FLOOD INSURANCE STUDY

HUNTINGDON COUNTY, PENNSYLVANIA
(ALL JURISDICTIONS)

This FIS report does not include Floodway Data and Flood Profiles that were not revised as a part of this study. The unrevised Floodway Data and Flood Profiles will appear in the final FIS report.

COMMUNITY NAME	COMMUNITY NUMBER
ALEXANDRIA, BOROUGH OF	420481
BARREE, TOWNSHIP OF	421683
BIRMINGHAM, BOROUGH OF	420482
BRADY, TOWNSHIP OF	421684
BROAD TOP CITY, BOROUGH OF*	420483
CARBON, TOWNSHIP OF	421685
CASS, TOWNSHIP OF	421686
CASSVILLE, BOROUGH OF*	422703
CLAY, TOWNSHIP OF	421687
COALMONT, BOROUGH OF	420484
CROMWELL, TOWNSHIP OF	421688
DUBLIN, TOWNSHIP OF	421689
DUDLEY, BOROUGH OF	421681
FRANKLIN, TOWNSHIP OF	422573
HENDERSON, TOWNSHIP OF	420960
HOPEWELL, TOWNSHIP OF	421690
HUNTINGDON, BOROUGH OF	420486
JACKSON, TOWNSHIP OF	421691
JUNIATA, TOWNSHIP OF	421692
LINCOLN, TOWNSHIP OF	421693
LOGAN, TOWNSHIP OF	421694
MAPLETON, BOROUGH OF	420487
MARKLESBURG, BOROUGH OF	422574
MILL CREEK, BOROUGH OF	420488
MILLER, TOWNSHIP OF	421695
MORRIS, TOWNSHIP OF	421696
MOUNT UNION, BOROUGH OF	420489
ONEIDA, TOWNSHIP OF	421697
ORBISONIA, BOROUGH OF	421682
PENN, TOWNSHIP OF	421698
PETERSBURG, BOROUGH OF	420490
PORTER, TOWNSHIP OF	421699
ROCKHILL, BOROUGH OF	422575
SALTILLO, BOROUGH OF	420492
SHADE GAP, BOROUGH OF*	422705
SHIRLEY, TOWNSHIP OF	421700
SHIRLEYSBURG, BOROUGH OF	420493
SMITHFIELD, TOWNSHIP OF	420494
SPRINGFIELD, TOWNSHIP OF	421701
SPRUCE CREEK, TOWNSHIP OF	422621
TELL, TOWNSHIP OF	421702
THREE SPRINGS, BOROUGH OF	422576
TODD, TOWNSHIP OF	421703
UNION, TOWNSHIP OF	421704
WALKER, TOWNSHIP OF	422577
WARRIORS MARK, TOWNSHIP OF	421705
WEST, TOWNSHIP OF	421706
WOOD, TOWNSHIP OF	421707

* No Special Flood Hazard Areas Identified

REVISED **PRELIMINARY APRIL 7, 2016**

Federal Emergency Management Agency

FLOOD INSURANCE STUDY NUMBER 42061CV000B

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 Community Map Repository. Please contact the Community Map Repository for any additional data.

The Federal Emergency Management Agency (FEMA) may revise and republish part or all of the FIS at any time. In addition, FEMA may revise part of this FIS Report by the Letter of Map Revision process, which does not involve republication or redistribution of the FIS report. Therefore, users should consult with community officials and check the Community Map Repository to obtain the most current FIS report components.

Initial Countywide FIS Effective Date: October 16, 2012

Revised Countywide FIS Date: [TBD]

This Preliminary FIS report does not include Floodway Data and Flood Profiles that were not revised as part of this study. The unrevised Floodway Data and Flood Profiles will appear in the final FIS report.

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FLOOD INSURANCE STUDY
HUNTINGDON COUNTY, PENNSYLVANIA (ALL JURISDICTIONS)

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study (FIS) revises and updates information on the existence and severity of flood hazards in the geographic area of Huntingdon County, Pennsylvania, including the Boroughs of Alexandria, Birmingham, Broad Top City, Cassville, Coalmont, Dudley, Huntingdon, Mapleton, Marklesburg, Mill Creek, Mount Union, Orbisonia, Petersburg, Rockhill, Saltillo, Shade Gap, Shirleysburg and Three Springs; and the Townships of Barree, Brady, Carbon, Cass, Clay, Cromwell, Dublin, Franklin, Henderson, Hopewell, Jackson, Juniata, Lincoln, Logan, Miller, Morris, Oneida, Penn, Porter, Shirley, Smithfield, Springfield, Spruce Creek, Tell, Todd, Union, Walker, Warriors Mark, West and Wood (referred to collectively herein as Huntingdon County), and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study has developed flood-risk data for various areas of the county that will establish actuarial flood insurance rates and to assist the county in its efforts to promote sound floodplain management. Minimum floodplain management requirements for participation in the National Flood Insurance Program (NFIP) are set forth in the Code of Federal Regulations at 44 CFR, 60.3.

Please note that on the effective date of this study, the Boroughs of Broad Top City, Cassville, and Shade Gap have no mapped special flood hazard areas. This does not preclude future determinations of Special Flood Hazard Areas (SFHA) that could be necessitated by changed conditions affecting the community (i.e. annexation of new lands) or the availability of new scientific or technical data about flood hazards.

In some states and 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 takes precedence and the State (or other jurisdictional agency) will be able to explain them.

The Digital Flood Insurance Rate Map (DFIRM) and FIS report for this countywide study have been produced in a digital format. Flood hazard information was created to meet the Federal Emergency Management Agency (FEMA) DFIRM database specifications and Geographic Information System (GIS) format requirements.

1.2 Authority and Acknowledgments

The source of authority for this FIS is the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

This FIS was prepared to include all jurisdictions within Huntingdon County in a countywide format. Information on the authority and acknowledgements for each jurisdiction included in this countywide FIS, as complied from their previously printed FIS reports is shown below.

Alexandria, Borough of:	For the FIS dated August 1979 and the Flood Insurance Rate Map (FIRM) dated February 1, 1980, the hydrologic and hydraulic analyses were performed by Erdman, Anthony, and Associates for the Federal Insurance Administration (FIA), under Contract No. H-4501. This work was completed in September 1978 (Reference 1).
Brady, Township of:	For the FIS and FIRM dated February 17, 1989, the hydrologic and hydraulic analyses were prepared by the U.S. Geological Survey (USGS) for the Federal Emergency Management Agency (FEMA), under Inter-Agency Agreement No. EMW-85-E-1823, Project Order No. 8. This work was completed in February 1987 (Reference 2).
Carbon, Township of:	For the FIS and FIRM dated June 19, 1989, the hydrologic and hydraulic analyses were prepared by the USGS for FEMA, under Inter-Agency Agreement No. EMW-85-E-1823, Project Order No. 8. This work was completed in March 1987 (Reference 3).
Clay, Township of:	For the FIS and FIRM dated August 16, 1988, the hydrologic and hydraulic analyses were prepared by the USGS for FEMA, under Inter-Agency Agreement No. EMW-85-E-1823, Project Order No. 8. This work was completed in February 1987 (Reference 4).
Coalmont, Borough of:	For the FIS and FIRM dated August 3, 1989 the hydrologic and hydraulic analyses were prepared by the USGS for FEMA, under Inter-Agency Agreement No. EMW-85-E-1823, Project Order No. 8. This work was completed in March 1987 (Reference 5).
Cromwell, Township of:	For the original FIS and FIRM dated December 4, 1985, the hydrologic and hydraulic analyses were prepared by the USGS for FEMA. For the revised FIS and FIRM dated March 18, 1991, the hydrologic and hydraulic analyses were prepared by the USGS during the preparation of the FIS for the Borough of Rockhill, under Inter-Agency Agreement No. EMW-85-E-1823, Project Order No. 8. This work was completed in June 1988 (Reference 6).
Franklin, Township of:	For the FIS and FIRM dated February 17, 1989, the hydrologic and hydraulic analyses were prepared by the USGS for FEMA, under Inter-Agency Agreement No. EMW-85-E-1823, Project Order No. 8. This work was completed in March 1987 (Reference 7).

Henderson, Township of:	For the original FIS and FIRM dated August 3, 1989, the hydrologic and hydraulic analyses were prepared by USGS for FEMA, under Inter-Agency Agreement No. EMW-85-E-1823, Project No. 8. That work was completed in February 1987. For the revised FIS and FIRM dated October 18, 1995, the hydrologic and hydraulic analyses for the Juniata River were prepared by GEO-Technical Services, Inc., for FEMA under Contract No. EMW-90-C-3128. This work was completed in November 1992 (Reference 8).
Hopewell, Township of:	For the FIS and FIRM dated August 15, 1989, the hydrologic and hydraulic analyses were prepared by the USGS for FEMA, under Inter-Agency Agreement No. EMW-85-E-1823, Project Order No. 8. This work was completed in March 1987 (Reference 9).
Huntingdon, Borough of:	For the original FIS dated March 1978 and FIRM dated September 29, 1978, the hydrologic and hydraulic analyses were prepared by the Susquehanna River Basin Commission (SRBC) for the FIA, under Contract No. H-3496. For the revision of the FIS and FIRM dated May 16, 1995, the hydrologic analysis was prepared by the Pennsylvania Department of Environmental Protection (PADEP) (formerly known as Pennsylvania Department of Environmental Resources). This work was completed in August 1984. The hydraulic analysis was prepared by GEO-Technical Services, Inc., for FEMA, under Contract No. EMW-90-C-3128. This work was completed in November 1992 (Reference 10).
Jackson, Township of:	For the FIS and FIRM dated August 3, 1989, the hydrologic and hydraulic analyses were prepared by the USGS for FEMA, under Inter-Agency Agreement No. EMW-85-E-1823, Project Order No. 8. This work was completed in February 1987 (Reference 11).

Juniata, Township of:	For the original FIS and FIRM dated February 17, 1989, the hydrologic and hydraulic analyses were prepared by the USGS for FEMA, under Inter-Agency Agreement No. EMW-85-E-1823, Project Order No. 8. That work was completed in February 1987. For the revised FIS and FIRM dated May 2, 1995, the hydrologic analysis for the Juniata River was prepared by the PADEP for FEMA, under Inter-Agency Agreement No. EMW-90-C-3128. That work was completed in August 1984. The hydraulic analysis for the Juniata River was performed by GEO-Technical Services, Inc. This work was completed in November 1992 (Reference 12).
Logan, Township of:	For the FIS and FIRM dated August 3, 1989, the hydrologic and hydraulic analyses were prepared by the USGS for FEMA, under Inter-Agency Agreement No. EMW-85-E-1853, Project Order No. 8. This work was completed in March 1987 (Reference 13).
Mapleton, Borough of:	For the FIS dated January 1977 and FIRM dated July 5, 1977, the hydrologic and hydraulic analyses were prepared by the SRBC for the FIA, under Contract No. H-3496 (Reference 14).
Mill Creek, Borough of:	For the FIS and FIRM dated March 2, 1989, the hydrologic and hydraulic analyses were prepared by the USGS for FEMA, under Inter-Agency Agreement No. EMW-85-E-1823, Project Order No. 8. This work was completed in February 1987 (Reference 15).
Miller, Township of:	For the original FIS and FIRM dated March 2, 1989, the hydrologic and hydraulic analyses were prepared by the USGS for FEMA, under Inter-Agency Agreement No. EMW-85-E-1823, Project Order No. 8. This work was completed in February 1987. For the revised FIS and FIRM dated April 16, 1990, the hydrologic and hydraulic analysis was prepared by the USGS for FEMA, under Inter-Agency Agreement No. EMW-88-E-2764. This work was completed in November 1988 (Reference 16).
Mount Union, Borough of:	For the FIS dated January 1977 and FIRM dated July 18, 1977, the hydrologic and hydraulic analyses were prepared by the SRBC for the FIA, under Contract No. H-3496 (Reference 17).

Oneida, Township of:	For the original FIS and FIRM dated March 2, 1989, the hydrologic and hydraulic analyses were prepared by the USGS for FEMA, under Inter-Agency Agreement No. EMW-85-E-1823, Project Order No. 8. This work was completed in July 1987. For the revised FIS and FIRM dated December 19, 1995, the hydrologic analysis was performed by the PADEP, and was completed in 1984. The hydraulic analysis was prepared by GEO-Technical Services, Inc., for FEMA, under Contract No. EMW-90-C-3128. This work was completed in November 1992 (Reference 18).
Orbisonia, Borough of:	For the FIS and FIRM dated March 18, 1991, the hydrologic and hydraulic analyses were prepared by the USGS for FEMA during the preparation of the FIS for the Borough of Rockhill, under Inter-Agency Agreement No. EMW-85-E-1823, Project Order No. 8. This work was completed in June 1988. For the revised FIS and FIRM dated July 3, 1995, the survey information for Blacklog Creek was supplied to FEMA by the USGS. This work was completed in March 1994 (Reference 19).
Petersburg, Borough of:	For the FIS and FIRM dated August 15, 1989, the hydrologic and hydraulic analyses were prepared by the USGS for FEMA, under Inter-Agency Agreement No. EMW-85-E-1823, Project Order No. 8. This work was completed in February 1987 (Reference 20).
Porter, Township of:	For the FIS dated September 16, 1980 and FIRM dated March 16, 1981, the hydrologic and hydraulic analyses were performed by Erdman, Anthony, and Associates, for the FIA, under Contract No. H-4501. This work, was completed in September 1978 (Reference 21).
Rockhill, Borough of:	For the FIS and FIRM dated July 3, 1990, the hydrologic and hydraulic analyses were prepared by the USGS for FEMA, under Inter-Agency Agreement No. EMW-85-E-1823, Project Order No. 8. This work was completed in August 1987 (Reference 22).

Shirley, Township of:	For the original FIS and FIRM dated August 15, 1989, the hydrologic and hydraulic analyses were prepared by the USGS for FEMA, under Inter-Agency Agreement No. EMW-85-E-1823, Project Order No. 8. This work was completed in February 1987. For the revised FIS and FIRM dated September 20, 1996, the hydrologic and hydraulic analyses were prepared by GEO-Technical Services, Inc. for FEMA under Contract No. EMW-93-C-4146-94-5. This work was completed in December 1994 (Reference 23).
Smithfield, Township of:	For the original FIS dated September 1976 and FIRM dated March 15, 1977, the hydrologic and hydraulic analyses were prepared by the SRBC for the FIA, under Contract No. H-3496. For the revised FIS and FIRM dated July 16, 1996, the hydrologic analysis was prepared by the PADEP and was completed in August 1984. The hydraulic analysis was prepared by GEO-Technical Services, Inc., for FEMA, under Contract No. EMW-90-C-3128. This work was completed in December 1992 (Reference 24).
Spruce Creek, Township of:	For the FIS and FIRM dated March 2, 1989, the hydrologic and hydraulic analyses were prepared by the USGS for FEMA, under Inter-Agency Agreement No. EMW-85-E01823, Project Order No. 8. This work was completed in May 1987 (Reference 25).
Todd, Township of:	For the FIS and FIRM dated August 15, 1989, the hydrologic and hydraulic analyses were prepared by the USGS for FEMA under Inter-Agency Agreement No. EMW-85-E-1823, Project Order No. 8. This work was complete in March 1987 (Reference 26).

Union, Township of:	For the original FIS and FIRM dated March 2, 1989, the hydrologic and hydraulic analyses for the Juniata River were prepared by the USGS for FEMA, under Inter-Agency Agreement No. EMW-85-E-1823, Project Order No. 8. That work was completed in February 1987. For the revised FIS and FIRM dated August 2, 1994, the hydrologic and hydraulic analyses for the Juniata River were prepared by GEO-Technical Services, Inc., for FEMA, under Contract No. EMW-90-C-3128. This work was completed in November 1992 (Reference 27).
Warriors Mark, Township of:	For the FIS and FIRM dated March 2, 1989, the hydrologic and hydraulic analyses were prepared by the USGS for FEMA, under Inter-Agency Agreement No. EMW-85-E-1823, Project Order No. 8. This work was completed in March 1987 (Reference 28).

There are no previous FISs or FIRMs for the Boroughs of Birmingham, Broad Top City, Cassville, Marklesburg, Shade Gap; and the Townships of Lincoln; and no previous FISs for the Boroughs of Dudley, Saltillo, Shirleysburg and Three Springs; and the Townships of Barree, Cass, Dublin, Morris, Penn, Springfield, Tell, Walker, West and Wood; therefore, the previous authority and acknowledgement information for these communities is not included in this FIS. These communities may not appear in the Community Map History Table (Section 6.0).

For the October 16, 2012, initial countywide FIS, the DFIRM database and mapping were prepared for FEMA by GG3, a joint venture between Gannett Fleming, Inc., Camp Hill, Pennsylvania, and Greenhorne & O'Mara, Inc., Laurel, Maryland under Contract No. HSFE03-08-D-0007, Task Order No. 05. The October 16, 2012, countywide FIS does not include new detailed hydrologic and hydraulic analyses, but rather redelineation of effective flood hazard information and new approximate analyses. This work was completed in September 2010.

For the [TBD] FIS revision, new hydrology and hydraulics for Little Juniata River were prepared by United States (U.S) Army Corps of Engineers (USACE), Baltimore District for the Borough of Tyrone to be used as the basis to revise the effective FEMA FIS (Reference 28a). The work was completed in November 2012 and revised in July 2013 (Reference 28a). The DFIRM database and mapping were prepared for FEMA by Compass PTS (a joint venture between AECOM and CDM Smith) under Contract No.HSFEHQ-60-D-0003, Task Order No. HSFE60-15-J-0002. This work was completed in February 2016.

The orthophotography base mapping was provided by the PAMAP Program, Pennsylvania Department of Conservation and Natural Resources, Bureau of Topographic and Geologic Survey. This information was photogrammetrically compiled at a scale of 1:2,400 from aerial photography dated April 2007. The digital countywide FIRM was produced in Pennsylvania State Plane South Zone (FIPS Zone

3702) coordinate system with a Lambert Conformal Conic projection, units in feet, and Referenced to the North American Datum of 1983, GRS80 spheroid. Differences in datum and spheroid used in the production of the 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 this FIRM.

1.3 Coordination

An initial Consultation Coordination Officer's (CCO) meeting is held typically with representatives of FEMA, the community, and the study contractor to explain the nature and purpose of a FIS, and to identify streams to be studied by detailed methods. A final CCO meeting is held typically with the same representatives to review the results of the study.

The initial and final meeting dates for the previous FIS reports for Huntingdon County are shown in Table 1, "Initial and Final CCO Meetings."

TABLE 1 - INITIAL AND FINAL CCO MEETINGS

Community Name	Initial CCO Date	Final CCO Date
Borough of Alexandria	August 1976	March 8, 1979
Township of Brady	December 11, 1984	March 1, 1988
Township of Carbon	December 13, 1984	July 20, 1988
Township of Clay	December 12, 1984	September 28, 1987
Borough of Coalmont	December 13, 1984	September 13, 1988
Township of Cromwell	September 13, 1989	April 30, 1990
Township of Franklin	*	*
Township of Henderson	December 11, 1984	September 13, 1988
Township of Hopewell	December 13, 1984	September 13, 1988
Borough of Huntington	*	August 18, 1975
Township of Jackson	December 11, 1984	December 13, 1988
Township of Juniata	December 11, 1984	March 1, 1988
Township of Logan	December 13, 1984	September 13, 1988
Borough of Mapleton	*	August 19, 1975
Borough of Mill Creek	December 11, 1984	March 1, 1988
Township of Miller	December 11, 1984	March 1, 1988
Borough of Mount Union	*	June 4, 1975
Township of Oneida	December 11, 1984	March 1, 1988
Borough of Orbisonia	March 18, 1991	April 30, 1990
Borough of Petersburg	December 13, 1984	September 13, 1988
Township of Porter	August 1976	June 26, 1979
Borough of Rockhill	December 12, 1984	April 27, 1989
Township of Shirley	December 12, 1984	September 13, 1988
Township of Smithfield	*	August 18, 1975
Township of Spruce Creek	December 13, 1984	March 1, 1988
Township of Todd	December 12, 1984	September 13, 1988
Township of Union	December 11, 1984	March 1, 1988
Township of Warriors Mark	December 13, 1984	March 1, 1988

* Data Not Available

The results of the October 16, 2012, initial countywide study were reviewed at the final CCO meeting held on January 12, 2011, and attended by FEMA, State NFIP Coordinator, the Mapping Partner, and Bedford County community representatives. All problems raised at that meeting have been addressed in this study.

For the [TBD], FIS revision, the USACE Batlimore District held several meeting between April 2010 and July 2013 to discuss the flooding issues in the Borough of Tyrone, Blair County, PA (Reference 28a).

For the [TBD], FIS revision, the results were reviewed at the final CCO meeting held on [TBD], and attended by [TBD]. All concerns and/or issues raised at the meeting have been addressed in this study.

2.0 AREA STUDIED

2.1 Scope of Study

This FIS covers the geographic area of Huntingdon County, Pennsylvania, including the communities listed in Section 1.1.

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

TABLE 2 – STREAMS STUDIED BY DETAILED METHODS

Aughwick Creek
Blacklog Creek
Chilcoat Run
Coal Bank Run
Crooked Creek
East Branch Standing Stone Creek
Emma Creek
Frankstown Branch Juniata River
Hares Valley Creek
Hill Valley Creek
Jordan Run
Juniata River
Little Juniata River
Muddy Run
Murray Run
Raystown Branch Juniata River
Robinson Run
Saddler Creek
Shaver Creek
Shoup Run
Spruce Creek
Standing Stone Creek
Sugarcamp Run
Three Springs Creek
Unnamed Tributary to Great Trough Creek
Unnamed Tributary to Shoup Run
Warriors Mark Run
Yellow Branch

For the [TBD], FIS revision, the following portion of Little Juniata River was updated.

Stream	Limits New Detailed Study
Little Juniata River	From approximately 0.39 miles upstream of Spruce Creek to the Huntingdon/Blair county boundary.

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.

The October 16, 2012, countywide FIS incorporated the determinations of Letters of Map Revision (LOMRs) issued by FEMA, for the projects listed by community in Table 3, "Letters of Map Change."

TABLE 3 – LETTERS OF MAP CHANGE

Type	Case Number	Date Issued	Stream(s) / Project Identifier
LOMR	99-03-113P	April 14, 2000	Reflects a corrected floodway delineation along Juniata River from a point approximately 1,600 feet downstream of 4th Street to just downstream of 4th Street.
LOMR	03-03-083P	March 7, 2003	Mount Union Bypass - Reflects the construction of a new bridge, excavation, and the placement of fill along the Juniata River.
LOMR	09-03-0587P	April 13, 2009	Reflects the revision to Shoup Run, from approximately 100 feet upstream to approximately 1,150 feet upstream of the eastern borough limits of the Borough of Dudley.

For the [TBD], FIS revision no LOMRs have been issued within the affected area. Therefore, no LOMRs needed to be incorporated.

Numerous flooding sources in the county were studied by approximate methods. Approximate analyses were used to study those areas having a low development potential or minimal flood hazards.

2.2 Community Description

Huntingdon County is bordered by Centre County, Pennsylvania to the north; Mifflin County, Pennsylvania and Juniata County, Pennsylvania to the east; Franklin County, Pennsylvania to the southeast; Fulton County, Pennsylvania to the south; Bedford County, Pennsylvania to the southwest; and Blair County, Pennsylvania to the west. The population of Huntingdon County was 45,913 people as of the 2010 U.S. Census

(Reference 29). In 2014 the total population of Huntingdon County was estimated to be 45,750 (Reference 29a). The total area of the county is approximately 2,303 square miles (Reference 29).

Huntingdon County is located in the Appalachian Ridge and Valley Province of central Pennsylvania (Reference 10).

The climate in the study area is generally continental in nature, modified by the effects of the Atlantic Ocean and the Gulf of Mexico. Moderately warm summers, with temperatures occasionally rising above 85 degrees Fahrenheit (°F), and cool winters, with temperatures occasionally dropping below 20°F, characterize the climate. Summer and winter mean temperatures range from 71°F to 26°F, respectively. Temperature extremes range from -15°F (January 1994) to a sultry 104°F (July 1988). The annual precipitation averages 38.25 inches (Reference 30).

2.3 Principal Flood Problems

The history of flooding along the streams in Huntingdon County indicates that floods can occur in any season of the year; however, the possibility of flooding is greatly reduced during the winter months. Although most severe floods have been attributed to rainfall alone, floods occurring in spring have been compounded by snow melt and moving ice. The area's major floods in late summer and fall have been associated with tropical storms and hurricanes moving up the Atlantic Coast. The following paragraphs summarize the principal flooding problems within Huntingdon County.

Aughwick Creek is a source of flooding in the Township of Shirley. The stream gage for this source is USGS Gaging Station No. 01564500, located near Three Springs, Pennsylvania.

Emma Creek and Robinson Run are sources of flooding in the Township of Porter. Flooding occurring on these two streams is elevated by backwater from Frankstown Branch Juniata River. A sudden downpour can, however, cause flooding on Emma Creek and Robinson Run independent of the backwater effects on the Frankstown Branch Juniata.

Juniata River is the chief source of flood damage in the Boroughs of Huntingdon, Mapleton, Mill Creek, Mount Union, Orbisonia and Petersburg; and the Townships of Brady, Henderson, Huntingdon, Juniata, Logan, Porter, Shirley, Smithfield and Union. The river gages for Juniata River are USGS Gaging Station No. 01563500 located at Mapleton Depot, USGS Gaging Station No. 01559000 located at Huntingdon and USGS Gaging Station No. 01567000 located in Newport (Perry County). The Mapleton Depot gage has recorded information from 1938 to the present, and the Newport gage has recorded information from 1899.

Frankstown Branch Juniata River is the major source of flooding in the Borough of Alexandria and the Township of Porter.

Little Juniata River is a source of flooding in the Townships of Logan, Porter, Spruce Creek and Warriors Mark. The discharge estimates for Frankstown Branch Juniata River and Little Juniata River are based on observations at USGS Gaging Station No. 01559000 and USGS Gaging Station No. 01556000 located at the Borough of Williamsburg (Blair County). In addition to the USGS Gaging Station No.

01559000, Little Juniata River is also gaged at USGS Gaging Station No. 01558000 located at Spruce Creek and USGS Gaging Station No. 01556500 located at Tipton. The most notable of past floods are those of March 1936 and June 1972. The flood of March 1936, which had a discharge of 38,000 cubic feet per second (cfs) in the Township of Porter, is the largest flood of record for the Township of Porter, and was a result of spring rains and snowmelt (Reference 31). This flood had a recurrence interval of approximately 100 years in the Township of Smithfield and 200 years in the Township of Porter. The flood of June 1972, was associated with Tropical Storm Agnes and had a recorded discharge of 25,000 cfs in the Township of Porter (Reference 32). This flood had a recurrence interval of approximately 130 years in the Borough of Mapleton, and 35 years and 60 years in the Townships of Porter and Smithfield, respectively. The floodwaters from these two floods caused considerable damage to buildings and property in the Township of Porter, and caused localized inundation of structures in the Boroughs of Mapleton, Mount Union and Petersburg and the Townships of Brady, Henderson, Juniata and Logan, and caused damage to residences and private businesses sealing Main Street in the Borough of Alexandria.

Shaver Creek is a source of flooding in the Borough of Petersburg and the Township of Logan. The stream gages for these sources are located at Huntingdon and Spruce Creeks.

Standing Stone Creek is a source of flooding in the Borough of Huntingdon and the Townships of Jackson, Miller and Oneida. East Branch Standing Stone Creek is an additional source of flooding in the Township of Jackson. The most notable floods for these two streams are those of March 1936 and June 1972. The stream gage for these sources, located near Huntingdon, is USGS Gaging Station No. 01559500, which has 29 years of records. Flooding of these two sources causes localized inundation of structures along the streams.

Additional sources of flooding include Backlog Creek located in the Boroughs of Orbisonia and Rockhill and in the Townships of Cromwell and Shirley; Coal Bank Run in the Borough of Coalmont; Crooked Creek in the Township of Smithfield; East Branch Warriors Mark Run in the Township of Warriors Mark; Henderson Hollow Creek in the Township of Smithfield; Jordan Run located in the Borough of Rockhill and the Township of Cromwell; Muddy Run located in the Borough of Huntingdon; North Spring Branch in the Township of Clay; Saddler Creek in the Township of Brady; Shoup Run located in the Borough of Coalmont and the Townships of Carbon and Hopewell; Sideling Hill Creek and Spring Creek in the Township of Clay; Spruce Creek located in the Townships of Franklin and Spruce Creek; Sugarcamp Run in the Township of Carbon; Three Springs Creek in the Township of Clay; Unnamed Tributary to Great Trough Creek in the Township of Todd; Unnamed Tributary to Shoup Run in the Township of Coalmont; Warriors Mark Run in the Townships of Franklin and Warriors Mark; and Yellow Branch in the Township of Todd. These streams are ngagged and no data is available to provide information about the magnitude and severity of past flooding in the area.

2.4 Flood Protection Measures

At present, there are no flood protection structures located within the Boroughs of Alexandria, Coalmont, Hopewell, Mapleton and Petersburg and the Townships of Carbon, Clay, Franklin, Jackson, Logan, Miller, Porter, Shirley, Spruce Creek, Todd and Warriors Mark. Residents of these municipalities rely on the usual warnings

through radio, television, and the local newspapers for information concerning possible flood conditions. Non-structural measures of flood protection in the form of land use regulations adopted from the Code of Federal Regulations, which control building within areas that have high risk of flooding are being utilized in the Boroughs of Alexandria and Huntingdon; and the Townships of Oneida, Porter and Smithfield (Reference 33).

Within the Township of Smithfield, levees constructed along the Crooked Creek and Juniata River protect the community from the 1-percent-annual-chance flood. Levees within the Township of Smithfield all meet the FEMA specifications. In addition, an upstream reservoir and pressure conduit system on Lily Creek has reduced the flood hazards on that waterway through the developed areas of the Township.

Flooding along the Juniata River, downstream of its confluence with Raystown Branch Juniata River, has been reduced by the multi-purpose Raystown Dam and Reservoir, which is located on the Raystown Branch Juniata River, in the Boroughs of Huntingdon, Mapleton, Mill Creek and Mount Union and the Townships of Brady Henderson, Juniata, Oneida, Smithfield and Union. The Raystown Dam and Reservoir reduces the 1-percent-annual-chance flood elevation from Juniata River by an average of 4.8 feet in the Borough of Mill Creek and the Townships of Brady and Union, and 2.5 feet in the Borough of Mount Union. In 1952, a flood protection levee was constructed along the Juniata River upstream from the U.S. Route 522 bridge. This levee was raised and the upper end extended to the railroad track in 1974. In the Borough of Mount Union, the levee protects the area located between Filbert Street, North Washington Street and the levee from the 1-percent-annual-chance flood on the Juniata River.

Privately held lands that were subject to flooding by Raystown Lake, which was created by Raystown Dam on the Raystown Branch Juniata River in the Township of Juniata have been acquired by the U.S. Government.

In the Borough of Rockhill and the Township of Cromwell, it has been ascertained that a levee along the west bank of Backlog Creek may not protect the community from rare events such as the 1-percent-annual-chance flood. The criteria used to evaluate protection against the 1-percent-annual-chance flood are 1.) Adequate design including freeboard; 2.) Structural stability; and 3.) Proper operation and maintenance. Levees that do not protect against the 1-percent-annual-chance flood are not considered in the hydraulic analyses of the 1-percent-annual-chance floodplain. The levee along the west bank of Backlog Creek has a maximum of 1.5 feet of freeboard for the 1-percent-annual-chance flood from the point at which this levee crosses Water Street, approximately 270 feet upstream of State Route 994. FEMA specifies that all levees must have a minimum of 3-foot freeboard against 1-percent-annual-chance flood flooding to be considered a safe flood protection structure. This levee does not meet FEMA guidelines.

3.0 ENGINEERING METHODS

For the flooding sources studied in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood-hazard data required for this study. Flood events of a magnitude 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-, 50-, 100-, and 500-year floods, have a 10-, 2-, 1-, and 0.2-percent-annual-chance, respectively, of being equaled or exceeded during any year. Although the recurrence interval represents the long term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than one 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); 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 by detailed methods affecting the communities within Huntingdon County.

Pre-countywide Analyses

Within Huntingdon County, the Boroughs of Alexandria, Coalmont, Huntingdon, Mapleton, Mill Creek, Mount Union, Orbisonia, Petersburg and Rockhill; and the Townships of Brady, Carbon, Clay, Cromwell, Franklin, Henderson, Hopewell, Jackson, Juniata, Logan, Miller, Oneida, Porter, Shirley, Smithfield, Spruce Creek, Todd, Union and Warriors Mark have a previously published FIS report. The hydrologic analyses described in those reports have been compiled and are summarized below.

The discharges for Aughwick Creek; East Branch Standing Stone Creek; and the reaches of Standing Stone Creek located in the Townships of Jackson and Miller were determined utilizing discharge records at USGS stream gages, USGS Bulletin 17B and regional regression equations developed in Water-Resources Investigations 82-21 (References 34 and 35). Data for Aughwick Creek was recorded at USGS Gaging Station No. 01564500. Data for East Branch Standing Stone Creek and the reaches of Standing Stone Creek located in the Townships of Jackson and Miller was recorded at USGS Gaging Station No. 01559500.

Discharges for Backlog Creek; Chilcoat Run; Coal Bank Run; Jordan Run; Murray Run; Shaver Creek; Shoup Run; Spruce Creek; Sugarcamp Run; Three Springs Run; Unnamed Tributary to Great Trough Creek; Unnamed Tributary to Shoup Run; Warriors Mark Run; and Yellow Branch were determined using regional regression

equations developed in USGS Water Resources Investigations 82-21 (Reference 35). The Pennsylvania State University PSU-IV method was used to confirm the determinations for Backlog Creek; Coal Bank Run; Jordan Run; the reaches of Shoup Run located in the Borough of Coalmont and the Township of Hopewell; Unnamed Tributary to Great Trough Creek; Unnamed Tributary to Shoup Run; and Yellow Branch (Reference 36).

The discharges for Crooked Creek, Muddy Run and the reach of Standing Stone Creek located in the Borough of Huntingdon were obtained from the regional flood frequency method developed by the USACE (Reference 37).

The discharges for the reaches of Frankstown Branch Juniata River located in the Borough of Alexandria and the Township of Porter; the reach of Juniata River located in the Township of Shirley; and the reach of Little Juniata River located in the Township of Porter, were determined from analyses of the discharge-frequency curves which were developed using USGS gaging stations. Discharges for the reach of Juniata River were taken from the FIS report for the Township of Wayne, which determined the discharges from analyses of the discharge-frequency curves developed by using USGS gaging stations (Reference 38). These curves were developed by the USGS using a standard log-Pearson Type III method of analysis. Recorded flood-flow frequency data for the Frankstown Branch Juniata River was based on a statistical analysis of discharge records covering a 60-year period at USGS Gaging Station No. 01556000. Recorded flood-flow frequency data for the Little Juniata River was based on a statistical analysis of discharge records from USGS Gaging Station No. 01558000 and USGS Gaging Station No. 01556500, and USGS Gaging Station No. 1559000. Recorded flood-flow frequency data for the Juniata River was based on a statistical analysis of discharge records from USGS Gaging Station No. 01563500 and USGS Gaging Station No. 01567000. The analysis followed the standard log-Pearson Type III method as outlined by Water Resources Council Bulletin 15 (Reference 39). The resulting discharges for the Juniata River were modified to account for regulation from the Raystown Dam based on information made available by the USACE. Upstream and downstream of USGS Gaging Station No. 01556000, the discharges for Frankstown Branch Juniata River were adjusted for the changes in drainage area using regression equations from the PADEP Water Resources Bulletin No. 13 (Reference 40). These regression equations, which are based on a regional analysis, relate drainage area, channel slope, percent area of storage, and an index of average annual excess precipitation to the peak discharge.

The 10-, 2-, and 0.2-annual-percent-chance discharges for Emma Creek and Robinson Run were also computed using the regression equations from PADEP Water Resources Bulletin No. 13 (Reference 40). The 0.2-percent-annual-chance flood discharges for these two streams were determined by extending the discharge-frequency curves which were plotted for each stream.

Discharges for Hares Valley Creek; Hill Valley Creek; and the reaches of the Juniata River located in the Borough of Mapleton and the Township of Mount Union were obtained from discharge frequency curves for the USGS Gaging Station No. 01563500 as published by the USGS (Reference 41). This procedure is based on a log-Pearson Type III analysis of annual series with annual peak discharges. The

discharges for Juniata River were adjusted for the stream flow regulation provided as a result of the Raystown Dam. To obtain homogeneous series, the regulated curves were obtained from the natural curve by routing various floods, determining average reduction factors and smoothing the resulting curve. The length of record for USGS Gaging Station No. 01563500 extends from 1938 to present and is located on the Juniata River about 2.5 miles upstream from the Borough of Mount Union.

Discharges for the reaches of Juniata River located in the Borough of Mill Creek and the Townships of Brady and Logan; and reaches of Little Juniata River located in the Townships of Logan, Spruce Creek and Warriors Mark were developed using guidelines shown in USGS Bulletin 17B to analyze the flow records from USGS Gaging Stations (Reference 34). The discharge values for the reaches of Juniata River located in the Borough of Mill Creek and the Township of Brady were adjusted for regulation by Raystown Dam and Reservoir. This adjusted discharge value was transferred to the upstream and downstream corporate limits of the Township of Brady. The data from USGS Gaging Station No. 01559000 and 01558000 was used to determine the discharges for reaches of Juniata River and Little Juniata River in the Township of Logan. Forty years of recorded stream data from USGS Gaging Station No. 01558000, was used to compute the discharge for the reach of Little Juniata River located in the Township of Spruce Creek. This discharge was then weighted with the flow value determined by the regional regression method (Reference 35). Data from USGS Gaging Station No. 01559000, 01558000, and.01556500 were used to determine the discharges for the reach of Little Juniata River located in the Township of Warriors Mark (References 42 and 43).

The 1-percent-annual-chance discharges for the reach of Juniata River from a point approximately 580 feet upstream of State Route 829 to the upstream corporate limits, located in the Township of Henderson; the reach of Juniata River located in the Borough of Huntingdon; the reach of Juniata River located in the Township of Oneida from the upstream corporate limits with the Borough of Huntingdon to a point approximately 1,100 feet upstream; the entire reach of Juniata River located in the Township of Smithfield; the reach of Juniata River from approximately 300 feet upstream of the State Route 829 bridge to the upstream corporate limits, located in the Township of Union; were taken from the existing approved analysis completed by the PADEP in August 1984 (Reference 44). The 10-, 2-, and 0.2-percent-annual-chance flood discharges for the reach of Juniata River located in the Township of Henderson were taken from the current FIS reports for the Borough of Huntingdon and the Townships of Juniata and the original FIS report for the Township of Smithfield (References 10, 12 and 45). The 10-, 2-, and 0.2-percent-annual-chance flood discharges for the reach of Juniata River located in the Borough of Huntingdon were taken from the original FIS report for the Borough of Huntingdon (Reference 46). In the previous FIS report for the Townships of Henderson and Union, the discharges for Juniata River were determined utilizing data from USGS Gaging Station Nos. 01559000 and 01553500, located at Huntingdon and Mapleton Depot, respectively, and utilizing the Water Resources Council's Guidelines (Reference 34). In the previous FIS report for the Borough of Huntingdon, the discharges for Juniata River were obtained from the discharge frequency curves for the Huntingdon stream gage, covering a 31 year period. The Huntingdon stream gage is located approximately 1.1 miles upstream from the eastern boundary of the community. Flood peak data for this station were analyzed

as recommended by the Water Resources Council and adjusted for the community (Reference 39). The 10-, 2-, and 0.2-percent-annual-chance flood discharges for the reach of Juniata River located in the Township of Smithfield were determined utilizing the same stream gages that were utilized in the previous FIS report for the Township of Henderson. The 10-, 2-, and 0.2-percent-annual-chance flood discharges at these two gaging stations were plotted against drainage area on log-log paper. Appropriate values for the Township of Smithfield were obtained from this plot using appropriate drainage area. The USGS Gaging Station No. 01563500 flood-frequency curve published by the USACE was used. The flood-frequency curve for the Huntingdon gage was computed as recommended by the Water Resources Council (Reference 39). The reaches of the Juniata River located in the Townships of Henderson and Union, downstream of their confluence with the Raystown Branch of the Juniata River, the 1-percent-annual-chance flood discharge was reduced from 84,500 cfs to 76,000 cfs due to the existence of the Raystown Dam and reservoir.

The 10-, 2-, and 0.2-percent-annual-chance discharges for the reaches of Juniata River and Raystown Branch Juniata River, located in the Township of Juniata, were taken from the previous FIS reports for the Borough of Huntingdon and the Townships of Juniata and Smithfield (References 12, 45 and 46).

The discharges for the reach of Juniata River located in the Township of Porter were obtained from the Susquehanna River Basin Commission (SRBC), who completed the FIS report for the Township of Smithfield (Reference 45).

Discharges for Saddler Creek were determined using the Pennsylvania State University PSU-IV method (Reference 36). This technique was developed for specific use in estimating peak flood flows for ungagged sites on small streams in Pennsylvania.

The flood-frequency discharges for the reaches of Standing Stone Creek studied by detailed methods, excluding the reach from 3,870 feet upstream of Penn Street to 500 feet upstream of the downstream corporate limits, were taken from the previous FIS report for the Township of Oneida (Reference 47). In the previous FIS report for the Township of Oneida, the discharges for the remaining portions of Standing Stone Creek were determined using 29-years of records from USGS Gaging Station No. 01559500, Bulletin 17B and regional regression equations developed in USGS Water Resources Investigations 82-21 (References 34 and 35).

<u>October 16, 2012, Countywide Analyses</u>

No new hydrologic analyses were conducted as part of this countywide FIS.

<u>[TBD], Analyses, FIS revision</u>

New hydrologic analyses were conducted as a part of the USACE, Baltimore District's "Flood Modeling and Mapping for the Borough of Tyrone" (Reference 28a) to establish peak-discharge-frequency relationships for Bald Eagle Creek, Cook Hollow Run, Decker Run, Hutchinson Run, and Schell Run in Blair County, Pennsylvania and Little Juniata River in Blair and Huntingdon Counties. A

statistical/regression was used to estimate peak flows. Updated flood-frequency curves were developed at the following three USGS gaging stations within the watershed using Bulletin 17B, Guidelines for Determining Flood Flow Frequency (Reference 34), through the USGS PeakFQWin program. The previous analysis for the following gaging stations was done by the USGS in 2008, to water year (WY) 2005. The PeakFQWin program was used to develop updated flood-frequency data at the following gaging stations to include six additional years of record to WY 2011. Flows have changed minimally with the additional six years of record when compared to the previous USGS analysis (Reference 28a).

USGS Gaging Station	Period of Record	Years of Record	Drainage Area (sq.mi)	Date of Previous USGS Analysis
01558000 - Little Juniata River at Spruce Creek, PA	1936-2011	73	220.0	USGS 2008 (to WY 2005)
01557500 - Bald Eagle Creek at Tyrone, PA	1936-2011	72	44.1	USGS 2008 (to WY 2005)
01556500 - Little Juniata River at Tipton, PA	1936-1981	36	93.7	USGS 2008 (to WY 1981)

Variables for both gaged and ungagged flow points need for input into USGS regression equations was conducted. The drainage area to each flow point was delineated using a 1-meter Digital Elevation Model (DEM) obtained from PSU/PASDA dated 2006-2007. Translating the flood frequency estimates from the gaged sites to the ungagged sites was done by calculating the predicted flow at the gaged flow points and ungagged flow points using the USGS regression equations through the National Streamflow Statistics (NSS) Program (Version 5.1) using methods outlined in USGS Water Resources Investigations Report 00-4189, Techniques for Estimating Magnitude and Frequency of Peak Flows for Pennsylvania Streams (WRIR 00-4189, Reference 47a).

Peak discharge-drainage area relationships for the 10-, 2-, 1-, and 0.2-percent-annual-chance floods for each stream studied by detailed methods are presented in Table 4, “Summary of Discharges”.

TABLE 4 – SUMMARY OF DISCHARGES

Flooding Source and Location	Drainage Area (square miles)	Peak Discharges (cubic feet per second) 10-Percent-Annual-Chance	2-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
AUGHWICK CREEK					
At Aughwick Mills Road	320.00	*	*	38,000	*
At US Route 522	307.00	*	*	36,800	*
BLACKLOG CREEK					
Above the confluence with Jordan Run	66.90	*	*	11,900	*
CHILCOAT RUN					
At the confluence with Standing Stone Creek	5.26	*	*	1,160	*
COAL BANK RUN					
At the confluence with Shoup Run	2.22	*	*	580	*
CROOKED CREEK					
At the confluence with Juniata River	27.50	1,400	4,950	6,600	12,000
EAST BRANCH STANDING STONE CREEK					
Approximately 100 feet downstream of East Branch Road	15.40	*	*	2,220	*
At Obryan Road	13.90	*	*	2,040	*
EMMA CREEK					
At the confluence with Robinson Run	2.70	345	590	710	1,045
FRANKSTOWN BRANCH JUNIATA RIVER					
At the confluence with Little Juniata and Juniata Rivers	395.00	17,440	27,800	33,400	49,600
HARES VALLEY CREEK					
At the confluence with Juniata River	13.10	1,350	3,080	4,300	8,400
HILL VALLEY CREEK					
At the confluence with Juniata River	16.50	1,250	2,950	4,000	7,600
JORDAN RUN					
At the confluence with Blacklog Creek	1.96	*	*	620	*

*Data Not Available

TABLE 4 – SUMMARY OF DISCHARGES (continued)

Flooding Source and Location	Drainage Area (square miles)	Peak Discharges (cubic feet per second) 10-Percent-Annual-Chance	2-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
JUNIATA RIVER					
Downstream of the confluence of Aughwick Creek	2,405.00	52,500	82,500	104,000	180,000
At the USGS Gaging Station No. 01563500 in the Borough of Mapleton	2,030.00	44,000	68,000	86,000	160,000
Upstream of the confluence of Mill Creek	1,956.00	*	*	84,500	*
Above the confluence of Raystown Branch Juniata River	984.00	34,000	58,000	71,000	111,000
At the USGS Gaging Station No. 01559000 in the Borough of Huntingdon	816.00	32,000	54,000	66,000	100,000
Downstream of the confluence of Shaver Creek	805.00	*	*	65,300	*
Above the confluence of Shaver Creek	742.00	*	*	61,200	*
LITTLE JUNIATA RIVER					
At the confluence with Juniata River and Frankstown Branch Juniata River	343.00	18,600	34,600	43,400	71,100
Downstream of the confluence of Spruce Creek	330.00	*	*	37,640	*
At USGS Gaging Station No. 1558000	220.30	11,240	19,760	24,540	39,210
Downstream of confluence with Sinking Run	218.10	11,127	19,439	24,282	38,440
Downstream of confluence with Gensimore Run	187.50	9,689	16,310	19,955	30,565
At Babe Road	182.50	9,426	15,699	19,216	29,142
At Irish Flats Road	177.60	9,173	15,214	18,495	27,900
MUDDY RUN					
At the confluence with Juniata River	2.40	425	1,000	1,450	2,950
MURRAY RUN					
At Standing Stone Road (State Route 26)	8.80	*	*	1,690	*
RAYSTOWN BRANCH JUNIATA RIVER					
At the confluence with Juniata River	963.00	*	*	40,000	*

* Data Not Available

TABLE 4 – SUMMARY OF DISCHARGES (continued)

Flooding Source and Location	Drainage Area (square miles)	Peak Discharges (cubic feet per second) 10-Percent-Annual-Chance	2-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
ROBINSON RUN					
At the confluence with Frankstown Branch Juniata River	9.90	955	1,575	1,870	2,680
SADDLER CREEK					
At the confluence with Mill Creek	20.70	*	*	2,460	*
At Big Valley Pike (State Route 655)	19.60	*	*	2,360	*
SHAVER CREEK					
At the confluence with Juniata River	63.00	*	*	7,180	*
SHOUP RUN					
Above the confluence of Sugarcamp Run	16.80	*	*	2,520	*
At the corporate limits between the Borough of Coalmont and the Township of Carbon	15.40	*	*	2,360	*
Above the confluence of Coal Bank Run	13.00	*	*	2,090	*
Above the confluence of Unnamed Tributary to Shoup Run	12.50	*	*	2,030	*
SPRUCE CREEK					
At the confluence with Little Juniata River	109.00	*	*	11,800	*
At the corporate limits between the Townships of Franklin and Spruce Creek	105.00	*	*	11,500	*
Above the confluence of Warriors Mark Run	76.70	*	*	9,110	*
At Graysville Cemetery Road	63.90	*	*	7,870	*
STANDING STONE CREEK					
At the most downstream bridge along Standing Stone Road (SR-26) in the Township of Oneida	128.00	*	*	9,760	*
Downstream of the confluence of Chilcoat Run	112.00	*	*	9,100	*
At the most upstream bridge along Standing Stone Road (SR-26) in the Township of Oneida	106.00	*	*	8,700	*

* Data Not Available

TABLE 4 – SUMMARY OF DISCHARGES (continued)

Flooding Source and Location	Drainage Area (square miles)	Peak Discharges (cubic feet per second) 10-Percent-Annual-Chance	2-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
STANDING STONE CREEK (continued)					
At the corporate limits between the Townships of Miller and Oneida	100.70	*	*	9,300	*
At Stone Creek Ridge Road bridge at Cornpropst Mills	97.50	*	*	9,120	*
Above the East Branch Standing Stone Creek	69.30	*	*	7,390	*
At the corporate limits between Townships of Jackson and Miller	55.20	*	*	6,160	*
At State Route 26, at McAlevys Fort Road	35.20	*	*	4,300	*
SUGARCAMP RUN					
At the confluence with Shoup Run	1.23	*	*	380	*
THREE SPRINGS CREEK					
At Hudson Street (State Route 994)	23.40	*	*	4,950	*
UNNAMED TRIBUTARY TO GREAT TROUGH CREEK					
At the confluence with Great Trough Creek	2.17	*	*	570	*
UNNAMED TRIBUTARY TO SHOUP RUN					
At the confluence with Shoup Run	0.40	*	*	200	*
WARRIORS MARK RUN					
At a point approximately 3,600 feet downstream of Burket Road	12.40	*	*	2,590	*
Downstream of the confluence of East Branch Warriors Mark Run at Burket Road	12.20	*	*	2,560	*
Upstream of the confluence of East Branch Warriors Mark Run	4.35	*	*	1,210	*
At Pennington Road (State Route 550)	1.83	*	*	645	*
YELLOW BRANCH					
At the confluence with Great Trough Creek	2.08	*	*	550	*

* Data Not Available

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of flooding from the sources studied were carried out to provide estimates of the elevations of floods of the selected recurrence intervals. Users should be aware that the flood elevations shown on the FIRM represent rounded whole-foot elevations and may not exactly reflect the elevations shown on the Flood Profiles or in the Floodway Data tables in the FIS report. The flood elevations shown on the FIRM are primarily intended for flood insurance rating purposes. For construction and/or floodplain management purposes, users are encouraged to use the flood elevation data presented in this FIS in conjunction with the data shown on the FIRM.

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 selected cross sections used in the hydraulic analyses are shown on the Flood Profiles (Exhibit 1). For stream segments for which a floodway is computed (Section 4.2), selected cross-section locations are also shown on the FIRM (Exhibit 2).

The hydraulic analyses for these studies were based on unobstructed flow. The flood elevations shown on the profiles are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

All elevations shown on the Flood Profiles and FIRM (Exhibits 1 and 2) are Referenced to the North American Vertical Datum of 1988 (NAVD 88).

Pre-countywide Analyses

Within Huntingdon County, the Boroughs of Alexandria, Coalmont, Huntingdon, Mapleton, Mill Creek, Mount Union, Orbisonia, Petersburg and Rockhill; and the Townships of Brady, Carbon, Clay, Cromwell, Franklin, Henderson, Hopewell, Jackson, Juniata, Logan, Miller, Oneida, Porter, Shirley, Smithfield, Spruce Creek, Todd, Union and Warriors Mark have a previously published FIS report. The hydraulic analyses described in those reports have been compiled and are summarized below.

Water surface profiles along the reach of Aughwick Creek located in the Township of Shirley from approximately 1,700 feet downstream of realigned U.S. Route 522 to approximately 1,750 feet upstream of realigned U.S. Route 522; Crooked Creek; Emma Creek; Frankstown Branch Juniata River; Hares Valley Creek; Hill Valley Creek; the reach of Juniata River located in the Township of Henderson from approximately 580 feet upstream of State Route 829 to the upstream corporate limits; the reach of Juniata River located in the Township of Oneida from the upstream corporate limits with the Borough of Huntingdon to a point approximately 1,100 feet upstream; the reach of Juniata River located in the Township of Union from approximately 300 feet upstream of State Route 829 bridge to the upstream corporate limits; reaches of Juniata River located in the Boroughs of Henderson, Mapleton and Mount Union and the Townships of Juniata, Logan, Porter, Shirley and Smithfield; the reach of Little Juniata River located in the Township of Warriors Mark from the downstream corporate limits upstream to Silver Barn Road, a distance of approximately 15,550 feet; reaches of Little Juniata River located in the Townships of Logan and Porter; Muddy Run; Robinson Run; and the reach of Standing Stone Creek located in the Borough of Henderson were calculated using the USACE's

Hydrologic Engineering Center (HEC) HEC-2 step-backwater program (Reference 48). For the portion of Frankstown Branch Juniata River located in the Borough of Alexandria, all assumed hydraulic factors, cross sections, and hydraulic structure data were checked by computations that duplicated the historic flood of March 1936. The hydraulic model used on Hares Valley Creek; Hill Valley Creek; and the reaches of the Juniata River located in the Boroughs of Mapleton and Mount Union was tested and the "n" values adjusted within an acceptable range to best fit known highwater marks and/or elevations at gaging stations for the Juniata River from the mouth of Aughwick Creek to the vicininty of the Borough of Mapleton. All gaging station elevations were determined by the SRBC based on established rating curves. Highwater marks obtained by the USGS and from the Commonwealth of Pennsylvania Water Resources Bulletin for the June 1972 flood were used (Reference 49). The 1972 flood has a recurrence interval of approximately 130 years for the study area. When a satisfactory model was achieved, the water-surface profiles were computed using the USACE HEC-2 computer program (Reference 48). For Hares Valley Creek, it was not possible to verify the profile using known high water marks.

Water surface profiles along the reaches of Aughwick Creek studied by detailed methods located in the Township of Shirley, excluding the reach from approximately 1,700 feet downstream of realigned U.S. Route 522 to approximately 1,750 feet upstream of realigned U.S. Route 522; Backlog Creek; the reach of East Branch Standing Stone Creek located in the Township of Jackson; the reach of Juniata River located in the Township of Brady from approximately 13,420 feet to 22.660 feet upstream of the corporate limits; all reaches of Juniata River located in the Township of Henderson, excluding the reach from a point approximately 580 feet upstream of State Route 829 to the upstream corporate limits; the reach of Juniata River located in the Borough of Mill Creek; the reaches of Juniata River located in the Township of Union from the upstream corporate limits with the Borough of Mapleton to approximately 2,000 feet upstream of the railroad bridge and from the lower corporate limits of the Borough of Mill Creek to 300 feet upstream of the State Route 829 bridge; the reach of Little Juniata River located in the Township of Spruce Creek; the reach of Saddler Creek located in the Township of Brady from approximately 1,060 feet to 10,620 feet upstream from its confluence with Mill Creek; the reach of Shoup Run located in the Township of Hopewell; Shaver Creek; the reaches of Spruce Creek located in the Township of Franklin from the lower corporate limits to 5,500 feet upstream and from 10,500 feet to 15,450 feet upstream of the lower corporate limits; the reach of Spruce Creek located in the Township of Spruce Creek; the reach of Standing Stone Creek located in the Township of Jackson from approximately 12,760 feet to 27,740 feet upstream of the lower corporate limits; the reaches of Standing Stone Creek located in the Township of Miller; the reach of Standing Stone Creek located in the Township of Onedia from 740 feet downstream of Chilcoat Run to 1,040 feet upstream of State Route 26; and the reach of Warriors Mark Run located in the Township of Warriors Mark, from approximately 3,490 feet to 11,000 feet upstream of the lower corporate limit and backwater at the footbridge on Shoup Run were computed by modeling channel and bridge hydraulics with the USGS WSPRO step-backwater computer model (References 50 and 51).

Normal depths of flooding for the 1-percent-annual-chance flood recurrence intervals for the reach of Chilcoat Run from its confluence with Standing Stone Creek to approximately 920 feet upstream; the reach of East Standing Stone Creek located in the Township of Jackson; Coal Bank Run; Jordan Run; the reach of Murray Run

from approximately 600 feet downstream to 830 feet upstream of State Route 26; the reach of Saddler Creek located in the Township of Brady from approximately 1,060 feet to 10,620 feet upstream from its confluence with Mill Creek; the reach of Shoup Run located in the Township of Carbon; the reach of Shoup Run located in the Borough of Coalmont; the reach of Spruce Creek located in the Township of Franklin from approximately 47,250 feet to 49,560 feet upstream of the lower corporate limits; the reach of Standing Stone Creek located in the Township of Jackson from approximately 12,760 feet to 27,740 feet upstream of the lower corporate limits; the reaches of Standing Stone Creek located in the Township of Miller from the downstream corporate limits to a point approximately 8,100 feet upstream, and from a point approximately 24,376 feet to 36,060 feet upstream of the downstream corporate limits; Sugarcamp Run; Three Springs Creek; the reach of Unnamed Tributary to Great Trough Creek located in the Township of Todd from the mouth to approximately1,900 feet upstream; Unnamed Tributary to Shoup Run; and the reach of Yellow Branch located in the Township of Todd from the mouth to approximately 2,600 feet upstream were estimated from the regional relationship between drainage area and flood depth prepared by the USGS (Reference 52). This relationship was developed by means of regional regression analyses of basin areas and 1-percent-annual-chance flood within-channel depths observed at stream gages. Depths for Coal Bank Run; Jordan Run; the reach of Shoup Run located in the Borough of Coalmont; Sugarcamp Run; and Unnamed Tributary to Shoup Run were adjusted on the basis of hydraulic calculations to account for increased depth due to backwater from hydraulic structures such as bridges and culverts (References 53 and 54). Depths for Murray Run and Chilcoat Run were adjusted based on hydraulic calculations to account for increased depth because of backwater from hydraulic structures, such as bridges and culverts (Reference 44). Depths for Three Springs Creek were adjusted to account for increased depth due to backwater from hydraulic structures, such as bridges and culverts (References 50, 51 and 53).

Water surface elevations for the reaches of Juniata River located in the Township of Henderson, excluding the reach of Juniata River below the Township of Smithfield; and the reach of Juinata River from a point approximately 580 feet upstream of State Route 829 to the upstream corporate limits were taken from the previous FIS report for the Township of Smithfield (Reference 55).

Water surface elevations for Raystown Branch Juniata River, from the mouth to a point approximately 1,840 feet upstream, are the result of backwater from the Juniata River.

Cross section information for the portions of Aughwick Creek located in the Township of Shirley studied by detailed methods, excluding the reach from approximately 1,700 feet downstream of realigned U.S. Route 522 to approximately 1,750 feet upstream of realigned U.S. Route 522; Backlog Creek; Coal Bank Run; East Branch Standing Stone Creek; Jordan Run; the reaches of Juniata River located in the Townships of Brady, Henderson and Logan; the reaches of Little Juniata River located in the Townships of Logan, Spruce Creek and Warriors Mark; Saddler Creek; Shaver Creek; Shoup Run; Spruce Creek; reaches of Standing Stone Creek located in the Townships of Jackson and Miller; Sugarcamp Run; Three Springs Creek; Unnamed Tributary to Great Trough Creek; Unnamed Tributary to Shoup Run; Warriors Mark Run; and Yellow Branch were obtained from field surveys and located at close intervals above and below bridges and culverts in order to compute

the significant backwater effects of these structures. All bridges, dams and culverts were field surveyed to obtain elevation data and structural geometry.
Cross section for the reach of Juniata River located in the Township of Shirley was obtained from aerial photographs at a scale of 1:9,600 and supplemented by field measurements (Reference 56). All drainage structures affecting stream flow were also measured.

Cross section information for the reach of Aughwick Creek from approximately 1,700 feet downstream of realigned U.S. Route 522 to approximately 1,750 feet upstream of realigned U.S. Route 522, located in the Township of Shirley, was obtained by field surveys conducted by GEO-Technical Services, Inc. The bridge geometry at realigned U.S. Route 522 was obtained from "as-built" drawings prepared by the Pennsylvania Department of Transportation (Reference 57).

Cross section information for the portions studied by detailed method of Chilcoat Run; Emma Creek; Frankstown Branch Juniata River; reaches of Juniata River located in the Townships of Juniata, Oneida, Porter, Smithfield and Union; the reach of Little Juniata River located in the Township of Porter; Murray Run; Raystown Branch Juniata River; Robinson Run; and the reach of Standing Stone Creek located in the Township of Oneida was obtained by field surveys. All bridges, dams and culverts were field surveyed to obtain elevation data and structural geometry.

Cross section information for Crooked Creek; Hares Valley Creek; Hill Valley Creek; the reaches of Juniata River located in the Boroughs of Huntingdon, Mapleton and Mount Union; Muddy Run; and the reach of Standing Stone Creek located in the Borough of Huntingdon was located at regular intervals along the stream length and at significant changes in ground relief and land use or land cover. A total of six cross sections were used to analyze Hares Valley Creek through the Borough of Mapleton. A total of 25 cross sections were used to analyze the reach of Juniata River located in the Borough of Huntingdon, and four cross sections were used to analyze the reach of Juniata River located in the Borough of Mapleton. Muddy Run and the reach of Standing Stone Creek, located in the Borough of Huntingdon, were analyzed using 15 and six cross sections, respectively. Ground elevations for the cross sections were photogrammetrically obtained from 1:2,400 scale base maps (References 58 and 59). The bottom elevations of the reach of Juniata River located in the Borough of Huntingdon were obtained from existing profiles. Channel bottom elevations for the reaches of Juniata River located in the Boroughs of Mapleton and Mount Union were obtained from existing profiles provided by the USACE (Reference 60). The channel bottom elevations for Crooked Creek, Hares Valley Creek, Hill Valley Creek, Muddy Run and the reach of Standing Stone Creek located in the Borough of Huntingdon were taken from field surveyed profiles of the bottom with an interval distance of not more than 1,500 feet. For the reaches of Juniata River located in the Boroughs of Huntingdon and Mapleton, and for Hares Valley Creek reach lengths for the channel were measured along the centerline of the channel between sections as scaled from the 1:2,400 scale mapping of the stream bottom profiles. The overbank reach lengths were scaled from the same mapping measured along the approximate centerline of the effective area.

None of the surveyed cross sections for the portion of Juniata River located in the Borough of Mill Creek lie within the community.

The starting water surface elevations along Aughwick Creek; Backlog Creek; Chilcoat Run; Coal Bank Run; East Branch Standing Stone Creek; Jordan Run; Murray Run; Saddler Creek; Shoup Run; the reach of Spruce Creek located in the Township of Franklin from approximately 47,250 feet to 49,560 feet upstream of the lower corporate limits; Standing Stone Creek; Sugarcamp Run; Three Springs Creek; Unnamed Tributary to Great Trough Creek; Unnamed Tributary to Shoup Run; and Yellow Branch were selected from the normal depth regional relationship between drainage area and flood depth for the 1-percent-annual-chance flood as prepared by the USGS (Reference 52).

The starting water surface elevations along Crooked Creek; Emma Creek; Hares Valley Creek; the reaches of Juniata River located in the Borough of Mapleton and the Townships of Smithfield and Union; the reach of Little Juniata River located in the Township of Porter; Robinson Run; and Warriors Mark Run were calculated using the slope-area method. For the reach of Juniata River located in the Borough of Mapleton, the elevations were developed using the slope-area method at the first river section located about 6.9 miles downstream from Borough of Mapleton.

The starting water surface elevations along Frankstown Branch Juniata River located in the Borough of Alexandria were started from known water surface elevations downstream on the Juniata River (Reference 55).

The reaches of Frankstown Branch Juniata River and Juniata River located in the Township of Porter were modeled as one continuous stream, starting with water-surface elevations adopted from the previous FIS report for the Township of Smithfield (Reference 45).

The starting water surface elevations for Hares Valley Creek located in the Borough of Mapleton; Hill Valley Creek located in the Borough of Mount Union; the reaches of Juniata River located in the Boroughs of Huntingdon, Mill Creek and Mount Union, and the Townships of Juniata, Logan and Oneida; the reach of Little Juniata River located in the Township of Logan; the reach of Muddy Run located in the Borough of Huntingdon; the reach of Raystown Branch Juniata River located in the Township of Juniata; the reaches of Shaver Creek located in the Borough of Petersburg and the Township of Logan; and the reach of Standing Stone Creek located in the Borough of Huntingdon were not identified in the FIS reports for the corresponding municipalities.

The starting water surface elevations for the reach of Juniata River located in the Township of Henderson from a point approximately 580 feet upstream of State Route 829 to the upstream corporate limits; the reach of Little Juniata River located in the Township of Warriors Mark; and the reaches of Spruce Creek located in the Township of Franklin from the lower corporate limits to 5,500 feet upstream and from 10,500 feet to 15,450 feet upstream of the lower corporate limits were taken from the FIS reports for the Townships of Brady, Tyrone and Spruce Creek, respectively (References 2, 37 and 61).

Starting water surface elevations for the reach of Juniata River located in the Township of Porter were computed at a cross section downstream from the limit of detailed study. The computed starting water surface elevations were established using Manning's equation assuming normal depth and uniform flow. At several depths of water, discharges were determined and a stage-discharge curve established.

The starting water surface elevations were determined by entering the discharges established during the hydrologic analysis for the 10-, 2-, 1-, and 0.2-percent-annual-chance flood frequencies in the stage-discharge curve.

The starting water surface elevation for the reach of Little Juniata River located in the Township of Spruce Creek was obtained by using the slope of the streambed and allowing the step-backwater program to generate the starting normal-depth elevation.

The starting water surface elevation for the reach of Spruce Creek located in the Township of Spruce Creek was taken from the profile for the Little Juniata River at the confluence.

Roughness coefficients (Manning's "n" values) were estimated based on a field inspection of the individual streams supplemented by the use of aerial photography. Roughness coefficients were selected using engineering judgment based on tables published by Ven Te Chow and the Bureau of Public Roads and channel conditions and overbank vegetation or land use (References 62 and 63). The "n" values used in within the Borough of Mount Union were increased in the downtown area to account for the effect of the buildings. The hydraulic model was tested and the "n" values adjusted within an acceptable range to best fit known highwater marks and/or elevations at gaging stations for the Juniata River from the mouth of Aughwick Creek to the vicinity of the Borough of Mapleton.

October 16, 2012, Countywide Analyses

No new detailed hydraulic analyses were conducted as part of this countywide FIS; however for flooding sources studied with approximate methods, the 1-percent-annual-chance flood elevations were determined using USGS Regression Equations (Reference 64) and the USACE HEC-RAS (River Analysis System) computer program (Reference 65). The peak flood discharges from the regression equations were input into a HEC-RAS model that included cross sections extracted from PAMAP LiDAR data collected in 2007. Because this cross section information was not supplemented with field survey data and the models did not include bridge and culvert information, the resulting floodplain boundaries are considered approximate. Approximately 652 stream miles in the County were analyzed using this approach.

[TBD], Analyses, FIS revision

The USACE HEC-RAS, version 4.1, was used to develop geo-referenced hydraulic models and calculate flood elevations for the 10-, 2, 1-, and 0.2- percent annual chance flood events for Little Juniata River. The hydraulic analysis are taken from the USACE, Baltimore District's, Flood Modeling and Mapping for the Borough of Tyrone (Reference 28a).

Cross sections for the Little Juniata River were developed by field survey and the 1-meter DEM obtained from PSU/PASDA dated 2006-2007. A field survey was used to obtain below-water channel geometry for the cross sections and completed in June 2012. Field sections were generally located at road crossings and at effective cross-section locations. The DEM was used to complete the cross-sections in the overbank areas. For cross-sections that were not field surveyed, the below-water channel geometry was interpolated using adjacent field surveyed cross-sections.

Data for road crossing was taken from various as-built bridge plans provided by Pennsylvania Department of Transportation.

For the Little Juniata River, a rating curve provided by the USGS for Gaging Station 01558000 – Little Juniata River at Spruce Creek, PA as used as the downstream boundary condition. This rating curve was developed using approximately 80 years of stage-discharge measurements at the gaging station.

Roughness factors (Manning's "n") used in hydraulic computations were chosen based upon engineering judgement, land use, aerial photography, and field observations. The tabulation showing the channel and overbank Manning's "n" values for the streams studied by detailed methods can be found in Table 5, "Manning's "n" Values."

TABLE 5 – MANNING'S "n" VALUES

Stream	Channel "n"	Overbank "n"
Aughwick Creek	0.026 – 0.033	0.030 – 0.070
Backlog Creek	0.035 – 0.037	0.042 – 0.080
Chilcoat Run	0.027 – 0.041	0.046 – 0.065
Coal Bank Run	0.042	0.060 – 0.070
Crooked Creek	0.035	0.035 – 0.100
East Branch Standing Stone Creek	0.034 – 0.038	0.047 – 0.075
Emma Creek	0.030 – 0.033	0.033 – 0.100
Frankstown Branch Juniata River	0.030 – 0.035	0.040 – 0.110
Hares Valley Creek	0.039	0.080 – 0.108
Hill Valley Creek	0.039 – 0.044	0.078 – 0.118
Jordan Run	0.035 – 0.037	0.042 – 0.080
Juniata River	0.025 – 0.098	0.015 – 0.120
Little Juniata River	0.030 – 0.040	0.015 – 0.150
Muddy Run	0.035 – 0.040	0.030 – 0.100
Murray Run	0.027 – 0.041	0.046 – 0.065
Raystown Branch Juniata River	0.037 – 0.040	0.064 – 0.070
Robinson Run	0.030 – 0.033	0.030 – 0.100
Saddler Creek	0.036 – 0.040	0.050 – 0.080
Shaver Creek	0.030 – 0.036	0.030 – 0.110
Shoup Run	0.038 – 0.042	0.050 – 0.075
Spruce Creek	0.035 – 0.045	0.040 – 0.200
Standing Stone Creek	0.027 – 0.041	0.015 – 0.120
Sugarcamp Run	0.042	0.070 – 0.075
Three Springs Creek	0.037 – 0.046	0.052 – 0.110
Unnamed Tributary to Great Trough	0.033 – 0.042	0.038 – 0.200
Unnamed Tributary to Shoup Run	0.042	0.060 – 0.070
Warriors Mark Run	0.030 – 0.038	0.043 – 0.100
Yellow Branch	0.033 – 0.034	0.038 – 0.200

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

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

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

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

Stability C: Monuments which may be affected by surface ground movements (e.g., concrete mounted 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 bench marks, the FIRM may also show vertical control monument 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 bench marks 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, 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 purposes of establishing local vertical control. Although these monuments are not shown on the digital FIRM, they may be found in the Technical Support Data Notebook associated with this FIS and FIRM. Interested individuals may contact FEMA to access this data.

3.3 Vertical Datum

All FISs 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 in use for newly created or revised FISs and FIRMs was the National Geodetic Vertical Datum of 1929 (NGVD 29). With the finalization of the NAVD 88, many FIS reports and FIRMs are being prepared using NAVD 88 as the Referenced vertical datum.

For this countywide FIS, all flood elevations shown in the FIS report and on the FIRM are Referenced to NAVD 88. 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 corporate limits between the communities.

As noted above, the elevations shown in the FIS report and on the FIRM for Huntingdon County are referenced to NAVD 88. Ground, structure, and flood elevations may be compared and/or referenced to NGVD 29 by applying a standard conversion factor. The conversion factor from NGVD 29 to NAVD 88 for Huntingdon County is -0.615 foot. The locations used to establish the conversion factor were USGS 7.5-minute topographic quadrangle corners that fell within the County, as well as those that were within 2.5 miles outside the County. The bench marks are referenced to NAVD 88.

Conversion locations and values for Huntingdon County are shown below in Table 6, "Vertical Datum Conversion Values."

TABLE 6 – VERTICAL DATUM CONVERSION VALUES

USGS 7.5-minute Quadrangle Name	Corner	Latitude (Decimal Degrees)	Longitude (Decimal Degrees)	Conversion from NGVD 29 to NAVD 88 (foot)
Alexandria	SE	40.500	-78.000	-0.699
Aughwick	SE	40.250	-77.750	-0.646
Butler Knob	SE	40.250	-77.875	-0.659
Cassville	SE	40.250	-78.000	-0.566
Donation	SE	40.500	-77.875	-0.616
Entriken	SE	40.250	-78.125	-0.547
Franklinville	SE	40.625	-78.000	-0.636
Frankstown	SE	40.375	-78.250	-0.558
Huntingdon	SE	40.375	-78.000	-0.643
Julian	SE	40.750	-77.875	-0.621
Martinsburg	SE	40.250	-78.250	-0.612
McAlevys Fort	SE	40.625	-77.750	-0.651
Mount Union	SE	40.375	-77.875	-0.666
Newton Hamilton	SE	40.375	-77.750	-0.615
Orbisonia	SE	40.125	-77.875	-0.619
Pine Grove Mills	SE	40.625	-77.875	-0.669
Port Matilda	SE	40.750	-78.000	-0.583
Saltillo	SE	40.125	-78.000	-0.640
Sandy Ridge	SE	40.750	-78.125	-0.524
Saxton	SE	40.125	-78.125	-0.564
Spruce Creek	SE	40.500	-78.125	-0.611
State College	SE	40.750	-77.750	-0.583
Tyrone	SE	40.625	-78.125	-0.610
Williamsburg	SE	40.375	-78.125	-0.631

Average Conversion from NGVD 29 to NAVD 88 = -0.615 foot

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 conversion factor (+**0.615** foot) to elevations shown on the Flood Profiles and supporting data tables in this FIS report, which are shown at a minimum to the nearest 0.1 foot.

For more information regarding conversion between NGVD29 and NAVD 88, see *Converting the National Flood Insurance Program to the North American Vertical Datum of 1988* (Reference 66) or contact the National Geodetic Survey online (www.ngs.noaa.gov) or 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

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 provides 1-percent-annual-chance floodplain data, which may include a combination of the following: 10-, 2-, 1-, and 0.2-percent-annual-chance flood elevations; delineations of the 1- and 0.2-percent-annual-chance floodplains; and the 1-percent-annual-chance floodway. This information is presented on the FIRM and in many components of the FIS, including Flood Profiles, Floodway Data tables, and Summary of Stillwater Elevation tables. Users should Reference the data presented in the FIS as well as additional information that may be available at the local Community Map Repository before making flood elevation and/or floodplain boundary determinations.

4.1 Floodplain Boundaries

To provide a national standard without regional discrimination, the 1-percent-annual-chance flood has been adopted by FEMA as the base flood for floodplain management purposes. The 0.2-percent-annual-chance flood is employed to indicate additional areas of flood risk in the community. For the streams studied in detail, the 1- and 0.2-percent-annual-chance floodplain boundaries have been delineated using the flood elevations determined at each cross section.

For the October 16, 2012, countywide FIS the floodplain boundaries were interpolated between cross sections using topographic maps (References 58, 59, 67, 68 and 69) and delineated in a GIS environment using PAMAP LiDAR data collected in 2007 (Reference 70).

For the [TBD], FIS revision, the floodplain boundaries for Little Juniata River were delineated using the 1-meter DEM obtained from PSU/PASDA dated 2006-2007 (Reference 70).

The 1-percent-annual-chance floodplain boundaries are shown on the FIRM (Exhibit 2). On this map, the 1-percent-annual-chance floodplain boundary

corresponds to the boundary of the areas of special flood hazards (Zones A and AE) and the 0.2-percent-annual-chance floodplain boundary corresponds to the boundary of areas of moderate flood hazards. In cases where the 1- and 0.2-percent-annual-chance floodplain boundaries are close together, only the 1-percent-annual-chance floodplain boundary has been shown. Small areas within the floodplain boundaries may lie above the flood elevation 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 a minimum standard that can be adopted directly or that can be used as a basis for additional floodway studies.

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 to areas outside the floodways.

The floodways presented in this FIS report and on the FIRM were computed for certain stream segments on the basis of equal-conveyance reduction from each side of the floodplain. Floodway widths were computed at cross sections. Between cross sections, the floodway boundaries were interpolated. The results of the floodway computations have been tabulated for selected cross sections, Table 7, “Floodway Data”. The computed floodways are shown on the FIRM (Exhibit 2). In cases where the floodway and 1-percent-annual-chance floodplain boundaries are either close together or collinear, only the floodway boundary has been shown.

Near the mouths of streams studied in detail, floodway computations are made without regard to flood elevations on the receiving water body. Therefore, “Without Floodway” elevations presented in Table 7 for certain downstream cross sections of Crooked Creek; Hares Valley Creek; Hill Valley Creek; Little Juniata River; Robinson Run; and Standing Stone Creek. 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.

The area between the floodway and the 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".

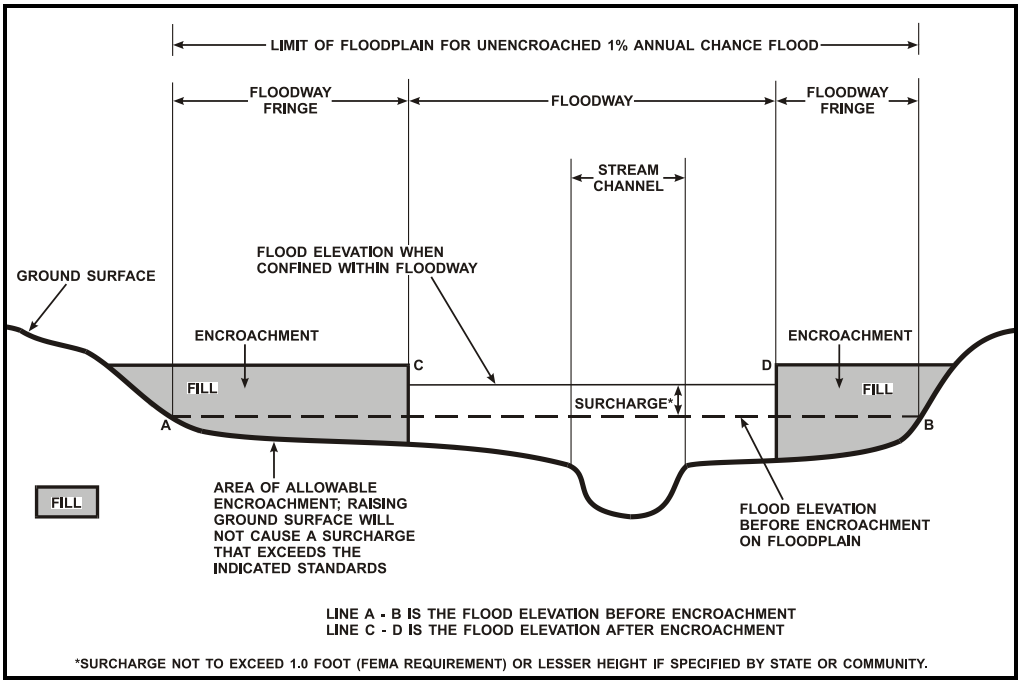

Figure 1 – Floodway Schematic

No floodways were computed for the reaches of Aughwich Creek downstream of U.S. Route 522; Blacklog Creek; Chilcoat Run; Coal Bank Run; East Branch Standing Stone Creek; Jordan Run; Juniata River within the Township of Union; Muddy Run downstream of 14th Street; Murray Run; Raystown Branch Juniata River; Saddler Creek; Shaver Creek; Shoup Run; Spruce Creek; Standing Stone Creek Upstream of the Borough of Huntingdon; Sugarcamp Run; Three Springs Creek; Unnamed Tributary to Great Trough Creek; Unnamed Tributary to Shoup Run; Warriors Mark Run; and Yellow Branch.

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

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NAVD)	WITHOUT FLOODWAY (FEET NAVD)	WITH FLOODWAY (FEET NAVD)	INCREASE (FEET)
Little Juniata River								
A	700	363	4,399	9.9	678.6	677.6[4]	678.6	1.0
B	1,455	221	3,032	14.3	682.1	682.1	682.1	0.0
C	2,065	581	8,018	5.4	686.0	686.0	686.2	0.2
D	5,105	298	3,622	12.0	687.7	687.7	688.4	0.7
E	8,315	325	5,369	8.1	699.6	699.6	699.8	0.2
F	10,960	622	6,661	6.5	701.3	701.3	702.0	0.7
G	12,250	297	3,368	12.9	701.7	701.7	702.7	1.0
H	14,150	467	4,906	8.8	709.6	709.6	710.1	0.5
I	16,710	607	6,863	6.3	718.0	718.0	718.6	0.6
J	19,680	448	3,582	12.1	721.8	721.8	721.9	0.1
K	21,125	159	2,249	19.3	724.4	724.4	725.3	0.9
L	23,215	185	3,388	12.8	737.6	737.6	737.6	0.0
M-O[3]								
P	38,665	191	2,513	9.8	771.1	771.1	772.0	0.9
Q	41,404	227	4,329	5.6	780.0	780.0	780.8	0.8
R	45,133	170	2,093	11.6	786.4	786.4	786.5	0.1
S	49,455	314/404[2]	4,432	4.5	797.0	797.0	797.7	0.7
T	49,984	296/368[2]	3,476	5.7	798.2	798.2	798.4	0.2
U	51,536	296/354[2]	3,508	5.7	801.3	801.3	801.8	0.5
V	53,234	82/113[2]	1,471	13.6	805.3	805.3	805.6	0.3
W	54,699	92/115[2]	1,662	11.6	810.2	810.2	811.1	0.9

[1] Feet above confluence with Juniata River and Frankstown Branch Juniata River
[2] Floodway width within Huntingdon County/Total floodway width
[3] Floodway data not computed
[4] Elevation computed without consideration of backwater effects from Juniata River

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY
HUNTINGDON COUNTY, PA
(ALL JURISDICTIONS)

FLOODWAY DATA

LITTLE JUNIATA RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)[2]	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NAVD)	WITHOUT FLOODWAY (FEET NAVD)	WITH FLOODWAY (FEET NAVD)	INCREASE (FEET)
Little Juniata River (continued)								
X	56,434	92/157	1,698	11.3	815.0	815.0	815.4	0.4
Y	57,792	116/184	2,764	7.0	824.7	824.7	825.2	0.5
Z	60,180	118/188	3,223	5.7	829.6	829.6	830.5	0.9
AA	61,987	109/197	3,187	5.8	836.3	836.3	836.8	0.5
AB	63,405	78/152	2,396	7.7	840.5	840.5	841.2	0.7
AC	64,809	157/195	2,633	7.0	843.7	843.7	844.4	0.7
AD	66,681	74/221	2,358	7.8	847.6	847.6	848.4	0.8
AE	68,744	76/229	2,321	7.8	851.9	851.9	852.8	0.9
AF	69,881	67/247	3,440	5.3	857.5	857.5	858.5	1.0

[1] Feet above confluence with Juniata River and Frankstown Branch Juniata River
[2] Floodway width within Huntingdon County/Total floodway width

5.0 INSURANCE APPLICATIONS

For flood insurance rating purposes, flood insurance zoning 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 risk 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 BFEs or base flood depths are shown within this zone.

Zone AE

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

Zone AH

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

Zone AO

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

Zone AR

Zone AR is the flood insurance risk zone that corresponds to an area of special flood hazard formerly protected from the 1-percent-annual-chance flood event 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-percent-annual-chance or greater flood event.

Zone A99

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

Zone V

Zone V is the flood insurance risk zone that corresponds to the 1-percent-annual-chance coastal floodplains that have additional hazards associated with storm waves. Because approximate hydraulic analyses are performed for such areas, no BFEs are shown within this zone.

Zone VE

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

Zone X

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

Zone X (Future Base Flood)

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

Zone D

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

6.0 FLOOD INSURANCE RATE MAP

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

For flood insurance applications, the map designates flood insurance rate zones as described in Section 5.0 and, in the 1-percent-annual-chance floodplains that were studied by detailed methods, shows selected whole-foot 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-annual-chance floodplains and the location of the selected cross sections used in the hydraulic analyses.

The current FIRM presents flooding information for the entire geographic area of Huntingdon County. Previously, separate Flood Hazard Boundary Maps and/or FIRMS were prepared for each incorporated community with identified flood hazard areas. Historical map dates relating to pre-countywide maps prepared for each community are presented in Table 8, "Community Map History."

7.0 OTHER STUDIES

Information pertaining to revised and unrevised flood hazards for each jurisdiction within Huntingdon County has been compiled into this countywide FIS. Therefore, this FIS either supersedes or is compatible with all previous studies published on streams studied in this report and should be considered authoritative for the purposes of the NFIP.

8.0 LOCATION OF DATA

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

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4. Federal Emergency Management Agency, Flood Insurance Study, Township of Clay, Huntingdon County, Pennsylvania, Washington D.C., August 16, 1988.

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COMMUNITY NAME	INITIAL NFIP MAP DATE	FLOOD HAZARD BOUNDARY MAP REVISIONS DATE	INITIAL FIRM DATE	FIRM REVISIONS DATE
Alexandria, Borough of	September 14, 1973	October 15, 1976	February 1,1980	
Barree, Township of	December 6, 1974	July 6, 1979	September 10, 1984	
Birmingham, Borough of[1]	N/A	N/A	N/A	
Brady, Township of	January 24, 1975	July 18, 1980	February 17, 1989	
Broad Top City, Borough of[1, 2]	N/A	N/A	N/A	
Carbon, Township of	January 10, 1975	August 15, 1980	June 19, 1989	
Cass, Township of	December 27, 1974	June 8, 1979	November 1, 1985	
Cassville, Borough of[1,2]	N/A	N/A	N/A	
Clay, Township of	December 13, 1974	August 8, 1980	August 16, 1988	
Coalmont, Borough of	March 28, 1975	None	August 3, 1989	
Cromwell, Township of	Decmeber 27, 1974	October 3, 1980	December 4, 1985	March 18, 1991
Dublin, Township of	December 13, 1974	October 31, 1980	December 4, 1985	
Dudley, Borough of	November 8, 1974	November 14, 1975	September 24, 1984	
Franklin, Township of	December 27, 1974	July 20, 1979	February 17, 1989	

[1]This community does not have map history prior to the first countywide mapping
[2]No Special Flood Hazard Areas identified

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

HUNTINGDON COUNTY, PA
(ALL JURISDICTIONS)

COMMUNITY MAP HISTORY

COMMUNITY NAME	INITIAL NFIP MAP DATE	FLOOD HAZARD BOUNDARY MAP REVISIONS DATE	INITIAL FIRM DATE	FIRM REVISIONS DATE
Henderson, Township of	May 31, 1974	August 6, 1976	August 3, 1989	October 18, 1995
Hopewell, Township of	December 6, 1974	July 20, 1979	August 15, 1989	
Huntingdon, Borough of	December 6, 1974	May 7, 1976	September 29, 1978	May 16, 1995
Jackson, Township of	December 13, 1974	May 18, 1979	August 3, 1989	
Juniata, Township of	January 17, 1975	None	February 17, 1989	May 2, 1995
Lincoln, Township of[1]	N/A	N/A	N/A	
Logan, Township of[1]	December 6, 1974	June 15, 1979	August 3, 1989	
Mapleton, Borough of	September 7, 1973	April 23, 1976	July 5, 1977	
Marklesburg, Borough of[1]	N/A	N/A	N/A	
Mill Creek, Borough of	December 13, 1974	None	March 2, 1989	
Miller, Township of	November 29, 1974	June 8, 1979	March 2, 1989	April 16, 1990
Morris, Township of	November 22, 1974	June 8, 1979	December 4, 1985	
Mount Union, Borough of	August 24, 1973	August 20, 1976	July 18, 1977	
Oneida, Township of	January 10, 1975	None	March 2, 1989	December 19, 1995

[1]This community does not have map history prior to the first countywide mapping

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

HUNTINGDON COUNTY, PA
(ALL JURISDICTIONS)

COMMUNITY MAP HISTORY

COMMUNITY NAME	INITIAL NFIP MAP DATE	FLOOD HAZARD BOUNDARY MAP REVISIONS DATE	INITIAL FIRM DATE	FIRM REVISIONS DATE
Orbisonia, Borough of	November 8, 1974	None	December 31, 1982	July 3, 1995
Penn, Township of	December 6, 1974	May 25, 1979	November 15, 1985	
Petersburg, Borough of	July 30, 1976	None	August 15, 1989	
Porter, Township of	December 6, 1974	None	March 16, 1981	
Rockhill, Borough of	January 17, 1975	August 20, 1976	July 3, 1990	
Saltillo, Borough of	January 31, 1975	None	October 15, 1985	
Shade Gap, Borough of[1,2]	N/A	N/A	N/A	
Shirley, Township of	December 13, 1974	June 8, 1979	August 15, 1989	September 20, 1996
Shirleysburg, Borough of	November 15, 1974	None	April 15, 1986	
Smithfield, Township of	February 8, 1974	August 13, 1976	March 15, 1977	July 16, 1996
Springfield, Township of	December 13, 1974	July 20, 1979	December 4, 1985	
Spruce Creek, Township of	December 20, 1974	July 20, 1979	March 2, 1989	
Tell, Township of	January 24, 1975	None	June 11, 1982	

[1]This community does not have map history prior to the first countywide mapping
[2]No Special Flood Hazard Areas identified

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

HUNTINGDON COUNTY, PA
(ALL JURISDICTIONS)

COMMUNITY MAP HISTORY

COMMUNITY NAME	INITIAL NFIP MAP DATE	FLOOD HAZARD BOUNDARY MAP REVISIONS DATE	INITIAL FIRM DATE	FIRM REVISIONS DATE
Three Springs, Borough of	January 24, 1975	None	October 1, 1982	
Todd, Township of	December 27, 1974	July 8, 1977	August 15, 1989	
Union, Township of	December 6, 1974	August 17, 1979	March 2, 1989	August 2, 1994
Walker, Township of	January 10, 1975	None	September 10, 1984	
Warriors Mark, Township of	January 17, 1975	January 23, 1981	March 2, 1989	
West, Township of	January 17, 1975	May 18, 1979	December 4, 1985	
Wood, Township of	December 20,1974	October 31, 1975 July 6, 1979	November 1, 1985	

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

HUNTINGDON COUNTY, PA
(ALL JURISDICTIONS)

COMMUNITY MAP HISTORY

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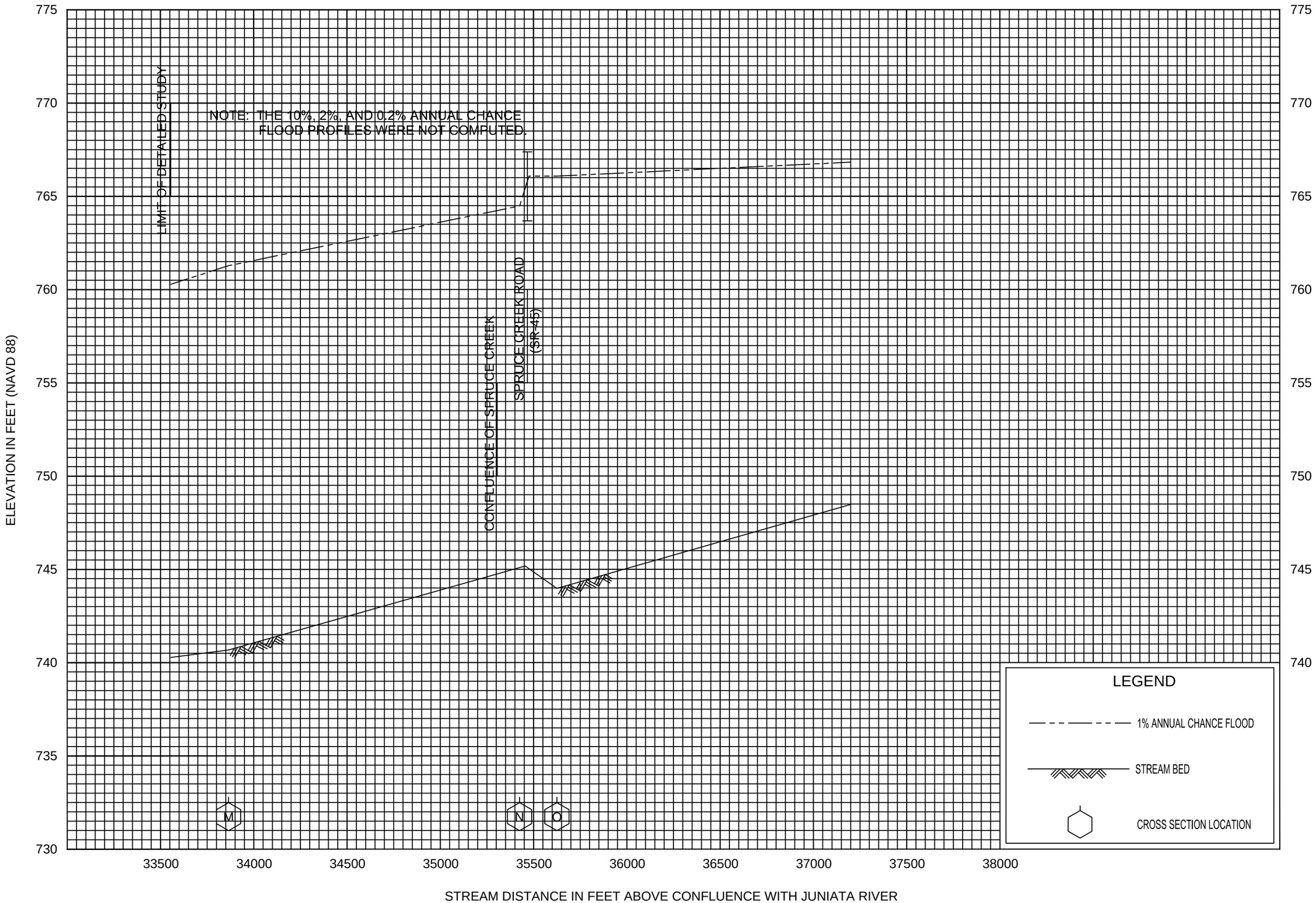


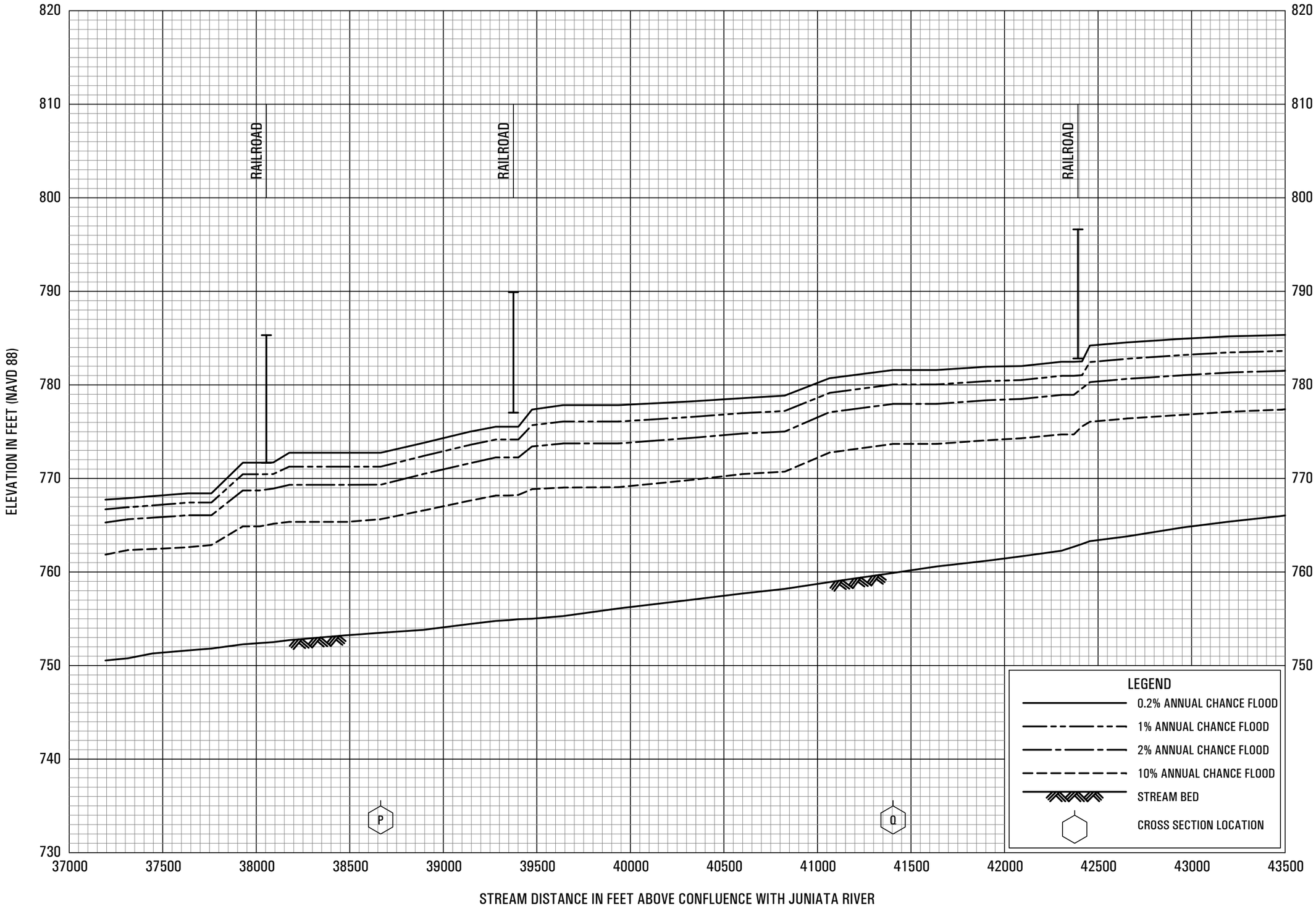
FLOOD PROFILES

LITTLE JUNIATA RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

HUNTINGDON COUNTY, PA

(ALL JURISDICTIONS)



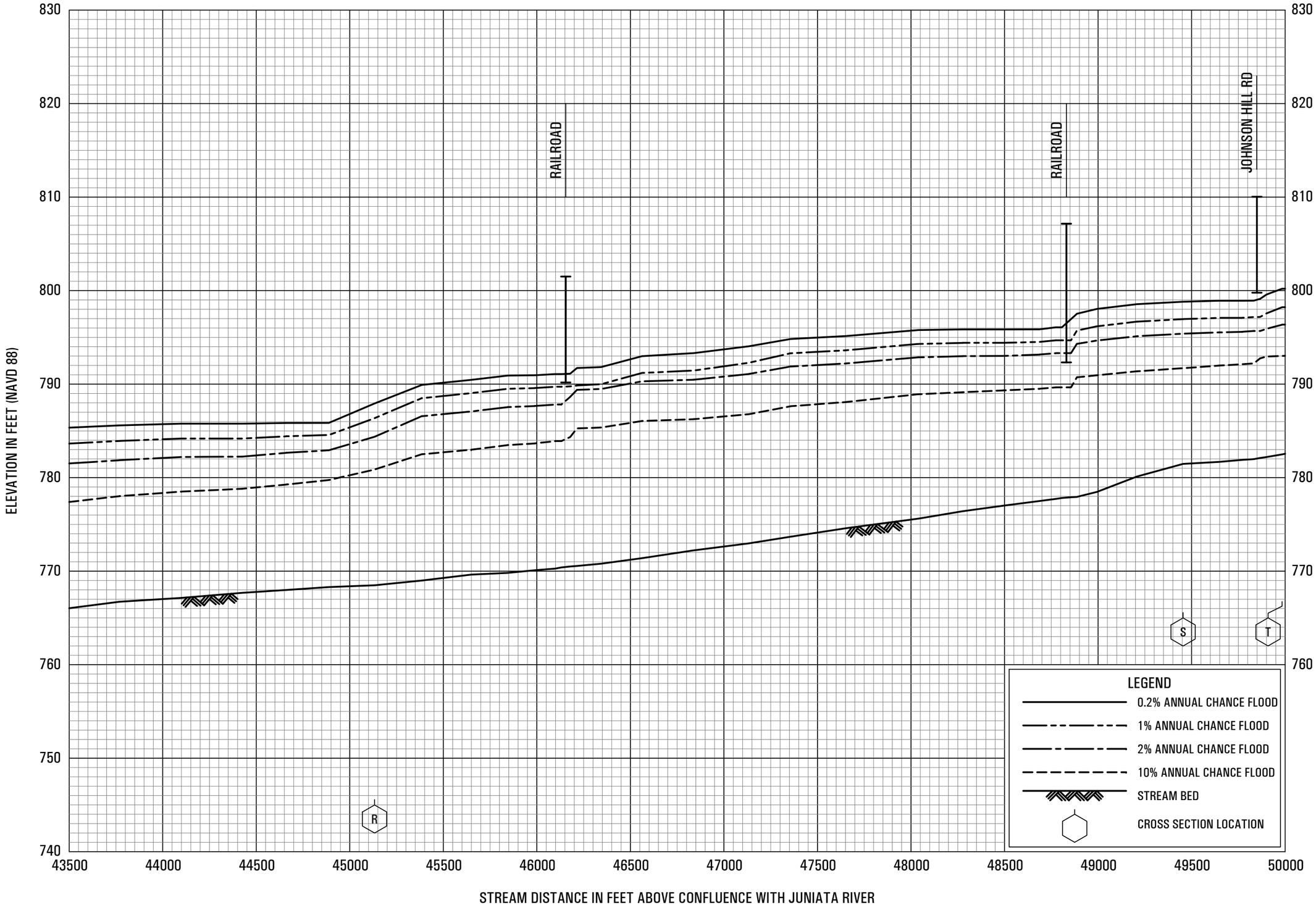
FLOOD PROFILES

LITTLE JUNIATA RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

HUNTINGDON COUNTY, PA

(ALL JURISDICTIONS)



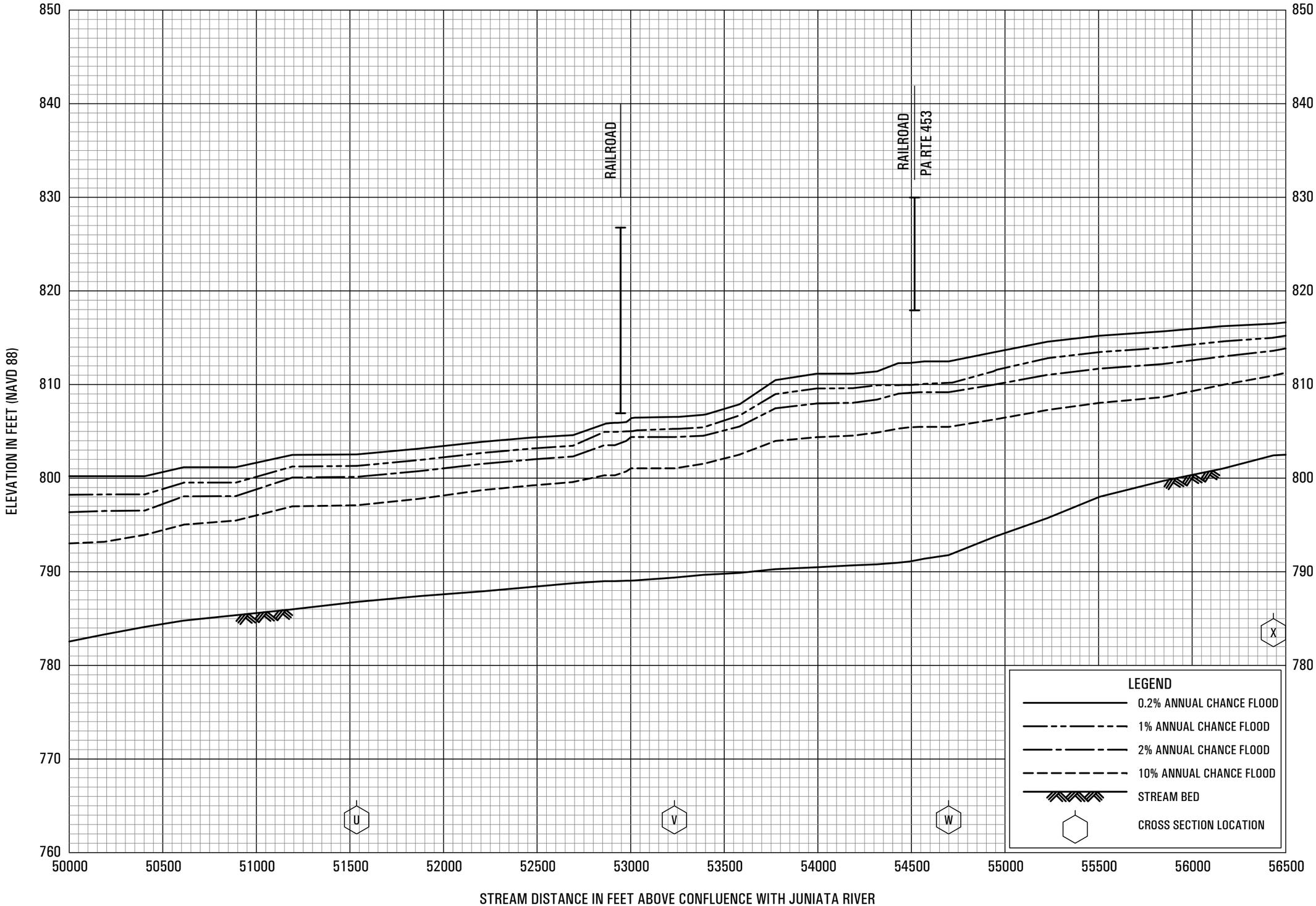
FLOOD PROFILES

LITTLE JUNIATA RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

HUNTINGDON COUNTY, PA

(ALL JURISDICTIONS)



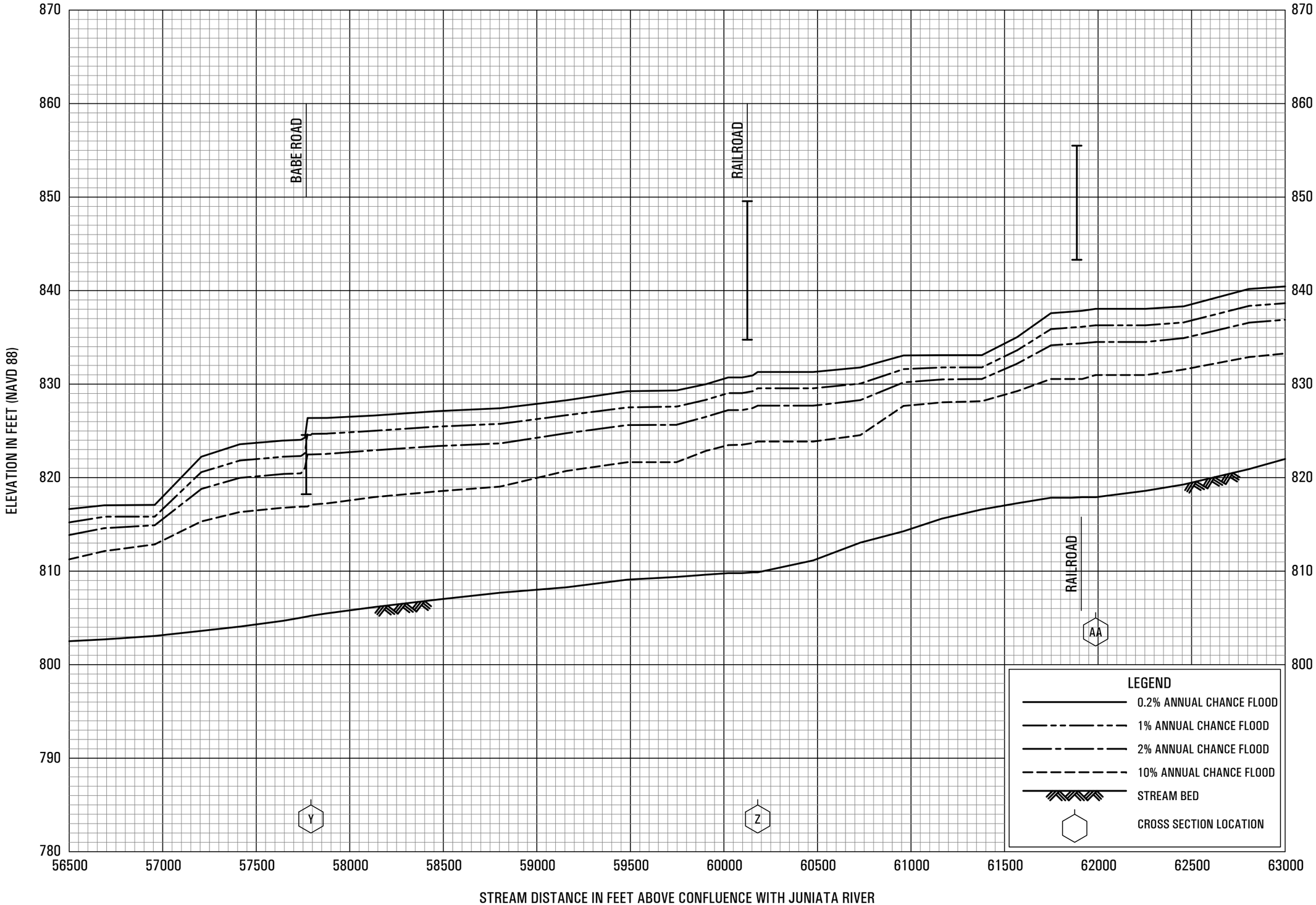
FLOOD PROFILES

LITTLE JUNIATA RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

HUNTINGDON COUNTY, PA

(ALL JURISDICTIONS)



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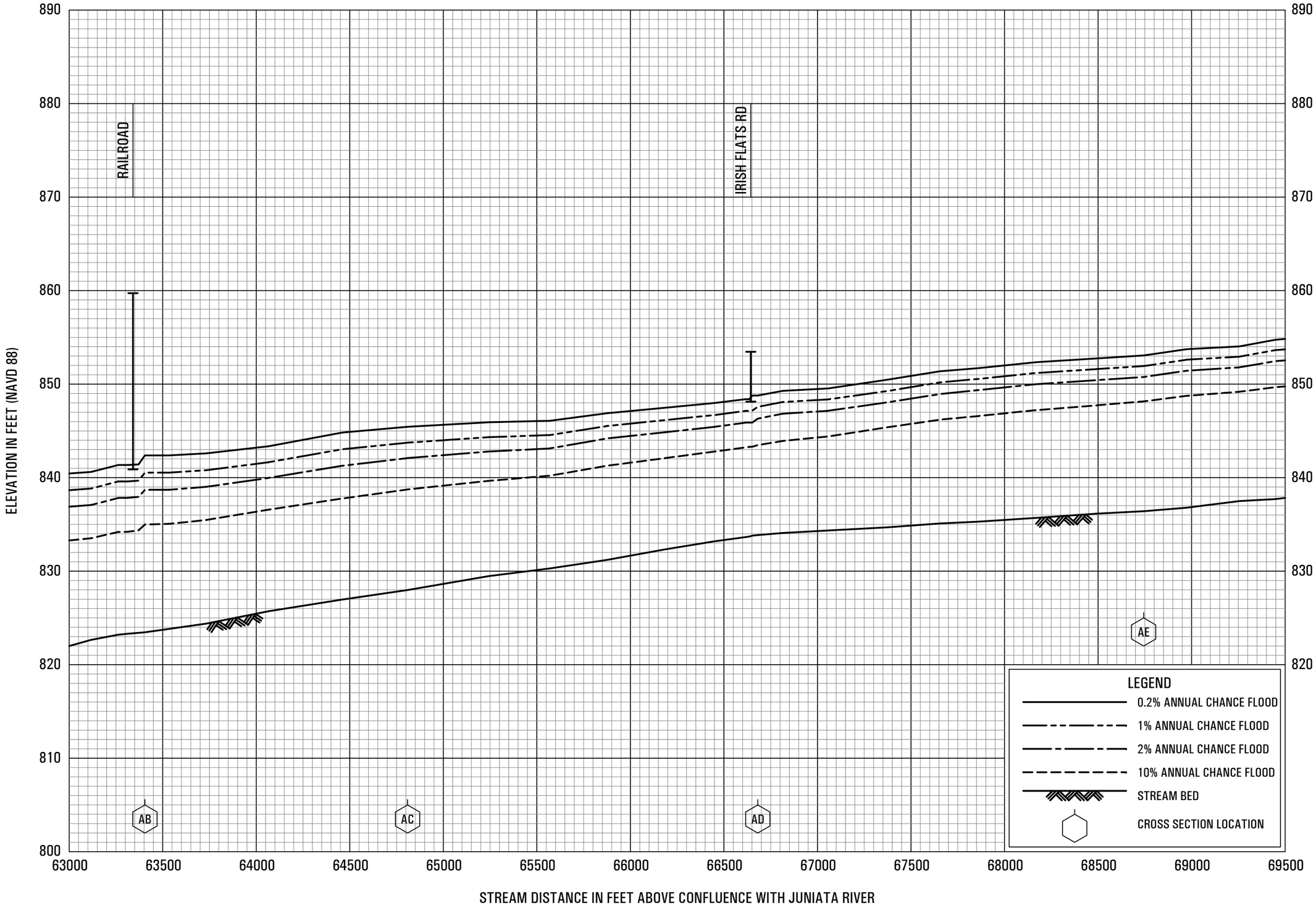

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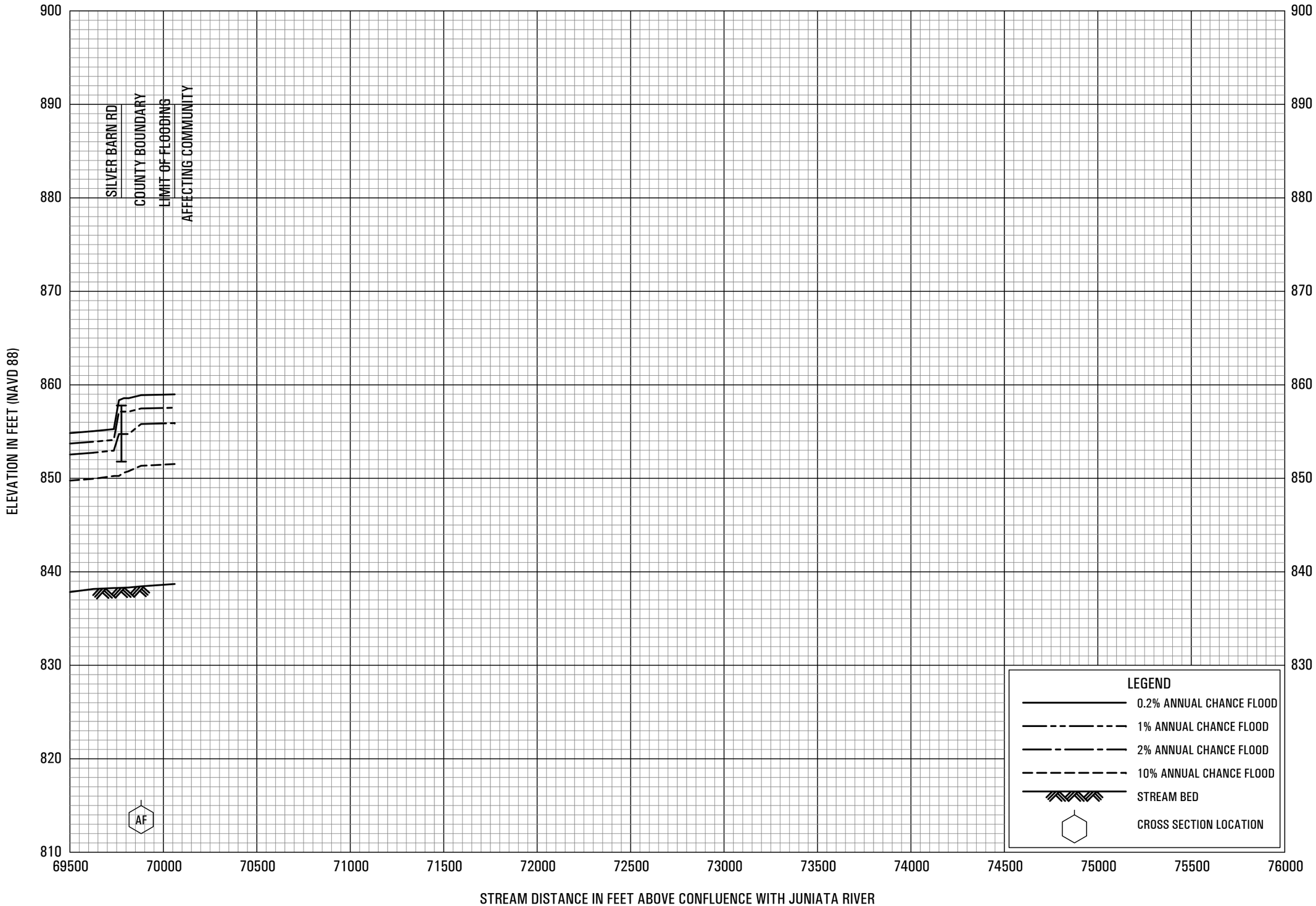

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