for the unincorporated areas of Garrett County (References 44, 51). Flood profiles were drawn showing computed water-surface elevations for floods of the selected recurrence intervals.

Channel roughness factors (Manning's “n”) used in the hydraulic computations were chosen by field inspection and previously published guidelines (Reference 31). The channel “n” value for the Little Youghiogheny River was 0.035, and the overbank “n” value was 0.080. For Unnamed Tributary to Little Youghiogheny River, the channel “n” values ranged from 0.024 to 0.040, and the overbank “n” values ranged from 0.070 to 0.090.

Town of Oakland

Cross sections for the backwater analyses were field surveyed and were located at close intervals above and below bridges and culverts to compute the significant backwater effects of these structures. Bridges and culverts were field surveyed to obtain elevation data and structural geometry. Additional cross sections were obtained from aerial photographs and topographic maps, at a scale of l"=200', with a contour interval of five feet (Reference 30). The below-water cross sections were obtained by field measurements.

Water-surface elevations of floods of the selected recurrence intervals were computed using the U.S. Army Corps of Engineers HEC-2 step- backwater computer program (Reference 5). Flood profiles were drawn showing computed water-surface elevations to an accuracy of 0.5 foot for floods of the selected recurrence intervals. Starting water-surface elevations for the Little Youghiogheny River and the portion of Bradley Run that was studied by detailed methods in the original FIS were determined by the slope/area method. In this revision, the starting water- surface elevation for Bradley Run was determined using the base flow computation.

Roughness factors (Manning's "n") for these computations were assigned by field observations and previously published guidelines (Reference 31). The roughness coefficients for the Little Youghiogheny River varied from 0.013 to 0.045 for the channel and from 0.07 to 0.09 for the overbank areas. Assigned Manning's "n" values for Bradley Run varied from 0.012 to 0.040 in the channel and from 0.05 to 0.07 in the overbank areas.

Initial Countywide FIS

The October 2, 2013, FIS is a restudy of all flood hazards identified on the effective FIRM. Streams studied by detailed methods on the effective FIRM were to be restudied in detail while approximate effective streams were to be improved through enhanced approximate studies. For all of the studies, AMEC used the stream crossing inventory collected by the Maryland Department of the Environment (MDE) and the topographic data developed from LiDAR data for Garrett County to perform the hydraulic analyses. For detailed studies, AMEC also extracted channel data from the effective hydraulic models and incorporated it where appropriate. The hydraulic analyses were used to establish flood elevations and regulatory floodways for the subject flooding sources.

Detailed hydraulic models include water-surface profile development for the 10-percent (10-year), 2-percent (50-year), 1-percent (100-year) and 0.2-percent (500-year) annual chance floods and floodway. Enhanced approximate models include only the 1-percent annual chance flood and do not include flood profile or floodway development.

Water-surface elevations for floods of the selected recurrence intervals were computed through use of the USACE's HEC-RAS (Version 4.0) step-backwater computer program (Reference 63).

Two foot elevation contours derived from 2005 LiDAR points provided by the county were used to generate TINSs and DEMs that served as the terrain basis for detailed and approximate study model data extractions. HEC-RAS (version 4.0) models were created using AMEC-developed automated tools.

The stream centerlines provided by the county were ortho-rectified and aligned with the contours where orthophotos were inconclusive. Cross- sections were placed within ArcGIS at hydraulically significant locations. Stream stationing for each designated reach begins at its outlet.

The TINs and DEMs were used to import the cross section data into HEC- RAS model. For streams studied in detail the channel data was extracted from effective HEC-2 hydraulic models and incorporated into the updated hydraulic models, where appropriate. For this study, the computed water- surface elevations were converted from the National Geodetic Vertical Datum of 1929 (NGDV 29) to the North American Vertical Datum of 1988 (NAVD 88).

Stream crossings inventoried by MDE were incorporated in HEC-RAS models for detailed and enhanced approximate studies. Since the provided bridge data were not vertically referenced, structures were coded relative to road surface extracted from the terrain data. Inaccessible structures were modeled using data from effective HEC-2 models; otherwise, assumptions were made for structure geometry based on the available data and engineering judgment. The internal Manning's 'n' values for stream crossings were adjusted based on the MDE inventory photos.

February 1, 2019 FIS Revision

For the February 1, 2019 FIS revision, detailed hydraulics were developed for a portion of North Branch Potomac River. Model geometry was derived from a combined Triangulated Irregular Network (TIN) dataset of USGS National Elevation dataset (NED) and Light Detection and Ranging (LiDAR) data available from the West Virginia Department of Environmental Protection (WVDEP). The TIN was developed as part of the topographic TSDN for Grant County, West Virginia submitted to FEMA on October 14, 2014. The USACE's HEC-RAS, version 4.1.0 was used for hydraulic modeling. Model cross sections were developed and placed in accordance with FEMA Guidelines and Specifications and the HEC-RAS users manual. Cross sections were placed at all crossing structures (ie. bridges). Additional cross sections were placed to account for significant profile inflections points (ie. profile breaks). The TIN was then used within the USACE's HEC-GeoRAS software to develop model cross section geometry.

Channel and overbank roughness factors (Manning's "n" Values) were assigned to each cross section using HEC-RAS Reference Manual Table 3-1 (Reference 63). The aerial photographs and pictures taken by MDE during structure inventory were used to estimate the roughness coefficients. For North Branch Potomac River, channel roughness factors were chosen using engineering judgement and inspection of 2013 digital photography. Table 6, "Manning's "n" Values," shows the channel and overbank "n" values for the streams studied by detailed methods.

Table 6 – Manning's "N" Values

Stream	Channel "n"	Overbank "n"
Bear Creek	0.03 - 0.065	0.04 - 0.1
Big Shade Run	0.03 - 0.05	0.04 - 0.1
Block Run	0.025 - 0.035	0.05 - 0.1
Bradley Run	0.03 - 0.04	0.04 - 0.1
Little Laurel Run	0.03 - 0.045	0.04 - 0.1
Little Shade Run	0.03 - 0.055	0.04 - 0.1
Little Youghiogheny River	0.035 - 0.047	0.013 - 0.1
Mill Run	0.035 - 0.065	0.05 - 0.1
Minnow Creek	0.03 - 0.04	0.04 - 0.06
North Branch Potomac River	0.030-0.035	0.04 - 0.140
Nydegger Run	0.03	0.04 - 0.1
Piney Creek	0.035 - 0.045	0.06 - 0.1
Savage Creek	0.043 - 0.045	0.05 - 0.1
Snow Creek	0.04 - 0.045	0.04 - 0.1
South Branch Casselman River	0.03 - 0.045	0.04 - 0.1
Unnamed Tributary to Little Youghiogheny River	0.035 - 0.045	0.05 - 0.1
Youghiogheny River (Lower Reach)	0.025 - 0.04	0.035 - 0.1
Youghiogheny River (Upper Reach)	0.03 - 0.045	0.04 - 0.1

Floodways were developed for streams studied by detailed methods. Initially, Encroachment Method 4 was used to obtain equal conveyance reduction on each overbank, if possible. The results were imported into Method 1 and adjusted accordingly to maintain allowable surcharges throughout the study reach.

AMEC developed enhanced approximate floodplain models using their Automated Floodplain Generator (AFG) proprietary software along with ArcGIS v.9.3. Stream crossing information was included in these approximate models. Despite enhancements to the typical approximate analysis, these models should not be utilized to support the mapping of Base Flood Elevations.

All qualifying benchmarks within a given jurisdiction that are catalogued by the National Geodetic Survey (NGS) and entered into the National Spatial Reference System (NSRS) as First or Second Order Vertical and have a vertical stability classification of A, B or C are shown and labeled on the FIRM with their 6-character NSRS Permanent Identifier. Benchmarks catalogued by the NGS and entered into the NSRS vary widely in vertical stability classification. NSRS vertical stability classifications are as follows:

- Stability A: Monuments of the most reliable nature, expected to hold position/elevation (e.g., mounted in bedrock)

- Stability B: Monuments which generally hold their position/elevation (e.g., concrete bridge abutment)

- Stability C: Monuments which may be affected by surface ground movements (e.g., concrete monument below frost line)

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

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

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

It is important to note that 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.

3.3 Vertical Datum

All FIS reports and FIRMs are referenced to a specific vertical datum. The vertical datum provides a starting point against which flood, ground, and structure elevations can be referenced and compared. Until recently, the standard vertical datum used for newly created or revised FIS reports and FIRMs was the National Geodetic Vertical Datum of 1929 (NGVD 29). With the completion of the North American Vertical Datum of 1988 (NAVD 88), many FIS reports and FIRMs are now prepared using NAVD 88 as the referenced vertical datum.

All flood elevations shown in this FIS report and on the FIRM are now referenced to NAVD 88. In order to perform this conversion, effective NGVD 29 elevation values were adjusted downward by 0.42 foot. Structure and ground elevations in the community must, therefore, be referenced to NAVD 88. It is important to note that adjacent communities may be referenced to NGVD 29. This may result in differences in base flood elevations across the corporate limits between the communities.

The BFEs shown on the FIRM represent whole-foot rounded values. For example, a BFE of 102.4 will appear as 102 on the FIRM and 102.6 will appear as 103. Therefore, users that wish to convert the elevations in this FIS to NGVD 29 should apply the stated conversion factor to elevations shown on the Flood Profiles and supporting data tables in the FIS report, which are shown at a minimum to the nearest 0.1 foot.

The vertical datum conversion factor from NGVD 29 to NAVD 88 for Garrett County is -0.42 foot.

NGVD 29 – 0.42 = NAVD 88

For more information on NAVD 88, see Converting the National Flood Insurance Program to the North American Vertical Datum of 1988, FEMA Publication FIA-20/June 1992, 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, Maryland 20910-3282
(301) 713-3242

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

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

4.0 FLOODPLAIN MANAGEMENT APPLICATIONS

The NFIP encourages State and local governments to adopt sound floodplain management programs. To assist in this endeavor, each FIS report provides 1-percent annual chance floodplain data, which may include a combination of the following: 10-, 2-, 1-, and 0.2-percent annual chance flood elevations; delineations of the 1-percent and 0.2-percent annual chance floodplains; and a 1-percent annual chance floodway. This information is presented on the FIRM and in many components of the FIS report, including Flood Profiles, and Floodway Data 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 county. For the streams studied in detail, the 1-percent annual chance and 0.2-percent annual chance boundaries have been determined at each cross section. The delineations are based on the best available topographic information.

Pre-countywide Analysis

For the streams studied in detail, the 1-percent and 0.2-percent annual chance floodplains have been delineated using the flood elevations determined at each cross section.

Garrett County (Unincorporated Areas)

For the streams studied in detail, the 1-percent and 0.2-percent annual chance floodplain boundaries have been delineated using the flood elevations determined at each cross section. Between cross sections, the boundaries were interpolated using topographic maps at a scale of l"=200' with a contour interval of 5 feet (Reference 4).

For the streams studied by approximate methods, the boundary of the 1-percent annual chance flood was delineated using USGS topographic maps and the Flood Hazard Boundary Map for Garrett County (References 7 and 8).

Town of Deer Park

For the streams studied in detail, the 1-percent and 0.2-percent annual chance floodplain boundaries have been delineated using the flood elevations determined at each cross section. Between cross sections, the boundaries were

interpolated using stereoscopic digitizing techniques (Reference 20).

Town of Friendsville

For each stream studied in detail, the boundaries of the 1-percent and 0.2-percent annual chance floods have been delineated using the flood elevations determined at each cross section; between cross sections the flood boundaries were interpolated using topographic maps at a scale of l"=200' with a contour interval of 5 feet (Reference 30).

Town of Kitzmiller

For the stream studied in detail, the 1-percent and 0.2-percent annual chance floodplain boundaries have been delineated using the flood elevations determined at each cross section. Between cross sections, the boundaries were interpolated using topographic maps (Reference 4).

For the stream studied by approximate methods, the boundary of the 1-percent annual chance flood was delineated using the Flood Hazard Boundary Map for Kitzmiller (Reference 45).

Town of Loch Lynn Heights

For the stream studied in detail, the 1-percent and 0.2-percent annual chance floodplain boundaries have been delineated using the flood elevations determined at each cross section. Between cross sections, the flood boundaries were interpolated using topographic maps at a scale of l"=200', with a contour interval of 5 feet (Reference 50).

Town of Mountain Lake Park

For the streams studied in detail, the 1-percent and 0.2-percent annual chance floodplain boundaries have been delineated using the flood elevations determined at each cross section. Between cross sections, the boundaries were interpolated using topographic maps at a scale of 1:1,200, with a contour interval of 2 feet (Reference 30).

For Bradford Lake, the 1-percent annual chance approximate floodplain boundaries were delineated using topographic maps at a scale of 1:24,000 with a contour interval of 20 feet (Reference 7). The 1-percent annual chance approximate floodplain boundaries for Mountain Lake were assumed to be coincident with the shoreline of the lake.

Town of Oakland

For the streams studied in detail, the 1-percent and 0.2-percent annual chance floodplain boundaries have been delineated using the flood elevations determined at each cross section. Between cross sections, the boundaries were interpolated using topographic maps at a scale of l"=200' with a contour interval of five feet (Reference 30). In the October 18, 1995 revision, the boundaries for Bradley Run were interpolated between cross sections using topographic maps at a scale of 1:24,000 with a contour interval of one foot (Reference 55).

Approximate flood boundaries were determined by normal depth analysis and topographic maps at a scale of l"=200' with a contour interval of five feet (Reference 30).

Initial Countywide FIS

Floodplains were spatially adjusted to fit the best available stream centerline data. Also, floodplain boundaries from the jurisdictions outlined in section 1.1 have been combined in this countywide revision.

February 1, 2019 FIS Revision

For the February 1, 2019 FIS revision, floodplain boundaries for studied streams were derived from a combined TIN dataset of USGS NED and LiDAR data available from the WVDEP. The TIN was developed as part of the topographic TSDN for Grant County, West Virginia submitted to FEMA on October 14, 2014.

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

For the streams studied by approximate methods, only the 1-percent annual chance floodplain boundary is shown on the FIRM (Exhibit 2).

4.2 Floodways

Encroachment on floodplains, such as structures and fill, reduces flood-carrying capacity, increases flood heights and velocities, and increases flood hazards in areas beyond the encroachment itself. One aspect of floodplain management involves balancing the economic gain from floodplain development against the resulting increase in flood hazard. For purposes of the NFIP, a floodway is used as a tool to assist local communities in this aspect of floodplain management. Under this concept, the area of the 1-percent annual chance floodplain is divided into a floodway and a floodway fringe. The floodway is the channel of a stream, plus any adjacent floodplain areas, that must be kept free of encroachment so that the 1-percent annual chance flood can be carried without substantial increases in flood heights. Minimum federal standards limit such increases to 1.0 foot, provided that hazardous velocities are not produced. The floodways in this FIS are presented to local agencies as minimum standards that can be adopted directly or that can be used as a basis for additional floodway studies.

The floodways presented in this study were computed on the basis of equal conveyance reduction from each side of the flood plains. The results of these computations are tabulated at selected cross sections for each stream segment for which a floodway is computed (Table 7).

As shown on the FIRM (Exhibit 2), the floodway widths were determined at cross sections; between cross sections, the boundaries were interpolated. In cases where the boundaries of the flood-way and the 1-percent annual chance flood are either close together or collinear, only the floodway boundary has been shown. Portions of the floodway widths for the North Branch Potomac, North Branch Potomac River and Little Youghiogheny Rivers extend beyond the county boundary.

Near the mouths of streams studied in detail, floodway computations are made without regard to flood elevations on the receiving water body. Therefore, "With Floodway" elevations presented in Table 7 for certain downstream cross sections of Little Youghiogheny River, Snowy Creek, Mill Run, Big Shade Run, and Little Shade Run are lower than the regulatory flood elevations in that area, which must take into account the 1-percent annual chance flooding due to backwater from other sources.

Encroachment into areas subject to inundation by floodwaters having hazardous velocities aggravates the risk of flood damage, and heightens potential flood hazards by further increasing velocities. A listing of stream velocities at selected cross sections is provided in Table 7, "Floodway Data." In order to reduce the risk of property damage in areas where the stream velocities are high, the community may wish to restrict development in areas outside the floodway.

The area between the floodway and 1-percent annual chance floodplain boundaries is termed the floodway fringe. The floodway fringe encompasses the portion of the floodplain that could be completely obstructed without increasing the water-surface elevation of the 1-percent annual chance flood by more than 1.0 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to floodplain development are shown in Figure 1, "Floodway Schematic."

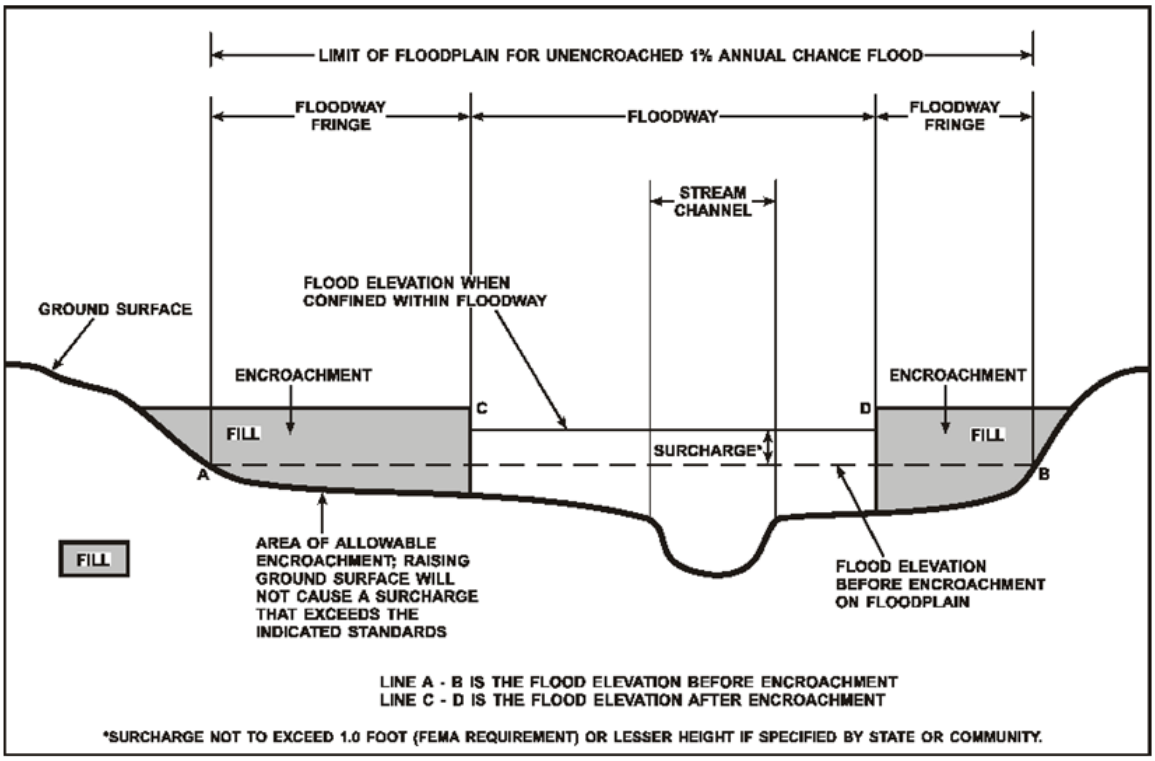

Figure 1 – Floodway Schematic

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET NAVD 88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Bear Creek								
A	1,358	109	563	13.2	1,485.3	1,485.3	1,485.3	0.0
B	1,762	93	514	14.4	1,490.6	1,490.6	1,490.7	0.1
C	1,930	88	961	7.7	1,494.5	1,494.5	1,494.5	0.0
D	2,268	93	527	14.1	1,497.4	1,497.4	1,497.5	0.1
E	2,543	66	580	12.8	1,503.0	1,503.0	1,503.0	0.0
F	3,007	68	484	15.3	1,509.3	1,509.3	1,509.3	0.0
G	3,582	157	695	10.7	1,519.9	1,519.9	1,519.9	0.0
H	4,116	100	726	10.2	1,527.6	1,527.6	1,527.8	0.2
I	4,523	89	1,014	7.3	1,535.5	1,535.5	1,536.0	0.6
J	5,131	75	554	13.4	1,543.1	1,543.1	1,543.1	0.0
K	5,623	99	678	10.9	1,551.6	1,551.6	1,551.6	0.0
L	6,517	60	543	13.5	1,568.8	1,568.8	1,569.1	0.3
M	7,271	72	633	11.6	1,585.3	1,585.3	1,585.7	0.4

[1]Feet above confluence with Youghiogheny River (Lower Reach)

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

GARRETT COUNTY, MD AND INCORPORATED AREAS

FLOODWAY DATA

BEAR CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET NAVD 88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Bear Creek (continued)								
N	8,346	54	460	16.0	1,605.0	1,605.0	1,605.0	0.0
O	9,494	60	466	15.7	1,626.8	1,626.8	1,626.9	0.1
P	10,687	72	501	10.6	1,651.5	1,651.5	1,652.0	0.5
Q	12,320	76	514	10.4	1,690.2	1,690.2	1,691.2	1.0
R	13,726	84	640	8.3	1,718.5	1,718.5	1,719.3	0.8
S	14,720	148	880	5.9	1,736.6	1,736.6	1,736.8	0.2
T	16,665	80	531	9.7	1,765.5	1,765.5	1,766.4	0.9
U	17,777	52	397	13.0	1,781.8	1,781.8	1,781.8	0.0
V	19,960	101	433	11.9	1,810.1	1,810.1	1,810.2	0.1
W	21,763	106	556	9.3	1,829.8	1,829.8	1,829.8	0.0
X	23,593	353	1,270	4.1	1,849.7	1,849.7	1,850.6	0.9
Y	24,685	100	615	8.4	1,859.1	1,859.1	1,859.9	0.8
Z	26,036	95	668	7.7	1,874.4	1,874.4	1,875.1	0.7

[1]Feet above confluence with Youghiogheny River (Lower Reach)

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

GARRETT COUNTY, MD AND INCORPORATED AREAS

FLOODWAY DATA

BEAR CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET NAVD 88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Bear Creek (continued)								
AA	27,578	200	687	7.5	1,893.2	1,893.2	1,893.5	0.3
AB	27,942	160	699	7.4	1,897.7	1,897.7	1,897.9	0.2
AC	29,498	192	616	6.8	1,915.8	1,915.8	1,916.6	0.8
AD	31,237	118	539	7.7	1,935.1	1,935.1	1,935.3	0.2
AE	33,243	154	751	5.5	1,956.7	1,956.7	1,957.7	1.0
AF	35,200	250	551	6.8	1,980.3	1,980.3	1,980.4	0.1
AG	36,952	75	375	8.8	1,997.8	1,997.8	1,997.8	0.0
AH	38,384	100	386	8.5	2,014.9	2,014.9	2,014.9	0.0
AI	39,988	85	432	7.6	2,031.9	2,031.9	2,032.4	0.5
AJ	41,765	62	374	8.8	2,052.4	2,052.4	2,052.6	0.2
AK	42,223	100	551	6.0	2,058.3	2,058.3	2,058.3	0.0

[1]Feet above confluence with Youghiogheny River (Lower Reach)

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

GARRETT COUNTY, MD AND INCORPORATED AREAS

FLOODWAY DATA

BEAR CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET NAVD 88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Big Shade Run								
A	658	34	161	7.8	2,157.9	2,151.4[2]	2,151.6	0.2
B	1,063	35	148	8.4	2,157.9	2,155.3[2]	2,155.7	0.4
C	1,362	79	458	2.7	2,161.3	2,161.3	2,161.3	0.0
D	1,725	73	364	3.4	2,161.5	2,161.5	2,161.6	0.1
E	3,361	46	183	6.8	2,168.0	2,168.0	2,168.1	0.1
F	3,981	59	196	6.4	2,172.9	2,172.9	2,173.7	0.8
G	4,978	122	654	1.3	2,177.3	2,177.3	2,177.7	0.4
H	5,381	55	121	7.0	2,184.1	2,184.1	2,184.1	0.0
I	6,102	46	270	3.1	2,194.8	2,194.8	2,194.8	0.0
J	6,293	41	201	4.2	2,197.2	2,197.2	2,197.2	0.0
K	6,587	35	161	5.3	2,201.3	2,201.3	2,201.3	0.0
L	6,695	28	103	8.2	2,201.8	2,201.8	2,201.9	0.1
M	7,849	28	85	10.0	2,214.7	2,214.7	2,215.4	0.7
N	8,594	34	135	6.3	2,227.7	2,227.7	2,227.7	0.0
O	10,074	28	121	6.5	2,243.3	2,243.3	2,243.9	0.6

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

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

GARRETT COUNTY, MD AND INCORPORATED AREAS

FLOODWAY DATA

BIG SHADE RUN

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET NAVD 88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Block Run								
A	672	69	193	4.7	2,442.6	2,442.6	2,443.1	0.5
B	1,934	139	385	2.3	2,447.2	2,447.2	2,447.4	0.2
C	2,594	67	197	4.6	2,450.6	2,450.6	2,451.1	0.5
D	3,510	108	319	2.8	2,454.4	2,454.4	2,454.6	0.2
E	3,732	148	646	1.4	2,457.1	2,457.1	2,457.9	0.8
F	4,270	89	415	2.2	2,457.5	2,457.5	2,458.3	0.8
G	5,065	74	180	5.0	2,461.0	2,461.0	2,461.3	0.3
H	6,328	65	107	8.4	2,466.1	2,466.1	2,466.3	0.2
I	6,874	45	264	3.0	2,470.9	2,470.9	2,471.5	0.6
J	7,866	110	196	4.0	2,472.0	2,472.0	2,472.5	0.5
K	8,435	37	118	6.6	2,474.7	2,474.7	2,474.9	0.2
L	9,175	73	348	2.3	2,481.8	2,481.8	2,482.4	0.6
M	9,894	106	286	2.6	2,482.5	2,482.5	2,483.0	0.5

[1]Feet above confluence with Little Youghiogheny River

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

GARRETT COUNTY, MD AND INCORPORATED AREAS

FLOODWAY DATA

BLOCK RUN

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET NAVD 88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Bradley Run								
A	556	201	1,490	0.2	2,372.2	2,372.2	2,372.2	0.0
B	1,294	68	172	1.6	2,372.2	2,372.2	2,372.2	0.0
C	1,982	34	84	3.2	2,372.8	2,372.8	2,373.4	0.6
D	2,454	22	51	5.2	2,376.6	2,376.6	2,376.9	0.3
E	2,674	25	52	5.1	2,377.7	2,377.7	2,378.1	0.4
F	2,969	18	49	5.5	2,379.9	2,379.9	2,380.3	0.4
G	3,900	17	34	7.8	2,387.2	2,387.2	2,387.9	0.7
H	4,949	27	36	4.7	2,393.5	2,393.5	2,393.5	0.0
I	5,275	22	36	4.7	2,396.6	2,396.6	2,396.7	0.1

[1]Feet above confluence with Little Youghiogheny River

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

GARRETT COUNTY, MD AND INCORPORATED AREAS

FLOODWAY DATA

BRADLEY RUN

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET NAVD 88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Little Laurel Run								
A	399	39	83	6.7	2,189.7	2,189.7	2,189.7	0.0
B	767	47	93	6.0	2,196.2	2,196.2	2,196.2	0.0
C	1,182	48	91	6.1	2,202.0	2,202.0	2,202.0	0.0
D	2,095	64	99	5.6	2,211.2	2,211.2	2,211.2	0.0
E	3,181	24	64	8.7	2,224.7	2,224.7	2,224.8	0.1
F	3,677	71	123	4.5	2,233.5	2,233.5	2,234.1	0.6
G	3,954	19	56	8.8	2,238.7	2,238.7	2,239.0	0.3
H	4,637	23	66	7.5	2,259.3	2,259.3	2,259.3	0.0

[1]Feet above confluence with South Branch Casselman River

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

GARRETT COUNTY, MD AND INCORPORATED AREAS

FLOODWAY DATA

LITTLE LAUREL RUN

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET NAVD 88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Little Shade Run								
A	1,209	23	85	6.2	2,185.8	2,185.8	2,186.0	0.2
B	1,763	40	372	1.4	2,197.8	2,197.8	2,197.8	0.0
C	1,835	38	284	1.8	2,197.8	2,197.8	2,197.8	0.0
D	2,073	40	290	1.8	2,198.1	2,198.1	2,198.1	0.0
E	2,226	57	233	2.2	2,198.1	2,198.1	2,198.2	0.1
F	3,103	75	86	6.1	2,201.3	2,201.3	2,201.3	0.0
G	4,082	28	112	4.2	2,206.0	2,206.0	2,206.2	0.2

[1]Feet above confluence with Big Shade Run

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

GARRETT COUNTY, MD AND INCORPORATED AREAS

FLOODWAY DATA

LITTLE SHADE RUN

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET NAVD 88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Little Youghiogheny River								
A	187	129	1,497	2.9	2,368.8	2,368.8	2,369.4	0.6
B	1,400	130	1,603	2.7	2,369.3	2,369.3	2,370.1	0.8
C	2,903	180	1,881	2.1	2,369.8	2,369.8	2,370.5	0.7
D	4,349	83	833	4.8	2,370.2	2,370.2	2,371.0	0.8
E	5,611	129	1,228	3.3	2,371.3	2,371.3	2,372.0	0.7
F	6,217	75	759	5.3	2,371.9	2,371.9	2,372.5	0.6
G	7,103	131	1,250	3.2	2,373.3	2,373.3	2,373.8	0.5
H	8,443	207	1,525	2.6	2,374.1	2,374.1	2,374.6	0.5
I	9,173	184	1,568	2.5	2,377.5	2,377.5	2,378.0	0.5
J	10,433	225	1,689	2.3	2,378.0	2,378.0	2,378.5	0.5
K	12,426	74	607	6.3	2,380.4	2,380.4	2,380.8	0.4
L	13,857	612	4,362	0.9	2,381.8	2,381.8	2,382.2	0.4
M	15,247	553	3,586	1.1	2,381.9	2,381.9	2,382.4	0.5
N	16,901	190	1,575	2.4	2,382.3	2,382.3	2,382.8	0.5

[1]Feet above confluence with Youghiogheny River

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

GARRETT COUNTY, MD AND INCORPORATED AREAS

FLOODWAY DATA

LITTLE YOUGHIOGHENY RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET NAVD 88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Little Youghiogheny River (continued)								
O	17,133	190	1,271	3.0	2,383.0	2,383.0	2,383.3	0.3
P	18,501	781	3,747	1.0	2,383.6	2,383.6	2,384.0	0.4
Q	21,621	360	1,182	2.6	2,385.5	2,385.5	2,385.9	0.4
R	21,840	501	1,437	2.2	2,385.8	2,385.8	2,386.1	0.3
S	22,462	456	1,564	2.0	2,386.5	2,386.5	2,386.6	0.1
T	25,125	432	1,636	1.5	2,387.6	2,387.6	2,387.9	0.3
U	26,712	511	702	2.1	2,388.3	2,388.3	2,388.6	0.3
V	28,748	102	296	4.9	2,391.3	2,391.3	2,391.4	0.2
W	29,167	98	489	2.9	2,392.5	2,392.5	2,392.6	0.1
X	29,745	139	458	3.1	2,394.5	2,394.5	2,394.5	0.0
Y	30,839	245	799	1.8	2,395.7	2,395.7	2,395.8	0.1
Z	31,825	62	282	4.3	2,396.9	2,396.9	2,396.9	0.0
AA	32,064	120	350	3.5	2,397.5	2,397.5	2,397.5	0.0
AB	34,057	163	483	2.5	2,401.5	2,401.5	2,401.6	0.1

[1]Feet above confluence with Youghiogheny River

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

GARRETT COUNTY, MD AND INCORPORATED AREAS

FLOODWAY DATA

LITTLE YOUGHIOGHENY RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET NAVD 88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Little Youghiogheny River (continued)								
AC	35,798	195	428	2.8	2,404.9	2,404.9	2,405.2	0.3
AD	37,781	41	199	6.1	2,411.1	2,411.1	2,411.3	0.2
AE	39,396	162	468	2.6	2,414.3	2,414.3	2,414.7	0.4
AF	40,671	52	198	6.1	2,416.8	2,416.8	2,417.0	0.2
AG	42,315	52	214	5.6	2,421.9	2,421.9	2,421.9	0.0
AH	43,499	182	531	2.3	2,424.9	2,424.9	2,425.0	0.1
AI	44,626	136	330	3.7	2,426.8	2,426.8	2,426.8	0.0
AJ	45,956	163	439	2.8	2,429.3	2,429.3	2,429.8	0.5
AK	46,826	155	701	1.7	2,432.0	2,432.0	2,432.2	0.2
AL	47,294	217	839	1.4	2,433.6	2,433.6	2,433.6	0.0
AM	48,677	213	636	1.6	2,434.5	2,434.5	2,434.5	0.0
AN	50,673	177	427	2.4	2,437.7	2,437.7	2,437.8	0.1
AO	51,746	125	370	1.2	2,439.3	2,439.3	2,439.6	0.3
AP	52,336	19	42	4.0	2,440.0	2,440.0	2,440.4	0.4

[1]Feet above confluence with Youghiogheny River

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

GARRETT COUNTY, MD AND INCORPORATED AREAS

FLOODWAY DATA

LITTLE YOUGHIOGHENY RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET NAVD 88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Little Youghiogheny River (continued)								
AQ	52,965	17	43	3.8	2,443.0	2,443.0	2,443.0	0.0
AR	53,384	41	99	1.7	2,445.0	2,445.0	2,445.0	0.0
AS	53,711	71	234	0.7	2,445.6	2,445.6	2,445.7	0.1
AT	54,188	26	64	2.6	2,445.8	2,445.8	2,445.9	0.1
AU	54,954	17	52	3.2	2,449.2	2,449.2	2,449.3	0.1
AV	55,739	10	28	6.0	2,452.2	2,452.2	2,452.2	0.0
AW	56,889	22	58	2.9	2,458.2	2,458.2	2,458.7	0.5
AX	57,478	19	55	3.0	2,460.5	2,460.5	2,460.8	0.3
AY	57,806	20	49	3.4	2,461.5	2,461.5	2,461.6	0.1
AZ	58,315	19	43	3.9	2,463.8	2,463.8	2,463.8	0.0
BA	58,821	25	126	1.3	2,470.2	2,470.2	2,470.7	0.5
BB	59,684	20	45	1.6	2,470.8	2,470.8	2,471.2	0.4

[1]Feet above confluence with Youghiogheny River

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

GARRETT COUNTY, MD AND INCORPORATED AREAS

FLOODWAY DATA

LITTLE YOUGHIOGHENY RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET NAVD 88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Mill Run								
A	69	71	357	8.5	1,470.0	1,441.4[2]	1,441.5	0.1
B	1,264	48	287	10.6	1,470.0	1,456.8[2]	1,457.0	0.2
C	1,761	70	374	8.2	1,470.0	1,462.9[2]	1,463.7	0.8
D	3,290	40	261	11.7	1,491.6	1,491.6	1,491.6	0.0
E	3,702	155	698	4.4	1,500.7	1,500.7	1,500.8	0.1
F	4,056	34	281	9.5	1,502.9	1,502.9	1,503.0	0.1
G	4,297	147	726	3.7	1,510.4	1,510.4	1,510.6	0.2
H	4,672	60	335	8.0	1,516.3	1,516.3	1,516.3	0.0
I	6,225	125	394	6.8	1,546.3	1,546.3	1,546.3	0.0
J	6,464	76	330	8.1	1,551.2	1,551.2	1,551.2	0.0
K	7,045	34	207	12.7	1,562.5	1,562.5	1,562.5	0.0
L	7,356	81	273	9.6	1,568.8	1,568.8	1,568.9	0.1
M	7,760	32	201	13.1	1,579.6	1,579.6	1,580.0	0.4

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

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

GARRETT COUNTY, MD AND INCORPORATED AREAS

FLOODWAY DATA

MILL RUN

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET NAVD 88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Mill Run (continued)								
N	9,430	37	220	12.0	1,620.7	1,620.7	1,621.2	0.5
O	10,169	36	205	12.8	1,638.8	1,638.8	1,638.9	0.1
P	10,375	48	227	11.6	1,645.9	1,645.9	1,645.9	0.0
Q	11,403	75	328	7.0	1,673.7	1,673.7	1,674.5	0.8
R	12,314	40	211	10.9	1,698.0	1,698.0	1,698.4	0.4
S	12,861	47	259	8.9	1,708.3	1,708.3	1,709.0	0.7
T	13,137	42	206	11.1	1,716.8	1,716.8	1,716.9	0.1
U	14,372	32	152	10.5	1,750.1	1,750.1	1,751.0	0.9
V	15,268	55	183	8.7	1,776.4	1,776.4	1,776.8	0.4
W	15,575	45	187	8.5	1,786.3	1,786.3	1,786.3	0.0
X	16,366	38	187	8.5	1,809.5	1,809.5	1,809.8	0.3
Y	16,823	34	157	10.1	1,825.8	1,825.8	1,826.0	0.2

[1]Feet above confluence with Youghiogheny River Lake

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

GARRETT COUNTY, MD AND INCORPORATED AREAS

FLOODWAY DATA

MILL RUN

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET NAVD 88)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Minnow Creek								
A	1,036[1]	54	79	6.6	1,490.5	1,490.5	1,490.5	0.0
B	1,279[1]	22	61	8.6	1,494.0	1,494.0	1,494.0	0.0
C	1,984[1]	15	50	10.4	1,508.2	1,508.2	1,508.2	0.0
D	2,121[1]	20	55	9.5	1,513.1	1,513.1	1,513.1	0.0
North Branch Potomac River								
A	5,828[2]	178[3]	2,492	12.9	1,510.6	1,510.6	1,511.6	1.0
B	7,655[2]	313[3]	2,280	14.1	1,521.8	1,521.8	1,522.0	0.2
C	10,275[2]	146[3]	1,669	19.2	1,534.0	1,534.0	1,534.0	0.0
D	12.200[2]	136[3]	1,636	19.6	1,544.3	1,544.3	1,544.3	0.0
E	14,270[2]	292[3]	2,714	11.8	1,564.7	1,564.7	1,564.7	0.0
F	15,667[2]	414[3]	2,250	14.3	1,579.9	1,579.9	1,579.9	0.0
G	16,922[2]	172[3]	1,793	17.9	1,589.6	1,589.6	1,589.6	0.0
H	18,528[2]	221[3]	1,962	16.4	1,599.1	1,599.1	1,599.1	0.0

[1]Feet above confluence with Youghiogheny River
[2]Feet above Bloomington Lake
[3]Width extends beyond county boundary

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

GARRETT COUNTY, MD AND INCORPORATED AREAS

FLOODWAY DATA

MINNOW CREEK – NORTH BRANCH POTOMAC RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET NAVD 88)			
CROSS SECTION	DISTANCE[1]	WIDTH[2] (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
North Branch Potomac River (continued)								
I	19,302	222	1,924	16.7	1,606.0	1,606.0	1,606.0	0.0
J	19,770	216	2,727	11.8	1,610.4	1,610.4	1,610.6	0.2
K	21,101	215	1,928	16.6	1,618.2	1,618.2	1,618.2	0.0
L	22,799	243	1,979	16.2	1,631.3	1,631.3	1,631.3	0.0
M	23,718	174	1,823	17.6	1,641.1	1,641.1	1,641.1	0.0
N	24,091	210	2,824	11.4	1,645.8	1,645.8	1,645.8	0.0
O	25,156	225	2,381	13.5	1,650.9	1,650.9	1,651.8	0.9
P	26,174	225	1,935	16.6	1,660.9	1,660.9	1,660.9	0.0
Q	28,025	171	1,820	17.6	1,679.5	1,679.5	1,679.5	0.0
R	29,525	206	2,021	15.9	1,694.1	1,694.1	1,694.1	0.0

[1]Feet above Bloomington Lake
[2]Width extends beyond county boundary

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

GARRETT COUNTY, MD AND INCORPORATED AREAS

FLOODWAY DATA

NORTH BRANCH POTOMAC RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD 88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
North Branch Potomac River								
S	81,831	218	1,890	5.7	2335.5	2335.5	2335.6	0.1
T	82,525	213 / 198[2]	1,496	7.2	2337.0	2337.0	2337.5	0.5
U	83,199	154 / 88[2]	1,129	9.6	2340.0	2340.0	2340.7	0.7
V	84,006	129 / 76[2]	1,387	6.7	2346.9	2346.9	2347.0	0.1
W	85,344	158 / 128[2]	1,144	8.1	2356.2	2356.2	2356.2	0.0

[1] Feet above Bloomington Lake
[2] Total floodway width / width within jurisdiction

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

GARRETT COUNTY, MD AND INCORPORATED AREAS

FLOODWAY DATA

NORTH BRANCH POTOMAC RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET NAVD 88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Nydegger Run								
A	151	38	112	10.0	2,322.0	2,311.2[2]	2,311.2	0.0
B	221	76	367	3.0	2,322.0	2,315.1[2]	2,315.8	0.7
C	314	89	451	2.5	2,322.0	2,315.5[2]	2,316.0	0.5
D	501	51	185	6.0	2,322.0	2,315.5[2]	2,315.8	0.3
E	951	34	126	8.8	2,322.0	2,319.2[2]	2,319.7	0.5
F	1,209	40	119	9.3	2,322.0	2,321.1[2]	2,321.2	0.1
G	1,772	40	212	5.1	2,324.9	2,324.9	2,325.0	0.1
H	2,122	78	162	6.7	2,331.5	2,331.5	2,331.5	0.0
I	2,428	68	144	7.5	2,334.4	2,334.4	2,334.7	0.3
J	2,961	60	155	7.0	2,342.9	2,342.9	2,342.9	0.0
K	3,812	104	172	6.3	2,353.2	2,353.2	2,353.4	0.2

[1]Feet above confluence with North Branch Potomac River
[2]Elevation computed without consideration of backwater from North Branch Potomac River

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

GARRETT COUNTY, MD AND INCORPORATED AREAS

FLOODWAY DATA

NYDEGGER RUN

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET NAVD 88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Piney Creek								
A	568	1,157	5,822	0.3	2,369.2[2]	2,369.2	2,369.2	0.0
B	3,713	810	4,081	0.5	2,369.2[2]	2,369.2	2,369.2	0.0
C	4,984	617	2,927	0.6	2,369.2[2]	2,369.2	2,369.2	0.0
D	5,225	541	2,634	0.7	2,369.8	2,369.8	2,369.8	0.0
E	7,377	30	234	4.7	2,370.1	2,370.1	2,370.2	0.1
F	9,450	32	249	4.5	2,374.7	2,374.7	2,375.1	0.4
G	11,133	26	137	8.0	2,379.9	2,379.9	2,379.9	0.0

[1]Feet above Frostburg Reservoir Dam
[2]Elevation computed based on Frostburg Reservoir Dam

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

GARRETT COUNTY, MD AND INCORPORATED AREAS

FLOODWAY DATA

PINEY CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET NAVD 88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Savage River								
A	101	238	1,251	7.2	1,475.8	1,475.8	1,475.8	0.0
B	882	200	1,297	7.0	1,483.0	1,483.0	1,483.1	0.1
C	1,831	146	1,244	7.3	1,491.5	1,491.5	1,492.2	0.7
D	2,726	125	794	11.4	1,497.9	1,497.9	1,498.1	0.2
E	4,005	157	1,229	7.3	1,508.2	1,508.2	1,509.0	0.8
F	5,057	142	923	9.8	1,517.3	1,517.3	1,517.4	0.1
G	6,158	108	798	11.3	1,528.7	1,528.7	1,529.3	0.6
H	7,106	113	886	10.2	1,534.9	1,534.9	1,535.4	0.5
I	8,121	149	882	10.2	1,543.8	1,543.8	1,544.7	0.9
J	9,068	244	1,557	5.8	1,552.5	1,552.5	1,552.8	0.3
K	10,375	186	1,266	6.4	1,563.3	1,563.3	1,564.1	0.8
L	11,740	300	1,354	6.0	1,574.5	1,574.5	1,574.9	0.4
M	12,014	265	1,156	7.0	1,577.9	1,577.9	1,578.0	0.1
N	13,127	241	1,031	7.9	1,586.9	1,586.9	1,587.3	0.4

[1]Feet above confluence with Savage River Reservoir

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

GARRETT COUNTY, MD AND INCORPORATED AREAS

FLOODWAY DATA

SAVAGE RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET NAVD 88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Savage River (continued)								
O	14,009	223	895	9.1	1,598.0	1,598.0	1,598.0	0.0
P	14,520	85	620	13.1	1,601.5	1,601.5	1,602.3	0.8
Q	15,183	103	653	12.4	1,608.7	1,608.7	1,608.8	0.1
R	16,145	142	1,191	6.8	1,617.7	1,617.7	1,618.7	1.0
S	17,084	207	1,319	6.1	1,626.3	1,626.3	1,626.9	0.6
T	17,994	174	1,263	6.4	1,635.4	1,635.4	1,636.2	0.8
U	19,314	81	683	11.9	1,647.5	1,647.5	1,648.5	1.0
V	20,389	86	819	9.9	1,655.4	1,655.4	1,655.8	0.4
W	21,396	71	556	14.6	1,664.5	1,664.5	1,664.7	0.2
X	22,138	118	706	11.5	1,672.9	1,672.9	1,673.3	0.4
Y	23,040	232	1,182	6.5	1,682.2	1,682.2	1,682.7	0.5
Z	23,834	164	639	10.1	1,688.9	1,688.9	1,689.2	0.3
AA	24,114	165	746	8.6	1,692.5	1,692.5	1,693.2	0.7
AB	24,493	130	806	8.0	1,695.8	1,695.8	1,696.7	0.9

[1]Feet above confluence with Savage River Reservoir

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

GARRETT COUNTY, MD AND INCORPORATED AREAS

FLOODWAY DATA

SAVAGE RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET NAVD 88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Savage River (continued)								
AC	25,303	64	496	13.0	1,704.1	1,704.1	1,704.3	0.2
AD	26,223	237	1,187	5.4	1,712.6	1,712.6	1,713.6	1.0
AE	26,621	189	863	7.5	1,715.6	1,715.6	1,716.1	0.5
AF	27,023	120	569	11.3	1,717.4	1,717.4	1,717.7	0.3
AG	28,069	105	734	8.8	1,729.4	1,729.4	1,730.3	0.9
AH	29,115	164	1,115	5.8	1,739.3	1,739.3	1,740.2	0.9
AI	30,164	415	1,251	5.2	1,752.5	1,752.5	1,752.8	0.3
AJ	31,129	80	517	12.0	1,762.5	1,762.5	1,763.2	0.7
AK	31,472	195	863	7.2	1,766.1	1,766.1	1,766.1	0.0
AL	32,315	211	824	7.5	1,775.1	1,775.1	1,775.4	0.3
AM	32,586	271	1,324	4.7	1,778.0	1,778.0	1,778.9	0.9
AN	33,641	118	453	9.2	1,789.3	1,789.3	1,789.3	0.0

[1]Feet above confluence with Savage River Reservoir

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

GARRETT COUNTY, MD AND INCORPORATED AREAS

FLOODWAY DATA

SAVAGE RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET NAVD 88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Snowy Creek								
A	359	132	680	8.5	2,387.8	2,380.9[2]	2,381.4	0.5
B	1,326	385	2,015	2.4	2,387.8	2,385.3[2]	2,385.4	0.1
C	1,761	197	1,234	3.9	2,387.8	2,385.4[2]	2,385.7	0.3
D	3,430	900	5,034	0.9	2,387.8	2,386.8[2]	2,387.0	0.2
E	4,253	584	1,301	2.7	2,387.8	2,387.0[2]	2,387.2	0.2
F	5,506	129	724	4.8	2,387.8	2,387.8	2,388.5	0.7
G	5,819	190	906	3.9	2,389.7	2,389.7	2,390.2	0.5
H	6,405	200	914	3.8	2,390.4	2,390.4	2,391.3	0.9
I	6,913	252	972	3.6	2,391.7	2,391.7	2,392.3	0.6
J	8,144	105	624	5.6	2,395.5	2,395.5	2,395.6	0.1
K	9,594	145	811	4.3	2,398.7	2,398.7	2,399.5	0.8

[1]Feet above confluence with Youghiogheny River (Upper Reach)
[2]Elevation computed without consideration of backwater from Youghiogheny River (Upper Reach)

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

GARRETT COUNTY, MD AND INCORPORATED AREAS

FLOODWAY DATA

SNOWY CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET NAVD 88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
South Branch Casselman River								
A	88	174	1,826	3.8	2,157.5	2,157.5	2,158.0	0.5
B	1,615	394	4,096	1.6	2,158.1	2,158.1	2,158.8	0.7
C	2,996	677	6,027	1.1	2,158.3	2,158.3	2,159.1	0.8
D	4,909	754	6,296	1.0	2,158.5	2,158.5	2,159.3	0.8
E	6,827	404	3,065	1.8	2,158.7	2,158.7	2,159.6	0.9
F	7,054	312	1,835	3.1	2,158.8	2,158.8	2,159.7	0.9
G	7,638	250	1,803	3.1	2,159.2	2,159.2	2,160.2	1.0
H	8,506	157	1,193	4.7	2,160.3	2,160.3	2,161.0	0.7
I	9,190	231	1,321	4.3	2,161.6	2,161.6	2,162.1	0.5
J	10,792	226	697	4.3	2,163.1	2,163.1	2,163.6	0.5
K	11,503	98	719	4.2	2,166.4	2,166.4	2,166.6	0.2
L	11,731	84	516	5.8	2,166.5	2,166.5	2,166.7	0.2
M	12,307	93	665	4.5	2,167.7	2,167.7	2,168.0	0.3
N	12,871	126	560	5.4	2,168.2	2,168.2	2,168.5	0.3
O	13,985	263	1,317	2.3	2,169.8	2,169.8	2,170.2	0.4

[1]Feet above confluence with Casselman River

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

GARRETT COUNTY, MD AND INCORPORATED AREAS

FLOODWAY DATA

SOUTH BRANCH CASSELMAN RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET NAVD 88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
South Branch Casselman River (continued)								
P	16,233	196	1,310	2.3	2,177.5	2,177.5	2,177.9	0.4
Q	17,509	128	747	4.0	2,178.4	2,178.4	2,178.9	0.5
R	18,351	39	314	9.6	2,179.8	2,179.8	2,180.3	0.5
S	19,056	58	543	5.5	2,183.4	2,183.4	2,183.8	0.4
T	19,277	146	947	3.2	2,185.4	2,185.4	2,185.9	0.5
U	19,505	168	1,045	2.9	2,185.7	2,185.7	2,186.3	0.6
V	20,337	174	729	2.9	2,186.3	2,186.3	2,186.9	0.6
W	21,257	190	699	3.0	2,188.0	2,188.0	2,188.3	0.3
X	21,628	85	258	8.2	2,188.1	2,188.1	2,188.4	0.3
Y	22,688	206	378	5.6	2,193.0	2,193.0	2,193.0	0.0
Z	23,841	175	588	3.6	2,196.9	2,196.9	2,197.2	0.3
AA	25,067	179	529	4.0	2,200.5	2,200.5	2,200.7	0.2
AB	25,980	70	320	6.6	2,202.8	2,202.8	2,203.2	0.4
AC	27,111	109	282	7.5	2,209.6	2,209.6	2,209.7	0.1

[1]Feet above confluence with Casselman River

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

GARRETT COUNTY, MD AND INCORPORATED AREAS

FLOODWAY DATA

SOUTH BRANCH CASSELMAN RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET NAVD 88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Unnamed Tributary to Little Youghiogheny River								
A	356	20	29	2.5	2,386.5	2,385.3[2]	2,385.3	0.0
B	882	12	17	4.4	2,393.2	2,393.2	2,393.5	0.3
C	1,196	10	17	4.3	2,397.3	2,397.3	2,397.8	0.5
D	1,496	13	40	1.9	2,401.9	2,401.9	2,401.9	0.0
E	1,941	12	19	3.8	2,405.6	2,405.6	2,405.9	0.3
F	2,332	15	26	2.9	2,412.7	2,412.7	2,413.5	0.8
G	3,186	28	51	1.5	2,424.8	2,424.8	2,425.7	0.9
H	3,602	26	44	1.7	2,431.8	2,431.8	2,431.9	0.1
I	4,017	14	46	1.6	2,440.8	2,440.8	2,441.4	0.6
J	4,108	7	11	6.9	2,442.3	2,442.3	2,442.5	0.2

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

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

GARRETT COUNTY, MD AND INCORPORATED AREAS

FLOODWAY DATA

UNNAMED TRIBUTARY TO LITTLE YOUGHIOGHENY RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET NAVD 88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Youghiogheny River (Lower Reach)								
A	1,550	440	3,325	6.6	1,470.0	1,464.8[2]	1,465.3	0.5
B	3,503	215	1,990	9.7	1,470.9	1,470.9	1,471.0	0.1
C	5,531	525	2,629	7.3	1,480.3	1,480.3	1,481.2	0.9
D	7,206	191	1,413	13.5	1,486.4	1,486.4	1,486.4	0.0
E	7,783	200	1,955	9.8	1,490.4	1,490.4	1,490.7	0.3
F	8,237	214	2,173	8.8	1,492.6	1,492.6	1,492.6	0.0
G	8,628	199	2,048	9.4	1,492.9	1,492.9	1,493.3	0.4
H	9,088	169	2,135	9.0	1,494.6	1,494.6	1,494.6	0.0
I	10,571	369	2,037	9.4	1,496.7	1,496.7	1,497.0	0.3

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

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

GARRETT COUNTY, MD AND INCORPORATED AREAS

FLOODWAY DATA

YOUGHIOGHENY RIVER (LOWER REACH)

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET NAVD 88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Youghiogheny River (Upper Reach)								
A	16	121	1,906	5.4	2,387.7	2,387.7	2,387.7	0.0
B	1,073	150	2,049	3.4	2,388.2	2,388.2	2,388.6	0.4
C	2,172	120	1,436	4.9	2,388.4	2,388.4	2,388.9	0.5
D	3,803	86	1,235	5.7	2,389.5	2,389.5	2,390.2	0.7
E	5,389	120	1,560	4.5	2,390.6	2,390.6	2,391.5	0.9
F	6,970	121	1,309	5.4	2,391.4	2,391.4	2,392.3	0.9
G	8,022	153	1,590	4.4	2,393.0	2,393.0	2,393.6	0.6
H	9,122	298	2,046	3.4	2,394.0	2,394.0	2,394.7	0.7
I	11,023	249	1,762	2.9	2,395.4	2,395.4	2,395.9	0.5
J	12,132	459	3,703	1.4	2,396.2	2,396.2	2,396.8	0.6
K	12,801	448	2,805	1.8	2,396.5	2,396.5	2,397.0	0.5
L	13,973	183	1,474	3.5	2,396.8	2,396.8	2,397.3	0.5
M	14,942	192	1,301	3.9	2,397.3	2,397.3	2,397.8	0.5

[1]Feet above confluence with Youghiogheny River

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

GARRETT COUNTY, MD AND INCORPORATED AREAS

FLOODWAY DATA

YOUGHIOGHENY RIVER (UPPER REACH)

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET NAVD 88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Youghiogheny River (Upper Reach) (continued)								
N	15,638	481	2,605	2.0	2,398.1	2,398.1	2,398.7	0.6
O	16,934	785	3,679	1.4	2,398.7	2,398.7	2,399.3	0.6
P	17,962	570	3,347	1.5	2,399.1	2,399.1	2,399.9	0.8
Q	18,223	583	3,164	1.6	2,399.4	2,399.4	2,400.1	0.7
R	19,069	525	2,794	1.8	2,399.7	2,399.7	2,400.3	0.6
S	20,442	351	1,847	2.8	2,400.1	2,400.1	2,400.7	0.6
T	21,898	257	1,844	2.8	2,401.9	2,401.9	2,402.3	0.4
U	22,786	259	1,691	3.0	2,402.4	2,402.4	2,403.0	0.6

[1]Feet above confluence with Youghiogheny River

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

GARRETT COUNTY, MD AND INCORPORATED AREAS

FLOODWAY DATA

YOUGHIOGHENY RIVER (UPPER REACH)

5.0 INSURANCE APPLICATIONS

For flood insurance rating purposes, flood insurance zone designations are assigned to a community based on the results of the engineering analyses. The 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 by approximate methods. Because detailed hydraulic analyses are not performed for such areas, no base flood elevations 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 by detailed methods. In most instances, whole-foot base flood elevations 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, and to 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, and areas protected from the 1-percent annual chance flood by levees. No base flood elevations or depths are shown within this zone.

6.0 FLOOD INSURANCE RATE MAP

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

For flood insurance applications, the map designates flood insurance rate zones as described in Section 5.0. In the 1-percent annual chance floodplains that were studied by detailed methods, shows selected whole-foot base flood elevations or average depths. Insurance agents use the zones and base flood elevations 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-percent and 0.2-percent annual chance floodplains. Floodways and the locations of selected cross sections used in the hydraulic analyses and floodway computations are shown where applicable.

The countywide FIRM presents flooding information for the entire geographic area of Garrett County. Historical map dates relating to pre-countywide maps prepared for

each community are presented in Table 8, "Community Map History."

7.0 OTHER STUDIES

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 data.

This study is authoritative for purposes of the Flood Insurance Program and the data presented here either supersede or are compatible with previous determinations.

FISs have been prepared for the Towns of Friendsville, Oakland, Mountain Lake Park, Deer Park, Loch Lynn Heights, Accident, and Kitzmiller (References 9, 10, 11, 12, 13, 14, and 15). Discharges for Bear Creek in this study differ from those in the Friendsville study due to updated data. The Flood Insurance Study for the Unincorporated Areas of Garrett County was prepared on December 5, 1984 (References 17 and 44) and revised on August 16, 1994 (Reference 51). All of these reports have been superseded by the countywide study.

An FIS has been prepared for the Unincorporated Areas of Allegany County (Reference 16). Subsequently, the Flood Insurance Study for Allegany County, Maryland and Incorporated Areas has been prepared as a countywide study and submitted to the community for review under the revised preliminary issuance on September 30, 2015 (Reference 66).

In 1971, the Maryland Geological Survey prepared a report on the hydrological flow characteristics of Maryland streams (Reference 21). Regional equations are given in this report to compute the peak discharges of all the streams in Maryland. The discharge values used in the FIS report for the Town of Friendsville (Reference 9) are comparable with those computed from the regional equations derived in this report.

However, these equations are not applicable to the Little Youghiogheny River due to the controlled nature of the flow caused by the six floodwater retarding structures which were mentioned in Section 2.4. The SCS had conducted a detailed hydrologic analysis of the Little Youghiogheny River watershed to design the six floodwater retarding structures (Reference 22). The results of the analysis were coordinated with the U.S. Army Corps of Engineers, Pittsburgh District, the USGS, and the Maryland Water Resources Administration. This impacts the towns along the Little Youghiogheny River: Deer Park, Loch Lynn Heights, Mountain Lake Park, and Oakland.

In 1974, the USGS prepared a map of flood-prone areas in the Deer Park quadrangle (Reference 52).

COMMUNITY NAME	INITIAL IDENTIFICATION	FLOOD HAZARD BOUNDARY MAP REVISIONS DATE	FIRM EFFECTIVE DATE	FIRM REVISIONS DATE
Accident, Town of	April 15, 1977	None	September 1,1978	
Deer Park, Town of	November 8, 1974	January 2, 1976	August 16, 1994	
Friendsville, Town of	June 28, 1974	September 12, 1975	September 14, 1979	
Garrett County (Unincorporated Areas)	July 15, 1977	None	June 5, 1985	
Grantsville, Town of[1]	July 15, 1977	None	June 5, 1985	
Kitzmiller, Town of	November 8, 1974	February 27, 1976	October 15, 1985	
Loch Lynn Heights, Town of	June 28, 1974	February 6, 1976	August 15, 1979	August 16, 1994
Mountain Lake Park, Town of	June 28, 1974	January 16, 1976	October 16, 1984	August 16, 1994
Oakland, Town of	June 14, 1974	None	July 16, 1979	October 18, 1995

[1] Dates for this community were taken from Garrett County Unincorporated Areas

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

GARRETT COUNTY, MD AND INCORPORATED AREAS

COMMUNITY MAP HISTORY

In 1974, the USGS prepared a map of flood-prone areas in the Friendsville quadrangle (Reference 32). Since the publication of these maps, the FIA has published Flood Hazard Boundary Maps which were revised in September 1975 (Reference 33).

A Flood Hazard Boundary Map has been published for the Town of Kitzmiller (Reference 45).

8.0 LOCATION OF DATA

Information concerning the pertinent data used in preparation of this study can be obtained by contacting Federal Insurance and Mitigation Division, Federal Emergency Management Agency, One Independence Mall, Sixth Floor, 615 Chestnut Street, Philadelphia, Pennsylvania 19106-4404.

9.0 BIBLIOGRAPHY AND REFERENCES

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Appendix

Each FIRM panel may contain specific notes to the user that provide additional information regarding the flood hazard data shown on that map. However, the FIRM panel does not contain enough space to show all the notes that may be relevant in helping to better understand the information on the panel. Figure 2 contains the full list of these notes.

Figure 2 – FIRM Notes to Users

NOTES TO USERS

For information and questions about this map, available products associated with this FIRM including historic versions of this FIRM, how to order products, or the National Flood Insurance Program in general, please call the FEMA Map Information eXchange at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA Flood Map Service Center website at msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the website. Users may determine the current map date for each FIRM panel by visiting the FEMA Flood Map Service Center website or by calling the FEMA Map Information eXchange.

Communities annexing land on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM Index. These may be ordered directly from the Flood Map Service Center at the number listed above.

For community and countywide map dates, refer to Table 8 and Notice to Flood Insurance Users in this FIS Report.

To determine if flood insurance is available in the community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

The map is for use in administering the NFIP. It may not identify all areas subject to flooding, particularly from local drainage sources of small size. Consult the community map repository to find updated or additional flood hazard information.

BASE FLOOD ELEVATIONS: For more detailed information in areas where Base Flood Elevations (BFEs) and/or floodways have been determined, consult the Flood Profiles and Floodway Data and/or Summary of Non-Coastal Stillwater Elevations tables within this FIS Report. Use the flood elevation data within the FIS Report in conjunction with the FIRM for construction and/or floodplain management.

FLOODWAY INFORMATION: Boundaries of the floodways were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the FIS Report for this jurisdiction.

FLOOD CONTROL STRUCTURE INFORMATION: Certain areas not in Special Flood Hazard Areas may be protected by flood control structures. Refer to Section 2.4 "Flood Protection Measures" of this FIS Report for information on flood control structures for this jurisdiction.

Figure 2 – Notes to Users - continued

PROJECTION INFORMATION: The projection used in the preparation of the map was Universal Transverse Mercator (UTM) Zone 17N. The horizontal datum was the North American Datum of 1983 NAD83, GRS1980 spheroid. Differences in datum, spheroid, projection or State Plane zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of the FIRM.

ELEVATION DATUM: Flood elevations on the FIRM are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same vertical datum. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988**,** visit the National Geodetic Survey website at www.ngs.noaa.gov/ or contact the National Geodetic Survey at the following address:

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

Local vertical monuments may have been used to create the map. To obtain current monument information, please contact the appropriate local community listed in Section 3.2 of this FIS Report.

BASE MAP INFORMATION: Base map information shown on the February 1, 2019, FIRMs was derived from the effective Garrett County FIRMs.

The map reflects more detailed and up-to-date stream channel configurations than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables may reflect stream channel distances that differ from what is shown on the map.

Corporate limits shown on the map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after the map was published, map users should contact appropriate community officials to verify current corporate limit locations.

NOTES FOR FIRM INDEX

REVISIONS TO INDEX: As new studies are performed and FIRM panels are updated within Garrett County, Maryland, corresponding revisions to the FIRM Index will be incorporated within the FIS Report to reflect the effective dates of those panels. Please refer to Table 8 of this FIS Report to determine the most recent FIRM revision date for each community. The most recent FIRM panel effective date will correspond to the most recent index date.

SPECIAL NOTES FOR SPECIFIC FIRM PANELS

This Notes to Users section was created specifically for Garrett County, Maryland, effective February 1, 2019.

Each FIRM panel contains an abbreviated legend for the features shown on the maps. However, the FIRM panel does not contain enough space to show the legend for all map features. Figure 3 shows the full legend of all map features. Note that not all of these features may appear on the FIRM panels in Garrett County.

Figure 3 – Map Legend for FIRM

SPECIAL FLOOD HAZARD AREAS: *The 1% annual chance flood, also known as the base flood or 100-year flood, has a 1% chance of happening or being exceeded each year. Special Flood Hazard Areas are subject to flooding by the 1% annual chance flood. The Base Flood Elevation is the water surface elevation of the 1% annual chance flood. The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights. See note for specific types. If the floodway is too narrow to be shown, a note is shown.*

	Special Flood Hazard Areas subject to inundation by the 1% annual chance flood (Zones A, AE, AH, AO, AR, A99, V and VE)
Zone A	The flood insurance rate zone that corresponds to the 1% annual chance floodplains. No base (1% annual chance) flood elevations (BFEs) or depths are shown within this zone.
Zone AE	The flood insurance rate zone that corresponds to the 1% annual chance floodplains. Base flood elevations derived from the hydraulic analyses are shown within this zone.
Zone AH	The flood insurance rate zone that corresponds to the areas of 1% annual chance shallow flooding (usually areas of ponding) where average depths are between 1 and 3 feet. Whole-foot BFEs derived from the hydraulic analyses are shown at selected intervals within this zone.
Zone AO	The flood insurance rate zone that corresponds to the areas of 1% 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 hydraulic analyses are shown within this zone.
Zone AR	The flood insurance rate zone that corresponds to areas that were formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
Zone A99	The flood insurance rate zone that corresponds to areas of the 1% annual chance floodplain that will be protected by a Federal flood protection system where construction has reached specified statutory milestones. No base flood elevations or flood depths are shown within this zone.
Zone V	The flood insurance rate zone that corresponds to the 1% annual chance coastal floodplains that have additional hazards associated with storm waves. Base flood elevations are not shown within this zone.
Zone VE	Zone VE is the flood insurance rate zone that corresponds to the 1% annual chance coastal floodplains that have additional hazards associated with storm waves. Base flood elevations derived from the coastal analyses are shown within this zone as static whole-foot elevations that apply throughout the zone.

Figure 3 – Map Legend for FIRM - continued

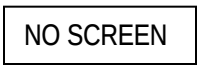
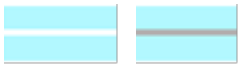
	Regulatory Floodway determined in Zone AE.
OTHER AREAS OF FLOOD HAZARD	
	Shaded Zone X: Areas of 0.2% annual chance flood hazards and areas of 1% annual chance flood hazards with average depths of less than 1 foot or with drainage areas less than 1 square mile.
	Future Conditions 1% Annual Chance Flood Hazard – Zone X: The flood insurance rate zone that corresponds to the 1% annual chance floodplains that are determined based on future-conditions hydrology. No base flood elevations or flood depths are shown within this zone.
	Area with Reduced Flood Risk due to Levee: Areas where an accredited levee, dike, or other flood control structure has reduced the flood risk from the 1% annual chance flood.
	Area with Flood Risk due to Levee: Areas where a non-accredited levee, dike, or other flood control structure is shown as providing protection to less than the 1% annual chance flood.
OTHER AREAS	
	Zone D (Areas of Undetermined Flood Hazard): The flood insurance rate zone that corresponds to unstudied areas where flood hazards are undetermined, but possible.
	Unshaded Zone X: Areas of minimal flood hazard.
FLOOD HAZARD AND OTHER BOUNDARY LINES	
 (ortho) (vector)	Flood Zone Boundary (white line on ortho-photography-based mapping; gray line on vector-based mapping)
	Limit of Study
	Jurisdiction Boundary
	Limit of Moderate Wave Action (LiMWA): Indicates the inland limit of the area affected by waves greater than 1.5 feet
GENERAL STRUCTURES	
Aqueduct *Channel* *Culvert* *Storm Sewer*	Channel, Culvert, Aqueduct, or Storm Sewer
Dam *Jetty* *Weir*	Dam, Jetty, Weir

Figure 3 – Map Legend for FIRM - continued

	Levee, Dike, or Floodwall
Bridge	Bridge
COASTAL BARRIER RESOURCES SYSTEM (CBRS) AND OTHERWISE PROTECTED AREAS (OPA): *CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.*	
CBRS AREA 09/30/2009	Coastal Barrier Resources System Area: Labels are shown to clarify where this area shares a boundary with an incorporated area or overlaps with the floodway.
OTHERWISE PROTECTED AREA 09/30/2009	Otherwise Protected Area
REFERENCE MARKERS	
22.0	River mile Markers
CROSS SECTION & TRANSECT INFORMATION	
B 20.2	Lettered Cross Section with Regulatory Water Surface Elevation (BFE)
5280 21.1	Numbered Cross Section with Regulatory Water Surface Elevation (BFE)
17.5	Unlettered Cross Section with Regulatory Water Surface Elevation (BFE)
8	Coastal Transect
	Profile Baseline: Indicates the modeled flow path of a stream and is shown on FIRM panels for all valid studies with profiles or otherwise established base flood elevation.
	Coastal Transect Baseline: Used in the coastal flood hazard model to represent the 0.0-foot elevation contour and the starting point for the transect and the measuring point for the coastal mapping.
513	Base Flood Elevation Line
ZONE AE (EL 16)	Static Base Flood Elevation value (shown under zone label)
ZONE AO (DEPTH 2)	Zone designation with Depth

Figure 3 – Legend for FIRM - continued

ZONE AO (DEPTH 2) (VEL 15 FPS)	Zone designation with Depth and Velocity
BASE MAP FEATURES	
Missouri Creek	River, Stream or Other Hydrographic Feature
	Interstate Highway
	U.S. Highway
	State Highway
	County Highway
	Street, Road, Avenue Name, or Private Drive if shown on Flood Profile
	Railroad
	Horizontal Reference Grid Line
	Horizontal Reference Grid Ticks
+	Secondary Grid Crosshairs
Land Grant	Name of Land Grant
7	Section Number
R. 43 W. T. 22 N.	Range, Township Number
$^{42}76^{000m}$**E**	Horizontal Reference Grid Coordinates (UTM)
365000 FT	Horizontal Reference Grid Coordinates (State Plane)
80° 16’ 52.5”	Corner Coordinates (Latitude, Longitude)