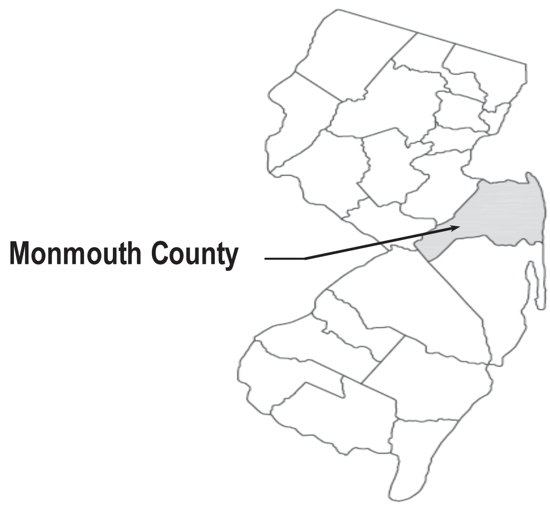
FLOOD INSURANCE STUDY

VOLUME 1 OF 3

This Preliminary FIS report only includes revised Floodway Data Tables and revised Flood Profiles. The unrevised components will appear in the final FIS report.

MONMOUTH COUNTY, NEW JERSEY
(ALL JURISDICTIONS)



COMMUNITY NAME	COMMUNITY NUMBER
ABERDEEN, TOWNSHIP OF	340312
ALLENHURST, BOROUGH OF	340283
ALLENTOWN, BOROUGH OF	340284
ASBURY PARK, CITY OF	340285
ATLANTIC HIGHLANDS, BOROUGH OF	340286
AVON-BY-THE-SEA, BOROUGH OF	340287
BELMAR, BOROUGH OF	345283
BRADLEY BEACH, BOROUGH OF	340289
BRIELLE, BOROUGH OF	340290
COLTS NECK, TOWNSHIP OF	340291
DEAL, BOROUGH OF	340292
EATONTOWN, BOROUGH OF	340293
ENGLISHTOWN, BOROUGH OF	340294
FAIR HAVEN, BOROUGH OF	340295
FARMINGDALE, BOROUGH OF	340296
*FREEHOLD, BOROUGH OF	345536
FREEHOLD, TOWNSHIP OF	340297
HAZLET, TOWNSHIP OF	340298
HIGHLANDS, BOROUGH OF	345297
HOLMDEL, TOWNSHIP OF	340300
HOWELL, TOWNSHIP OF	340301
INTERLAKEN, BOROUGH OF	340302
KEANSBURG, BOROUGH OF	340303
KEYPORT, BOROUGH OF	340304
LAKE COMO, BOROUGH OF	340328
LITTLE SILVER, BOROUGH OF	340305
LOCH ARBOUR, VILLAGE OF	340306
LONG BRANCH, CITY OF	340307
MANALAPAN, TOWNSHIP OF	340308
MANASQUAN, BOROUGH OF	345303
MARLBORO, TOWNSHIP OF	340310
MATAWAN, BOROUGH OF	340311
MIDDLETOWN, TOWNSHIP OF	340313

*No Special Flood Hazard Areas identified

COMMUNITY NAME	COMMUNITY NUMBER
MILLSTONE, TOWNSHIP OF	340314
MONMOUTH BEACH, BOROUGH OF	340315
NEPTUNE CITY, BOROUGH OF	340316
NEPTUNE, TOWNSHIP OF	340317
OCEAN, TOWNSHIP OF	340319
OCEANPORT, BOROUGH OF	340320
RED BANK, BOROUGH OF	340321
ROOSEVELT, BOROUGH OF	340322
RUMSON, BOROUGH OF	345316
SEA BRIGHT, BOROUGH OF	345317
SEA GIRT, BOROUGH OF	340325
SHREWSBURY, BOROUGH OF	340326
*SHREWSBURY, TOWNSHIP OF	340002
SPRING LAKE HEIGHTS, BOROUGH OF	340330
SPRING LAKE, BOROUGH OF	340329
TINTON FALLS, BOROUGH OF	340318
UNION BEACH, BOROUGH OF	340331
UPPER FREEHOLD, TOWNSHIP OF	340332
WALL, TOWNSHIP OF	340333
WEST LONG BRANCH, BOROUGH OF	340334

*No Special Flood Hazard Areas identified

EFFECTIVE:
PRELIMINARY JANUARY 31, 2014

Federal Emergency Management Agency

FLOOD INSURANCE STUDY NUMBER
34025CV001B

NOTICE TO
FLOOD INSURANCE STUDY USERS

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

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

Initial Countywide FIS Effective Date: September 25, 2009

Revised Countywide FIS Date: to incorporate new detailed coastal flood hazard analyses, to add Base Flood Elevations, floodway, and Special Flood Hazard Areas; to change zone designations and Special Flood Hazard Areas; and to reflect updated topographic information.

This Preliminary FIS report only includes revised Floodway Data Tables and revised Flood Profiles. The unrevised components will appear in the final FIS report.

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Exhibit 1 – Flood Profiles (continued)

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FLOOD INSURANCE STUDY
MONMOUTH COUNTY, NEW JERSEY (ALL JURISDICTIONS)

1.0 INTRODUCTION

1.1 Purpose of Study

This countywide Flood Insurance Study (FIS) revises and updates previous FISs/Flood Insurance Rate Maps (FIRMs) for the geographic area of Monmouth County, New Jersey, including: the Boroughs of Allenhurst, Allentown, Atlantic Highlands, Avon-by-the-Sea, Belmar, Bradley Beach, Brielle, Deal, Eatontown, Englishtown, Fair Haven, Farmingdale, Freehold, Highlands, Interlaken, Keansburg, Keyport, Lake Como, Little Silver, Manasquan, Matawan, Monmouth Beach, Neptune City, Oceanport, Red Bank, Roosevelt, Rumson, Sea Bright, Sea Girt, Shrewsbury, Spring Lake, Spring Lake Heights, Tinton Falls, Union Beach and West Long Branch; the Cities of Asbury Park and Long Branch; the Townships of Aberdeen, Colts Neck, Freehold, Hazlet, Holmdel, Howell, Manalapan, Marlboro, Middletown, Millstone, Neptune, Ocean, Shrewsbury, Upper Freehold and Wall; and the Village of Loch Arbour (hereinafter referred to collectively as Monmouth County).

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

Please note that on the effective date of this study, the Borough of Freehold and Township of Shrewsbury have no mapped Special Flood Hazard Areas (SFHAs). This does not preclude future determinations of the SFHAs that might be necessitated by changed conditions affecting the community (ie. Annexation of new lands) or the availability of new scientific or technical data about flood hazards.

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

1.2 Authority and Acknowledgments

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

The original September 25, 2009 countywide FIS was prepared to include all jurisdictions within Monmouth County into a countywide format FIS. Information on the authority and acknowledgments for each jurisdiction with a previously printed FIS report included in this countywide FIS is shown below.

Aberdeen, Township of:	the hydrologic and hydraulic analyses in the FIS report dated September 18, 1984, were prepared by Richard Browne Associates, for the Federal Emergency Management Agency (FEMA), under Contract No. H-6809. This work was completed in November 1982. The wave height analysis was performed by Dewberry & Davis for FEMA, under Contract No. EMW-C-0543. This work was completed in July 1983.
Allenhurst, Borough of:	the hydrologic and hydraulic analyses in the FIS report dated September 1978 were performed by Tetra Tech, Inc., for the Federal Insurance Administration (FIA) under Contract No. H-3830. This work was completed in September 1977
Allentown, Borough of:	the hydrologic and hydraulic analyses in the FIS report dated March 16, 1981, were conducted by Gannett Fleming Corddry and Carpenter, Inc., under subcontract to the State of New Jersey, Department of Environmental Protection (NJDEP), Division of Water Resources, for the FIA under Contract No. H-4623. This work was completed in March 1980.
Asbury Park, City of:	the hydrologic and hydraulic analyses in the FIS report dated March 15, 1983, represent a revision of the original analyses by Tetra Tech, Inc., for FEMA under Contract No. H-3830. The updated analyses were also prepared by Tetra Tech, Inc., under agreement with FEMA. This work was completed in August 1981.
Atlantic Highlands, Borough of:	the wave height analysis in the FIS report dated January 5, 1984, was prepared by Dewberry & Davis for FEMA, under Contract No. EMW-C-0543. This work was completed in May 1983.
Avon-by-the-Sea, Borough of:	the hydrologic and hydraulic analyses in the FIS report dated January 5, 1983, were prepared by Tetra Tech, Inc., for FEMA under Contract No. H-3830. The updated version was prepared by Tetra Tech,

Inc. as well, for FEMA under Contract No. H-3830. This work was completed in August 1981.

Belmar, Borough of: the wave height analysis in the FIS report dated September 1, 1983, was prepared by Dewberry & Davis for FEMA, under Contract No. EMW-C-0543. This work was completed in December 1982.

Bradley Beach, Borough of: the hydrologic and hydraulic analyses in the FIS report dated December 15, 1982, represent a revision of the original analyses performed by Tetra Tech, Inc., for FEMA under Contract No. H-3830. The updated version was prepared by Tetra Tech, Inc. for FEMA under Contract No. H-3830. This work was completed in August 1981.

Brielle, Borough of: the hydrologic and hydraulic analyses in the FIS report dated March 30, 1983, represent a revision of the original analyses performed by Tetra Tech, Inc., for FEMA under Contract No. H-3830. The updated version was also prepared by Tetra Tech, Inc., under agreement with FEMA. This work was completed in August 1981.

Colts Neck, Township of: the hydrologic and hydraulic analyses in the FIS report dated October 15, 1981, were conducted by Tippetts-Abbett-McCarthy-Stratton under subcontract to NJDEP, Division of Water Resources for FEMA, under Inter-Agency Agreement M-3959. This work was completed in May 1978.

Deal, Borough of: the hydrologic and hydraulic analyses in the revised FIS report dated August 6, 2002, were prepared by Leonard Jackson Associates, for FEMA, under Contract No. EMN-96-CO-0026. This work was completed in December, 2000. The wave height analysis in the same FIS report was prepared by Dewberry & Davis for FEMA under Contract No. EMW-C-0543. This work was completed in December 1982.

Eatontown, Borough of: the hydrologic and hydraulic analyses in the FIS report dated March 16, 1981, were prepared by Tippetts-Abbett-McCarthy-Stratton under subcontract to NJDEP, Division of Water Resources for the FIA under Contract No. H-3959. This work was completed in January 1978.

Englishtown, Borough of: the hydrologic and hydraulic analyses in the FIS report dated September 16, 1980, represent a revision of the original analysis. The analyses for this study were conducted by Justin and Courtney, Inc., under subcontract NJDEP for the FIA under Contract No. H-3959. This work was completed in December 1979.

Fair Haven, Borough of: the hydrologic and hydraulic analyses for the FIS report dated April 1979 were conducted by Tippetts-Abbett-McCarthy-Stratton under subcontract to NJDEP, Division of Water Resources, Bureau of Flood Plain Management, for the FIA under Contract No. H-3959. This work was completed in November 1977.

Freehold, Township of: the hydrologic and hydraulic analyses for the FIS report dated October 4, 1982, were performed by T & M Associates under subcontract to NJDEP for FEMA, under Contract No. H-4759. This work was completed in August 1980.

Hazlet, Township of: the hydrologic and hydraulic analyses in the FIS report dated June 1, 1982, represent a revision of the original analyses completed in September 1977 by Tetra Tech, Inc., for FEMA under Contract No. H-3830. This updated version was prepared by Dewberry & Davis under agreement with FEMA, and was completed in October 1981.

Highlands, Borough of: the hydrologic and hydraulic analyses in the revised FIS report dated December 22, 1998, were prepared by the U.S. Army Corps of Engineers (USACE), Philadelphia District, for FEMA under Inter-Agency Agreement No. EMW-94-E-4432, Project Order Nos. 1 and 1A. This work was completed in April 1996.

Holmdel, Township of: the hydrologic and hydraulic analyses in the FIS report dated September 1, 1981, were prepared by Tippetts-Abbett-McCarthy-Stratton for FEMA under Contract No. H-3959. This work was completed in May 1978.

Howell, Township of: the hydrologic and hydraulic analyses in the FIS report dated July 6, 1982, were prepared by T & M Associates under subcontract to NJDEP for FEMA, under Contract No.. A14516. This work was completed in August 1980.

Keansburg, Borough of:	the hydrologic and hydraulic analyses in the FIS report dated November 16, 1982, were prepared by Tetra Tech, Inc., for FEMA under Contract No. H-3830. This work was completed in August 1981.
Keyport, Borough of:	the hydrologic and hydraulic analyses in the FIS report dated October 18, 1982, represents a revision of the original analyses by Tetra Tech, Inc., for FEMA under Contract No. H-3830. The updated version was also prepared by Tetra Tech, Inc., under agreement with FEMA. This work was completed in August 1981.
Little Silver, Borough of:	the wave height analysis in the FIS report dated June 15, 1982, was prepared by Dewberry & Davis for FEMA.
Loch Arbour, Village of:	the hydrologic and hydraulic analyses in the FIS report dated March 15, 1983, represent a revision of the original analyses by Tetra Tech, Inc., for FEMA under Contract No. H-3830. The updated version was also prepared by Tetra Tech, Inc., under agreement with FEMA. This work was completed in August 1981.
Long Branch, City of:	the wave height analysis in the FIS report dated July 5, 1983, was prepared by Dewberry & Davis for FEMA, under Contract No. EMW-C-0543. This work was completed in December 1982.
Manalapan, Township of:	the hydrologic and hydraulic analyses in the FIS report dated September 15, 1977 were performed by Anderson-Nichols & Co., Inc., for the FIA under Contract No. H-3715. The work was completed in May 1976.
Manasquan, Borough of:	the wave height analysis in the FIS report dated June 15, 1983, was prepared by Dewberry & Davis for FEMA under Contract No. EMW-C-0543. This work was completed in December 1982.
Marlboro, Township of:	the hydrologic and hydraulic analyses in the FIS report revised April 1982 was performed by Anderson-Nichols & Co., Inc., for the FIA under Contract No. H-3715. This work was completed in May 1976.

Matawan, Borough of: the hydrologic and hydraulic analyses in the FIS report dated March 30, 1981, was conducted by T & M Associates under subcontract to NJDEP for the FIA, under Contract No A14516. This work was completed in November 1979.

Middletown, Township of: the hydrologic and hydraulic analyses in the FIS report dated August 15, 1983, represent a revision of the original analyses performed by Tetra Tech, Inc., for FEMA under Contract No. H-3830. The updated version was prepared by Dewberry & Davis under agreement with FEMA. The wave height analysis was prepared by Tetra Tech, Inc., for FEMA under Contract No. H-3830. This work was completed in August 1981.

Millstone, Township of: the hydrologic and hydraulic analyses in the FIS report dated July 20, 1981, was conducted by Anderson-Nichols & Co., Inc., under subcontract to NJDEP for FEMA under Contract No. H-4546. This work was completed in February 1979.

Monmouth Beach, Borough of: the wave height analysis in the FIS report dated October 16, 1984, was prepared by Dewberry & Davis for FEMA under Contract No. EMW-C-0543. This work was completed in January 1982.

Neptune, Township of: the wave height analysis in the FIS report dated September 1, 1983, was prepared by Dewberry & Davis for FEMA under Contract No. EMW-C-0543. This work was completed in February 1983.

Ocean, Township of: the hydrologic and hydraulic analyses in the FIS report revised July 2, 2003, represent a revision of the original analyses performed by Edward Schnitzer, Consulting Engineers for USACE for the FIA under Inter-Agency Agreement Nos. IAA-H-2-73 and IAA-H-19-74, Project Order Nos. 14 and 15, respectively. That work was completed in August 1975. The revised analyses were prepared by Leonard Jackson Associates for FEMA under Contract No. EMN-96-CO-0026. This work was completed in December 2000.

Oceanport, Borough of: the hydrologic and hydraulic analyses in the FIS report dated August 1976 was conducted by Tippetts-Abbett-McCarthy-Stratton for the FIA under Contract No. H-3733.

Red Bank, Borough of:	the hydrologic and hydraulic analyses in the FIS report dated November 19, 1980, were prepared by Tippetts-Abbett-McCarthy-Stratton under subcontract to NJDEP, Division of Water Resources, Bureau of Flood Plain Management under Contract No. H-3959. This work was completed in November 1977.
Rumson, Borough of	the wave height analysis in FIS report dated June 15, 1982, was prepared by Dewberry & Davis for FEMA.
Sea Bright, Borough of:	the wave height analysis in the FIS report dated May 16, 1983, was prepared by Dewberry & Davis for FEMA under Contract No. EMW-C-0543. This work was completed in November 1982.
Sea Girt, Borough of:	the wave height analysis in the FIS report dated July 5, 1983, was prepared by Dewberry & Davis for FEMA under Contract No. EMW-C-0543. This work was completed in December 1982.
Shrewsbury, Borough of:	the hydrologic and hydraulic analyses in the FIS report dated February 1979 was performed by NJDEP for the FIA under Contract No. H-3959. This work was completed in March 1978.
Spring Lake, Borough of:	the wave height analysis in the FIS report dated September 1, 1983, was prepared by Dewberry & Davis for FEMA under Contract No. EMW-C-0543. This work was completed in December 1982.
Spring Lake Heights, Borough of:	the hydrologic and hydraulic analyses in the FIS report dated June 15, 1981, was prepared by T & M Associates under subcontract to NJDEP for FEMA under Contract No. H-4546. This work was completed in November 1979.
Tinton Falls, Borough of:	the hydrologic and hydraulic analyses in the FIS report dated October 15, 1981, was conducted by Tippetts-Abbett-McCarthy-Stratton under subcontract to NJDEP, Division of Water Resources under Inter-Agency Agreement No. H-3959. The hydrologic and hydraulic analyses for the Swimming River were conducted By Dewberry, Nealon & Davis as the Technical Evaluation

Contractor (TEC). This work was completed in February 1978.

Union Beach, Borough of:	the hydrologic and hydraulic analyses in the FIS report dated September 2, 1982, represent a revision of the original analyses performed by Tetra Tech, Inc., for FEMA under Contract No. H-3830. The updated version was prepared by Tetra Tech, Inc., under agreement with FEMA. This work was completed in August 1981.
Wall, Township of:	the hydrologic and hydraulic analyses in the FIS report dated August 1976 were conducted by Tippetts-Abbett-McCarthy-Stratton for the FIA under Contract No. H-3733.
West Long Branch, Borough of:	the hydrologic and hydraulic analyses in the FIS report dated July 16, 1980, were conducted by Tippetts-Abbett-McCarthy-Stratton under subcontract to NJDEP, Division of Water Resources under Contract No. H-3959. This work was completed in January 1978.

There are no previous FIS Reports published for the Boroughs of Farmingdale, Interlaken, Lake Como, Neptune City and the Township of Upper Freehold; therefore, the previous authority and acknowledgements for these communities are not included in this FIS.

There are no previous FISs or FIRMs for the Borough of Roosevelt; therefore, the previous authority and acknowledgments for these communities are not included in this FIS.

For the September 25, 2009 countywide study, revised hydrologic and hydraulic analyses for Manalapan Brook from the confluence with South River at the county line (Township of Manalapan and Middlesex County) to a location approximately 10 miles upstream at Moonlight Court in the Township of Millstone, were prepared for FEMA by Medina Consultants, P.C. under Contract No. EMN-2003-CO-0005. This work was completed in September 2007.

The remaining flooding sources studied in detail have been redelineated using updated topographic data provided to FEMA by Monmouth County.

For the [date] countywide revision, the coastal wave height analysis along Atlantic Ocean, Branchport Creek, Manahassett Creek, Manasquan River, Navesink River, Raritan Bay, Sandy Hook Bay, Shark River, Shrewsbury River, and Troutmans Creek were prepared by Risk Assessment Mapping and Planning Partners (RAMPP) for FEMA under contract No.HSFEHQ-09-D-0369, task order HSFE02-09-J-0001. This work was completed in 2012.

Base map information shown on this FIRM was provided in digital format by New Jersey Office of Information Technology (NJOIT), Office of Geographic Information Systems (OGIS). This information was derived from digital orthophotos produced at a scale of 1:2400 (1"=200') with a 1 foot pixel resolution from photography dated 2012.

The projection used in the preparation of this map was State Plane New Jersey zone (FIPS Zone 2900). The horizontal datum was North American Datum of 1983 (NAD 83), Geodetic Reference System 1980 (GRS 80) spheroid. Differences in datum, spheroid, projection or State Plane zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of information shown on this FIRM.

1.3 Coordination

Consultation Coordination Officer's (CCO) meetings may be held for each jurisdiction in this countywide FIS. An initial 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 the streams to be studied by detailed methods. A final CCO meeting is held typically with representatives of FEMA, the community, and the study contractor to review the results of the study.

The dates of the initial and final CCO meetings held for Monmouth County and the incorporated communities within its boundaries are shown in Table 1, "Initial and Final CCO Meetings."

TABLE 1 – INITIAL AND FINAL CCO MEETINGS

Community	Initial CCO Date	Final CCO Date
Aberdeen, Township of	June 15, 1979	February 29, 1984
Allenhurst, Borough of	*	January 23, 1978
Allentown, Borough of	February, 1978	September 29, 1980
Asbury Park, City of	*	October 28, 1982
Atlantic Highlands, Borough of	*	August 2, 1983
Avon-by-the-Sea, Borough of	*	January 27, 1982
Belmar, Borough of	*	January 21, 1983
Bradley Beach, Borough of	*	February 8, 1982
Brielle, Borough of	*	September 22, 1982
Colts Neck, Township of	May 18, 1976	December 10, 1980
Deal, Borough of	*	January 4, 1983
	*	July 20, 2001
Eatontown, Borough of	May 18, 1976	April 29, 1980

*****Data not available

TABLE 1 – INITIAL AND FINAL CCO MEETINGS – continued

Community	Initial CCO Date	Final CCO Date
Englishtown, Borough of	March 15, 1976	April 29, 1980
Fair Haven, Borough of	May 18, 1976	November 29, 1978
Freehold, Township of	June 6, 1977	May 20, 1982
Hazlet, Township of	August 26, 1976	January 7, 1982
Highlands, Borough of	August 1, 1996	April 28, 1997
Holmdel, Township of	May 18, 1976	February 26, 1981
Howell, Township of	June 3, 1977	February 2, 1982
Keansburg, Borough of	*	June 30, 1982
Keyport, Borough of	*	April 13, 1982
Little Silver, Borough of	*	October 26, 1981
Loch Arbour, Village of	*	October 28, 1982
Long Branch, City of	*	February 2, 1983
Manalapan, Township of	December 16, 1974	July 20, 1976
Manasquan, Borough of	*	January 21, 1983
Marlboro, Township of	December 17, 1974	September 15, 1976
Matawan, Borough of	*	September 9, 1980
Middletown, Township of	August 26, 1976	April 30, 1982
Millstone, Township of	June 1977	November 25, 1980
Monmouth Beach, Borough of	*	October 26, 1981
Neptune, Township of	*	April 13, 1983
Ocean, Township of	October 2, 1973	January 15, 1976
Oceanport, Borough of	*	October 29, 1975
Red Bank, Borough of	May 18, 1976	April 4, 1980
Rumson, Borough of	*	October 27, 1981
Sea Bright, Borough of	*	January 10, 1983
Sea Girt, Borough of	*	January 21, 1983
Shrewsbury, Borough of	May 18, 1976	August 14, 1978
Spring Lake, Borough of	*	January 24, 1983
Spring Lake Heights,	July 14, 1978	December 2, 1980
Borough of	*	*
Tinton Falls, Borough of	May 18, 1976	January 22, 1981
Union Beach, Borough of	*	April 22, 1982
Wall, Township of	May 7, 1975	March 4, 1976
West Long Branch, Borough of	May 18, 1976	January 23, 1980

*****Data not available

The initial scoping meetings for the September 25, 2009 countywide study were held on October 18, 20 and 25, 2005.

For the September 25, 2009 countywide study, the final CCO meeting was held on March 17-19, 2008. Representatives of FEMA, the County of Monmouth, New

Jersey Department of Environmental Protection, Dewberry & Davis, and various communities in Monmouth County were present.

For the [TBD] countywide revision, an initial CCO meeting was held on August 19, 2010, and attended by representatives of NJDEP, RAMPP, FEMA, and local officials. The Flood Risk Review (FRR) meeting was held on August 21, 2013.

The results of the study were reviewed at the final CCO meeting held on ______________________________, and attended by representatives of ____. All concerns raised at that meeting have been addressed in this study.

2.0 AREA STUDIED

2.1 Scope of Study

This FIS covers the geographic area of Monmouth County, New Jersey.

All or portions of the flooding sources listed in Table 2, "Flooding Sources Studied by Detailed Methods from the September 25, 2009 County-Wide Study" 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 - FLOODING SOURCES STUDIED BY DETAILED METHODS FROM THE SEPTEMBER 25, 2009 COUNTY-WIDE STUDY

Applegates Creek	Deep Run Tributary C
Aredena Brook	Doctors Creek
Atlantic Ocean	East Creek
Big Brook (Upstream Reach)	Flat Creek
Bannen Meadow Brook	Fletcher Lake
Barclay Brook	Gander Brook
Barren Neck Creek	Gravelly Brook
Betty Brook	Gravelly Run
Big Brook (Downstream Reach)	Groundhog Brook
Big Brook Tributary H	Hannabrand Brook
Burkes Creek	Haystack Brook
Claypit Creek	Heroys Pond Creek
Comptons Creek	Hockhockson Branch
Cranberry Brook	Hog Swamp Brook
Deal Lake	Hollow Brook
Deal Tributary 1	Indian Run
Deal Tributary 2	Judas Creek (Downstream Reach)
Deal Tributary 3	Judas Creek (Upstream Reach)
Deal Tributary 3A	Jumping Brook 1
Deal Tributary 4	Jumping Brook 2
Deal Tributary 4A	Little Silver Creek
Debois Creek	Little Silver Creek Tributary 1

TABLE 2 - FLOODING SOURCES STUDIED BY DETAILED METHODS FROM THE SEPTEMBER 25, 2009 COUNTY-WIDE STUDY- continued

Debois Creek Tributary	Little Silver Creek Tributary 2
Deep Run	Little Silver Creek Tributary 2A
Deep Run Tributary A	Little Silver Creek Tributary 2B
Deep Run Tributary B	Little Silver Creek Tributary A
Long Brook	Roberts Swamp Brook (Upstream Reach)
Mac's Brook	Rocky Brook (Downstream Reach)
Mahoras Brook	Rocky Brook (Upstream Reach)
Manalpan Brook	Sandy Hook Bay
Manalpan Brook Tributary A	Shark River
Manalpan Brook Tributary B	Shark River Tributary D
Manasquan River	Shrewsbury River
Manasquan River Tributary A	South Shrewsbury River
Marl Brook	Still House Brook
Matawan Creek	Swimming River
Matchaponix Brook	Sylvan Lake
McClees Creek	Tepehemus Brook
McGellairds Brook	Tepehemus Brook, South Branch
Metedeconk River North Branch	Toms River
Milford Brook	Town Brook
Millstone River	Turtle Mill Brook
Mine Brook	Town Neck Creek
Miry Bog Brook	Waackaak Creek
Mohingson Brook	Wampum Brook
Monascunk Creek	Watson Creek
Musquash Creek	Weamaconk Creek
Navesink River	Weamaconk Creek Tributary
Nut Swamp Brook	Wells Brook
Parkers Creek	Wemrock Brook
Parkers Creek North Branch	Whale Creek
Perrineville Lake	Whale Pond Brook
Pine Brook 1	Whale Pond Brook Tributary 1
Pine Brook 2	Whale Pond Brook Tributary 2
Pine Brook Tributary C	Willow Brook
Poly Pond Brook	Willow Brook Tributary F
Polypod Brook	Willow Brook Tributary G
Poplar Brook	Willow BrookEast Branch
Poplar Brook Tributary 1	Wreck Pond Brook
Poplar Brook Tributary 2	Wreck Pond Brook East Branch
Poplar Brook Tributary 3	Yellow Brook
Poricy Brook	Yellow Brook 2
Ramanessin Brook	Yellow Brook 2 Tributary
Raritan Bay	Yellow Brook Tributary K
Roberts Swamp Brook (Downstream Reach)	Yellow BrookTributary L

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.

Numerous flooding sources in the country were studied by approximate methods. Approximate analyses were used to study those areas having a low development potential or minimal flood hazards. The scope and methods of study were proposed to, and agreed upon by, FEMA and Monmouth County.

For the September 25, 2009 countywide FIS, Manalapan Brook has been restudied using detailed methods. The revised hydrologic analysis includes the entire basin area of Manalapan Brook (drainage area 17.53 square miles). The revised hydraulic analysis extends from its confluence with the South River at the border of Monmouth and Middlesex Counties in the Township of Manalapan to Moonlight Court in the Township of Millstone.

This [date] FIS revision includes a new coastal analysis and mapping for 95 miles of shoreline.

2.2 Community Description

Monmouth County is located in the central part of New Jersey, extending west to east across nearly the entire state, and is the northernmost county along the area known as the Jersey Shore. Monmouth County is bordered by Middlesex County to the north, Ocean County to the south, Burlington County to the southwest, Mercer County to the west and the Atlantic Ocean to the east. Monmouth County also borders the New York City Borough of Staten Island, on the east side of the Raritan Bay. Monmouth County spans 665 square miles and according to the 2012 census, the population was 629,384 (U.S. Census Bureau; 2012). The County seat is the Borough of Freehold. Several major highways span Monmouth County, including the Garden State Parkway, New Jersey Turnpike, Interstate 195, and State Roads 9, 18, 34, 35, 36 and 70. Monmouth County is also home to the United States Naval Reservation, Naval Weapons Station Earle. Several rail lines and bus lines also pass through the County, including the New Jersey Transit North Jersey Coast Line.

The eastern part of Monmouth County is a significant portion of the Jersey Shore, a very popular tourist destination, particularly in summer months. The western part of Monmouth County is far more residential and not as densely populated. The lowest points in Monmouth County occur at the Atlantic Ocean, while the highest point is atop Crawford Hill in the Township of Holmdel, which lies 391 feet above sea level.

Monmouth County has a temperate climate with warm summers and moderate winters. The average annual temperature is approximately 53 degrees Fahrenheit (°F), with January being the coldest month, averaging 39°F and July the warmest month averaging 86°F. The average annual precipitation is approximately 46 inches (U.S Department of Commerce and National Oceanic and Atmospheric Administation; 1967-2012).

2.3 Principal Flood Problems

Flooding in Monmouth County is attributed mainly to tropical storms, extratropical cyclones (also known as northeasters) and to a lesser extent, severe thunderstorms. Near the Atlantic Ocean, Raritan Bay, Navesink River, Sandy Hook Bay, Shark River and Shrewsbury River, serious flooding problems are the result of high tidal surge and associated wave activity caused primarily by coastal storms, especially hurricanes. Usually occurring during late summer and early autumn, these storms can result in severe damage to coastal areas. Although extratropical cyclones can develop at almost any time of the year, they are more likely to occur during winter and spring. Thunderstorms are a common occurrence during the warm summer months.

Other low-lying areas throughout Monmouth County are vulnerable to severe flooding and flood-related damage, due to the periodic flooding caused by the overflow of streams and lakes. Heavy rainfall can result in higher than normal stages of Deal Lake, affecting the Borough of Allenhurst, the City of Asbury Park, the Borough of Deal and the Village of Loch Arbour, which frequently experiences property damage. Additional flooding in the Township of Aberdeen is attributed to tidal inundation and backwater from inadequate culverts. Due to high tidal stages on the Raritan Bay, the northern area of Aberdeen in the tidal plains of Matawan Creek, Mohingson Brook and Whale Creek is prone to flooding that affects Route 35 and properties near the shoreline. Areas adjacent to Mohingson Brook, Gravelly Run and Matawan Creek are prone to flooding due to inadequate culverts.

In the Borough of Deal, the lower portion of Poplar Brook is within the tidal range of the Atlantic Ocean. Runoff from severe rain periodically can cause the upper reach of Poplar Brook to overflow its banks. Residential properties will be affected by flooding on both stretches of Poplar Brook.

In the Borough of Eatontown, at times blockage by debris and refuse on Wampum Brook, Parkers Creek, Whale Pond Brook, Husky Brook, Crystal Book and Turtle Mill Brook can cause severe restrictions of culverts and contribute to local flooding. Most local flooding occurs upstream of State Route 35 on Parkers Creek, upstream of State Route 35 near Clinton Avenue, upstream of State Route 71 on Husky Brook at the twin 48-inch culverts under the Duncan Thecker Associates Service Road, and along the Lewis Street Bridge over Wampum Brook.

In the Township of Freehold, flooding has occurred along Manasquan River Tributary B upstream of Elton Adelphia Road, to a distance of 100 feet beyond normal channel bank. During severe conditions, Coventry Drive, which parallels the stream, has become impassable due to flooding. Debois Creek causes localized flooding where roadways cross the stream. The Strickland Road crossing has been flooded to a depth of two feet above the road surface during severe storms. The adjacent floodplain has been inundated, but with no extensive property damage. Debois Creek Tributary has experienced flooding during storm conditions due to constricted channel areas in the downstream portions of the stream. Extensive erosion in the channel of the tributary has been reported.

In the Township of Holmdel, flooding occurs upstream of State Route 34 and along South Street by Willow Brook, as well as near Middle Road by Waackaack Creek.

In the Township of Howell, localized flooding problems have occurred in the area of Long Brook and Bannen Meadow Brook. Long Brook has caused flooding of adjacent property near Wyckoff Road and the State Route 33 crossing. Howell Road is prone to flooding during severe conditions. Bannen Meadow Brook has caused flooding of adjacent property near Fort Plains Road and Casino Drive. The Fort Plains Road crossing is also flooded during severe flooding conditions.

In the Township of Manalapan considerable flooding occurs along Matchaponix Brook in the area of the corporate limits and at its junction with Pine Brook 2. Flood elevations along the lower reach of Pine Brook 2 are affected by backwater from the main branch of Matchaponix Brook. Flooding occurs along Pension Road near Clarks Mills. The housing development along Birmingham Drive, Terrytown Road and Winthrop Drive is subject to flooding from Pine Brook 2. The area along Pine Brook Road and Pease Road is flooded regularly when Pine Brook 2 Tributary C overflows its banks. Flooding problems also exist along Milford Brook in the area of Commack Lane, Pease Road and Tennant Road. Additional problems along Milford Brook arise during heavy rains in the area of Lafayette Mills and Lafayette Mills Road.

In the Borough of Matawan, flood gates are maintained by the community on Matawan Creek at the Lake Lefferts Dam. At times when the flood gates were not opened quickly enough during severe storm conditions, Ravine Drive was flooded to a depth of eight inches. Gravelly Brook has flooded Mill Road to a depth of six inches. The Municipal Garage, located in the floodplain of Gravelly Brook upstream of Church Street, has been flooded to a depth of eight inches, and the Church Street crossing has been flooded by Gravelly Brook to a depth of four inches. Downstream of the confluence of Gravelly Brook with Matawan Creek, the triple culvert at the Railroad Bridge causes backwater flooding of Aberdeen Road to a depth of five feet.

In the Township of Marlboro, considerable flooding occurs along Deep Run in the area of the corporate limits and Old Texas Road, a relatively flat region. A wide floodplain also occurs at Deep Run's junction with Deep Run Tributary B. Additionally, backwater effects of the culvert on Milford Brook at State Route 18 cause flooding upstream of that structure.

In the Township of Middletown, the bayshore portion of the township lies in a poorly drained floodplain with abundant swamp and marshland. The low banks of the stream and the low relief of the surrounding terrain render this region extremely vulnerable to flooding. During periods of heavy precipitation, the creeks overtop their banks and spread their floodwaters over the broad floodplain.

In the Township of Ocean, inland flow of the ocean tidal surges in restricted by weirs in the streams flowing to the ocean, as well as by lake storage. Flooding in the township is caused mostly by local rainstorms.

In the Borough of Spring Lake Heights, flooding occurs along Wreck Pond Brook, Wreck Pond North Branch and Poly Pond Brook. In general, localized flooding may occur under severe storm conditions due to poor surface drainage.

In the Borough of Tinton Falls, low-lying areas are subject to periodic flooding caused by the overflow of Swimming River, Pine Brook 1 and Jumping Brook 2. The most severe flooding occurs at the junction of Pine Brook 1 and Swimming River.

The Borough of Union Beach, on the shores of Raritan Bay, lies in a poorly drained floodplain with abundant swamps and marshland. The flat gradient of the streams and low relief of the surrounding terrain makes the area extremely vulnerable to flooding. During periods of heavy rainfall, streams within the Borough can overtop and spread floodwaters across the broad floodplain. Union Beach, was laid bare by Hurricane Sandy that made landfall on October 29, 2012. According to the the Borough's Department of Emergency Management Agency,

uninhabitable. More than 300 other homes sustained damage and 400 were flooded by six feet of water or more. In northern Monmouth County, along Raritan Bay, more than 4,000 houses were devastated by Sandy's wind and water.

In the Township of Wall, flooding in the eastern section and remaining parts of the Township is caused by streams overflowing their banks. The non-tidal sections of Shark River, Manasquan River and Wreck Pond flow in wide, meandering channels. Urbanization in the areas of Watson Creek, Judas Creek (Upstream Reach), Roberts Swamp Brook (Upstream Reach), Poly Pond Brook and Heroys Pond Brook increase the runoff to these streams. Flooding can be aggravated by the accumulation of debris at culverts and bridges.

Several severe storms have struck Monmouth County in the past. The most severe of these storms are described below:

> On September 14-15 of 1944, the entire coast of New Jersey was struck by hurricane-force winds. Wind velocity ranged from 90 miles per hour at Atlantic City to over 100 miles per hour at New York City. The storm produced a maximum tidal elevation of 7.4 (Datum unknown) feet recorded at a gage in Sandy Hook, located in the Township of Middletown (USACE, 1960; USACE, 1972).
>
> On November 25, 1950, a nor'easter brought gale-force winds and more than three inches of rainfall to the entire coastline of Monmouth County. A wind velocity of 70 miles per hour was

recorded in the City of Long Branch. The gage at Sandy Hook recorded a maximum tidal elevation of 7.2 feet (Datum unknown) (USACE, 1960; USACE, 1972).

On November 6-7 of 1953, a strong storm passed through Monmouth County. The City of Long Branch recorded a wind velocity of 78 miles per hour. The gage at Sandy Hook recorded a maximum tidal elevation of 7.9 feet (Datum unknown).

On September 12, 1960, Hurricane Donna struck the coast of Monmouth County with wind gusts to nearly 70 miles per hour. The concurrence of the hurricane tidal surge and mean high tide resulted in a maximum tidal elevation of 8.6 (NGVD 29) feet at the gage at Sandy Hook (U.S. Department of Commerce, 1971).

On March 6-8 of 1962, a strong storm passed through Monmouth County with sustained winds of 45 miles per hour and gusts to 70 miles per hour. The storm remained in the region for 60 hours. This usually long duration coincided with five successive spring high tides. The combination produced a maximum tidal elevation of 7.8 (Datum unknown) feet at the gage at Sandy Hook (USACE, 1960; USACE, 1972).

On August 26-28 of 1971, Tropical Storm Doria resulted in peak flows greater than any other recorded at 41 streams throughout New Jersey (State of New Jersey, 1972).

On August 9, 1976, Hurricane Belle struck the New Jersey coastline with winds of up to 100 miles per hour. In Asbury Park, 2.56 inches of rain fell in a 24-hour period. At Beach Haven, a tidal surge combined with high tide levels produced a tidal height six feet above normal stage (FEMA, 1985).

On September 22, 1992, Tropical Storm Danielle produced rain fall across much of New Jersey. The southwest portion of the state experienced over 3 inches of rain. The storm washed out miles of beaches along the coastline. (National Hurricane Center, 1992)

Hurricane Floyd originally made landfall in Cape Fear, North Carolina, as a Category 2 hurricane on September 16, 1999. The storm crossed over North Carolina and southeastern Virginia, before briefly entered the western Atlantic Ocean. The storm reached New Jersey on September 17, 1999. Record breaking flooding was recorded throughout the State of New Jersey. The Raritan River basin experienced record floods of up to 4.5 ft. higher than any previous record flood crest. The areas of Bound Brook and Manville were especially hit hard. A Federal Emergency Declaration was issued on September 17, 1999. Overall damage estimates for Hurricane Floyd, in the State of New

Jersey are estimated around $250 million dollars. (National Hurricane Center, 1999)

Hurricane Irene came ashore in Little Egg Inlet in Southern New Jersey; on August 28, 2011. In anticipation of the storm, Governor Chris Christy declared a state of emergency on August 25th, with President Obama reaffirming the declaration on August 27th. Mandatory evacuations of approximaty 75,000- 100,000 Monmouth County residents were ordered. Wind gusts topped off at 63 mph in Sandy Hook and 52 mph in Belmar and rain totals reached over 10 inches in many parts of the state. Massive tidal surges caused significant damage to coastal towns, wrecking the boardwalk in Spring Lake and flooding low-lying bay shore towns, such as Keansburg and Union Beach. More severe damage, however, occurred miles inland, in western Monmouth County near the Manasquan River, which had already flooded as a result of heavy rains the week before. 121,000 Monmouth County residents lost power during the storm. Overall damage estimates, for the State of New Jersey, came to over $1 billion dollars (Associated Press, 2011)

Hurricane Sandy came ashore as an immense tropical storm in Brigantine, New Jersey, on October 29, 2012. Sandy dropped heavy rain on the area; almost a foot in some areas. Wind gust were recorded at 90 mph. A full moon made the high tides 20 percent higher than normal and amplified the storm surge. The New Jersey shore suffered the most damage. Some barrier island communities suffered severe “wash over” including the creation of two temporary inlets. More than 100 homes were destroyed in Union Beach, including about 30 washed away by the tides. NOAA’s gage #8531680 at Sandy Hook, NJ; the high water mark (which is considered as a stillwater elevation without waves) was 9.21 ft NAVD88 at 6:00 PM on October 29, 2012. Nearby USGS HWMs are 11.57 and 11.06 ft. NAVD88. Seaside communities were damaged and destroyed up and down the coastline. Some 263,000 households had lost power in Monmouth County. Initial reports suggest that over 12,000 homes and businesses were damaged or destroyed by the storm. Governor Chris Christy declared a state of emergency on October 31. Hurricane Sandy is estimated to cost the State of New Jersey over $36 billion. (Associated Press, 2012)

2.4 Flood Protection Measures

Development and use of land within floodplains and the floodway are regulated by the New Jersey Department of Environmental Protection, Division of Land Use Regulation. Additionally, several municipalities within Monmouth County have adopted stream cleanup programs, which clear debris near bridges and culverts to prevent backwater flooding during large storm events.

Several structural flood protection measures have been furnished throughout Monmouth County as well. Small dams are located on Conines Mill Pond and Indian Run in the Borough of Allentown, on Swimming River in the Township of Middletown, on Pine Brook near Tinton Avenue in the Borough of Tinton Falls, and scattered elsewhere throughout the County. Small weirs restrict the passage of tidal surges into inland areas on Whale Pond Brook and Poplar Brook in the Township of Ocean, and small erosion control structures have been placed along the streams in the Township of Holmdel. The Township of Wall has also placed small stone wave management measures near roads and other critical infrastructure. A bulkhead was constructed along Marine Park in the Borough of Red Bank.

Monmouth County has no levee type structure that would require analysis of levee failure and removal under Section D.2.10.3.4.1 of the Draft Atlantic Ocean and Gulf of Mexico Coastal Guidelines update.

In alignment with standard practice used in other FEMA studies, all coastal armoring structures and beach stabilization structures have been included in the analysis without adjusting the analysis to remove the structure or reduce the effects of the structure.

3.0 ENGINEERING METHODS

For the flooding sources studied in detail in the county, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this FIS. 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 chance, respectively, of being equaled or exceeded during any year. Although the recurrence interval represents the long term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood which equals or exceeds the 100-year flood (1-percent chance of annual exceedence) in any 50-year period is approximately 40 percent (4 in 10), and, for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the county at the time of completion of this FIS. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Riverine Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency relationships for the flooding sources studied in detail affecting the county.

Information on the methods used to determine peak discharge-frequency relationships for the streams studied by detailed methods before the September 25, 2009 countywide FIS is shown below.

Each incorporated community within, and the unincorporated areas of, Monmouth County, with the exceptions of the Boroughs of Farmingdale, Interlaken, Lake Como, Neptune City and Roosevelt, as well as the Township of Upper Freehold, has a previously printed FIS report. The hydrologic and hydraulic analyses described in those reports have been compiled and are summarized below.

For inland areas surrounding Deal Lake, Fletcher Lake and Sylvan Lake, temporary ponding was found to result from heavy rainfall. A hydrologic budget was used to estimate this ponding, and rainfall information for the calculations was obtained from the U.S. Weather Bureau (U.S. Department of Commerce, 1963).

For streams studies by detailed methods in Monmouth County, several methods were used for hydrologic analyses. Special Report 38, developed by the NJDEP in cooperation with the USGS, uses a series of mathematical and graphical relationships to estimate discharge frequency data (U.S. Department of the Interior, 1974). Various parameters such as drainage area, main channel slope, surface storage area and an index of manmade impervious cover based on basin population and development conditions are used in this type of analysis.

A log-Pearson Type III analysis is a statistical technique for fitting frequency distribution data to a curve for the purpose of predicting design floods at a specific site (Water Resources Council, 1976). Probabilities of floods of various sizes can be extracted from this curve. This allows development of a drainage discharge ratio between a known discharge at a known point (gaging station) and the discharge at the area in question. The following equation was used at several streams in Monmouth County to determine this relationship:

$$Q_1 / Q_2 = (A_1 / A_2)^T$$

Where Q_1 and A_1 are the known discharge from a gaging station and the associated drainage area; Q_2 and A_2 are the discharge to be calculated and the associated drainage area, and T is the transfer exponent. This method is outlined by the Water Resources Council in Bulletins 15, 17, 17A and 17B (Water Resource Council, 1977; 1976; 1967).

The last common hydrologic analysis method used in this study is the Rational Method, used for streams with a drainage area less than approximately one square mile. The equation for the Rational Method is:

$$Q = CIA$$

Where Q is the discharge to be calculated, C is the runoff coefficient (dependent on land use), I is the rainfall intensity for the design storm and A is the drainage area.

Peak discharges for Big Brook (Downstream Reach) in the Townships of Colts Neck and Big Brook (Upstream Reach) in the Townships of Marlboro were determined using Special Report 38.

Gravelly Brook, in the Township of Aberdeen was studied using a log-Pearson Type III analysis. In the Township of Howell, it was studied by the Rational Method. In the Borough of Matawan and Township of Marlboro, peak discharges for Gravelly Brook were determined using Special Report 38.

In the Township of Middletown, Jumping Brook 1 was studied using Special Report 38, and the Borough of Tinton Falls and Township of Wall used drainage area disposition to determine peak flows, then verified the results using Special Report 38.

Peak discharges for Matawan Creek in the Township of Aberdeen were determined using a log-Pearson Type III analysis, and were determined using Special Report 38 in the Township of Marlboro and Borough of Matawan.

In the Borough of Englishtown and Townships of Freehold and Manalapan, peak discharges for McGellairds Brook were determined using Special Report 38.

In the Townships of Manalapan and Marlboro, Milford Brook was studied using Special Report 38.

In the Boroughs of Eatontown, Shrewsbury and Tinton Falls, peak discharges for Parkers Creek were determined using Special Report 38.

In the Township of Colts Neck and the Borough of Tinton Falls, peak discharges for Pine Brook 1 were determined using Special Report 38.

In the Townships of Manalapan and Marlboro, peak discharges for Pine Brook 2 were calculated using Special Report 38.

In the Township of Howell, peak flows for Polypod Brook were determined using the Rational Method.

In the Township of Wall, peak discharges for Poly Pond Brook were determined during an overall basin study using drainage area disposition.

In the Borough of Deal and Township of Ocean, peak discharges for Poplar Brook were determined using a log-Pearson Type III analysis, using gage information obtained from Matawan Creek, and then verified using the Rational Method.

Peak discharges for the Shark River in the Borough of Tinton Falls and Township of Wall were determined using a log-Pearson Type III analysis, for which gage records were obtained for Manasquan River located in Squankum, New Jersey to determine a discharge-frequency relationship (U.S. Geological Survey, published annually).

In the Townships of Colts Neck, Middletown and Ocean, and the Borough of Tinton Falls, peak discharges for the Swimming River were determined using a log-Pearson Type III analysis.

Tepehemus Brook, in the Townships of Manalapan and Marlboro, was studied using Special Report 38.

In the Townships of Colts Neck and Freehold, peak discharges for Yellow Brook 2 Tributary were determined using Special Report 38.

In the Townships of Hazlet and Middletown, as well as the Borough of Keansburg and Union Beach, peak discharges for Waackaack Creek were derived from a previous USACE study (USACE, 1968). However, in the Township of Holmdel, Special Report 38 was used to study this stream.

In the Townships of Freehold and Manalapan, as well as the Borough of Englishtown, peak discharges for Weamaconk Creek were determined by Special Report 38. Peak discharges for Wemrock Brook in the Townships of Freehold and Manalapan were determined from Special Report 38 as well.

In the Borough of Eatontown, peak flows for Whale Pond Brook were derived from a USACE study (U.S. Department of Housing and Urban Development, 1977). However, in the Township of Ocean, peak flows were calculated from an overall basin study using drainage area disposition.

In the Townships of Colts Neck, Holmdel and Marlboro, peak discharges for Willow Brook were determined using Special Report 38.

In the Townships of Colts Neck and Freehold, peak discharges for Yellow Brook were determined using Special Report 38.

In the Township of Aberdeen, peak discharges for Mohingson Brook and Whale Creek were determined using a gage analysis based on data obtained from gages on Matawan Creek.

In the Borough of Allentown, peak discharges for Doctors Creek were determined using a gage analysis. Flows for Indian Run were obtained using the Soil Conservation Service (SCS) Computer Program TR20 (U.S. Department of Agriculture, 1976).

In the Township of Colts Neck, peak discharges for Barren Neck Creek, Hockhockson Brook and Marl Brook were obtained using Special Report 38.

In the Township of Freehold, peak discharges for Applegates Creek, Burkes Creek, Debois Creek, Manasquan River Tributary A, Manasquan River Tributary B, Manasquan River Tributary C and Debois Creek Tributary were determined using Special Report 38. Peak flows for Manasquan River were determined using a log-Pearson Type III analysis.

In the Township of Hazlet, peak flows for East Creek, Flat Creek and Monascunk Creek were determined using Special Report 38.

In the Township of Holmdel, peak flows for Willow Brook, East Branch, Mahoras Brook and Ramanessin Brook were determined using Special Report 38.

In the Township of Howell, peak flows for Ardena Brook, Bannen Meadow Brook, Groundhog Brook, Haystack Brook and Long Brook were determined using Special Report 38. Peak flows for Manasquan River and Metedeconk River North Branch were determined using a log-Pearson Type III analysis, while Polypod Brook was studied using the Rational Method.

In the Township of Manalapan, peak discharges for Gander Brook, Matchaponix Brook, Still House Brook, Manalapan Brook Tributary A, Manalapan Brook Tributary B and Pine Brook 2 Tributary C were determined using Special Report 38.

In the Township of Marlboro, Barclay Brook, Deep Run, Deep Run Tributary A, Deep Run Tributary B, Deep Run Tributary C, Willow Brook Tributary F, Willow Brook Tributary G, Big Brook Tributary H, Yellow Brook Tributary K and Yellow Brook Tributary L were determined using Special Report 38.

In the Township of Middletown, peak discharges for Claypit Creek, Comptons Creek, Mahoras Creek, McClees Creek, Nut Swamp Brook, Poricy Brook and Town Brook were determined using Special Report 38.

In the Township of Millstone, peak discharges for Millstone River, Toms River and Rocky Brook (Upstream Reach) were determined using Special Report 38. Flows for Rocky Brook (Downstream Reach) were derived from the Flood Insurance Study for the Township of East Windsor, Middlesex County, New Jersey.

In the Township of Ocean, a basin study was conducted and a drainage area disposition was used to determine the peak discharges for Deal Tributary 1, Deal Tributary 2, Deal Tributary 3, Deal Tributary 3A, Deal Tributary 4, Deal Tributary 4A, Poplar Brook Tributary 1, Poplar Brook Tributary 2, Poplar Brook Tributary 3, Whale Pond Brook Tributary 1 and Whale Brook Tributary 2. Hog Swamp Brook was studied using the Rational Method, and Hollow Brook was studied using Special Report 38.

Peak flows for Turtle Mill Brook in the Borough of Oceanport were derived from a USACE study (USACE, 1969).

Peak flows for Parkers Creek North Branch in the Borough of Shrewsbury were determined using Special Report 38.

Peak flows for Wreck Pond Brook in the Borough of Spring Lake Heights were derived from the FIS for the Township of Wall (U.S. Department of Housing and Urban Development, 1976).

In the Township of Wall, a basin study was conducted and a drainage area disposition was used to determine the peak discharges for Wreck Pond Brook East Branch, Hannabrand Brook, Heroys Pond Creek, Judas Creek (Upstream Reach), Laurel Gully, Poly Pond Brook (Wall), Roberts Swamp Brook (Upstream Reach), Shark River Tributary D, Shark River Tributary E, Watson Creek and Wreck Pond Brook. Calculated flows were verified using Special Report 38.

In the Borough of Little Silver, streams were divided into two basic systems. The first included Little Silver Creek, Little Silver Tributary A and Little Silver Tributary 1. The second included Little Silver Tributary 2, Little Silver Tributary 2A and Little Silver Tributary 2B. The watershed contributing to each system was defined and converted to a standard model using parameters that allow the selection of a similar gaged watershed, necessary because no gages exist on these streams. For gage data, Swimming River in the Borough of Red Bank was used, with records since 1923. Using a standard log-Pearson Type III analysis, peak discharge-frequency curves were developed for the two watersheds and applied uniformly.

In the Borough of Manasquan peak discharge-drainage area relationships were determined by high water marks for Mac's Brook, Roberts Swamp Brook (Downstream Reach) and Judas Creek (Downstream Reach).

Information on the methods used to determine peak discharge-frequency relationships for the stream restudied as part of the September 25, 2009 countywide FIS is shown below.

All discharges shown below for Manalapan Brook were calculated in accordance with procedures outlined in the publication by the USGS entitled "Nationwide Summary of U.S. Geological Survey Regional Regression Equations for Estimating Magnitude and Frequency of Floods for Ungaged Sites, 1993", also referred to as Water Resources Investigation (WRI) Report 94-4002 (U.S. Department of the Interior, 1982).

Flow locations were selected at various points along the reaches of this brook. Locations were first selected based on prior documented FEMA flow locations for prior studies of the drainage basin (FEMA, 1981; U.S. Department of Housing and Urban Development, 1977) and on USGS gage locations (U.S. Department of the Interior, retrieved 2006: USGS 01405303, 01405330, 01405335, 01405400). Additional flow locations were added along the brook to provide a uniform drainage analysis of the study area.

Based on WRI Report 94-4002, the variables governing the peak stream flows for each of the flow locations are Drainage Area, Main Channel Slope, Population Density and Surface Storage Index. With the flow locations selected, the drainage area to each of the locations was delineated based on the Monmouth County GIS 2-foot contour topography (State of New Jersey, Provided 2006).

The Main Channel Slope was measured between points which are 10 percent and 85 percent of the main channel length upstream from the study site. This was also measured based on the Monmouth County GIS 2-foot contour topography. The Population Density was based on Census 2000 Data obtained form the New Jersey Department of Labor and Workforce Development (State of New Jersey, 2001). First the Population density was calculated for each overall community area. A weighted value was then calculated for each incremental drainage area based on estimated community coverage.

The Surface Storage Index is the percentage of the drainage area occupied by lakes and swamps. This was measured based on the New Jersey 2002 digital orthoimagery (New Jersey Image Warehouse, Retrieved 2006). There are two reservoirs, Millhurst Pond and Bulks Lake located along Manalapan Brook. Neither reservoir has significant surcharge capacity or serves as a flood control structure. Therefore, this study neglects any detention effects of these ponds. Their areas, however, are reflected in the Surface Storage Index.

A regression analysis was performed at each of the flow locations in accordance with WRI Report 94-4002 to calculate flood discharges. The regression analysis was performed utilizing the National Flood Frequency Program (NFF) (U.S. Department of the Interior, 2002). This program employs the New Jersey regional regression equations established in Special Report 38 (U.S. Department of the Interior, 1974) to calculate discharges for the 2-, 5-, 10-, 25-, 50- and 100-year flood. These equations are applicable to rural and urbanized areas because they account for basin development through the Population Density variable. The discharges for the 500-year flood are extrapolated by the NFF. This involves fitting a log-Pearson Type III curve to the 2- and 100-year flood discharges and extrapolates the curve to the 500-year flood discharge.

The governing variables were input into the NFF program and regression flows output by the program were used as the discharge at the selected flow locations.

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No new detailed hydrologic analyses were carried out for the [date] revision.

A summary of the drainage area-peak discharge relationships for all streams studied by detailed methods is shown in Table 3, "Summary of Discharges" and in Figure 1, "Frequency Discharge, Drainage Area Curves."

TABLE 3 - SUMMARY OF DISCHARGES

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs)			
		10-PERCENT	2-PERCENT	1-PERCENT	0.2-PERCENT
APPLEGATES CREEK					
Upstream of confluence with Debois Creek	1.68	246	425	536	872

TABLE 3 - SUMMARY OF DISCHARGES - CONTINUED

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10-PERCENT	2-PERCENT	1-PERCENT	0.2-PERCENT
ARDENA BROOK					
Upstream of confluence with Manasquan River	1.22	170	293	369	590
BANNEN MEADOW BROOK					
Upstream of confluence with Manasquan River	2.00	327	551	690	1,094
BARREN NECK CREEK					
At limit of detailed study	1.22	230	390	500	800
BIG BROOK (DOWNSTREAM REACH)					
Upstream of Willow Brook	10.11	770	1,280	1,590	2,550
At limit of detailed study	8.22	750	1,250	1,550	2,500
BURKES CREEK					
Upstream of confluence with Debois Creek	1.43	175	307	388	631
CLAYPIT CREEK					
At Locust Avenue	1.54	285	480	605	1,000
At Lakeside Avenue	0.91	185	315	425	720
COMPTONS CREEK					
At Campbell Avenue	5.86	682	1,093	1,326	2,120
DEAL LAKE TRIBUTARIES					
*	3.00	330	570	750	*
*	1.00	120	350	520	900
*	0.70	10.70	35	45	90
*	0.01	1.10	4.40	6.50	20.20
DEBOIS CREEK					
Upstream of confluence with Manasquan River	7.70	530	910	1,110	1,640
Upstream of confluence of Applegates Creek and Debois Creek Tributary	5.50	450	745	920	1,370
Approximately 800 feet upstream of Jones Siding Road	2.08	163	282	348	518

*Data not available

TABLE 3 - SUMMARY OF DISCHARGES - CONTINUED

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10-PERCENT	2-PERCENT	1-PERCENT	0.2-PERCENT
DEBOIS CREEK TRIBUTARY					
Upstream of confluence with Debois Creek	1.17	218	366	453	699
DOCTORS CREEK					
At Fowlers Bridge Road	17.20	1,180	1,830	2,170	3,150
At upstream corporate limits	16.30	1,150	1,785	2,115	3,065
EAST CREEK					
At SR 36	2.31	463	771	947	1,385
At Middle Road	1.41	367	608	747	1,090
At SR 35	0.58	213	351	432	630
FLAT CREEK					
At SR 36	2.08	644	1,070	1,320	1,823
Upstream of confluence of Monascunk Creek	0.86	334	559	692	910
Upstream of SR 36	0.67	198	325	401	575
GRAVELLY RUN					
At Lake Matawan Dam	2.57	589	1,107	1,413	2,405
Upstream of confluence with Metedeconk River North Branch	0.92	113	199	250	403
GROUNDHOG BROOK					
Upstream of confluence with Haystack Brook	1.56	178	306	382	606
Upstream of confluence of Polypod Brook	0.75	140	220	300	500
HAYSTACK BROOK					
Upstream of confluence with the Metedeconk River North Branch	11.40	485	830	1,020	1,550
Approximately 3,000 feet upstream of Ramtown Greenville Road	6.30	402	675	832	1,292
Approximately 1,700 feet from the Glenn Road crossing	4.34	348	587	725	1,135

TABLE 3 - SUMMARY OF DISCHARGES - CONTINUED

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs)			
		10-PERCENT	2-PERCENT	1-PERCENT	0.2-PERCENT
HOCKHOCKSON BROOK					
Upstream of junction with Pine Brook 1	6.86	590	990	1,230	2,100
Approximately 700 feet upstream of Water Street	4.88	540	910	1,140	1,500
Upstream of Roller Road	0.52	303	385	443	516
HOLLOW BROOK					
*	1.00	480	560	650	900
*	0.70	55	85	90	160
*	0.10	65	95	140	240
*	0.01	14	24	32	40
INDIAN RUN					
At confluence with Doctors Creek	1.80	630	900	1,045	1,550
At upstream corporate limits	1.60	615	875	1,025	1,500
JUMPING BROOK 1					
At Neptune corporate limits	3.70	970	1,500	1,760	2,490
Upstream of tributary, 800 feet upstream of corporate limits	2.47	680	1,090	1,270	1,800
At bridge at Shadow Lake	2.11	425	685	835	1,300
At Middletown-Lincroft Road	1.10	280	455	555	820
LONG BROOK					
Upstream of confluence with Manasquan River	2.40	281	476	596	951
Upstream of Adelphia-Farmingdale Road	1.46	242	413	517	829
Upstream of Varnderveer Road	0.96	167	289	363	588
MAHORAS BROOK					
At downstream corporate limits	3.06	645	965	1,115	1,505
At NY & Long Branch Railroad	2.74	597	896	1,035	1,393
At Holland Road	1.37	366	549	635	855
Upstream of confluence with Waackaack Creek	1.30	825	1,245	1,425	1,920

*Data not available

TABLE 3 - SUMMARY OF DISCHARGES - CONTINUED

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs)			
		10-PERCENT	2-PERCENT	1-PERCENT	0.2-PERCENT
MANASQUAN RIVER					
Downstream of Southard Avenue	33.46	1,380	1,963	2,239	2,932
Approximately 3,500 feet downstream of West Farms Road	28.65	1,200	1,736	1,980	2,590
Upstream of confluence of Ardena Brook	25.18	1,099	1,566	1,786	2,335
Upstream of confluence of Barren Meadow Brook	21.80	980	1,395	1,591	2,081
Upstream of confluence of Long Brook	19.40	893	1,271	1,450	1,896
Upstream of confluence of Debois Creek	10.41	544	774	883	1,155
Upstream of Jackson Mills Road	8.46	459	653	745	975
Upstream of confluence of Manasquan River Tributary B	6.87	391	557	635	830
MANASQUAN RIVER TRIBUTARY A					
Upstream of confluence with Manasquan River	2.10	325	545	685	1,085
MANASQUAN RIVER TRIBUTARY B					
Upstream of confluence with Manasquan River	1.42	214	366	458	727
MANASQUAN RIVER TRIBUTARY C					
Upstream of confluence with Manasquan River	1.80	312	527	657	1,043
MARL BROOK					
Upstream of Mine Brook	1.54	270	460	580	980
At limit of detailed study	1.04	210	370	470	800

TABLE 3 - SUMMARY OF DISCHARGES - CONTINUED

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs)			
		10-PERCENT	2-PERCENT	1-PERCENT	0.2-PERCENT
MATAWAN CREEK					
At mouth with Raritan Bay	13.19	1,850	3,480	4,440	7,560
Upstream of Mohingson Brook	9.94	1,520	2,855	3,640	6,200
At USGS gaging station at Lake Lefferts Dam	6.11	1,080	2,030	2,590	4,410
At New Brunswick Road	4.18	830	1,555	1,990	3,380
At upstream corporate limits	1.16	340	635	810	1,380
MCCLEES CREEK					
At Navesink River Road	4.56	690	1,100	1,380	1,900
At Whipporwill Valley Road	2.95	430	700	865	1,280
At Sleepy Hollow Road	1.56	260	430	535	790
MCGELLAIRDS BROOK					
At downstream corporate limits	14.99	760	1,240	1,510	2,490
Upstream of Freehold/ Manalapan corporate limits	2.46	143	272	334	601
METEDECONK RIVER NORTH BRANCH					
Upstream of Howell-Lakewood corporate limits	34.90	671	998	1,160	1,612
Upstream of confluence of Gravelly Run	32.79	658	979	1,137	1,581
Upstream of confluence of Haystack Brook	21.39	535	797	926	1,287
Upstream of Ramtown-Greenville Road	20.78	528	786	913	1,235
Upstream of Lakewood-Farmingdale Road	20.30	522	777	902	1,254
Approximately 4,500 feet upstream of Lakewood-Farmingdale Road	19.69	514	765	889	1,235
Approximately 755 feet upstream of Kent Road	18.08	490	730	847	1,178
Upstream of Church Road	15.40	452	672	781	1,085
Approximately 600 feet downstream of Aldrich Road	11.26	387	576	669	930
Upstream of Farmingdale Road	10.80	348	518	602	837

TABLE 3 - SUMMARY OF DISCHARGES - CONTINUED

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs)			
		10-PERCENT	2-PERCENT	1-PERCENT	0.2-PERCENT
METEDECONK RIVER NORTH BRANCH-CONTINUED					
Approximately 1,800 feet upstream of Hulse's Road	7.20	323	480	558	775
MILLSTONE RIVER					
At Millstone/Monroe corporate limits	7.47	705	1,095	1,305	1,870
At Sweetmans Lane	2.52	249	441	561	730
MINE CREEK					
Upstream of Yellow Brook	5.63	740	1,230	1,540	2,500
Downstream of Marl Brook	5.28	670	1,120	1,400	2,300
Upstream of Marl Brook	3.74	500	850	1,060	1,800
At limit of detailed study	2.40	350	600	760	1,220
MIRY BOG BROOK					
Upstream of Yellow Brook	1.08	170	300	380	625
MOHINGSON BROOK					
At confluence with Matawan Creek	2.44	570	1,070	1,360	2,320
Upstream of GSP	2.17	525	985	1,255	2,140
Upstream of Church Street	1.74	450	845	1,075	1,830
At upstream corporate limits	0.65	225	425	540	920
MONASCUNK CREEK					
At confluence with Flat Creek	0.96	285	469	577	835
At SR 35	0.75	255	416	511	730
NUT SWAMP BROOK					
At bridge at Shadow Lake	2.93	425	690	840	1,310
At GSP	2.40	375	620	760	1,130
At Middletown-Lincroft Road	1.55	255	425	525	785
PARKERS CREEK					
At Sunnybank Drive	6.12	700	1,110	1,350	2,050
Downstream of confluences with Parkers Creek North Branch and Wampum Brook	5.47	740	1,190	1,440	2,300

TABLE 3 - SUMMARY OF DISCHARGES - CONTINUED

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs)			
		10-PERCENT	2-PERCENT	1-PERCENT	0.2-PERCENT
PARKERS CREEK-CONTINUED					
Upstream of confluences with Parkers Creek North Branch and Wampum Brook	1.58	290	480	580	920
At Main Street	1.24	250	410	500	810
At Railroad crossing	1.24	250	410	500	810
PARKERS CREEK NORTH BRANCH					
Upstream of confluence with Parkers Creek	1.03	180	310	380	600
At limit of detailed study	0.83	150	250	310	510
PINE BROOK 1					
Upstream of confluence with Swimming River	13.20	900	1,480	1,830	2,900
Upstream of Tinton Avenue	11.04	950	1,560	1,930	3,100
Upstream of junction with Hockhockson Brook	4.18	430	730	900	1,950
POLYPOD BROOK					
Upstream of confluence with Groundhog Brook	0.72	174	220	255	413
POPLAR BROOK					
At confluence with Atlantic Ocean	3.74	593	1,044	1,292	1,990
Upstream of Monmouth Road	2.93	441	777	962	1,481
Upstream of confluence with Poplar Brook Tributary 2	1.70	531	676	762	864
Upstream of Willow Drive	1.15	405	515	589	685
PORICY BROOK					
At confluence with Navesink River	2.86	425	690	845	1,330
At Normandy Road	1.31	290	480	590	900
At Middletown-Lincroft Road	1.21	275	460	570	845

TABLE 3 - SUMMARY OF DISCHARGES - CONTINUED

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs)			
		10-PERCENT	2-PERCENT	1-PERCENT	0.2-PERCENT
RAMANESSIN BROOK					
Upstream of confluence with Willow Brook	6.49	1,000	1,700	200	2,900
Approximately 1,200 feet northwest of Middletown and Stillwell Avenue, downstream	5.06	950	1,620	1,900	2,700
Approximately 1,200 feet northwest of Middletown and Stillwell Avenue, upstream	3.83	760	1,399	1,599	2,199
Approximately 1,400 feet downstream of Robert Road	2.43	510	830	1,000	1,460
Upstream of Longstreet Road	1.03	300	500	620	960
ROCKY BROOK (DOWNSTREAM REACH)					
At Disbrow Road	6.10	410	690	870	1,310
ROCKY BROOK (UPSTREAM REACH)					
Approximately 2,240 feet downstream of Perrineville Road	3.19	327	562	705	1,128
SHARK RIVER					
At Neptune corporate limits	7.99	440	670	790	1,140
At Shark River Road	2.37	130	200	230	330
SWIMMING RIVER					
At Hubbards Avenue	61.70	3,844	8,253	11,176	21,970
USGS gage near Red Bank	48.50	3,280	7,060	9,630	18,000
At Swimming River Road	48.50	3,248	6,973	9,443	18,563
TEPEHEMUS BROOK SOUTH BRANCH					
Upstream of Freehold/ Manalapan corporate limits	1.74	200	340	430	790
TOMS RIVER					
At Millstone-Jackson corporate limits	3.39	191	342	433	717
At upstream study limit	2.92	219	390	495	808

TABLE 3 - SUMMARY OF DISCHARGES - CONTINUED

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs)			
		10-PERCENT	2-PERCENT	1-PERCENT	0.2-PERCENT
TOWN BROOK					
At Park Avenue	2.69	385	629	769	1,220
At SR 35	1.33	219	366	450	715
TURTLE MILL BROOK					
*	4.20	600	900	1,100	2,600
*	0.64	200	250	320	650
WAACKAACK CREEK					
At downstream corporate limits	7.44	1,200	1,800	2,080	2,800
At SR 36	6.77	1,125	1,685	1,950	2,620
At downstream corporate limits	5.64	1,125	1,685	1,950	2,620
Upstream of confluence with Mahoras Brook	4.34	355	530	615	825
WAMPUM BROOK					
At Main Street	2.86	390	630	760	1,200
At Lewis Street	2.01	360	580	710	1,110
WEAMACONK CREEK					
At downstream corporate limits	7.66	410	650	790	1,360
Upstream of Freehold/ Manalapan corporate limits	1.49	146	230	300	494
Upstream of US Route 9	1.02	106	167	219	360
WEAMACONK CREEK TRIBUTARY					
At confluence with Weamaconk Creek	0.34	120	185	220	320
At upstream corporate limits	0.19	90	135	160	215
WEMROCK BROOK (within the Township of Freehold)					
Upstream of Freehold/ Manalapan corporate limits	2.58	215	401	423	694

*Data not available

TABLE 3 - SUMMARY OF DISCHARGES - CONTINUED

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs)			
		10-PERCENT	2-PERCENT	1-PERCENT	0.2-PERCENT
WHALE POND BROOK					
At Whale Pond Road	3.94	320	730	1,080	2,700
Downstream of Neptune Highway	2.64	240	560	850	2,000
Upstream of Neptune Highway	1.81	180	410	680	1,500
WHALE POND BROOK AND TRIBUTARIES					
*	4.50	480	875	1,450	4,200
*	0.70	75	260	350	610
*	0.10	10	34	48	140
WILLOW BROOK					
Downstream of confluence of Ramanessin Brook	14.07	1,700	2,800	3,400	5,200
Upstream of confluence of Ramanessin Brook	7.58	1,065	1,790	2,735	3,275
Downstream of CR 520	5.00	1,100	1,850	2,250	3,100
Upstream of CR 520	2.25	700	1,200	1,500	2,400
Upstream of confluence of East Branch Willow Brook	1.75	400	700	900	1,450
At limit of detailed study	1.30	320	550	700	1,100
WILLOW BROOK, EAST BRANCH					
At confluence with Willow Brook	0.50	130	210	250	400
WRECK POND BROOK					
Upstream of Old Mill Road	7.20	1,600	2,450	2,940	4,200
YELLOW BROOK					
Downstream of Mine Brook	15.45	1,580	2,580	3,180	5,000
Upstream of Mine Brook	9.82	1,020	1,680	2,090	3,350
Downstream of Tributary to Yellow Brook	8.80	920	1,520	1,880	3,000
Upstream of Tributary to Yellow Brook	7.72	820	1,380	1,710	2,800
Junction North and South Branch	6.03	790	1,330	1,650	2,640
Upstream of South Branch	2.02	370	630	790	1,300
At limit of detailed study	1.76	350	590	750	1,220
Upstream of confluence of Tributary to Yellow Brook	1.18	258	438	549	873

*Data not available

TABLE 3 - SUMMARY OF DISCHARGES - CONTINUED

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs)			
		10-PERCENT	2-PERCENT	1-PERCENT	0.2-PERCENT
YELLOW BROOK 2					
Upstream of the Township of Freehold/Township of Colts Neck corporate limits	1.76	360	610	770	1,220
Upstream of the confluence of Tributary to Yellow Brook	1.18	258	438	549	873
YELLOW BROOK 2 TRIBUTARY					
Upstream of confluence with Yellow Brook 2	0.66	176	301	377	599

The stillwater elevations have been determined for the 10-, 2-, 1-, and 0.2-percent annual chance floods for the flooding sources studied by detailed methods and are summarized in Table 4, "Summary of Stillwater Elevations."

TABLE 4 - SUMMARY OF STILLWATER ELEVATIONS

FLOODING SOURCE AND LOCATION	STILLWATER ELEVATION (feet NAVD)			
	10-PERCENT	2-PERCENT	1-PERCENT	0.2-PERCENT
PARKERS CREEK				
Shoreline within Borough of Shrewsbury	5.1	6.9	7.9	12.4
PERRINEVILLE LAKE				
Entire shoreline	162.8	164.0	164.6	166.2

3.2 Riverine Hydraulic Analyses

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

Each incorporated community within, and the unincorporated areas of, Monmouth County, with the exceptions of the Boroughs of Freehold, Interlaken, Lake Como, Neptune City, and Roosevelt, as well as the Township of Upper Freehold, has a previously printed FIS report. The hydraulic analyses described in those reports prior to the September 25, 2009 countwide FIS have been compiled and are summarized below.

For streams studied by detailed methods, water-surface elevations of floods of the selected recurrence intervals were predominantly computed through use of the USACE HEC-2 step-backwater program (USACE, 1976; 1974). Cross sections for the backwater analyses of the streams studied in detail were field-surveyed and located at close intervals above and below bridges and culverts, in order to compute the significant backwater effects of these structures in highly urbanized areas.

Water surface elevations of floods of the selected recurrence intervals were calculated by a flood/rainfall routing analysis for Deal Lake. Indian Run, in the Borough of Allentown, was studied using the SCS WSP-2 program (U.S. Department of Agriculture, 1976)

In the Township of Aberdeen, starting water surface elevations for Matawan Creek and Whale Creek were derived from the mean high tide. Starting water surface elevations were determined using the slope/area method for Mohingson Brook, and were derived from the FIS for the Borough of Matawan (FEMA, 1981) for Gravelly Brook.

In the Borough of Allentown, starting water surface elevations for Doctors Creek were taken from the FIS for the Township of Hamilton, Mercer County, New Jersey (FEMA, 1984). For Indian Run, starting water surface elevations were calculated using the slope/area method.

In the Borough of Brielle, starting water surface elevations for Roberts Swamp Brook (Downstream Reach) were obtained from the FIS for the Borough of Manasquan (U.S. Department of Housing and Urban Development, 1971).

In the Township of Colts Neck, starting water surface elevations were obtained from the FIS for the township of Middletown (FEMA, 1983) for Barren Neck Creek, Big Brook (Downstream Reach), Willow Brook and Yellow Brook. Starting elevations for Pine Brook 1 were obtained from the FIS for the Borough of Tinton Falls (FEMA, 1981). Starting elevations for Hockhockson Brook were derived from the Pine Brook 1 profiles, while starting water surface elevations for Marl Brook were derived from the Mine Brook Profiles. Starting water surface elevations for Mine Brook and Miry Bog Brook were obtained from the Yellow Brook profiles.

In the Borough of Deal, starting water surface elevations for Poplar Brook were taken from known tidal elevations.

In the Borough of Eatontown, starting water surface elevations for Wampum Brook were derived from a discharge rating curve. Starting water surface elevations for Parkers Creek were obtained from the FIS for the Borough of Oceanport (U.S. Department of Housing and Urban Development, 1976), and starting elevations for Whale Pond Brook were obtained from the FIS for the Borough of West Long Branch (FEMA, 1981).

In the Borough of Englishtown, starting water surface elevations for McGellairds Brook and Weamaconk Creek were obtained from the FIS for the Township of Manalapan (U.S. Department of Housing and Urban Development, 1977). Starting elevations for Weamaconk Creek Tributary were derived from the profiles for Weamaconk Creek.

In the Township of Freehold, starting water surface elevations for Applegates Creek, Burkes Creek, Debois Creek, Debois Creek Tributary, Manasquan River Tributary A, Manasquan River Tributary B, Manasquan River Tributary C, Tepehemus Brook South Branch, Yellow Brook and Yellow Brook Tributary were calculated using the slope/area method. Starting elevations for Manasquan River were obtained from the FIS for the Township of Howell (FEMA, 1982). Starting elevations for McGellairds Brook, Weamaconk Creek and Wemrock Brook were obtained from the FIS for the Township of Manalapan (U.S Department of Housing and Urban Development, 1977).

In the Township of Hazlet, starting water surface elevations for East Creek and Flat Creek were calculated using the slope/area method. Starting elevations for Monascunk Creek were derived from the Flat Creek profiles. Starting elevations for Waackaack Creek were obtained from the FIS for the Borough of Keansburg (FEMA, 1982).

In the Township of Holmdel, starting water surface elevations for Waackaack Creek were obtained from the FIS for the Township of Hazlet (FEMA, 1982), and starting elevations for Mahoras Brook were derived from the Waackaack Creek profiles. Starting water surface elevations for Willow Brook were obtained from the FISs for the Townships of Colts Neck and Marlboro (FEMA, 1981 & 1982), and the starting elevations for Ramanessin Brook and Willow Brook East Branch were derived from the Willow Brook profiles.

In the Township of Howell, starting water surface elevations for Ardena Brook, Bannen Meadow Brook, Gravelly Run, Groundhog Brook, Haystack Brook, Long Brook and Manasquan River were calculated using the slope/area method. Starting elevations for Metedeconk River North Branch were obtained from the FIS for the Township of Lakewood, Ocean County, New Jersey (FEMA, 1976). Starting elevations for Polypod Brook were derived from the Groundhog Brook profiles.

In the Borough of Keansburg, starting water surface elevations for Waackaack Creek were taken from the Spring High Tide for Raritan Bay.

In the Borough of Matawan, starting water surface elevations for Gravelly Brook and Matawan Creek were calculated using spillway rating curves.

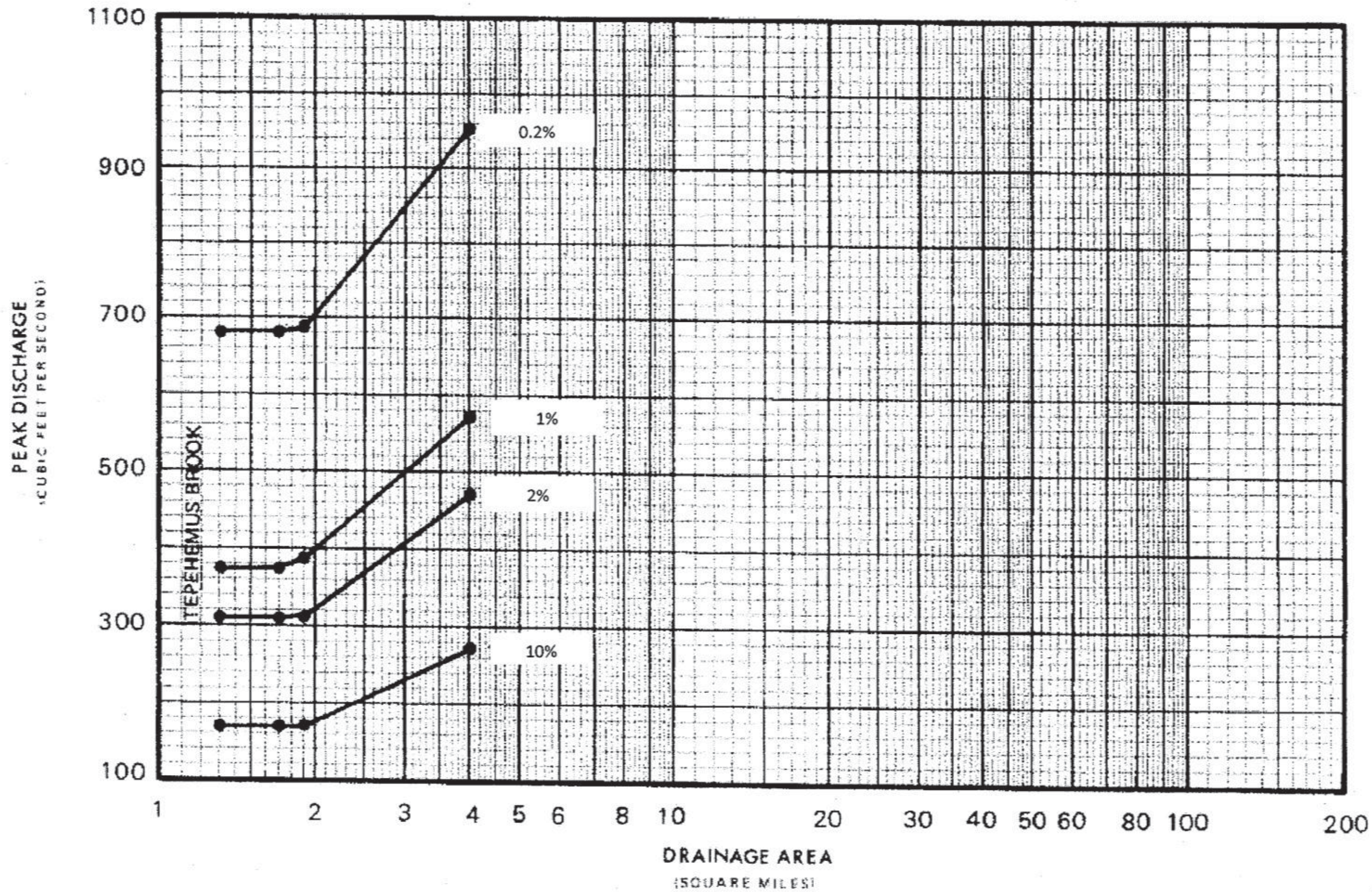

FIGURE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

MONMOUTH COUNTY, NJ
(ALL JURISDICTIONS)

FREQUENCY DISCHARGE, DRAINAGE AREA CURVES

TEPHEMUS BROOK

In the Township of Middletown, starting water surface elevations for Claypit Creek, McClees Creek, Poricy Brook and Swimming River were obtained from the Mean Low Tide of Navesink River. Starting elevations for Comptons Creek were calculated using the slope/area method. Starting elevations for Mahoras Brook and Waackaack Creek were obtained from the FIS for the Township of Holmdel (FEMA, 1981). Starting elevations for Jumping Brook 1 and Nut Swamp Brook were derived from the profiles for Shadow Lake. Starting elevations for Town Brook were derived from the profiles for Comptons Creek.

In the Township of Millstone, starting water surface elevations for Rocky Brook (Upstream Reach) and Toms River were calculated using the slope/area method. Starting elevations for Millstone River were obtained from the FIS for the Township of Monroe, Middlesex County, New Jersey (FEMA, unpublished). Starting elevations for Rocky Brook (Downstream Reach) were derived from the profiles for Millstone River.

In the Township of Ocean, starting water surface elevations for Poplar Brook and Whale Pond Brook were obtained from the FIS for the Borough of Deal (FEMA, 1976). Starting elevations for Deal Tributary 1, Deal Tributary 2, Deal Tributary 3, Deal Tributary 3A, Deal Tributary 4, Deal Tributary 4A, Hog Swamp Brook and Hollow Brook were derived from the profiles for Deal Lake. Starting elevations for Poplar Brook Tributary 1, Poplar Brook Tributary 2 and Poplar Brook Tributary 3 were derived from the profiles for Poplar Brook.

In the Borough of Shrewsbury, starting water surface elevations for Parkers Creek were obtained from the FIS for the Boroughs of Oceanport and Little Silver (FEMA, 1976 & 1977). Starting elevations for Parkers Creek North Branch, were derived from the profiles for Parkers Creek.

In the Borough of Spring Lake Heights, starting water surface elevations for Wreck Pond Brook were obtained from the FIS for the Township of Wall (U.S. Department of Housing and Urban Development, 1976).

In the Borough of Tinton Falls, starting water surface elevations for Pine Brook 1 were calculated using the slope/area method. Starting elevations for Jumping Brook 2 were obtained from the FIS for the Borough of Neptune (U.S. Department of Housing and Urban Development, 1978). Starting elevations for Parkers Creek were obtained from the FIS for the Borough of Eatontown (FEMA, 1981). Starting elevations for Shark River were obtained from the FIS for the Township of Wall (U.S. Department of Housing and Urban Development, 1976). Starting elevations for Swimming River were obtained from the FIS for the Township of Middletown (FEMA, 1983).

In the Borough of Union Beach, starting water surface elevations for Waackaack Creek were obtained from the FIS for the Borough of Keansburg (FEMA, 1982).

In the Borough of Little Silver, water-surface profiles for floods of the selected recurrence intervals were computed using HEC-2. Starting water surface elevations for Little Silver Creek, Little Silver Tributary 1 and Little Silver

Tributary 2 were obtained from a USACE tidal frequency study. Starting water surface elevations for the remaining streams were determined using the profiles of the downstream stream at the confluence.

Information on the methods used to determine peak discharge-frequency relationships for Manalapan Brook, restudied as part of the September 25, 2009 countywide FIS, is shown below.

The study area on Manalapan Brook extends from the downstream corporate limit of Township of Manalapan to Moonlight Court in the Township of Millstone. This stream contains 13 distinct bridges or other structures as it traverses a suburban area. Using aerial photographs, cross-section locations were identified for use in the modeling program. These locations were then surveyed to obtain accurate information on the river channel and bank configurations. The surveyors also obtained the necessary dimensions of crossing structures and overlying streets.

Of the structures, ten (10) are bridges/culverts for roads or pedestrian paths. One surveyed bridge is a home-built stream crossing made of tree trunks and planks. Upon close inspection it was determined that this structure will likely not hold up in severe floods; therefore it was not included in the hydraulic model. The other two structures are small dams located at the downstream ends of Millhurst Pond and Bulks Lake. Neither reservoir has significant surcharge capacity nor serves as a flood control structure. Therefore, this study neglects any detention effects of these ponds.

Using the HEC-RAS 3.1.3 computer model (USACE, 2005) with RiverCAD software (Boss, 2007), a backwater hydraulic model of the river was developed. The study includes approximately 52,000 feet (9.8 miles) of river. The hydraulic analysis was performed using 95 river cross-sections.

Based on the information obtained in the survey and site inspections, several roughness coefficients (Manning's "n" values) are used for the overbank areas, as follows:

0.100 – Trees: heavy stand of timber, few down trees.
0.053 – Development areas (Sub-Urban)
0.050 – Brush and heavy weeds
0.035 – Pasture (native Grass)

The bottom of the channel varies greatly in elevation, from 66 feet in the northern portion to 180 feet in the southern portion. The channel has small stones and some small pools. Banks are mildly sloped in the northern portion and fairly steep in the southern portion and they are lined with trees and brush along the channel. Based on site inspections, Manning's "n" values of 0.045 is assigned to the channel.

Water surface elevations for design floods at the selected cross sections were computed through use of the HEC-RAS 3.1.3 computer program. The downstream beginning water surface elevations are taken from the profiles for Manalapan Brook found in the FIS for Monroe Township, Middlesex County, New Jersey.

Flood profiles were drawn showing computed water surface elevations for floods of the selected recurrence intervals.

No new hydraulic analyses were carried out for the [date] countywide revision.

Channel roughness factors (Manning's "n") for these hydraulic computations were assigned on the basis of field inspection of floodplain areas and the study of past floods. Channel roughness factors for streams studied by detailed methods are listed in Table 5, "Manning's "n" Values."

TABLE 5 – MANNING'S "n" VALUES

Stream	Channel "n"	Overbank "n"
Applegates Creek	0.030-0.035	0.060-0.080
Ardena Brook	0.030-0.040	0.060-0.070
Bannen Meadow Brook	0.025-0.035	0.060-0.080
Barclay Brook	*	*
Barren Neck Creek	0.020-0.035	0.055
Betty Brook	*	*
Big Brook	0.025-0.035	0.050-0.055
Big Brook Tributary H	*	*
Burkes Creek	0.025-0.040	0.050-0.100
Claypit Creek	0.016-0.050	0.080
Comptons Creek	0.018-0.060	0.080-0.100
Cranberry Brook	*	*
Deal Tributary 1	0.035-0.040	0.040-0.060
Deal Tributary 2	0.035-0.040	0.040-0.060
Deal Tributary 3	0.035-0.040	0.040-0.060
Deal Tributary 3A	0.035-0.040	0.040-0.060
Deal Tributary 4	0.035-0.040	0.040-0.060
Deal Tributary 4A	0.035-0.040	0.040-0.060
Debois Creek	0.025-0.035	0.040-0.080
Debois Creek Tributary	0.025-0.040	0.060-0.080
Deep Run	*	*
Deep Run Tributary A	*	*
Deep Run Tributary B	*	*
Deep Run Tributary C	*	*
Doctors Creek	0.030-0.050	0.050-0.080
East Creek	0.050-0.100	0.060-0.140
Flat Creek	0.014-0.060	0.070-0.100
Gander Brook	*	*
Gravelly Brook	*	*

*Data not available

TABLE 5 – MANNING'S "n" VALUES- continued

Stream	Channel "n"	Overbank "n"
Gravelly Run	0.018-0.040	0.040-0.100
Groundhog Brook	0.030-0.050	0.045-0.060
Hannabrand Brook	*	*
Haystack Brook	0.025-0.040	0.050-0.080
Heroys Pond Creek	*	*
Hockhockson Brook	0.025-0.035	0.055
Hog Swamp Brook	0.035-0.040	0.040-0.060
Hollow Brook	0.035-0.040	0.040-0.060
Indian Run	0.060-0.070	0.100-0.170
Judas Creek (Upstream Reach)	*	*
Jumping Brook 1	0.012-0.070	0.055-0.100
Jumping Brook 2	0.015-0.035	0.055
Little Silver Creek	*	*
Little Silver Creek Tributary A	*	*
Little Silver Creek Tributary I	*	*
Little Silver Creek Tributary II	*	*
Little Silver Creek Tributary II-A	*	*
Little Silver Creek Tributary II-B	*	*
Long Brook	0.025-0.045	0.050-0.080
Mac's Brook	*	*
Mahoras Brook	0.013-0.070	0.070-0.100
Manalapan Brook	0.035-0.053	0.035-0.100
Manalapan Brook Tributary A	*	*
Manalapan Brook Tributary B	*	*
Manasquan River	0.030	0.060-0.150
Manasquan River Tributary A	0.030-0.045	0.050-0.150
Manasquan River Tributary B	0.030-0.040	0.050-0.100
Manasquan River Tributary C	0.030-0.045	0.050-0.150
Marl Brook	0.035	0.055
Matawan Creek	0.018-0.040	0.040-0.100
Matchaponix Brook	*	*
McClees Creek	0.018-0.040	0.050-0.100
McGellairds Brook	0.030-0.080	0.040-0.100
Metedeconk River North Branch	0.045-0.060	0.050-0.070
Milford Brook	*	*
Millstone River	0.045	0.100
Mine Brook	0.013-0.035	0.055
Miry Bog Brook	0.015-0.035	0.045-0.055
Mohingson Brook	0.018-0.040	0.060-0.100
Monascunk Creek	0.013-0.070	0.060-0.100
Musquash Brook	*	*
Navesink River	*	*
Nut Swamp Brook	0.012-0.060	0.070-0.085
Parkers Creek	0.015-0.040	0.050-0.065

*Data not available

TABLE 5 – MANNING'S "n" VALUES – continued

Stream	Channel "n"	Overbank "n"
Parkers Creek, North Branch	0.015-0.040	0.050-0.065
Pine Brook 1	0.015-0.040	0.055
Pine Brook 2	*	*
Pine Brook Tributary C	*	*
Polypod Brook	0.030	0.060
Poly Pond Brook (Wall Township)	*	*
Poly Pond Brook (Spring Lake Heights)	*	*
Poplar Brook	0.035-0.050	0.040-0.070
Poplar Brook Tributary 1	0.035-0.040	0.040-0.060
Poplar Brook Tributary 2	0.035-0.040	0.040-0.060
Poplar Brook Tributary 3	0.035-0.040	0.040-0.060
Poricy Brook	0.014-0.040	0.060-0.150
Ramanessin Brook	0.035-0.040	0.055-0.065
Roberts Swamp Brook	*	*
Rocky Brook (Downstream Reach)	0.035-0.045	0.070-0.170
Rocky Brook (Upstream Reach)	0.030-0.040	0.060-0.090
Shark River	0.035	0.035
Shark River Tributary D	*	*
Shark River Tributary E	*	*
Shrewsberry River	*	*
Still House Brook	*	*
Swimming River	0.016-0.040	0.070-0.090
Tepehemus Brook	*	*
Tepehemus Brook South Branch	0.035-0.048	0.040-0.120
Toms River	0.035-0.050	0.060-0.110
Town Brook	0.013-0.060	0.050-0.090
Town Neck Creek	*	*
Turtle Mill Brook	*	*
Upper Yellow Brook	*	*
Waackaack Creek	0.014-0.080	0.013-0.100
Wampum Brook	0.015-0.040	0.050-0.065
Watson Creek	*	*
Weamaconk Creek	0.040-0.050	0.045-0.120
Weamaconk Creek Tributary	0.013-0.035	0.060
Wells Brook	*	*
Wemrock Brook	0.045-0.052	0.090
Whale Creek	0.018-0.040	0.060-0.100
Whale Pond Brook	0.015-0.075	0.030-0.070
Whale Pond Tributary 1	*	*
Whale Pond Tributary 2	*	*
Willow Brook	0.015-0.040	0.050-0.065
Willow Brook Tributary F	*	*
Willow Brook Tributary G	*	*
Willow Brook, East Branch	0.040-0.045	0.070

* Data not available

TABLE 5 – MANNING'S "n" VALUES – continued

Stream	Channel "n"	Overbank "n"
Wreck Pond East Branch	*	*
Wreck Pond Brook	*	*
Yellow Brook	0.015-0.040	0.045-0.080
Yellow Brook 2	0.030-0.040	0.050-0.080
Yellow Brook Tributary 2	0.030	0.040-0.060
Yellow Brook Tributary K	*	*
Yellow Brook Tributary L	*	*

* Data not available

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

All elevations are referenced to the North American Vertical Datum of 1988 (NAVD 88).

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

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

- Stability A: Monuments of the most reliable nature, expected to hold position/elevation well (e.g., mounted in bedrock)
- Stability B: Monuments which generally hold their position/elevation well (e.g., concrete bridge abutment)
- Stability C: Monuments which may be affected by surface ground movements (e.g., concrete monument below 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 monuments established by a local jurisdiction; these monuments will be shown on the FIRM with the appropriate designations. Local monuments will only be placed on the FIRM if the community has requested that they be included, and if the monuments meet the aforementioned NSRS inclusion criteria.

To obtain current elevation, description, and/or location information for 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 at www.ngs.noaa.gov.

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

3.3 Coastal Analyses

The FEMA, Region II office, initiated a study in 2009 to update the coastal storm surge elevations within the states of New York and New Jersey including the Atlantic Ocean, the Barnegat Bay, the Raritan Bay, the Jamaica Bay, the Long Island Sound and their tributaries. The study replaces outdated coastal analyses as well as previously published storm surge stillwater elevations for all FIS Reports in the study area, including Monmouth County, NJ, and serves as the basis for updated FIRMs. The coastal study for the New Jersey Atlantic Ocean coast and New York City coast was conducted for FEMA by RAMPP under contract HSFEHQ-09-D-0369 task order HSFE02-09-J-0001.

The region wide storm surge modeling system includes the Advanced Circulation Model for Oceanic, Coastal and Estuarine Waters (ADCIRC) for simulation of 2-dimensional hydrodynamics. ADCIRC was dynamically coupled to the unstructured numerical wave model Simulating Waves Nearshore (unSWAN) to calculate the contribution of waves to total storm surge (FEMA, 2010). The resulting model system is typically referred to as SWAN+ADCIRC (FEMA, 2010). A seamless modeling grid was developed to support the storm surge modeling efforts. The modeling system validation consisted of a comprehensive tidal calibration followed by a validation using carefully reconstructed wind and pressure fields for six major flood events for the region: the 1938 hurricane, the Great Atlantic Hurricane of 1944, Hurricane Donna, Hurricane Gloria, and two extra-tropical storms, from 1984 and 1992. Two of the more recent storm events, Hurricane Irene and Hurricane Sandy were not used in this study for validation. Both Hurricane Irene and Hurricane Sandy occurred during the study or after this storm surge study was completed. Hurricane Irene was a major rainfall event and did not produce major coastal tidal flooding. The climatology of Hurricane Sandy, at this time, is not well studied.

Model skill was assessed by quantitative comparison of model output to wind, wave, water level and high water mark observations. The model was then used to re-create 30 historical extra-tropical storms and 157 synthetic hurricanes to create a synthetic water elevation record from which the 10-, 2-, 1-, and 0.2- percent annual chance of exceedence elevations were determined.

Wave setup results in an increased water level at the shoreline due to the breaking of waves and transfer of momentum to the water column during hurricanes and severe storms. For the New York and New Jersey surge study, wave setup was determined directly from the coupled wave and storm surge model. The total stillwater elevation (SWEL) with wave setup was then used for the erosion and wave modeling.

The stillwater elevations for the 10-, 2-, 1-, and 0.2- percent annual chance floods determined for the primary sources of flooding in Monmouth County: the Atlantic Ocean, Manasquan River, Navesink River, Raritan Bay, Sandy Hook Bay, Shark River and Shrewsbury River are shown in Table 6, "Transect Data." The analyses reported herein reflect the stillwater elevations due to tidal and wind setup effects. If the elevation on the FIRM is higher than the elevation shown in this table, a wave height, wave runup, and/or wave setup component likely exists, in which case, the higher elevation should be used for construction and/or floodplain management purposes.

Coastal flooding is in the eastern part of Monmouth County. The Atlantic Ocean shoreline is comprised of steep bluffs with lower-lying areas towards the north and south ends. The majority of the shoreline is low-lying sandy beach with a variable height sand dune and is primarily backed by residential areas. The northernmost shoreline in Monmouth County is along the Raritan Bay and is primarily low-lying with a mix of marsh and residential areas. The Navesink River and Shrewsbury River impact much of the northeastern county, which is comprised of residential areas. The Navesink River shoreline is characterized by moderate to steep bluffs while much lower-lying topography characterizes the Shrewsbury River The southeastern portion of the county is primarily residential areas and is impacted by both the Shark River and Manasquan River.

The destructiveness of coastal flooding due to high stillwater elevations may be increased by wind-induced waves, which contribute to increased water levels and whose size and velocity may damage structures directly. The height of a wave is dependent upon wind speed and its duration, depth of water, and length of fetch. The tidal surge in the Atlantic Ocean affects 27 miles of Monmouth County coastline, and that entire length was modeled for overland wave hazards. The fetch length across the Raritan Bay and Sandy Hook Bay varies from approximately 3 to 13 miles, across Navesink River varies from approximately 0.2 to 1.9 miles, across Shrewsbury River varies from approximately 0.6 to 3 miles, across Shark River varies from approximately 0.5 to 1.7 miles and across Manasquan River varies from approximately 0.1 to 0.4 miles.

The coastal hydraulic analysis for this revision involved transect layout, field reconnaissance, erosion analysis, and overland wave modeling including wave height and wave run-up analysis. The analysis was carried out along the shoreline of the Atlantic Ocean, Raritan Bay, Sandy Hook Bay, Navesink River, Shrewsbury River, Shark River, and Manasquan River.

Transects represent the locations where the overland wave height analysis was modeled and are placed with consideration given to topography, land use, shoreline features and orientation, and the available fetch distance. Each transect was placed to capture the dominant wave direction, typically perpendicular to the shoreline and extended inland to a point where coastal flooding ceased. Along each transect, wave heights were computed considering the combined effects of changes in ground elevation, obstructions, and wind contributions. Transects were placed along the shoreline along all sources of primary flooding in Monmouth County, as illustrated on the FIRMs and in the "Transect Location Map" provided in Figure 2. Transects also represent locations visited during field reconnaissance to assist in parameterizing obstructions and observing shore protection features.

Erosion was modeled at transects where a dune was identified; this included sections of the Raritan Bay and most of the Atlantic Ocean shoreline. A review of the geology and shoreline type in Monmouth County supported using FEMA's standard erosion methodology for primary frontal dunes, referred to as the "540 rule," (FEMA, 2007). Beach profiles collected before and after Hurricane Sandy were also used to qualitatively assess the beach response during an extreme event and found to be in good agreement with standard erosion methodology.

Erosion was also modeled at steep bluffs vulnerable to a fetch greater than 5 mileswhere wave energy is highest (Hardaway, 1999), found along the Raritan Bay and the Atlantic Ocean. The field reconnaissance data along with imagery collected after Hurricane Sandy was used to identify the resilience of shore protection in preventing bluff erosion during storm events. For transects where bluff erosion was applicable, a retreat-style erosion method was applied allowing a minimum of 150 ft^2 of material to be eroded targeting a horizontal retreat distance between 10 and 30 ft, depending on the height of the bluff.

The methodology for analyzing the effects of wave heights associated with coastal storm surge flooding is described in a report prepared by the National Academy of Sciences (NAS) (NAS, 1977). This method is based on three major concepts. First, depth-limited waves in shallow water reach maximum breaking height that is equal to 0.78 times the total stillwater depth. The wave crest is 70 percent of the total wave height above the total stillwater level. The second major concept is that wave height may be diminished by dissipation of energy due to the presence of obstructions, such as sand dunes, dikes and seawalls, buildings and vegetation. The amount of energy dissipation is a function of the physical characteristics of the obstruction and is determined by procedures prescribed in NAS Report. The third major concept is that wave height can be regenerated in open fetch areas due to the transfer of wind energy to the water. This added energy is related to fetch length and depth.

Simulations of inland wave propagation were conducted using FEMA's Wave Height Analysis for Flood Insurance Studies (WHAFIS) model Version 4.0

(FEMA, August 2007). WHAFIS is a one-dimensional model that was applied to each transect in the study area. The model uses the total stillwater and starting wave information extracted from the coupled wave and storm surge model. In Table 6, "Transect Data," the 10-, 2-, 1-, and 0.2-percent annual chance stillwater elevations for each transect are provided along with the starting wave height and period. Simulations of wave transformations were then conducted with WHAFIS taking into account the storm-induced erosion and overland features of each transect. The model outputs the combined flood elevation from the total SWEL and wave height along each cross-shore transect allowing for the establishment of base flood elevations (BFEs) and flood zones from the shoreline to points inland within the study area. Wave heights were calculated to the nearest 0.1 foot, and BFEs were determined at whole-foot increments along the transects.

Wave runup is defined as the maximum vertical extent of wave uprush on a beach or structure. FEMA's 2007 Guidelines and Specifications require the 2% wave runup level be computed for the coastal feature being evaluated (cliff, coastal bluff, dune, or structure) (FEMA, February 2007). The 2% runup level is the highest 2 percent of wave runup affecting the shoreline during the 1-percent-annual-chance flood event. Each transect defined within the Region II study area was evaluated for the applicability of wave runup, and if necessary, the appropriate runup methodology was selected and applied to each transect. Runup elevations were then compared to WHAFIS results to determine the dominant process affecting BFEs and associated flood hazard levels. Based on wave runup rates, wave overtopping was computed following the FEMA 2007 Guidelines and Specifications.

The results of the overland wave height and runup calculations are accurate until local topography, vegetation, or cultural development within the community undergoes major changes. Consequently between transects, elevations were interpolated using topographic maps, land-use and land-cover data, and engineering judgment to determine the extent of coastal flood zones.

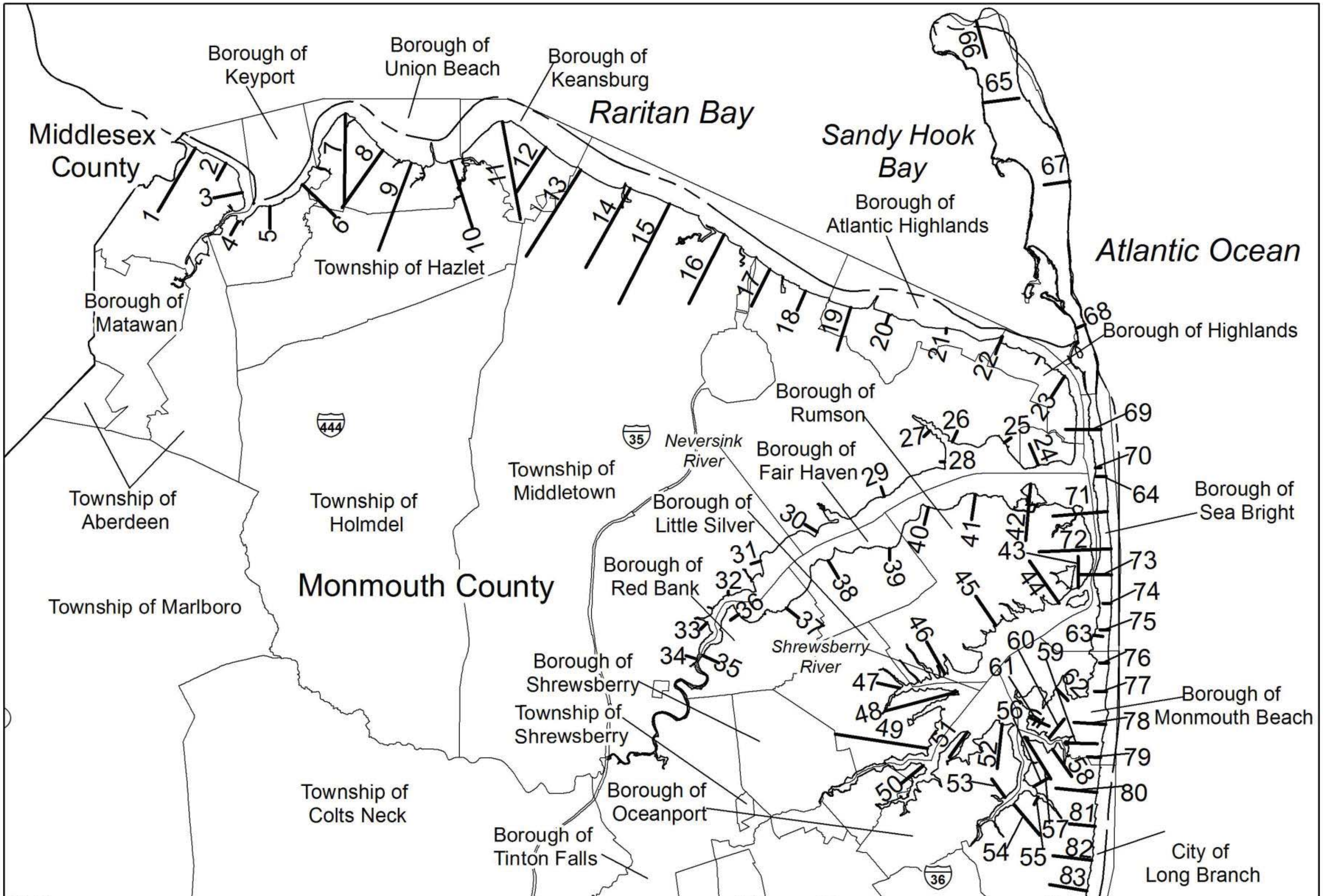

Figure 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

MONMOUTH COUNTY, NEW JERSEY (ALL JURISDICTIONS)

TRANSECT LOCATION MAP

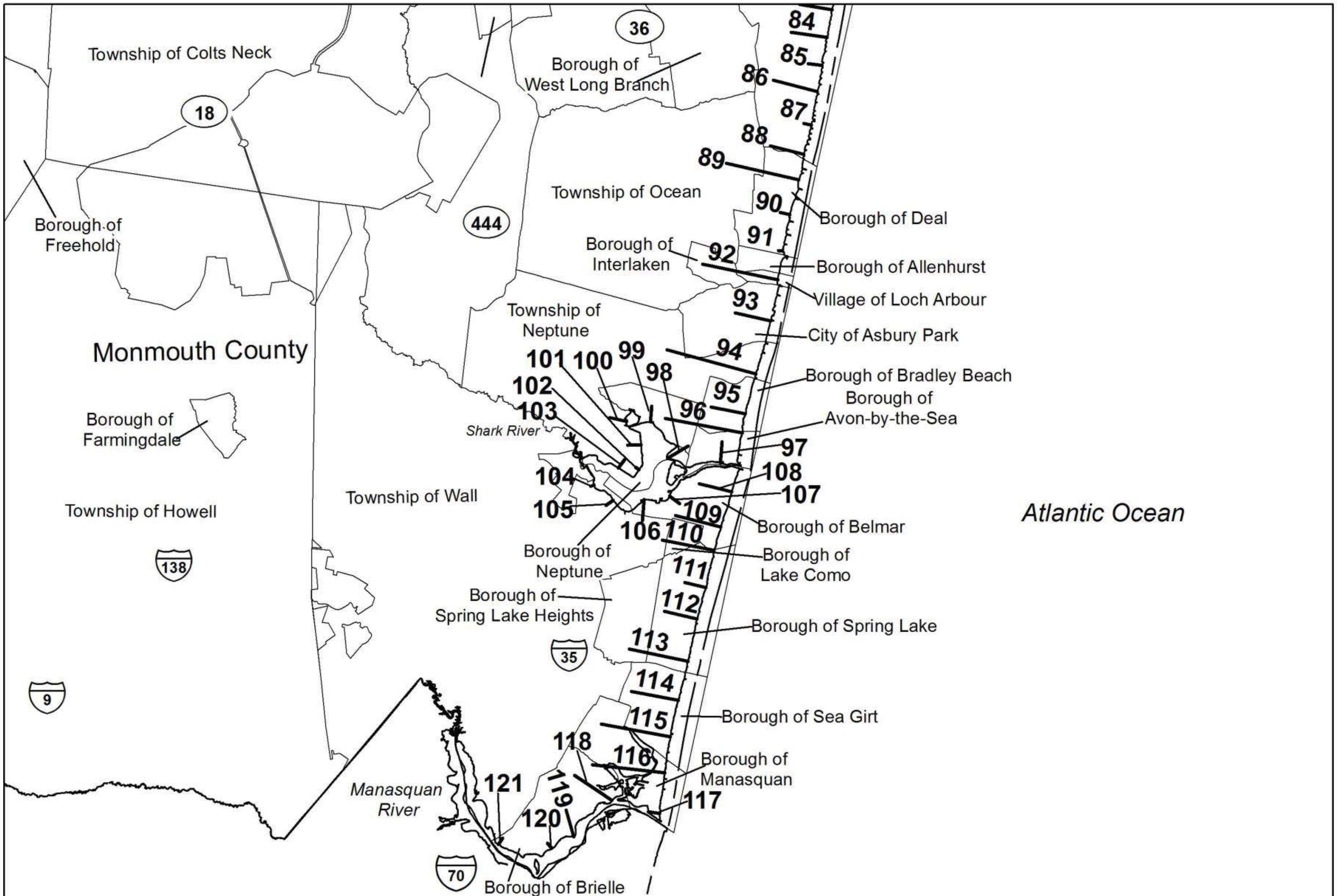

Figure 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

MONMOUTH COUNTY, NEW JERSEY (ALL JURISDICTIONS)

Approximate Scale

0 1 2 4 6 8 Miles

TRANSECT LOCATION MAP

Table 6 - Transect Data								
		Starting Wave Conditions for the 1% Annual Chance			Starting Stillwater Elevations (ft NAVD88) Range of Stillwater Elevations*(ft NAVD88)			
Flood Source	**Transect**	**Coordinates**	**Significant Wave Height Tp (sec)**	**Peak Wave Period Tp (sec)**	**10% Annual Chance**	**2% Annual Chance**	**1% Annual Chance**	**0.2% Annual Chance**
Raritan Bay	1	N 40.451371 W 74.220314	5.65	6.31	8.2	11.2 11 - 11.2	12.8 12.4 - 12.8	16.2 16.2 - 16.6
Raritan Bay	2	N 40.448213 W 74.211952	5.55	6.08	8.2	11.3 11.2 - 11.3	12.6	16.0
Raritan Bay	3	N 40.442110 W 74.207530	4.31	4.72	8.2 8.2 - 8.3	11.3 11.3 - 11.4	12.5 12.4 - 12.7	16.0 16.0 - 16.2
Raritan Bay	4	N 40.436054 W 74.208669	3.56	4.40	8.3	11.3	12.7	16.1
Raritan Bay	5	N 40.439208 W 74.200053	4.44	4.67	8.2	11.2 11.2 - 11.3	12.6	15.9 15.9 – 16.0
Raritan Bay	6	N 40.443681 W 74.191151	5.15	4.86	8.0 7.9 - 8.1	11.1 10.9 - 11.1	12.4 12.1 - 12.5	15.9 15.8 - 15.9
Raritan Bay	7	N 40.458400 W 74.179329	5.44	6.43	7.9 7.9 – 8.0	10.9 10.9 - 11	12.2 11.9 - 12.8	15.5 15.5 - 15.8
Raritan Bay	8	N 40.450795 W 74.169231	5.38	6.16	8.0 8.0 - 8.1	11.1 11.0 - 11.1	12.2 11.8 - 12.8	15.6 15.5 - 16.3
Raritan Bay	9	N 40.448123 W 74.161467	5.30	5.79	7.9 7.9 - 8	10.8 10.8 - 10.9	12.1 11.9 - 12.7	15.4 15.3 - 15.7
Raritan Bay	10	N 40.448498 W 74.150587	5.24	5.7	7.9 7.8 - 7.9	10.7 9.9 - 10.8	12.0 11.2 - 12.1	15.3 14.5 - 15.4
Raritan Bay	11	N 40.456673 W 74.136671	5.33	6.90	7.7 7.7 - 7.8	10.4 9.7 - 10.4	11.8 11.0 - 11.8	15.0 13.8 – 15.0
Raritan Bay	12	N 40.451262 W 74.124778	5.38	7.34	7.7 7.7 - 7.8	10.5 9.6 - 10.5	11.8 10.9 - 11.8	15.0 13.7 – 15.0
Raritan Bay	13	N 40.446558 W 74.115301	5.30	6.81	7.7 7.7 - 7.8	10.5 9.4 - 10.5	11.7 10.3 - 11.7	14.9 13.3 - 14.9
Raritan Bay	14	N 40.442664 W 74.101888	4.92	5.05	7.6 7.4 - 7.8	10.2 9.3 - 10.2	11.6 10.2 - 11.6	14.8 13.3 - 14.8
Raritan Bay	15	N 40.439381 W 74.091143	4.97	5.35	7.6 7.3 - 7.6	10.3 9.5 - 10.3	11.5 10.7 - 11.5	14.5 13.6 - 14.5
Raritan Bay	16	N 40.432984 W 74.076420	4.81	4.86	7.6 7.5 - 7.7	10.2 9.8 - 10.3	11.5 10.8 - 11.6	14.6 14.1 – 15.0
Raritan Bay	17	N 40.425673 W 74.063999	4.60	4.33	7.5 7.5 - 7.7	10.2 10.2 - 10.4	11.4 11.4 - 11.6	14.6 14.6 – 15.0
Raritan Bay	18	N 40.425673 W74.054254	4.45	4.09	7.5	10.1	11.3 11.3 - 11.4	14.5
Sandy Hook Bay	19	N 40.417655 W 74.042010	4.38	4.00	7.4	10.1 10.0 - 10.1	11.3 10.8 - 11.3	14.4 14.3 - 14.4

* For Transects with a constant Stillwater Elevation,only one number is provided to represent both the starting value and the range.

Table 6 - Transect Data- continued								
		Starting Wave Conditions for the 1% Annual Chance			**Starting Stillwater Elevations (ft NAVD88) Range of Stillwater Elevations*(ft NAVD88)**			
Flood Source	**Transect**	**Coordinates**	**Significant Wave Height Tp (sec)**	**Peak Wave Period Tp (sec)**	**10% Annual Chance**	**2% Annual Chance**	**1% Annual Chance**	**0.2% Annual Chance**
Sandy Hook Bay	20	N 40.416046 W 74.031589	4.06	4.07	7.4 7.4 - 7.5	10.1	11.3 11.1 - 11.4	14.5 14.4 - 14.7
Sandy Hook Bay	21	N 40.413180 W 74.016022	3.81	3.66	7.4	10.0	11.2	14.4
Sandy Hook Bay	22	N 40.411452 W 74.000799	3.38	3.17	7.3	9.9	11.1 10.8 - 11.1	14.4 14.3 - 14.4
Sandy Hook Bay	23	N 40.403082 W 73.983908	2.50	2.76	7.0	9.6 9.3 - 9.6	10.8 10.6 - 10.8	14.1 13.8 - 14.1
Navesink River	24	N 40.384637 W 73.991211	1.94	2.54	6.1	8.3	9.2	11.5
Navesink River	25	N 40.389344 W 74.000402	2.75	2.85	6.1	8.3	9.3	11.6
Navesink River	26	N 40.389562 W 74.014560	2.13	2.65	6.2	8.4	9.4 9.2 - 9.4	11.8 11.7 - 11.8
Navesink River	27	N 40.391926 W 74.020586	0.75	1.52	6.2	8.5	9.5	11.9 11.9 – 12.0
Navesink River	28	N 40.385374 W 74.016685	2.44	2.86	6.2	8.5	9.4	11.8
Navesink River	29	N 40.378309 W 74.033190	2.31	2.70	6.3	8.6	9.6	11.8
Navesink River	30	N 40.370936 W 74.051467	2.19	2.61	6.4	8.7	9.7	11.9
Navesink River	31	N 40.365005 W 74.066900	1.99	2.42	6.5	8.9	9.8	12.1
Navesink River	32	N 40.357945 W 74.075691	1.41	2.15	6.6	8.9	9.9	12.0
Navesink River	33	N 40.352203 W 74.081575	1.41	2.15	6.6	9.0	9.9	12.1
Navesink River	34	N 40.344621 W 74.084364	0.65	1.51	6.7 6.6 - 6.7	9.0 8.9 – 9.0	9.9 9.8 - 9.9	12.1
Navesink River	35	N 40.345389 W 74.082850	0.65	1.51	6.7 6.4 - 6.7	9.0 8.8 – 9.0	9.9 9.7 - 9.9	12.1 11.9 - 12.1
Navesink River	36	N 40.353934 W 74.072885	1.70	2.29	6.6	8.9	9.8	12.0
Navesink River	37	N 40.355192 W 74.059987	1.99	2.42	6.5	8.8	9.8	11.9
Navesink River	38	N 40.365036 W 74.048546	2.20	2.67	6.4	8.7	9.7	11.9

* For Transects with a constant Stillwater Elevation,only one number is provided to represent both the starting value and the range.

Table 6 - Transect Data- continued

			Starting Wave Conditions for the 1% Annual Chance		Starting Stillwater Elevations (ft NAVD88) Range of Stillwater Elevations*(ft NAVD88)			
Flood Source	Transect	Coordinates	Significant Wave Height Tp (sec)	Peak Wave Period Tp (sec)	10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Navesink River	39	N 40.367463 W 74.031814	2.33	2.70	6.3	8.6	9.5	11.7
Navesink River	40	N 40.375956 W 74.021214	2.44	2.74	6.2	8.5	9.4	11.7
Navesink River	41	N 40.378637 W 74.008410	2.66	2.76	6.2	8.3 8.3 - 8.4	9.3	11.6
Navesink River	42	N 40.380712 W 73.993320	1.31	2.15	6.1	8.3	9.2 9.1 - 9.2	11.5 11.4 - 11.5
Shrewsbur y River	43	N 40.359054 W 73.980500	0.84	1.64	5.0 4.8 - 5.4	6.7 6.6 - 6.7	7.4 7.2 - 7.4	8.8
Shrewsbur y River	44	N 40.355856 W 73.985770	1.62	2.41	5.1 4.8 - 5.1	6.8 6.6 - 6.8	7.4 7.2 - 7.6	8.9 8.8 - 8.9
Shrewsbur y River	45	N 40.351259 W 74.003005	1.93	2.40	5.1	6.9	7.4 7.3 - 7.6	9.0 8.9 – 9.0
Little Silver Creek	46	N 40.341352 W 74.017017	1.84	2.30	5.2 5.1 - 5.2	7.0 6.8 – 7.0	7.6 7.4 - 7.7	9.0 9.0 - 9.1
Little Silver Creek	47	N 40.338419 W 74.029171	1.25	1.97	5.3 5.2 - 5.3	7.0	7.7 7.6 - 7.7	9.2 9.1 - 9.2
Little Silver Creek	48	N 40.337520 W 74.013620	1.94	2.45	5.2 5.0 - 5.5	6.9 6.8 - 6.9	7.6 7.5 - 7.7	9.0 8.9 - 9.2
Shrewsbur y River	49	N 40.325768 W 74.021775	1.34	2.08	5.3 5.3 - 5.5	7.0 6.9 – 7.0	7.6 7.5 - 7.7	9.0 8.9 – 9.0
Shrewsbur y River	50	N 40.322212 W 74.022897	1.19	1.91	5.3 5.2 - 5.3	7.0 6.8 – 7.0	7.6 7.5 - 7.6	9.0
Shrewsbur y River	51	N 40.329165 W 74.010867	1.97	2.45	5.2 5.2 - 5.5	6.9	7.6 7.5 - 7.6	8.9 8.9 – 9.0
Shrewsbur y River	52	N 40.330744 W 74.001413	1.91	2.43	5.2	6.9 6.8 - 6.9	7.5 7.3 - 7.7	8.9 8.8 - 8.9
Branchport Creek	53	N 40.315521 W 74.000702	0.87	1.60	5.2	6.9 6.8 - 6.9	7.4	8.8
Branchport Creek	54	N 40.313983 W 73.998367	0.92	1.61	5.2	6.9	7.4 6.9 - 7.6	8.8 8.2 - 8.8
Troutmans Creek	55	N 40.315544 W 73.991770	0.55	1.26	5.2	6.9	7.5	8.9
Troutmans Creek	56	N 40.317723 W 73.992964	1.18	1.91	5.2	6.8 6.7 - 6.8	7.4 7.2 - 7.6	8.8 8.7 - 8.8
Manahasse tt Creek	57	N 40.328067 W 73.995289	1.71	2.14	5.2	6.8 6.5 - 6.8	7.4 7.2 - 7.6	8.8 8.7 - 8.8
Manahasse tt Creek	58	N 40.325457 W 73.987850	0.92	1.76	5.2	6.8 6.5 - 6.8	7.4 7.3 - 7.4	8.8 8.7 – 9.0

* For Transects with a constant Stillwater Elevation,only one number is provided to represent both the starting value and the range.

Table 6 - Transect Data- continued								
		Starting Wave Conditions for the 1% Annual Chance			Starting Stillwater Elevations (ft NAVD88) Range of Stillwater Elevations*(ft NAVD88)			
Flood Source	**Transect**	**Coordinates**	**Significant Wave Height Tp (sec)**	**Peak Wave Period Tp (sec)**	**10% Annual Chance**	**2% Annual Chance**	**1% Annual Chance**	**0.2% Annual Chance**
Manahassett Creek	59	N 40.326799 W 73.984531	0.87	1.61	5.2	6.8 6.7 - 6.8	7.5 7.3 – 9.0	8.9 8.8 - 9.3
Manahassett Creek	60	N 40.327868 W 73.988719	0.94	1.76	5.2	6.9 6.7 - 6.9	7.5 7.2 - 7.6	8.9 8.7 - 8.9
Manahassett Creek	61	N 40.332107 W 73.994179	1.88	2.38	5.2 5.1 - 5.2	6.9 6.7 - 6.9	7.5 7.2 - 7.6	8.9 8.7 - 8.9
Shrewsbury River	62	N 40.338154 W 73.986729	1.84	2.52	5.1	6.7	7.4 7.1 - 7.4	8.8 8.6 - 8.8
Shrewsbury River	63	N 40.349124 W 73.976423	1.80	2.31	5.1	6.7 6.5 - 6.7	7.3 7.0 - 7.3	8.7 8.5 - 8.7
Navesink River	64	N 40.383998 W 73.975775	2.46	3.22	6.0	8.3	9.2 9.2 - 9.3	11.6 11.5 - 13.4
Atlantic Ocean	65	N 40.460099 W 74.005711	4.00	3.82	7.2	9.9 9.0 - 9.9	11.1 10.3 - 11.1	14.4 14.0 - 14.4
Atlantic Ocean	66	N 40.477181 W 74.007428	5.12	10.39	7.1 7.1 - 7.2	9.7 9.4 - 10.1	10.8 10.6 - 11.6	13.8 13.3 - 14.7
Atlantic Ocean	67	N 40.443703 W 73.982161	5.01	11.94	7.1 7.1 - 7.2	9.5 9.4 - 9.6	10.5 10.0 - 10.9	13.1 13.1 - 14.4
Atlantic Ocean	68	N 40.413810 W 73.978192	4.95	11.53	6.9 6.9 - 7.2	9.3 9.3 - 9.8	10.4 10.4 - 10.9	13.1 13.1 - 14.4
Atlantic Ocean	69	N 40.391966 W 73.974095	5.01	11.92	6.8 6.1 - 6.9	9.3 8.2 - 9.5	10.5 9.3 - 10.8	13.3 11.7 - 13.8
Atlantic Ocean	70	N 40.382237 W 73.972799	4.84	11.97	6.8 6.0 - 6.8	9.1 8.1 - 9.1	10.2 9.1 - 10.2	12.9 11.4 - 13.2
Atlantic Ocean	71	N 40.374856 W 73.972535	4.86	12.03	6.8 5.9 - 6.8	9.1 7.9 - 9.1	10.2 8.9 - 10.2	13.1 11.2 - 13.3
Atlantic Ocean	72	N 40.367081 W 73.971503	4.82	12.06	6.8 5.7 - 6.9	9.1 7.4 - 9.2	10.1 8.5 - 10.7	12.7 10.4 - 14.7
Atlantic Ocean	73	N 40.361717 W 73.971428	4.83	12.05	6.8 4.9 - 6.9	9.1 6.6 - 9.2	10.1 7.2 - 10.1	12.6 8.7 - 12.7
Atlantic Ocean	74	N 40.355795 W 73.971624	4.89	11.99	6.9 5 - 7	8.9 6.6 - 8.9	10.3 7.0 - 10.3	12.7 8.5 - 12.7
Atlantic Ocean	75	N 40.350267 W 73.972055	4.81	11.91	6.8 5.0 - 6.8	9.1 6.5 - 9.1	10.1 7.3 - 10.1	12.6 8.5 - 12.7
Atlantic Ocean	76	N 40.343408 W 73.972439	4.74	12.56	6.6 5.1 - 6.6	8.9 6.5 - 8.9	9.9 7.2 - 9.9	12.5 8.5 - 12.7
Atlantic Ocean	77	N 40.337336 W 73.973017	4.96	12.76	6.9 5.1 - 7.1	8.9 6.6 - 8.9	10.4 7.1 - 10.5	12.9 8.7 – 13.0
Atlantic Ocean	78	N 40.330540 W 73.973335	4.85	12.53	6.8 5.2 - 6.8	9.1 6.7 - 9.1	10.1 7.2 - 10.1	12.7 8.7 - 12.7

* For Transects with a constant Stillwater Elevation, only one number is provided to represent both the starting value and the range.

Table 6 - Transect Data- continued								
		Starting Wave Conditions for the 1% Annual Chance		Starting Stillwater Elevations (ft NAVD88) Range of Stillwater Elevations*(ft NAVD88)				
Flood Source	Transect	Coordinates	Significant Wave Height Tp (sec)	Peak Wave Period Tp (sec)	10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Atlantic Ocean	79	N 40.323710 W 73.974741	5.11	12.58	6.9 6.8 – 7.0	9.2 6.7 - 9.2	10.7 8.9 - 10.9	13.5 9.3 - 13.8
Atlantic Ocean	80	N 40.316439 W 73.975776	4.89	12.49	6.9 6.9 - 7	9.3 6.6 - 9.3	10.2 7.3 - 10.2	12.9 8.7 - 13.2
Atlantic Ocean	81	N 40.309351 W 73.976354	4.87	12.56	7.0 5.1 – 7.0	9.2 6.7 - 9.3	10.2 7.2 - 10.3	12.6 8.7 - 12.7
Atlantic Ocean	82	N 40.302301 W 73.977270	5.09	12.86	6.9	9.5 9.5 - 9.7	10.6 10.6 - 10.9	13.5 8.7 - 13.8
Atlantic Ocean	83	N 40.295961 W 73.978665	5.07	12.79	6.8 6.8 - 6.9	9.5 9.5 - 9.7	10.6 10.6 - 10.9	13.4 13.4 - 13.8
Atlantic Ocean	84	N 40.289373 W 73.980291	4.93	12.67	6.9	9.3 9.2 - 9.3	10.3 10.2 - 10.3	12.8 12.8 - 12.9
Atlantic Ocean	85	N 40.282688 W 73.981917	4.86	12.79	7.0	9.2	10.2 10.1 - 10.2	12.6
Atlantic Ocean	86	N 40.276426 W 73.983336	4.85	13.06	7.0	9.1	10.1	12.5 11.4 - 12.5
Atlantic Ocean	87	N 40.268415 W 73.985316	4.78	12.97	7.0	9.0	10.0	12.5
Atlantic Ocean	88	N 40.261504 W 73.987760	4.84	13.15	6.9	9.2	10.1	12.7
Atlantic Ocean	89	N 40.255437 W 73.989286	4.88	13.06	6.9 6.7 – 7.0	9.1	10.2	12.4 11.4 - 12.4
Atlantic Ocean	90	N 40.247194 W 73.992204	4.96	12.90	6.9	9.2	10.4 10.3 - 10.4	12.7
Atlantic Ocean	91	N 40.238440 W 73.994480	4.86	13.26	7.0	9.1	10.1	12.9
Atlantic Ocean	92	N 40.231594 W 73.996044	4.88	13.16	7.0	9.1	10.2	12.6 11.4 - 12.6
Atlantic Ocean	93	N 40.221769 W 73.998285	4.78	13.21	6.8	9.0	10.0 10.0 - 10.1	12.6 11.4 - 12.7
Atlantic Ocean	94	N 40.209220 W 74.002970	4.80	13.77	6.9	9.1	10.0 10 - 10.1	12.1 11.4 - 12.1
Atlantic Ocean	95	N 40.199702 W 74.006314	4.86	14.03	7.0	9.2	10.1	12.5

* For Transects with a constant Stillwater Elevation,only one number is provided to represent both the starting value and the range.

Table 6 - Transect Data- continued								
		Starting Wave Conditions for the 1% Annual Chance			Starting Stillwater Elevations (ft NAVD88) Range of Stillwater Elevations*(ft NAVD88)			
Flood Source	Transect	Coordinates	Significant Wave Height Tp (sec)	Peak Wave Period Tp (sec)	10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Atlantic Ocean	96	N 40.195123 W 74.007373	4.78	13.90	7.0 6.9 – 7.0	9.1 8.9 - 9.1	10.0 9.9 - 10	12.2 11.4 - 12.2
Shark River	97	N 40.188019 W 74.014234	0.51	1.34	6.8 6.6 - 6.8	8.9 8.8 - 8.9	9.7 9.6 - 9.9	11.5 11.5 - 11.9
Shark River	98	N 40.189250 W 74.030641	1.94	2.42	6.9 6.8 - 6.9	8.9 8.8 - 8.9	9.7 9.4 - 9.7	11.3 11.1 - 11.3
Shark River	99	N 40.197917 W 74.035948	2.39	2.54	6.9 6.8 - 6.9	9.0 8.9 - 9	9.8 9.7 - 9.8	11.5
Shark River	100	N 40.198015 W 74.043237	0.94	1.70	6.9 6.7 - 6.9	9	9.8	11.6 11.5 - 11.7
Shark River	101	N 40.192477 W 74.038778	2.39	2.54	6.9 6.8 - 6.9	9.0 8.8 – 9.0	9.8 9.6 - 9.8	11.4 11.4 - 11.5
Shark River	102	N 40.186509 W 74.039507	2.20	2.52	6.9	9.0	9.8	11.4
Shark River	103	N 40.186984 W 74.046010	2.10	2.63	7.0	9.1 8.8 - 9.1	9.8 9.7 - 9.8	11.5 11.4 - 11.5
Shark River	104	N 40.182881 W 74.053515	2.11	2.63	7.1	9.1	9.9	11.5
Shark River	105	N 40.179254 W 74.047587	1.87	2.41	7.0	9.1	9.8	11.4
Shark River	106	N 40.179388 W 74.038059	2.07	2.42	7.0	9.0 8.9 – 9.0	9.7 9.6 - 9.7	11.3 11.1 - 11.3
Shark River	107	N 40.180156 W 74.030081	2.03	2.42	6.9	8.9	9.7	11.3 11.1 - 11.3
Atlantic Ocean	108	N 40.181181 W 74.010693	4.75	13.98	6.8	9.0 8.9 – 9.0	9.9 9.9 - 10	12.3 11.4 - 12.6
Atlantic Ocean	109	N 40.172735 W 74.014142	4.79	14.23	6.7	9.0	10.0 10 - 10.1	12.7 11.4 - 12.9
Atlantic Ocean	110	N 40.167183 W 74.016335	4.83	14.1	7.0 6.8 – 7.0	9.1 8.9 - 9.1	10.1	12.4 11.4 - 12.4
Atlantic Ocean	111	N 40.158336 W 74.018958	4.78	14.02	6.8	9.0	10.0	12.5 12.5 - 12.9
Atlantic Ocean	112	N 40.150813 W 74.021712	4.86	13.98	7.2	9.2	10.1	12.3
Atlantic Ocean	113	N 40.140770 W 74.024579	4.86	13.88	6.7	9.1 8.5 - 9.1	10.1 10.0 - 10.2	12.8 11.4 - 12.9
Atlantic Ocean	114	N 40.131500 W 74.027673	4.77	14.18	6.9	9.1	9.9	12.4 12.4 - 12.5
Atlantic Ocean	115	N 40.122756 W 74.030242	4.96	14.33	7.2 6.3 - 7.2	9.0 8.1 – 9.0	10.3 8.7 - 10.4	13.1 10.0 - 13.1

* For Transects with a constant Stillwater Elevation,only one number is provided to represent both the starting value and the range.

Table 6 - Transect Data- continued								
		Starting Wave Conditions for the 1% Annual Chance			**Starting Stillwater Elevations (ft NAVD88) Range of Stillwater Elevations*(ft NAVD88)**			
Flood Source	**Transect**	**Coordinates**	**Significant Wave Height Tp (sec)**	**Peak Wave Period Tp (sec)**	**10% Annual Chance**	**2% Annual Chance**	**1% Annual Chance**	**0.2% Annual Chance**
Atlantic Ocean	116	N 40.114163 W 74.031969	4.91	14.25	7.3 6.2 - 7.4	9.3 7.9 - 9.3	10.2 8.8 - 10.2	12.3 10.0 - 12.3
Atlantic Ocean	117	N 40.104535 W 74.033591	4.84	14.25	7.2 6.6 - 7.3	9.2 8 - 9.2	10.1 8.7 - 10.5	12.4 9.9 - 12.8
Manasquan River	118	N 40.107688 W 74.048508	1.98	2.48	6.6	8.3 8.1 - 8.3	8.9 8.7 – 9.0	10.2 9.9 - 10.2
Manasquan River	119	N 40.099038 W 74.060363	1.84	2.28	6.6 6.4 - 6.6	8.3	8.9 8.9 – 9.0	10.1 10.0 - 10.1
Manasquan River	120	N 40.097273 W 74.083835	2.00	2.38	6.6	8.4	9.0	10.1
Manasquan River	121	N 40.097273 W 74.083835	0.92	1.69	6.8	8.5	9.1	10.3

* For Transects with a constant Stillwater Elevation,only one number is provided to represent both the starting value and the range.

Areas of coastline subject to significant wave attack are referred to as coastal high hazard zones. The USACE has established the 3-foot breaking wave as the criterion for identifying the limit of coastal high hazard zones. The 3-foot wave has been determined to be the minimum size wave capable of causing major damage to conventional wood frame or brick veneer structures. The one exception to the 3-foot wave criteria is where a primary frontal dune exists. The limit of the coastal high hazard area then becomes the landward toe of the primary frontal dune or where a 3-foot or greater breaking wave exists, whichever is most landward. The coastal high hazard zone is depicted on the FIRMs as Zone VE, where the delineated flood hazard includes wave heights equal to or greater than three feet. Zone AE is depicted on the FIRMs where the delineated flood hazard includes wave heights less than three feet. A depiction of how the Zones VE and AE are mapped is shown in Figure 3, "Transect Schematic.".

Post-storm field visits and laboratory tests have confirmed that wave heights as small as 1.5 feet can cause significant damage to structures when constructed without consideration to the coastal hazards. Additional flood hazards associated with coastal waves include floating debris, high velocity flow, erosion, and scour which can cause damage to Zone AE-type construction in these coastal areas. To help community officials and property owners recognize this increased potential for damage due to wave action in the AE zone, FEMA issued guidance in December 2008 on identifying and mapping the 1.5-foot wave height line, referred to as the Limit of Moderate Wave Action (LiMWA). While FEMA does not impose floodplain management requirements based on the LiMWA, the LiMWA is provided to help communicate the higher risk that exists in that area. Consequently, it is important to be aware of the area between this inland limit and the Zone VE boundary as it still poses a high risk, though not as high of a risk as Zone VE, see Figure 3, "Transect Schematic."

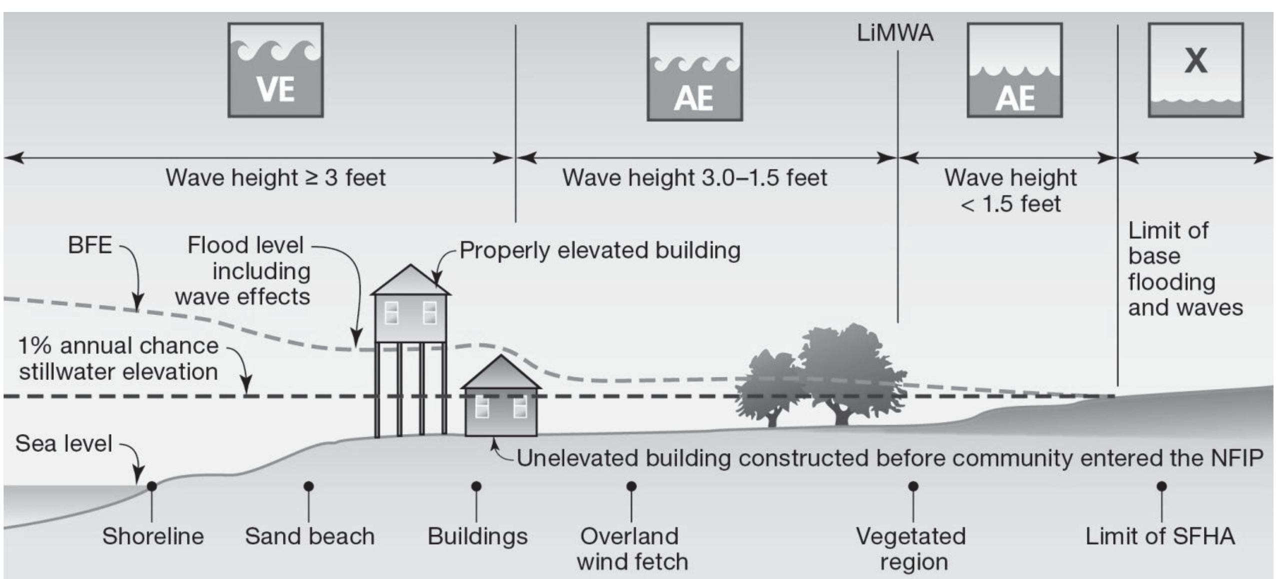

Figure 3: Transect Schematic

3.4 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 North American Vertical Datum of 1988 (NAVD 88), many FIS reports and FIRMs are being prepared using NAVD 88 as the referenced vertical datum.

All flood elevations shown in this 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 disagreement in datum may result in apparent differences in base flood elevations across the corporate limits between the communities for equivalent flood depths.

Prior versions of the FIS report and FIRM were referenced to NGVD 29. When a datum conversion is effected for an FIS report and FIRM, the Flood Profiles and base flood elevations (BFEs) reflect the new datum values. To compare structure and ground elevations to 1-percent annual chance flood elevations shown in the FIS and on the FIRM, the subject structure and ground elevations must be referenced to the new datum values.

As noted above, the elevations shown in the FIS report and on the FIRMs for Monmouth 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 to NGVD 29 is +1.1. The conversion between the datums may be expressed as an equation:

NAVD 88 + 1.1 feet = NGVD 29

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

For more information on NAVD 88, see Converting the National Flood Insurance Program to the North American Vertical Datum of 1988, FEMA Publication FIA-20/June 1992, or contact the Spatial Reference System Division, National Geodetic Survey, NOAA, Silver Spring Metro Center, 1315 East-West Highway, Silver Spring, Maryland 20910 (Internet address http://www.ngs.noaa.gov).

4.0 FLOODPLAIN MANAGEMENT APPLICATIONS

The NFIP encourages State and local governments to adopt sound floodplain management programs. To assist in this endeavor, each FIS 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 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 county. 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.

Floodplain delineation was based on topographic data provided by Monmouth County. This data were derived from April 2003 aerial photogrammetry.

Similarly, using datum-converted effective flood profiles for non-revised, detailed streams, all flood boundaries were made current with the topography supplied by Monmouth County.

In the Township of Aberdeen, aerial photographs at a scale of 1:9,600 and 1:12,000 were used to delineate floodplain boundaries between cross sections, as well as topographic maps at a scale of 1"=400' with a 4-foot contour interval. Information was supplemented by 7.5-Minute Series Topographic Maps at a scale of 1:24,000 and contour interval of 20 feet.

In the Borough of Allenhurst, aerial contour maps at a scale of 1"=500' and a 2-foot contour interval were used to delineate floodplain boundaries between cross sections, as well as 7.5-Minute Series Topographic Maps at a scale of 1:24,000 and contour interval of 20 feet.

In the Borough of Allentown, aerial photographs and topographic maps at a scale of 1:2,400 and 5-foot contour interval were used to delineate floodplain boundaries between cross sections, as well as 7.5-Minute Series Topographic Maps at a scale of 1:24,000 and 10-foot contour interval.

In the City of Asbury Park, floodplain boundaries between cross sections were interpolated using aerial contour maps at a scale of 1:6,000 with a 2-foot contour interval, as well as 7.5-Minutes Series Topographic Maps at a scale of 1:24,000 and a 20-foot contour interval.

In the Borough of Avon-by-the-Sea, aerial photographs and topographic maps at a scale of 1:6,000 and contour interval of 2 feet were used to delineate floodplain boundaries between cross sections, as well as 7.5-Minute Series topographic maps at a scale of 1:24,000 and contour interval of 20 feet.

In the Borough of Belmar, floodplain boundaries between cross sections were interpolated using aerial photographs at a scale of 1:12,000, topographic maps at a scale of 1:2,400 with a 4-foot contour interval, as well as 7.5-Minute Series topographic maps at a scale of 1:24,000 and a 20-foot contour interval.

In the Borough of Bradley Beach, floodplain boundaries between cross sections were interpolated using aerial photographs and topographic maps at a scale of 1:6,000 with a 2-foot contour interval, and 7.5-Minute Series topographic maps at a scale of 1:24,000 with a 20-foot contour interval.

In the Borough of Brielle, aerial contour maps of a 1:6,000 scale and 2-foot contour interval were used to delineate floodplain boundaries between cross sections, as well as aerial contour maps of a 1:2,400 scale with a 5-foot contour interval. Additionally, 7.5-Minute Series topographic maps were used, with a scale of 1:24,000 and 20-foot contour interval.

In the Township of Colts Neck, floodplain boundaries between cross sections were interpolated using topographic maps of 1:2,400 scale with a 5-foot contour interval.

In the Borough of Deal, aerial photographs and aerial plotting plates at a scale of 1:12,000 were used to delineate floodplain boundaries between cross sections, as well as topographic maps at scales of 1:24,000 and 1:2,400 with contour intervals of 4 feet. Additionally, 7.5-Minute Series topographic maps at a scale of 1:24,000 with a 20-foot contour interval were used.

In the Borough of Eatontown, topographic maps of Northeast Monmouth County, at a scale of 1:1,200 and a one-foot contour interval, were used to delineate floodplain boundaries between cross sections, as well as 7.5-Minute Series topographic maps at a scale of 1:24,000 and a 20-foot contour interval.

In the Borough of Englishtown, topographic maps sheets at a scale of 1"=200' and a contour interval of 5 feet were used to delineate floodplain boundaries between cross sections, as well as 7.5-Minute Series topographic maps at a scale of 1:24,000 and a 20-foot contour interval.

In the Borough of Fair Haven, floodplain boundaries between cross sections were interpolated using topographic maps of Northeast Monmouth County, at a scale of 1:1,200 and a one-foot contour interval.

In the Township of Freehold, topographic maps at a scale of 1:2,400 with a 5-foot contour interval were used to delineate floodplain boundaries between cross sections, as well as 7.5-Minute Series topographic maps and flood-prone area maps at a scale of 1:24,000 and a 10-foot contour interval.

In the Township of Hazlet, topographic maps at a scale of 1:1,200 and a 2-foot contour interval were used to delineate floodplain boundaries between cross sections.

In the Borough of Highlands, topographic maps at a scale of 1"=200' with a contour interval of 2 feet were used to delineate floodplain boundaries between cross sections.

In the Township of Holmdel, topographic maps at a scale of 1:24,000 with a 5-foot contour interval were used to delineate floodplain boundaries between cross sections.

In the Township of Howell, topographic maps at a scale of 1:2,400 with a 5-foot contour interval were used to delineate floodplain boundaries between cross sections.

In the Borough of Keansburg, topographic maps of scales 1” = 500’ with a contour interval of 2 feet and 1:600 with a one-foot contour interval were used to delineate floodplain boundaries between cross sections, as well as 7.5-Minute Series topographic maps at a scale of 1:24,000 with a 20-foot contour interval.

In the Borough of Keyport, aerial contour maps at a scale of 1:6,000 with a 2-foot contour interval were used to delineate floodplain boundaries between cross sections, as well as 7.5-Minute topographic maps at a scale of 1:24,000 with a 20-foot contour interval.

In the Borough of Little Silver, aerial photographs with a scale of 1:12,000 were used to delineate floodplain boundaries between cross sections, as well as topographic maps at a scale of 1:1,200 with a one-foot contour interval and 7.5-Minute Series topographic maps at a scale of 1:24,000 with a 20-foot contour interval.

In the Village of Loch Arbour, aerial contour maps at a scale of 1:6,000 with a 2-foot contour interval were used to delineate floodplain boundaries between cross sections, as well as 7.5-Minute Series topographic maps at a scale of 1:24,000 with a 20-foot contour interval.

In the City of Long Branch, aerial photographs and aerial plotting plates at a scale of 1:12,000 were used to delineate floodplain boundaries between cross sections, as well as topographic maps at a scale of 1:2,400 with a 4-foot contour interval and 7.5-Minute Series topographic maps at a scale of 1:24,000 with a 20-foot contour interval.

In the Township of Manalapan, 7.5-Minute Series topographic maps at a scale of 1:24,000 with contour intervals of 10 feet and 5 feet were used to delineate floodplain boundaries between cross sections.

In the Borough of Manasquan, aerial photographs and aerial plotting plates at a scale of 1:12,000 were used to delineate floodplain boundaries between cross sections, as well as topographic maps at a scale of 1:2,400 with a 4-foot contour interval and 7.5-Minute Series topographic maps at a scale of 1:24,000 with a 20-foot contour interval.

In the Township of Marlboro, topographic maps at a scale of 1:2,400 with a 5-foot contour interval were used to delineate floodplain boundaries between cross sections, as well as 7.5-Minute Series topographic maps at a scale of 1:24,000 with contour intervals of 10 feet and 20 feet.

In the Borough of Matawan, floodplain boundaries were interpolated between cross sections using topographic maps at a scale of 1:2,400 with a 5-foot contour interval.

In the Township of Middletown, floodplain boundaries were interpolated between cross sections using topographic maps at a scale of 1"=100' with a one-foot contour interval, as well as 7.5-Minute Series topographic maps at a scale of 1:24,000 with contour intervals of 10 feet and 20 feet.

In the Township of Millstone, aerial photographs and photogrammetric mapping at a scale of 1:2,400 with a 5-foot contour interval were used to delineate floodplain boundaries between cross sections, as well as 7.5-Minute Series topographic maps at a scale of 1:24,000 with contour intervals of 5 feet and 10 feet.

In the Borough of Monmouth Beach, aerial photographs at a scale of 1:12,000 were used to delineate floodplain boundaries between cross sections, as well as topographic maps at a scale of 1:1,200 with a one-foot contour interval and 7.5-Minute Series topographic maps at a scale of 1:24,000 with a 20-foot contour interval.

In the Township of Neptune, aerial photographs and aerial plotting plates at a scale of 1:12,000 were used to delineate floodplain boundaries between cross sections, as well as topographic maps at a scale of 1:2,400 with a 4-foot contour interval and 7.5-Minute Series topographic maps at a scale of 1:24,000 with a 20-foot contour interval.

In the Township of Ocean, topographic maps at scales of 1:1,200 with a 2-foot contour interval and 1:24,000 with a 4-foot contour interval were used to delineate floodplain boundaries between cross sections.

In the Borough of Oceanport, floodplain boundaries between cross sections were interpolated using topographic maps at a scale of 1"=100' with a one-foot contour interval.

In the Borough of Red Bank, floodplain boundaries between cross sections were interpolated using topographic maps at a scale of 1:1,200 with a 2-foot contour interval.

In the Borough of Rumson, aerial photographs at a scale of 1:12,000 were used to delineate floodplain boundaries between cross sections, as well as topographic maps at a scale of 1:1,200 with a one-foot contour interval and 7.5-Minute Series topographic maps at a scale of 1:24,000 with a 20-foot contour interval.

In the Borough of Sea Bright, aerial photographs and aerial plotting plates at a scale of 1:12,000 were used to delineate floodplain boundaries between cross sections, as well as topographic maps at a scale of 1:2,400 with a 4-foot contour interval and 7.5-Minute Series topographic maps at a scale of 1:24,000 with a 20-foot contour interval.

In the Borough of Sea Girt, aerial photographs and aerial plotting plates at a scale of 1:12,000 were used to delineate floodplain boundaries between cross sections, as well as topographic maps at a scale of 1:2,400 with a 4-foot contour interval and 7.5-Minute Series topographic maps at a scale of 1:24,000 with a 20-foot contour interval.

In the Borough of Shrewsbury, floodplain boundaries between cross sections were interpolated using topographic maps at a scale of 1:1,200 with a one-foot contour interval.

In the Borough of Spring Lake, aerial photographs and aerial plotting plates at a scale of 1:12,000 were used to delineate floodplain boundaries between cross sections, as well as topographic maps at a scale of 1:2,400 with a 4-foot contour interval and 7.5-Minute Series topographic maps at a scale of 1:24,000 with a 20-foot contour interval.

In the Borough of Spring Lake Heights, floodplain boundaries between cross sections were interpolated using topographic maps at a scale of 1:2,400 with a contour interval of 5 feet, as well as 7.5-Minute Series flood-prone area maps at a scale of 1:24,000 with a 20-foot contour interval.

In the Borough of Tinton Falls, floodplain boundaries between cross sections were interpolated using topographic maps at a scale of 1:1,200 with a 3-foot contour interval.

In the Borough of Union Beach, floodplain boundaries between cross sections were interpolated using topographic maps at a scale of 1"=50' with a one-foot contour interval and 1:6,000 with a 2-foot contour interval.

In the Township of Wall, floodplain boundaries between cross sections were interpolated using topographic maps at a scale of 1:2,400 with a 2-foot contour interval, as well as the Tax Map for the Township of Wall.

In the Borough of West Long Branch, floodplain boundaries between cross sections were interpolated using topographic maps at a scale of 1:1,200 with a one-foot contour interval as well as 7.5-Minute Series topographic maps at a scale of 1:24,000 with a 20-foot contour interval.

Topographic elevation data for Monmouth County were derived from two Light Detection and Ranging (LiDAR) datasets. Data covering the upper part of Monmouth County were collected by the U.S. Geological Survey (USGS) from early December 2006 to February 2007. Elevation data for the lower part of Monmouth County were derived from a LiDAR collection effort by FEMA in April 2010.

LiDAR data for upper and lower Monmouth were merged to develop continuous terrain coverage for overland wave modeling in Monmouth County. For the coastal analysis, the source data for upper Monmouth County were converted to the State Plane New Jersey FIPS 2900 (feet) horizontal coordinate system, and the vertical units were converted from meters to feet to be consistent with the projections and units of the lower Monmouth County dataset. Final seamless Digital Elevation Model (DEM) products were developed at a 1-meter horizontal resolution in the State Plane New Jersey FIPS 2900 (feet) horizontal coordinate system and the North American Vertical Datum of 1988 (NAVD88) with elevations in feet. (USGS 2010)

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

For the streams studied by approximate methods, only the 1-percent-annual-chance floodplain boundaries are shown on the FIRMs (Exhibit 2).

4.2 Floodways

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

The floodways presented in this FIS were computed for certain stream segments on the basis of equal conveyance reduction from each side of the floodplain.

Floodway widths were computed at cross sections. Between cross sections, the floodway boundaries were interpolated. The results of the floodway computations are tabulated for selected cross sections (Table 7). The computed floodways are shown on the FIRM (Exhibit 2). In cases where the floodway and 1-percent annual chance floodplain boundaries are either close together or collinear, only the floodway boundary is shown.

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, "Floodway Data" for certain downstream cross sections of Ardena Brook, Bannen Meadow Brook, Burkes Creek, Claypit Creek, Comptons Creek, Gravelly Run, Groundhog Brook, Haystack Brook, Jumping Brook 1, McClees Creek, Mohingson Brook, Parkers Creek, Parkers Creek North Branch, Pine Brook 1, Poplar Creek Tributary 1, Shark River, Waackaack Creek, Weamaconk Creek Tributary, and Yellow Brook Tributary 2 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.

No floodways were calculated for Cranberry Brook or Wells Brook.

Portions of the floodways for Metedeconk River North Branch and Rocky Brook (Downstream Reach) extend beyond the county boundary

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

The area between the floodway and 1-percent annual chance floodplain boundaries is termed the floodway fringe. The floodway fringe encompasses the portion of the floodplain that could be completely obstructed without increasing the water-surface elevation of the 1-percent annual chance flood by more than 1.0 foot at any point.

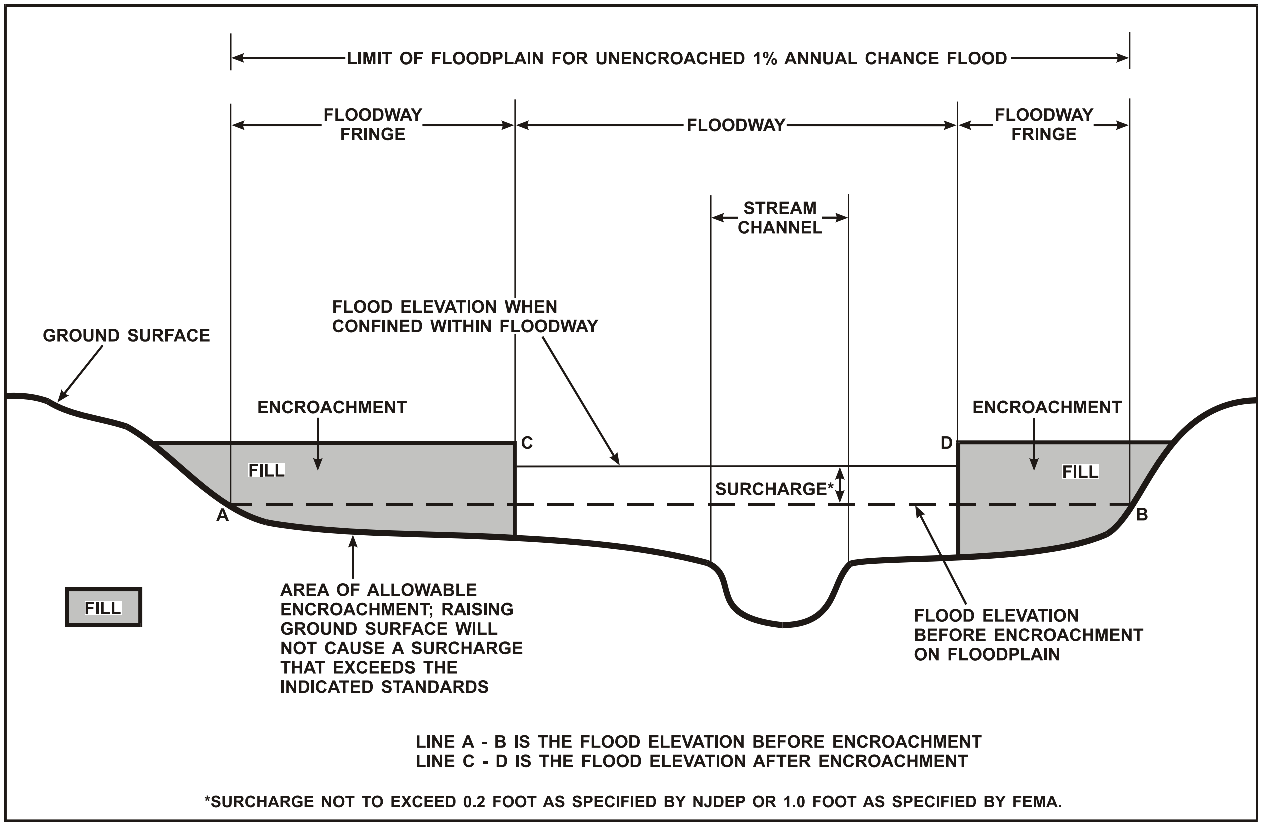

Figure 4: Floodway Schematic

Typical relationships between the floodway and the floodway fringe and their significance to floodplain development are shown in Figure 4, “Floodway Schematic.”

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Claypit Creek								
A	0[1]	*	2,419	0.30[4]	**	4.0[4]	4.2[4]	0.2[4]
B	1,200[1]	220	691	0.90[4]	**	4.1[4]	4.3[4]	0.2[4]
C	1,900[1]	250	390	1.60[4]	**	4.8[4]	4.9[4]	0.1[4]
D	2,020[1]	214	631	1.00	10.6	10.6	10.6	0.0
E	2,450[1]	*	781	0.50	10.8	10.8	10.8	0.0
Comptons Creek								
A	115[2]	359	1,209	1.10[4]	**	5.9[4]	6.0[4]	0.1[4]
B	622[2]	554	1,713	0.80[4]	**	6.1[4]	6.3[4]	0.2[4]
C	1,430[2]	34	262	5.10[4]	**	7.0[4]	7.2[4]	0.2[4]
D	3,850[2]	253	681	1.90[4]	**	7.9[4]	8.1[4]	0.2[4]
E	5,235[2]	185	570	1.60	12.3	12.3	12.4	0.1
F	5,615[2]	124	446	2.00	13.1	13.1	13.1	0.0
Cranberry Brook								
A	640[3]	*	*	*	14.0	*	*	*
B	2,280[3]	*	*	*	16.5	*	*	*
C	2,490[3]	*	*	*	19.6	*	*	*
D	3,610[3]	*	*	*	19.6	*	*	*
E	3,960[3]	*	*	*	19.6	*	*	*
F	4,340[3]	*	*	*	19.6	*	*	*
G	5,295[3]	*	*	*	19.6	*	*	*
Deal Tributary 1								
A	230[3]	12	88	0.50	10.5	10.5	10.5	0.0
B	350[3]	16	84	0.50	10.6	10.6	10.6	0.0
C	630[3]	39	206	0.20	10.7	10.7	10.8	0.1

[1] Feet above Locust Avenue Bridge (upstream face)
[2] Feet above Campbell Avenue
[3] Feet above mouth
[4] Coastal flooding effects control NFIP regulatory Base Flood Elevations in this area. Riverine floodway data are provided for the purpose of a no-rise analysis in accordance with floodway determinations for development within the SFHA.

* Data not available
** Data superseded by updated coastal analyses

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

MONMOUTH COUNTY, NJ (ALL JURISDICTIONS)

FLOODWAY DATA

CLAYPIT CREEK – COMPTONS CREEK – CRANBERRY BROOK – DEAL TRIBUTARY 1

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
East Creek								
A	4,800[1]	33	232	4.10	15.0	15.0	15.1	0.1
B	5,920[1]	173	633	1.50	16.8	16.8	16.9	0.1
C	6,945[1]	320	890	0.80	21.9	21.9	21.9	0.0
D	7,730[1]	127	332	2.30	24.3	24.3	24.5	0.2
E	8,070[1]	103	269	2.80	25.7	25.7	25.8	0.1
Flat Creek								
A	1,850[1]	112	579	4.10[4]	*	15.0[4]	15.1[4]	0.1[4]
B	2,550[1]	225	909	1.50	11.6	11.6	11.7	0.1
C	3,500[1]	98	351	3.80	14.3	14.3	14.4	0.1
D	4,450[1]	120	170	4.10	22.4	22.4	22.4	0.0
E	4,950[1]	50	218	3.20	25.1	25.1	25.2	0.1
F	5,775[1]	46	185	3.70	26.2	26.2	26.4	0.2
G	6,775[1]	50	134	5.20	29.8	29.8	30.0	0.2
H	7,900[1]	96	441	1.30	39.8	39.8	39.8	0.0
I	8,550[1]	21	47	8.50	39.9	39.9	39.9	0.0
Gander Brook								
A	1,637[2]	100	220	0.80	106.0	106.0	106.1	0.1
B	5,597[2]	35	40	4.30	123.8	123.8	123.8	0.0
Gravelly Brook								
A	3,065[3]	290	1,545	0.90	21.1	21.1	21.3	0.2
B	3,899[3]	232	425	2.90	21.2	21.2	21.4	0.2
C	4,378[3]	201	988	1.30	26.7	26.7	26.9	0.2
D	4,652[3]	290	577	2.20	23.6	23.6	23.8	0.2

[1] Feet above downstream side of State Route 36
[2] Feet above confluence with Still House Brook
[3] Feet above confluence with Matawan Creek
[4] Coastal flooding effects control NFIP regulatory Base Flood Elevations in this area. Riverine floodway data are provided for the purpose of a no-rise analysis in accordance with floodway determinations for development within the SFHA.

* Data superseded by updated coastal analyses

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

MONMOUTH COUNTY, NJ (ALL JURISDICTIONS)

FLOODWAY DATA

EAST CREEK – FLAT CREEK – GANDER BROOK – GRAVELLY BROOK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Gravelly Brook (continued)								
E	5,000[1]	217	1,316	1.00	26.7	26.7	26.9	0.2
F	6,092[1]	190	767	1.60	27.1	27.1	27.3	0.2
G	11,976[1]	100	280	3.50	53.4	53.4	53.4	0.0
H	13,549[1]	24	123	8.10	66.7	66.7	66.7	0.0
I	14,077[1]	20	55	8.30	72.6	72.6	72.6	0.0
J	14,182[1]	30	105	3.00	75.1	75.1	75.2	0.1
K	16,241[1]	15	35	2.60	91.9	91.9	91.9	0.0
L	19,093[1]	10	15	6.00	162.2	162.2	162.2	0.0
Gravelly Run								
A	200[2]	68	151	1.70	19.0	16.2[4]	16.4	0.2
B	1,040[2]	16	51	4.90	20.0	20.0	20.2	0.2
C	1,860[2]	16	42	6.00	25.2	25.2	25.3	0.1
D	2,650[2]	33	69	3.60	32.0	32.0	32.2	0.2
Groundhog Brook								
A	100[3]	23	59	6.40	49.0	47.4[5]	47.6	0.2
B	1,134[3]	16	60	6.40	52.7	52.7	52.7	0.0
C	1,142[3]	50	252	1.50	57.5	57.5	57.5	0.0
D	1,165[3]	274	1,836	0.20	57.6	57.6	57.6	0.0
E	2,430[3]	153	572	0.50	57.6	57.6	57.6	0.0
F	2,970[3]	23	68	4.40	57.6	57.6	57.6	0.0

[1] Feet above confluence with Matawan Creek
[2] Feet above confluence with Metedeconk River North Branch
[3] Feet above confluence with Haystack Brook
[4] Elevation computed without consideration of backwater effects from Metedeconk River North Branch
[5] Elevation computed without consideration of backwater effects from Haystack Brook

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

MONMOUTH COUNTY, NJ (ALL JURISDICTIONS)

FLOODWAY DATA

GRAVELLY BROOK – GRAVELLY RUN – GROUNDHOG BROOK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Hannabrand Brook								
A	1,050[1]	290	1,231	3.10	11.9	11.9	12.1	0.2
B	2,946[1]	28	169	7.40	18.0	18.0	18.2	0.2
C	5,075[1]	80	209	7.50	24.5	24.5	24.7	0.2
D	8,150[1]	277	621	2.10	33.4	33.4	33.6	0.2
E	11,200[1]	64	171	4.50	45.3	45.3	45.5	0.2
F	12,950[1]	77	192	4.00	55.7	55.7	55.9	0.2
G	15,000[1]	46	103	7.30	65.6	65.6	65.8	0.2
H	16,850[1]	98	194	4.40	81.2	81.2	81.4	0.2
Haystack Brook								
A	55[2]	257	919	1.10	22.0	20.1[3]	20.3	0.2
B	830[2]	28	169	6.00	22.0	20.5[3]	20.6	0.1
C	865[2]	30	152	6.70	22.0	20.5[3]	20.6	0.1
D	2,250[2]	127	348	2.90	23.7	23.7	23.8	0.1
E	3,030[2]	226	413	2.50	24.8	24.8	24.8	0.0
F	4,235[2]	84	266	3.80	26.9	26.9	27.0	0.1
G	5,165[2]	67	226	3.70	28.8	28.8	29.0	0.2
H	6,025[2]	89	249	3.30	30.3	30.3	30.4	0.1
I	6,934[2]	28	249	3.30	30.3	30.3	30.4	0.1
J	6,964[2]	66	183	4.60	31.7	31.7	31.7	0.0
K	8,325[2]	204	520	1.60	34.2	34.2	34.3	0.1
L	9,126[2]	28	148	5.60	35.2	35.2	35.3	0.1
M	9,156[2]	76	176	4.70	35.6	35.6	35.6	0.0
N	10,865[2]	112	354	2.00	39.0	39.0	39.2	0.2
O	11,785[2]	198	458	1.60	39.8	39.8	40.0	0.2
P	12,685[2]	57	156	4.60	42.1	42.1	42.3	0.2
Q	13,356[2]	27	166	4.40	44.4	44.4	44.6	0.2
R	13,381[2]	27	166	4.40	44.4	44.4	44.6	0.2

[1] Feet above confluence with Wreck Pond Brook
[2] Feet above confluence with Metedeconk River North Branch
[3] Elevation computed without consideration of backwater effects from Metedeconk River North Branch

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

MONMOUTH COUNTY, NJ (ALL JURISDICTIONS)

FLOODWAY DATA

HANNABRAND BROOK – HAYSTACK BROOK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Haystack Brook (continued)								
S	14,176[1]	87	234	3.10	46.2	46.2	46.4	0.2
T	14,830[1]	27	121	6.00	47.3	47.3	47.5	0.2
U	14,860[1]	126	377	1.80	48.0	48.0	48.1	0.1
V	15,640[1]	111	278	2.40	49.0	49.0	49.2	0.2
W	16,365[1]	164	310	2.20	50.1	50.1	50.3	0.2
X	17,055[1]	50	120	5.60	52.1	52.1	52.3	0.2
Y	17,845[1]	176	371	1.80	54.5	54.5	54.7	0.2
Z	19,280[1]	111	278	2.40	56.3	56.3	56.4	0.1
AA	20,266[1]	16	104	6.50	57.8	57.8	58.0	0.2
AB	20,296[1]	97	161	4.20	58.4	58.4	58.6	0.2
AC	21,565[1]	99	240	2.80	62.0	62.0	62.0	0.0
AD	22,670[1]	66	163	4.10	64.3	64.3	64.5	0.2
AE	23,493[1]	88	281	2.40	68.5	68.5	68.6	0.1
AF	23,523[1]	38	131	5.10	68.5	68.5	68.6	0.1
AG	24,505[1]	64	220	2.10	69.8	69.8	69.9	0.1
AH	25,905[1]	56	141	3.20	70.7	70.7	70.9	0.2
AI	26,875[1]	111	284	1.60	72.1	72.1	72.3	0.2
AJ	27,785[1]	34	78	5.90	73.6	73.6	73.8	0.2
Heroys Pond Creek								
A	230[2]	140	670	0.90[3]	*	4.9[3]	5.1[3]	0.2[3]
B	2,950[2]	129	836	0.80	32.1	32.1	32.3	0.2
C	4,500[2]	112	249	2.50	34.4	34.4	34.6	0.2
D	5,100[2]	65	100	6.20	36.7	36.7	36.9	0.2

[1] Feet above confluence with Metedeconk River North Branch
[2] Feet above confluence with Shark River Estuary
[3] Coastal flooding effects control NFIP regulatory Base Flood Elevations in this area. Riverine floodway data are provided for the purpose of a no-rise analysis in accordance with floodway determinations for development within the SFHA.
* Data superseded by updated coastal analyses

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

MONMOUTH COUNTY, NJ (ALL JURISDICTIONS)

FLOODWAY DATA

HAYSTACK BROOK – HEROYS POND CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Hockhockson Brook								
A	0[1]	227	1,470	0.80	46.3	46.3	46.5	0.2
B	280[1]	99	522	2.30	46.3	46.3	46.5	0.2
C	1,500[1]	161	666	1.80	47.0	47.0	47.2	0.2
D	2,520[1]	190	571	2.10	47.6	47.6	47.8	0.2
E	3,000[1]	74	252	4.70	48.0	48.0	48.2	0.2
F	3,500[1]	139	291	4.10	49.7	49.7	49.9	0.2
G	4,250[1]	196	577	2.10	51.4	51.4	51.6	0.2
Hog Swamp Brook								
A	300[2]	80	1,215	0.80	20.5	20.5	20.7	0.2
B	1,450[2]	65	780	1.20	20.5	20.5	20.7	0.2
C	2,570[2]	130	1,247	0.80	20.5	20.5	20.7	0.2
D	3,550[2]	140	573	1.70	21.5	21.5	21.7	0.2
E	5,280[2]	69	405	2.40	32.5	32.5	32.6	0.1
F	6,070[2]	115	283	3.40	33.2	33.2	33.4	0.2
G	6,980[2]	85	254	3.80	35.4	35.4	35.4	0.0
H	8,560[2]	190	406	2.40	41.9	41.9	42.1	0.2
I	9,140[2]	170	473	1.40	43.3	43.3	43.4	0.1
J	9,840[2]	100	172	4.00	43.4	43.4	43.6	0.2
K	11,220[2]	280	539	1.30	48.6	48.6	48.7	0.1
L	12,320[2]	55	101	6.70	49.9	49.9	49.9	0.0
M	12,710[2]	55	141	4.80	51.0	51.0	51.2	0.2
N	13,910[2]	70	100	4.40	54.6	54.6	54.8	0.2
O	14,930[2]	150	982	0.50	63.5	63.5	63.5	0.0
P	16,410[2]	91	232	1.90	63.5	63.5	63.6	0.1

[1] Feet above confluence with Pine Brook 1
[2] Feet above confluence with Deal Lake

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

MONMOUTH COUNTY, NJ (ALL JURISDICTIONS)

FLOODWAY DATA

HOCKHOCKSON BROOK – HOG SWAMP BROOK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Jumping Brook 1								
A	0[1]	318	614	2.70	16.0	16.0[3]	16.1	0.1
B	565[1]	312	1,787	0.50	16.6	16.6	16.7	0.1
C	885[1]	215	1,096	0.70	17.6	17.6	17.7	0.1
D	1,615[1]	100	705	1.10	22.2	22.2	22.2	0.0
E	2,365[1]	105	409	1.90	22.3	22.3	22.4	0.1
F	2,955[1]	122	463	1.60	24.1	24.1	24.3	0.2
G	3,985[1]	96	445	1.70	27.6	27.6	27.8	0.2
H	4,465[1]	70	194	3.80	29.4	29.4	29.6	0.2
I	5,335[1]	65	313	2.20	32.7	32.7	32.9	0.2
J	5,556[1]	130	1,019	0.70	39.3	39.3	39.3	0.0
K	7,466[1]	109	239	2.40	40.7	40.7	40.8	0.1
L	8,006[1]	121	574	1.00	44.1	44.1	44.3	0.2
M	8,966[1]	101	462	1.20	44.6	44.6	44.8	0.2
Jumping Brook 2								
A	0[2]	130	1,335	2.00[4]	*	8.9[4]	9.1[4]	0.2[4]
B	500[2]	580	2,225	1.20[4]	*	8.9[4]	9.1[4]	0.2[4]
C	2,850[2]	325	1,035	2.60[4]	*	8.9[4]	9.1[4]	0.2[4]
D	3,360[2]	120	490	5.40	10.3	10.3	10.5	0.2
E	3,900[2]	135	700	3.80	11.7	11.7	11.9	0.2
F	4,400[2]	255	1,035	2.60	12.4	12.4	12.6	0.2
G	4,750[2]	280	765	3.55	12.9	12.9	13.1	0.2
H	5,150[2]	50	245	10.90	15.1	15.1	15.2	0.1
I	5,400[2]	50	250	10.70	17.9	17.9	18.0	0.1
J	5,700[2]	130	430	6.20	21.3	21.3	21.5	0.2
K	5,904[2]	328	1,057	2.90	25.4	25.4	25.6	0.2
L	6,300[2]	150	897	3.00	25.5	25.5	25.7	0.2

[1] Feet above Private Drive (Upstream Face) (Private drive is approximately 775 feet below West Front Street)
[2] Feet above mouth
[3] Elevation computed without consideration of backwater effects from Nut Swamp Brook
[4] Coastal flooding effects control NFIP regulatory Base Flood Elevations in this area. Riverine floodway data are provided for the purpose of a no-rise analysis in accordance with floodway determinations for development within the SFHA.

* Data superseded by updated coastal analyses

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

MONMOUTH COUNTY, NJ (ALL JURISDICTIONS)

FLOODWAY DATA

JUMPING BROOK 1 – JUMPING BROOK 2

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Jumping Brook 2 (continued)								
M	6,700	348	1,732	1.60	25.7	25.7	25.9	0.2
N	6,900	116	569	4.70	25.7	25.7	25.9	0.2
O	8,052	386	581	4.60	27.2	27.2	27.4	0.2
P	8,972	205	1,834	1.40	38.3	38.3	38.3	0.0
Q	9,100	317	3,924	0.80	38.3	38.3	38.3	0.0
R	10,050	390	3,086	0.80	38.3	38.3	38.3	0.0
S	11,400	132	835	2.80	38.3	38.3	38.3	0.0
T	12,600	123	454	5.20	38.7	38.7	38.7	0.0
U	13,100	87	249	9.60	39.6	39.6	39.8	0.2
V	13,500	99	554	4.10	42.3	42.3	42.5	0.2
W	13,620	283	3,287	0.80	52.2	52.2	52.4	0.2
X	15,000	225	1,778	1.40	52.2	52.2	52.4	0.2
Y	15,700	199	1,255	1.80	52.2	52.2	52.4	0.2
Z	17,100	176	822	2.70	52.4	52.4	52.6	0.2
AA	18,500	170	316	7.40	54.2	54.2	54.4	0.2
AB	18,900	67	207	8.70	57.0	57.0	57.2	0.2
AC	19,720	95	313	5.70	60.8	60.8	61.0	0.2
AD	19,940	187	2,340	0.80	71.4	71.4	71.5	0.1
AE	19,990	240	3,858	0.00	71.4	71.4	71.5	0.1
AF	21,220	140	3,200	0.00	71.4	71.4	71.5	0.1
AG	21,470	250	2,013	0.90	71.4	71.4	71.6	0.2
AH	22,125	350	2,704	0.70	71.4	71.4	71.6	0.2
AI	22,240	350	2,070	0.90	71.4	71.4	71.6	0.2
AJ	23,230	319	1,115	1.10	72.1	72.1	72.2	0.1
AK	23,620	289	808	1.60	72.2	72.2	72.3	0.1
AL	24,495	84	322	3.90	73.9	73.9	74.0	0.1

[1] Feet above mouth

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

MONMOUTH COUNTY, NJ (ALL JURISDICTIONS)

FLOODWAY DATA

JUMPING BROOK 2

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Jumping Brook 2 (continued)								
AM	25,070	172	688	1.80	78.1	78.1	78.1	0.0
AN	25,770	109	370	4.10	78.7	78.7	78.9	0.2
AO	26,605	83	244	5.20	82.2	82.2	82.3	0.1
AP	27,220	150	2,076	0.60	90.1	90.1	90.1	0.0
Little Silver Creek								
A	9,480	35	204	0.4	8.0	8.0	8.0	0.0
B	9,980	150	449	1.7	8.2	8.2	8.4	0.2
C[2]	10,479	46	283	2.7	11.3	11.3	11.3	0.0
D	10,980	100	487	1.6	11.5	11.5	11.6	0.1
E	11,580	268	683	1.1	11.6	11.6	11.8	0.2
F	12,080	140	363	2.1	11.9	11.9	12.1	0.2
G	12,680	99	224	3.4	12.9	12.9	13.1	0.2
H	13,180	110	280	2.4	13.8	13.8	14.0	0.2
Little Silver Tributary A								
A	140	113	240	0.04	12.9	12.9	13.1	0.2

[1] Feet above mouth

[2] Data at bridge culverts reflect conditions on upstream side of bridge

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

MONMOUTH COUNTY, NJ (ALL JURISDICTIONS)

FLOODWAY DATA

JUMPING BROOK 2 – LITTLE SILVER CREEK – LITTLE SILVER TRIBUTARY A

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Little Silver Tributary 1								
A[2]	1,830	30	142	0.9	10.4	10.4	10.4	0.0
B	1,910	10	55	2.2	10.4	10.4	10.5	0.1
C[2]	2,020	152	334	0.4	11.1	11.1	11.3	0.2
D	2,450	28	60	2.0	11.1	11.1	11.3	0.2
E	2,850	91	91	1.3	11.9	11.9	12.1	0.2
F[2]	3,150	33	142	0.9	14.9	14.9	15.1	0.2
Little Silver Tributary 2								
A	3,270	138	232	1.6	8.4	8.4	8.5	0.1
B	3,570	55	126	2.8	8.9	8.9	9.0	0.1
C[2]	3,870	115	250	1.4	12.9	12.9	13.1	0.2
D	4,270	140	501	0.7	13.0	13.0	13.2	0.2
E	4,670	80	235	1.5	13.1	13.1	13.3	0.2
F	5,070	102	199	1.8	13.5	13.5	13.7	0.2
G	5,450	56	91	2.4	13.7	13.7	13.8	0.1
H[2]	5,950	40	81	2.7	18.7	18.7	18.8	0.1
I	6,350	53	59	3.7	19.1	19.1	19.3	0.2
J	6,850	42	64	3.4	22.4	22.4	22.5	0.1
Little Silver Tributary 2A								
A	500	30	56	2.5	14.1	14.1	14.4	0.3
B	1,220	38	37	3.1	15.9	15.9	16.0	0.1
C	1,820	38	37	3.1	19.5	19.5	19.7	0.2

[1] Feet above mouth
[2] Data at bridge culverts reflect conditions on upstream side of bridge

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

MONMOUTH COUNTY, NJ (ALL JURISDICTIONS)

FLOODWAY DATA

LITTLE SILVER TRIBUTARY 1 – LITTLE SILVER TRIBUTARY 2 - LITTLE SILVER TRIBUTARY 2A

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Manasquan River Tributary C (continued)								
M	6,290[1]	32	121	5.40	106.1	106.1	106.1	0.0
N	7,030[1]	16	84	7.80	108.3	108.3	108.5	0.2
O	7,060[1]	33	134	4.90	109.3	109.3	109.4	0.1
P	7,903[1]	247	634	1.00	110.8	110.8	110.9	0.1
Q	9,165[1]	57	150	4.40	115.2	115.2	115.4	0.2
Marl Brook								
A	1,660[2]	70	149	3.90	71.2	71.2	71.2	0.0
B	2,590[2]	72	110	4.30	74.6	74.6	74.6	0.0
C	4,930[2]	70	166	3.10	82.4	82.4	82.6	0.2
Matawan Creek								
A	19,674[3]	333	2,488	1.00	18.9	18.9	19.0	0.1
B	19,907[3]	402	3,273	0.60	18.9	18.9	19.0	0.1
C	21,098[3]	378	2,351	0.70	18.9	18.9	19.0	0.1
D	22,229[3]	286	302	4.40	19.1	19.1	19.3	0.2
E	23,026[3]	179	411	3.20	24.4	24.4	24.6	0.2
F	23,917[3]	165	717	1.40	25.3	25.3	25.5	0.2
G	24,885[3]	107	178	5.50	30.2	30.2	30.4	0.2
H	26,360[3]	120	530	0.90	39.6	39.6	39.6	0.0
I	26,466[3]	140	645	0.70	40.3	40.3	40.3	0.0
J	27,522[3]	90	95	4.30	48.3	48.3	48.3	0.0
K	27,628[3]	220	730	0.60	50.8	50.8	50.9	0.1
L	28,684[3]	300	345	1.00	51.0	51.0	51.1	0.1
M	29,951[3]	215	175	1.50	66.9	66.9	67.1	0.2

[1] Feet above confluence with Manasquan River
[2] Feet above confluence with Mine Brook
[3] Feet above mouth
* Data superseded by updated coastal analyses

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

MONMOUTH COUNTY, NJ (ALL JURISDICTIONS)

FLOODWAY DATA

MANASQUAN RIVER TRIBUTARY C – MARL BROOK – MATAWAN CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Matchaponix Brook								
A	581[1]	350	2,205	1.20	56.2	56.2	56.4	0.2
B	1,531[1]	730	3,070	0.70	56.2	56.2	56.4	0.2
C	2,112[1]	510	2,935	0.70	56.9	56.9	57.0	0.1
D	6,072[1]	500	920	2.40	58.2	58.2	58.2	0.0
McClees Creek								
A	970[2]	178	497	2.50[4]	*	7.2[4]	7.4[4]	0.2[4]
B	2,510[2]	111	259	4.80	9.5	9.5	9.6	0.1
C	4,250[2]	129	744	1.70	17.3	17.3	17.4	0.1
D	5,340[2]	244	623	2.00	24.7	24.7	24.7	0.0
E	6,235[2]	163	843	1.00	27.8	27.8	27.8	0.0
F	7,595[2]	170	371	2.20	32.4	32.4	32.5	0.1
G	8,695[2]	110	374	1.70	34.1	34.1	34.3	0.2
H	9,555[2]	284	1,156	0.50	39.1	39.1	39.2	0.1
McGellairds Brook								
A	2,114[3]	189	360	4.18	61.1	61.1	61.1	0.0
B	2,399[3]	180	373	4.16	62.0	62.0	62.0	0.0
C	2,469[3]	188	759	2.01	62.6	62.6	62.6	0.0
D	3,314[3]	350	968	1.60	63.1	63.1	63.1	0.0
E	4,277[3]	300	1,480	1.00	63.7	63.7	63.7	0.0
F	5,650[3]	400	1,310	1.10	65.4	65.4	65.6	0.2
G	7,286[3]	240	415	3.60	66.9	66.9	66.9	0.0
H	8,290[3]	515	1,030	1.10	68.3	68.3	68.3	0.0
I	9,557[3]	175	720	1.50	71.1	71.1	71.1	0.0
J	12,144[3]	510	775	1.40	72.7	72.7	72.7	0.0
K	12,778[3]	145	80	6.70	73.4	73.4	73.4	0.0

[1] Feet above county boundary
[2] Feet above Cooper Road (upstream face)
[3] Feet above confluence with Matchaponix Brook
[4] Coastal flooding effects control NFIP regulatory Base Flood Elevations in this area. Riverine floodway data are provided for the purpose of a no-rise analysis in accordance with floodway determinations for development within the SFHA.
*Data superseded by updated coastal analyses

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

MONMOUTH COUNTY, NJ (ALL JURISDICTIONS)

FLOODWAY DATA

MATCHAPONIX BROOK – MCCLEES CREEK – MCGELLAIRDS BROOK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Mine Brook (continued)								
O	13,720[1]	50	125	7.30	80.4	80.4	80.4	0.0
P	15,540[1]	66	183	5.00	84.4	84.4	84.6	0.2
Q	16,500[1]	88	292	3.10	87.3	87.3	87.5	0.2
R	17,300[1]	118	310	2.90	88.7	88.7	88.9	0.2
Miry Bog Brook								
A	600[1]	26	53	7.20	66.9	66.9	67.0	0.1
B	1,300[1]	26	68	5.60	72.9	72.9	73.0	0.1
C	1,500[1]	40	141	2.70	75.2	75.2	75.2	0.0
D	1,770[1]	61	124	3.10	75.5	75.5	75.5	0.0
E	2,080[1]	184	990	0.40	79.1	79.1	79.1	0.0
F	2,340[1]	184	872	0.40	79.1	79.1	79.1	0.0
G	2,550[1]	191	1,024	0.40	83.3	83.3	83.3	0.0
H	3,040[1]	160	742	0.50	83.3	83.3	83.3	0.0
I	3,530[1]	49	166	2.30	83.3	83.3	83.3	0.0
Mohingson Brook								
A	113[2]	447	695	1.90[3]	*	3.4[3]	3.6[3]	0.2[3]
B	625[2]	170	1,015	1.30[3]	*	8.9[3]	8.9[3]	0.0[3]
C	1,165[2]	130	842	1.60	16.1	16.1	16.3	0.2
D	1,631[2]	116	976	1.20	21.1	21.1	21.1	0.0
E	2,719[2]	266	3,836	0.30	21.1	21.1	21.3	0.2
F	3,077[2]	90	740	0.40	25.5	25.5	25.5	0.0
G	3,407[2]	498	6,078	0.00	25.5	25.5	25.5	0.0
H	4,798[2]	117	1,150	0.20	25.5	25.5	25.5	0.0
I	5,103[2]	431	4,329	0.10	25.5	25.5	25.5	0.0

[1] Feet above confluence with Yellow Brook
[2] Feet above confluence with Matawan Creek
[3] Coastal flooding effects control NFIP regulatory Base Flood Elevations in this area. Riverine floodway data are provided for the purpose of a no-rise analysis in accordance with floodway determinations for development within the SFHA.
* Data superseded by updated coastal analyses

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

MONMOUTH COUNTY, NJ (ALL JURISDICTIONS)

FLOODWAY DATA

MINE BROOK – MIRY BOG BROOK – MOHINGSON BROOK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Mohingson Brook (continued)								
J	5,337[1]	188	1,377	0.20	25.5	25.5	25.5	0.0
K	6,932[1]	156	402	1.70	25.5	25.5	25.5	0.0
L	7,732[1]	29	106	11.0	26.5	26.5	26.5	0.0
M	8,630[1]	40	194	6.0	34.0	34.0	34.0	0.0
N	9,002[1]	129	115	8.60	39.6	39.6	39.6	0.0
O	9,580[1]	72	338	2.90	41.8	41.8	41.8	0.0
P	9,932[1]	124	273	3.60	45.5	45.5	45.7	0.2
Q	10,862[1]	33	91	8.90	48.0	48.0	48.0	0.0
R	11,221[1]	36	156	5.20	53.4	53.4	53.4	0.0
S	11,561[1]	33	152	5.30	53.9	53.9	53.9	0.0
T	11,887[1]	37	346	2.30	59.9	59.9	59.9	0.0
U	12,220[1]	58	157	5.20	65.3	65.3	65.3	0.0
V	12,585[1]	33	272	3.00	75.7	75.7	75.7	0.0
W	13,232[1]	24	187	3.40	77.3	77.3	77.3	0.0
X	13,623[1]	60	234	2.70	77.5	77.5	77.6	0.1
Monascunk Creek								
A	450[2]	61	169	3.40	19.6	19.6	19.7	0.1
B	980[2]	40	164	3.50	23.9	23.9	24.0	0.1
C	1,400[2]	18	132	4.40	26.8	26.8	26.9	0.1
D	1,950[2]	100	144	4.00	29.7	29.7	29.8	0.1
E	2,810[2]	100	243	2.40	33.7	33.7	33.9	0.2
F	4,070[2]	135	520	1.00	42.6	42.6	42.6	0.0
G	5,115[2]	73	245	2.10	43.4	43.4	43.5	0.1

[1] Feet above confluence with Matawan Creek
[2] Feet above confluence with Flat Creek

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

MONMOUTH COUNTY, NJ (ALL JURISDICTIONS)

FLOODWAY DATA

MOHINGSON BROOK – MONASCUNK CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Musquash Brook								
A	200[1]	*	*	*	**	*	*	*
B	800[1]	*	*	*	**	*	*	*
C	1,550[1]	*	*	*	**	*	*	*
D	2,400[1]	*	*	*	14.0	*	*	*
E	3,000[1]	*	*	*	18.3	*	*	*
F	4,450[1]	*	*	*	38.5	*	*	*
G	4,900[1]	*	*	*	53.2	*	*	*
H	5,500[1]	291	2303	0.1	53.2	53.2	53.4	0.2
I	7,425[1]	23	61	10.4	57.7	57.7	57.9	0.2
Nut Swamp Brook								
A	0[2]	318	614	2.70	16.0	16.0	16.1	0.1
B	895[2]	240	894	0.90	16.7	16.7	16.8	0.1
C	1,835[2]	80	259	3.20	18.0	18.0	18.1	0.1
D	2,185[2]	114	359	2.30	19.1	19.1	19.3	0.2
E	2,645[2]	201	1,315	0.60	24.7	24.7	24.8	0.1
F	4,395[2]	69	237	3.50	25.6	25.6	25.8	0.2
G	5,185[2]	100	606	1.30	29.5	29.5	29.5	0.0
H	6,405[2]	73	163	3.70	31.3	31.3	31.3	0.0
I	7,925[2]	120	216	2.60	40.2	40.2	40.4	0.2
J	8,495[2]	196	416	1.30	43.7	43.7	43.8	0.1
L	9,175[2]	192	398	1.30	49.3	49.3	49.4	0.1
M	9,595[2]	161	323	1.60	50.0	50.0	50.2	0.2
Parkers Creek								
A	6,420[1]	250	2,893	0.50[3]	**	5.1[3]	5.3[3]	0.2[3]
B	7,970[1]	465	3,031	0.40[3]	**	5.1[3]	5.3[3]	0.2[3]

[1] Feet above mouth

[2] Feet above limit of detailed study (limit of detailed study is approximately 2300 feet below Normandy Road)

[3] Coastal flooding effects control NFIP regulatory Base Flood Elevations in this area. Riverine floodway data are provided for the purpose of a no-rise analysis in accordance with floodway determinations for development within the SFHA.

* Data not available

** Data superseded by updated coastal analyses

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

MONMOUTH COUNTY, NJ (ALL JURISDICTIONS)

FLOODWAY DATA

MUSQUASH BROOK – NUT SWAMP BROOK – PARKERS CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Parkers Creek (continued)								
C	11,250[1]	294	1,116	1.20[6]	*	6.2[6]	6.4[6]	0.2[6]
D	12,900[1]	186	672	0.80[6]	*	6.3[6]	6.5[6]	0.2[6]
E	13,995[1]	99	177	3.00[6]	*	6.6[6]	6.8[6]	0.2[6]
F	14,520[1]	183	351	1.50	8.0	8.0	8.2	0.2
G	14,950[1]	137	265	2.00	8.7	8.7	8.9	0.2
H	15,320[1]	39	127	4.30	9.9	9.9	10.1	0.2
I	15,610[1]	41	164	3.30	10.8	10.8	11.0	0.2
J	16,020[1]	216	574	0.90	12.5	12.5	12.6	0.1
K	16,350[1]	124	216	2.50	12.7	12.7	12.8	0.1
L	16,652[1]	118	224	2.40	13.6	13.6	13.8	0.2
M	17,220[1]	156	349	1.50	14.6	14.6	14.8	0.2
Parkers Creek North Branch								
A	110[2]	197	1,008	0.30	8.2	8.2[4]	8.4	0.2
B	2,170[2]	187	456	0.80	8.2	8.2[4]	8.4	0.2
C	3,900[2]	48	124	2.80	12.3	12.3	12.5	0.2
D	4,020[2]	45	137	2.50	12.6	12.6	12.8	0.2
E	4,420[2]	23	61	5.60	14.8	14.8	14.8	0.0
Pine Brook 1								
A	300[3]	110	473	3.90	10.6	2.1[5]	2.3	0.2
B	525[3]	240	612	3.00	10.6	2.4[5]	2.6	0.2
C	1,705[3]	242	882	2.10	10.6	3.2[5]	3.4	0.2
D	2,225[3]	345	778	2.40	10.6	3.5[5]	3.7	0.2
E	3,100[3]	350	1,622	1.10	10.6	6.5[5]	6.7	0.2
F	3,700[3]	265	1,310	1.40	10.6	6.5[5]	6.7	0.2

[1] Feet above mouth
[2] Feet above confluence with Parkers Creek
[3] Feet above confluence with Swimming River
[4] Elevation computed without consideration of backwater effects from Parkers Creek
[5] Elevation computed without consideration of backwater effects from Swimming River
[6] Coastal flooding effects control NFIP regulatory Base Flood Elevations in this area. Riverine floodway data are provided for the purpose of a no-rise analysis in accordance with floodway determinations for development within the SFHA
* Data superseded by updated coastal analyses

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

MONMOUTH COUNTY, NJ (ALL JURISDICTIONS)

FLOODWAY DATA

PARKERS CREEK – PARKERS CREEK, NORTH BRANCH – PINE BROOK 1

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Poplar Brook								
A	490[1]	25	127	10.20[4]	*	8.4[4]	8.6[4]	0.2[4]
B	1,665[1]	236	1,523	0.80	13.6	13.6	13.8	0.2
C	2,370[1]	200	986	1.30	13.7	13.7	13.9	0.2
D	3,305[1]	230	689	1.90	14.1	14.1	14.3	0.2
E	4,080[1]	155	715	1.80	18.1	18.1	18.2	0.1
F	6,630[1]	280	1,164	1.10	27.6	27.6	27.7	0.1
G	7,110[1]	260	1,892	0.50	27.6	27.6	27.8	0.2
H	8,190[1]	140	800	1.20	27.6	27.6	27.8	0.2
I	9,600[1]	80	284	3.40	27.7	27.7	27.9	0.2
J	10,360[1]	440	823	1.20	30.1	30.1	30.2	0.1
K	11,600[1]	180	338	2.80	30.7	30.7	30.9	0.2
L	12,565[1]	260	371	2.10	33.8	33.8	33.9	0.1
M	13,055[1]	200	445	1.70	34.1	34.1	34.3	0.2
N	14,870[1]	45	101	7.60	36.7	36.7	36.7	0.0
O	15,140[1]	37	94	8.10	38.7	38.7	38.7	0.0
P	16,550[1]	190	559	1.10	45.2	45.2	45.4	0.2
Q	17,600[1]	23	101	5.90	47.1	47.1	47.3	0.2
R	18,430[1]	50	174	3.40	50.1	50.1	50.2	0.1
Poplar Brook Tributary 1								
A	750[2]	11	23	4.80	27.6	25.4[3]	25.4	0.0
B	1,650[2]	24	65	1.70	28.6	28.6	28.8	0.2
Poplar Brook Tributary 2								
A	1,000[2]	7	16	3.60	35.8	35.8	35.8	0.0
B	2,150[2]	9	16	3.60	42.2	42.2	42.2	0.0

[1] Feet above Atlantic Ocean
[2] Feet above confluence with Poplar Brook
[3] Elevation computed without consideration of backwater effects from Poplar Brook
[4] Coastal flooding effects control NFIP regulatory Base Flood Elevations in this area. Riverine floodway data are provided for the purpose of a no-rise analysis in accordance with floodway determinations for development within the SFHA.
* Data superseded by updated coastal analyses

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

MONMOUTH COUNTY, NJ (ALL JURISDICTIONS)

FLOODWAY DATA

POPLAR BROOK – POPLAR BROOK TRIBUTARY 1 – POPLAR BROOK TRIBUTARY 2

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Poplar Brook Tributary 3								
A	200[1]	100	4,522	0.00	34.8	34.8	35.0	0.2
B	1,200[1]	15	33	5.90	37.1	37.1	37.1	0.0
Poricy Brook								
A	1,800[2]	371	5,470	0.20	24.2	24.2	24.2	0.0
B	2,820[2]	*	4,719	0.20	24.2	24.2	24.2	0.0
C	3,900[2]	*	4,108	0.20	24.2	24.2	24.2	0.0
D	5,200[2]	320	4,563	0.20	24.2	24.2	24.2	0.0
E	6,760[2]	263	2,281	0.30	24.2	24.2	24.2	0.0
F	8,420[2]	196	613	1.10	24.5	24.5	24.5	0.0
G	9,490[2]	92	224	3.10	26.3	26.3	26.5	0.2
H	10,470[2]	119	219	2.90	32.9	32.9	33.0	0.1
I	11,200[2]	142	206	3.10	39.3	39.3	39.5	0.2
J	11,610[2]	139	255	2.50	43.8	43.8	44.0	0.2
K	12,200[2]	164	589	1.00	47.2	47.2	47.4	0.2
L	13,000[2]	120	244	2.40	50.0	50.0	50.2	0.2
M	13,825[2]	45	117	5.10	54.1	54.1	54.3	0.2
N	14,260[2]	40	139	4.10	57.3	57.3	57.3	0.0
O	15,000[2]	17	77	7.40	62.7	62.7	62.8	0.1
Ramanessin Brook								
A	1,760[3]	549	1,785	1.90	41.6	41.6	41.8	0.2
B	2,000[3]	400	1,473	2.30	42.7	42.7	42.7	0.0
C	3,050[3]	224	865	2.30	43.3	43.3	43.5	0.2
D	4,820[3]	224	544	3.70	46.4	46.4	46.4	0.0
E	6,600[3]	179	544	3.70	52.0	52.0	52.2	0.2
F	8,520[3]	127	438	4.60	58.4	58.4	58.5	0.1
G	8,860[3]	79	437	4.30	60.6	60.6	60.7	0.1

[1] Feet above confluence with Poplar Brook
[2] Feet above confluence with Navesink River
[3] Feet above confluence with Willow Brook

* Data not available

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

MONMOUTH COUNTY, NJ (ALL JURISDICTIONS)

FLOODWAY DATA

POPLAR BROOK TRIBUTARY 3 – PORICY BROOK – RAMANESSIN BROOK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Ramanessin Brook (continued)								
H	10,820[1]	226	498	3.80	65.5	65.5	65.6	0.1
I	12,285[1]	112	358	5.30	71.3	71.3	71.5	0.2
J	12,500[1]	166	1,046	1.80	76.4	76.4	76.5	0.1
K	13,700[1]	202	676	2.80	77.1	77.1	77.1	0.0
L	15,560[1]	120	497	3.00	83.1	83.1	83.2	0.1
M	17,600[1]	182	664	2.30	87.3	87.3	87.5	0.2
N	18,500[1]	169	395	3.80	93.1	93.1	93.3	0.2
O	20,085[1]	177	413	2.40	100.7	100.7	100.8	0.1
P	20,900[1]	110	375	2.70	102.5	102.5	102.6	0.1
Q	22,500[1]	189	499	2.00	110.7	110.7	110.8	0.1
R	23,590[1]	105	341	2.90	116.3	116.3	116.4	0.1
S	24,200[1]	127	303	2.00	118.1	118.1	118.3	0.2
T	25,185[1]	130	253	2.50	125.6	125.6	125.8	0.2
Roberts Swamp Brook (Upstream Reach)								
A	300[2]	20	42	8.30	16.4	16.4	16.6	0.2
B	730[2]	22	58	6.10	20.3	20.3	20.5	0.2
C	1,080[2]	36	129	3.40	24.4	24.4	24.6	0.2
D	1,400[2]	72	138	3.70	24.9	24.9	25.1	0.2
E	2,000[2]	20	42	8.30	28.6	28.6	28.7	0.1
Rocky Brook (Downstream Reach)								
A	26,687[3]	162/118[4]	626	1.60	106.5	106.5	106.6	0.1
B	27,887[3]	450/360[4]	995	1.00	107.0	107.0	107.2	0.2
C	28,987[1]	419/379[4]	1,064	0.90	107.4	107.4	107.6	0.2

[1] Feet above confluence with Willow Brook
[2] Feet above limit of detailed study (limit of detailed study is approximately 785 feet below Algonkin Trail)
[3] Feet above county boundary
[4] Width / Width within Monmouth County corporate limits

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

MONMOUTH COUNTY, NJ (ALL JURISDICTIONS)

FLOODWAY DATA

RAMENESSIN BROOK – ROBERTS SWAMP BROOK (UPSTREAM REACH) – ROCKY BROOK (DOWNSTREAM REACH)

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Rocky Brook (Downstream Reach) (continued)								
D	29,937[1]	516/481[4]	755	1.30	109.4	109.4	109.4	0.0
E	30,637[1]	525/435[4]	1,145	0.90	110.0	110.0	110.1	0.1
Rocky Brook (Upstream Reach)								
A	-2,240[2]	243	796	1.00	141.1	141.1	141.3	0.2
B	-545[2]	100	399	2.00	146.8	146.8	146.8	0.0
C	519[2]	192	505	1.50	148.5	148.5	148.7	0.2
D	1,118[2]	43	194	4.00	155.3	155.3	155.5	0.2
Shark River								
A	1,900[3]	130	554	1.80[5]	*	4.9[5]	5.1[5]	0.2[5]
B	2,530[3]	435	690	1.40[5]	*	5.2[5]	5.4[5]	0.2[5]
C	3,230[3]	445	265	3.80[5]	*	6.2[5]	6.3[5]	0.1[5]
D	4,600[3]	630	2,193	0.50[5]	*	6.4[5]	6.5[5]	0.1[5]
E	5,100[3]	399	1,507	0.80[5]	*	6.4[5]	6.5[5]	0.1[5]
F	6,530[3]	327	826	1.10[5]	*	6.5[5]	6.6[5]	0.1[5]
G	7,400[3]	148	265	3.80[5]	*	6.8[5]	7.0[5]	0.2[5]
H	8,120[3]	50	160	6.30	10.2	10.2	10.4	0.2
I	8,710[3]	50	146	6.10	11.5	11.5	11.7	0.2
J	9,330[3]	90	339	2.70	12.8	12.8	12.9	0.1
K	9,780[3]	110	432	2.10	13.0	13.0	13.1	0.1
L	10,600[3]	90	409	2.10	13.3	13.3	13.4	0.1
M	11,160[3]	43	174	5.10	13.6	13.6	13.7	0.1
N	12,350[3]	49	167	5.30	16.2	16.2	16.4	0.2
O	13,355[3]	50	161	5.90	19.2	19.2	19.4	0.2

[1] Feet above county boundary
[2] Feet from Perrineville Road
[3] Feet above mouth
[4] Width / width within Monmouth County boundary
[5] Coastal flooding effects control NFIP regulatory Base Flood Elevations in this area. Riverine floodway data are provided for the purpose of a no-rise analysis in accordance with floodway determinations for development within the SFHA.

* Data superseded by updated coastal analyses

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

MONMOUTH COUNTY, NJ (ALL JURISDICTIONS)

FLOODWAY DATA

ROCKY BROOK (DOWNSTREAM) – ROCKY BROOK (UPSTREAM) – SHARK RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Shark River (continued)								
P	14,100[1]	92	326	2.80	22.1	22.1	22.3	0.2
Q	15,600[1]	95	265	3.30	23.8	23.8	24.0	0.2
R	16,100[1]	146	261	3.40	24.7	24.7	24.7	0.0
S	16,720[1]	131	322	2.80	25.8	25.8	26.0	0.2
T	17,600[1]	59	180	5.20	27.2	27.2	27.4	0.2
U	18,200[1]	40	161	5.50	28.8	28.8	29.0	0.2
V	18,660[1]	30	137	6.50	29.5	29.5	29.7	0.2
W	19,520[1]	123	387	2.30	31.5	31.5	31.7	0.2
X	20,050[1]	30	104	8.50	32.0	32.0	32.0	0.0
Y	20,460[1]	59	238	3.70	33.5	33.5	33.7	0.2
Z	20,850[1]	53	201	4.60	35.1	35.1	35.3	0.2
AA	21,600[1]	36	156	3.90	36.4	36.4	36.6	0.2
AB	22,900[1]	30	115	5.20	38.6	38.6	38.8	0.2
AC	24,400[1]	30	131	4.50	42.1	42.1	42.2	0.1
AD	25,980[1]	30	109	5.50	45.1	45.1	45.3	0.2
AE	27,480[1]	24	75	8.00	49.0	49.0	49.2	0.2
AF	30,185[1]	19	48	6.40	55.8	55.8	56.0	0.2
AG	30,665[1]	24	69	4.50	57.9	57.9	57.9	0.0
AH	31,255[1]	21	44	7.00	59.6	59.6	59.8	0.2
AI	33,493[1]	30	90	3.40	67.5	67.5	67.6	0.1
AJ	35,285[1]	17	40	7.60	72.8	72.8	72.9	0.1
Shark River Tributary D								
A	400[2]	34	47	6.80	35.1	35.1	35.3	0.2
B	600[2]	169	340	0.90	36.7	36.7	36.9	0.2
C	1,200[2]	90	67	4.70	40.3	40.3	40.3	0.0

[1] Feet above mouth

[2] Feet above confluence with Shark River

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

MONMOUTH COUNTY, NJ (ALL JURISDICTIONS)

FLOODWAY DATA

SHARK RIVER – SHARK RIVER TRIBUTARY D

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Shark River Tributary D (continued)								
D	1,800[1]	56	58	5.50	51.6	51.6	51.7	0.1
E	2,150[1]	50	54	5.90	57.8	57.8	57.8	0.0
F	2,410[1]	24	49	7.70	64.1	64.1	64.3	0.2
Shark River Tributary E								
A	500[1]	56	129	9.00	51.7	51.7	51.9	0.2
B	1,900[1]	464	672	2.50	59.4	59.4	59.6	0.2
C	2,800[1]	125	340	4.30	63.7	63.7	63.9	0.2
D	3,450[1]	256	1,370	0.10	70.4	70.4	70.6	0.2
Still House Brook								
A	1,056[2]	120	390	0.90	94.1	94.1	94.3	0.2
B	2,270[2]	120	110	3.10	97.5	97.5	97.5	0.0
C	3,432[2]	150	250	0.70	101.1	101.1	101.3	0.2
D	4,435[2]	60	50	3.30	103.3	103.3	103.3	0.0
E	6,600[2]	60	90	1.80	121.6	121.6	121.8	0.2
Swimming River								
A	0[3]	170	1,930	5.80[4]	*	8.1[4]	8.3[4]	0.2[4]
B	3,480[3]	639	5,926	1.90[4]	*	9.7[4]	9.9[4]	0.2[4]
C	7,180[3]	1,085	6,703	1.40	10.9	10.9	11.1	0.2
D	7,480[3]	250	3,088	3.10	11.0	11.0	11.2	0.2
E	11,780[3]	434	9,247	1.00	21.8	21.8	22.0	0.2
F	14,110[3]	483	7,706	1.20	21.9	21.9	22.1	0.2
G	14,550[3]	566	7,896	1.20	21.9	21.9	22.1	0.2

[1] Feet above confluence with Shark River
[2] Feet above confluence with Manalapan Brook
[3] Feet above Newman Springs Road (downstream face)
[4] Coastal flooding effects control NFIP regulatory Base Flood Elevations in this area. Riverine floodway data are provided for the purpose of a no-rise analysis in accordance with floodway determinations for development within the SFHA.
* Data superseded by updated coastal analyses

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

MONMOUTH COUNTY, NJ (ALL JURISDICTIONS)

FLOODWAY DATA

SHARK RIVER TRIBUTARY D – SHARK RIVER TRIBUTARY E – STILL HOUSE BROOK – SWIMMING RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Toms River								
A	380[1]	281	800	0.60	149.5	149.5	149.7	0.2
B	1,967[1]	39	109	4.30	150.4	150.4	150.5	0.1
C	3,830[1]	93	277	1.70	155.0	155.0	155.2	0.2
D	4,622[1]	190	452	1.00	155.6	155.6	155.8	0.2
Town Brook								
A	7,675[2]	336	1,458	0.50	17.5	17.5	17.5	0.0
B	9,175[2]	117	518	1.50	18.7	18.7	18.8	0.1
C	10,870[2]	249	1,434	0.50	26.6	26.6	26.6	0.0
D	11,285[2]	245	1,232	0.50	27.5	27.5	27.5	0.0
E	12,135[2]	163	719	0.90	29.7	29.7	29.7	0.0
F	13,930[2]	252	253	1.80	30.9	30.9	30.9	0.0
G	15,065[2]	209	162	2.80	36.7	36.7	36.7	0.0
H	15,975[2]	473	2,580	0.20	43.7	43.7	43.7	0.0
I	16,925[2]	228	267	1.70	44.2	44.2	44.2	0.0
Turtle Mill Brook								
A	820[3]	90	289	3.80	3.9	3.9	4.1	0.2
B	970[3]	53	146	7.60	3.9	3.9	4.1	0.2
C	1,200[3]	137	611	2.00	5.8	5.8	5.9	0.1
D	1,535[3]	36	186	5.90	5.8	5.8	5.9	0.1
E	1,700[3]	55	205	5.40	6.4	6.4	6.6	0.2
F	1,980[3]	40	199	5.50	7.3	7.3	7.5	0.2
G	2,390[3]	173	473	2.90	9.0	9.0	9.2	0.2
H	3,950[3]	130	565	2.10	9.3	9.3	9.5	0.2
I	5,150[3]	162	385	3.50	9.7	9.7	9.9	0.2

[1] Feet above Monmouth Road
[2] Feet above Campbell Avenue
[3] Feet above confluence with Branchport Creek

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

MONMOUTH COUNTY, NJ (ALL JURISDICTIONS)

FLOODWAY DATA

TOMS RIVER – TOWN BROOK – TURTLE MILL BROOK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Waackaack Creek								
A	9,130[1]	511	2,740	0.70[3]	*	8.0[3]	8.2[3]	0.2[3]
B	9,980[1]	683	3,130	0.60[3]	*	8.0[3]	8.2[3]	0.2[3]
C	10,430[1]	552	2,622	0.70[3]	*	8.1[3]	8.3[3]	0.2[3]
D	10,680[1]	712	3,315	0.60[3]	*	8.1[3]	8.3[3]	0.2[3]
E	11,490[1]	458	2,180	0.90[3]	*	8.1[3]	8.3[3]	0.2[3]
F	12,665[1]	1,080	3,068	0.60[3]	*	8.4[3]	8.6[3]	0.2[3]
G	13,165[1]	1,140	4,263	0.50[3]	*	8.4[3]	8.6[3]	0.2[3]
H	13,740[1]	937	3,025	0.60[3]	*	8.5[3]	8.7[3]	0.2[3]
I	14,640[1]	240	1,030	1.90[3]	*	8.7[3]	8.9[3]	0.2[3]
J	14,915[1]	530	2,234	0.90[3]	*	9.0[3]	9.2[3]	0.2[3]
K	15,620[1]	238	560	3.50[3]	*	9.4[3]	9.6[3]	0.2[3]
L	15,720[1]	293	740	2.60[3]	*	9.8[3]	10.0[3]	0.2[3]
M	16,570[1]	207	478	4.10	13.9	13.9	14.1	0.2
N	16,700[1]	552	1,458	1.30	16.1	16.1	16.3	0.2
O	18,060[1]	511	1,749	1.10	16.8	16.8	17.0	0.2
P	18,750[1]	150	164	3.70	19.4	19.4	19.4	0.0
Q	19,170[1]	42	132	4.70	20.1	20.1	20.1	0.0
R	19,270[1]	74	136	4.20	22.0	22.0	22.0	0.0
S	19,850[1]	120	345	1.70	23.1	23.1	23.2	0.1
T	20,500[1]	80	121	4.80	24.9	24.9	24.9	0.0
U	21,150[1]	100	254	2.30	26.4	26.4	26.6	0.2
V	21,630[1]	254	339	1.70	29.6	29.6	29.7	0.1
W	22,240[1]	70	97	5.90	33.0	33.0	33.0	0.0
Wampum Brook								
A	430[2]	170	1,137	0.70	12.4	12.4	12.6	0.2
B	2,000[2]	39	207	3.70	12.4	12.4	12.6	0.2

[1] Feet above confluence with Raritan Bay
[2] Feet above Limit of Flood Affecting Community (Limit of Flood Affecting Community is approximately 110 feet downstream of western boundary of Fort Monmouth)
[3] Coastal flooding effects control NFIP regulatory Base Flood Elevations in this area. Riverine floodway data are provided for the purpose of a no-rise analysis in accordance with floodway determinations for development within the SFHA.
* Data superseded by updated coastal analyses

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

MONMOUTH COUNTY, NJ (ALL JURISDICTIONS)

FLOODWAY DATA

WAACKAACK CREEK – WAMPUM BROOK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Willow Brook Tributary G								
A	634[1]	20	55	7.70	114.8	114.8	114.9	0.1
B	2,957[1]	10	20	7.40	169.4	169.4	169.4	0.0
Willow Brook East Branch								
A	830[2]	90	195	1.30	80.7	80.7	80.9	0.2
B	1,300[2]	32	82	3.10	81.2	81.2	81.3	0.1
C	2,330[2]	48	70	3.60	84.4	84.4	84.5	0.1
D	3,890[2]	28	62	4.10	99.0	99.0	99.2	0.2
E	4,710[2]	18	56	4.40	106.7	106.7	106.9	0.2
Wreck Pond Brook								
A	4,300[3]	350	1,090	2.60[4]	*	9.2[4]	9.4[4]	0.2[4]
B	6,170[3]	273	730	3.90	15.6	15.6	15.6	0.0
C	7,460[3]	338	1,789	1.80	20.3	20.3	20.3	0.0
D	9,080[3]	255	828	5.60	21.6	21.6	21.8	0.2
E	11,000[3]	376	3,093	0.80	28.7	28.7	28.9	0.2
F	12,620[3]	216	861	3.80	30.2	30.2	30.4	0.2
G	14,300[3]	283	861	4.40	33.9	33.9	34.1	0.2
H	15,000[3]	191	815	4.40	39.0	39.0	39.2	0.2
I	17,200[3]	131	334	9.00	41.6	41.6	41.8	0.2
J	18,500[3]	281	1,024	2.50	46.7	46.7	46.8	0.1
K	19,650[3]	264	650	4.10	48.1	48.1	48.3	0.2
L	21,000[3]	138	306	8.30	53.9	53.9	54.1	0.2
M	22,680[3]	313	1,185	1.30	59.7	59.7	59.9	0.2
N	24,400[3]	107	214	7.70	63.0	63.0	63.2	0.2
O	25,374[3]	34	129	7.70	68.4	68.4	68.6	0.2
P	26,900[3]	182	483	3.10	71.5	71.5	71.7	0.2
Q	29,625[3]	50	111	9.00	87.8	87.8	87.8	0.0

[1] Feet above confluence with Willow Brook Tributary F

* Data superseded by updated coastal analyses

[2] Feet above confluence with Willow Brook

[3] Feet above Township of Wall corporate limits (corporate limits are approximately 4325 ft below Old Mill Road)

[4] Coastal flooding effects control NFIP regulatory Base Flood Elevations in this area. Riverine floodway data are provided for the purpose of a no-rise analysis in accordance with floodway determinations for development within the SFHA.

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

MONMOUTH COUNTY, NJ (ALL JURISDICTIONS)

FLOODWAY DATA

WILLOW BROOK TRIBUTARY G – WILLOW BROOK EAST BRANCH – WRECK POND BROOK

5.0 INSURANCE APPLICATIONS

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

Zone A

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

Zone AE

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

Zone AH

Zone AH is the flood insurance rate 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 base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone AO

Zone AO is the flood insurance rate zone that corresponds to 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 depths derived from the detailed hydraulic analyses are shown within this zone.

Zone AR

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

Zone V

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

Zone VE

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

Zone X

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

Zone D

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

6.0 FLOOD INSURANCE RATE MAP

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

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

The current FIRM presents flooding information for the entire geographic area of Monmouth County. Historical data relating to the maps prepared for each communty are presented in Table 8, "Community Map History."

COMMUNITY NAME	INITIAL IDENTIFICATION	FLOOD HAZARD BOUNDARY MAP REVISIONS DATE	FIRM EFFECTIVE DATE	FIRM REVISIONS DATE
Aberdeen, Township of	February 28, 1975	None	March 18, 1985	August 3, 1992
Allenhurst, Borough of	August 24, 1973	April 30, 1976	March 15, 1979	September 15, 1983
Allentown, Borough of	December 21, 1973	February 6, 1976	September 16, 1981	
Asbury Park, City of	July 13, 1973	April 30, 1976	February 15, 1979	September 15, 1983
Atlantic Highlands, Borough of	December 21, 1975	February 20, 1976	August 3, 1981	July 5, 1984
Avon-By-The-Sea, Borough of	February 1, 1974	None	March 15, 1979	July 5, 1983
Belmar, Borough of	May 13, 1972	None	May 13, 1972	July 1, 1974 February 27, 1976 March 1, 1984
Bradley Beach, Borough of	December 21, 1973	February 6, 1976	August 1, 1979	June 15, 1983
Brielle, Borough of	August 31, 1973	February 11, 1977	April 2, 1979	September 30, 1983
Colts Neck, Township of	April 12, 1974	September 17, 1976 February 11, 1977	April 15, 1982	

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

MONMOUTH COUNTY, NJ (ALL JURISDICTIONS)

COMMUNITY MAP HISTORY

COMMUNITY NAME	INITIAL IDENTIFICATION	FLOOD HAZARD BOUNDARY MAP REVISIONS DATE	FIRM EFFECTIVE DATE	FIRM REVISIONS DATE
Deal, Borough of	January 14, 1972	February 21, 1975	March 5, 1976	January 5, 1984 August 6, 2002
Eatontown, Borough of	June 21, 1974	February 6, 1976	September 16, 1981	
Englishtown, Borough of	June 21, 1974	None	March 16, 1981	
Fair Haven, Borough of	July 6, 1973	August 20, 1976	October 16, 1979	
Farmingdale, Borough of	March 15, 1974	February 13, 1976	November 26, 1982	
Freehold, Borough[1]				
Freehold, Township of	February 15, 1974	July 16, 1976	April 4, 1983	
Hazlet, Township of	December 28, 1973	April 30, 1976	December 1, 1982	
Highlands, Borough of	December 15, 1970	None	September 3, 1971	July 1, 1974 June 30, 1976
Holmdel, Township of	January 25, 1974	October 17, 1975 April 16, 1976	March 1, 1982	
Howell, Township of	March 22, 1974	August 27, 1976	January 6, 1983	

[1]No Special Flood Hazard Areas Identified

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

MONMOUTH COUNTY, NJ (ALL JURISDICTIONS)

COMMUNITY MAP HISTORY

COMMUNITY NAME	INITIAL IDENTIFICATION	FLOOD HAZARD BOUNDARY MAP REVISIONS DATE	FIRM EFFECTIVE DATE	FIRM REVISIONS DATE
Interlaken, Borough of	March 15, 1974	None	January 2, 1981	
Keansburg, Borough of	April 20, 1973	February 3, 1978	May 16, 1983	
Keyport, Borough of	January 23, 1974	February 6, 1976	July 2, 1979	April 18, 1983 July 15, 1992
Lake Como, Borough of	February 22, 1974	None	November 28, 1980	November 2, 1995
Little Silver, Borough of	August 31, 1973	August 27, 1976	February 1, 1978	December 15, 1982
Loch Arbour, Village of	November 30, 1973	April 16, 1976	March 15, 1979	September 15, 1983
Long Branch, City of	May 31, 1974	None	May 5, 1976	January 13, 1978 January 5, 1984
Manalapan, Township of	July 20, 1973	None	September 15, 1977	
Manasquan, Borough of	May 12, 1972	None	May 12, 1972	July 1, 1974 January 16, 1976 December 15, 1983

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

MONMOUTH COUNTY, NJ (ALL JURISDICTIONS)

COMMUNITY MAP HISTORY

COMMUNITY NAME	INITIAL IDENTIFICATION	FLOOD HAZARD BOUNDARY MAP REVISIONS DATE	FIRM EFFECTIVE DATE	FIRM REVISIONS DATE
Marlboro, Township of	December 21, 1973	None	June 15, 1978	April 9, 1982
Matawan, Borough of	March 1, 1974	None	September 30, 1981	
Middletown, Township of	July 19, 1974	July 9, 1976	February 15, 1984	July 15, 1992
Millstone, Township of	March 29, 1974	May 14, 1976	January 20, 1982	
Monmouth Beach, Borough of	May 17, 1974	None	May 16, 1977	May 2, 1983 October 16, 1984 July 15, 1992
Neptune City, Borough of	June 28, 1974	August 11, 1978	August 11, 1978	
Neptune, Township of	July 13, 1973	September 3, 1976	February 16, 1977	March 1, 1984
Ocean, Township of	June 1, 1973	May 31, 1974 September 10, 1976	October 14, 1977	December 18, 1981 July 2, 2003
Oceanport, Borough of	May 11, 1973	None	February 16, 1977	
Red Bank, Borough of	March 8, 1974	March 19, 1976	May 19, 1981	

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

MONMOUTH COUNTY, NJ
(ALL JURISDICTIONS)

COMMUNITY MAP HISTORY

COMMUNITY NAME	INITIAL IDENTIFICATION	FLOOD HAZARD BOUNDARY MAP REVISIONS DATE	FIRM EFFECTIVE DATE	FIRM REVISIONS DATE
Roosevelt, Borough of[1]				
Rumson, Borough of	December 28, 1973	None	December 28, 1973	July 1, 1974 November 7, 1975 April 23, 1976 December 15, 1982 July 15, 1992
Sea Bright, Borough of	October 14, 1971	None	October 14, 1971	July 1, 1974 April 23, 1976 November 16, 1983 July 15, 1992
Sea Girt, Borough of	February 2, 1973	None	April 16, 1976	April 16, 1976 January 5, 1984
Shrewsbury, Borough of	June 7, 1974	October 24, 1975	August 1, 1979	
Shrewsbury, Township of[2]				
Spring Lake, Borough of	May 25, 1973	March 5, 1976 April 9, 1976 January 4, 1980 June 30, 1980	February 17, 1982	March 1, 1984

[1]This community did not have a FIRM prior to the September 25, 2009 first countywide FIRM for Monmouth County
[2]No Special Flood Hazard Areas Identified

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

MONMOUTH COUNTY, NJ (ALL JURISDICTIONS)

COMMUNITY MAP HISTORY

COMMUNITY NAME	INITIAL IDENTIFICATION	FLOOD HAZARD BOUNDARY MAP REVISIONS DATE	FIRM EFFECTIVE DATE	FIRM REVISIONS DATE
Spring Lake Heights, Borough of	May 3, 1974	March 5, 1976	December 15, 1981	
Tinton Falls, Borough of	April 12, 1974	April 23, 1976 December 31, 1976	April 15, 1982	
Union Beach, Borough of	December 28, 1973	August 6, 1976	May 15, 1980	March 2, 1983 August 15, 1992
Upper Freehold, Township of	March 22, 1974	August 20, 1976 July 29, 1977	October 12, 1979	December 11, 1981
Wall, Township of	June 1, 1973	None	February 16, 1977	
West Long Branch, Borough of	August 24, 1973	August 20, 1976	January 16, 1981	

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

MONMOUTH COUNTY, NJ (ALL JURISDICTIONS)

COMMUNITY MAP HISTORY

7.0 OTHER STUDIES

Information pertaining to revised and unrevised flood hazards for each jurisdiction within Monmouth County has been compiled into this FIS. Therefore, this FIS supersedes all previously printed FIS reports, FIRMs, and/or FBFMs for all of the incorporated and unincorporated jurisdictions within Monmouth County, and should be considered authoritative for the purposes of the NFIP.

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

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, 26 Federal Plaza, Room 1351, New York, New York 10278.

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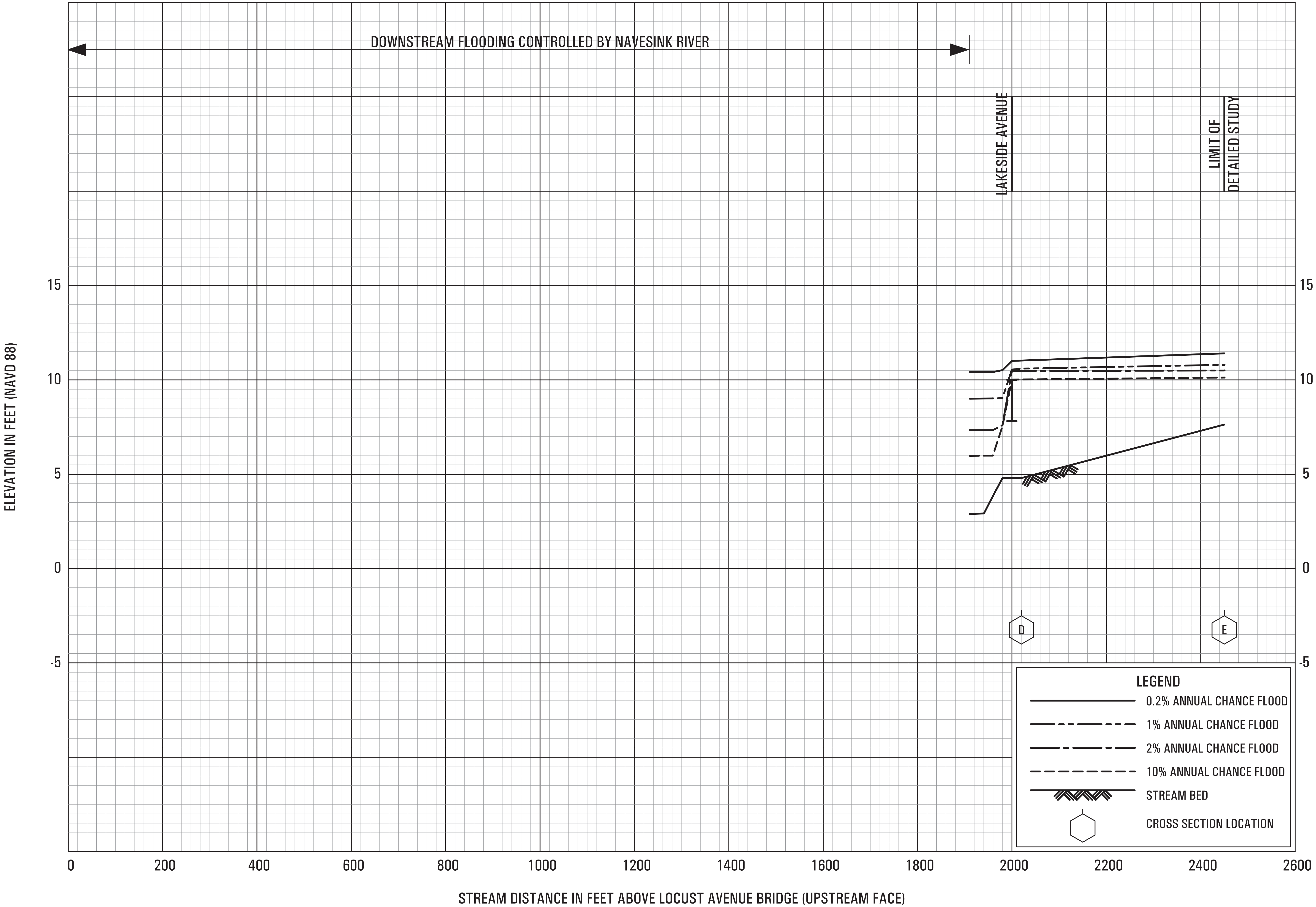


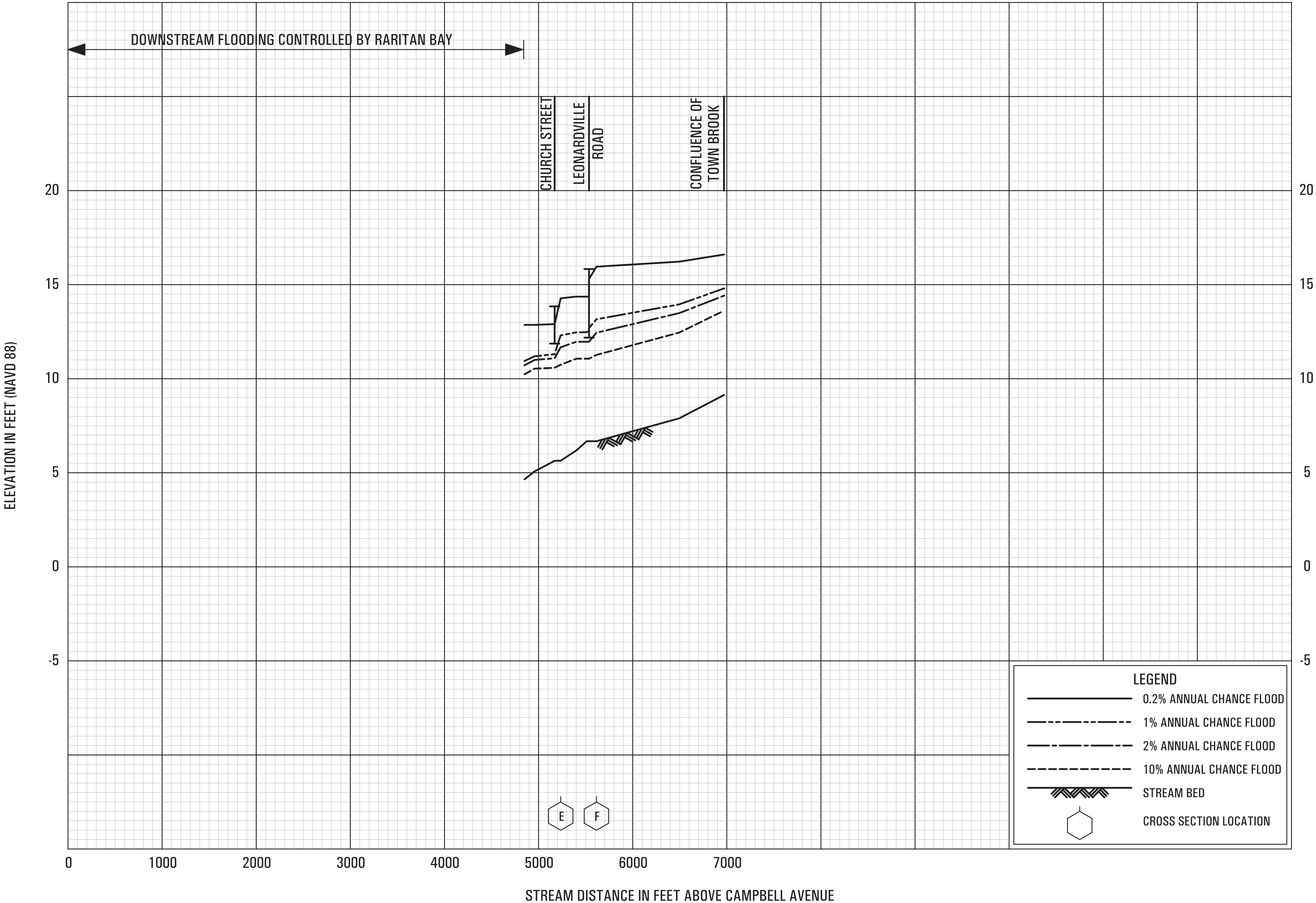
FLOOD PROFILES

CLAYPIT CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

MONMOUTH COUNTY, NJ

(ALL JURISDICTIONS)



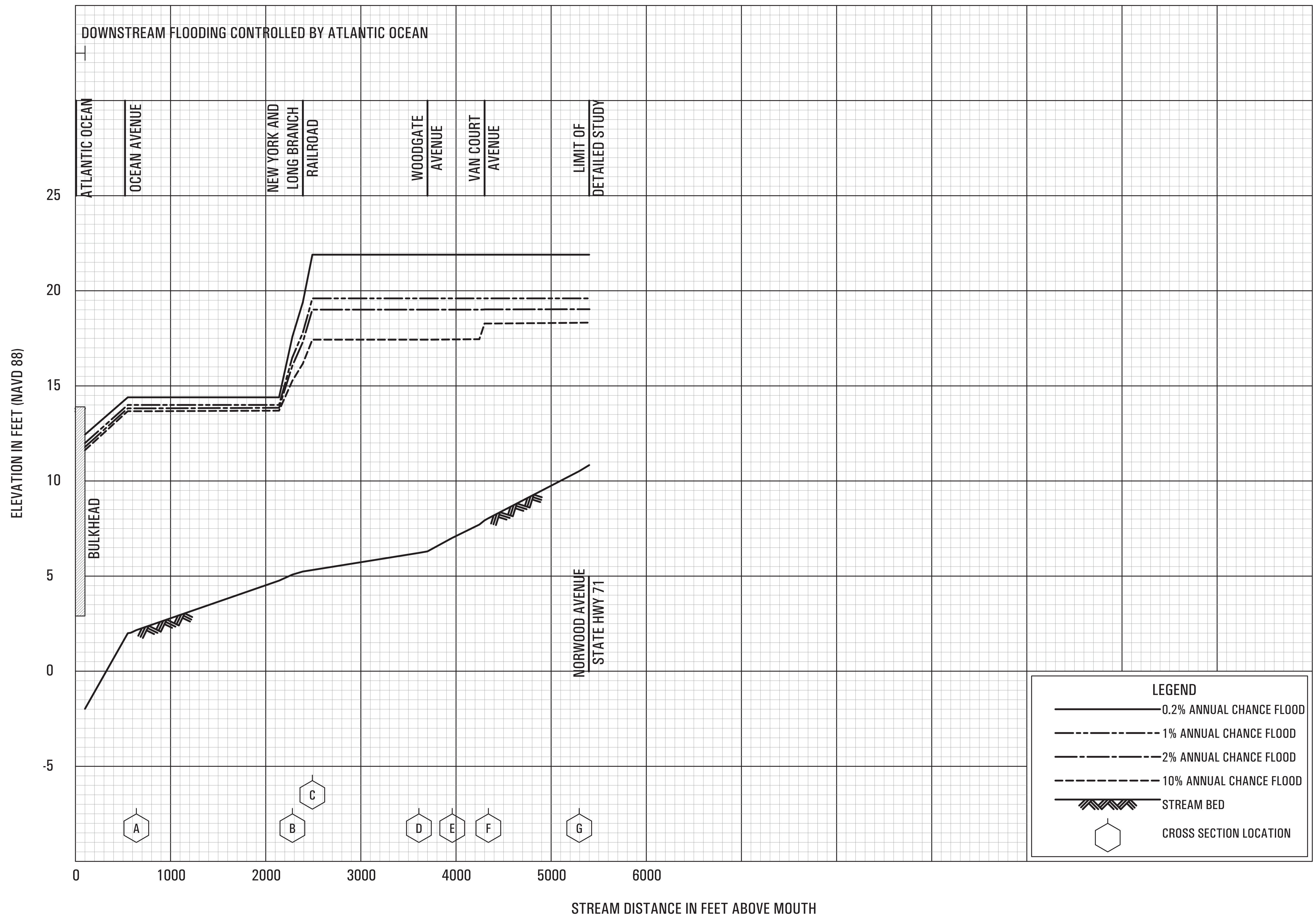
FLOOD PROFILES

COMPTONS CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

MONMOUTH COUNTY, NJ

(ALL JURISDICTIONS)



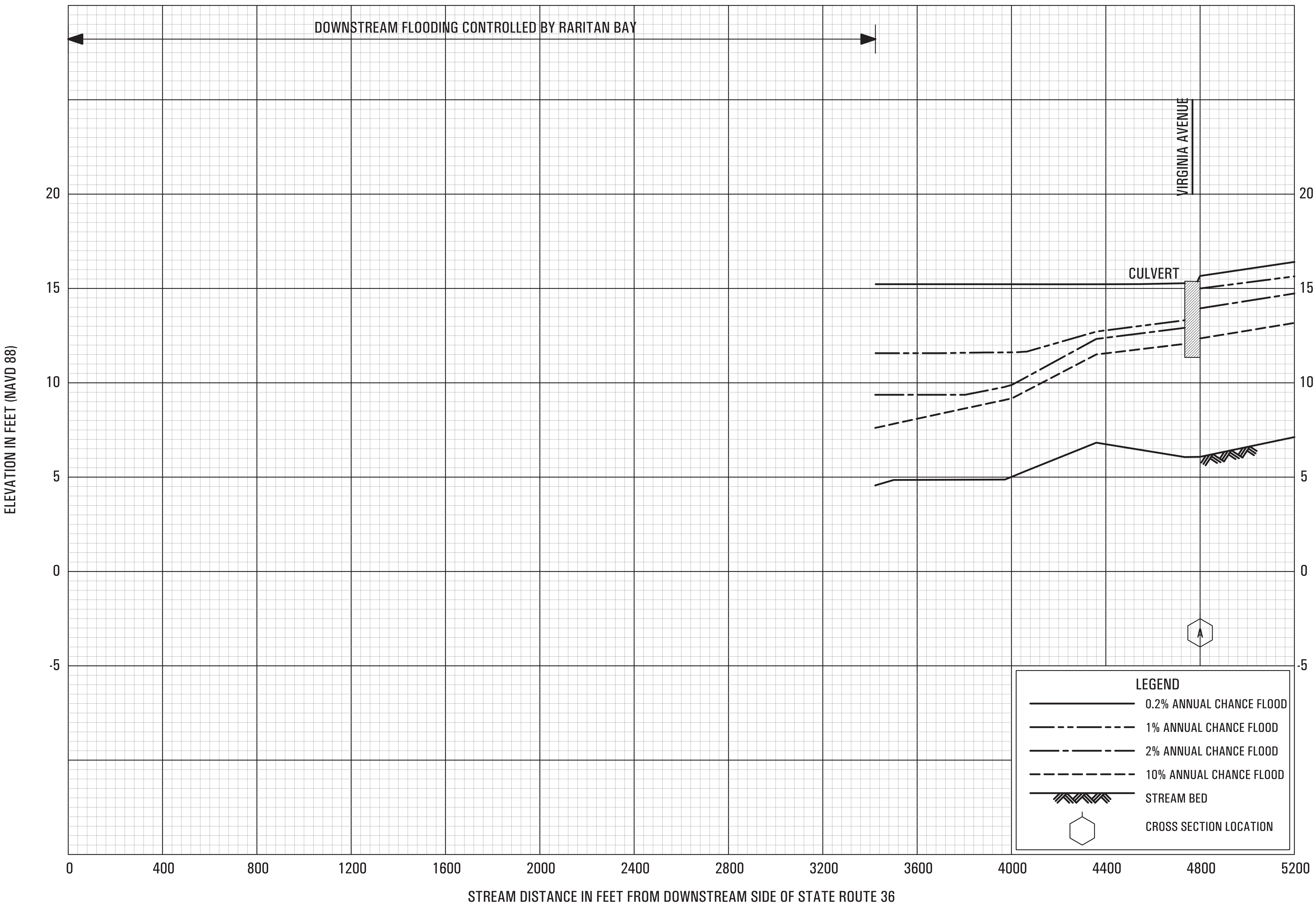
FLOOD PROFILES

CRANBERRY BROOK

FEDERAL EMERGENCY MANAGEMENT AGENCY

MONMOUTH COUNTY, NJ

(ALL JURISDICTIONS)



FLOOD PROFILES

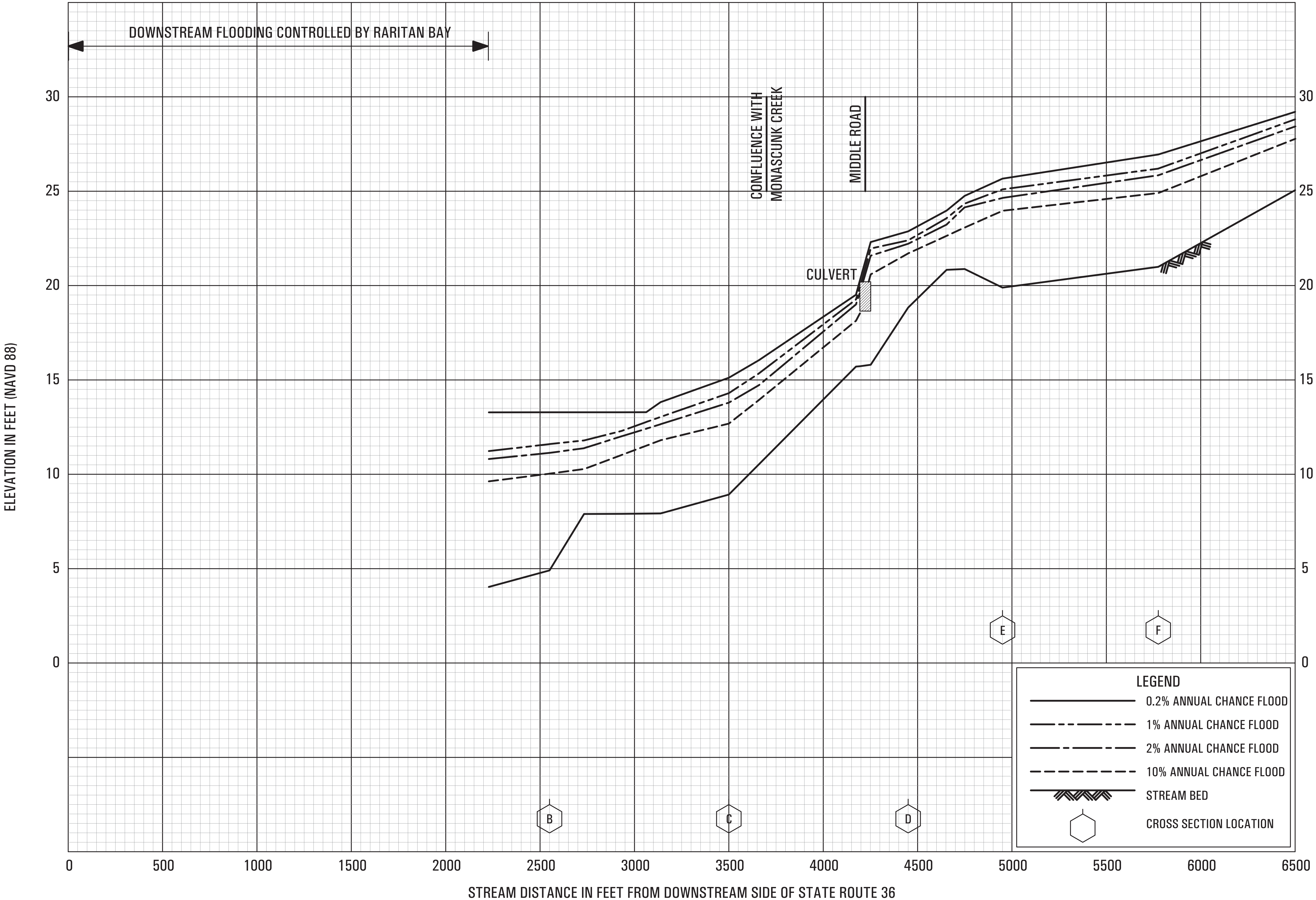
EAST CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

MONMOUTH COUNTY, NJ

(ALL JURISDICTIONS)

35P



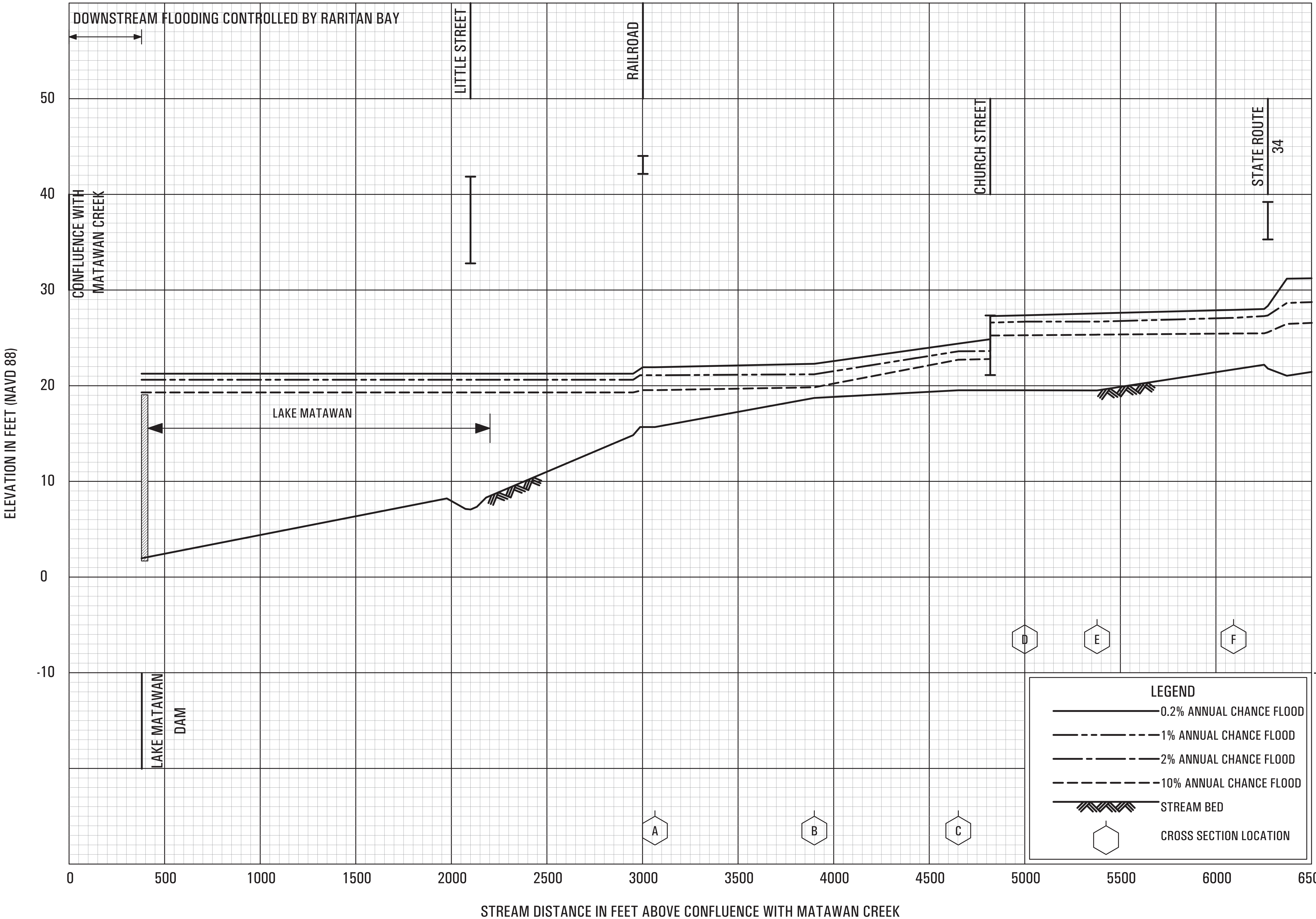
FLOOD PROFILES

FLAT CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

MONMOUTH COUNTY, NJ

(ALL JURISDICTIONS)



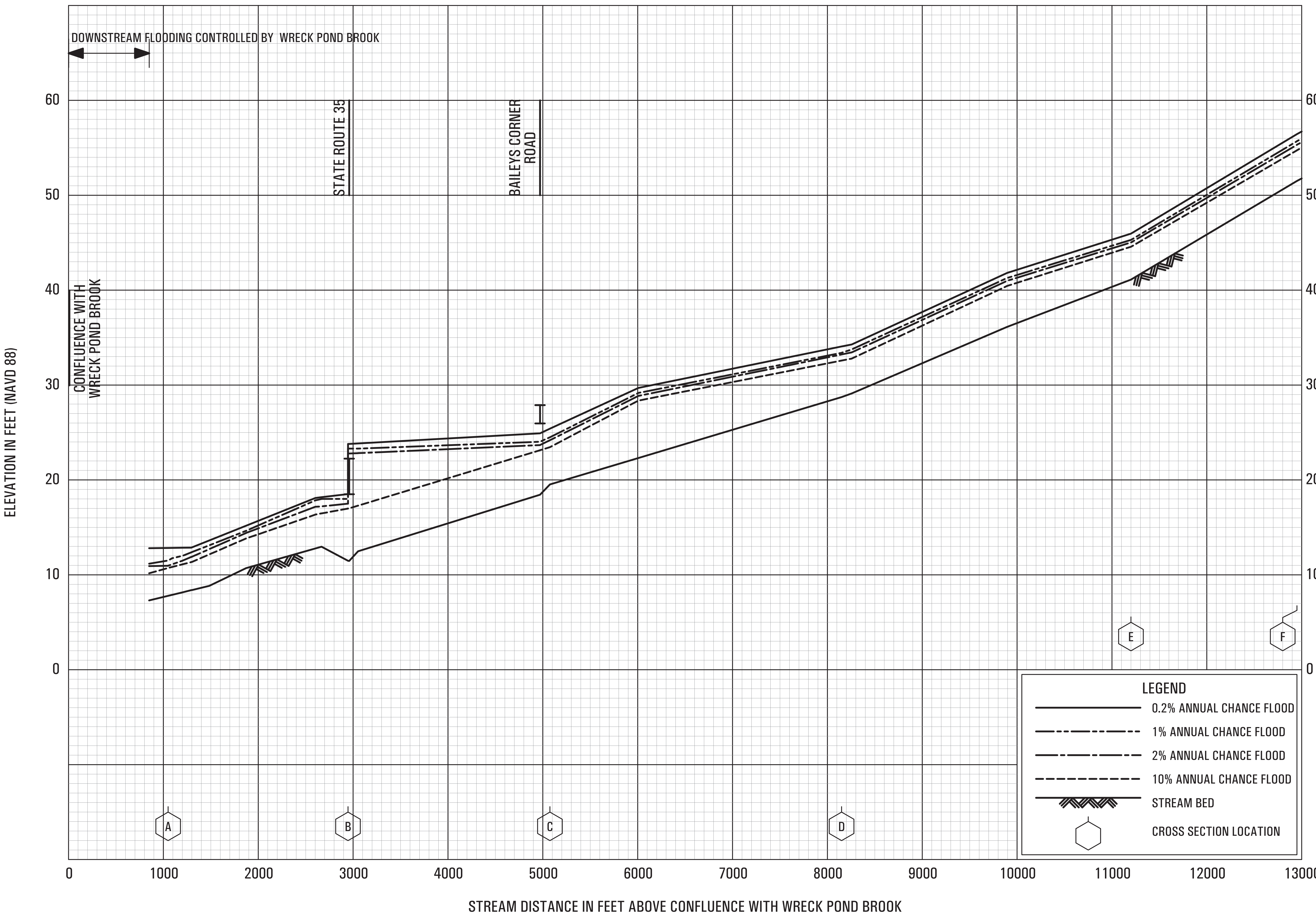
FLOOD PROFILES

GRAVELLY BROOK

FEDERAL EMERGENCY MANAGEMENT AGENCY

MONMOUTH COUNTY, NJ

(ALL JURISDICTIONS)



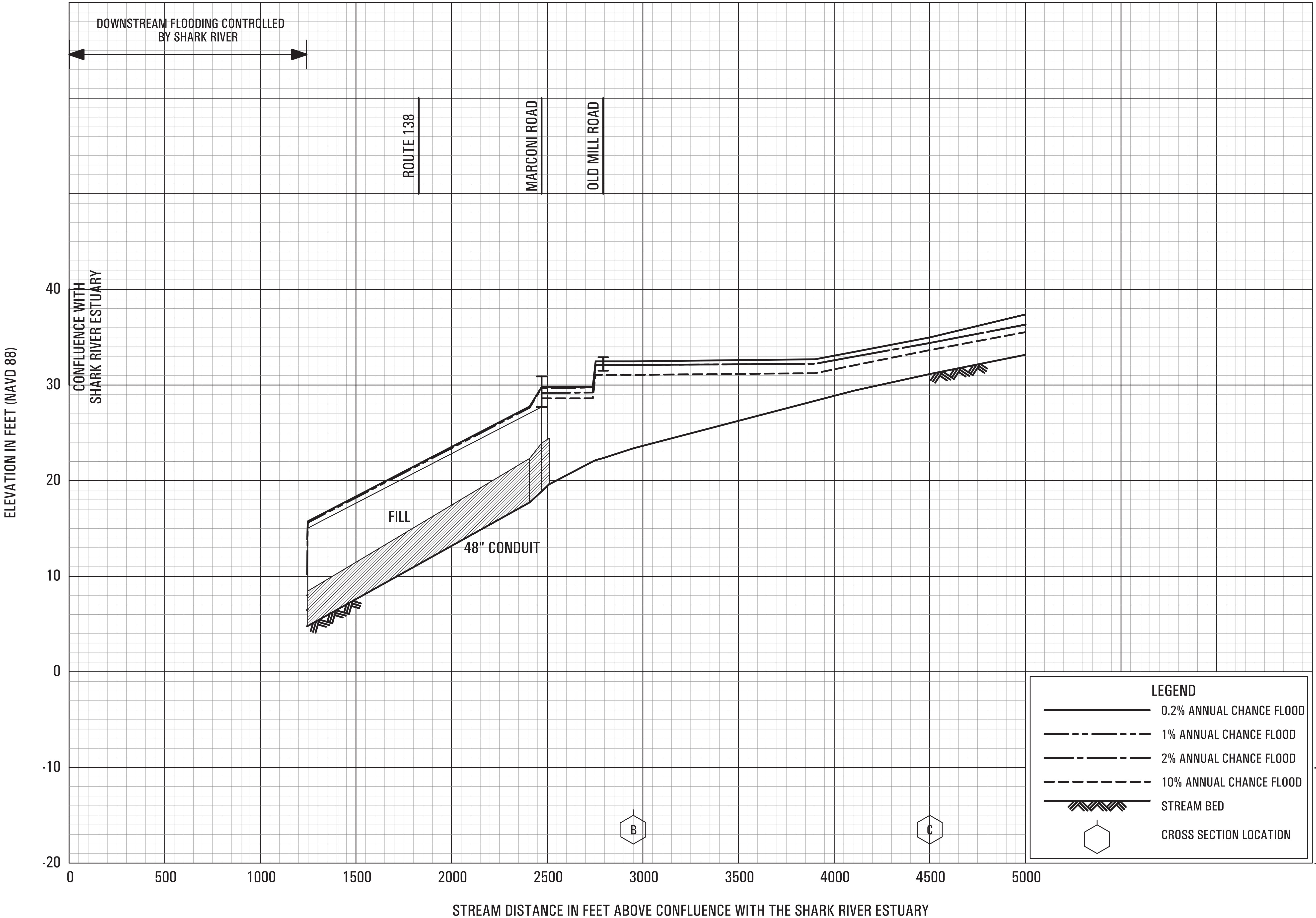
FLOOD PROFILES

HANNABRAND BROOK

FEDERAL EMERGENCY MANAGEMENT AGENCY

MONMOUTH COUNTY, NJ

(ALL JURISDICTIONS)



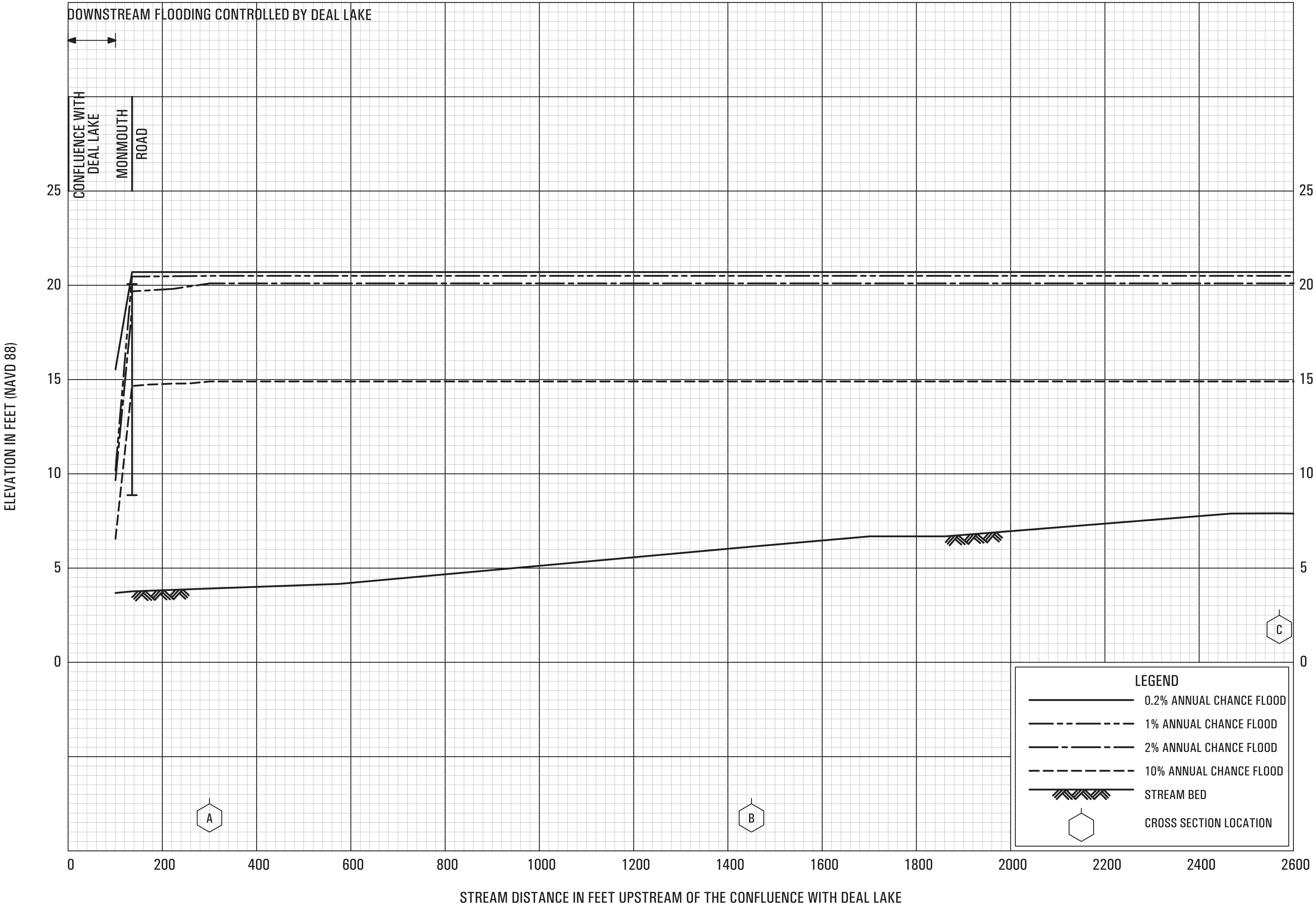
FLOOD PROFILES

HEROYS POND CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

MONMOUTH COUNTY, NJ

(ALL JURISDICTIONS)



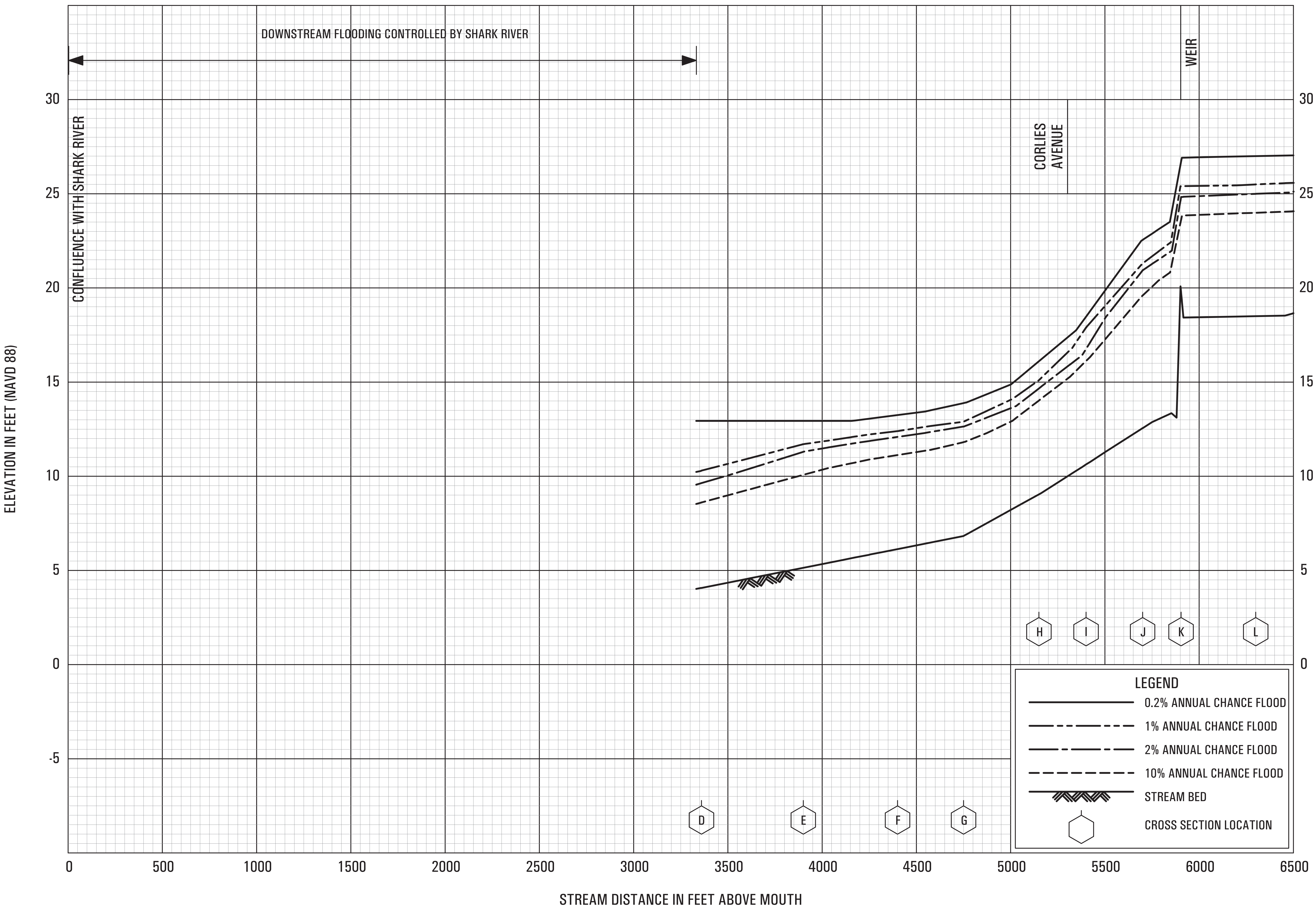
FLOOD PROFILES

HOG SWAMP BROOK

FEDERAL EMERGENCY MANAGEMENT AGENCY

MONMOUTH COUNTY, NJ

(ALL JURISDICTIONS)



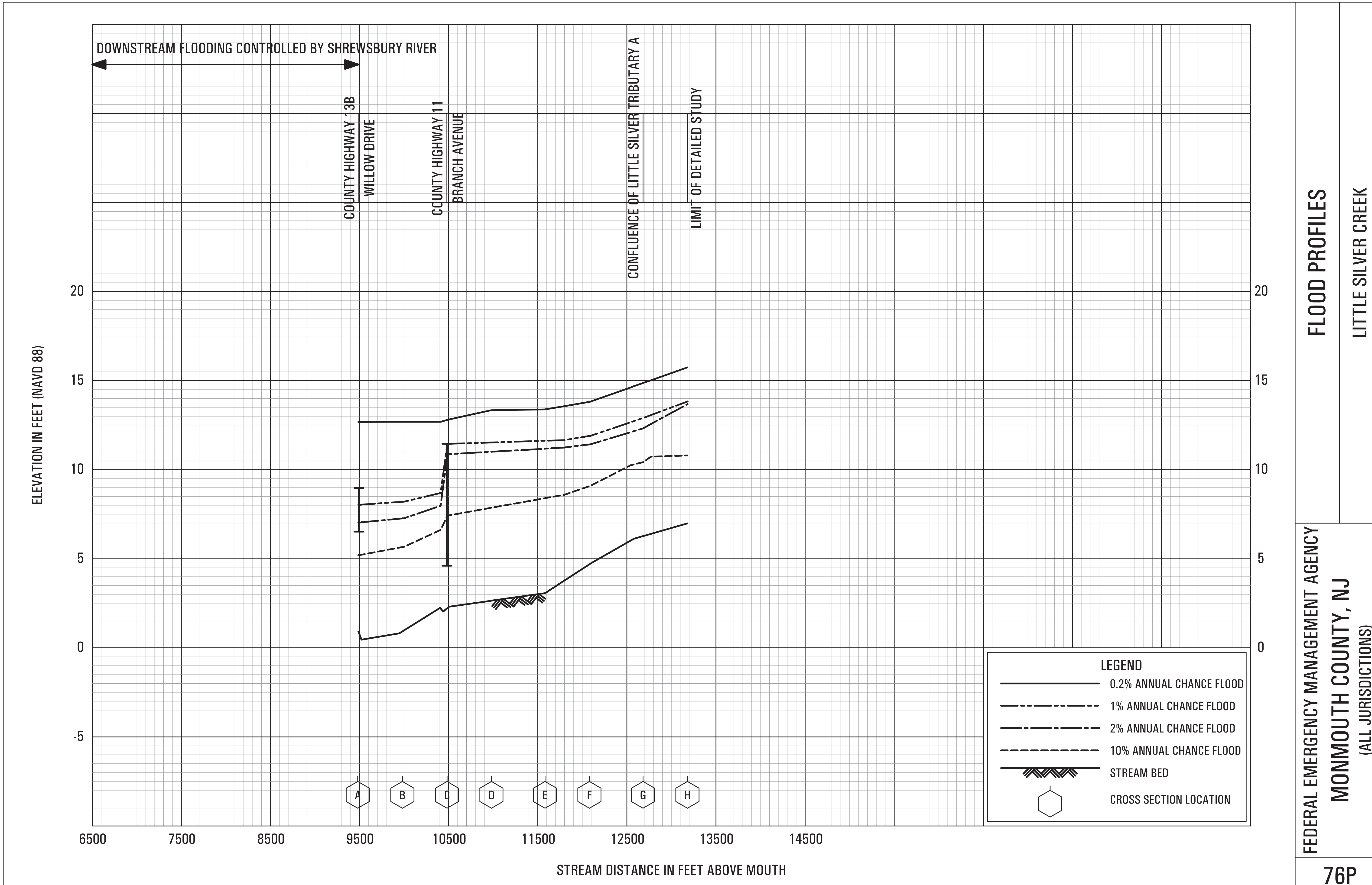
FLOOD PROFILES

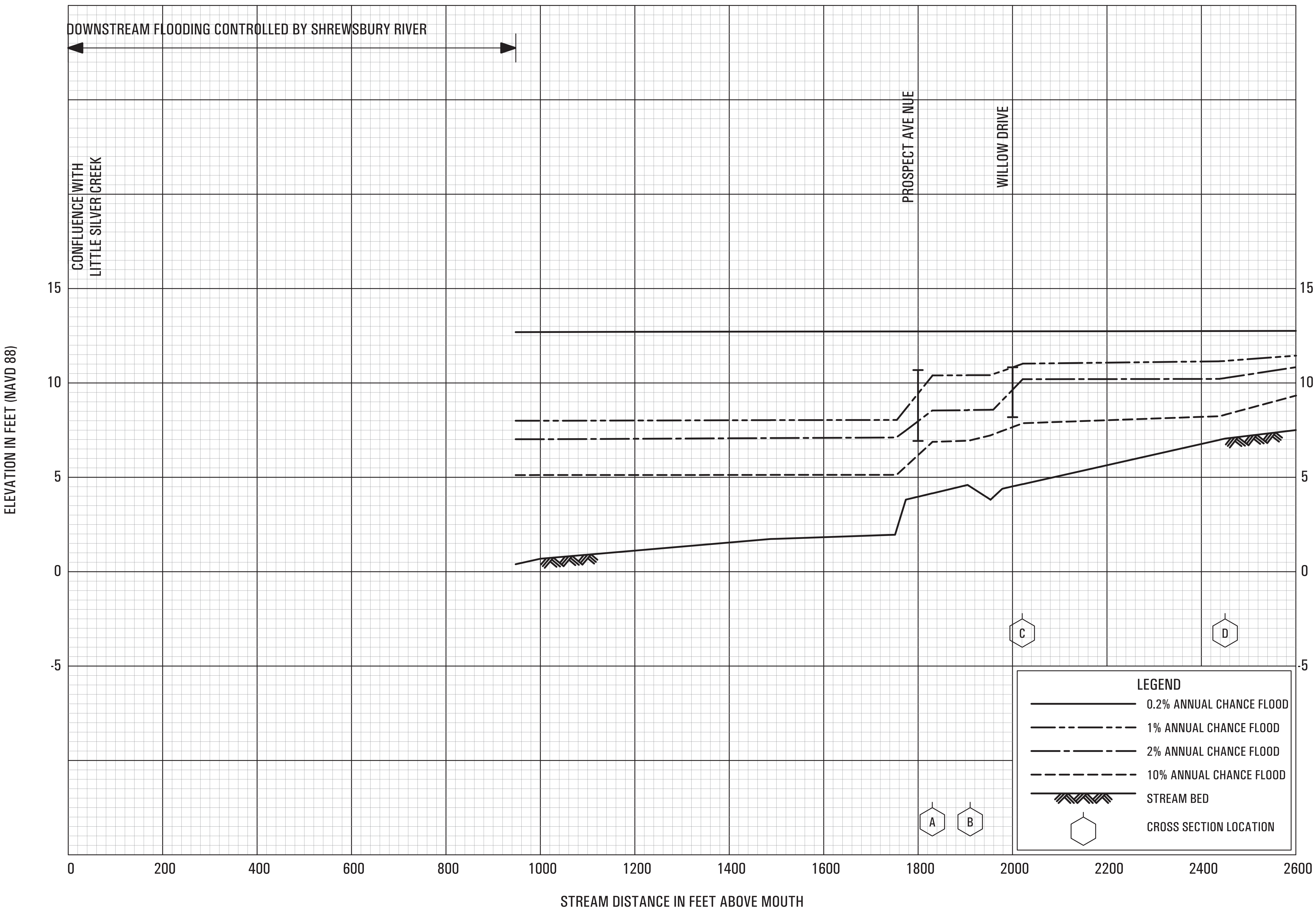
JUMPING BROOK 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

MONMOUTH COUNTY, NJ

(ALL JURISDICTIONS)


DOWNSTREAM FLOODING CONTROLLED BY SHREWSBURY RIVER
COUNTY HIGHWAY 13B
WILLOW DRIVE
COUNTY HIGHWAY 11
BRANCH AVENUE
CONFLUENCE OF LITTLE SILVER TRIBUTARY A
LIMIT OF DETAILED STUDY
ELEVATION IN FEET (NAVD 88)
20
15
10
5
0
-5
A
B
C
D
E
F
G
H
6500
7500
8500
9500
10500
11500
12500
13500
14500
STREAM DISTANCE IN FEET ABOVE MOUTH
LEGEND
0.2% ANNUAL CHANCE FLOOD
1% ANNUAL CHANCE FLOOD
2% ANNUAL CHANCE FLOOD
10% ANNUAL CHANCE FLOOD
STREAM BED
CROSS SECTION LOCATION
FLOOD PROFILES
LITTLE SILVER CREEK
FEDERAL EMERGENCY MANAGEMENT AGENCY
MONMOUTH COUNTY, NJ
(ALL JURISDICTIONS)
76P



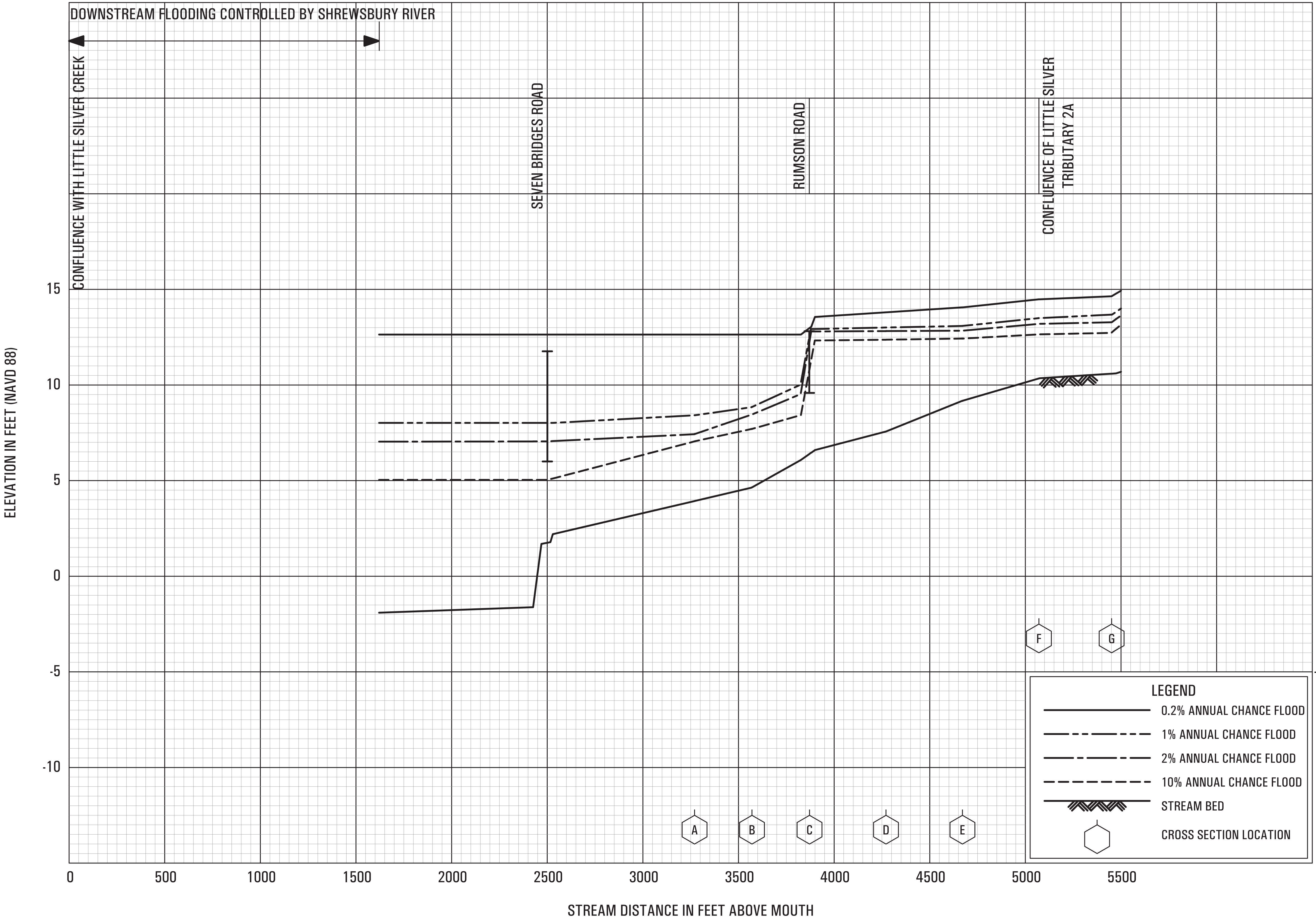
FLOOD PROFILES

LITTLE SILVER TRIBUTARY 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

MONMOUTH COUNTY, NJ

(ALL JURISDICTIONS)



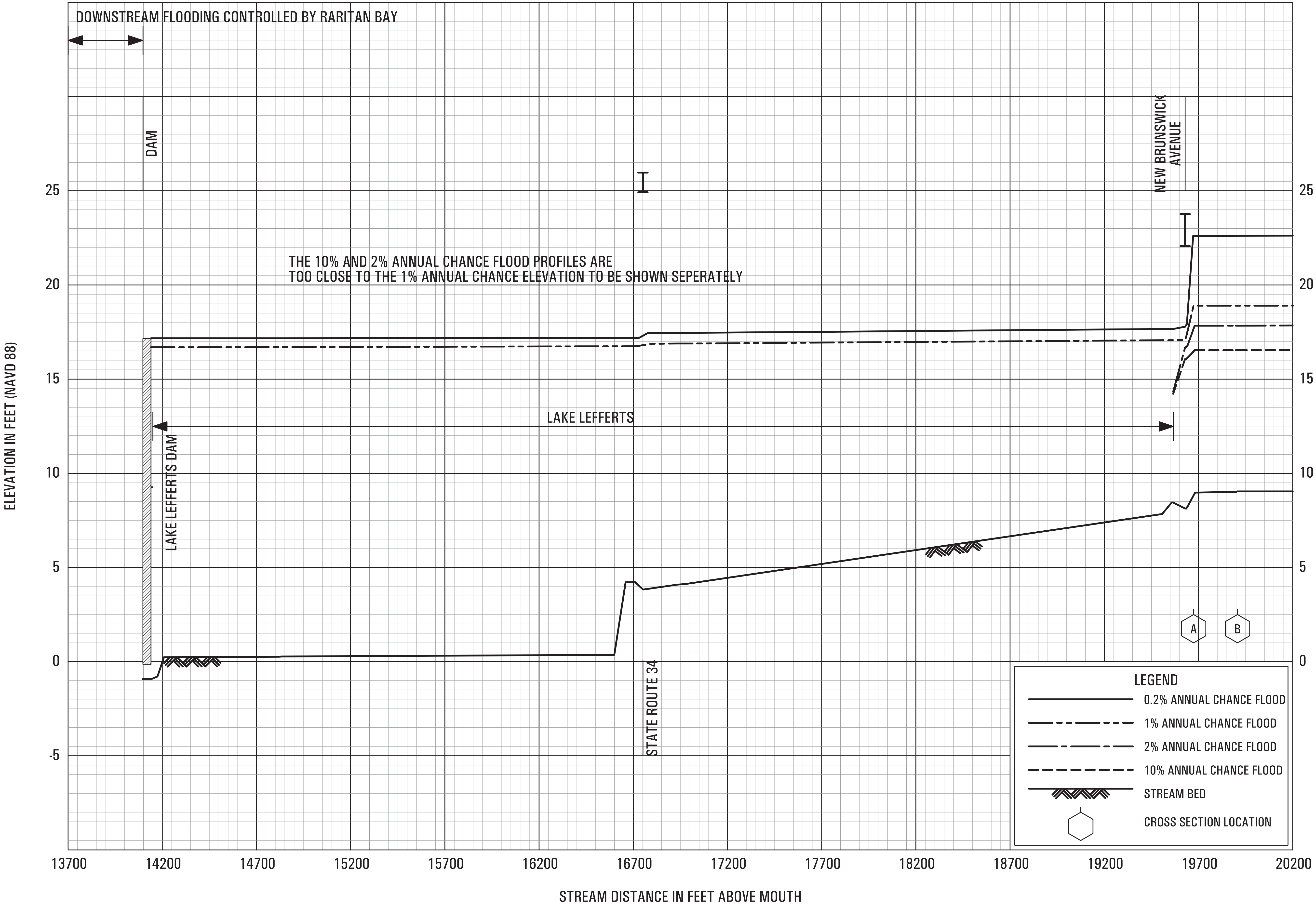
FLOOD PROFILES

LITTLE SILVER TRIBUTARY 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

MONMOUTH COUNTY, NJ

(ALL JURISDICTIONS)



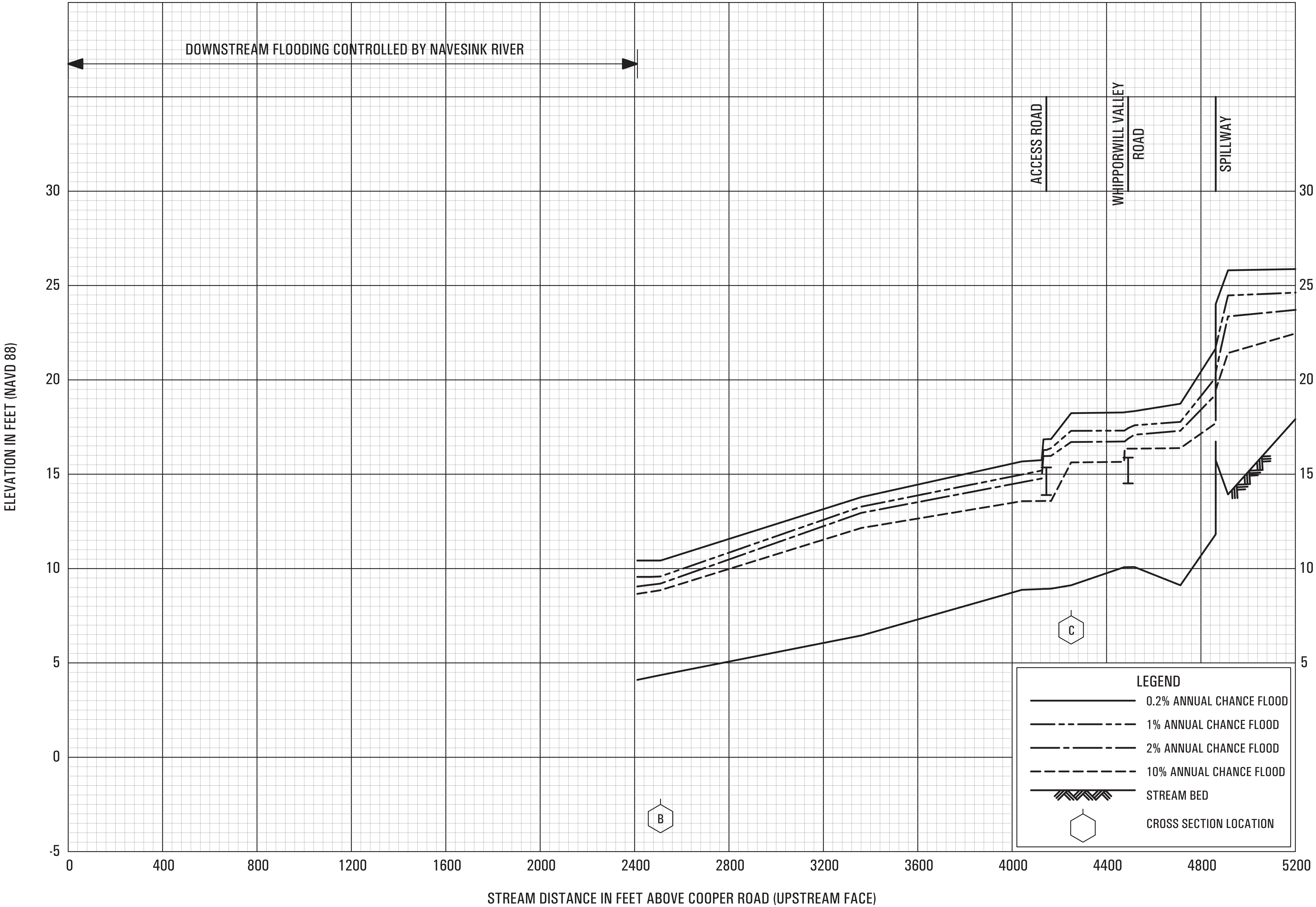
FLOOD PROFILES

MATAWAN CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

MONMOUTH COUNTY, NJ

(ALL JURISDICTIONS)



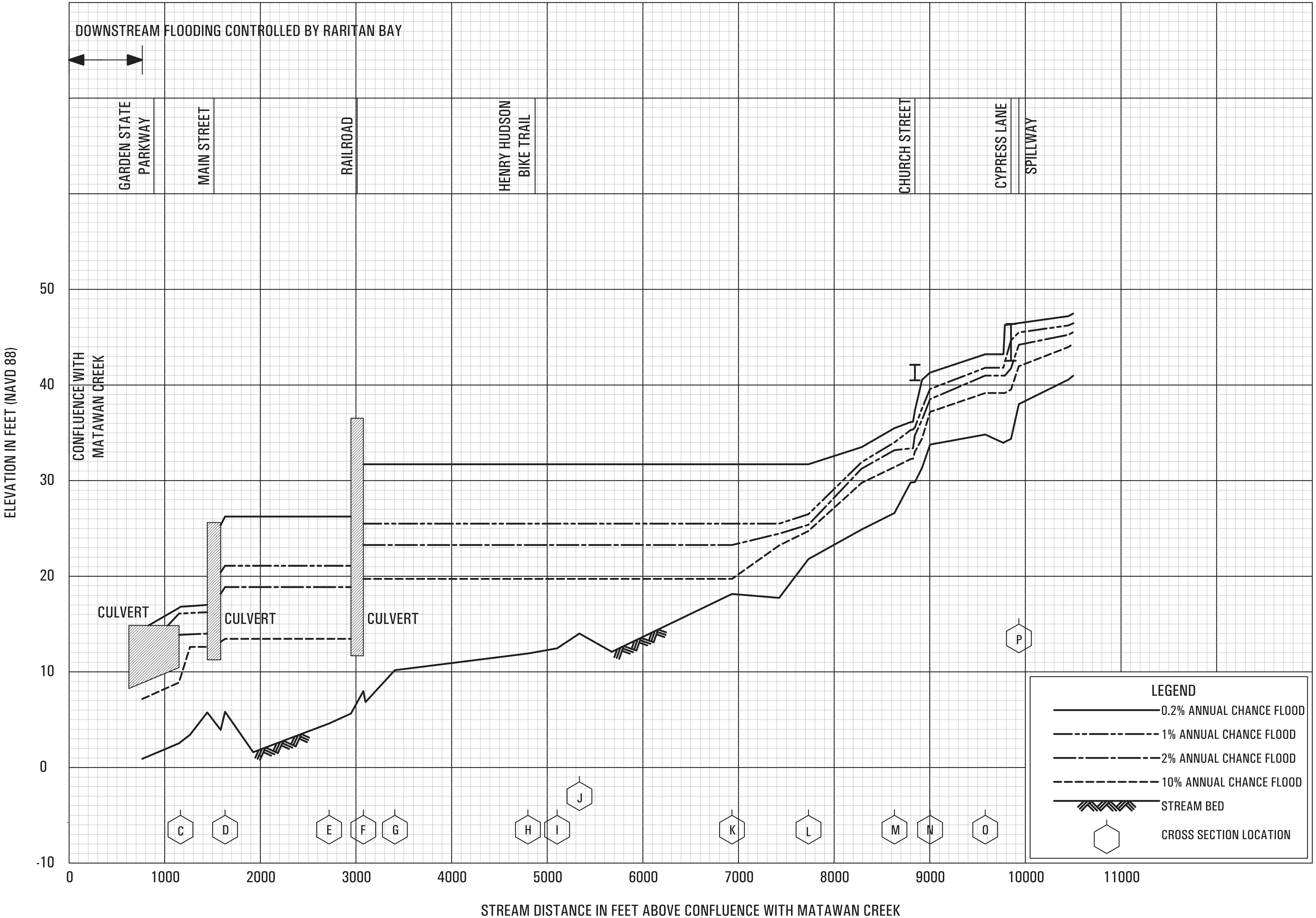
FLOOD PROFILES

MCCLEES CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

MONMOUTH COUNTY, NJ

(ALL JURISDICTIONS)



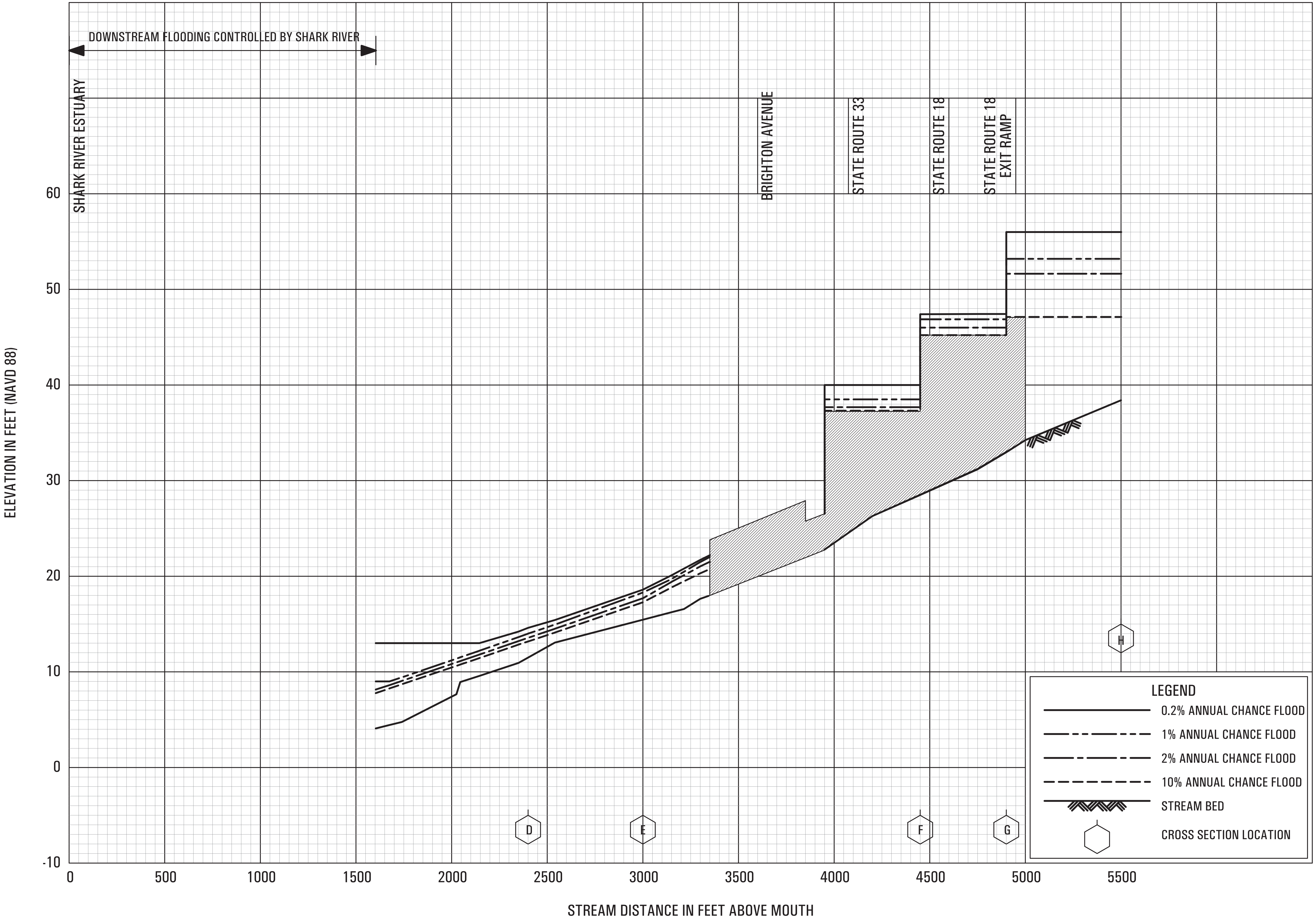
FLOOD PROFILES

MOHINGSON BROOK

FEDERAL EMERGENCY MANAGEMENT AGENCY

MONMOUTH COUNTY, NJ

(ALL JURISDICTIONS)



FLOOD PROFILES

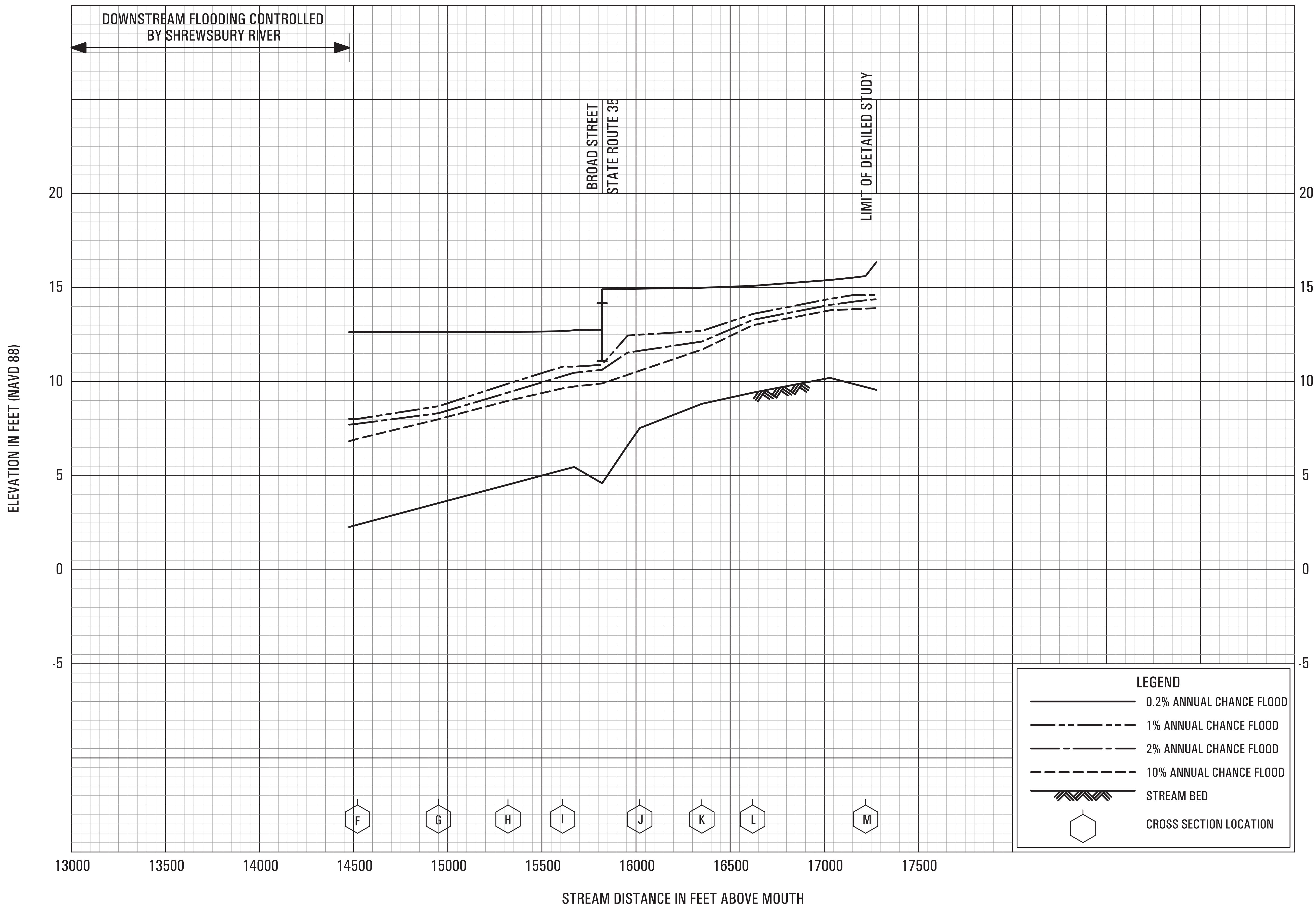
MUSQUASH BROOK

FEDERAL EMERGENCY MANAGEMENT AGENCY

MONMOUTH COUNTY, NJ

(ALL JURISDICTIONS)

147P



FLOOD PROFILES

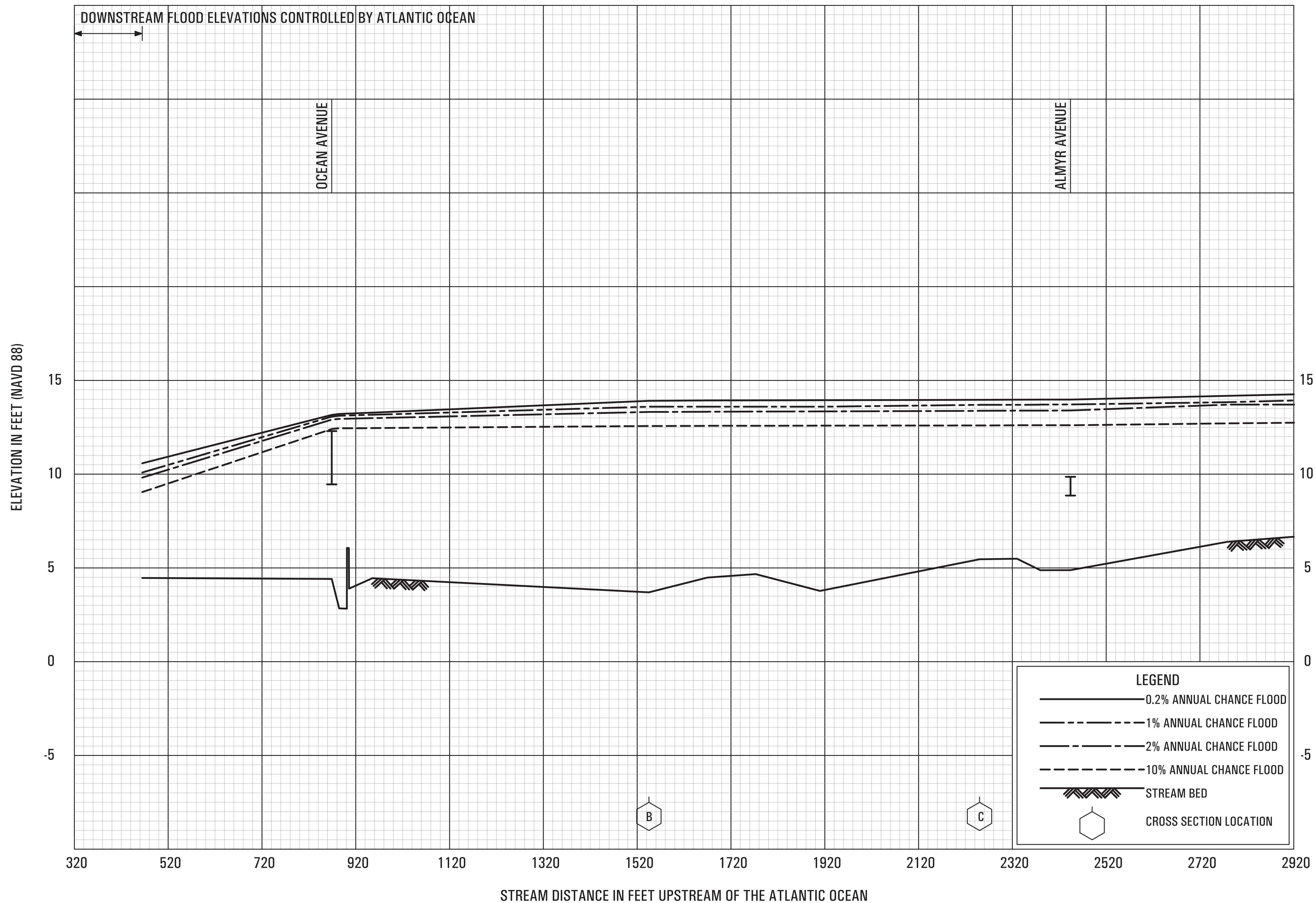
PARKERS CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

MONMOUTH COUNTY, NJ

(ALL JURISDICTIONS)

153P



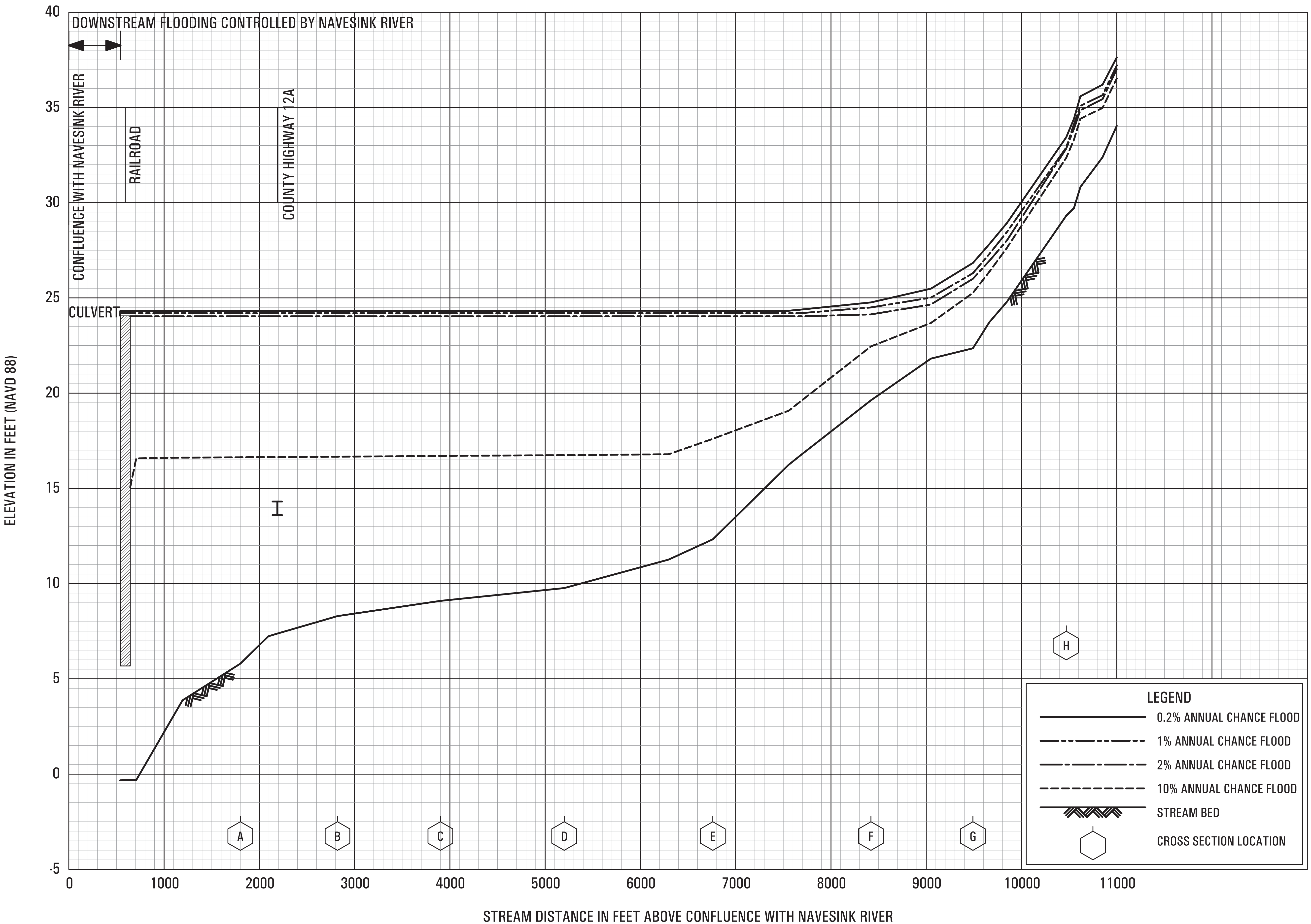
FLOOD PROFILES

POPLAR BROOK

FEDERAL EMERGENCY MANAGEMENT AGENCY

MONMOUTH COUNTY, NJ

(ALL JURISDICTIONS)



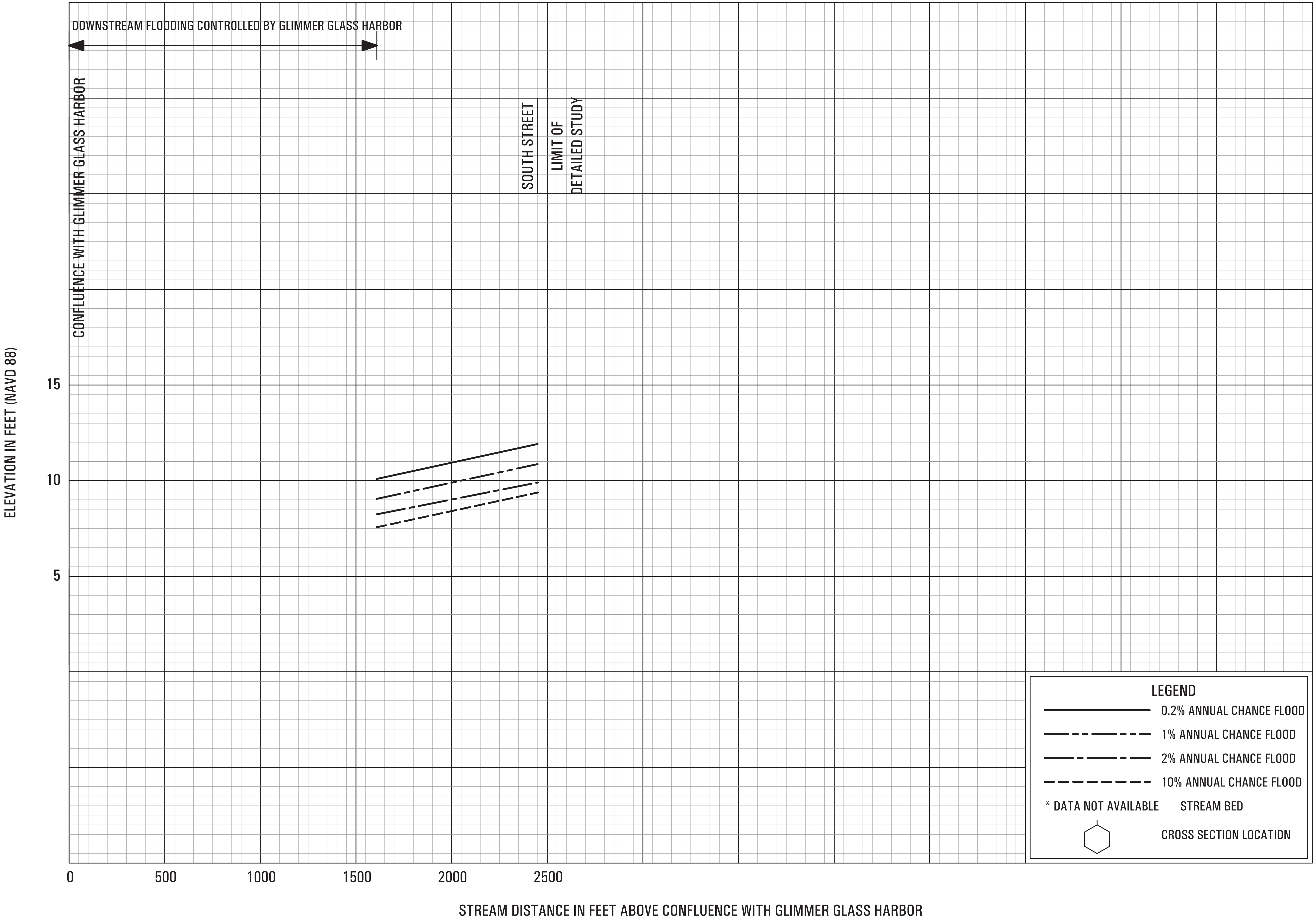
FLOOD PROFILES

PORICY BROOK

FEDERAL EMERGENCY MANAGEMENT AGENCY

MONMOUTH COUNTY, NJ

(ALL JURISDICTIONS)



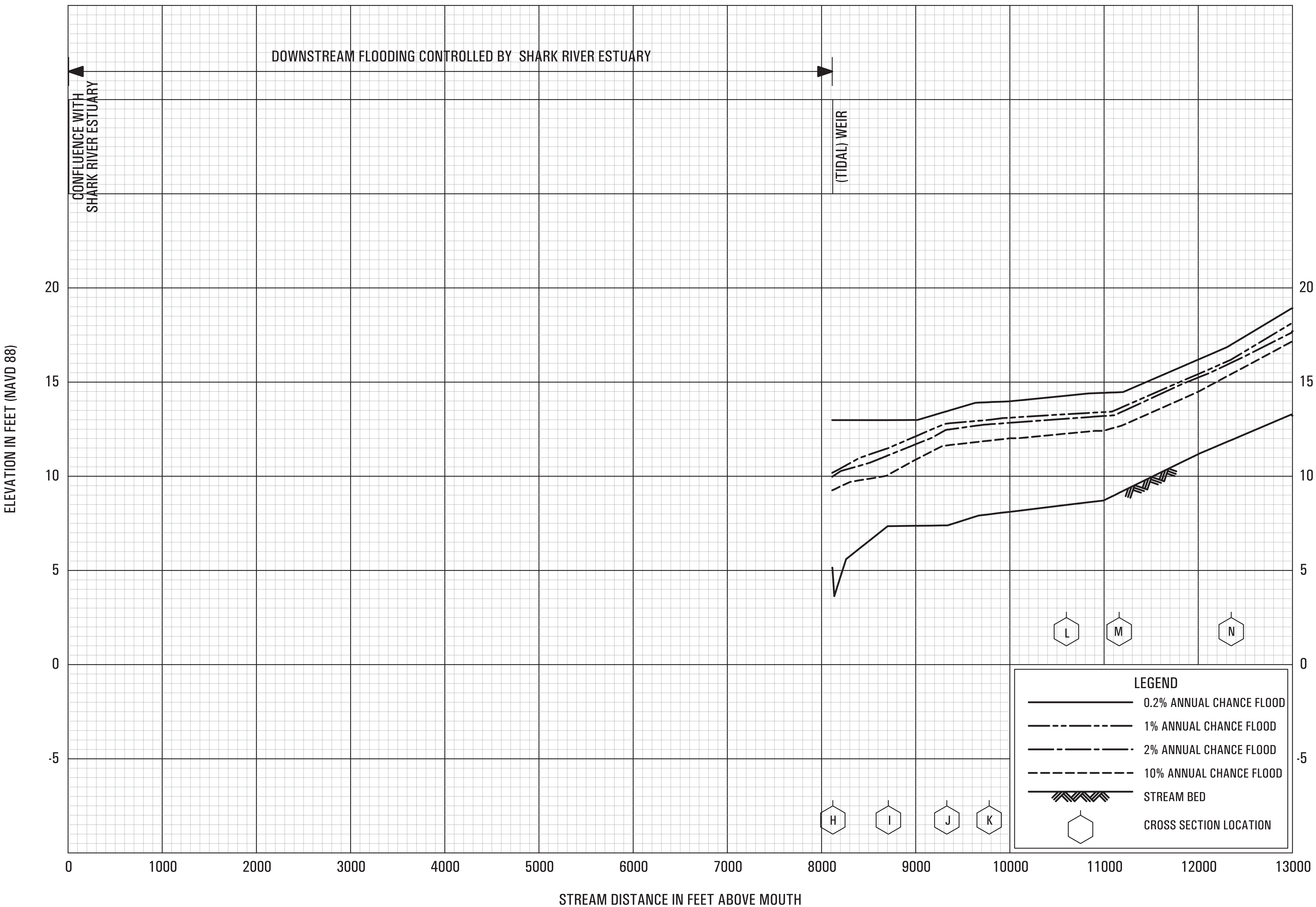
FLOOD PROFILES

ROBERTS SWAMP BROOK (DOWNSTREAM REACH)

FEDERAL EMERGENCY MANAGEMENT AGENCY

MONMOUTH COUNTY, NJ

(ALL JURISDICTIONS)



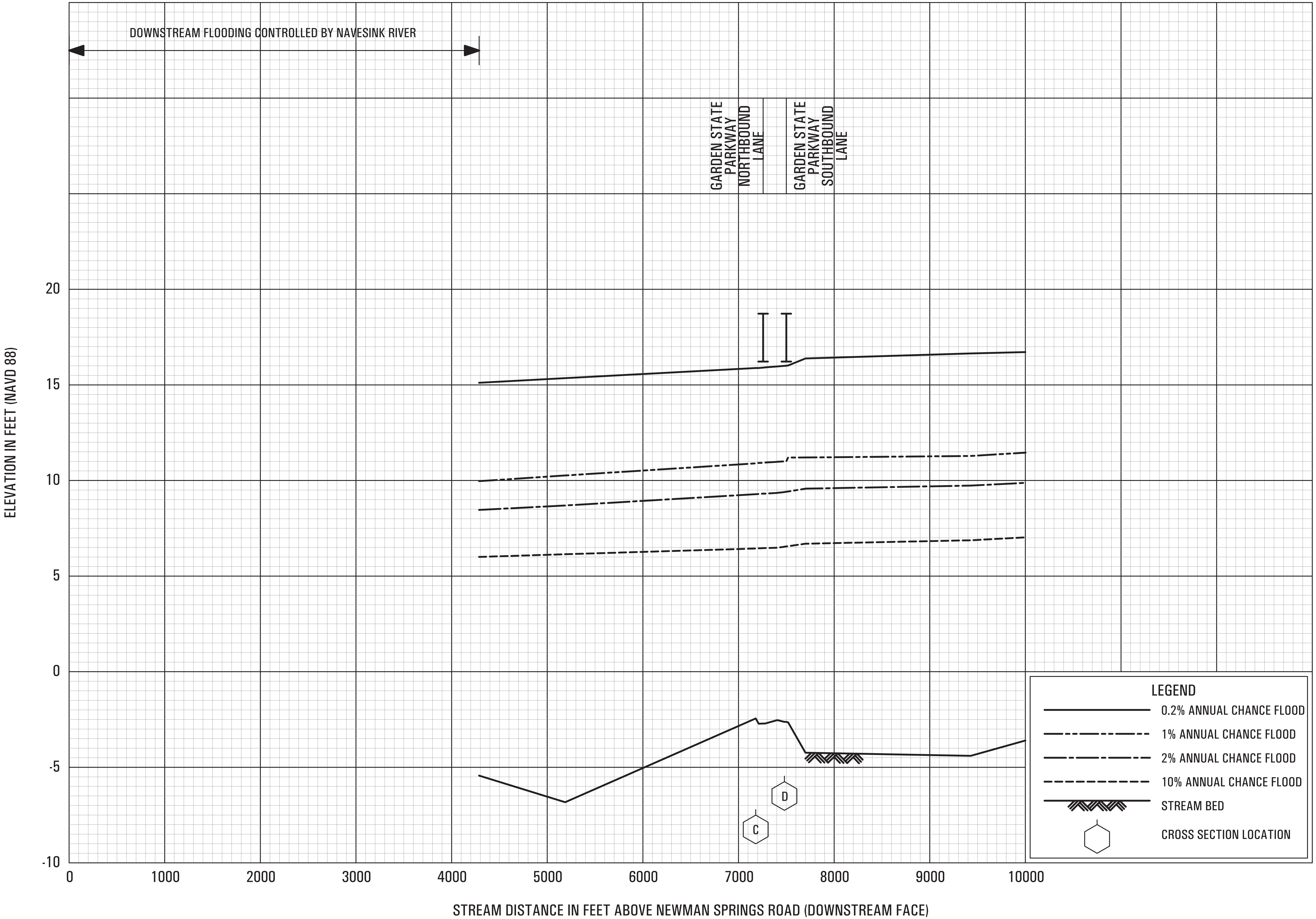
FLOOD PROFILES

SHARK RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

MONMOUTH COUNTY, NJ

(ALL JURISDICTIONS)



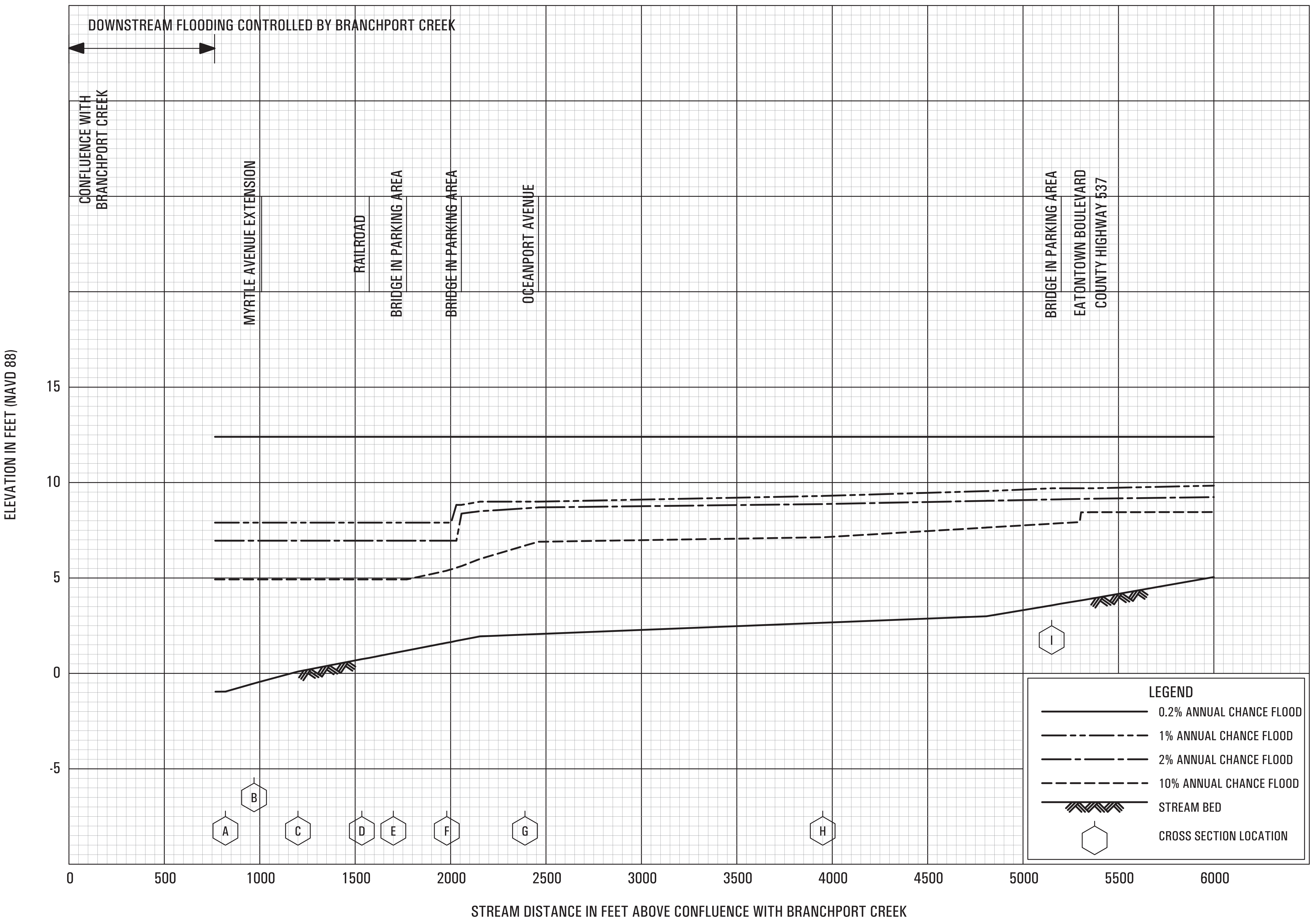
FLOOD PROFILES

SWIMMING RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

MONMOUTH COUNTY, NJ

(ALL JURISDICTIONS)



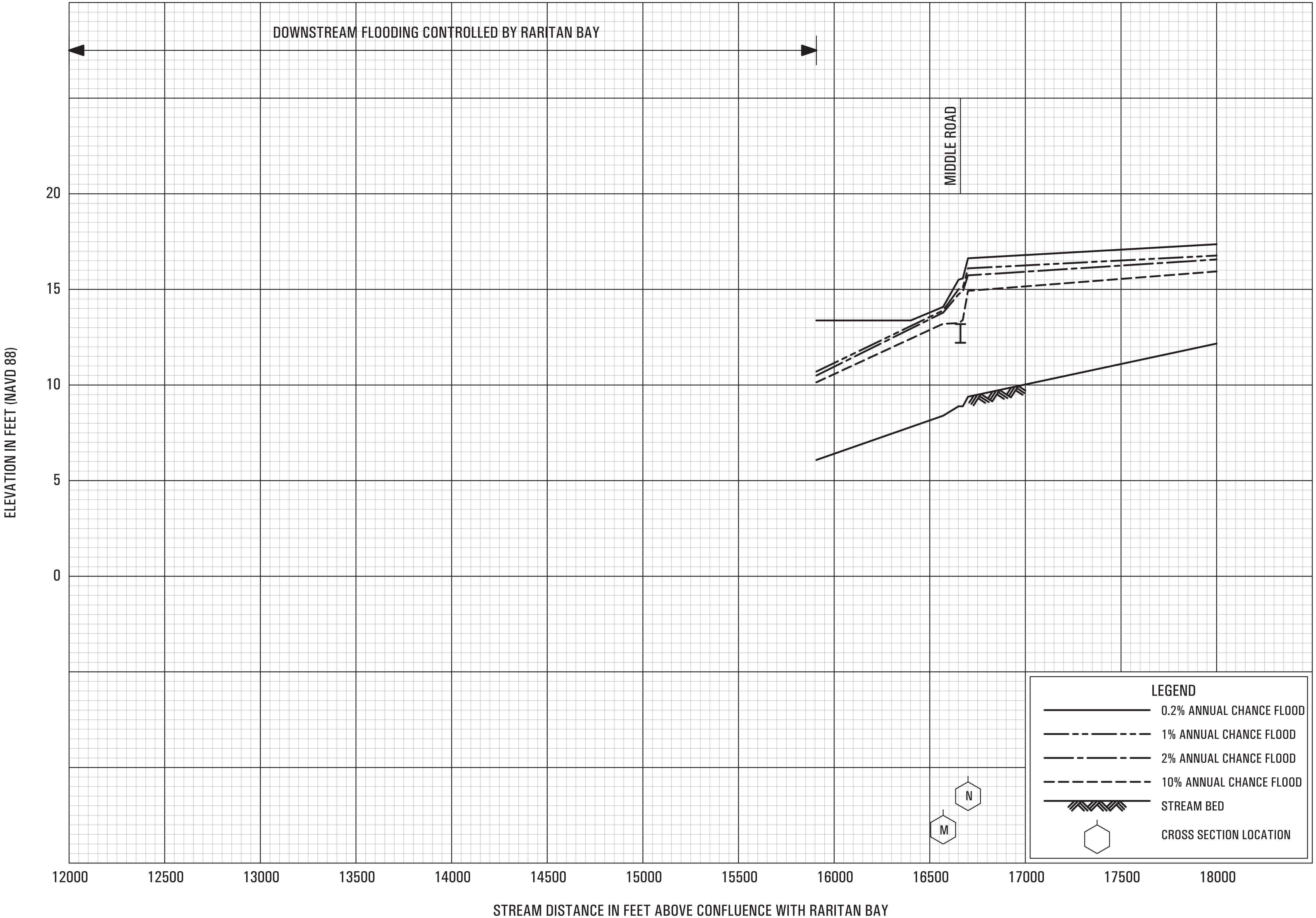
FLOOD PROFILES

TURTLE MILL BROOK

FEDERAL EMERGENCY MANAGEMENT AGENCY

MONMOUTH COUNTY, NJ

(ALL JURISDICTIONS)



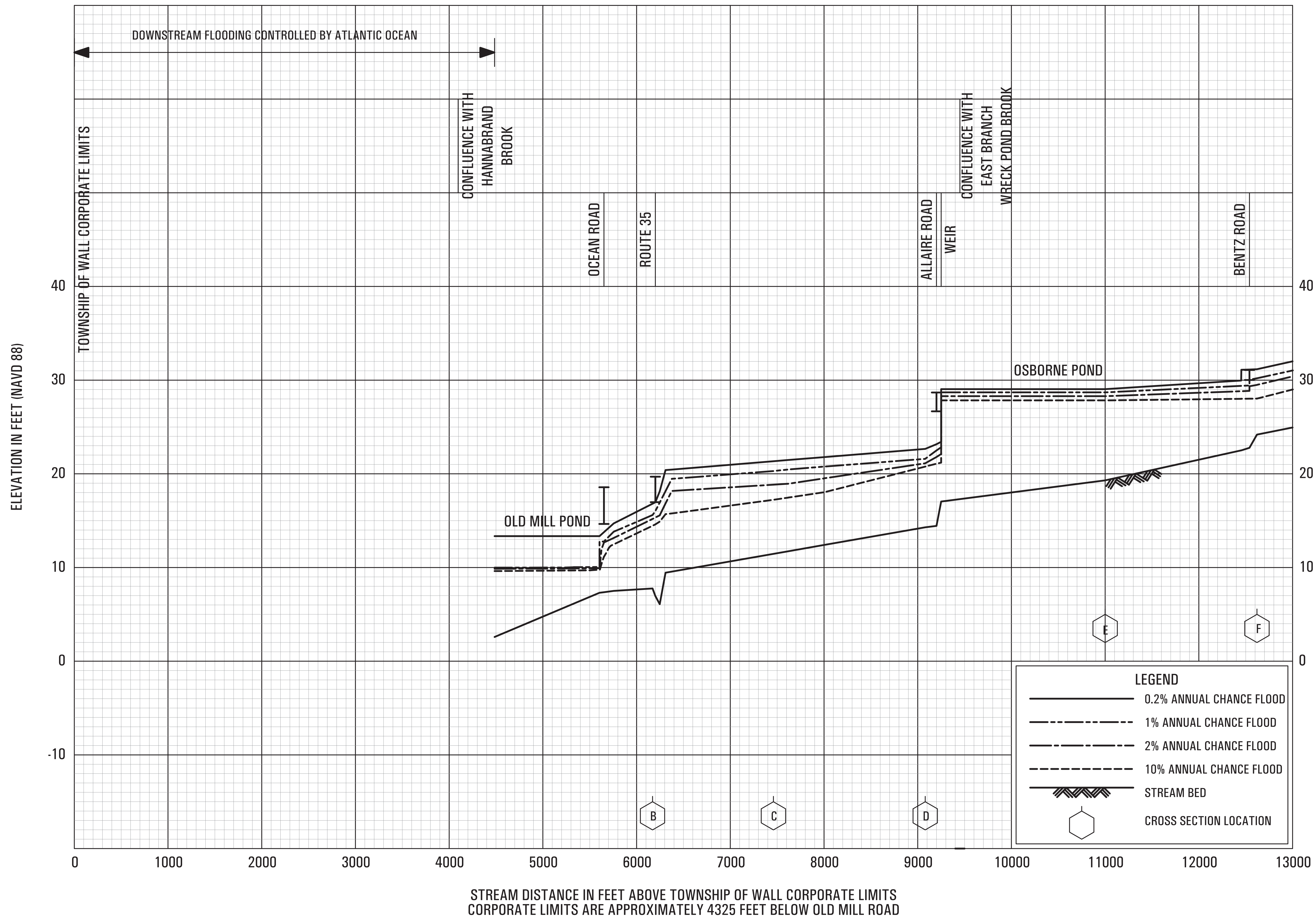
FLOOD PROFILES

WAACKAACK CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

MONMOUTH COUNTY, NJ

(ALL JURISDICTIONS)



FLOOD PROFILES

WRECK POND BROOK

FEDERAL EMERGENCY MANAGEMENT AGENCY

MONMOUTH COUNTY, NJ

(ALL JURISDICTIONS)