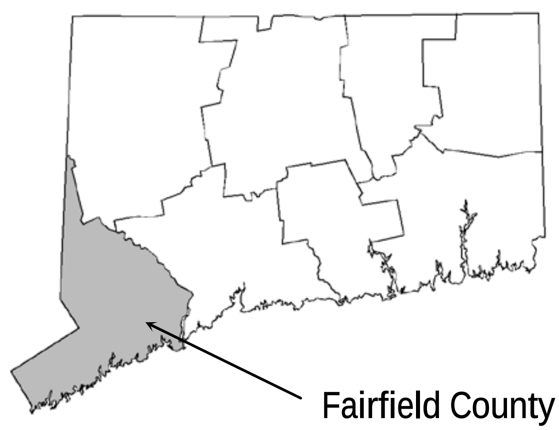
FLOOD INSURANCE STUDY

VOLUME 1 OF 6

FAIRFIELD COUNTY, CONNECTICUT
(ALL JURISDICTIONS)



COMMUNITY NAME	COMMUNITY NUMBER
BETHEL, TOWN OF	090001
BRIDGEPORT, CITY OF	090002
BROOKFIELD, TOWN OF	090003
DANBURY, CITY OF	090004
DARIEN, TOWN OF	090005
EASTON, TOWN OF	090006
FAIRFIELD, TOWN OF	090007
GREENWICH, TOWN OF	090008
MONROE, TOWN OF	090009
NEW CANAAN, TOWN OF	090010
NEW FAIRFIELD, TOWN OF	090188
NEWTOWN, TOWN OF	090011
NORWALK, CITY OF	090012
REDDING, TOWN OF	090141
RIDGEFIELD, TOWN OF	090013
SHELTON, CITY OF	090014
SHERMAN, TOWN OF	090166
STAMFORD, CITY OF	090015
STRATFORD, TOWN OF	090016
TRUMBULL, TOWN OF	090017
WESTON, TOWN OF	090018
WESTPORT, TOWN OF	090019
WILTON, TOWN OF	090020

Revised:
October 16, 2013

Federal Emergency Management Agency

FLOOD INSURANCE STUDY NUMBER
09001CV001C

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) report 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 report may be revised by the Letter of Map Revision process, which does not involve republication or redistribution of the FIS report. 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 report components.

Initial Countywide FIS Effective Date: June 18, 2010

Revised Countywide FIS Dates: July 8, 2013
October 16, 2013

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FLOOD INSURANCE STUDY
FAIRFIELD COUNTY, CONNECTICUT (ALL JURISDICTIONS)

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study (FIS) investigates the existence and severity of flood hazards in, or revises and updates previous FISs/Flood Insurance Rate Maps (FIRMs) for the geographic area of Fairfield County, Connecticut, including: the Cities of Bridgeport, Danbury, Norwalk, Shelton, and Stamford; and the Towns of Bethel, Brookfield, Darien, Easton, Fairfield, Greenwich, Monroe, New Canaan, New Fairfield, Newtown, Redding, Ridgefield, Sherman, Stratford, Trumbull, Weston, Westport, and Wilton and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study has developed flood risk data for various areas of the county that will be used to establish actuarial flood insurance rates. This information will also be used by the communities of Fairfield County to update existing floodplain regulations as part of the Regular Phase of the National Flood Insurance Program (NFIP), and by local and regional planners to further promote sound land use and floodplain development. Minimum floodplain management requirements for participation in the NFIP are set forth in the Code of Federal Regulations at 44 CFR, 60.3.

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 June 18, 2010 FIS was prepared to include all incorporated communities within Fairfield County in a countywide FIS. Information on the authority and acknowledgments for each jurisdiction included in the 2010 countywide FIS, as compiled from their previously printed FIS reports, is shown below:

Bethel, Town of:	The hydrologic and hydraulic analyses from the FIS report dated August 15, 1983, were performed by CE Maguire, Inc., for the Federal Emergency Management Agency (FEMA), under Contract No. EMW-C-0278. That work was completed in July 1981.
Bridgeport, City of:	The hydrologic and hydraulic analyses from the original FIS report represent a revision of the original analyses prepared by CE Maguire, Inc., for FEMA,

Bridgeport, City of: - continued	under Contract No. H-4560. The work for the original analyses was completed in September 1978. The hydrologic and hydraulic analyses for the Rooster River for the FIS report dated September 6, 1989 were prepared by FGA Services, Inc. The work for that revision was completed in September 1988.
Brookfield, Town of:	The hydrologic and hydraulic analyses from the FIS report dated December 1978 were performed by Harris-Toups Associates for the Federal Insurance Administration (FIA), under Contract No. H-3987. That work, which was completed in October 1977, covered all significant flooding sources affecting the Town of Brookfield.
Danbury, City of:	The hydrologic and hydraulic analyses from the FIS report dated April 1982 were performed by Anderson-Nichols & Company, Inc., for the FIA, under Contract No. H-3707. That work, which was completed in March 1976, covered all flooding sources affecting the City of Danbury.
Darien, Town of:	The hydrologic and hydraulic analyses from the original FIS report were prepared by CE Maguire, Inc., for FEMA under Contract No. H-4560. That work was completed in August 1978. The effects of wave action for Long Island Sound for the FIS report dated May 17, 1982 were prepared by Dewberry & Davis. The hydrologic and hydraulic analyses for that revision were taken from the FIS for the City of Stamford, which was prepared by the USACE, New England District, for FEMA, under Inter-Agency Agreement No. EMW-E-0941 (FEMA, 1984). That work was completed in May 1990.
Easton, Town of:	The hydrologic and hydraulic analyses from the FIS report dated March 30, 1983, were performed by CE Maguire, Inc., for FEMA, under Contract No. EMW-C-0278. That work was completed in September 1981.
Fairfield, Town of:	The hydrologic and hydraulic analyses from the original August 19, 1986, FIS report were performed by the USACE, New England Division, under Inter-Agency Agreement No. IAA-H-19-74, Project Order

Fairfield, Town of: - continued	No. 15 and by CE Maguire, Inc., under Contract No. EMW-C-0278 for FEMA. That work was completed in October 1976, and May 1984, respectively.
	The hydrologic and hydraulic analyses for the revised portion of Londons Brook and Londons Brook Divided Flow for the FIS report dated October 6, 1998 were prepared by Green International Affiliates, Inc. for FEMA, under Contract No. EMW-93-C-4144. That work was completed in May 1995.
Greenwich, Town of:	The hydrologic and hydraulic analyses from the original August 19, 1986, FIS report were performed by the USACE, New England Division, for FEMA, under Inter-Agency Agreement No. IAA-H-17-74, Project Order No. 15. That work was completed in September 1975.
	The hydrologic and hydraulic analyses for the East Branch Byram River, Converse Pond Brook, Horseneck Brook, West Brothers Brook, Rockwood Lake Brook, Strickland Brook, Mianus River, and Cider Mill Brook were conducted by CE Maguire, Inc., for FEMA, under Contract No. EMW-C-0278. That work was completed in December 1982.
	The coastal analyses for the FIS report dated February 22, 1999 were prepared by Aubrey Consulting, Inc., and Dewberry & Davis, for FEMA, under Contract No. EMW-94-C-442. That work was completed in May 1997.
Monroe, Town of:	The hydrologic and hydraulic analyses from the FIS report dated March 4, 1991, represent a revision of the original analyses prepared by C. E. Maguire, Inc., for FEMA under Contract No. EMW-C-0278. The work for that study was completed in March 1984. The analyses in the updated study were prepared by FGA Services, Inc., for FEMA, under Contract No. EMW-87-C-2447. The work for that study was completed in March 1988.
New Canaan, Town of:	The hydrologic and hydraulic analyses from the FIS report dated June 4, 1990, represent a revision of the original analyses prepared by Anderson-Nichols, Inc., for FEMA. The hydrologic and hydraulic analyses in this revision were prepared by the U.S. Geological

New Canaan, Town of: - continued	Survey (USGS) for FEMA, under Inter-Agency Agreement No. EMW-85-E-1923, Project Order No. 3. That work was completed in May 1988.
New Fairfield, Town of:	The hydrologic and hydraulic analyses from the original FIS report were performed by CE Maguire, Inc., for FEMA, under Contract No. EMW-C-0278. That work was completed in April 1981. Subsequent revisions to the hydrologic and hydraulic analyses as requested by the Town of New Fairfield were completed by Dewberry & Davis for FEMA, under Contract No. EMW-R-0968. That work was completed in March 1983.
Newtown, Town of:	The hydrologic and hydraulic analyses from the original December 1978 FIS study, and June 15, 1979, FIRM, were prepared by Harris-Toups Associates for the FIA, under Contract No. H-3987. That work was completed in September 1977. The hydrologic and hydraulic analyses for Pond Brook for the FIS report dated April 16, 2003 were prepared by the USGS for FEMA, under Inter-Agency Agreement No. EMW-99-IA-0163, Project Order No. 1. That work was completed in May 2000.
Norwalk, City of:	The hydrologic and hydraulic analyses from the FIS report dated June 2, 1982, for some portions of the study, were performed by the USACE, New England Division, for FEMA, under Inter-Agency Agreement No. IAA-H-2-73, Project Order No. 2. That work was completed in June 1976. The hydrologic and hydraulic analyses for the portion of the study which includes Betts Pond Brook were conducted by CE Maguire, Inc., for FEMA, under Contract No. EMW-C-0278. That work was completed in October 1983. The hydraulic analyses for the portions of the study which include the section of the Norwalk River between Glover Avenue and Grist Mill Road, the section of Five Mile River from Florshiem Pond Dam upstream to the corporate limits, and the section of Keelers Brook from the Connecticut Light and Power Bridge to the downstream side of the Boston Post Road (U.S. Route 1) crossing were conducted by CE

Norwalk, City of: - continued	Maguire, Inc., for FEMA, under Contract No. EMW-C-0278. That work was completed in October 1983.
Redding, Town of:	The hydrologic and hydraulic analyses from the FIS report dated December 15, 1981, were prepared by Philip W. Genovese and Associates for FEMA, under Contract No. H-4711. That work was completed in May 1980.
Ridgefield, Town of:	The hydrologic and hydraulic analyses from the original FIS report, dated March 30, 1982, and FIRM, dated September 30, 1982, were prepared by Philip Genovese and Associates for FEMA, under Contract No. H-4711. That work was completed in May 1980.
	The hydrologic and hydraulic analyses for the FIS report dated August 23, 1999 were prepared by Roald Haestad, Inc., for FEMA, under Contract No. EMB-96-CO-0405. That work was completed in June 1997.
Shelton, City of:	The hydrologic and hydraulic analyses in the original FIS were prepared by the Natural Resources Conservation Service (NRCS) for FEMA, under Inter-Agency Agreement No. IAA-H-9-76, Project Order No. 1. The work for that original FIS was completed in April 1977.
	The hydrologic and hydraulic analyses for the Housatonic River in the 1991 revision were prepared by FGA Services, Inc., for FEMA, under Contract No. EMW-87-C-2447. That work was completed in March 1988.
	The hydrologic and hydraulic analyses for Farmill River (formerly known as Far Mill River) from the confluence of Means Brook to the downstream side of Far Mill Reservoir Dam for the FIS report dated September 7, 2000 were prepared by Green International Affiliates, Inc., for FEMA, under Contract No. EMB-96-CO-0403 (Task No. 11). That work was completed in August 1998.
Sherman, Town of:	The hydrologic and hydraulic analyses from the FIS report dated June 18, 1987, were prepared by Flaherty Giavara Associates for FEMA, under Contract No. EMW-84-C-1594. That work was completed in August 1985.

Stamford, City of:

The hydrologic and hydraulic analyses for the Mianus River, the Rippowam River, the Noroton River, Toilsome Brook, and Laurel Brook, in the original study, were prepared by the USACE, New England District, for FEMA, under Inter-Agency Agreement No. IAA-H-2-73, Project Order No. 2. Portions of the original study, which include Toilsome Brook and the section of Mianus River from June Road to the downstream side of Samuel J. Bargh Reservoir spillway were conducted by CE Maguire, Inc., for FEMA under Contract No. H-4560. That work was completed in October 1979.

In the FIS Wave Height Supplement for the City of Stamford regarding Long Island Sound, dated September 1, 1983, the wave height analysis was prepared by Dewberry & Davis for FEMA, under Contract No. EMW-C-0543. That work was completed in August 1981.

The hydrologic analyses for the Mianus River, the East Branch Mianus River, the Rippowam River (Lower Reach), the Rippowam River (Upper Reach), Toilsome Brook (not including its upper reaches), the Noroton River, and Springdale Brook for the FIS report dated November 17, 1993 were prepared by the USACE, New England District, for FEMA, under Inter-Agency Agreement No. EMW-E-0941. That work was completed in May 1, 1990. Also in that revision, floodplain boundaries were redelineated along the community's coastlines and in tidally inundated areas. These delineations were prepared by Dewberry & Davis. That work was completed in February 1993.

Further, in the 1993 revision, the hydrologic analyses for the upper reaches of Toilsome Brook were prepared by Philip W. Genovese and Associates (PWG), Consulting Engineers and Land Surveyors, Hamden, Connecticut, for the city under contract with the city. That work was completed on May 1, 1991. Field survey data for the upper reaches of Toilsome Brook were prepared by PWG under contract with the city. The hydraulic analyses for the streams studied in detail in that revision were prepared by PWG for FEMA, under subcontract with the USACE. That work was completed in July 1989. Field survey data

Stamford, City of: - continued	for the streams studied by detailed methods in that revision, except for the upper reaches of Toilsome Brook, were prepared by Bromfield-Redniss and Mead, Stamford, Connecticut, under contract with PWG.
Stratford, Town of:	The hydrologic and hydraulic analyses from the FIS report dated April 16, 1990, represent a revision of the original analyses prepared by the New England District of the USACE for FEMA, under Inter-Agency Agreement No. IAA-H-19-74, Project Orders No. 17 and 23. The work for the original study was completed in April 1977. That study has been revised twice. In the first revision, wave height analyses were prepared by Dewberry & Davis for FEMA, under Contract No. EMW-C-0543. The work for the first revision was completed in March 1983. In the second revision, updated hydrologic and hydraulic analyses for Long Brook were prepared by the Maguire Group, Inc. The work for the second revision was completed in June 1988.
Trumbull, Town of:	The hydrologic and hydraulic analyses for the original June 1979 FIS report and December 4, 1979, FIRM, were prepared by Anderson-Nichols & Company, Inc., for the FIA, under Contract No. H-3862. That work was completed in May 1977. The hydrologic and hydraulic analyses for the FIS report dated December 19, 1997 were prepared by Green International Affiliates, Inc., for FEMA, under Contract No. EMW-93-C-4144 (Task No. 14). That work was completed in December 1995.
Weston, Town of:	The hydrologic and hydraulic analyses in the original October 17, 1978, FIS were performed by Anderson-Nichols & Company, Inc., for FEMA under Contract No. H-3862. That work was completed in October 1976. The hydrologic and hydraulic analyses for the FIS report dated May 15, 1984 represent a revision by Dewberry & Davis of the original analyses.

Weston, Town of: - continued

The hydrologic and hydraulic analyses for the West Branch Saugatuck River for the FIS report dated December 19, 1997 were prepared by Roald Haestad, Inc., for FEMA under Contract No. EMW-94-C-4405. That work was completed in December 1995.

Westport, Town of:

The hydrologic and hydraulic analyses for some portions of the original June 4, 1984, FIS report and December 4, 1984, FIRM, were performed by the USACE, New England District, for FEMA, under Inter-Agency Agreement No. IAA-H-19-74, Project Order No. 15. That work was completed in November 1975.

Also for the 1984 FIS, the hydrologic and hydraulic analyses for the portions of the study that include Stony Brook (now known as Stony Brook 2), the section of Dead Man’s Brook from the Silent Grove North crossing to a point approximately 1,450 feet upstream of Highland Road, Poplar Plains Brook, and Willow Brook were conducted by CE Maguire, Inc., for FEMA, under Contract No. EMW-C-0278. That work was completed in September 1982. Subsequent revisions to the hydraulic analysis for Stony Brook 2, as requested by the Town of Westport, were completed by CE Maguire, Inc., for FEMA, under Contract No. EMW-C-0278. That work was completed in February 1984.

The hydrologic and hydraulic analyses for the West Branch Saugatuck River for the FIS report dated January 7, 1998 were prepared by Roald Haestad, Inc., for FEMA, under Contract No. EMW-94-C-4405, Amendment No. 1. That work was completed in December 1995.

Wilton, Town of:

The hydrologic and hydraulic analyses for the original May 17, 1982, FIS and November 17, 1982, Flood Boundary and Floodway Map (FBFM), were prepared by Philip W. Genovese and Associates for FEMA, under Contract No. H-4711. That work was completed in May 1980.

The hydrologic and hydraulic analyses for the FIS report dated June 4, 1990 were prepared by the USGS for FEMA, under Inter-Agency Agreement

Wilton, Town of: - continued	No. EMW-86-E-1923, Project Order No. 3. That work was completed in May 1988. The hydrologic and hydraulic analyses for the West Branch Saugatuck River for the FIS report dated February 18, 1998 were prepared by Roald Haestad, Inc. for FEMA, under Contract No. EMW-94-C-4405, Amendment No. 1. That work was completed in December 1995.

Base map information shown on the FIRM panels produced for the 2010 countywide study was provided in digital format by the Connecticut Department of Environmental Protection (DEP). This information was derived from Digital Orthophotos produced at a scale of 1:12,000 from aerial photography flown in 2004 and supplemented with aerial photography from 2005. The projection used in the preparation of the FIRMs was Connecticut State Plane (FIPSZONE 0600). The horizontal datum used was North American Datum of 1983 (NAD83), GRS1980 spheroid. Differences in datum, spheroid, projection or State Plane zones used in the production of FIRMS for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of the FIRM.

July 2013 Coastal Study Update:

The coastal wave height analysis for this countywide coastal study was prepared by the Strategic Alliance for Risk Reduction (STARR) for FEMA under Contract No. HSFEHQ-09-D-0370 and completed in July 2013. This new analysis resulted in revisions to the FIRM for the Cities of Bridgeport, Norwalk, Stamford and the Towns of Darien, Fairfield, and Greenwich.

Base map information shown on FIRM panels produced for this 2013 revision was derived from USGS High Resolution orthophotography produced from 1 foot pixel cells from photography dated April 2008. The projection used in the preparation of this map was Connecticut State Plane Feet, FIPS Zone 0600. The horizontal datum used was NAD83.

1.3 Coordination

The purpose of an initial Consultation Coordination Officer's (CCO) meeting is to discuss the scope of the FIS. A final CCO meeting is held to review the results of the study.

The dates of the historical initial and final CCO meetings held for all jurisdictions within Fairfield County are shown in Table 1, "Initial and Final CCO Meetings."

TABLE 1 – INITIAL AND FINAL CCO MEETINGS

Community	Initial CCO Date	Final CCO Date
Town of Bethel	*	March 30, 1983
City of Bridgeport	May 1977	June 19, 1979
Town of Brookfield	February 1977	July 19, 1978
City of Danbury	February 5, 1975	December 4, 1975
Town of Darien	June 1977	June 27, 1979
Town of Easton	*	November 19, 1982
Town of Fairfield	1975	May 14, 1985
	January 17, 1995	October 10, 1997
Town of Greenwich	August 19, 1993	January 15, 1998
Town of Monroe	October 29, 1986	March 22, 1990
Town of New Canaan	December 7, 1984	May 31, 1989
Town of New Fairfield	October 1979	December 2, 1981
Town of Newtown	February 1977	July 17, 1978
	June 2000	April 25, 2002
City of Norwalk	March 11, 1977	January 16, 1985
Town of Redding	April 1978	June 24, 1981
Town of Ridgefield	March 1978	September 10, 1981
	September 13, 1995	June 11, 1998
City of Shelton	March 4, 1977	August 4, 1977
	September 10, 1997	July 23, 1999
Town of Sherman	April 10, 1984	June 11, 1986
City of Stamford	April 29, 1975	December 18, 1979
	June 29, 1982	June 11, 1992
Town of Stratford	*	July 15, 1976
Town of Trumbull	May 1975	May 26, 1977
	January 30, 1990[1]	
Town of Weston	May 1975	November 29, 1976
	August 2, 1993	December 20, 1996
Town of Westport	January 10, 1975	June 23, 1983
	August 2, 1993	December 20, 1996
Town of Wilton	December 7, 1984	July 12, 1989
	August 2, 1993	January 7, 1997

*Data not available
[1]FEMA notified community by letter

For the 2010 countywide study, all coastal communities in Fairfield County were notified by FEMA and Roald Haestad, Inc. in a letter dated April 14, 2008 about the scope of the countywide FIS. The results of the 2010 countywide study were reviewed at the final CCO meeting held on December 2, 2008, and attended by representatives of FEMA, the Connecticut Department of Environmental Protection, Dewberry, and Fairfield County. All problems raised at that meeting were addressed in the 2010 study.

For this July 2013 coastal study revision, letters were sent to all communities within the county notifying them of the scope of the FIS, and soliciting pertinent information from them. Letters were mailed on April 13, 2010. The results of this countywide study were reviewed at the final CCO meetings held on November 28, 2011, and attended by representatives of Fairfield County, the Connecticut Department of Energy and Environmental Protection (DEEP), the FEMA Regional Service Center (RSC), FEMA Region 1, and STARR. All questions raised at these meetings were addressed in this study.

2.0 AREA STUDIED

2.1 Scope of Study

This FIS covers the geographic area of Fairfield County, Connecticut.

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

June 18, 2010 Countywide FIS:

All or portions of the flooding sources listed in Table 2 were studied by detailed methods.

TABLE 2 - FLOODING SOURCES STUDIED BY DETAILED METHODS

Riverine	Riverine - continued
Aspetuck River (Lower Reach)	Deep Brook
Aspetuck River (Upper Reach)	Dibbles Brook
Ball Pond Brook	East Branch Byram River
Ballwall Brook	East Branch Mianus River
Beardsley Brook	East Branch Silvermine River
Beaver Brook	East Brook
Belden Brook	East Brothers Brook
Betts Pond Brook	East Swamp Brook
Blind Brook	Farmill River
Booth Hill Brook	Ferry Creek/Long Brook
Brown’s Brook	Five Mile River
Bruce Brook	Goodwives River
Burying Ground Brook	Grasmere Brook
Byram River	Halfway River
Cider Mill Brook	Harvey Pete Brook
Comstock Brook	Hawley Pond Brook
Converse Pond Brook	Horseneck Brook
Cooper Pond Brook	Horse Tavern Brook
Copper Mill Brook	Housatonic River (Lower Reach)
Cricker Brook	Housatonic River (Middle Reach)

<u>TABLE 2 - FLOODING SOURCES STUDIED BY DETAILED METHODS</u> - continued

<u>Riverine</u>

Dead Man's Brook
Island Brook
Jenning's Brook
Keelers Brook
Kettle Creek
Kohanza Brook
Laurel Brook
Lewis Brook
Limekiln Brook 1
Limekiln Brook 2
Londons Brook
Londons Brook Divided Flow
Means Brook
Mianus River
Mill River
Miry Brook
Morehouse Brook
Muddy Brook
Noroton River
North Farrar Brook
Norwalk River
Padanaram Brook
Parting Brook
Pequonnock River (Lower Reach)
Pequonnock River (Upper Reach)
Pond Brook
Pootatuck River
Poplar Plains Brook
Pumpkin Ground Brook
Putnam Park Brook
Ridgefield Brook
Rippowam River (Lower Reach)
Rippowam River (Upper Reach)
Rockwood Lake Brook
Rooster River
Sasco Creek
Saugatuck River (Lower Reach)
Saugatuck River (Upper Reach)
Silvermine River

<u>Riverine</u> - continued

Housatonic River (Upper Reach)
South Branch of Unnamed Tributary to Saugatuck River
Split Flow from Lake Windwing
Springdale Brook
Still River
Stony Brook 1
Stony Brook 2
Strickland Brook
Sympaug Brook
Tanners Brook
Tenmile River
Terehaute Brook
Titicus River
Toilsome Brook
Tokeneke Brook
Tributary A to Horse Tavern Brook
Tributary B to Canoe Brook Lake
Tributary C to Tributary B to Canoe Brook Lake
Tributary D to Easton Reservoir
Tributary E to Pequonnock River
Tributary F to Pequonnock River
Tributary G to Pequonnock River
Tributary H to Tributary G to Pequonnock River
Tributary I to Pequonnock River
Tributary J to Pequonnock River
Tributary K at State Route 8
Tributary L at Huntington Road
Tributary M to Pinewood Lake
Tributary N to Pinewood Lake
Tributary O at Intervale Road
Unnamed Tributary to Saugatuck River
West Branch Pequonnock River
West Branch Saugatuck River
West Brothers Brook
Willow Brook
Wolf Pit Brook

TABLE 2 - FLOODING SOURCES STUDIED BY DETAILED METHODS - continued

Coastal/Tidal	**Coastal/Tidal - continued**
Smith Pond Brook	Yellow Mill Channel
Brewsters Pond	Lake Zoar
Fox Hill Lane	Long Island Sound
Lake Windwing	

Table 3, "Stream Name Changes," lists streams that have names in the countywide FIS other than those used in the previously printed FISs for the communities in which they are located.

TABLE 3 - STREAM NAME CHANGES

Old Name	New Name	Community
Aspetuck River	Aspetuck River (Lower Reach)	Town of Easton
		Town of Fairfield
		Town of Weston
	Aspetuck River (Upper Reach)	Town of Westport
Aspetuck River		Town of Easton
		Town of Newtown
		Town of Redding
Far Mill River	Farmill River	City of Shelton
Fivemile River	Five Mile River	Town of New Canaan
Housatonic River	Housatonic River (Lower Reach)	Town of Monroe
		City of Shelton
Housatonic River	Housatonic River (Middle Reach)	Town of Stratford
		Town of Brookfield
		Town of Monroe
Housatonic River	Housatonic River (Upper Reach)	Town of Newtown
		Town of Sherman
Limekiln Brook	Limekiln Brook 1	Town of Brookfield
Limekiln Brook	Limekiln Brook 2	Town of Bethel
		City of Danbury
Pequonnock River	Pequonnock River (Lower Reach)	City of Bridgeport
		Town of Trumbull
	Pequonnock River (Upper Reach)	Town of Monroe
		Town of Trumbull
Rippowam River	Rippowam River (Upper Reach)	Town of New Canaan
Saugatuck River	Saugatuck River (Lower Reach)	Town of Weston
	Saugatuck River (Upper Reach)	Town of Westport
		City of Danbury
		Town of Redding
		Town of Weston

TABLE 3 - STREAM NAME CHANGES - continued

Old Name	New Name	Community
Stony Brook	Stony Brook 1	Town of Darien
Stony Brook	Stony Brook 2	City of Norwalk
		Town of Westport

The 2010 countywide FIS also incorporated the determination of letters issued by FEMA resulting in map changes (Letter of Map Revision [LOMR], Letter of Map Revision - based on Fill [LOMR-F], and Letter of Map Amendment [LOMA], as shown in Table 4 "Letters of Map Change."

TABLE 4 - LETTERS OF MAP CHANGE

Community Name	LOMC Type	Case Number	Effective Date	Flooding Source / Project Identifier
Bridgeport, City of; Stratford, Town of	LOMR	95-01-071P	September 19, 1996	Bruce brook- Stratford Stormwater Project
Danbury, City of	LOMR	02-01-009P	September 12, 2002	Blind Brook
Darien, Town of	LOMR	95-01-087P	September 5, 1996	Five Mile River - Replacement of Old Kings Highway Bridge
Darien, Town of	LOMR	95-01-081P	December 11, 1997	Noroton River- Omega Manufacturing Site
Greenwich, Town of	LOMR	99-01-019P	September 24, 1999	Long Island Sound- Harbor Driver North of Captain Harbor
Greenwich, Town of	LOMR	03-01-023P	April 28, 2003	Long Island Sound- 300 feet southwest of Tods Driftway and Shore Road intersection
Greenwich, Town of	LOMR	03-01-041P	September 5, 2003	Long Island Sound- 650 feet southeast of Shore Road and East Point Lane intersection
Greenwich, Town of	LOMR	03-01-075P	September 22, 2003	Horseneck Brook- Trippe Property
Greenwich, Town of	LOMR	04-01-021P	April 26, 2004	Long Island Sound- 100 feet southwest of Tods Driftway and Shore Road intersection
Greenwich, Town of	LOMR	04-01-065P	November 23, 2004	Long Island Sound- 475 feet east of East Point Lane and Middle Way
Greenwich, Town of	LOMR	05-01-0130P	February 7, 2005	Long Island Sound- 250 feet southeast of East Point Lane and Shore Road
Greenwich, Town of	LOMR	05-01-0060P	June 15, 2005	Long Island Sound- Hardman Property

TABLE 4 - LETTERS OF MAP CHANGE - continued

Community Name	LOMC Type	Case Number	Effective Date	Flooding Source / Project Identifier
Greenwich, Town of - continued	LOMR	05-01-0688P	October 11, 2005	Long Island Sound- 8 East Point Lane
Greenwich, Town of	LOMR	05-01-0751P	May 25, 2006	Long Island Sound- 245 Byram Shore Road
Greenwich, Town of	LOMR	07-01-0700P	January 9, 2008	Springdale Brook- Maneleski Property- 247 Byram Shore Road
New Canaan, Town of	LOMR	96-01-071P	October 1, 1997	Five Mile River- Bothwell Property
Norwalk, City of	LOMR	95-01-055P	October 12, 1995	Five Mile River- Richard's Avenue
Norwalk, City of	LOMR	96-01-033P	July 8, 1997	Five Mile River- Slavitt Property
Norwalk, City of	LOMR	08-01-1021P	August 27, 2008	Norwalk River- City of Norwalk Redevelopment Agency
Stamford, City of	LOMR	95-01-023P	July 12, 1995	Rippowam River (Lower Reach)- Rosenthal Residence
Stamford, City of	LOMR	96-01-019P	May 9, 1996	Springdale Brook- Davis Contracting, Inc., Property
Stamford, City of	LOMR	97-01-035P	June 23, 1998	Rippowam River (Lower Reach)- Bridge Street Bridge
Stamford, City of	LOMR	98-01-051P	April 18, 2000	Rippowam River (Lower Reach)- Bongiorno Property
Stamford, City of	LOMR	01-01-047P	April 23, 2002	Long Island Sound and Westcott Cove – west of Wallacks Drive
Stamford, City of	LOMR	08-01-0709P	May 30, 2008	Rippowam River (Lower Reach)- Old Town Hall
Stamford, City of	LOMR	09-01-0298P	December 31, 2008	Rippowam River (Lower Reach)-Royal Bank of Scotland
Stamford, City of*	LOMR	11-01-1304P	May 6, 2011	Rippowam River - 2187 Atlantic Street
Trumbull, Town of	LOMR	98-01-045P	March 1, 1999	Island Brook- Zacchilli Property
Wilton, Town of	LOMR	98-01-031P	September 22, 1999	Norwalk River- Wilson Commercial Real Estate Property

* Incorporated in the 2013 Coastal Study Update

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

July 2013 Coastal Study Update:

The coastal wave height analysis for this countywide coastal study was prepared by STARR. This new analysis resulted in revisions to the FIRM for the Cities of Bridgeport, Norwalk, Stamford and the Towns of Darien, Fairfield, Greenwich, Stratford and Westport.

October 2013 Physical Map Revision:

For this physical map revision, the levee on the Norwalk River is now shown on the effective FIRM as accredited and providing protection from the 1-percent-annual-chance flood.

2.2 Community Description

Fairfield County is located in southwestern Connecticut. Fairfield County is bordered to the north and east by the communities of Litchfield County, Connecticut and New Haven County, Connecticut. To the south, the county is bordered by Long Island Sound. To the west, the county is bordered by the communities of Westchester County, New York, Putnam County, New York, and Dutchess County, New York.

According to the U.S. Census, the population of the county in 2010 was 916,829. The population in the 2000 census was 882,567, representing a 3.9% increase from 2000 to 2010 (Reference 1).

The climate is typical of New England. It is influenced by constant conflicts between cold dry air masses flowing out of the great subpolar region to the northwest and the warmer moisture-bearing tropical air from the south. The average annual precipitation is 48 inches. The average annual snowfall is 41 inches. Temperatures range from summer highs above 90 degrees Fahrenheit (°F) to below 0°F in the winter. The average annual temperature is 51.7°F. The tendency of most of the general cyclonic disturbances to skirt the polar front brings their paths of movement through the region and results in a somewhat regular succession of biweekly storms.

2.3 Principal Flood Problems

Fairfield County has experienced four general types of storms: extratropical continental storms under the influence of prevailing westerly winds, extratropical maritime storms which move in a northeasterly direction along the east coast of the United States, storms of tropical origin, and heavy local thunderstorms (Reference 2).

Five hurricanes have affected Connecticut in the last two decades, causing minimal damage to Fairfield County. Hurricane Gloria in September 1985, Hurricane Bob in

August 1991, Hurricane Grace in October 1991, Hurricane Bertha in July 1996, and Hurricane Tammy in October 2005. Hurricane Gloria made landfall in the Westport, CT area as a Category II hurricane. Relatively light rainfall minimized flooding and debris cleanup and power restoration were the major issues for this hurricane. Hurricane Bob travelled up the eastern seaboard and struck Newport, Rhode Island as a Category II hurricane and caused light to moderate tree damage in central Connecticut. Hurricane Grace resulted in 30-50 foot seas along the coastline from New Jersey to Maine but damage to Connecticut was minimal. Hurricane Bertha caused minimal damage to Connecticut resulting in downed power lines and damaged trees. The remnants of Hurricane Tammy combined with a low-pressure system caused heavy rainfall events from October 7-10th and October 14-15th, 2005. The combined rainfall across the state from both of these events totaled between 9 and 16 inches. Combined, the rainfall from these two events totaled 9 – 16 inches. The rainfall caused major flooding in Hartford County and Tolland County and moderate flooding across the entire state of Connecticut. A total of 14 dams completely failed or partially failed and another 30 dams were damaged across the state of Connecticut. Several dozen roads were washed out or undermined. Some residents of the two counties were evacuated. The remnants of hurricane Tammy caused $6.1 million in damages to municipal and non-profit properties, $6.9 million to businesses and an estimated $30 million of damages to private residences (References 3 & 4).

A nor'easter in December 1992 killed 3 people and destroyed 26 homes in Connecticut. The storm caused $4.3 million in damages to over 6,000 homes. Tides in Long Island Sound stacked up due to the 55 MPH winds which resulted in the third highest tide of 9.2 feet NAVD88 measured in Bridgeport, CT eroded shorelines and damaged homes (Reference 3).

In Westport, 26 percent of the residents live within the 1-percent-annual-chance floodplain. An unnamed storm in 1996 damaged several dozen homes in the Compo Beach area that were not elevated (Reference 5).

Tropical Storm Floyd in September 1999 had sustained winds of 60 MPH and affected the Towns of Danbury (Fairfield County), and in Plainville, Bristol, and Southington (Hartford County). Total rainfall in two days ranged from 3 inches in southeastern Connecticut up to 11 inches in Danbury. On average, 4-8 inches fell across the entire State. The storm caused damage to over 300 homes and a bridge in Danbury. Approximately 25-30 homes and businesses were flooded in Southington with 250 year rainfall return frequencies. According to Chapter 5 of the Connecticut Natural Hazard Mitigation Plan, heavy rains from Floyd damaged 420 buildings and caused $2.2 Million in Public Assistance damages to the state of Connecticut (Reference 3).

Based on anecdotal information obtained from residents during field reconnaissance for the 2001 FIS, Pond Brook experienced flooding problems at several locations during the heavy rainfall associated with Tropical Storm Floyd. According to residents, the bridges on Lands End Road, Old Hawleyville Road, and State Route 25 in Hawleyville were all overtopped at some point during the storm. Flooding problems in tributaries of Pond Brook north of Currituck Road have been reported to town officials.

In a 4 hour time frame in August of 2000, a total of 6.3 inches of rain fell in Fairfield County. Four of the inches fell within a 16 minute interval which created 177 million gallons of runoff. The storm caused major damage to 60 businesses, 471 homes, and flooded 3 high schools with 6 feet of water. There were no fatalities associated with this event. Damages totaled just under $6 million. Flooding from this storm exceeded the 0.2-percent-annual-chance-flood event (Reference 3).

In December 2003, a winter storm caused a presidential emergency to be declared due to heavy snowfall. Windham County saw 20 inches of snow, 19 inches in Hartford County and 18 inches in Fairfield, New London, and Tolland Counties (Reference 3).

In April of 2007 a nor'easter dropped greater than 7 inches of rain in Fairfield, Litchfield, Middlesex, New Haven and New London Counties. Rainfall in Fairfield County ranged from 3.57 inches to 7.81 inches. The Federal Emergency Management Agency (FEMA) reported that flood damages in Connecticut exceeded an estimated $6.4 million. Over 200 people in Connecticut were forced to evacuate their residences. Residential damages were as follows, Fairfield: 48 major damages & 1,600 total residential units impacted, Middlesex: 3 major damages & 11 total residential units impacted, New Haven: 32 major damages & 446 total residential units impacted. Business damages were as follows, Fairfield: 5 businesses with major damage of an estimated cost of $958,000, Middlesex: 7 businesses with major damage with an estimated cost of damage of $598,000, New Haven: 2 businesses with major damage with an estimated cost of damage of $550,000, New London: 1 business with major damage with an estimated cost of $2 million (Reference 3).

In September of 2008, Tropical Storm Hanna dropped 6.5 inches of rain in Bethel, CT and flooded parts of Ridgefield & Danbury. Three academic buildings on the downtown campus in Danbury flooded due to the storm (Reference 6).

A nor'easter in March of 2010 caused significant damage to Fairfield County, CT. The storm closed 70 roads in Fairfield and deprived 9,200 out of 21,000 households of electricity over the weekend. Fairfield incurred over $1.1 million in costs from the 60 mile an hour wind storm which uprooted more than 200 trees. Two people in Fairfield County died from falling trees & 33 homes were hit by trees. Five homes were declared uninhabitable by building inspectors. Schools remained closed for three days. The Fairfield police and fire departments addressed 522 potential life-safety incidents in 36 hours, including several residents trapped in their vehicles (References 7 through 9).

In June of 2010, a storm in Fairfield, CT resulted in 25 minor injuries and left nearly 25,000 homes throughout the region without power. Numerous roads closed and a tractor-trailer overturned on Interstate 95. State police received reports of partially collapsed buildings in the city and nine structures suffered serious damage (References 10 & 11).

Torrential downpours from an unnamed tropical storm in October 2010 downed trees and utility wires, leaving over 17,000 Connecticut residents without power. The storm dumped 2 inches of rain an hour, flooded many roads, and damaged the Longshore Marina in Fairfield County. Fairfield schools closed early and the National Weather

Service issued flash flood warnings for Fairfield, New London, and Middlesex counties (Reference 12).

From December 2010 through January 2011, the State of Connecticut saw a series of winter storms that led to a record January snowfall of 4’ 11” statewide. These storms caused a number of problems statewide with transportation and ceiling collapses. These are summarized below:

An unnamed storm in December 2010 caused The National Weather Service to issue flood warnings for coastal areas and the Middletown area of Middlesex County where the melting snow and rainfall caused the Connecticut River levels to exceed flood stage (Reference 13).

A December 2010 blizzard caused The National Weather Service issued a severe weather warning for Fairfield County. The storm’s high winds and up to 18 inches of snowfall left 1,160 Fairfield residents without power. Metro-North Railroad suspended service on the New Haven Line in both directions due to equipment and switch failures caused by the blizzard. Over 17,000 Connecticut Light & Power customers were without power statewide (References 14 through 17).

In January 2011, a snow emergency was declared in preparation for the third snowstorm in three weeks to hit Connecticut. Parts of Fairfield County saw up to 22 inches of snow and schools were closed for two days. There was extensive damage to six classrooms and administrative offices of Ponus Ridge Middle School; the school remained closed until the sheetrock and fallen parts of the ceiling were removed. Many storm drains and grassy spaces in the County were blocked by ice, and water accumulated quickly on the streets. New London County spent $94,333 on snow-related expenses to transport the 17 inches of snow to vacant areas. Metro-North trains were suspended from Stamford to New Haven (References 18 through 21).

Ella, a two day winter storm in February 2011 brought up to 10" of snow and up to 3/4" of ice to Connecticut. The Emergency Operations Center was opened by Gov. Dannel P. Malloy. Ice and winds knocked down power lines around the region, with a reported 1,400 outages in Fairfield County alone The National Weather Service issued ice storm and freezing rain warnings for Fairfield County. Water from melting snow, Ice and falling rain gathered in Fairfield’s streets, leading to flooding on major roads. Fairfield’s schools closed again. Route 163, Route 62 closed due to flooding in New London County. 14 buildings in Middletown, Middlesex County, were evacuated after one collapsed from built up snow (References 22 through 26).

An unnamed winter storm in March 2011 caused the Housatonic River to swell more than two feet over its flood mark. Several empty cars, two pickup trucks, and around 20 houses in New Haven County were swept into the rain-swollen Housatonic River. The River banks flooded, full from the heavy rain and melting snow and forced the evacuation of dozens of people. The storm dropped between 2-4 inches of snow, a month’s worth, in just 24 hours. The flash flood, powered by the heavy rain and run-off from snow melt, slammed into the Pine Brook Bridge in Middlesex County. The bridge gave way, and repairs are estimated at $400,000 (References 27 through 32). In Fairfield County, the washout left 120 feet of train track dangling in mid-air. The Metro-North

Danbury Line was shut down for two weeks. The late winter storm knocked out power and flooded roads in Fairfield County. After the Saugatuck River overflowed, three residents were evacuated from their homes by the firefighters Higher Water Rescue truck.

In 2011 Hurricane Irene and in 2012 Hurricane Sandy impacted the coastline of Fairfield County. The impacts of these hurricanes have not been considered in the July 2013 coastal analysis study.

Flooding on the streams in the Town of Bethel may occur during any season as a result of intense rainfall from the tropical storms of summer and fall, or rain combined with melting snow, typical of early spring rains. The greatest floods have developed from rainfall alone, when the intensity and the antecedent conditions, rather than the volume of rainfall, were the determining factors. The March 1936 flood resulted from two closely occurring storms combined with considerable snowmelt runoff. The floods of September 1938 and August 1955 were produced by hurricane storms falling on saturated ground. The flood of October 1955 exceeded any prior flood. At that time, lakes and ponds swollen by rains of the previous two months dumped surging flood waters almost instantaneously into streams which were rising rapidly. The river channels quickly overflowed and properties which were believed to be safe from flooding were inundated.

Areas of the town most frequently subjected to periodic flooding include the swampy lowlands adjacent to East Swamp Brook, between Shelter Rock Road and Plumtrees Road, and portions of Sympaug Brook; in particular, the lowland adjacent to the brook, from South Street upstream to the railroad culvert, and also the area near the confluence with Terehaute Brook.

In general, all areas adjacent to watercourses in the City of Bridgeport are subject to recurring flood problems. Due to the developed and urbanized nature of the area, flash-flooding may occur at any time of the year. Early spring rains combined with melting snow have caused spring flash floods; heavy rains, particularly those associated with tropical storms, have caused major floods in the summer and fall.

The largest floods in the Pequonnock River basin occurred in July 1897, July 1905, March 1936, September 1938, December 1948, August 1955, October 1955, and April 2007. The maximum tidal flooding of record in the study area occurred during the September 1938 and the August 1954 hurricanes, with flood surges reaching an elevation of 9.2 feet in both cases.

In the Town of Brookfield, the Still River has experienced floods during all seasons as a result of either intensive rainfall during the coastal storm and hurricane season from June to October or because of rain combined with melting snow, which caused the flood of 1936. The most notable recent storms in the Still River basin occurred in March 1936, September 1938, December 1948, August and October 1955, and September 1960. Of these, only the March 1936 and December 1948 storms were not associated with tropical activity. The greatest flood was a result of rainfall alone, when rainfall intensity and the antecedent conditions rather than the volume of rainfall were the determining factors. This was evident with the flood of October 1955, which is the greatest flood on record, having a recurrence interval estimated at approximately 80 years. No record of damage is available.

For two months previous to the October flood, the area had been deluged with an inordinate amount of precipitation, leaving lakes and ponds swollen to capacity. When the October storm arrived, no natural storage was available for these new rains resulting in the almost instantaneous dumping of surging floodwaters from lakes and ponds into streams which were rising rapidly. The Still River and its tributaries quickly overflowed, inundating dozens of residential and commercial properties.

The greatest flood damage occurred along the flat floodplains of the Still River where many industrial and commercial concerns in the vicinity of White Turkey Road, Station Road, and along U.S. Highway 7 were inundated by three or more foot flood depths. No photographs in reproducible form are available.

Two small tributaries, Limekiln Brook 1 and East Brook, have experienced minor flooding chiefly in the vicinity of their confluences with the Still River.

In the Town of Easton, the flood of October 1955 exceeded any prior recorded flood.

Because the quantity of developed land along the detailed study streams is minimal at present and was definitely less in October 1955, little is known of the severity of the flooding during this storm. According to Easton citizens, the October 1955 flood washed out the Valley Road bridge and the Center Road bridge across the Aspetuck River (Upper Reach), upstream of the Aspetuck Reservoir. Flooding from the Mill River also destroyed public and private property during the flood of October 1955. No recorded data is available as to the severity of flooding on Ballwall Brook and Morehouse Brook during October 1955. According to the Bridgeport Hydraulic Company, none of the four water supply reservoirs (Easton, Aspetuck, Hemlock, or Saugatuck) were in danger of overtopping during October 1955.

During April 1980, a spring rain storm caused severe flooding along all watercourses in the Town of Easton. As a result of frozen ground conditions and excessive snow melt flooding was quite extensive. According to local residents, the Aspetuck River (Lower Reach) overflowed its banks in April 1980 and flooded State Route 136 downstream of the Aspetuck Reservoir.

In the Town of Fairfield, severe flooding can result from high tide levels along the coastal areas. High tide levels are caused predominantly by "northeasters," characterized by slow moving low-pressure zones which can occur at any time of the year, but most often occur during the winter. Inland flooding along rivers and streams is caused by overland runoff from unusually heavy rains, which are generally most severe during hurricanes in the months of August through October. Record floods of this nature occurred in August 1955 (Hurricane Diane) and in October 1955.

In addition to riverine flooding, the coastal areas of Greenwich are subject to flooding that is associated with high tides and wave action during severe storms and hurricanes. The hurricanes of September 1938 and August 1954 are the most significant coastal events on record for Fairfield, and tidal elevations reached 11.3 and 10.6 feet (NAVD88), respectively (Reference 33). The storm surge accompanying the September 1938 hurricane approximately equaled that associated with a 2-percent-annual-chance (50-year) event, and the storm surge of the August 1954 hurricane had a recurrence interval of considerably less than a 2-percent-annual-chance.

In the Town of Greenwich, areas which are periodically subject to flooding include the low areas adjacent to the Byram River, Horseneck Brook, East Brothers Brook, West Brothers Brook, Strickland Brook, the Mianus River, and Cider Mill Brook.

In the Town of Monroe, the areas which are most frequently subject to flooding are the lowlands adjacent to the Pequonnock River (Upper Reach). This river overflows its banks with every major storm.

The October 1955 flood resulted in great damage within the Town of New Canaan, including the washing away or severe damage of 14 road bridges. Other severe damage included the washing away of half of the Buttery Mill on Silvermine Road.

In the Town of New Fairfield, areas periodically subjected to flooding included the low-lying areas along Ball Pond Brook near its confluences with Short Woods Brook and with Scudder Brook. Severe flooding occurred as a result of Hurricane Diane in August 1955; the hurricane caused water levels on Ball Pond Brook to rise to about 1.5 feet above the State Route 39 bridge. In addition, the Bear Mountain Road crossing was completely washed out in October 1955.

In the Town of Newtown, the USGS operated a stream gage on Pond Brook at Hawleyville from 1963 to 1976. During its operation, the highest recorded flow was 1,400 cubic feet per second (cfs), occurring twice, on February 2, 1973, and on September 26, 1975. The USGS also operated a stream gage on the Pootatuck River at Sandy Hook from 1966 to 1984. The highest recorded flow in this river, with a drainage area of roughly twice that of Pond Brook at the gage, was 2,720 cfs occurring on January 25, 1979.

In the City of Norwalk, the flood of October 1955 washed out a portion of the Merritt Parkway on the Silvermine River, and also washed out a portion of the main line of the New York, New Haven, and Hartford Railroad on the Five Mile River. The flood destroyed property and other structures on these streams.

In general, there are few flooding problems in the Town of Sherman. This is due to the rural nature of the area, as well as the many hills. Some flood problems have been reported, especially during the 1955 flood caused by Hurricane Diane, which has an estimated return period of 100 years. For example, a section of Leachhollow Road fell into Glenn Brook, culverts on State Route 37 near Chapel Hill Road washed out, and there was reported damage to pipes under the bridge on Saw Mill Road. There are also reports of some flash flooding during major storms, but no serious problems have been reported.

There have been at least 26 major storms in the period of 1693-2000 in the Housatonic River Basin; however, none of these were as great as the flood caused by Hurricane Diane in 1955.

Flooding from the Housatonic River (Upper Reach) within the town has only affected farm land. A few acres of cornfield reportedly were flooded during the 1955 flood, but no structures were affected by this flood. The maximum water-surface elevation during the 1955 flood, measured at the Gaylordsville gage on the Housatonic River (Upper Reach), was recorded at 319.3 feet with a flow rate of 17,400 cfs. Rocky River Reservoir Gage No. 02101000 at Lake Candlewood reached an elevation of 428.5 feet for this same storm event. The following USGS gaging stations were used in the hydrologic analyses in this study: Gage No. 01205500 at Stevenson, Connecticut; and Gage No. 0230050 and Gage No. 01200000 at Gaylordsville, Connecticut.

In the Town of Stratford, flooding on Long Brook, upstream of Interstate Route 95 (Connecticut Turnpike bridge) is caused by riverine flooding; flooding downstream of the bridge is tidal in nature. Therefore, the dividing line between tidal and riverine flooding for Long Brook was set at the Connecticut Turnpike bridge.

In the Town of Trumbull, because of the steep topography and the limited valley storage of the streams, most of the streams studied are subject to rapid rates of rise and high velocities, both characteristic of flash floods. The Pequonnock River (Lower Reach) and Pequonnock River (Upper Reach) have a relatively large drainage area and, in sections, a flat gradient. This river may be subject to floods with longer durations and higher water depths.

In the Town of Westport, areas of the town periodically subjected to flooding include the Compo Beach and Sherwood Island State Park sections along Long Island Sound, and the areas adjacent to the Saugatuck River (Lower Reach) near the confluences of Dead Man's, Silver, and Willow Brooks and Stony Brook 2.

The history of flooding in the Town of Wilton indicates that there has been little basin-wide flooding, but a number of instances of localized flooding.

2.4 Flood Protection Measures

There are no structural flood protection measures, existing or planned, within the Town of Bethel, the Town of New Fairfield, the City of Shelton, or the Town of Weston.

Non-structural measures of flood protection are being utilized to aid in the prevention of future flood damage. These are in the form of land use regulations, developed by the Community's Conservation Commission, which control building within wetland areas.

In the City of Bridgeport, in 1973, a study was prepared for Island Brook, from the spillway at Lake Forest to its confluence with the Pequonnock River (Lower Reach); the spillway at Charcoal Pond; the existing drainage structures; and the stream channels (Reference 34). No flood control improvements will be implemented in the foreseeable future along Island Brook.

Flooding problems in the Rooster River/Ox Brook drainage basin have been under study by the USACE since 1953. In 1958, another study was performed for the Connecticut Water Resources Commission, and in 1967 the State Legislature authorized $500,000 for expenditures related to flood control on the Rooster River (Reference 35). In 1968, the Connecticut Department of Public Works retained a consulting firm to update the 1958 study. Subsequent studies involving analysis of proposed construction were performed in 1970, 1971, 1973, 1974, and 1975; in September 1976, the Department of Public Works authorized a consultant to prepare an environmental impact evaluation for the flood control improvements.

In July 1982, construction of Phase I and Phase II flood control improvements for the Rooster River was completed. These improvements consist of the following:

(1) reconstruction of the upper and lower Brooklawn Avenue bridges;

(2) channelization of the Rooster River, from the upper Brooklawn Avenue bridge to upper Laurel Avenue, and from lower Laurel Avenue to the lower Brooklawn Avenue bridge;

(3) relocation of the Rooster River to an underground conduit between upper Laurel Avenue and lower Laurel Avenue; and

(4) relocation of Ox Brook to an underground conduit that begins at Lincoln Boulevard and joins the Rooster River conduit.

Provisions were made to permit small amounts of flow to continue in the original channels of the Rooster River and Ox Brook for environmental reasons. Also, although storm drainage is connected to the conduits, these channels carry runoff from the immediately adjacent areas.

The USACE has recommended construction of a dam and reservoir on the Pequonnock River (Lower Reach) at Trumbull for purposes of flood control, water supply, water quality control, and recreation. The site of the proposed Trumbull Pond Dam is in the Town of Trumbull, about one mile north of Daniel’s Farm Road. In line with this proposal, the Pequonnock River (Lower Reach) was studied in 1967 in detail from the proposed dam site downstream to River Street in Bridgeport, to determine the extent of flood control improvements required along this portion of the river (Reference 36). For various reasons, both environmental and economic, the implementation of these projects is not anticipated in the near future.

In the Town of Brookfield, the reconstruction of U.S. Highway 7, running parallel to the Still River from White Turkey Hill Road to Silvermine Road, should improve the flood-carrying capacity of the Still River. Many bridges have been replaced or raised and sections of the river have been changed to trapezoidal channels. These measures, in conjunction with the high overbank created by the new U.S. Highway 7, lower flood elevations and help reduce damage along the Still River.

There are no existing State Encroachment Lines within the Town of Brookfield.

In the City of Danbury, three major structural flood control channel improvements are either under construction or have been completed in Danbury since the floods of 1955.

The City of Danbury has constructed an improved concrete-walled channel and improved trapezoidal channel as part of the Central Flood Urban Renewal Project. This project covers the reach of the Still River upstream from the railroad yard to Rose Street. This project confines the flows from the 1-percent-annual-chance flood as well as the flow from floods equal to the 1955 event. The 0.2-percent-annual-chance flood will overflow the conduits and flood the parking lots bordered by Crosby and Elm Streets.

The USACE constructed a local protection project consisting of approximately 3,625 feet of concrete conduit and 2,695 feet of enlarged and realigned Still River riprapped trapezoidal channel downstream from Triangle Street to upstream from the railroad yards. The project required rebuilding four railroad bridges, constructing two highway bridges, and removing a privately owned bridge. This project protects a major industrial area in the city.

The State of Connecticut has constructed a riprapped trapezoidal channel along the Still River upstream from Cross Street to downstream of Triangle Street. This project lowers flood elevations and reduces the damages along the Still River and its tributary Sympaug Brook. A design discharge of 3,300 cfs was used for the Still River between Cross Street Bridge and Sympaug Brook. Between Sympaug Brook and Padanaram Brook a design discharge of 2,800 cfs was used for the Still River.

The police and fire departments are responsible for local flood warnings, and the National Weather Service provides flood warnings and forecasts on a regional scale.

In 1973, the Town of Darien formed an Inland Wetlands Commission that the Board of Selectmen authorized in accordance with the provisions of the Inland Wetland and Watercourses Act of the Connecticut General Statutes. A primary function of the commission is to protect the public interest by the preservation and protection of the wetlands and watercourses within the town from random, undesirable, and unregulated uses, disturbance, and destruction. The community also has an active Flood and Erosion Control Board that is responsible for planning and implementing a flood and erosion control system.

In the past, increased flooding has occurred along the lower reaches of Stony Brook 1. As a result, the Flood and Erosion Control Board in 1974 contracted with the private firm of Stearns and Wheler to conduct a hydraulic study of Stony Brook 1, which it completed in December 1976. Town officials have reviewed the study's recommendations for short-range improvements, but have not given approval for their initiation. The long-range improvements will be implemented according to a schedule that the board will set.

In the past, several channel improvements, culvert improvements, and bridge replacements have been implemented on the Noroton River south of Middlesex Road. North of Middlesex Road, additional channel and culvert improvements and bridge replacements have been designed, but not yet constructed. Along Goodwives River, limited channel improvements have been made in the vicinity of Tokeneke Road. No flood protection measures exist or are any planned along Tokeneke Brook or the Five Mile River.

Four reservoirs are contained in or border on the Town of Easton: the Aspetuck, Easton, Hemlock, and Saugatuck Reservoirs. These reservoirs were built solely for water supply purposes, but their scope and the wetland areas adjacent to them serve as water storage areas during peak storms. These reservoirs therefore provide some measure of flood protection.

The Town of Easton has two existing detention ponds in the Mill River watershed. They were built in conjunction with a housing subdivision in 1979, and are found along two different tributaries between Sport Hill Road and Bartling Drive. The Town of Easton has no other flood protection measures along any watercourses.

Flood protection measures within the Town of Fairfield include the widening of channels and the enlarging of culverts at problem areas. Flood peaks are reduced by maintaining wetlands and upland lakes which attenuate peak flood flows through storage. Seawalls have been constructed to reduce erosion along coastal areas.

In August 1978, the Town of Fairfield adopted flood hazard zoning regulations to control the construction of buildings in areas subject to flooding to minimize the damages of such flooding and to promote the health and safety of the town's residents.

One reservoir and three large lakes are contained in or border on the town: the Hemlock Reservoir, Lake Mohegan, Samp Mortar Lake, and Buckley Pond. The Hemlock Reservoir was built solely for water supply. Lake Mohegan was built for recreation purposes and has no dam at its outlet. Lake Mohegan is simply a widening of the Mill River. Samp Mortar Lake on the Mill River, and Buckley Pond, on Sasco Creek are both lakes with dams blocking their outlets. All of these water bodies and the wetland areas adjacent to them serve as water storage areas during peak storms. These lakes and the Hemlock Reservoir therefore provide some measure of flood protection.

Londons Brook is currently piped from a point west of State Route 59 approximately 90 feet north of Fairfield Woods Road through a residential area to a point approximately 150 feet north of Casmir Drive. The diversion of Londons Brook, and a westerly tributary north of Bond Street, into a piped system has occurred in several phases over the past 30 or more years. According to local residents, piping the brook has improved flooding conditions in the area. However, the piping system does not have the capacity to carry a 1-percent-annual-chance flood. The floodplain north of Casmir Drive acts as a natural detention area and allows a portion of the piping system along Wynn Wood Drive to contain the 1-percent-annual-chance flood. Encroachment into this area would cause additional flooding downstream along Wynn Wood Drive.

The Town of Greenwich is actively pursuing several means aimed at protection against flood damage and at sound floodplain management. The Pemberwick Dam on the Byrum River was built in 1867 and serves no flood protection function. The dam is in fair condition, with some seepage noted on the downstream face. The dam is noted as a 'high hazard potential structure' when taken into context with current USACE guidelines.

During September 1977 the town adopted floodplain regulations for the purpose of protecting life and property from the ravages of flooding and controlling development in areas subject to flooding. These regulations were adopted in accordance with the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973, and enabled the town to participate in the Regular Flood Insurance Program.

Presently, there are no existing or planned structural flood protection measures along any of the watercourses within the Town of Monroe. The small dams found in the community provide primarily for recreation and water supply rather than flood protection.

Non-structural measures of flood protection in the form of land use regulations are being used to aid in the prevention of future flood damage.

In the Town of New Canaan, in 1975, the Connecticut Department of Transportation modified the Merritt Parkway Bridge over the Five Mile River by adding two 11-foot diameter pipes to the existing 10-foot by 10-foot box culvert. The increased opening allows a larger flow of water under the bridge, producing a drop in water surface. This has resulted in less flood damage to the bridge and adjacent properties upstream of the bridge.

There are several large water-supply reservoirs in the Town of New Canaan, as well as many small pond dams with little storage capacity. Only Laurel Reservoir was assumed to reduce peak flows on the Rippowam River (Upper Reach) and Laurel Brook.

The town has adopted a policy to help minimize property damage by designating all potential flood hazard areas. The Planning and Zoning Commission discourages building in the areas that offer storage for water during winter storms.

There have not been any formal flood protection projects carried out by the Town of Newtown to reduce flooding on the Housatonic River (Middle Reach), the Pootatuck River, or any other small tributaries.

There are no publicly developed flood protection measures existing in the Pond Brook watershed. Some of the newer residential developments have small runoff detention structures to prevent flood increases caused by increased impervious surfaces. A short sub-reach of Pond Brook between U.S. Route 6 and Covered Bridge Road is channelized with a concrete lined trapezoidal channel bed.

After the flood of 1955, several flood control projects were undertaken in the City of Norwalk. The Norwalk River below New Canaan Avenue was realigned and the channel improved. Bridges which were washed out or were very inadequate were replaced. All of the bridges washed out in 1955 were replaced with structures of greater hydraulic capacity. A levee was built along the western bank of the Norwalk River between Perry Avenue and the railroad bridge. On August 3, 2011, the City of Norwalk received notification of levee accreditation, which states that the levee complies with the minimum requirements outlined in Title 44 of the Code of Federal Regulations, Section 65.10 (44

CFR 65.10). The accredited levee is shown on the effective FIRM as providing protection from the 1-percent-annual-chance flood.

In April 1978, the City of Norwalk adopted flood hazard zoning regulations to control the construction of buildings in areas which are subject to flooding to minimize the damages of such flooding and to promote the health and safety of the city's residents.

The NRCS designed a flood control project for the Norwalk River watershed which included five dams and the implementation of channel improvements along several sections of the river. The completed project would indicate the 1-percent-annual-chance flood would be 1,250 cfs.

One of these dams has been built in Ridgefield, near Fox Hill Condominiums and the source of Ridgefield Brook. The other two dams are located just upstream of Millers Pond on the Norwalk River and near Candees Pond on Cooper Pond Brook.

The 1-percent-annual-chance flood flow of 3,300 cfs at Branchville will only be decreased to 2,665 cfs instead of the expected 1,080 cfs. The October 1955 flood flow at Branchville was estimated at 3,040 cfs. There will be no decrease in the expected 1,090 cfs at the mouth of Cooper Pond Brook for a 1-percent-annual-chance flood, but there will be a significant difference of 1,105 cfs to 235 cfs for Ridgefield Brook at the outlet from Great Swamp (Reference 37). There have been no significant structural changes on the Titicus River or the East Branch Silvermine River to alter flood flows.

In the Town of Sherman, during Hurricane Diane, soil between culverts under the Saw Mill Bridge was washed out. These culverts were later replaced by a 10-foot diameter pipe in 1956 by the town.

Flooding problems resulting from Candlewood Lake can be controlled by lowering its elevation at the power station. However, this was not done during major floods because this would further raise the water-surface elevation on the Housatonic River (Upper Reach). No major flooding problems were reported due to Candlewood Lake.

In the City of Stamford, the USACE constructed the hurricane barrier, which protects low-lying development in the south end of the city from flooding caused by hurricanes or severe coastal storms of 0.2-percent-annual-chance recurrence intervals. On July 9, 2010, the City of Stamford received notification of levee accreditation, which states that the levees comply with the minimum requirements outlined in Title 44 of the Code of Federal Regulations, Section 65.10 (44 CFR 65.10). The accredited levees are shown on the effective FIRM as providing protection from the 1-percent-annual-chance flood.

The City of Stamford has widened the Toilsome Brook channel between Dann Street and Dartley Street, as well as the Bracewood Lane section. Further improvements on Toilsome Brook are in the planning stage.

The reservoirs in the study area were constructed for water supply only; therefore, the reservoirs have no significant effect on the 1- and 0.2-percent-annual-chance floods.

The Stamford Environmental Protection Board and the Connecticut Department of Environmental Protection regulate floodplain encroachment ordinances within the city and establish restrictions in floodprone areas. The Environmental Protection Board can provide site-specific flood and flood-related data, such as where property is in relation to the floodplain on the FIRM, the potential depth of flooding affecting a property, historic flooding for a neighborhood, and information regarding the regulations and permit requirements that pertain to construction and development activities on floodprone properties.

In the Town of Stratford, in March 1963, the USACE proposed a hurricane protection plan for Stratford that consisted principally of diking around the greater part of the flooded area in the Great Meadows section of the town; diking and wall protection along and inshore of the west bank of the lower Housatonic River (Lower Reach) and the shoreline of Long Island Sound north of Stratford Point; and pumping stations and other appurtenant works (Reference 38). Consideration of this hurricane barrier was dropped in 1975 because it would have adversely affected a wetland area.

There are no current flood protection measures in the Town of Stratford. Recent legislation, in the form of a wetlands bill, will enable the town to improve its guidelines for the development of lowland, wetland, and streambelt areas; it will not, however, address the problems posed by the existing high degree of urbanization in the town.

Adequate storage facilities exist only on Pumpkin Ground Brook; Beaver Dam Lake and Trap Falls Reservoir effectively lower the flood flows on this stream. However, these storage facilities are located at the head of the watershed, and are therefore not entirely effective. Beaver Dam Lake is in the northwest corner of town, and Trap Falls Reservoir is located outside the corporate limits, approximately 1 mile upstream of Beaver Dam Lake.

In the Town of Trumbull, at this time, no flood protection measures exist on the streams studied. Although there are a number of small dams on the streams studied, none provide significant storage for flood protection.

However, nine sites on the Pequonnock River (Upper Reach) and the Pequonnock River (Lower Reach) have been redesigned in conjunction with the proposed, federally funded reconstruction of State Route 25. These include, in the vicinity of the Merritt Parkway, the addition of five bridge structures along with the realignments and improvement of the river's channel; and between Whitney Avenue and the Monroe Turnpike, the addition of four bridge structures along with channel realignments and improvements. These structures, channel realignments, and channel improvements were not been included in the hydraulic analyses performed for the 2010 countywide FIS study.

There are no existing state ordinances regulating encroachment into floodplains for the Town of Trumbull.

In the Town of Westport, flood protection works within the town include elevating buildings to higher levels through support in state grants; enacting tough regulations on home renovation and construction in floodprone areas whereby homeowners or businesses that build additions or renovations to their buildings in floodprone areas must elevate the structure to one foot above the Base Flood Elevation (BFE) if their renovations or additions exceed 50 percent of the fair market value of the property in any five-year period; and widening of channels and enlarging of culverts in flood areas. Further, flood peaks are reduced by maintaining wetlands and upland lakes that attenuate peak flood flows through storage. In addition, the construction of seawalls has helped to reduce erosion of the coastal areas. And, the community has attempted to control direct encroachment on the immediate streambanks.

Previously, the NRCS had designed an entire system of flood control structures and channel modifications for the Norwalk River watershed, including five floodwater retarding structures and three lengths of channel modifications (Reference 39).

Only two of the NRCS dams have been constructed, one on Ridgefield Brook in Ridgefield and the other on Spectacle Brook, a tributary of Comstock Brook, in Wilton. NRCS policy prohibits channel modifications until all floodwater retarding structures are in place; therefore, the sections of channel modifications have not been completed.

3.0 ENGINEERING METHODS

For the flooding sources studied by detailed methods in the county, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude that is expected to be equaled or exceeded once on the average during any 10-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for floodplain management and for flood insurance rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10-, 2-, 1-, and 0.2-percent chance, respectively, of being equaled or exceeded during any year. Although the recurrence interval represents the long term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood which equals or exceeds the 1-percent-annual-chance in any 50-year period is approximately 40 percent (4 in 10); for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the county at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes. Riverine and coastal analyses are discussed separately in the following sections.

3.1 Riverine Hydrologic Analyses

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

For each community within Fairfield County that has a previously printed FIS report, the unrevised hydrologic analyses described in those reports have been compiled and are summarized below by city or town.

Pre-countywide Analyses

In the Town of Bethel, the discharges for Limekiln Brook 2 and Sympaug Brook were taken directly from the FIS for the City of Danbury (Reference 40).

The Regional Frequency Method (Reference 41) was used for computing peak discharges for East Swamp, Terehaute, Wolf Pit, Dibbles, and Putnam Park Brooks. This method is based on a regression analysis of stream flow records from 105 stream-gaging stations in Connecticut and 28 precipitation-gaging stations established by the National Weather Service in Connecticut, Massachusetts, Rhode Island, and New York.

The regional analysis is based on the parameters of drainage area, rainfall, main channel length, main channel slope, and extent of storm sewers.

The discharges were transposed to various points on the streams using the relationship:

$$\frac{Q_1}{Q_2} = \frac{A_1^{\left(\frac{.894}{A_1^{.048}}\right)}}{A_2^{\left(\frac{.894}{A_2^{.048}}\right)}}$$

Where Q_1 and Q_2 are discharges at the calculated point and at the mouth of the study stream, respectively, and A_1 and A_2 are the respective drainage areas at the aforementioned locations (Reference 42).

In the City of Bridgeport, peak discharges for Island Brook, Yellow Mill Channel, Horse Tavern Brook, and the Rooster River were computed for the 10-, 2-, 1-, and 0.2-percent-annual-chance floods using the Regional Frequency Method (Reference 41). For Island Brook and Yellow Mill Channel, these discharges were compared to those obtained from the rainfall-runoff technique based on the Synthetic Triangular Unit Hydrograph, and from NRCS methods (References 43 through 46). A smooth curve was plotted from the three sets of values and the final discharges were taken from the curve. For Horse Tavern Brook and the Rooster River, the discharges compared favorably with those in the regional discharge-frequency curves published in the FIS for the Town of Fairfield (Reference 47); therefore, the values from the Fairfield study were adopted. For the revised portion of the Rooster River, the flood frequency-discharge values from the original study were redistributed between the new conduit and the old channel to reflect the improvements.

Peak discharges for the Pequonnock River (Upper Reach) and Pequonnock River (Lower Reach) were similarly computed and were compared with those published in the FIS for the Town of Trumbull (Reference 48). The discharges at the upstream corporate limits compared favorably, and the published discharges were adopted. These discharges were adjusted in the downstream portions by a method developed by the NRCS using discharge-area relationships (Reference 42). Peak discharges for Bruce Brook were adopted from the FIS for the Town of Stratford (Reference 49).

In the Town of Brookfield, the hydrologic analysis for the Still River was based on data developed by the USACE, New England Division, for the Danbury Local Protection Project, Still River, Housatonic River basin, Connecticut (References 50 through 52). The USACE analysis utilized the 35 years of flow records of the USGS gaging station (number 01201510) on the Still River at Lanesville using the log-Pearson Type III analysis (Reference 53). These data were utilized by the NRCS to develop flood routing published in the Flood Hazard Analysis of the Still River (References 43 through 45). The results of these flood routings were utilized to produce the 10-, 2-, 1-, and 0.2-percent-annual-chance flood discharges.

Discharge-frequency estimates for Limekiln Brook 1, East Brook, and small drainage areas less than one square mile were calculated utilizing the Rational Method (References 53 through 55). Rainfall data were obtained from the U.S. Weather Bureau (Reference 56).

In the City of Danbury, the USACE Design Memorandum No. 2 (References 50 through 52) provides, in addition to the data at Lanesville, frequency-discharge data at Triangle Street.

For the reach of the Still River downstream from the city boundary to Triangle Street, the 10-, 2-, 1-, and 0.2-percent-annual-chance flood discharges utilized the results of flood routings by the U.S. Department of Agriculture, Soil Conservation Service (References 43 through 45).

The developed discharges for the reaches of the Still River above Triangle Street and Padanaram and Kohanza Brooks utilized the USACE hydrologic data at Triangle Street. The discharges for the reaches of Sympaug Brook and Limekiln Brook 2 were determined using the results for the gage at Lanesville. The discharges for the subwatersheds were determined using a drainage area-discharge ratio formula (Reference 57).

In the Town of Darien's original study, the Regional Frequency Method was used for computing all these peak discharges (Reference 46). Because of the inherent possibility of a large standard error in the Regional Frequency Method, comparative computations of discharges by rainfall-runoff technique based on synthetic triangular unit hydrograph and the SCS Methodology were also utilized for assisting in the judicious adoption of discharges for various frequencies in a smooth curve (References 43 through 46). Peak discharges for the Five Mile River were adopted from the FIS for the City of Norwalk (Reference 58). Peak discharges for the Noroton River were adopted from the FIS for the City of Stamford (Reference 59).

Due to significant storage between the first railroad crossing and the second railroad crossing along Tokeneke Brook, there is a decrease in discharge for the 1- and 0.2-percent-annual-chance floods downstream of the first railroad crossing.

In the May 17, 1982, revision, hydrologic analyses were performed by the USACE to establish the peak discharge-frequency relationships for floods of the selected recurrence intervals for each stream record from six USGS gaging stations in the region using a log-Pearson Type III distribution (Reference 60). The six gaging stations and their periods of record are listed below:

Location	Period of Record
Saugatuck River (Lower Reach) near Westport, Connecticut	1933-1967
Pomeraug River at Southbury, Connecticut	1933-1982
Blind Brook at Rye, New York	1944-1981
Pequabuck River at Forrestville, Connecticut	1938-1982
Saugatuck River (Upper Reach) near Redding, Connecticut	1962-1982
Norwalk River at South Wilton, Connecticut	1963-1982

Discharge frequencies for the Noroton River were adopted after a comparative hydrologic analysis including the following information: statistical analysis of streamflow records, analysis using Connecticut floodflow formulas based on a statewide frequency study, and reservoir storage routings (Reference 41).

On the main stem of the Noroton River, the statistically developed flows were within specified limits of the flow values used in an earlier FIS; therefore, the higher earlier flow values were to be adopted.

A hydrologic report prepared by Leonard Jackson Associates increased the earlier FIS discharges by 10 percent. These greater flows were used for the restudy of the Noroton River. The USACE agreed to the larger flows on the Noroton River.

In the Town of Easton, peak discharges for the Aspetuck River (Upper Reach) and Aspetuck River (Lower Reach) were obtained from the frequency discharge-drainage area curves in the FIS for the adjacent Town of Weston (Reference 61).

In the Town of Fairfield, the hydrologic analyses for Sasco Creek, the Aspetuck River (Lower Reach), the Mill River, Cricker Brook, the Rooster River, and Horse Tavern Brook were based on data from gaged streams, including the Norwalk River, the Silvermine River, the Saugatuck River (Lower Reach), the Still River, Sasco Creek, and Copper-Mill Brook, in and near the study area. The data was subject to log-Pearson Type III statistical analysis of annual peaks (Reference 62). From these data, frequency-discharge relationships were established for different sized drainage areas.

The Regional Frequency Method was used for computing the peak discharges for Brown's Brook and Londons Brook downstream of a point approximately 430 feet downstream of State Route 59 (Reference 63). This method is based on a regression analysis of stream flow records from 105 stream gaging stations in Connecticut and 28 precipitation-gaging stations established by the National Weather Service in Connecticut, Massachusetts, Rhode Island, and New York. The regional analysis is based on the parameters of drainage area, rainfall, main channel length, main channel slope, and extent of storm sewers.

For the October 6, 1998, revision, the 1-percent-annual-chance flood peak discharge for Londons Brook above its confluence with the westerly tributary at Bond Street was determined using the USGS regional regression equation (for drainage areas less than 10 square miles) in Connecticut (Reference 63). The 1-percent-annual-chance flood flow at the intersection of Church Hill Road and Wynn Wood Drive, and at the inlet to the piping system north of Casmir Drive were determined using the USACE HEC-1 Flood Hydrograph Package Computer Program (Reference 64). The HEC-1 Program was used to account for natural valley flood storage effects north of Casmir Drive.

Storm levels along the coastline were developed from information contained in "Tidal Flood Profiles for the Connecticut Shoreline of Long Island Sound" (Reference 65). The storm surge elevations and the wave heights were used to delineate the coastal flood insurance zones.

In the Town of Greenwich's August 19, 1986, FIS, the hydrologic analysis for East Brothers Brook was based on data from gaged streams in and near the study area. The data were subjected to the log-Pearson Type III statistical analysis of annual peaks with a required skew of 1.0 (Reference 60). From these data, frequency-discharge relationships were established for different sized drainage areas.

For the Byram River, flows were adopted from a Flood Plain Information report prepared by the USACE (Reference 66). The hydrologic methods used in that report were based on a statistical analysis of discharge records for the gaging station on Blind Brook at Rye, New York (drainage area of 9.2 square miles). Thirteen years of record were used in the analysis which assumed that the logarithms of annual peak flows are normally distributed.

Peak discharges for the East Branch Byram River, Converse Pond Brook, West Brothers Brook, Rockwood Lake Brook, Strickland Brook, and Cider Mill Brook were calculated using the Regional Frequency Method (Reference 41).

Horseneck Brook was analyzed as two separate streams connected by the spillway at the Putnam Lake Reservoir. Upstream of the reservoir, the Regional Frequency methodology was applied to the stream. The resulting discharges were then routed through the reservoir to determine the maximum outflow from the reservoir. Horseneck Brook from the reservoir spillway downstream to its mouth was also analyzed using the Regional Frequency method. Discharge hydrographs were then developed for the outflow from Putnam Lake and for Horseneck Brook at its mouth. The two hydrographs were superimposed and the peak discharge for Horseneck Brook at its mouth was obtained.

In the Town of Monroe, peak discharges for the Farmill River and Means Brook were obtained from calculations performed by the NRCS during the preparation of the FIS for the City of Shelton (Reference 67).

Peak discharges listed for the Halfway River were taken from the FIS for the adjacent Town of Newtown (Reference 68).

The Regional Frequency Method was used to compute peak discharges for the West Branch Pequonnock River, Cooper Mill Brook, and Smith Pond Brook (Reference 69). This method is based on a regression analysis of streamflow records from 105 gaging stations in Connecticut and 28 precipitation gaging stations established by the National Weather Service in Connecticut, Massachusetts, Rhode Island, and New York. This regional analysis is based on the parameters of drainage areas, rainfall, main channel length, main channel slope, and extent of storm sewers.

In this updated study, the hydrologic analyses for the Housatonic River (Upper Reach) and the Housatonic River (Lower Reach) flood flow frequencies was based on the statistical analyses performed by the USACE of the stage-discharge records at the USGS gaging station located 0.2 mile downstream of the Stevenson Dam. The period of record at the station is from 1928 to the present. The analysis was based on a log-Pearson Type III distribution as prescribed in USGS Bulletin 17 (Reference 53).

In the Town of New Canaan, peak discharges on the Rippowam River (Upper Reach) below the confluence of Laurel Brook are reduced by Laurel Reservoir. The reduced discharges were computed through standard flood routing methods.

In the Town of New Fairfield, because of marked differences in watershed characteristics above and below the State Route 39 culvert and the effects of these differences on peak discharges along Ball Pond Brook, as well as the paucity of nearby gaging stations, it was determined that a generalized regional analytical approach could not be employed.

Peak discharge-frequency relationships for Ball Pond Brook were developed at the State Route 39 culvert by using t-year frequency rainfall data and synthetically derived rainfall-runoff relationships. The rainfall-frequency data were obtained from “Five to 60-Minute Precipitation Frequency for the Eastern and Central United States,” published by the U.S. Department of Commerce (Reference 70). The synthetic rainfall-runoff relationships for Ball Pond Brook were developed from physical data obtained from topographic maps and methods described in the National Engineering Handbook (Reference 42). This resulted in discharges which were assumed to be inflows to the available valley storage above State Route 39. The effects of natural valley storage in the areas upstream of the State Route 39 culvert on peak discharges were calculated and 50-, 10-, 2-, and 1-percent-annual-chance flood discharges were derived at State Route 39. The 0.2-percent-annual-chance discharge was evaluated by an analysis of the synthetic statistics of the 50-, 10-, and 1-percent-annual-chance data (Reference 62).

To obtain the discharge-frequency relationships for locations above and below State Route 39, the following relationship was used:

$$\frac{Qs}{Qc} = \left[\frac{A_1}{A_2}\right]^x$$

where, Q_s is the discharge at the site in question, and A_1 is the drainage area at the site, and Q_c is the discharge at the State Route 39 culvert, and A_2 is the drainage area at the State Route 39 culvert with x being the transformation exponent (Reference 57).

A value of 0.5 was used for x at the confluence of Bates Brook. Below the confluence of Bates Brook there would only be a small increase in the peak discharge because of the addition of concurrent flood hydrograph recession limb flow. Thus, the peak discharge-frequency relationship for Ball Pond Brook at the confluence with Lake Candlewood is only slightly higher than at Bates Brook.

The discharge-frequency relationship for Ball Pond Brook upstream of the confluence of Short Woods Brook was obtained by using the above transformation relationship with a value of 0.8 for x. However, the discharge values for State Route 39 used were the inflow discharges to the valley storage above State Route 39.

In the Town of Newtown, for the 1978 FIS, the hydrologic analysis for the Housatonic River (Middle Reach) flood flow frequencies was based on the statistical analyses performed by the USACE on the stage-discharge records at the USGS gaging station located at Stevenson, Connecticut, 0.02 mile downstream of Stevenson Dam (50 years of record). The analysis was based on a log-Pearson Type III distribution (Reference 53).

The hydrology for Pootatuck River, Deep Brook, Halfway River and Lewis Brook was based upon flood flow formulas developed by Lawrence A. Weiss, a USGS hydrologist (Reference 69). The flood flow formulas developed in 1975 evolved from log-Pearson Type III regression analysis done on 107 stream gaging stations throughout Connecticut. These gaging stations have a mean record length of 34 years and are supplemented by almost 200 years of historical records. The resultant statistical parameters for use in the flood flow equations (skew and standard flood flow) were computed at each gaging station and plotted on an isopleth map. From these maps, values of skew and standard deviation can be selected for any stream located in Connecticut. Other parameters taken into account by these flood flow formulas are localized stream length and slope, urbanization, and rainfall intensity. These empirically developed flood flow equations were adopted with the approval of the FIA.

Discharge-frequency estimates for Lewis Brook with a drainage area less than one square mile, were calculated utilizing the Rational Method (References 54 & 55). Rainfall data for this method were obtained from the U.S. Weather Bureau (Reference 56). Discharge-frequency relationships for approximate studied streams were developed from 100 gaging stations throughout Connecticut. A discharge drainage-area curve for the 1-percent-annual-chance flood was developed using the best fit curve.

For the 2010 countywide revision, peak discharges for Pond Brook were derived from a statistical analysis of stream gage data (USGS gage 01201890 – Pond Brook at Hawleyville) using a log-Pearson III method (Reference 71). The statistical analysis was based on 14 years of historical record (period of record 1963-1976). The peak discharges from the statistical analysis of the stream gage data were then adjusted by a drainage area ratio equation (Reference 72) to account for a decrease in drainage area from the stream gage to the point of interest.

In the City of Norwalk, the results of the Norwalk study were utilized to determine the 10-, 2-, 1-, and 0.2-percent-annual-chance discharges on the Norwalk and Silvermine Rivers. An area-discharge relationship was used to relate various frequency storm flows for both rivers to Five Mile River, Keelers Brook, and Stony Brook 2.

Betts Pond Brook was analyzed as two separate streams connected at Blake Street by twin culverts. Peak discharges upstream of Blake Street were computed using the Regional Frequency Method (Reference 41).

Using the formula listed previously, the discharges at the mouth of Betts Pond Brook were transposed to Cannon Street. Peak discharge hydrographs were developed for the brook at Cannon Street and for the Blake Street culverts. The hydrographs from these two locations were superimposed and summed to determine the total peak discharges for Betts Pond Brook at Cannon Street.

Storm surge levels along the City of Norwalk coastline were developed from information contained in "Tidal Flood Profiles for the Connecticut Shoreline of Long Island Sound" (Reference 65). The storm surge elevations and the wave heights were used to delineate the coastal flood zones.

In the Town of Ridgefield, for the 1982 FIS, peak discharges for the Titicus River and the East Branch Silvermine River were determined through the use of USGS formulas for ungaged streams in Connecticut (Reference 41). The formulas were the result of a log-Pearson Type III regression analysis performed on 107 stream gaging stations throughout Connecticut. The gaging stations have a mean length of record of 34 years and are supplemented by close to 200 years of historic information. From this information, the skew and standard deviation for each gaging station were calculated for use in the flood-flow equations and a summary map for Connecticut was developed. This information, along with other watershed parameters (channel slope, drainage area, stream length, rainfall intensity, and degree of urbanization) were used to arrive at peak discharges for the Titicus and East Branch Silvermine Rivers. The parameters were taken from USGS topographic maps (Reference 73).

Peak discharges on the Norwalk River, Ridgefield Brook and Cooper Pond Brook are modifications of flows calculated by the NRCS (Reference 37). The modifications were needed because all the NRCS proposed flood control structures were not in place during the time period covered by the June 18, 2010 countywide FIS. Therefore, peak discharges calculated by the NRCS were modified to only include the effects of the NRCS flood control dam on Ridgefield Brook.

The NRCS method for calculating peak discharges used curves developed to predict runoff based primarily on soil type and land use. This method classifies areas according to these parameters and then applies a 24-hour duration storm to determine runoff units. The values were then adjusted based on watershed slope, channel slope, and percentages of swampy and impervious areas to arrive at a peak discharge for the watershed (References 43 through 45). The resulting discharges were modified by the NRCS by routing the subject storms through the flood control structure using the Wilson Routing Method (Reference 74).

For the August 23, 1999, revision, peak flood discharges established for the Norwalk River for the 1982 FIS were used for the restudy. The peak flood discharges for Miry Brook, the Unnamed Tributary to Saugatuck River, and the South Branch of Unnamed Tributary to Saugatuck River were calculated for the 10-, 2-, and 1-percent-annual-chance recurrence intervals using a hydrologic model and regression equations.

The USACE HEC-1 computer model was used to prepare the watershed model (Reference 64). The NRCS Curve Number Loss Rate methodology was used to calculate the watershed runoff hydrographs. Level pool storage routing was used to route the inflow hydrographs through the lakes and ponds.

The regression equations used in the analysis are published in Connecticut Water Resources Bulletin No. 36 from the USGS (Reference 75). A regression equation was not available for the 0.2-percent-annual-chance floods; therefore, the flood peaks were extrapolated from the 50- to 1-percent-annual-chance data. The rainfall values used in the regression equations were obtained from "Aerial Rainfall Maps for Connecticut" included in a paper entitled “Flood Flow Formulas for Urbanized and Nonurbanized Areas of Connecticut”, by the USGS (Reference 69).

Data on the stream lengths and channel slopes were obtained from USGS topographic maps (Reference 73). The percent stratified drift within the watersheds was obtained from "Water Resources Inventory of Connecticut, Part 6, Upper Housatonic River Basin," prepared by the USGS in cooperation with the Connecticut Water Resources Commission (Reference 76).

The HEC-1 model produced peak discharges of higher magnitude than the regression equations. The computed peak discharges were presented to the FEMA Region I project officer for his review and comment. The project officer selected the peak discharges computed with the regression equations.

In the City of Shelton, for the streams studied by detailed methods in the original FIS, with the exception of the Housatonic River (Lower Reach), the NRCS synthetic rainfall-runoff method was used to obtain the 10-, 2-, 1-, and 0.2-percent-annual-chance peak discharges (Reference 77). This method uses (a) soils and land use information to develop the runoff curve numbers that relate the rainfall to runoff (allowing for initial abstraction losses), (b) topography and stream hydraulics from which times of concentration are calculated, and (c) rainfall and the distribution of rainfall taken from the Weather Bureau (Reference 42 & 56).

The USGS stream gage at Stevenson Dam (No. 0120550), located approximately 5,000 feet above the northern corporate limits of Shelton, was analyzed by the USACE for discharges on the Housatonic River (Lower Reach) in the original FIS. The gage has been in operation since August 1928. The log-Pearson Type III procedure was used with a discharge of 125,000 cfs from the August 1955 storm. At the time of the August 1955 storm, there was an abnormal amount of storage available in the watershed, so the measured discharge was not used.

In the 1991 revision, the hydrologic analyses for the Housatonic River (Lower Reach) used in the original FIS were reviewed and used.

In the City of Stamford’s original study, the hydrologic analyses were based on a log-Pearson Type III statistical analysis of peak-flow data for five long-term USGS gaging stations and used a regional skew of 0.7. The five gaging stations and the periods of record from that report are listed below:

Location	Period of Record
Saugatuck River (Lower Reach) near Westport, Connecticut	1932-1960
Quinnipac River at Wallingford, Connecticut	1932-1980
Pomperang River at Southbury, Connecticut	1932-1980
Blind Brook at Rye, New York	1943-1980
Pequabuck River at Forestville, Connecticut	1941-1980

Average parameters were developed for the streams, and these parameters were applied to the study streams. The computed flows were adjusted based on a discharge-drainage area relationship.

Within Stamford, several water-supply reservoirs have been developed. For the purpose of the original study, the reservoirs were assumed to be full, therefore, to have a negligible effect on reducing flood peaks.

Also in the original study, tidal flood stage frequencies were developed from an analysis of tidal data collected at the Stamford hurricane barrier tidal gage and from additional information (Reference 33). The Stamford gage has been operated since 1968 by the National Oceanic and Atmospheric Administration (NOAA).

In the November 17, 1993, revision, hydrologic analyses were performed by the USACE to establish the peak discharge-frequency relationships for floods of the selected recurrence intervals for each stream record from six USGS gaging stations in the region using a log-Pearson Type III distribution (Reference 60).

The adopted discharge frequencies for the Rippowam River (Upper Reach) and Rippowam River (Lower Reach) and its tributaries, Toilsome, Haviland, and Poorhouse Brooks, were based on a mean per square mile of 1.99, a standard deviation of 0.290, and an adopted skew of 0.5, which agreed closely with the data developed in a recent USACE flood control study for the basin.

Similarly, on the main stem of the Noroton River, the statistically developed flows were within specified limits of the flow values used in an earlier FIS; therefore, the higher earlier flow values were adopted. The developed statistical parameters were used in computing the adopted flows for Springdale Brook.

PWG received from the USACE a study prepared by Leonard Jackson Associates. This study had higher flow values than those developed by the USACE. These greater flows were used by PWG for the restudy of the East Branch Mianus River and the Noroton River. The USACE agreed to the larger flows on these two streams.

In the Town of Stratford, the NRCS booklet, "A Method of Estimating Volume and Rate of Runoff in Small Watersheds," was used to determine the flood frequency-discharge values for Bruce Brook, Tanners Brook, and Pumpkin Ground Brook (Reference 46). For the streams studied by detailed methods, storms of the selected recurrence intervals were computed. The 0.2-percent-annual-chance rainfall intensity was determined by the extrapolation of a curve fit to the 10-, 2- and 1-percent-annual-chance rainfall intensities probability graph. In the second revision, flood frequency-discharge values for Long Brook were determined using the USACE HEC-1 flood hydrographs (Reference 64). For the streams studied by approximate methods, the 1-percent-annual-chance storm was used.

For those watersheds that contained sizable ponds or lakes, inflow-outflow hydrographs were constructed to determine the reductions in the peak flows. Inflow-outflow hydrographs were constructed for Brewster's Pond on Long Brook, and for Beaver Dam Lake on Pumpkin Ground Brook.

In the design of the Stratford Local Protection Project, the USACE developed discharge-frequency relationships for the Housatonic River (Lower Reach), as modified by the system of upstream reservoirs (References 50 through 52). The discharge-frequency values for the Housatonic River (Lower Reach) were taken from this study.

In the Town of Trumbull, regional discharge-frequency curves developed by the USACE for the Pequonnock River (Upper Reach) and Pequonnock River (Lower Reach) at three known locations were the principal sources of data for defining the discharge-frequency relationships for all streams studied with the exception of Tributaries K and L (Reference 2). Tributaries K and L are tributaries of Pumpkin Ground Brook in Stratford, Connecticut. The principal source of data for these streams was the Pumpkin Ground Brook discharge-frequency plot in the Stratford, Connecticut FIS (Reference 49). Values of the 10-, 2-, 1-, and 0.2-percent-annual-chance flood discharges were calculated for the various drainage areas by applying the discharge drainage area formula:

$$(Q_1/Q_2) = (A_1/A_2)^{.8}$$

where Q_1, Q_2 are the discharges at specific locations and A_1, A_2 are the drainage areas at those locations (Reference 57).

For the December 19, 1997, revision, a hydrologic analysis for Tributary G was performed using the USACE HEC-1 flood hydrograph package (Reference 64).

In the Town of Weston, for the October 17, 1978, FIS, for the streams studied by detailed methods, discharges were determined using a regional discharge-drainage area plot developed for the FISs for the Towns of Fairfield and Westport (Reference 47 & 111). Values for the 10-, 2-, 1-, and 0.2-percent-annual-chance floods were obtained directly from this plot, except those for the Saugatuck River (Upper Reach) and Saugatuck River (Lower Reach) where drainage areas were less than 1 square mile.

Also for the October 17, 1973, FIS, a reservoir routing using a numerical iteration method was performed for the Saugatuck Reservoir (Reference 78). The results of this routing were used to adjust the discharge-drainage area plot for the Saugatuck River (Upper Reach) and Saugatuck River (Lower Reach). Frequency-discharge data for the portions of the stream where the drainage areas were less than 1 square mile were developed by comparison with the regional discharge-drainage area plot.

For the December 19, 1997, revision, for the West Branch Saugatuck River, peak discharges for the 10-, 2-, and 1-percent-annual-chance floods were calculated using the regression equations in Connecticut Water Resources Bulletin No. 36 from the USGS (Reference 75). A regression equation was not available for the 0.2-percent-annual-chance flood; therefore, the 0.2-percent-annual-chance flood peak was extrapolated from the 50- to 1-percent-annual-chance data. The rainfall values used in the regression equations were obtained from "Aerial Rainfall Maps for Connecticut," which were included in a paper entitled "Flood Flow Formulas for Urbanized and Nonurbanized Areas of Connecticut," by the USGS (Reference 69). Data on stream length and channel slopes were obtained from USGS topographic maps (Reference 73). The percent stratified drift within the watershed was obtained from "Water Resources Inventory of Connecticut, Part 4, Southwestern Coastal River Basin," prepared by the USGS in cooperation with the Connecticut Water Resources Commission (Reference 79).

For the Town of Westport, in the 1984 FIS, The hydrologic analyses for the Saugatuck River (Lower Reach), the Aspetuck River (Lower Reach), Dead Man's Brook, Muddy Brook, and Sasco Creek were based on data from gaged streams in and near the study area, including the Norwalk River, the Silvermine River, the Saugatuck River (Lower Reach), the Still River, Sasco Creek, and CopperMill Brook. The data was subjected to the log-Pearson Type III statistical analysis of annual peaks with a required skew of 1.0 (Reference 62). From these data, frequency-discharge relationships were established for different sized drainage areas.

For the January 7, 1998, revision, For the West Branch Saugatuck River, peak discharges of the 10-, 2-, and 1-percent-annual-chance floods were calculated using regression equations established by the USGS (Reference 75). A regression equation was not available for the 0.2-percent-annual-chance flood; therefore, the peak discharge for the 0.2-percent-annual-chance flood was extrapolated from the lesser floods that were calculated. The rainfall values used in the regression equations also were obtained from the USGS (Reference 41). Data on the stream length and channel slopes were obtained from USGS topographic maps (Reference 73). The percent stratified drift within the watershed was obtained from "Water Resources Inventory of Connecticut, Part 4, Southwestern Coastal River Basin," prepared by the USGS in cooperation with the Connecticut Water Resources Commission (Reference 79).

In the Town of Wilton, for the 1982 FIS, peak discharges for the Norwalk River and Comstock Brook are a modification of the flows calculated by the NRCS (Reference 37). The discharges were modified because all of the planned NRCS flood-retarding structures were not completed by the time the June 18, 2010 countywide FIS was prepared. Therefore, the natural peak discharges calculated by the NRCS have been modified to include only the effects of the completed dams, the first on Ridgefield Brook, and the other on Spectacle Brook.

The NRCS method of calculating peak discharges is based on curves that predict runoff based primarily on soil type and land use. This method classifies areas according to these parameters and then applies a 24-hour duration storm to it to determine runoff units. This method then adjusts the resulting values based on watershed shape, channel slope, and the percentages of swampy and impervious areas to arrive at a peak discharge for the watershed (References 43 through 45). Discharges were then modified by the NRCS by routing the subject storms through the floodwater retarding structures using Wilson's routing method.

Also for the 1982 FIS, peak discharges for the East Branch Silvermine River were determined from formulas for ungaged streams in Connecticut developed by L.A. Weiss (Reference 41). The formulas were the result of a log-Pearson Type III regression analysis performed on 107 stream gaging stations throughout Connecticut. The gaging stations have a mean record length of 34 years and are supplemented by nearly 200 years of historical information. The skew and standard deviation for each of the gaging stations were calculated for use in the flood flow equations, and a summary map of Connecticut was developed. This information, along with other watershed parameters, such as channel slope, drainage area, stream length, rainfall intensity, and degree of urbanization, were used to arrive at peak discharges for the East Branch Silvermine River. The parameters were taken from USGS topographic maps (Reference 73).

For the June 4, 1990, FIS, peak discharges for the Silvermine River and Parting Brook were determined from an updated version of the Weiss formulas for ungaged streams in Connecticut (Reference 41).

For the February 18, 1998, revision, peak discharges of the 10-, 2-, and 1-percent-annual-chance floods for the West Branch Saugatuck River were calculated using the regression equations in “Connecticut Water Resources Bulletin No. 36” from the USGS (Reference 75). A regression equation was not available for the 0.2-percent-annual-chance flood; therefore, the flood peak was extrapolated from the 50- to 1-percent-annual-chance data. The rainfall values used in the regression equations were obtained from the Weiss publication (Reference 41). Data on reach lengths and channel slopes were determined using USGS topographic maps (Reference 73). The percent stratified drift within the watershed was obtained from a publication prepared jointly by the USGS and the Connecticut Water Resources Commission (Reference 79).

Drainage area-peak discharge relationships for the Aspetuck River (Lower Reach), Saugatuck River (Lower Reach), Saugatuck River (Upper Reach), Beaver Brook, Jenning’s Brook, Kettle Creek, Kohanza Brook, Limekiln Brook 2, Padanaram Brook, Still River, and Sympaug Brook are shown in Figure 1, “Frequency-Discharge Drainage Area Curves.”

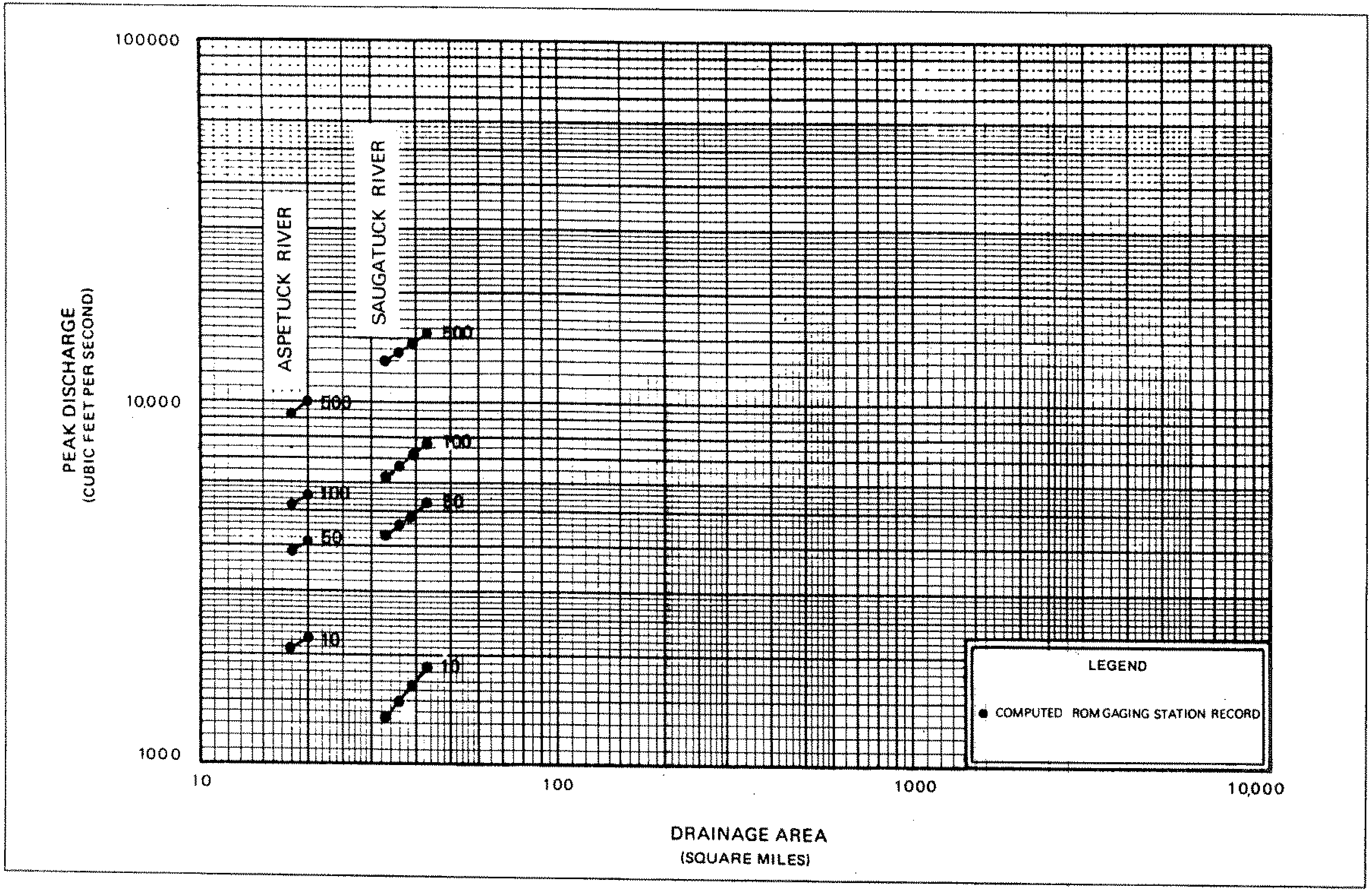

FIGURE 1 – FREQUENCY-DISCHARGE-DRAINAGE AREA CURVES – ASPETUCK RIVER (LOWER REACH) – SAUGATUCK RIVER (LOWER REACH) – SAUGATUCK RIVER (UPPER REACH)

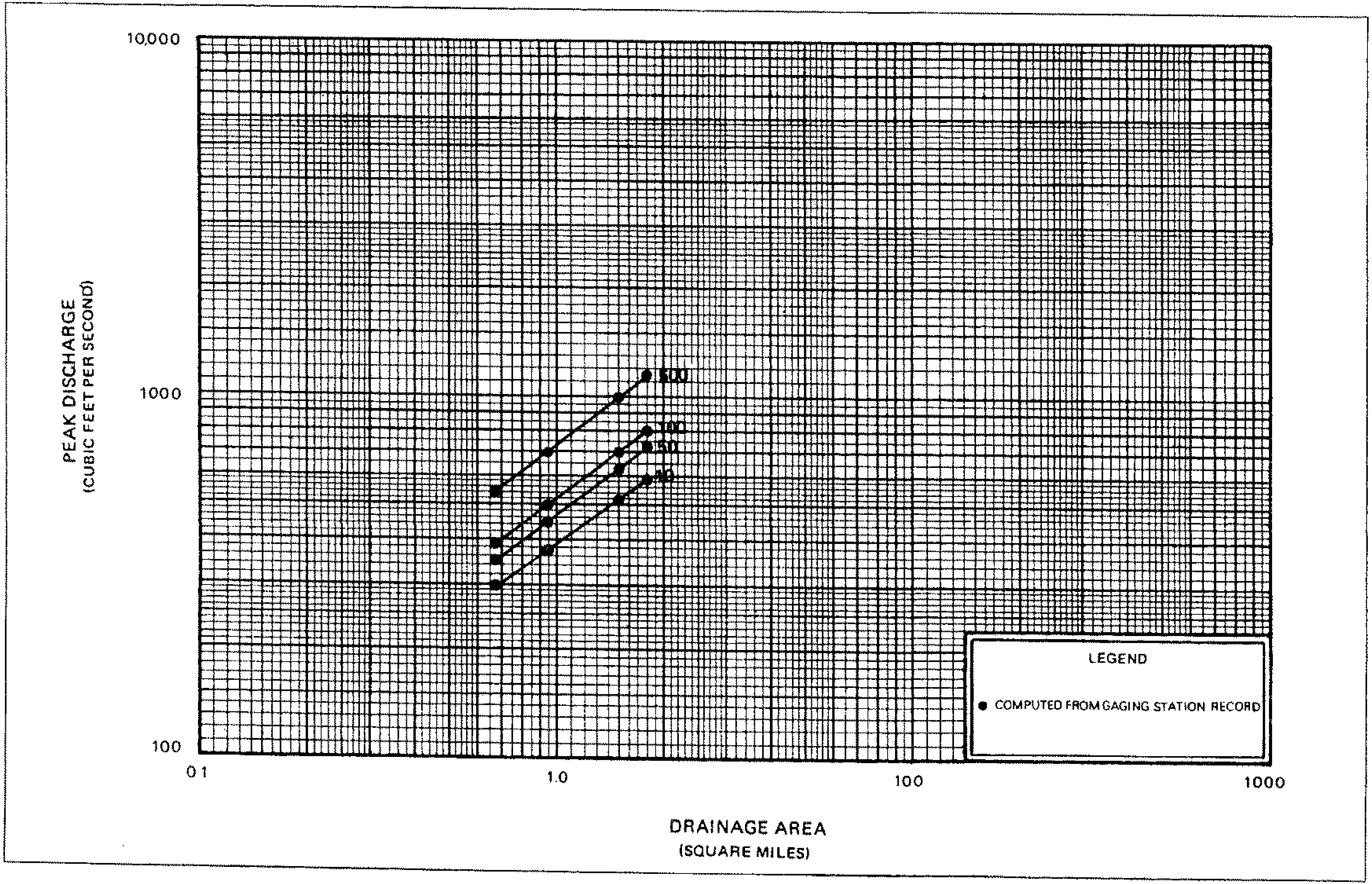

FIGURE 2 – FREQUENCY-DISCHARGE-DRAINAGE AREA CURVES – BEAVER BROOK

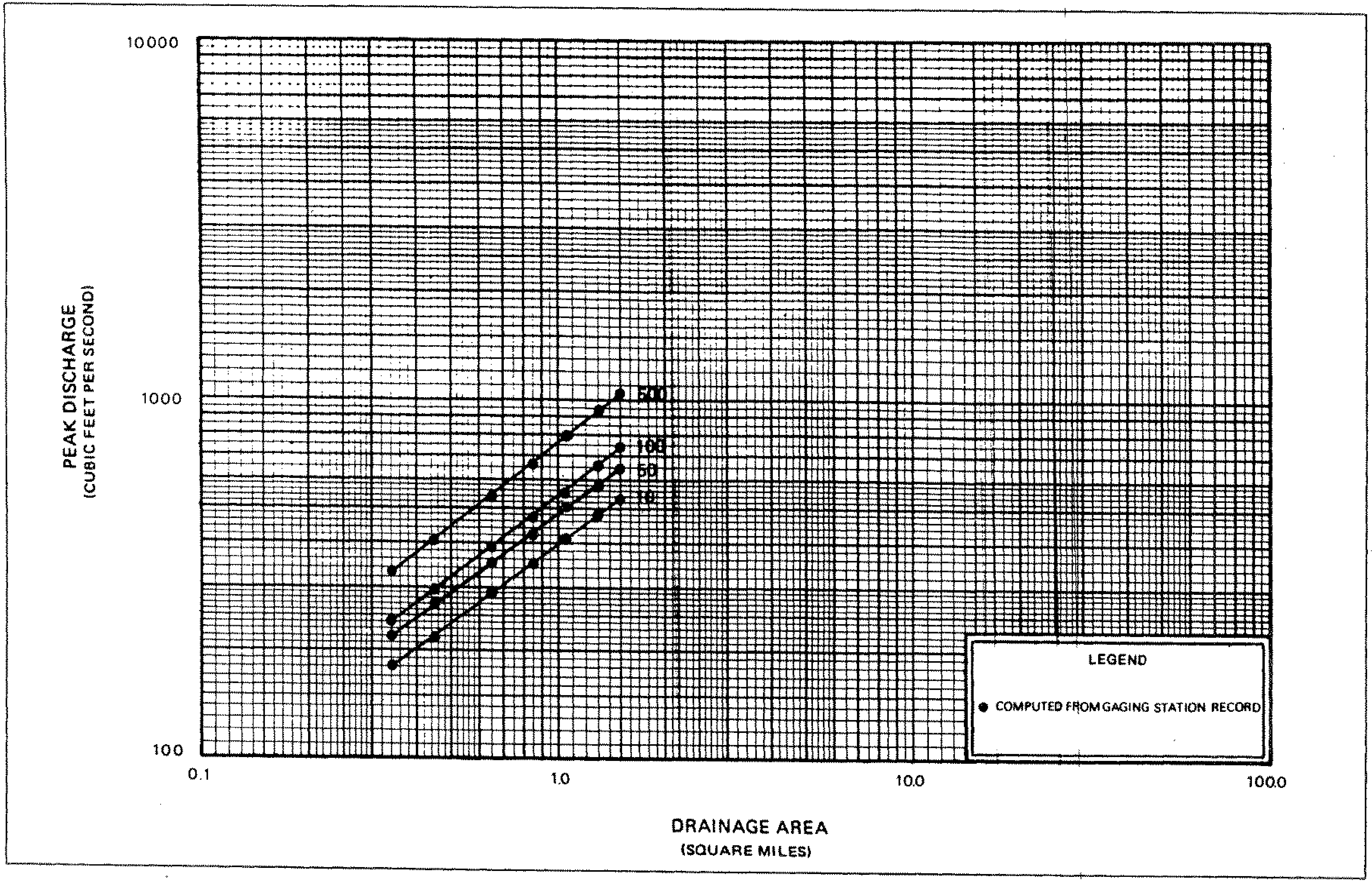

FIGURE 3 – FREQUENCY-DISCHARGE-DRAINAGE AREA CURVES – JENNING'S BROOK

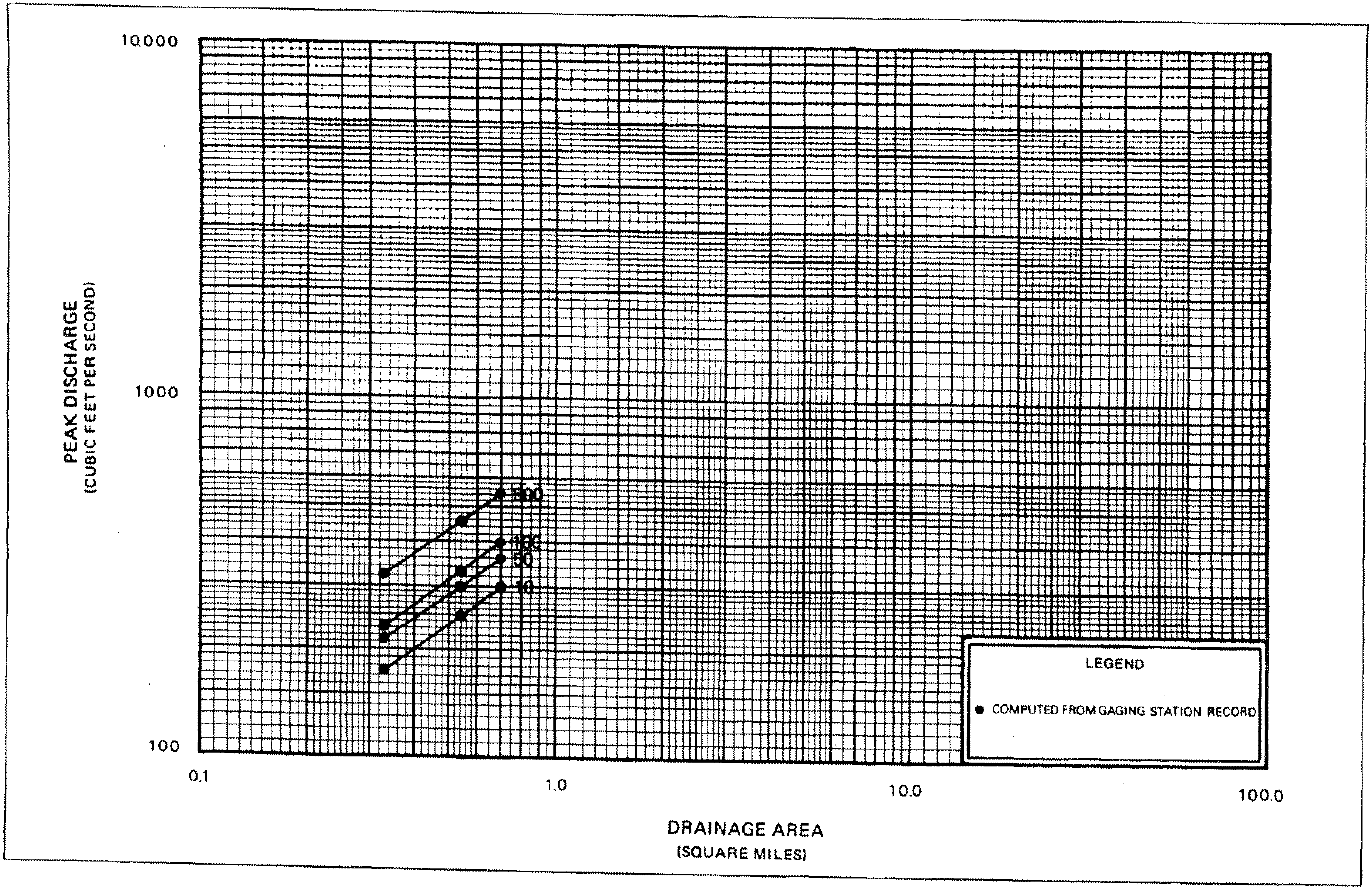

FIGURE 4 – FREQUENCY-DISCHARGE-DRAINAGE AREA CURVES – KETTLE CREEK

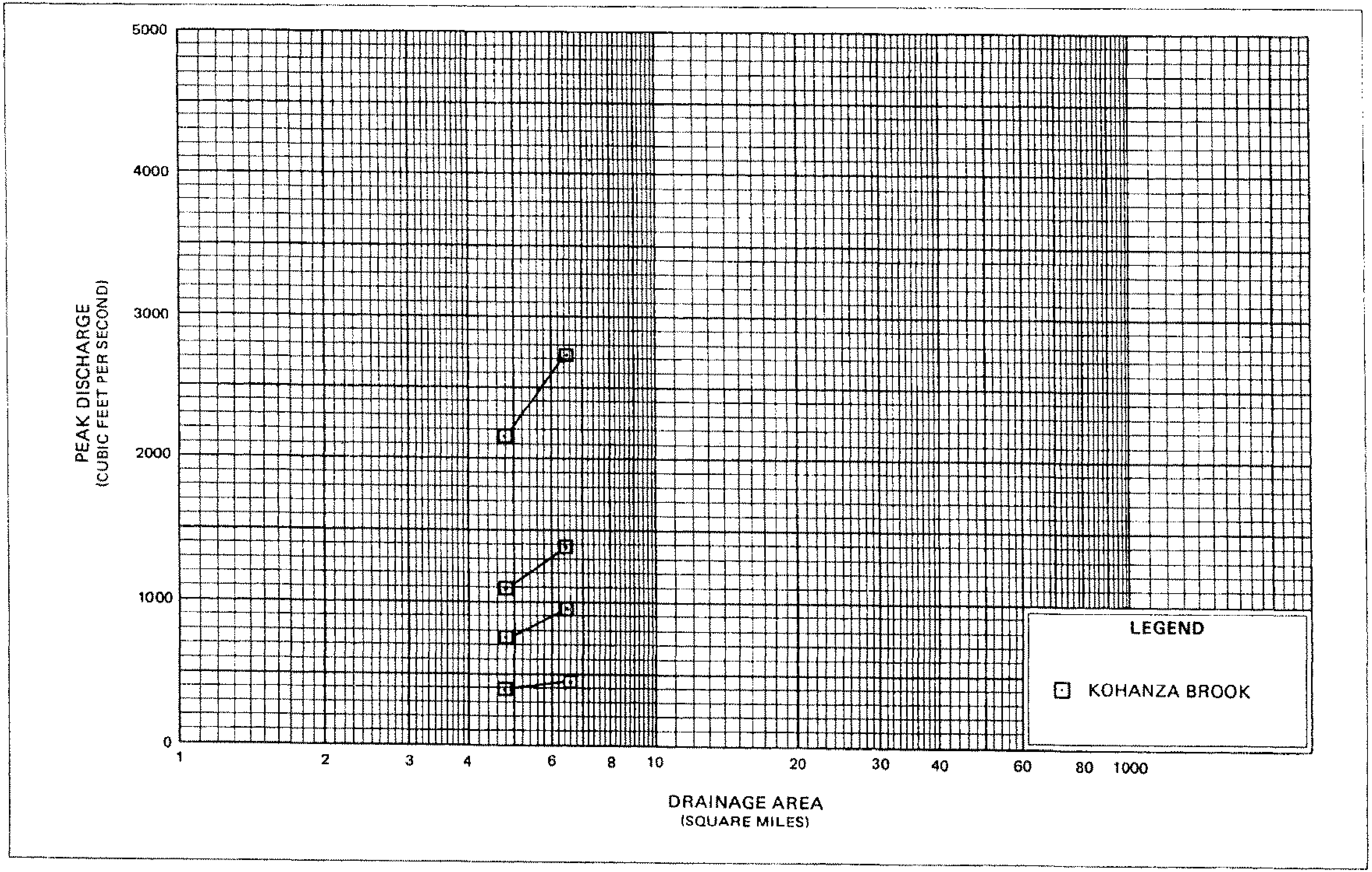

FIGURE 5 – FREQUENCY-DISCHARGE-DRAINAGE AREA CURVES – KOHANZA BROOK

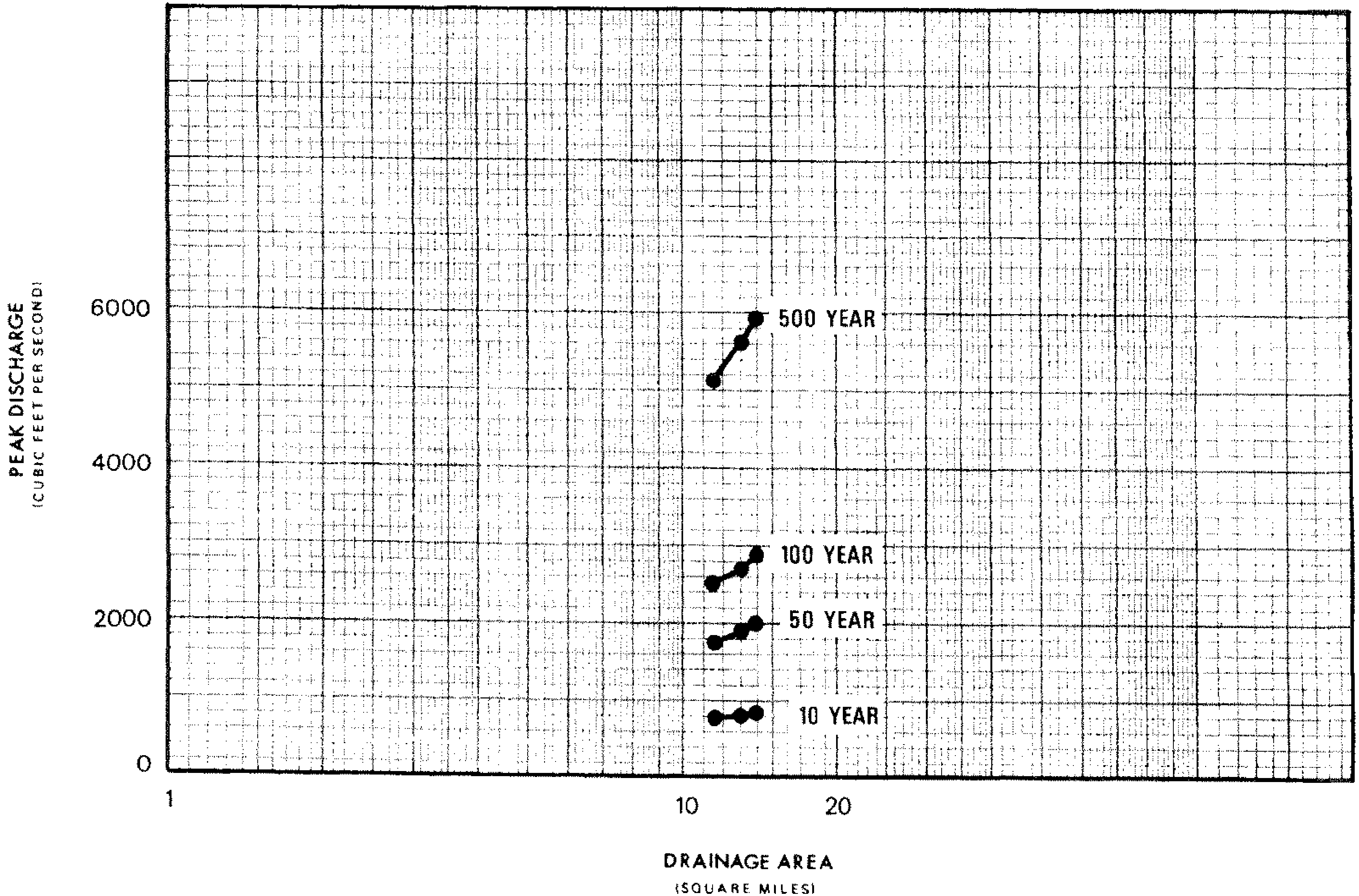

FIGURE 6 – FREQUENCY-DISCHARGE-DRAINAGE AREA CURVES – LIMEKILN BROOK

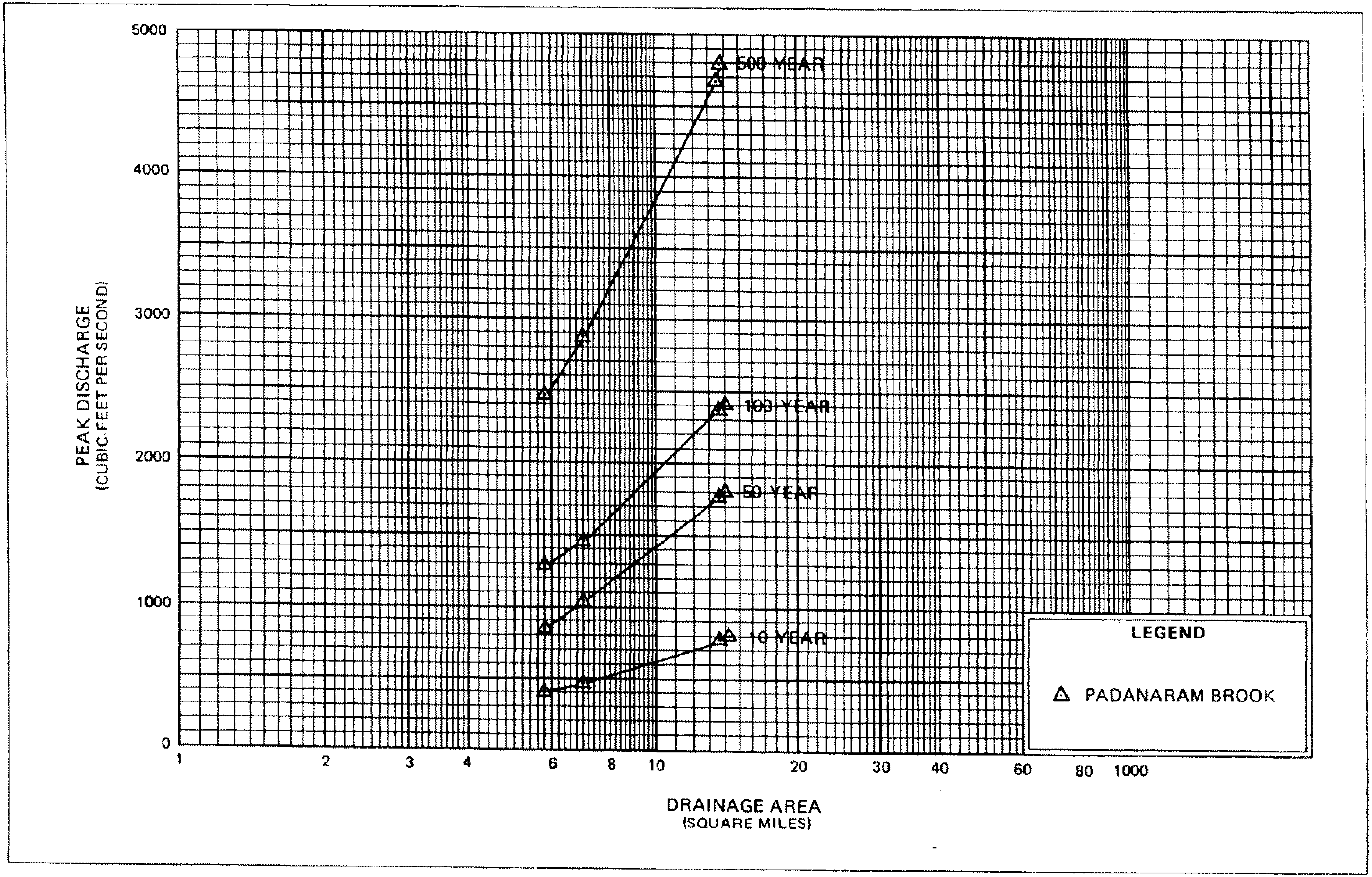

FIGURE 7 – FREQUENCY-DISCHARGE-DRAINAGE AREA CURVES – PADANARUM BROOK

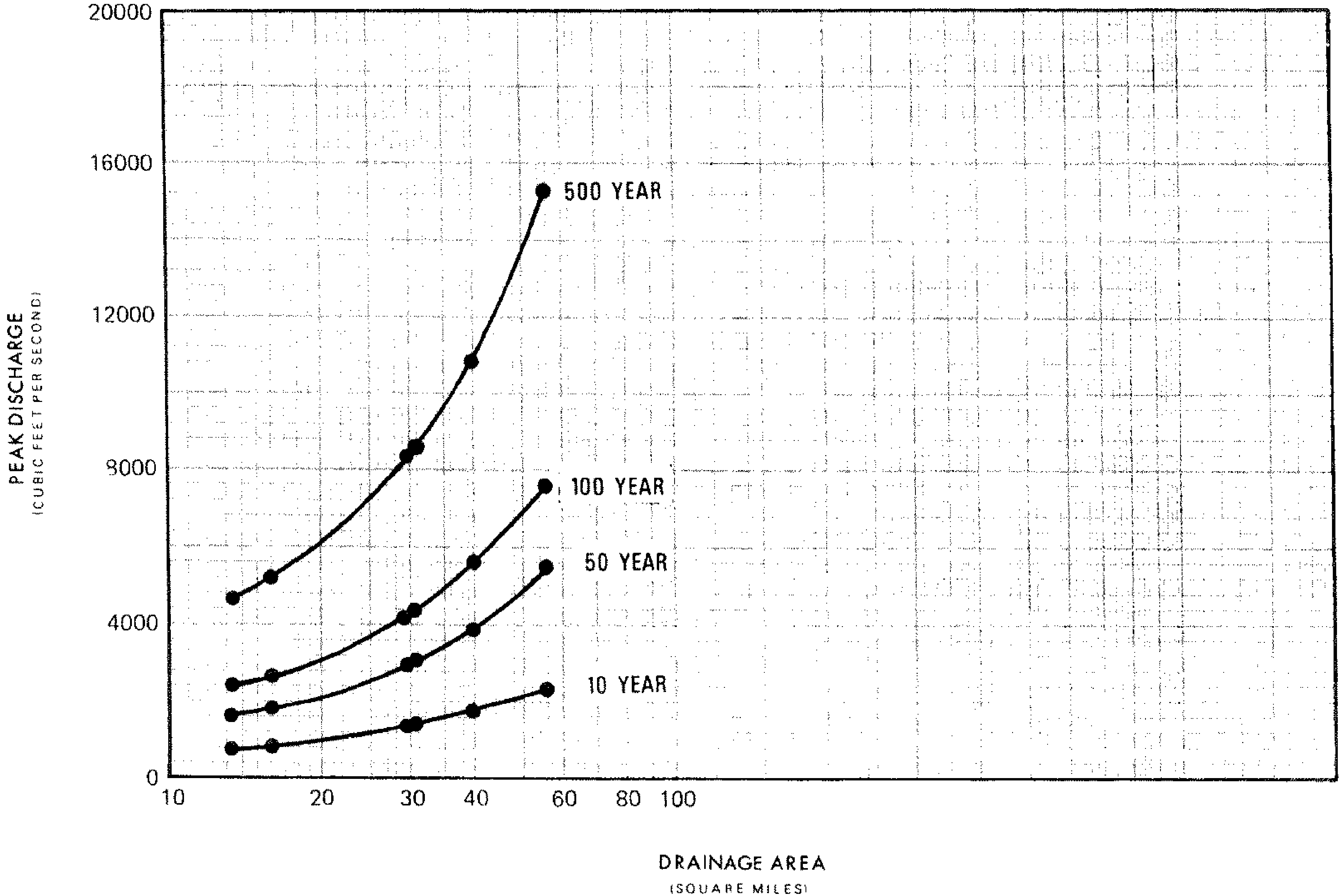

FIGURE 8 – FREQUENCY-DISCHARGE-DRAINAGE AREA CURVES – STILL RIVER

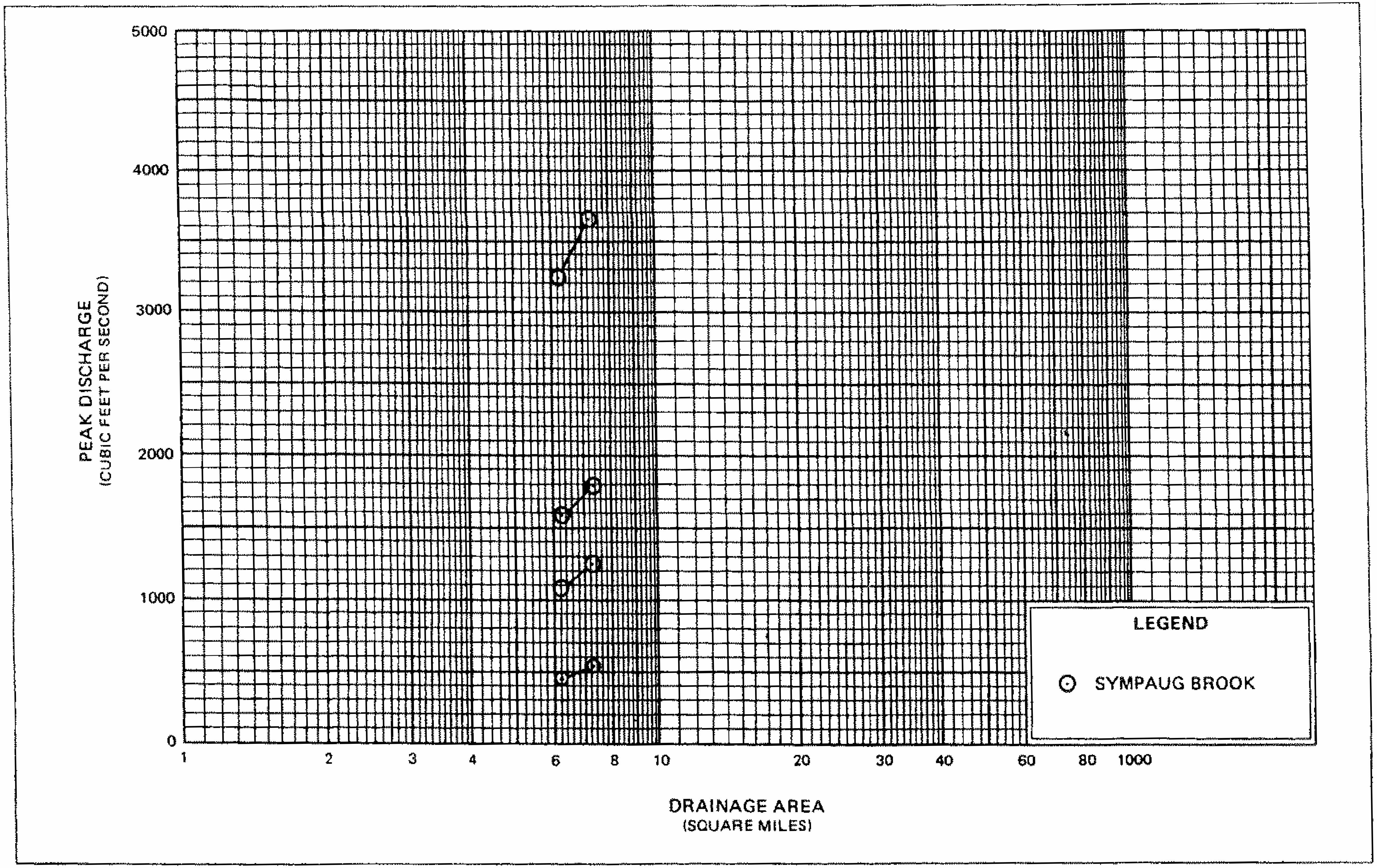

FIGURE 9 – FREQUENCY-DISCHARGE-DRAINAGE AREA CURVES – SYMPAUG BROOK

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

TABLE 5 - SUMMARY OF DISCHARGES

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10-PERCENT-ANNUAL-CHANCE	2-PERCENT-ANNUAL-CHANCE	1-PERCENT-ANNUAL-CHANCE	0.2-PERCENT-ANNUAL-CHANCE
ASPETUCK RIVER (LOWER REACH)					
At confluence with Saugatuck River (Lower Reach)	23.1	2,400	4,600	6,400	11,700
At unnamed pond near Weston (in Westport)	20.8	2,250	4,300	5,900	10,800
At the Easton-Weston-Fairfield corporate limits	20.1	2,210	4,100	5,700	10,000
At the Easton-Weston corporate limits	18.3	2,120	3,900	5,250	9,450
ASPETUCK RIVER (UPPER REACH)					
At Valley Road	7.7	865	1,235	2,090	3,010
At Stepney Road	6.9	815	1,170	1,975	2,845
At Valley Road	5.2	650	915	1,550	2,235
At Poverty Hollow Road	3.7	520	735	1,245	1,795
BALL POND BROOK					
At confluence with Lake Candlewood	7.49	1,930	3,280	3,940	5,760
At confluence of Bates Brook	6.42	1,900	3,250	3,900	5,700
At State Route 39	5.50	1,790	3,035	3,650	5,330
Downstream of State Route 37	2.85	1,000	2,550	3,000	4,300
BALLWALL BROOK					
At confluence with the Aspetuck River (Upper Reach)	1.82	234	311	388	660
Just upstream of confluence of tributary approximately 1,150 feet downstream of Staples Road	1.24	168	224	279	475

TABLE 5 - SUMMARY OF DISCHARGES - continued

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10-PERCENT-ANNUAL-CHANCE	2-PERCENT-ANNUAL-CHANCE	1-PERCENT-ANNUAL-CHANCE	0.2-PERCENT-ANNUAL-CHANCE
BEARDSLEY BROOK					
At unnamed pond at Latitude N 41°-18'-15"	2.30	653	989	1,130	1,459
At unnamed tributary approximately 1,400 feet upstream of confluence with the Farmill River	1.16	364	551	630	814
BELDEN BROOK					
At the confluence with the Pequonnock River (Upper Reach)	0.77	140	365	515	1,150
At Park Street	0.57	110	280	400	890
At Daniels Farm Road	0.35	80	200	290	640
BETTS POND BROOK					
At confluence with Norwalk River	2.62	253	316	377	520
At Cannon Street	2.00	113	123	137	177
At a point approximately 530 feet upstream of Blake Street	1.84	265	354	444	710
BOOTH HILL BROOK					
At the confluence with Pinewood Lake	1.49	240	610	860	1,850
BROWN'S BROOK					
At confluence with Mill River	1.64	351	485	620	1,110
Above confluence of tributary, approximately 350 feet upstream of Bronson Road	1.12	252	348	445	797
BRUCE BROOK					
At Tidegate	4.20	1,350	1,800	2,010	2,620
At Connors Lane	0.73	325	440	510	635

TABLE 5 - SUMMARY OF DISCHARGES - continued

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10-PERCENT-ANNUAL-CHANCE	2-PERCENT-ANNUAL-CHANCE	1-PERCENT-ANNUAL-CHANCE	0.2-PERCENT-ANNUAL-CHANCE
BURYING GROUND BROOK					
Long Hill Avenue	1.43	1,310	1,930	2,180	2,790
State Route 8	0.97	750	1,110	1,260	1,610
BYRAM RIVER					
At railroad crossing	28.5	3,130	4,950	5,850	8,600
At north end of Toll Gate Pond	25.6	2,950	4,660	5,500	8,090
CIDER MILL BROOK					
At Hendrie Avenue	1.8	266	356	446	790
Upstream of Interstate Route 95	1.1	170	228	286	506
COMSTOCK BROOK					
Upstream of confluence with Norwalk River	4.96	1,050	1,590	1,865	2,625
Downstream of Barretts Brook	3.94	860	1,315	1,540	2,175
Upstream of Barretts Brook	3.75	690	1,045	1,225	1,725
Upstream of East Branch	2.68	510	775	910	1,275
CONVERSE POND BROOK					
Above confluence with East Branch Byram River	6.2	599	788	984	1,750
Above unnamed tributary at Latitude N41°-05’-09”	4.7	492	647	807	1,436
Above confluence of Wilshire Pond Brook	2.2	276	363	453	806
COOPER POND BROOK					
At the confluence with the Norwalk River	2.37	315	620	845	1,215
At Stony Hill Road	0.96	155	275	385	550
At Cooper Hill Road	0.72	145	215	315	455

TABLE 5 - SUMMARY OF DISCHARGES - continued

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10-PERCENT-ANNUAL-CHANCE	2-PERCENT-ANNUAL-CHANCE	1-PERCENT-ANNUAL-CHANCE	0.2-PERCENT-ANNUAL-CHANCE
COPPER MILL BROOK					
At confluence with the Halfway River	2.48	343	458	575	1,050
CRICKER BROOK					
At confluence with Mill River	7.35	1,270	2,000	2,500	4,200
Above Congress Street and Dam	5.75	1,120	1,700	2,100	3,500
DEAD MAN'S BROOK					
At confluence with Saugatuck River (Lower Reach)	2.29	650	840	940	1,400
DEEP BROOK					
At confluence with Pootatuck River	5.40	505	965	1,236	2,103
Just downstream of Elm Drive	3.85	426	814	1,044	1,779
Just upstream of Cross Section AH	1.69	315	605	777	1,327
DIBBLES BROOK					
Upstream of confluence of Limekiln Brook 2	1.65	240	320	400	725
EAST BRANCH BYRAM RIVER					
Above confluence with Byram River	11.1	1,093	1,578	1,835	2,520
EAST BRANCH MIANUS RIVER					
At confluence with the Mianus River	5.30	950*	1,700*	2,100*	3,500*

*Flow from a report prepared by Leonard Jackson Associates

TABLE 5 - SUMMARY OF DISCHARGES - continued

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10-PERCENT-ANNUAL-CHANCE	2-PERCENT-ANNUAL-CHANCE	1-PERCENT-ANNUAL-CHANCE	0.2-PERCENT-ANNUAL-CHANCE
EAST BRANCH SILVERMINE RIVER					
At Ruscoe Road	3.47	390	760	1,020	1,465
At State Route 33	2.06	235	460	605	875
Upstream of Gay Road	0.83	115	255	340	490
EAST BROOK					
At mouth of the Still River	0.51	200	260	290	365
Approximately 2,940 feet upstream of mouth	0.42	170	220	245	310
Approximately 150 feet upstream of dam	0.29	125	160	175	225
Approximately 50 feet downstream from driveway (upstream of Huckleberry Hill Road)	0.05	30	40	45	55
EAST BROTHERS BROOK					
At Interstate Route 95	8.7	1,470	3,010	3,970	7,230
At East Putnam Avenue	5.0	1,243	2,550	3,557	6,110
EAST SWAMP BROOK					
At Shelter Rock Road	5.01	655	870	1,100	1,830
At Plumtrees Road	3.86	535	715	900	1,495
Upstream of Wolf Pit Brook confluence	0.95	165	220	275	460
FARMILL RIVER					
At State Route 110	23.66	4,000	6,300	7,200	9,400
At Buddington Road	18.50	3,750	5,900	6,800	8,900
At Huntington Road	9.40	1,780	2,760	3,160	4,130
At Mohegan Road	6.56	1,540	2,400	2,760	3,600
At Shelton-Monroe corporate limits	2.62	727	1,100	1,257	1,623

TABLE 5 - SUMMARY OF DISCHARGES - continued

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10-PERCENT-ANNUAL-CHANCE	2-PERCENT-ANNUAL-CHANCE	1-PERCENT-ANNUAL-CHANCE	0.2-PERCENT-ANNUAL-CHANCE
FERRY CREEK/LONG BROOK					
At Tide Gates at Broad Street	2.08	518	691	758	930
At Stratford Square	1.10	227	303	330	400
FIVE MILE RIVER					
At Tokeneke Road	12.50	1,300	3,050	4,600	8,800
Upstream of Keelers Brook confluence	9.83	1,100	2,600	3,800	8,200
Downstream of Boston Post Road	8.96	1,000	2,400	3,600	7,600
Approximately 1,950 feet downstream of Florsheim Pond	7.46	910	2,100	3,100	6,700
At State Route 15	6.58	680	1,160	1,410	2,500
At Old Norwalk Road	5.25	540	920	1,120	2,000
At Mill Pond	4.50	460	790	960	1,710
At State Route 123	3.28	340	580	700	1,250
Upstream of Country Club Road	0.83	150	260	310	550
GOODWIVES RIVER					
Upstream of confluence with Stony Brook 1	2.00	290	410	495	780
Upstream of Boston Post Road	1.37	210	300	360	565
GRASMERE BROOK					
Downstream of Old Field Road	2.4	690	940	1,100	1,600
Above Kings Highway Cutoff	1.92	600	790	880	1,350
Above Home Street	1.20	440	530	580	820
Above confluence of tributary, downstream of Glenarden Drive	0.94	354	427	467	660
HALFWAY RIVER					
At confluence with Lake Zoar	10.80	1,038	1,871	2,337	3,752

TABLE 5 - SUMMARY OF DISCHARGES - continued

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10-PERCENT-ANNUAL-CHANCE	2-PERCENT-ANNUAL-CHANCE	1-PERCENT-ANNUAL-CHANCE	0.2-PERCENT-ANNUAL-CHANCE
HALFWAY RIVER - continued					
Approximately 2,400 feet upstream of mouth	10.14	994	1,793	2,239	3,595
Downstream of Bagburn Road	8.95	916	1,652	2,062	3,113
Just upstream of Cross Section M	8.80	906	1,634	2,040	3,277
HARVEY PETE BROOK					
At Mohegan Road	2.07	830	1,260	1,430	1,850
At Thompson Street	0.81	330	490	560	720
HAWLEY POND BROOK					
At the confluence with Saugatuck River (Upper Reach)	0.6	40	70	90	145
HORSE TAVERN BROOK					
At Bridgeport-Fairfield corporate limits	5.19	1,050	1,600	1,900	3,100
At downstream Bridgeport-Trumbull corporate limits	3.85	900	1,300	1,500	2,400
At upstream Bridgeport-Trumbull corporate limits	1.95	310	800	1,130	2,400
At Black House Road	0.32	70	190	260	560
At a point approximately 2,520 feet upstream of Black House Road	0.08	25	60	90	185
HORSENECK BROOK					
At mouth at Greenwich Harbor	5.9	772	1,055	1,356	2,010
Above Glenville Road	5.1	638	872	1,120	1,661

TABLE 5 - SUMMARY OF DISCHARGES - continued

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10-PERCENT-ANNUAL-CHANCE	2-PERCENT-ANNUAL-CHANCE	1-PERCENT-ANNUAL-CHANCE	0.2-PERCENT-ANNUAL-CHANCE
HORSENECK BROOK - continued					
Below unnamed pond at Latitude N 41°-03'-47"	3.6	356	487	626	928
Above unnamed pond at Latitude N 41°-04'-12"	0.55	146	199	256	379
Above unnamed pond at Latitude N 41°-04'-44"	0.23	87[1]	118[1]	156[1]	296[1]
At north end of Putnam Lake	2.1	390	534	681	1,200
HOUSATONIC RIVER (LOWER REACH)					
At Stratford	1,890.0	57,000	175,000	170,000	330,000
Below Naugatuck River	1,889.0	55,000	120,000	170,000	220,000
Above Naugatuck River	1,578.0	45,000	90,000	130,000	198,000
At Stevenson Dam	1,541.0	42,000	87,000	126,000	196,000
HOUSATONIC RIVER (MIDDLE REACH)					
Below confluence of Eightmile Brook	1,559.0	45,000	90,000	130,000	198,000
HOUSATONIC RIVER (UPPER REACH)					
At Gaylordsville gaging station No. 0230050	993.0	23,500	40,350	50,350	81,400
At confluence with Ten Mile River	782.0	21,670	37,110	46,440	75,220
ISLAND BROOK					
At confluence with Pequonnock River (Lower Reach)	2.74	700	1,000	1,250	1,800
At Exeter Street	2.03	545	781	977	1,406

[1]These discharges are controlled by outflow from Putnam Lake

TABLE 5 - SUMMARY OF DISCHARGES - continued

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10-PERCENT-ANNUAL-CHANCE	2-PERCENT-ANNUAL-CHANCE	1-PERCENT-ANNUAL-CHANCE	0.2-PERCENT-ANNUAL-CHANCE
ISLAND BROOK - continued					
At Bridgeport-Trumbull corporate limits	0.89	165	420	600	1,280
At Merritt Parkway	0.52	110	280	400	840
At Melrose Avenue	0.29	70	170	250	520
At a point approximately 320 feet upstream of Orchard Street	0.03	10	30	40	90
KEELERS BROOK					
At confluence with Five Mile River	2.41	390	900	1,300	2,850
Upstream of the Connecticut Light and Power Bridge	1.98	340	780	1,110	2,500
LAUREL BROOK					
At confluence with the Rippowam River (Upper Reach) (in Stamford)	10.35	1,875	3,850	5,100	9,250
At confluence with the Rippowam River (Upper Reach) (in New Canaan)	14.85	810	1,530	1,860	3,490
LEWIS BROOK					
At confluence with Pootatuck River	1.48	178	326	410	668
Approximately 1,200 feet upstream of Hattertown Pond Dam	1.11	139	256	322	524
Just upstream of Cross Section AM	0.68	98	188	238	380
LIMEKILN BROOK 1					
Mouth of Still River	1.2	150	300	395	700
Approximately 50 feet downstream of North Mountain Road	1.0	135	260	340	600

TABLE 5 - SUMMARY OF DISCHARGES - continued

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10-PERCENT-ANNUAL-CHANCE	2-PERCENT-ANNUAL-CHANCE	1-PERCENT-ANNUAL-CHANCE	0.2-PERCENT-ANNUAL-CHANCE
LIMEKILN BROOK 1 - continued					
At downstream face of North Mountain Road	0.79	115	220	280	480
Upstream limit of detailed study	0.64	105	190	240	400
LIMEKILN BROOK 2					
At Bethel-Danbury corporate limits	11.65	735	1,735	2,500	5,130
At Shelter Rock Road	6.64	490	1,155	1,665	3,420
Upstream of confluence of Dibbles Brook	4.58	370	875	1,260	2,580
LONDONS BROOK					
At confluence with Rooster River	1.56	385	533	685	1,380
Above confluence of tributary (approximately 500 feet downstream of Montauk Street)	1.27	322	446	573	1,155
Above confluence of tributary (approximately 500 feet downstream of Montauk Street)	1.27	322	446	573	1,155
Above confluence of tributary (approximately 700 feet upstream of Fairfield Woods Road)	0.82	218	302	388	782
Above westerly tributary at Bond Street	0.46	*	*	250	*
At intersection of Church Hill Road and Wynn Wood Drive	0.40	*	*	230	*
At inlet to piping system north of Casmir Drive	0.32	*	*	96	*

*Data not available

TABLE 5 - SUMMARY OF DISCHARGES - continued

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10-PERCENT-ANNUAL-CHANCE	2-PERCENT-ANNUAL-CHANCE	1-PERCENT-ANNUAL-CHANCE	0.2-PERCENT-ANNUAL-CHANCE
LONDONS BROOK DIVIDED FLOW	*	*	*	120	*
MEANS BROOK					
Confluence with Farmill River	8.59	2,100	3,400	3,900	5,100
At State Route 108	7.58	1,950	3,170	3,640	4,780
Means Brook Reservoir Dam	5.77	1,710	2,760	3,150	4,120
At State Route 110	2.68	900	1,350	1,530	1,970
At Shelton-Monroe corporate limits	1.18	398	596	677	870
MIANUS RIVER					
At mouth at Cos Cob Harbor	34.6	3,256	4,271	5,257	7,987
At Palmers Hill Road	29.4	2,938	3,854	4,744	7,206
At Greenwich-Stamford corporate limits	28.9	2,905	3,810	4,690	7,125
At downside of June Road	26.6	2,380	3,400	4,150	6,650
Upstream of East Branch Mianus River	21.1	2,045	2,921	3,566	5,710
At confluence of unnamed stream (approximately 4,500 feet downstream of Farms Road)	20.0	1,977	2,824	3,447	5,520
Upstream of Farms Road	19.1	1,915	2,736	3,339	5,350
MILL RIVER					
At mouth near Long Island Sound	32.8	2,850	5,700	8,000	15,000
Above confluence of Brown’s Brook	29.1	2,750	5,400	7,600	14,200
Above Samp Mortar Lake Dam	26.5	2,600	5,100	7,200	13,300
Above confluence of Cricker Brook	18.6	2,250	4,200	5,800	10,500

*Data not available

TABLE 5 - SUMMARY OF DISCHARGES - continued

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10-PERCENT-ANNUAL-CHANCE	2-PERCENT-ANNUAL-CHANCE	1-PERCENT-ANNUAL-CHANCE	0.2-PERCENT-ANNUAL-CHANCE
MILL RIVER - continued					
Above Morehouse Highway at Lake Mohegan	18.4	2,050	3,800	5,200	9,000
At South Park Avenue	13.6	1,800	3,100	4,200	7,400
Just downstream of third crossing of South Park Avenue	13.1	1,755	3,022	4,095	7,215
MIRY BROOK					
At Ridgefield-Danbury corporate limits	3.50	410	760	1,000	1,440
Approximately 350 feet upstream of Ridgefield-Danbury corporate limits	2.97	350	650	860	1,280
At Chipmunk Lane	1.62	270	490	660	1,000
Approximately 1,440 feet downstream of North Ridgebury Road	0.74	150	270	370	530
MOREHOUSE BROOK					
At confluence with the Mill River	1.73	266	356	447	785
Just upstream of tributary confluence (approximately 650 feet downstream of Dogwood Drive)	1.29	207	277	347	610
MUDDY BROOK					
At mouth	2.85	740	1,000	1,100	1,700
Downstream of Hillandale Road	1.8	550	720	800	1,170
NOROTON RIVER					
At Railroad	11.90	1,900[1]	3,900[1]	5,300[1]	9,700[1]
At Darien-New Canaan corporate limits	5.60	1,400	2,975	4,150	7,800

[1]Flow from a report prepared by Leonard Jackson Associates

TABLE 5 - SUMMARY OF DISCHARGES - continued

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10-PERCENT-ANNUAL-CHANCE	2-PERCENT-ANNUAL-CHANCE	1-PERCENT-ANNUAL-CHANCE	0.2-PERCENT-ANNUAL-CHANCE
NOROTON RIVER - continued					
At Jelliff Mill Road	4.38	520	890	1,080	1,900
Upstream of Mead Park	1.90	220	390	460	820
Upstream of Wahackne Road	0.79	90	160	200	340
Upstream of Greenley Road	0.43	50	90	110	190
NORTH FARRAR BROOK					
At the confluence with the Pequonnock River (Upper Reach)	0.46	100	245	350	780
At the Trumbull-Monroe corporate limits	0.03	10	25	35	80
NORWALK RIVER					
Upstream of confluence of Betts Pond Brook	57.6	4,100	9,500	14,000	16,250
Upstream of confluence of Silvermine River	32.8	2,600	6,300	9,100	20,000
At Kent Road	30.0	2,980	5,840	7,455	12,505
Downstream of confluence of Comstock Brook	25.7	2,680	5,280	6,735	11,295
Upstream of confluence of Comstock Brook	18.4	1,845	3,660	4,675	7,840
Downstream of confluence of Gilbert and Bennett Brooks	13.8	1,425	2,865	3,655	6,135
Upstream of confluence of Gilbert and Bennett Brooks	12.3	1,205	2,445	3,125	5,240
Downstream of the confluence of Cooper Pond Brook	11.13	1,010	2,085	2,665	4,475
Upstream of the confluence of Cooper Pond Brook	8.73	665	1,250	1,595	2,680

TABLE 5 - SUMMARY OF DISCHARGES - continued

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10-PERCENT-ANNUAL-CHANCE	2-PERCENT-ANNUAL-CHANCE	1-PERCENT-ANNUAL-CHANCE	0.2-PERCENT-ANNUAL-CHANCE
NORWALK RIVER - continued					
Upstream of the confluence of Branchville Brook	8.1	1,010	2,085	2,665	4,475
At Millers Pond Dam	7.03	500	1,080	1,385	2,325
At the confluence of Ridgefield Brook	3.47	185	340	440	740
PARTING BROOK					
At Domenicks Road	1.59	157	270	340	660
At Thayer Pond Road	0.66	100	180	220	440
PEQUONNOCK RIVER (LOWER REACH)					
At Connecticut Turnpike	29.40	2,630	6,700	9,560	21,240
Immediately above confluence of Island Brook	25.00	2,375	6,035	8,615	19,140
At the Bridgeport-Trumbull corporate limits	24.00	2,300	5,850	8,350	18,550
At a point approximately 400 feet upstream of Brock Street	16.30	1,700	4,300	6,150	13,650
At Daniels Farm Road	15.60	1,650	4,150	5,900	13,150
PEQUONNOCK RIVER (UPPER REACH)					
At the confluence of Tributary G to Pequonnock River	11.20	1,300	3,300	4,700	10,450
At the confluence of Tributary J to Pequonnock River	8.90	1,050	2,650	3,800	8,400
At the Trumbull-Monroe corporate limits	8.48	1,014	2,559	3,670	8,112
Upstream of confluence of the West Branch Pequonnock River	3.58	528	1,333	1,911	4,225

TABLE 5 - SUMMARY OF DISCHARGES - continued

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10-PERCENT-ANNUAL-CHANCE	2-PERCENT-ANNUAL-CHANCE	1-PERCENT-ANNUAL-CHANCE	0.2-PERCENT-ANNUAL-CHANCE
POND BROOK					
Approximately 1,000 feet downstream of Currituck Road	9.2	1,030	2,250	3,030	5,800
Approximately 100 feet downstream of State Route 25	7.1	870	1,890	2,560	4,890
Approximately 300 feet downstream of Interstate Route 84	4.2	610	1,320	1,780	3,410
Upstream of confluence with Pogond Brook	2.5	420	910	1,220	2,340
POOTATUCK RIVER					
At confluence with Housatonic River (Middle Reach)	26.10	1,883	3,487	4,406	7,267
Just downstream of confluence of Tom Brook	23.99	1,740	3,222	4,071	6,714
Just downstream of confluence of Deep Brook	22.10	1,612	2,985	3,771	6,218
Just upstream of Deep Brook	16.70	1,247	2,307	2,914	4,802
Just downstream of Curtis Pond Brook	14.75	1,115	2,062	2,604	4,290
Just downstream of North Branch Pootatuck Brook	10.50	710	1,529	1,930	3,176
Just upstream of North Branch Pootatuck Brook	6.45	553	1,021	1,287	2,114
Just downstream of Lewis Brook	3.54	356	655	825	1,350
Just downstream of Hunting Town Road	1.30	205	374	470	763
Upstream of Cross Section BY	1.17	196	358	449	729

TABLE 5 - SUMMARY OF DISCHARGES - continued

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10-PERCENT-ANNUAL-CHANCE	2-PERCENT-ANNUAL-CHANCE	1-PERCENT-ANNUAL-CHANCE	0.2-PERCENT-ANNUAL-CHANCE
POPLAR PLAINS BROOK					
At confluence with Saugatuck River (Lower Reach)	0.94	145	195	245	480
PUMPKIN GROUND BROOK					
At confluence with Long Brook	6.12	1,165	1,640	1,895	2,875
At Beaver Dam Lake	1.15	935	1,330	1,550	2,290
PUTNAM PARK BROOK					
Upstream of confluence of Wolf Pit Brook	0.93	130	175	220	320
RIDGEFIELD BROOK					
At State Route 35	2.60	125	185	235	410
RIPPOWAM RIVER (LOWER REACH)					
At the mouth	37.5	2,900	5,800	7,400	9,300
At the Stillwater Pond	33.4	2,670	5,350	6,820	8,580
Downstream of confluence of Haviland Brook	28.7	2,400	4,800	6,140	7,710
Upstream of confluence of Haviland Brook	24.6	2,160	4,320	5,500	6,920
RIPPOWAM RIVER (UPPER REACH)					
At New Canaan-Stamford corporate limits	34.85	1,760	3,170	3,910	7,060
Upstream of confluence of Laurel Brook	5.15	720	1,240	1,550	2,700
Upstream of Lockwood Pond	4.33	610	1,040	1,300	2,270
At Siscowit Reservoir	3.46	480	830	1,040	1,810

TABLE 5 - SUMMARY OF DISCHARGES - continued

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10-PERCENT-ANNUAL-CHANCE	2-PERCENT-ANNUAL-CHANCE	1-PERCENT-ANNUAL-CHANCE	0.2-PERCENT-ANNUAL-CHANCE
ROCKWOOD LAKE BROOK					
At mouth above Greenwich Creek	4.0	314	413	512	930
Above unnamed pond at Latitude N 41°-04’-06”	3.5	276	362	449	815
Above Bolling Pond	2.9	224	294	364	662
ROOSTER RIVER					
Downstream of Railroad	11.52	1,625	2,750	3,700	6,250
Downstream of Kings Highway East	10.53	1,600	2,600	3,500	5,900
At mouth	9.48	1,500	2,450	3,100	5,400
At Bridgeport-Fairfield corporate limits	7.60	1,225	2,000	2,575	4,350
At Bridgeport-Fairfield corporate limits, downstream of Stratfield Road	7.6	1,300	2,100	2,700	4,500
SASCO CREEK					
At mouth near Long Island Sound	10.2	1,560	2,500	3,170	5,360
Downstream of Sasco Pond Dam	8.6	1,430	2,300	2,900	4,920
At Hulls Farm Road	7.3	1,350	2,100	2,600	4,300
Above confluence of Great Brook	5.7	1,150	1,750	2,100	3,500
At Silver Spring Road	5.4	1,100	1,700	2,000	3,300
Above confluence of unnamed brook at Greenfield Hill	2.0	610	820	900	1,400
SAUGATUCK RIVER (LOWER REACH)					
At Lee Pond Dam	81.0	4,500	9,200	12,600	24,800
Upstream of confluence of West Branch Saugatuck River	67.7	4,000	8,180	11,200	22,060
At reservoir entrance	20.8	1,560	2,930	3,740	5,920

TABLE 5 - SUMMARY OF DISCHARGES - continued

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10-PERCENT-ANNUAL-CHANCE	2-PERCENT-ANNUAL-CHANCE	1-PERCENT-ANNUAL-CHANCE	0.2-PERCENT-ANNUAL-CHANCE
SAUGATUCK RIVER (UPPER REACH)					
At Diamond Hill Road	19.2	1,185	2,215	3,115	5,800
At State Route 53 (South)	14.0	1,095	2,040	2,855	5,000
At State Route 53 (North)	13.0	935	1,750	2,485	4,900
Below Hawley Pond Brook	11.8	900	1,650	2,158	3,920
Below Umpwaug Pond Brook	8.9	760	1,065	1,730	2,400
Above Umpwaug Pond Brook	6.5	570	800	1,285	1,840
SILVERMINE RIVER					
At confluence with Norwalk River	22.9	2,000	4,800	7,000	15,000
At New Canaan-Wilton-Norwalk corporate limits	16.1	1,530	2,630	3,200	5,400
At Silvermine Pond	13.2	1,250	2,150	2,630	4,420
At Grupes Reservoir	10.2	970	1,660	2,030	3,420
SMITH POND BROOK					
At confluence with Copper Mill Brook	0.85	135	182	228	340
Downstream of Smith Pond	0.66	108	144	1,814	297
Downstream of Private Drive, approximately 0.4 mile downstream of Turkey Roost Road	0.38	0.64	85	107	175
SOUTH BRANCH OF UNNAMED TRIBUTARY TO SAUGATUCK RIVER					
At Upper Pond	0.80	160	290	400	580
At Fox Hill Lake	0.56	120	210	290	420

TABLE 5 - SUMMARY OF DISCHARGES - continued

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10-PERCENT-ANNUAL-CHANCE	2-PERCENT-ANNUAL-CHANCE	1-PERCENT-ANNUAL-CHANCE	0.2-PERCENT-ANNUAL-CHANCE
SPLIT FLOW FROM LAKE WINDWING					
At confluence with Unnamed Tributary to Saugatuck River	*	*	*	*	*
SPRINGDALE BROOK					
At confluence with the Noroton River	1.70	450	840	1,030	1,750
STILL RIVER					
At Brookfield-Bridgewater corporate limits	66.1	2,820	6,720	9,305	18,815
Upstream of Aldrich Road	65.8	2,790	6,640	9,195	18,590
Downstream of Limekiln Brook 1	65.6	2,755	6,560	9,085	18,370
Upstream of Limekiln Brook 1	63.6	2,670	6,360	8,810	17,810
Upstream of relocated Silvermine Road	62.0	2,605	6,200	8,585	17,360
Downstream of relocated U.S. Highway 7	59.6	2,505	5,960	8,255	16,690
Downstream of East Brook	58.3	2,450	5,830	8,075	16,375
At Brookfield-Danbury corporate limits	56.7	2,380	5,670	7,850	15,875
STONY BROOK 1					
Above Gorham's Pond	4.06	465	670	800	1,200
Downstream of West Avenue	2.47	312	450	538	807
STONY BROOK 2					
At confluence with Saugatuck River (Lower Reach)	3.29	495	1,150	1,700	3,665
At Blind Brook Road	2.59	410	950	1,405	3,020

*Data not available

TABLE 5 - SUMMARY OF DISCHARGES - continued

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10-PERCENT-ANNUAL-CHANCE	2-PERCENT-ANNUAL-CHANCE	1-PERCENT-ANNUAL-CHANCE	0.2-PERCENT-ANNUAL-CHANCE
STONY BROOK 2 - continued					
Downstream of Patrick Road (Town of Westport)	2.36	380	880	1,300	2,800
Approximately 250 feet upstream of Norwalk-Westport corporate limits	1.57	280	650	1,000	2,000
STRICKLAND BROOK					
At mouth at Indian Harbor	2.6	440	580	720	1,350
Downstream of unnamed tributary at Latitude N 41°-02’-45”	2.1	368	485	602	1,128
Upstream of Private Drive at Latitude N 41°-03'-26"	1.4	254	335	416	781
SYMPAUG BROOK					
At Bethel-Danbury corporate limits	6.37	465	1,090	1,570	3,225
Upstream of confluence of Terehaute Brook	3.67	305	715	1,030	2,115
At second railroad crossing	1.61	155	365	525	1,075
TANNERS BROOK					
At confluence with Long Brook	0.47	375	510	570	735
TENMILE RIVER					
At confluence with Housatonic River (Upper Reach)	210.2	7,500	13,660	16,850	26,280
TEREHAUTE BROOK					
Upstream of confluence of Sympaug Brook	2.70	440	595	750	1,220
At Lindberg Street	1.38	250	340	430	695

TABLE 5 - SUMMARY OF DISCHARGES - continued

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10-PERCENT-ANNUAL-CHANCE	2-PERCENT-ANNUAL-CHANCE	1-PERCENT-ANNUAL-CHANCE	0.2-PERCENT-ANNUAL-CHANCE
TITICUS RIVER					
At the downstream county boundary	9.44	800	1,550	2,005	2,890
At Washington Highway	5.11	515	980	1,295	1,865
At North Street	3.05	320	620	825	1,190
At Wooster Street	1.91	215	435	585	845
At State Route 116	1.52	185	385	530	765
TOILSOME BROOK					
Upstream of Edice Road	1.80	360	690	860	1,500
Upstream of Silver Hill Lane	0.90	190	342	440	790
Upstream of White Birch Lane	0.80	182	326	420	754
Upstream of Dannel Drive	0.50	165	295	380	682
TOKENEKE BROOK					
Upstream of Cross Road	1.19	170	250	300	450
Downstream of first railroad crossing	0.83	123	181	212	247
Downstream of second railroad crossing	0.56	86	126	148	148
Downstream of Rainbow Circle	0.56	86	126	153	227
Downstream of Silver Lake Drive	0.36	56	82	100	148
TRIBUTARY A TO HORSE TAVERN BROOK					
At the confluence with Horse Tavern Brook	0.82	155	400	560	1,190
At Park Lane	0.52	105	275	390	820
At a point approximately 2,224 feet upstream of Walker Avenue	0.05	15	40	60	120
TRIBUTARY B TO CANOE BROOK LAKE					
At the confluence with Canoe Brook Lake	1.06	190	490	690	1,500

TABLE 5 - SUMMARY OF DISCHARGES - continued

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10-PERCENT-ANNUAL-CHANCE	2-PERCENT-ANNUAL-CHANCE	1-PERCENT-ANNUAL-CHANCE	0.2-PERCENT-ANNUAL-CHANCE
TRIBUTARY B TO CANOE BROOK LAKE - continued					
At the mouth of Tributary C to Tributary B to Canoe Brook Lake	0.52	120	320	450	980
At a point approximately 460 feet upstream of Wendover Road	0.05	30	80	110	240
TRIBUTARY C TO TRIBUTARY B TO CANOE BROOK LAKE					
At the confluence with Tributary B to Canoe Brook Lake	0.14	40	100	140	300
At a point approximately 475 feet upstream of Dayton Road	0.06	20	50	70	150
TRIBUTARY D TO EASTON RESERVOIR					
At the confluence with Easton Reservoir	0.31	70	170	240	520
At a point approximately 35 feet upstream of Essex Lane	0.03	10	30	40	80
TRIBUTARY E TO PEQUONNOCK RIVER					
At the confluence with Pequonnock River (Lower Reach)	0.64	130	340	480	1,070
At Bayberry Lane	0.50	110	280	390	850
TRIBUTARY F TO PEQUONNOCK RIVER					
At the confluence with Pequonnock River (Lower Reach)	0.43	95	240	345	770

TABLE 5 - SUMMARY OF DISCHARGES - continued

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10-PERCENT-ANNUAL-CHANCE	2-PERCENT-ANNUAL-CHANCE	1-PERCENT-ANNUAL-CHANCE	0.2-PERCENT-ANNUAL-CHANCE
TRIBUTARY F TO PEQUONNOCK RIVER - continued					
At a point approximately 965 feet upstream of Lillian Drive	0.07	15	40	55	130
TRIBUTARY G TO PEQUONNOCK RIVER					
At the confluence with Pequonnock River (Upper Reach)	0.58	230	330	490	875
At the confluence of Tributary H to Tributary G to Pequonnock River	0.22	85	195	270	450
TRIBUTARY H TO TRIBUTARY G TO PEQUONNOCK RIVER					
At the confluence with Tributary G to Pequonnock River	0.18[1]	45[1]	115[1]	165[1]	365[1]
TRIBUTARY I TO PEQUONNOCK RIVER					
At the confluence with the Pequonnock River (Upper Reach)	0.23	55	145	205	455
At a point approximately 920 feet upstream of Newtown Turnpike	0.15	40	100	145	320
TRIBUTARY J TO PEQUONNOCK RIVER					
At the confluence with the Pequonnock River (Upper Reach)	0.66	130	330	470	1,040

[1]Discharge computed without consideration of backwater effects

TABLE 5 - SUMMARY OF DISCHARGES - continued

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10-PERCENT-ANNUAL-CHANCE	2-PERCENT-ANNUAL-CHANCE	1-PERCENT-ANNUAL-CHANCE	0.2-PERCENT-ANNUAL-CHANCE
TRIBUTARY J TO PEQUONNOCK RIVER - continued					
At a point approximately 2,430 feet upstream of Camp Ford Road	0.17	20	55	80	175
TRIBUTARY K AT STATE ROUTE 8					
At State Route 8	0.33	110	265	360	650
At a point approximately 1,000 feet upstream of Golden Hill Road	0.08	40	110	150	290
TRIBUTARY L AT HUNTINGTON ROAD					
At the Trumbull-Stratford corporate limits	0.49	135	310	410	760
At Merritt Boulevard	0.25	80	200	255	500
TRIBUTARY M TO PINEWOOD LAKE					
At the confluence with Pinewood Lake	1.31	230	580	820	1,750
At the Trumbull-Shelton corporate limits	0.74	130	350	490	1,070
TRIBUTARY N TO PINEWOOD LAKE					
At the confluence with Pinewood Lake	0.87	155	395	560	1,200
TRIBUTARY O AT INTERVALE ROAD					
At the Trumbull-Stratford corporate limits, Intervale Road	0.69	125	330	470	1,015
At Nichols Avenue	0.35	75	190	275	595

TABLE 5 - SUMMARY OF DISCHARGES - continued

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10-PERCENT-ANNUAL-CHANCE	2-PERCENT-ANNUAL-CHANCE	1-PERCENT-ANNUAL-CHANCE	0.2-PERCENT-ANNUAL-CHANCE
UNNAMED TRIBUTARY TO SAUGATUCK RIVER					
At Bennetts Pond Analysis Point	3.91	420	770	1,020	1,480
At confluence of brooks from Wataba Lake and Upper Pond	2.92	370	680	920	1,380
At Wataba Lake	1.98	340	630	850	1,240
At Lake Road	1.20	220	400	540	800
At Bennetts Farm Road culvert	0.56	120	220	290	440
At Lake Windwing	0.74	150	270	370	540
WEST BRANCH PEQUONNOCK RIVER					
At confluence with the Pequonnock River (Upper Reach)	4.83	477	628	783	1,350
At first Pepper Street crossing at Upper Stepney	3.63	382	503	627	1,081
Approximately 450 feet upstream of unnamed tributary upstream of Abandoned Railroad crossing	0.89	116	153	191	330
WEST BRANCH SAUGATUCK RIVER					
At confluence with Saugatuck River (Lower Reach)	11.98	1,100	2,000	2,500	3,700
At Weston-Westport corporate limits	11.23	1,100	2,000	2,500	3,700
At Westport-Wilton corporate limits	10.90	1,100	2,000	2,500	3,700
Approximately 600 feet upstream of confluence of Boone Brook	9.29	1,000	1,900	2,400	3,500

TABLE 5 - SUMMARY OF DISCHARGES - continued

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10-PERCENT-ANNUAL-CHANCE	2-PERCENT-ANNUAL-CHANCE	1-PERCENT-ANNUAL-CHANCE	0.2-PERCENT-ANNUAL-CHANCE
WEST BRANCH SAUGATUCK RIVER (continued)					
Approximately 2,200 feet downstream of confluence of Cobbs Mill Brook	8.59	1,000	1,800	2,300	3,400
At Cobbs Mill Pond	7.30	900	1,600	2,000	3,100
At Lakeside Drive	6.49	800	1,500	1,900	3,000
Approximately 400 feet upstream of confluence of North Brook	5.19	700	1,400	1,800	2,800
At Godfrey Road	4.13	700	1,400	1,800	2,800
Approximately 1,000 feet upstream of Godfrey Road	3.83	700	1,300	1,700	2,700
Approximately 4,800 feet upstream of Godfrey Road	1.90	400	800	1,000	1,600
Approximately 1,400 feet downstream of Indian Valley Road	0.86	200	400	500	700
WEST BROTHERS BROOK					
At mouth above confluence with East Brothers Brook	2.3	259	342	426	790
Above North Street	1.9	223	295	367	681
WILLOW BROOK					
At confluence with Saugatuck River (Lower Reach)	0.97	150	200	250	460
WOLF PIT BROOK					
Upstream of confluence of East Swamp Brook	2.45	305	405	505	785
Upstream of confluence of Putnam Park Brook	1.11	155	205	255	400

TABLE 5 - SUMMARY OF DISCHARGES – continued

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10-PERCENT-ANNUAL-CHANCE	2-PERCENT-ANNUAL-CHANCE	1-PERCENT-ANNUAL-CHANCE	0.2-PERCENT-ANNUAL-CHANCE
YELLOW MILL CHANNEL					
At Stratford Avenue	4.72	800	1,200	1,400	2,000
At Steward Street	3.69	660	990	1,156	1,652
Upstream of Success Lake, at Evers Street extended	1.72	354	530	620	885

Peak elevations for floods of the selected recurrence intervals along the Bridgeport coastline were adopted from information contained in the USACE Interim Memo No. USACE 2, and the FISs for the Towns of Fairfield and Stratford (References 47, 49, & 80).

In the Town of Darien, stillwater elevations used in this analysis were developed by Dewberry & Davis (Reference 65). These elevations were developed by adjusting the elevations of the USACE publication Tidal Profiles for the New England Coastline using an analysis for New London, Connecticut, and profiles for the 1938 and 1954 storm events (References 84 & 85).

In the Town of Monroe, pool elevations for Lake Zoar were based on data from a stage-storage volume and outflow capacity table contained in the license for the Housatonic River Project No. 2576 and from the discharge curves developed for the Stevenson Dam and illustrated in the federal licensing drawings (Reference 86).

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 6, “Summary of Stillwater Elevations.”

TABLE 6 - SUMMARY OF STILLWATER ELEVATIONS

FLOODING SOURCE AND LOCATION	ELEVATION (feet NAVD88*) 10-PERCENT-ANNUAL-CHANCE	2-PERCENT-ANNUAL-CHANCE	1-PERCENT-ANNUAL-CHANCE	0.2-PERCENT ANNUAL CHANCE
BREWSTERS POND				
Entire shoreline in County	34.9	35.1	35.2	35.4

*North American Vertical Datum of 1988 (NAVD88)

TABLE 6 - SUMMARY OF STILLWATER ELEVATIONS - continued

FLOODING SOURCE AND LOCATION	ELEVATION (feet NAVD88*) 10-PERCENT-ANNUAL-CHANCE	2-PERCENT-ANNUAL-CHANCE	1-PERCENT-ANNUAL-CHANCE	0.2-PERCENT ANNUAL CHANCE
BREWSTERS POND				
Entire shoreline in county	34.9	35.1	35.2	35.4
FOX HILL LAKE				
Entire shoreline within the county	555.6	555.9	556.0	556.2
LAKE WINDWING				
Entire shoreline within the county	601.8	602.0	602.1	602.2
LAKE ZOAR				
Entire shoreline within county	100.0	105.0	108.2	115.0

*North American Vertical Datum of 1988 (NAVD88)

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 cautioned to use the flood elevation data presented in this FIS in conjunction with the data shown on the FIRM.

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

Along certain portions of the stream studied by detailed methods a profile baseline is shown on the maps to represent channel distances as indicated on the Flood Profiles and Floodway Data Tables.

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

Pre-countywide Analyses

In the Town of Bethel, cross sections used in the pre-countywide study were taken from field surveys performed in September 1980, and photogrammetric mapping (Reference 87).

For tributary streams, the flood elevations of the main stream at the confluence were used for the starting water-surface elevations. This is a reasonable assumption, because the tributary streams' drainage areas are not significantly different in size. For this reason, the peak flows at each confluence were assumed to be concurrent.

In all areas where analysis indicated that supercritical flow would occur, critical depth was assumed. This is a reasonable assumption given the inherent instability of supercritical flow.

In the City of Bridgeport, for the revised portion of the Rooster River, the conduit was modeled as a special bridge section without piers. Since the HEC-2 program does not permit a change in flow rate inside a conduit, the flow from the Ox Brook conduit was treated as if it entered the Rooster River at the Rooster River conduit inlet.

Mean high-water levels in Long Island Sound were used as starting water-surface elevations for the Pequonnock River (Lower Reach) and Yellow Mill Channel. Starting water-surface elevations for Island Brook were calculated using the slope/area method (References 81 & 82). Starting water-surface elevations used in the backwater computations for the Rooster River and Horse Tavern Brook were taken from the FIS for the Town of Fairfield (Reference 47). For the lower portion of the Rooster River and for Bruce Brook, starting water-surface elevations were taken from the FISs for the Towns of Fairfield and Stratford, respectively (References 47 & 49).

In the Town of Brookfield, cross sections for the backwater analyses of all detailed study streams were determined by field survey in 1977 and strip aerial photographs, taken in April 1977 along the stream channel and mapped at a scale of 1:2,400, with a four-foot contour interval (Reference 88).

The starting water-surface elevations for the Still River were taken from the profile of the Still River at the corporate limits from the New Milford FIS (Reference 89). The starting water-surface elevations for the tributary streams, Limekiln Brook 1 and East Brook, were taken from the initially determined mainstream profiles at the points of confluence.

The stage above the mean annual flood for the 1-percent-annual-chance flood had been calculated at over 100 gaging stations throughout Connecticut. These values were plotted and an equation developed to determine the depth of flow above the mean annual flood for the 1-percent-annual-chance flood event at variable drainage areas. This depth was then plotted on USGS quadrangle sheets to delineate the approximately 1-percent-annual-chance flood limits. Where the contours intercepted the streams, it was assumed the mean annual flood elevation was represented.

In the City of Danbury, starting water-surface elevations for the Still River were based on the flood profiles for 10-, 2-, 1-, and 0.2-percent-annual-chance events determined by the U.S. Department of Agriculture, Soil Conservation Service.

The starting water-surface elevations for Limekiln Brook 2, and Sympaug and Padanaram Brooks reflect the peak flood profiles along the Still River. The starting water-surface elevations for Kohanza Brook reflect the coincidental flood peak along Padanaram Brook. All elevations are measured from mean sea level datum.

In the Town of Darien, water-surface elevations for the Five Mile River and the Noroton River were taken from the FISs for the Cities of Stamford and Norwalk (References 58 & 59). Maximum flood elevations in the lower reaches of all the streams were delineated based on tidal levels in the Long Island Sound. Starting water-surface elevations for the Goodwives River and Tokeneke Brook were calculated using the rating curves for the dams at Ring's End Road and Island Road, respectively. Starting water-surface elevations for Stony Brook 1 were obtained from the hydraulic analyses for the Goodwives River. Starting water-surface elevations for the Noroton River were based on the mean spring high tide in Long Island Sound (Reference 90).

In the Town of Easton, starting water-surface elevations for the Aspetuck River (Lower Reach), Aspetuck River (Upper Reach), and the Mill River were taken from the FISs for the Towns of Weston and Fairfield, respectively (References 61 & 47).

Starting water-surface elevations for Ballwall Brook and Morehouse Brook were calculated using the slope/area method.

Water-surface elevations of floods of the selected recurrence intervals for the section of the Aspetuck River (Lower Reach) from the Easton-Weston-Fairfield corporate limits to the Easton-Weston corporate limits were obtained from the FIS for the adjacent Town of Weston, Connecticut (Reference 61).

Water-surface elevations of floods of the selected recurrence intervals for the section of the Mill River shared by the Towns of Easton and Fairfield were obtained from the FIS for the Town of Fairfield, Connecticut (Reference 47).

In the Town of Fairfield, cross sections for the flooding sources studied by detailed methods were obtained from field surveys in June 1973, October and November 1980, February and May 1981, and in April 1984, and aerial photogrammetry (References 87 & 91). When available bridge plans were utilized to obtain elevation data and structural geometry, all bridges and culverts were field surveyed.

The starting water-surface elevations for Sasco Creek, the Mill River, and the Rooster River were calculated using the 10-percent-annual-chance starting water-surface elevation. The 2-percent-annual-chance starting water-surface elevation was interpolated between the 10- and 1-percent-annual-chance elevations; the 0.2-percent-annual-chance elevation was extrapolated. No profiles are shown for the lower reaches of Sasco Creek and the Mill River, which are under the influence of Long Island Sound.

For the Aspetuck River (Lower Reach), Cricker Brook, and Horse Tavern Brook, the flood elevations of the main stream at the confluence were used for the starting water-surface elevations. Starting water-surface elevations for Grasmere Brook were calculated using the slope/area method with an approximate starting water-surface elevation of mean high sea level. Starting water-surface elevations for Brown's Brook and an unrevised portion of Londons Brook were calculated using the slope/area method. Starting water-surface elevations for the revised portion of Londons Brook were determined using the effective FIS for the Town of Fairfield. Starting water-surface elevations for Londons Brook Divided Flow were taken from the HEC-2 modeling for Londons Brook.

For the October 6, 1998, revision, water-surface elevations for Londons Brook, from a point approximately 430 feet downstream of State Route 59 to a point approximately 1,100 feet upstream of Casmir Drive, were determined by calculating maximum flow in the piping system at full capacity using methodology from the Federal Highway Administration (Reference 92). This flow was then subtracted from the total estimated 1-percent-annual-chance flood discharge to determine the quantity of surcharge or overland flow that will cause flooding in this area. A step-backwater analysis of the surcharge flow was performed using the HEC-2 program to determine depth of flooding for the studied reach (References 81 & 82). For Londons Brook Divided Flow, water-surface elevations were computed using the HEC-2 step-backwater program.

Criteria used to determine starting water-surface elevations for the Byram River and East Brothers Brook were unavailable.

Mean high tide was used as the starting water-surface elevations for both Horseneck and Strickland Brooks for all storms.

The slope/area method was used to calculate the starting water-surface elevations for the East Branch Byram River, Converse Pond Brook, West Brothers Brook, and Rockwood Lake Brook.

Starting water-surface elevations used on the Mianus River were derived from a stage discharge curve developed for the spillway at the south end of Mianus Pond.

Because the natural course of Cider Mill Brook can be diverted into a culvert between Center Drive and Sound Beach Avenue, this brook was analyzed as two independent sections. Downstream of this bypass structure, starting water-surface elevations were established using the slope/area method. Upstream of the bypass structure, starting water-surface elevations were derived from a stage-discharge curve developed for the inlet of the bypass structure.

Water-surface profiles for the Halfway River were taken from the FIS for the Town of Newtown (Reference 68).

In the Town of Monroe, the cross sections used in the backwater analyses of the Housatonic River (Middle Reach) and Housatonic River (Lower Reach) and Lake Zoar were determined by a field survey in 1987.

The starting water-surface elevations for the Farmill River and Means Brook were taken from the FIS for the City of Shelton (Reference 67).

Starting water-surface elevations for Smith Pond Brook and for Beardsley Brook, which were considered secondary streams, were taken to be the flood elevations of the mainstream (Copper Mill Brook and the Farmill River, respectively) at the confluence.

For the March 4, 1991, revision, starting water-surface elevations for the Housatonic River (Lower Reach), Housatonic River (Middle Reach) and the Little River profiles were based on water-surface profiles which were developed during the preparation of the FIS for the Town of Seymour (Reference 93).

In the Town of New Canaan, starting water-surface elevations for the Rippowam River (Upper Reach) were obtained through the slope/area method. Starting water-surface elevations for the Noroton, Five Mile, and Silvermine Rivers were obtained from the FIS for the City of Norwalk (Reference 58). Starting water-surface elevations for Laurel Brook and Parting Brook were determined assuming coincident peak flows at their respective points of confluence.

In the Town of Newtown, for the 1978 FIS, water-surface elevations of floods of the selected recurrence intervals were computed using the USACE HEC-2 step-backwater computer program (References 81 & 82). Starting water-surface elevations for the tributary streams were determined by normal depth analysis. The water-surface elevations for the Housatonic River (Middle Reach) upstream of Stevenson Dam were based on flood flows determined at the Stevenson gage. Resultant pool elevations for the 10-, 2-, 1-, and 0.2-percent-annual-chance floods were based upon the discharge curves developed for the dam. The pool elevations are assumed to be constant for the entire length of the backwater pool extending to the base of the Shepaug Dam.

For the April 16, 2003, revision, water-surface elevations of floods of the selected recurrence intervals were computed using the USACE HEC-RAS step backwater computer program (Reference 94). The starting water-surface elevations for Pond Brook were determined by normal-depth analysis. In all areas where hydraulic analyses indicated that supercritical flow would occur, critical depth was assumed. This is a reasonable assumption given the inherent instability of supercritical flow. Flood profiles were drawn showing computed water-surface elevations for floods of the selected recurrence intervals.

In the City of Norwalk, no profiles are shown for the lower reaches of the Norwalk and Five Mile Rivers, which are under influence from Long Island Sound.

Starting water-surface elevations for the Norwalk River, Silvermine River, Five Mile River, Keelers Brook, and Stony Brook 2 were determined by normal depth analysis.

Starting water-surface elevations for Betts Pond Brook were developed from headwater computations for the culvert extending from the mouth of Betts Pond Brook at the Norwalk River to a point approximately 610 feet upstream.

For the Town of Redding, starting water-surface elevations for the Norwalk River were obtained from the FIS for the Town of Wilton (Reference 95). Starting water-surface elevations for the Saugatuck River (Upper Reach) were determined by the impoundment water level at Saugatuck Reservoir. Saugatuck Reservoir elevations were determined by the Wilson routing method, with the stage-storage-discharge curves obtained from the Bridgeport Hydraulic Company and USGS topographic maps (Reference 73). Starting water-surface elevations for Hawley Pond Brook were determined using the slope/area method.

In the Town of Ridgefield, for the 1982 FIS, cross-section data for the flooding sources studied by detailed methods were obtained from field survey, previous reports, and aerial photographs (References 37, 96, & 97). All bridges, dams, and culverts were field surveyed to obtain elevation data and structural geometry.

Except for portions of Ridgefield Brook, water-surface elevations of floods of the selected recurrence intervals were computed using the USACE HEC-2 step-backwater computer program (References 81 & 82). Water-surface elevations for Ridgefield Brook at Taylor Pond were computed through the use of a stage-discharge curve for Taylor Pond Dam (Reference 98). Water-surface elevations for Ridgefield Brook above the NRCS flood control dam were computed using the Wilson Routing Method and information from the NRCS (References 37 & 74).

Water-surface elevations of floods of the selected recurrence intervals were computed using the USACE HEC-2 step-backwater computer model (References 81 & 82).

The starting water-surface elevations for the Norwalk River and the East Branch Silvermine River were obtained from the FIS for the Town of Wilton (Reference 95). Starting water-surface elevations for Ridgefield Brook were determined using the slope/area method. Starting water-surface elevations for the Titicus River and Cooper Pond Brook were determined using critical depth.

For the August 23, 1999, revision, cross-section data for the backwater analyses of Miry Brook, the Unnamed Tributary to Saugatuck River, and the South Branch of Unnamed Tributary to Saugatuck River were compiled using topographic maps provided by the Town of Ridgefield (Reference 99). The main channel and all bridges, culverts, and dams were field surveyed to obtain or verify elevation data and structural geometry. The topographic mapping was also field verified. Cross section data for the Norwalk River backwater analyses were compiled using topographic maps at a scale of 1:1,200 with a contour interval of 2 feet which were provided by the Town of Ridgefield (Reference 99). The topographic mapping prepared for the Channel Encroachment Line (CEL) study was used to update the mapping provided by the town (Reference 100). The contours and spot elevations on the mapping provided by the town were found to match the field survey data better than the topographic mapping prepared for the CEL study. The main channel information was taken from the HEC-2 data file prepared for the CEL study and from the field survey. The main channel and all bridges, culverts, and dams were field surveyed to obtain or verify elevation data and structural geometry.

Starting water-surface elevations for Miry Brook, the Unnamed Tributary to Saugatuck River, and the South Branch of Unnamed Tributary to Saugatuck River were calculated using the slope/area method. The starting water-surface elevations for the Norwalk River were interpolated using computed water-surface elevations from the HEC-2 model prepared for the 1982 Ridgefield FIS and the Town of Wilton FIS (References 65 & 95).

In the City of Shelton, starting water-surface elevations for the Farmill River and Burying Ground Brook were determined using the 10-percent-annual-chance stage in the Housatonic River (Lower Reach). Starting water-surface elevations for Means Brook and Harvey Pete Brook were determined using the backwater elevation from the Farmill River.

Burying Ground Brook, from Long Hill Avenue to the Housatonic River (Lower Reach), disperses floodwaters into the streets during a 1-percent-annual-chance storm at an average depth of 2.8 feet.

In the original FIS and in the 1991 revision, analyses of levels in the Housatonic River (Lower Reach) were conducted by the New England Division of the USACE. The elevations used for the 10-, 2-, 1-, and 0.2-percent-annual-chance flood levels were obtained from the FISs for the Cities of Milford and Derby (References 101 & 102). In Milford, a gradual varied flow model was used. In Derby, high-water marks and statistical analyses were the bases for the profiles.

For the September 7, 2000, revision, water-surface elevations of floods of the selected recurrence intervals for Farmill River between its confluence with Means Brook and Far Mill Reservoir were computed using the USACE HEC-RAS computer program (Reference 103).

For the Town of Sherman, starting water-surface elevations for the Ten Mile River were determined by the slope/area method since the normal depth of flow for the Ten Mile River is greater than the backwater of the Housatonic River (Upper Reach) at the confluence.

In the City of Stamford, the method of computation is based on Bernoulli's energy theorem and the Manning friction formula. Starting water-surface elevations for Laurel Brook reflect the coincidental flood peak along the Rippowam River (Upper Reach). Starting water-surface elevations for the upper and lower reaches of the Rippowam River and the Noroton River, were based on the mean spring high tide in Long Island Sound (Reference 90). Starting water-surface elevations for the Mianus River were based on the previously printed FIS for the City of Stamford (Reference 104). Starting water-surface elevations for the East Branch Mianus River, Toilsome Brook, and Springdale Brook were based on normal flow analysis.

In the Town of Stratford, the HEC-2 program, which is a steady-state water-surface profile model, was found to be unacceptable for use on the portion of the Housatonic River (Lower Reach) covered in this study. This is because of the unsteady state of flow in the river, which exists because of the storage capacity of the river segment itself and its spatial and temporal effects on flood peak discharges in conjunction with rising and falling tide levels. To overcome this limitation, the Gradually Varied Unsteady Flow Program, developed by the USACE, was used (Reference 105). Data for the August 1955 flood were selected to calibrate this model; input boundary conditions for the upstream and downstream ends of the reach consisted of the discharge hydrograph recorded during this event at Shelton and the concurrent tidal fluctuations at Stratford. The result of this calibration was the selection of roughness coefficients of 0.020 for the channel, and 0.040 for the overbank areas. A volume ratio of 1.2 was used in the analysis.

Using these coefficients in the Gradually Varied Flow Model, water-surface profiles were developed for floods with the selected recurrence intervals. Discharge hydrographs for the Housatonic River (Lower Reach) at Shelton and tide graphs at Stratford were used to define the upstream and downstream boundary conditions, respectively. For each riverine flood condition analyzed, the associated tide graph represented a tidal storm condition having a recurrence interval equal to one-tenth of the recurrence interval of the riverine flood.

In some areas, the stationing distances indicated on the flood profiles for cross sections and structures, such as dams and bridges, are greater than those distances as shown on the maps. Because of limitations of map scale, not all meanders in the stream channels can be shown.

For the Town of Trumbull, in the 1979 FIS, the valley portions of the cross-section data for streams in the area were obtained from 1:2,400 scale, 2 feet contour interval topographic maps which were developed from 1:1,200 scale, 2 feet contour interval topographic maps provided by the Town of Trumbull (Reference 106). In areas where these maps were outdated, field measurements were made. The below-water portions of cross sections were obtained by field measurement.

Starting water-surface elevations for the Pequonnock River (Lower Reach), Pequonnock River (Upper Reach), Horse Tavern Brook, Island Brook, Tributary D to Easton Reservoir, and Tributary B to Canoe Brook Lake were estimated using the slope/area method (References 81 & 82). Starting water-surface elevations for Booth Hill Brook, Tributary N to Pinewood Lake, and Tributary M to Pinewood Lake were developed from backwater calculations done for Pinewood Lake. For Tributary K at State Route 8, Tributary L at Huntington Road, and Tributary O at Intervale Road, starting water-surface elevations were calculated from rating curves. All other detailed study streams are tributaries of either Horse Tavern Brook Pequonnock River (Lower Reach), or the Pequonnock River (Upper Reach), and therefore their starting water-surface elevations were taken at their respective confluences with the three above-mentioned waterways.

The 1-percent-annual-chance floods for Tributaries P and Q were approximated using the 1-percent-annual-chance flood depths developed for Tributary J to Pequonnock River. This method of approximation was used because of the similar characteristics of the streams and their watersheds.

The 1-percent-annual-chance floods for Easton Lake and Canoe Brook Lake were approximated using normal depths calculated at their confluences with Tributary D to Easton Reservoir and Tributary B to Canoe Brook Lake, respectively. For Easton Lake, USGS floodprone area mapping was also conducted (Reference 107).

For the December 19, 1997, revision, water-surface elevations of floods of the selected recurrence intervals for Tributary G to Pequonnock River were computed using the USACE HEC-2 step-backwater computer program (References 81 & 82).

In the Town of Weston, for the December 19, 1997 revision, cross-section data for the West Branch Saugatuck River were compiled using contour information from topographic maps at a scale of 1:2,400, with a contour interval of 5 feet, provided by the

Town of Weston (Reference 108). The main channel and all bridges and culverts were field surveyed to obtain or verify elevation data and structural geometry.

Numerous footbridges along the restudied reach of the West Branch Saugatuck River were included in the HEC-2 model. The footbridges span the main channel and do not constrict the channel to a significant degree, if at all, and there are no embankments in the overbank areas. The footbridges were modeled using a simplified approach because of the large number of bridges within the study reach. The obstructions created by the footbridge decks and appurtenances were included in the model using BT cards for the normal bridge method. In a major flood event, the footbridges would likely be washed away by the floodwaters.

For the October 17, 1978, FIS, starting water-surface elevations were calculated using engineering judgment, except for the Aspetuck River (Lower Reach), for which starting water-surface elevations were taken from the FIS for the Town of Fairfield (Reference 47). For the December 19, 1997, revision, starting water-surface elevations for the West Branch Saugatuck River were taken from the HEC-2 results for the revised Towns of Westport and Wilton profiles.

For the Town of Westport, for the 1984 FIS, cross-section data were obtained by field measurements performed in June 1973, October 1980, and November 1981, and from available topographic maps (References 109 & 110). When available, bridge plans were utilized to obtain elevation data and structural geometry; all bridges and culverts for which plans were unavailable or out-of-date were surveyed.

For the January 7, 1998 revision, cross-section data for the West Branch Saugatuck River were compiled using contour information from topographic maps at a scale of 1:1,200, with a contour interval of 2 feet (Reference 110). The main channel and all bridges, culverts, and dams were field surveyed to obtain or verify elevation data and structural geometry. Numerous footbridges along the restudied reach of the West Branch Saugatuck River were included in the HEC-2 model. The footbridges span the main channel and do not constrict the channel to a significant degree, if at all, and there are no embankments in the overbank areas. The footbridges were modeled using a simplified approach because of the large number of bridges within the study reach. The obstructions created by the footbridge decks and appurtenances were included in the model using BT cards for the normal bridge method. In a major flood event, the footbridges would likely be washed away by the floodwaters.

No profiles are shown for the lower reaches of the Saugatuck River (Lower Reach), Stony Brook 2, Dead Man's Brook, Muddy Brook, and Sasco Creek, which are controlled by Long Island Sound.

In the 1984 FIS, starting water-surface elevations for the 1-percent-annual-chance flood for the Saugatuck River (Lower Reach), Muddy Brook, and Sasco Creek were obtained from the 10-percent-annual-chance tidal-surge elevation of Long Island Sound. The peaks on the streams and Long Island Sound were desynchronized. For the 10-percent-annual-chance starting water-surface elevation, the level of spring high tide on Long Island Sound was used. The 2-percent-annual-chance starting water-surface elevation was interpolated between the 10- and 1-percent-annual-chance starting water-surface elevations; the 0.2-percent-annual-chance starting water-surface elevation was extrapolated. For the Aspetuck River (Lower Reach) and Dead Man's Brook, the flood elevations of the main stream at the confluences were used for the starting water-surface elevations. Starting water-surface elevations for Stony Brook 2, Poplar Plains Brook, and Willow Brook were calculated using the slope/area method.

For the 1982 FIS, for the Norwalk River, Comstock Brook, and East Branch Silvermine River, water-surface elevations of floods of the selected recurrence intervals were computed using the USACE HEC-2 step-backwater computer program (References 81 & 82).

Starting water-surface elevations for the Norwalk River were obtained from the FIS for the City of Norwalk (Reference 58). Starting water-surface elevations for Comstock Brook were determined using critical depth. Starting water-surface elevations for the East Branch Silvermine River were determined using the slope/area method.

For the June 4, 1990, FIS, for the Silvermine River and Parting Brook, water-surface elevations of floods of the selected recurrence intervals were computed using the USGS step-backwater computer program (U.S. Department of the Interior). Flood profiles were drawn showing computed water-surface elevations for floods of the selected recurrence intervals.

Starting water-surface elevations for the Silvermine River were obtained from the FIS for the City of Norwalk (Reference 58). Starting water-surface elevations for Parting Brook were determined assuming coincident peak flows at the confluence with the Silvermine River.

For the February 18, 1998 revision, for the West Branch Saugatuck River, water-surface elevations of floods of the selected recurrence intervals were computed using the USACE HEC-2 step-backwater computer program. Numerous footbridges along the restudied reach of the West Branch Saugatuck River were included in the HEC-2 model. The footbridges span the main channel and do not constrict the channel to a significant degree, if at all, and there are no embankments in the overbank areas. The footbridges were modeled using a simplified approach because of the large number of bridges within the study reach. The obstructions created by the footbridge decks and appurtenances were included in the model using BT cards for the normal bridge method. In a major flood event, the footbridges would likely be washed away by the flood waters.

Starting water-surface elevations were taken from the revised water-surface profiles from the FIS for the downstream community of the Town of Westport (Reference 111).

2010 Countywide Analyses

In the June 18, 2010 countywide analysis, for streams studied by approximate methods, the boundary of the 1-percent-annual-chance flood was delineated using the previously printed FIRMs. For some of these streams, flood depths were determined by developing stage-discharge versus drainage area relationships from USGS gaging station data; the 1-

percent-annual-chance flood was approximated using a hydraulic analysis of the 1-percent-annual-chance flood at the structures; the 1-percent-annual-chance flood was calculated with the use of standard pipe flow charts for culvert flow and normal depth calculations for overland flow; and the 1-percent-annual-chance flood elevations were established from records kept by the community and from flood levels indicated in the field by local residents.

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

Roughness factors (Manning's "n") used in the hydraulic computations were chosen by engineering judgment and were based on field observations of the streams and floodplain areas. Roughness factors for all streams studied by detailed methods are shown in Table 7, "Manning's "n" Values."

TABLE 7 – MANNING’S “n” VALUES

Stream	Channel “n”	Overbank “n”
Aspetuck River (Lower Reach)	0.030 – 0.060	0.040 – 0.120
Aspetuck River (Upper Reach)	0.025 – 0.050	0.030 – 0.100
Ball Pond Brook	*	*
Ballwall Brook	0.030 – 0.045	0.050 – 0.080
Beardsley Brook	0.030	0.070
Beaver Brook	0.030 – 0.060	0.040 – 0.120
Belden Brook	0.013 – 0.060	0.020 – 0.160
Betts Pond Brook	0.015 – 0.060	0.015 – 0.110
Booth Hill Brook	0.013 – 0.060	0.020 – 0.160
Brown’s Brook	0.030 – 0.040	0.020 – 0.060
Bruce Brook	0.020	0.100
Burying Ground Brook	*	*
Byram River	0.030 – 0.050	0.035 – 0.125
Cider Mill Brook	0.030 – 0.060	0.040 – 0.060
Comstock Brook	0.015 – 0.070	0.025 – 0.080
Converse Pond Brook	0.012 – 0.030	0.060 – 0.150
Copper Mill Brook	0.030	0.070
Cooper Pond Branch	0.035 – 0.040	0.025 – 0.075
Cricker Brook	0.030	0.050
Dead Man’s Brook	0.030	0.020 – 0.070
Deep Brook	0.030 – 0.050	0.060 – 0.100
Dibbles Brook	0.030 – 0.040	0.060 – 0.090
East Branch Byram River	0.020 – 0.030	0.060
East Branch Mianus River	0.024 – 0.068	0.030 – 0.138
East Branch Silvermine River	0.015 – 0.070	0.025 – 0.080
East Brook	0.020 – 0.065	0.060 – 0.120

* Data not available

TABLE 7 - MANNING'S "n" VALUES - continued

Stream	Channel "n"	Overbank "n"
East Brothers Brook	0.028 – 0.035	0.040 – 0.120
East Swamp Brook	0.030 – 0.040	0.060 – 0.090
Farmill River	0.030 – 0.060	0.050 – 0.140
Ferry Creek/Long Brook	0.020	0.100
Five Mile River	0.015 – 0.100	0.015 – 0.080
Goodwives River	*	*
Grasmere Brook	0.012 – 0.040	0.040 – 0.070
Halfway River	0.030 – 0.050	0.060 – 0.100
Harvey Pete Brook	*	*
Hawley Pond Brook	0.025 – 0.045	0.030 – 0.080
Horseneck Brook	0.060	0.015 – 0.037
Horse Tavern Brook	0.015 – 0.085	0.015 – 0.180
Housatonic River (Lower Reach)	0.020 – 0.050	0.060 – 0.100
Housatonic River (Middle Reach)	0.020 – 0.065	0.060 – 0.120
Housatonic River (Upper Reach)	0.020 – 0.050	0.060 – 0.100
Island Brook	0.015 – 0.050	0.015 – 0.135
Jenning's Brook	0.030 – 0.060	0.040 – 0.120
Keelers Brook	0.015 – 0.080	0.015 – 0.160
Kettle Brook	0.030 – 0.060	0.040 – 0.120
Kohanza Brook	*	*
Laurel Brook	0.028 – 0.035	0.040 – 0.060
Lewis Brook	0.030 – 0.050	0.060 – 0.100
Limekiln Brook 1	0.030 – 0.040	0.040 – 0.080
Limekiln Brook 2	*	*
Londons Brook	0.013 – 0.045	0.040 – 0.080
Londons Brook Divided Flow	0.013 – 0.080	0.013 – 0.080
Means Brook	0.030	0.060
Mianus River	0.028 – 0.035	0.040 – 0.060
Mill River	0.030	0.040 – 0.070
Miry Brook	0.030 – 0.060	0.050 – 0.100
Morehouse Brook	0.015 – 0.040	0.050 – 0.070
Muddy Brook	0.030	0.050
Noroton River	0.024 – 0.067	0.030 – 0.097
North Farrar Brook	0.013 – 0.060	0.020 – 0.160
Norwalk River	0.015 – 0.070	0.020 – 0.100
Padanaram Brook	*	*
Parting Brook	0.015 – 0.070	0.025 – 0.080
Pequonnock River (Lower Reach)	0.013 – 0.060	0.013 – 0.080
Pequonnock River (Upper Reach)	0.013 – 0.060	0.020 – 0.160
Pond Brook	0.025 – 0.045	0.080 – 0.150
Pootatuck River	0.030 – 0.050	0.060 – 0.100
Poplar Plains Brook	0.016 – 0.045	0.050 – 0.075

* Data not available

<u>TABLE 7 - MANNING'S "n" VALUES</u> - continued

Stream	Channel "n"	Overbank "n"
Pumpkin Ground Brook	0.020	0.100
Putnam Park Brook	0.015 – 0.050	0.040 – 0.080
Ridgefield Brook	0.012 – 0.035	0.025 – 0.070
Rippowam River (Lower Reach)	0.026 – 0.095	0.040 – 0.178
Rippowam River (Upper Reach)	0.026 – 0.095	0.040 – 0.178
Rockwood Lake Brook	0.030	0.060
Rooster River	0.020 – 0.040	0.040 – 0.070
Sasco Creek	0.030	0.050
Saugatuck River (Lower Reach)	0.030 – 0.060	0.040 – 0.120
Saugatuck River (Upper Reach)	0.025 – 0.045	0.030 – 0.120
Silvermine River	0.015 – 0.100	0.020 – 0.100
Smith Pond Brook	0.030	0.070
South Branch of Unnamed Tributary to Saugatuck River	0.020 – 0.060	0.050 – 0.100
Split Flow from Lake Windwing	*	*
Springdale Brook	0.024 – 0.055	0.035 – 0.091
Still River	0.020 – 0.065	0.060 – 0.120
Stony Brook 1	0.000 – 0.000	0.000 – 0.000
Stony Brook 2	0.015 – 0.080	0.030 – 0.100
Strickland Brook	0.012 – 0.030	0.060
Sympaug Brook	0.030	0.030 – 0.090
Tanners Brook	0.020	0.100
Tenmile River	0.025	0.040 – 0.045
Terehaute Brook	0.030	0.060 – 0.090
Titicus River	0.035 – 0.045	0.050 – 0.075
Toilsome Brook	0.014 – 0.045	0.020 – 0.150
Tokeneke Brook	0.030 – 0.120	0.015 - 0.160
Tributary A to Horse Tavern Brook	*	*
Tributary B to Canoe Brook Lake	*	*
Tributary C to Tributary B to Canoe Brook Lake	*	*
Tributary D to Easton Reservoir	*	*
Tributary E to Pequonnock River	*	*
Tributary F to Pequonnock River	*	*
Tributary G to Pequonnock River	*	*
Tributary H to Tributary G to Pequonnock River	*	*
Tributary I to Pequonnock River	*	*
Tributary J to Pequonnock River	*	*
Tributary K at State Route 8	*	*
Tributary L at Huntington Road	*	*
Tributary M to Pinewood Lake	*	*
Tributary N to Pinewood Lake	*	*
Tributary O at Intervale Road	*	*

*Data not available

TABLE 7 - MANNING'S "n" VALUES - continued

Stream	Channel "n"	Overbank "n"
Unnamed Tributary to Saugatuck River	0.020 – 0.080	0.040 – 0.100
West Branch Pequonnock River	0.030	0.070 – 0.085
West Branch Saugatuck River	0.020 – 0 .090	0.060 – 0.100
West Brothers Brook	0.060 – 0.090	*
Willow Brook	0.016 – 0.100	0.040 – 0.080
Wolf Pit Brook	0.020 – 0.045	0.040 – 0.100
Yellow Mill Channel	0.015 – 0.075	0.015 – 0.150

*Data not available

The hydraulic analyses for the June 18, 2010 countywide FIS were based on unobstructed flow. The flood elevations shown on the profiles are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

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 the June 18, 2010 countywide FIS and FIRM. Interested individuals may contact FEMA to access this data.

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

In the City of Stamford, for the upper and lower reaches of the Rippowam River and Springdale Brook watersheds, energy losses due to physical changes in the channel were computed by using contraction coefficients of 0.100 to 0.600 and expansion coefficients of 0.300 to 0.800. The range of contraction and expansion coefficients for the Noroton River were 0.100 to 0.500 and 0.300 to 0.500, respectively. For the East Branch River, the range of contraction and expansion coefficients were 0.100 to 0.300 and 0.300 to 0.500, respectively.

For the Mianus River, downstream of June Road, losses due to changes in cross-sectional areas of flow were computed by using coefficients of 0.100 to 0.300 for the contraction and 0.300 to 0.500 for expansion. For Toilsome Brook and the upper portion of Mianus River, energy losses due to changes in cross-sectional areas of flow were computed by using coefficients to 0.100 to 0.500 for contraction and 0.300 to 0.800 for expansion.

Split flow occurs on the East Branch Mianus River approximately 2,000 feet upstream of its confluence with the Mianus River. This is the location of the headwaters of Salamander Creek, which flows southwesterly approximately 2,000 feet to its confluence with the Mianus River. Split flows were determined by weir flow across Riverbank Road, which parallels the East Branch Mianus River at this location. Topographic mapping and cross-sectional data of Salamander Creek were furnished to PWG by Parson, Bromfield, and Redniss for the determination of approximate 1- and 0.2-percent-annual-chance flood boundaries on Salamander Creek (Reference 112).

In all areas where analysis indicated that supercritical flow would occur, critical depth was assumed. This is a reasonable assumption given the inherent instability of supercritical flow.

July 2013 Coastal Study Update:

Based on the results of the 2013 coastal analysis, the backwater elevations are revised where necessary. The flooding sources of Betts Pond Brook, Bruce Brook, Byram River, Cider Mill Brook, Dead Man’s Brook, East Brothers Brook, Ferry Creek/Long Brook, Goodwives River, Gorham’s Pond, Grasmere Brook, Horseneck Brook, Housatonic River, Mianus River, Mill River, Muddy Brook, Noroton River, Norwalk River, Pequonnock River (Lower Reach), Rippowam River (Lower Reach), Rooster River, Sasco Creek, Saugatuck River (Lower Reach), Stony Brook 1, Stony Brook 2, Strickland Brook, Fivemile River, Tokeneke Brook, and Yellow Mill Channel were revised for backwater elevations.

3.3 Coastal Hydrologic Analyses

The stillwater elevation is the elevation of the water due to the effects of the astronomic tides and storm surge on the water surface. Hydrologic analyses carried out to establish the peak discharge-frequency relationships for Long Island Sound flooding sources affecting the communities of Bridgeport, Darien, Fairfield, Greenwich, Norwalk, Stamford, Stratford, and Westport serve as a basis of coastal hydraulic analyses using detailed methods in accordance with Appendix D of the “Guidance for Coastal Flooding Analyses and Mapping,” of the April 2003 FEMA “Guidelines and Specifications for Flood Hazard Mapping Partners” (Reference 113).

For this effective study, the 10-, 2-, 1-, and 0.2-percent-annual-chance floods for the nearest gages to Fairfield County on Long Island Sound were obtained from the “Regional Frequency Analyses using L-Moments” memorandum developed by STARR (Reference 114) for areas subject to coastal flooding. Table 8 contains the stillwater elevations determined at the nearest tide gage stations to Fairfield County. These values were linearly interpolated to all coastal transects throughout the county for use in coastal hydraulic analyses.

TABLE 8 - SUMMARY OF COASTAL STILLWATER ELEVATIONS

FLOODING SOURCE AND LOCATION	ELEVATION (feet NAVD88)			
	10-PERCENT-ANNUAL-CHANCE	2-PERCENT-ANNUAL-CHANCE	1-PERCENT-ANNUAL-CHANCE	0.2-PERCENT-ANNUAL-CHANCE
LONG ISLAND SOUND				
Willets Point, Tide Station ID: 8516990	8.9	10.7	11.4	13.0
Stamford Hurricane Barrier (41°2.2’N, 73° 32.1’ W)	8.5	10.2	10.9	12.3
Bridgeport, Tide Station ID: 8467150	7.8	9.3	10.0	11.3
New Haven, Tide Station ID: 8465705	6.9	8.3	8.9	10.1

Transects (profiles) were located for coastal hydrologic and hydraulic analyses perpendicular to the average shoreline along areas subject to coastal flooding and extending inland to a point where wave action ceased in accordance with the “Users Manual for Wave Height Analysis” (Reference 115). Transects were placed with consideration of topographic and structural changes of the land surface, as well as the cultural characteristics of the land so that they would closely represent local conditions.

Coastal transect topography data was obtained from Light Detection and Ranging (LiDAR) data collected in December 2006 by Terrapoint USA for Dewberry & Davis LLC. Data is accurate to 2-ft contours (Reference 116). Vertical accuracy is 0.33 ft at a 95-percent confidence interval. Bathymetric data was obtained from the National Oceanographic and Atmospheric Administration (NOAA) National Ocean Service (NOS) Hydrographic Data Base (NOSHDB) and Hydrographic Survey Meta Data Base (HSMDB) (NOAA, May 27, 2010) (Reference 117). The sounding datum of mean low low water (MLLW) was converted to vertical datum NAVD88.

Transects were spaced close together in areas of complex topography and dense development. In areas having more uniform characteristics, transects were spaced at larger intervals. It was also necessary to locate transects in areas where unique flooding existed and in areas where computed wave heights varied significantly between adjacent transects.

3.4 Coastal Hydraulic Analyses

Wave height is the distance from the wave trough to the wave crest. The height of a wave is dependent upon wind speed and duration, water depth, and length of fetch. Offshore (deep water) and near shore (shallow water) heights and wave periods were calculated for restricted and unrestricted fetch settings following the methodology described in the February 2007 FEMA "Atlantic Ocean and Gulf of Mexico Coastal Guidelines Update" (Reference 118), for each coastal transect.

An extremal analysis of historical wind gage records was performed to determine the thresholds for peak wind speeds using three Peaks Over Threshold (POT) statistical methods. The wind speed calculated from the extremal analysis for Sikorsky Airport was used for Fairfield County wave height calculations at each coastal transect location. Wind speed data sets used in the extremal analyses were for the period December 1942 – May 2010.

Wave setup was assumed to be an important factor in determining total water level, since the coastline has historically experienced flooding damage above the predicted storm surge elevations. Wave setup is based upon wave breaking characteristics and profile slope. As stated in the "Atlantic Ocean and Gulf of Mexico Coastal Guidelines Update" (Reference 118), "Wave setup can be a significant contributor to the total water level landward of the +/- MSL shoreline and should be included in the determination of coastal BFEs." Wave setup values were calculated to the entire open coast shoreline in each community. Wave setup for each coastal transect was calculated by the Direct Integration Method (DIM) developed by Goda (2000) as described in the FEMA "Atlantic Ocean and Gulf of Mexico Coastal Guidelines Update" (Reference 118). For those coastal transects where a structure was located, the wave setup against the coastal structure was also calculated. For profiles with vertical structures or revetments, a failed structure analysis was performed and a new profile of the failed structure was generated and analyzed, in accordance with the USACE, Coastal Engineering Research Center report "Criteria for Evaluating Coastal Flood Protection Structures," (TR CERC-89-15) (Reference 119). The more conservative result of the two analyzed conditions was mapped.

Erosion analysis using FEMA's Coastal Hazard Analysis Modeling Program (CHAMP) Version 2.0 (Reference 120) was performed for profiles with erodible dunes and without coastal structures, such as vertical walls or revetments. The dune subject to erosion is a sandy feature with potentially light vegetation. Any thickly vegetated, rocky, silty, or clayey dune features or bluffs are assumed not subject to erosion. Predicted post-storm erosion profiles were used for analysis of wave heights associated with coastal storm surge flooding, where appropriate.

The methodology for analyzing the effects of wave heights is described in a report entitled "Methodology for Calculating Wave Action Effects Associated with Storm Surges," prepared by the National Academy of Sciences (Reference 121). 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 stillwater depth. The wave crest is 70 percent of the total wave height above the 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, rising topography, and vegetation. The amount of energy dissipation is a function of the physical characteristics of the obstruction and is determined by procedures prescribed in the 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.

Along each transect, overland wave propagation was computed considering the combined effects of changes in ground elevation, vegetation, and physical features. Wave heights were calculated to the nearest 0.1 foot, and wave crest elevations were determined at whole-foot increments. The calculations were carried inland along the transect until the wave crest elevation was permanently less than 0.5 foot above the total water elevation or the coastal flooding met another flood source (i.e. riverine) with an equal water-surface elevation. The results of the calculations are accurate until local topography, vegetation, or cultural development of the area undergoes any major changes.

Areas of the 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 (Reference 122). The 3-foot wave has been determined as the minimum size wave capable of causing major damage to conventional wood frame or brick veneer structures. This criterion has been adopted by FEMA for the determination of V-zones.

It has been shown in laboratory tests and observed in post storm damage assessments that wave heights as little as 1.5 feet can cause damage to and failure of typical Zone AE construction. Therefore, for advisory purposes only, a Limit of Moderate Wave Action (LiMWA) boundary has been added in coastal areas subject to moderate wave action. The LiMWA represents the approximate landward limit of the 1.5-foot breaking wave, and was delineated for all areas subject to significant wave attack in accordance with "Procedure Memorandum No. 50 – Policy and Procedures for Identifying and Mapping Areas Subject to Wave Heights Greater than 1.5 feet as an Informational Layer on Flood Insurance Rate Maps (FIRMS)."

The effects of wave hazards in the Zone AE (or shoreline in areas where VE Zones are not identified) and the limit of the LiMWA boundary are similar to, but less severe than, those in Zone VE where 3-foot breaking waves are projected during a 1-percent-annual-chance flooding event.

In areas where wave runup elevations dominate over wave heights, such as areas with steeply sloped beaches, bluffs, and/or shore-parallel flood protection structures, there is no evidence to date of significant damage to residential structures by runup depths less than 3 feet. However, to simplify representation, the LiMWA was continued immediately landward of the VE/AE boundary in areas where wave runup elevations dominate. Similarly, in areas where the Zone VE designation is based on the presence of a primary frontal dune (PFD) or wave overtopping, the LiMWA was also delineated immediately landward of the Zone VE/AE boundary.

Wave runup is the uprush of water caused by the interaction of waves with the area of shoreline where the stillwater hits the land or other barrier intercepting the stillwater level. The wave runup elevation is the vertical height above the stillwater level ultimately attained by the extremity of the uprushing water. Wave runup at a shore barrier can provide flood hazards above and beyond those from stillwater inundation. Guidance in the February 2007 FEMA "Atlantic Ocean and Gulf of Mexico Coastal Guidelines Update" (Reference 118) suggests using the 2-percent wave runup value, the value exceeded by 2 percent of the runup events. The 2-percent wave runup value is particularly important for steep slopes and vertical structures. Wave runup was calculated for each coastal transect using methods from the Shore Protection Manual (SPM) (Reference 123) for vertical structures, Technical Advisory Committee for Water Retaining Structures (TAW) method for sloped structures with a slope steeper than 1:8, and mean runup height calculated by the FEMA Wave Runup Model RUNUP 2.0 multiplied by 2.2 was used to obtain the 2-percent runup height for non-vertical structures and profiles with a slope less than 1:8, as described in the February 2007 "Atlantic Ocean and Gulf of Mexico Coastal Guidelines Update" to Appendix D, "Guidance for Coastal Flooding Analysis and Mapping" (Reference 118).

When the runup is greater than or equal to 3 feet above the maximum ground elevation, the BFE was determined to be 3 feet above the ground crest elevation, in accordance with guidance in Appendix D. Computed runup was not adjusted if less than three feet above the ground crest.

When runup overtops a barrier such as a partially eroded bluff or a structure, the floodwater percolates into the bed and/or runs along the back slope until it reaches another flooding source or a ponding area. Standardized procedures for the treatment of shallow flooding and ponding were applied as described in Appendix D of the "Guidance for Coastal Flooding Analysis and Mapping" (Reference 113).

Where uncertified coastal structures such as vertical walls and revetments were present, additional analysis for wave setup and wave runup was performed on profiles assuming the structure will partially fail during the base flood. The post-failure slopes applied for this analysis were 1:3 for sloped revetments, and 1:1.5 for vertical walls, which are within the range suggested by the February 2007 "Atlantic Ocean and Gulf of Mexico Coastal Guidelines Update" to Appendix D (Reference 118).

In accordance with 44 CFR Section 59.1 of the NFIP the effect of the PFD on coastal high hazard area (V Zone) mapping was evaluated for the Cities of Bridgeport, Norwalk, Stamford and the Towns of Darien, Fairfield, Greenwich, Stratford and Westport. Identification of the PFD was based upon a FEMA approved numerical approach for analyzing the dune's dimensional characteristics. This approach utilized LiDAR data for the study areas (Reference 116) and assessed change in back slope to determine the landward toe of the PFD. In areas where the PFD defines the landward limit of the V Zone, the V Zone extends to the landward toe of the dune. The PFD defined the landward limit of the V Zone along portions of the shoreline were identified in the Cities of Bridgeport, Stamford and Norwalk and Towns of Stratford, Fairfield, Greenwich and Westport.

Because wave height calculations are based on such parameters as the size and density of vegetation, natural barriers such as sand dunes, buildings, and other man-made structures, detailed information on the physical and cultural features of the study area were obtained from aerial photography. LiDAR data of the shorelines of the Cities of Bridgeport, Norwalk, Stamford and the Towns of Darien, Fairfield, Greenwich, Stratford and Westport was used for the topographic data. The land-use and land cover data were obtained from USGS 2008 High Resolution Orthoimagery for the Bridgeport, Hartford, and New Haven, Connecticut Urban Areas (Reference 124).

Figure 2 represents a sample transect which illustrates the relationship between the stillwater elevation, the wave crest elevation, the ground elevation profile, and the location of the A/V zone boundary. Actual wave conditions may not include all the situations illustrated in Figure 2.

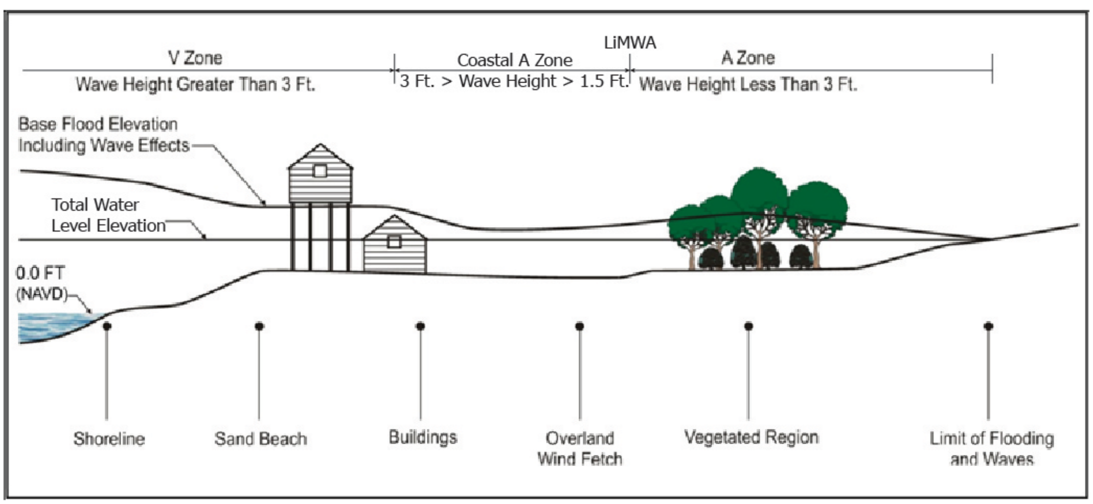

FIGURE 10 – TRANSECT SCHEMATIC

After analyzing computed wave heights along each transect, wave elevations were interpolated between transects. Various source data were used in the interpolation, including the topographic work maps, aerial photographs, and engineering judgment. Controlling features affecting the elevations are identified and considered in relation to their positions at a particular transect and their variation between transects.

Along each transect, wave envelope elevations were computed considering the combined effects of changes in ground elevation, vegetation, and physical features. Between transects, elevations were interpolated using the previously cited topographic maps, land-use data, land-cover data, and engineering judgment to determine the areal extent of flooding. The results of the calculations are accurate until local topography, vegetation, or cultural development within the community undergoes any major changes.

Table 9 provides a description of the transect locations, the 1-percent-annual-chance stillwater elevations, and the maximum 1-percent-annual-chance wave crest elevations. Figure 3, "Transect Location Map," illustrates the location of the transects for the county.

TABLE 9 - TRANSECT DESCRIPTIONS

		Elevation (Feet NAVD88)		
Transect	**Location**	**Stillwater 1-percent-annual-chance**	**Max. Wave Crest 1-percent-annual-chance**[1]	**V Zone Mapping Method**
1	At the shoreline of Long Island Sound, in the Town of Greenwich, the western corporate limits east of Byram Point	11.0	17	Primary Frontal Dune
2	At the shoreline of Long Island Sound, in the Town of Greenwich, to Byram Shore Road	11.0	20	Runup
3	At the shoreline of Long Island Sound, in the Town of Greenwich, West of Byram Harbor to Game Cock Road	11.0	22	Wave Overtopping Splash Zone
4	At the shoreline of Long Island Sound, in the Town of Greenwich, at Byram Harbor Game Cock Road to Harbor Drive	11.0	17	Runup
5	At the shoreline of Long Island Sound, in the Town of Greenwich, east of Byram Harbor from Harbor Drive to Glenwood Drive	9.2	20	Wave Overtopping Splash Zone

[1] Because of map scale limitations, maximum wave elevations may not be shown on the FIRM.

TABLE 9 - TRANSECT DESCRIPTIONS - continued

Transect	Location	Elevation (Feet NAVD88)		V Zone Mapping Method
		Stillwater 1-percent-annual-chance	Max. Wave Crest 1-percent-annual-chance [1]	
6	At the shoreline of Long Island Sound, in the Town of Greenwich, from Glenwood Drive to the Eastern Line of Field Point Circle	11.0	20	Wave Overtopping Splash Zone
7	At the shoreline of Long Island Sound, in the Town of Greenwich, at Greenwich Harbor to Smith Cove	11.0	19	Wave Overtopping Splash Zone
8	At the shoreline of Long Island Sound, in the Town of Greenwich, East of Indian Harbor, Horse Island and Saw Island, to Nipowin Lane	11.0	19	Wave Overtopping Splash Zone
9	At the shoreline of Long Island Sound, in the Town of Greenwich, at Cos Cob Harbor, Nipowin Lane to Indian Point Lane	10.9	16	Wave Overtopping Splash Zone
10	At the shoreline of Long Island Sound, in the Town of Greenwich, between Cos Cob Harbor and Greenwich Cove	10.9	18	Breaking Wave Height
11	At the shoreline of Long Island Sound, in the Town of Greenwich, at Greenwich Cove including Greenwich Point to Tod's Driftway	10.9	19	Wave Overtopping Splash Zone
12	At the shoreline of Long Island Sound, in the Town of Greenwich, east of Greenwich Point between East Point Lane and Rocky Point Road	10.8	18	Wave Overtopping Splash Zone
13	At the shoreline of Long Island Sound, in the City of Stamford, Rocky Point Lane to Dolphin Cove Quay	10.8	17	Wave Overtopping Splash Zone
14	At the shoreline of Long Island Sound, in the City of Stamford, at Stamford Harbor, Dolphin Cove Quay to Downs Avenue	10.8	19	Wave Overtopping Splash Zone

[1] Because of map scale limitations, maximum wave elevations may not be shown on the FIRM.

TABLE 9 - TRANSECT DESCRIPTIONS – continued

Transect	Location	Elevation (Feet NAVD88)		V Zone Mapping Method
		Stillwater 1-percent-annual-chance	Max. Wave Crest 1-percent-annual-chance [1]	
15	At the shoreline of Long Island Sound, in the City of Stamford, from Downs Avenue to Saddle Rock Road	10.8	17	Wave Overtopping Splash Zone
16	At the shoreline of Long Island Sound, in the City of Stamford, Southwest of Westcott Cove, From Saddle Rock Road to Wallacks Drive	10.8	19	Breaking Wave Height
17	At the shoreline of Long Island Sound, in the City of Stamford, east of Westcott Cove at Cove Harbor From Wallacks Drive to Cove Island Park	10.7	19	Wave Overtopping Splash Zone
18	At the shoreline of Long Island Sound, in the City of Stamford, at Cove Island and Holly Pond, from Cove Island Park to Pratt Island	10.7	16	Breaking Wave Height
19	At the shoreline of Long Island Sound, in the Town of Darien, from Pratt Island to Pear Tree Point Road	10.7	18	Wave Overtopping Splash Zone
20	At the shoreline of Long Island Sound, in the Town of Darien, at Longneck Point, from Pear Tree Point Road to Long Neck Point Road	10.7	19	Wave Overtopping Splash Zone
21	At the shoreline of Long Island Sound, in the Town of Darien, at Scotts Cove, from Long Neck Point Road to Contentment Island Road	10.6	17	Runup
22	At the shoreline of Long Island Sound, in the Town of Darien, at the eastern shore of Contentment Island Road to Five Mile River	10.6	19	Wave Overtopping Splash Zone

[1] Because of map scale limitations, maximum wave elevations may not be shown on the FIRM.

TABLE 9 - TRANSECT DESCRIPTIONS – continued

Transect	Location	Elevation (Feet NAVD88)		V Zone Mapping Method
		Stillwater 1-percent-annual-chance	Max. Wave Crest 1-percent-annual-chance [1]	
23	At the shoreline of Long Island Sound, in the City of Norwalk, at Crescent Beach, from Five Mile River to Rocky Point Road	10.6	18	Breaking Wave Height
24	At the shoreline of Long Island Sound, in the City of Norwalk, between Wilson Cove and Tavern Island	10.5	19	Wave Overtopping Splash Zone
25	At the shoreline of Long Island Sound, in the City of Norwalk, between Hoyt Island and Keyser Point	10.5	16	Breaking Wave Height
26	At the shoreline of Long Island Sound, in the City of Norwalk, at Harbor View Beach, from Keyser Point to Neptune Avenue	10.5	19	Breaking Wave Height
27	At the shoreline of Long Island Sound, in the City of Norwalk, at Norwalk Harbor, from Neptune Avenue to Charles Creek	10.5	17	Breaking Wave Height
28	At the shoreline of Long Island Sound, in the City of Norwalk, east of Norwalk Harbor near Calf Pasture Island, from Charles Creek to Caufield Island Creek	10.4	17	Runup
29	At the shoreline of Long Island Sound, in the Town of Westport, between Corporate Limits and Bluff Point including Saugatuck River (Lower Reach)	10.4	19	Wave Overtopping Splash Zone
30	At the shoreline of Long Island Sound, in the Town of Westport, between Bluff Point and Saugatuck River (Lower Reach)	10.4	20	Wave Overtopping Splash Zone

[1] Because of map scale limitations, maximum wave elevations may not be shown on the FIRM.

TABLE 9 - TRANSECT DESCRIPTIONS – continued

Transect	Location	Elevation (Feet NAVD88) Stillwater 1-percent-annual-chance	Elevation (Feet NAVD88) Max. Wave Crest 1-percent-annual-chance [1]	V Zone Mapping Method
31	At the shoreline of Long Island Sound, in the Town of Westport, at the shoreline south of Owenoke Park, from Sagauck River (Lower Reach) to Compo Beach Road	10.4	19	Wave Overtopping Splash Zone
32	At the shoreline of Long Island Sound, in the Town of Westport, Compo Beach Road to Compo Road South	10.3	17	Breaking Wave Height
33	At the shoreline of Long Island Sound, in the Town of Westport, at Compo Cover, from Compo Road South to Sherwood Island Connector	10.3	18	Wave Overtopping Splash Zone
34	At the shoreline of Long Island Sound, in the Town of Westport, at the shoreline of Sherwood Island State Park, from Sherwood Island Connector to Burying Hill Road	10.3	18	Primary Frontal Dune
35	At the shoreline of Long Island Sound, in the Town of Westport, from Burying Hill Beach to south of Sasco Creek Beach	10.2	19	Runup
36	At the shoreline of Long Island Sound, in the Town of Fairfield, at Southport Harbor, from Beachside Lane to the East Bank of Mill River	10.2	17	Breaking Wave Height
37	At the shoreline of Long Island Sound, in the Town of Fairfield, at Sasco Hill Breach, from the East Bank of Mill River to Sasco Hill Road	10.2	17	Breaking Wave Height
38	At the shoreline of Long Island Sound, in the Town of Fairfield, from Sasco Hill Road to South Pine Creek Road	10.2	20	Wave Overtopping Splash Zone

[1] Because of map scale limitations, maximum wave elevations may not be shown on the FIRM.

TABLE 9 - TRANSECT DESCRIPTIONS – continued

Transect	Location	Elevation (Feet NAVD88)		V Zone Mapping Method
		Stillwater 1-percent-annual-chance	Max. Wave Crest 1-percent-annual-chance [1]	
39	At the shoreline of Long Island Sound, in the Town of Fairfield, at South Pine Creek Beach, from South Pine Creek Road to Intersection of French Street and Pine Creek Avenue	10.2	19	Wave Overtopping Splash Zone
40	At the shoreline of Long Island Sound, in the Town of Fairfield, from the intersection of French Street and Pine Creek Avenue to Fairfield Beach Road	10.2	21	Runup
41	At the shoreline of Long Island Sound, in the Town of Fairfield, at Pine Creek Point, from Fairfield Beach Road to Old Dam Road	10.2	18	Breaking Wave Height
42	At the shoreline of Long Island Sound, in the Town of Fairfield, from Old Dam Road to College Place	10.1	18	Runup
43	At the shoreline of Long Island Sound, in the Town of Fairfield, from College Place to the West Bank of Ash Creek	10.1	17	Breaking Wave Height
44	At the shoreline of Long Island Sound, in the City of Bridgeport, from the West Bank of Ash Creek to Black Rock Harbor	10.0	19	Runup
45	At the shoreline of Long Island Sound, in the City of Bridgeport, from Black Rock Harbor to Iranistan Avenue	10.0	17	Wave Overtopping Splash Zone
46	At the shoreline of Long Island Sound, in the City of Bridgeport, at the eastern side of Seaside Park, from Iranistan Avenue to Monument Drive	9.9	19	Wave Overtopping Splash Zone

[1] Because of map scale limitations, maximum wave elevations may not be shown on the FIRM.

TABLE 9 - TRANSECT DESCRIPTIONS – continued

Transect	Location	Elevation (Feet NAVD88) Stillwater 1-percent-annual-chance	Elevation (Feet NAVD88) Max. Wave Crest 1-percent-annual-chance [1]	V Zone Mapping Method
47	At the shoreline of Long Island Sound, in the City of Bridgeport, at Bridgeport Harbor, from Monument Drive to Pleasure Beach	9.8	18	Wave Overtopping Splash Zone
48	At the shoreline of Long Island Sound, in the Town of Stratford, at Long Beach and Lewis Gut, from Pleasure Beach to Oak Bluff Avenue	9.8	17	Wave Overtopping Splash Zone
49	At the shoreline of Long Island Sound, in the Town of Stratford, from Oak Bluff Avenue to Jefferson Street	9.7	17	Runup
50	At the shoreline of Long Island Sound, in the Town of Stratford, at Lordship Beach, from Jefferson Street to Cove Place	9.7	18	Breaking Wave Height
51	At the shoreline of Long Island Sound, in the Town of Stratford, at Stratford Point, from Cove Place to Ryegate Place	9.6	20	Wave Overtopping Splash Zone
52	At the shoreline of Long Island Sound, in the Town of Stratford, from Ryegate Place to Housatanic River	9.6	18	Wave Overtopping Splash Zone
53	At the shoreline of Long Island Sound, in the Town of Stratford, from Housatonic River to eastern corporate limits	9.6	15	Breaking Wave Height

[1] Because of map scale limitations, maximum wave elevations may not be shown on the FIRM.

The results of the coastal analysis using detailed methods are summarized in Table 10, “Transect Data,” which provides the flood hazard zone and base flood elevations for each coastal transect, along with the 10-, 2-, 1- and 0.2-percent-annual-chance flood stillwater elevations from the Long Island Sound flooding source, including effects of wave setup where applicable. Historic flood damage information was also used in the determination of floodprone areas along the Fairfield shoreline.

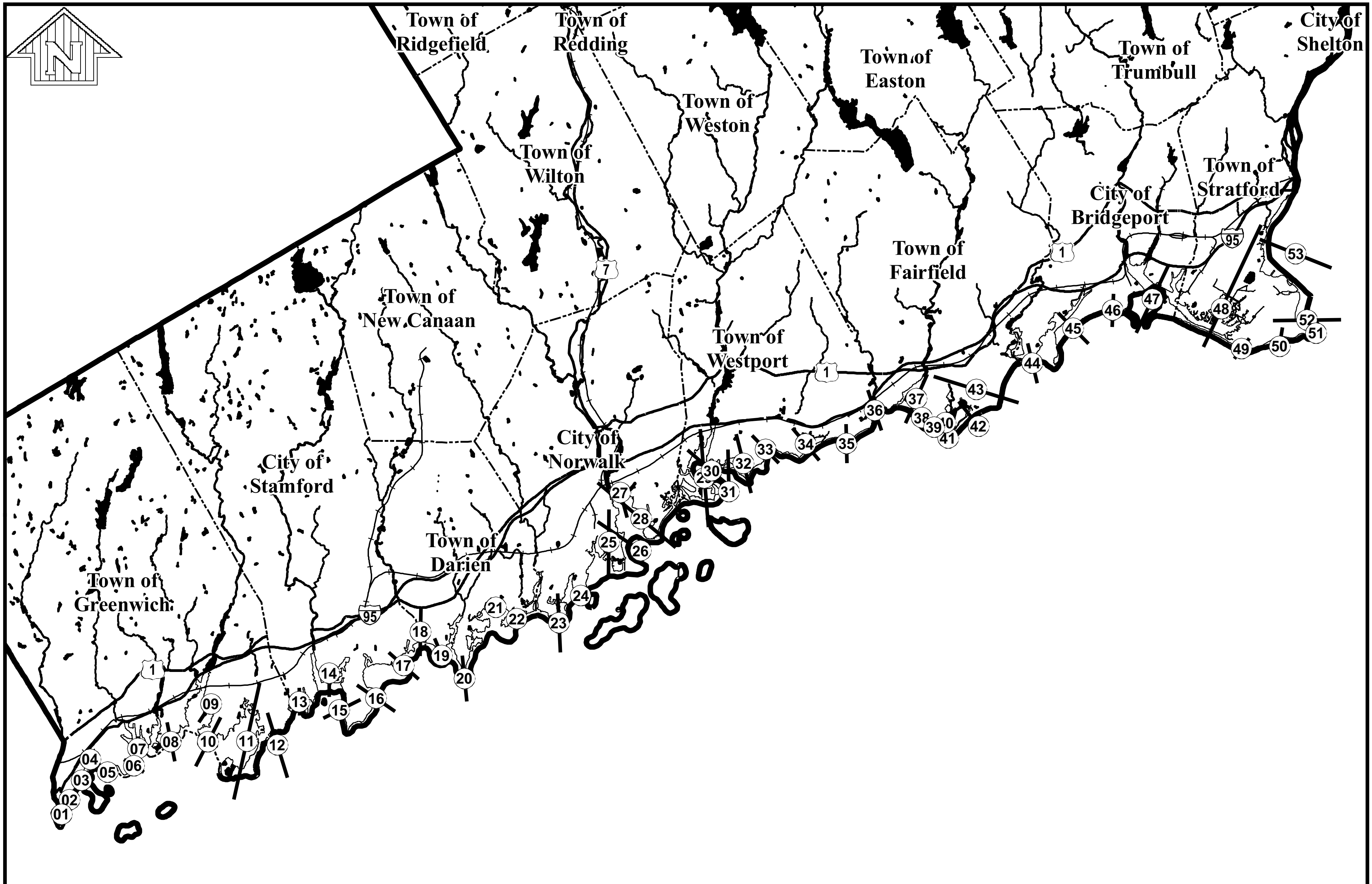

FIGURE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY

FAIRFIELD COUNTY, CT

(ALL JURISDICTIONS)

APPROXIMATE SCALE

0 17,000 34,000 51,000 68,000 Feet

TRANSECT LOCATION MAP

TABLE 10 - TRANSECT DATA

Flooding Source and Transect Number	Stillwater Elevation				Total Water Level [1]	Zone	Base Flood Elevation (Feet NAVD88) [2]
	10-percent-annual-chance	2-percent-annual-chance	1-percent-annual-chance	0.2-percent-annual-chance	1-percent-annual-chance		
LONG ISLAND SOUND							
Transect 1	8.6	10.4	11.0	12.5	12.1	AE	13-14
						VE	13-17
Transect 2	8.6	10.3	11.0	12.5	13.6	VE	17-20
Transect 3	8.6	10.3	11.0	12.5	14.9	AE	17
						VE	17-22
Transect 4	8.6	10.3	11.0	12.5	12.3	AE	13-14
						VE	14-17
Transect 5	8.6	10.3	11.0	12.5	13.8	AE	15-16
						VE	16-20
Transect 6	8.6	10.3	11.0	12.5	13.5	AE	15-16
						VE	16-20
Transect 7	8.6	10.3	11.0	12.5	12.9	AE	13-15
						VE	15-19
Transect 8	8.6	10.3	11.0	12.4	13.1	AE	13-15
						VE	15-19
Transect 9	8.6	10.2	10.9	12.4	11.4	AE	12-14
						VE	14-16
Transect 10	8.5	10.2	10.9	12.4	12.1	AE	12-14
						VE	14-18
Transect 11	8.5	10.2	10.9	12.4	13.8	AE	14-16
						VE	16-19
Transect 12	8.5	10.2	10.8	12.3	12.7	AE	13-15
						VE	15-18
Transect 13	8.5	10.1	10.8	12.3	11.8	AE	12-14
						VE	14-17
Transect 14	8.4	10.1	10.8	12.2	12.7	AE	13-15
						VE	15-19
Transect 15	8.4	10.1	10.8	12.2	11.9	AE	12-14
						VE	14-17

[*] Data not available.
[1] Including stillwater elevation and effects of wave setup.
[2] Because of map scale limitations, base flood elevations shown on the FIRM represent average elevations for the zones depicted.

TABLE 10 - TRANSECT DATA – continued

Flooding Source and Transect Number	Stillwater Elevation				Total Water Level [1]	Zone	Base Flood Elevation (Feet NAVD88) [2]
	10-percent-annual-chance	2-percent-annual-chance	1-percent-annual-chance	0.2-percent-annual-chance	1-percent-annual-chance		
LONG ISLAND SOUND - continued							
Transect 16	8.4	10.1	10.8	12.2	12.5	AE	13-15
						VE	15-19
Transect 17	8.4	10.0	10.7	12.2	13.3	AE	13-15
						VE	15-19
Transect 18	8.4	10.0	10.7	12.1	11.5	AE	12-14
						VE	14-16
Transect 19	8.4	10.0	10.7	12.1	12.6	AE	13-15
						VE	15-18
Transect 20	8.3	10.0	10.7	12.1	12.9	AE	13-15
						VE	15-19
Transect 21	8.3	10.0	10.6	12.1	11.6	AE	12-14
						VE	14-17
Transect 22	8.3	9.9	10.6	12.0	12.8	AE	13-15
						VE	15-19
Transect 23	8.3	9.9	10.6	12.0	12.7	AE	13-15
						VE	15-18
Transect 24	8.2	9.9	10.5	12.0	12.6	AE	13-15
						VE	15-19
Transect 25	8.2	9.8	10.5	11.9	10.9	AE	11-13
						VE	13-16
Transect 26	8.2	9.8	10.5	11.9	12.8	AE	14-15
						VE	15-19
Transect 27	8.2	9.8	10.5	11.9	11.6	AE	13-14
						VE	14-17
Transect 28	8.2	9.8	10.4	11.9	12.1	AE	12-14
						VE	14-17
Transect 29	8.1	9.7	10.4	11.8	12.7	AE	13-15
						VE	15-19
Transect 30	8.1	9.7	10.4	11.8	13.4	AE	13-16
						VE	17-20

* Data not available.
[1] Including stillwater elevation and effects of wave setup.
[2] Because of map scale limitations, base flood elevations shown on the FIRM represent average elevations for the zones depicted.

TABLE 10 - TRANSECT DATA – continued

Flooding Source and Transect Number	Stillwater Elevation				Total Water Level [1]	Zone	Base Flood Elevation (Feet NAVD88) [2]
	10-percent-annual-chance	2-percent-annual-chance	1-percent-annual-chance	0.2-percent-annual-chance	1-percent-annual-chance		
LONG ISLAND SOUND - continued							
Transect 31	8.1	9.7	10.4	11.8	12.6	AE	13-15
						VE	15-19
Transect 32	8.1	9.7	10.3	11.7	11.4	AE	11-13
						VE	13-17
Transect 33	8.1	9.7	10.3	11.7	12.3	AE	12-14
						VE	14-18
Transect 34	8.0	9.6	10.3	11.7	12.0	AE	12-14
						VE	14-18
Transect 35	8.0	9.6	10.2	11.6	12.8	AE	13-15
						VE	15-19
Transect 36	8.0	9.6	10.2	11.6	11.5	AE	12-14
						VE	14-17
Transect 37	8.0	9.5	10.2	11.6	11.4	AE	12-13
						VE	13-17
Transect 38	8.0	9.5	10.2	11.5	13.4	AE	14-16
						VE	16-20
Transect 39	8.0	9.5	10.2	11.5	12.7	AE	13-15
						VE	15-19
Transect 40	8.0	9.5	10.2	11.5	13.8	AE	14-16
						VE	16-21
Transect 41	7.9	9.5	10.2	11.5	11.9	AE	12-14
						VE	14-18
Transect 42	7.9	9.5	10.1	11.5	12	AE	13-14
						VE	14-18
Transect 43	7.9	9.5	10.1	11.5	11.1	AE	11-13
						VE	13-17
Transect 44	7.9	9.4	10.0	11.4	12.9	AE	14-15
						VE	15-19

[*] Data not available.
[1] Including stillwater elevation and effects of wave setup.
[2] Because of map scale limitations, base flood elevations shown on the FIRM represent average elevations for the zones depicted.

TABLE 10 - TRANSECT DATA – continued

Flooding Source and Transect Number	Stillwater Elevation				Total Water Level[1]	Zone	Base Flood Elevation (Feet NAVD88)[2]
	10-percent-annual-chance	2-percent-annual-chance	1-percent-annual-chance	0.2-percent-annual-chance	1-percent-annual-chance		
LONG ISLAND SOUND - continued							
Transect 45	7.8	9.3	10.0	11.3	11.6	AE	12-14
						VE	14-17
Transect 46	7.7	9.3	9.9	11.2	12.8	AE	14-15
						VE	15-19
Transect 47	7.7	9.2	9.8	11.1	12.2	AE	12-14
						VE	15-18
Transect 48	7.6	9.2	9.8	11.1	11.7	AE	12-14
						VE	14-17
Transect 49	7.6	9.1	9.7	11.1	11.3	AE	11-13
						VE	13-17
Transect 50	7.6	9.1	9.7	11.0	12.2	AE	13-14
						VE	14-18
Transect 51	7.6	9.0	9.6	11.0	13.3	AE	13-14
						VE	17-20
Transect 52	7.5	9.0	9.6	10.9	11.9	AE	12-14
						VE	14-18
Transect 53	7.5	9.0	9.6	10.9	11.3	AE	12-13
						VE	13-15

[*] Data not available.
[1] Including stillwater elevation and effects of wave setup.
[2] Because of map scale limitations, base flood elevations shown on the FIRM represent average elevations for the zones depicted.

3.5 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 FIS reports and FIRMs was the National Geodetic Vertical Datum of 1929 (NGVD29). With the completion of the NAVD88, many FIS reports and FIRMs are being prepared using NAVD88 as the referenced vertical datum.

All flood elevations shown in this FIS report and on the FIRMs are referenced to NAVD88. Structure and ground elevations in the community must, therefore, be referenced to NAVD88. It is important to note that adjacent communities may be referenced to NGVD29. This may result in differences in Base Flood Elevations (BFEs) across the corporate limits between the communities.

Versions of the FIS report and FIRM prior to June 18, 2010 were referenced to NGVD29. When a datum conversion is effected for a FIS report and FIRM, the Flood Profiles, BFEs and ERMs reflect the new datum values. To compare structure and ground elevations to 1-percent-annual-chance (100-year) 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 FIRM for Fairfield County are referenced to NAVD88. Ground, structure, and flood elevations may be compared and/or referenced to NGVD29 by applying a standard conversion factor to the NAVD88 values. The conversion factor is 1.0 foot, where NGVD29 = NAVD88 + 1.0 foot.

The BFEs shown on the FIRM represent whole-foot rounded values. For example, a BFE of 102.4 will appear as 102 on the FIRM and 102.6 will appear as 103. Therefore, users that wish to convert the elevations in this FIS to NGVD29 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.

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 NGVD29 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 NAVD88, 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. Between cross sections, the boundaries were interpolated using topographic maps at a scale of 1:4,800 with a contour interval of 5 feet (Reference 87); at a scale of 1:2,400 with a contour interval of 4 feet (Reference 88); at a scale of 1"=400' with a contour interval of 2 feet (Reference 125); at a scale of 1:2,400 with a contour interval of 2 feet (Reference 126); at a scale of 1"=500', with a contour interval of 5 feet (Reference 87); at a scale of 1:24,000, with a contour interval of 10 feet (Reference 73); and at a scale of 1:4,800 with a contour interval of 4 feet (Reference 127).

For coastal flooding sources studied by detailed methods in this countywide FIS, the 1- and 0.2-percent-annual-chance flood boundaries were delineated using 2-foot-contour topographic maps developed from LiDAR data collected in 2006 (Reference 116).

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

In the Town of Ridgefield, for the August 23, 1999, revision, the boundaries were interpolated between cross sections using topographic maps at a scale of 1:1,200 with a contour interval of 2 feet (Reference 99). The boundaries were then digitized for presentation on the digital work map. The roadway and brook centerlines, and edges of ponds shown on the work maps for Miry Brook, the Unnamed Tributary to Saugatuck River, and the South Branch of Unnamed Tributary to Saugatuck River were digitized from the 1:1,200 scale topographic maps (Reference 99). The roadway, railroad, and river centerlines, and edges of ponds for the Norwalk River work map were digitized from the 1:2,400 scale topographic maps with a contour interval of 2 feet prepared for the CEL study (Reference 100).

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

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

4.2 Floodways

Encroachment on floodplains, such as structures and fill, reduces flood-carrying capacity, increases flood heights and velocities, and increases flood hazards in areas beyond the encroachment itself. One aspect of floodplain management involves balancing the economic gain from floodplain development against the resulting increase in flood hazard. For purposes of the NFIP, a floodway is used as a tool to assist local communities in this aspect of floodplain management. Under this concept, the area of 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 study are presented to local agencies as minimum standards that can be adopted directly or that can be used as a basis for additional floodway studies.

The floodways presented in this FIS report and on the FIRM were computed for the 2010 countywide study 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 11, shown in Volume 2). The computed floodways are shown on the FIRM (Exhibit 2). In cases where the floodway and 1-percent-annual-chance floodplain boundaries are either close together or collinear, only the floodway boundary is shown.

The 2013 coastal study impacted the limit of backwater effects on some of the Floodway Data Tables and Flood Profiles by revising the annual 10-, 2-, 1-, and 0.2-percent-annual-chance flood elevations at the confluence of several rivers and Long Island Sound. Floodway Data Tables and Flood Profiles were updated for Bruce Brook, Byram River, Cider Mill Brook, Dead Man’s Brook, Ferry Creek/Long Brook, Goodwives River, Grasmere Brook, Horseneck Brook, Housatonic River, Mill River, Muddy Brook, Noroton River, Pequonnock River (Lower Reach), Rippowam River (Lower Reach), Rooster River, Sasco Creek, Saugatuck River (Lower Reach), Stony Brook 1, Stony Brook 2, Strickland Brook, Tokeneke Brook, and Yellow Mill Channel.

Portions of the floodway widths for Byram River, Housatonic River (Lower Reach), Housatonic River (Upper Reach), and Tenmile River are outside the county boundary.

In the City of Shelton, a floodway is within the channel on Burying Ground Brook upstream of the intersection of Center Street and Long Hill Avenue. Downstream of the intersection the 1-percent-annual-chance flood disperses as sheet flow.

Because floodways are not applicable for tidal water bodies, no floodway is designated for the Long Island Sound.

No floodway was calculated for Blind Brook, Housatonic River (Middle Reach), Londons Brook Divided Flow, Pond Brook, and Split Flow from Lake Windwing.

In the Town of Newtown, in the December 1978 revision, a floodway for the Housatonic River (Upper Reach) and Lake Zoar were not calculated due to the constant pool elevation of the lake and the steep slopes on each side of the watercourse. The 1-percent-annual-chance flood is contained within the channel banks. Pootatuck River cross section AM is shown as a divided floodway due to the river channel dividing around an area of elevated topography.

The Halfway River forms a community boundary and thus part of the floodway is in the Town of Monroe. There are no existing state encroachment lines within the Town of Newtown.

Floodways for this study were determined by using Encroachment Methods 1, 4, and 6 of the USACE HEC-2 computer program (References 81 & 82). No encroachment was attempted for cross sections at bridges and encroachment limits were based on equal conveyance, which would produce a surcharge in water surface related to a corresponding maximum 1-foot surcharge in energy gradeline or water-surface elevation. Because of the effects of downstream encroachment on energy gradeline or water-surface elevation upstream, there may be numerous cross sections where minimal encroachment can be permitted without upstream energy gradeline or water-surface elevation increases of more than 1 foot. These effects, therefore, impose an additional constraint on floodplain encroachment.

In the City of Bridgeport, floodways have been delineated for Lake Forest, Success Lake, and Bunnell's Pond, and coincide with the shorelines, as coordinated between city officials and the study contractor. In the revised portion of the Rooster River, a floodway has not been delineated because flow is confined to the channel and conduit.

In the City of Danbury, the floodways proposed for this study were determined using Method 1 of the USACE HEC-1 computer program involving general encroachment throughout the study reach (References 81 & 82). No encroachment was attempted for cross sections at bridges or areas having pre-floodway condition velocities greater than the maximum permitted. Encroachment limits were compressed to produce as near a 1 foot water-surface rise at each cross section as possible. Channel and overbank velocities were checked to insure that they were within the maximums permitted. If they were not, the encroachment limits were adjusted until the velocities were reduced below these maximums, often resulting in a water-surface increase of less than 1 foot.

Because of the effects of downstream encroachment on water-surface elevations upstream, there may be numerous cross sections where minimal or even no encroachment can be permitted without upstream elevation increases of more than 1 foot. This "domino" effect, therefore, imposes an additional constraint on floodplain encroachment.

Under certain flow conditions, as the cross-sectional flow area is reduced, the local effect is to lower the water-surface elevation and increase velocity. The water-surface elevation drops because potential energy is converted to kinetic energy to accelerate the flow through the restrictive section. Though the local effect of such an encroachment is a reduction of water-surface elevation, the increased velocity usually results in an increase in water-surface elevation at some point upstream. If further encroachment were allowed at the restrictive section, the water surface would continue to drop and the velocity would continue to increase, causing a rise greater than 1.0 foot at upstream sections.

The floodway width seems to indicate that encroachments can be made almost up to the channel limit in most cases without producing a 1 foot water-surface rise or hazardous velocities. The prime exceptions are the lower reach of the Still River and Limekiln Brook 2. Along the reach of the Still River below the new Route 7 bridge, the significantly wide floodway restricts the areas that could be filled. On the other hand, the Still River from U.S. Route 84 to Newtown Road and Limekiln Brook 2 require modest floodways with encroachment limits closer to the channel. This condition allows for further significant development. However, one further point should be considered. As previously mentioned, the swamps and lowlands along the floodplains provide some degree of natural flood retention and control. Developing these areas would reduce this control, possibly increasing flood heights and damages in other areas downstream.

In the Town of Darien, floodway information for Five Mile River and for the Noroton River was obtained from the FISs for the Cities of Stamford and Norwalk (References 58 & 59).

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 10 for certain downstream cross sections of Beaver Brook, Belden Brook, Brown's Brook, Cider Mill Brook, Cooper Pond Brook, East Branch Byram River, East Brook, Grasmere Brook, Goodwives River, Halfway River, Horseneck Brook, Island Brook, Jenning's Brook, Limekiln Brook 1, Londons Brook, Morehouse Brook, Pequonnock River (Lower Reach), Pootatuck River, Poplar Plains Brook, Rippowam River (Lower Reach), South Branch of Unnamed Tributary to Saugatuck River, Springdale Brook, Stony Brook 1, Strickland Brook, Tokeneke Brook, Tributary A to Horse Tavern Brook, Tributary C to Tributary B to Canoe Brook Lake, Tributary E to Pequonnock River, Tributary F to Pequonnock River, Tributary J to Pequonnock River, West Branch Pequonnock River, West Branch Saugatuck River, West Brothers Brook, Willow Brook, and Yellow Mill Channel 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.

In the Town of Greenwich, profiles for Horseneck Brook, Strickland Brook, and Cider Mill Brook were modified to reflect the influence of Long Island Sound.

In the Town of Monroe, floodwaters from the West Branch Pequonnock River, the Farmill River, Means Brook, and the Halfway River were found to have hazardous velocities. In the Town of Redding, floodwaters from the Aspetuck River (Upper Reach) were found to have hazardous velocities.

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 10, "Floodway Data," shown in Volume 2. To reduce the risk of property damage in areas where the stream velocities are high, the community may also wish to restrict development in areas outside the floodway.

The area between the floodway and 1-percent-annual-chance (100 year) floodplain boundaries is termed the floodway fringe. The floodway fringe encompasses the portion of the floodplain that could be completely obstructed without increasing the water-surface elevation of the 1-percent-annual-chance flood by more than 1.0 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to floodplain development are shown in Figure 4, "Floodway Schematic."

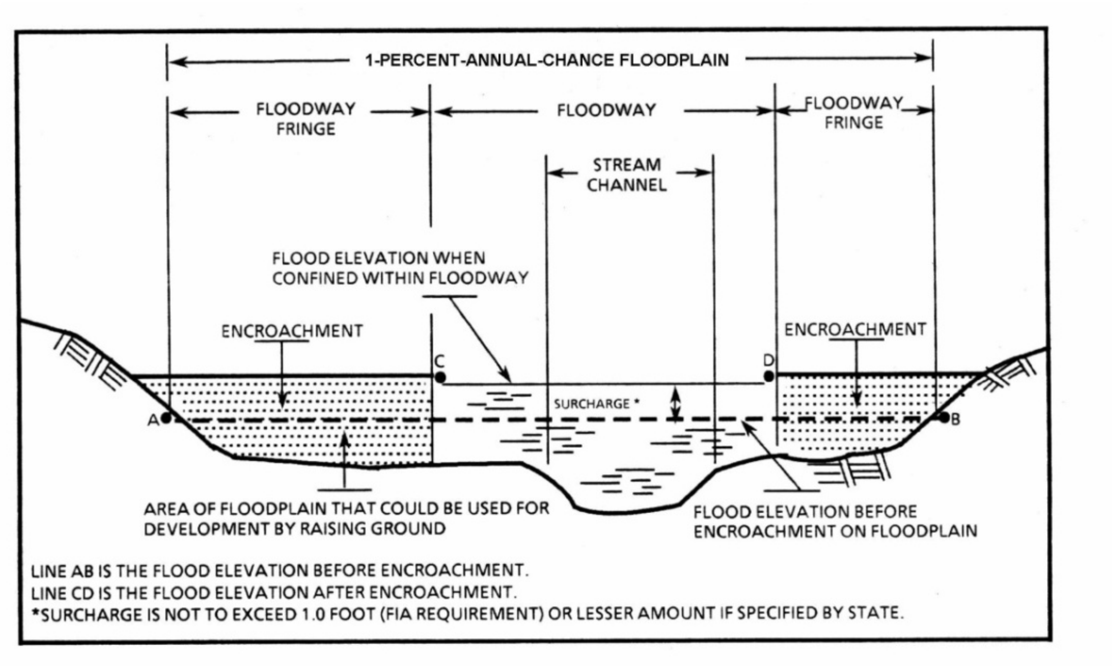

FIGURE 12 – FLOODWAY SCHEMATIC

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. These zones are as follows:

Zone A

Zone A is the flood insurance risk zone that corresponds to the 1-percent-annual-chance (100-year) floodplains that are determined in the FIS by approximate methods. Because detailed hydraulic analyses are not performed for such area, no BFEs or base flood depths are shown.

Zone AE

Zone AE is the flood insurance risk zone that corresponds to the 1-percent-annual-chance floodplains that are determined in the FIS by detailed methods. In most instances, whole-foot 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 risk zone that corresponds to the areas of 1-percent-annual-chance shallow flooding (usually sheet flow on sloping terrain) where average depths are between 1 and 3 feet. Average whole-depths derived from the detailed hydraulic analyses are shown within this zone.

Zone VE

Zone VE is the flood insurance risk zone that corresponds to the 1-percent-annual-chance coastal floodplains that have additional hazards associated with storm waves. Whole-foot 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 risk zone that corresponds to areas outside the 0.2-percent-annual-chance (500-year) 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.

Boundaries of the John H. Chafee Coastal Barrier Resources System (CBRS) shown on the FIRM were transferred from the official CBRS source maps and depicted on the FIRM for informational purposes only. The official CBRS maps are enacted by Congress via the Coastal Barrier Resources Act, as amended, and maintained by the U.S. Fish and Wildlife Service (FWS). The official CBRS maps used to determine whether or not an area is located within the CBRS are available for download at http://www.fws.gov. For an official determination of whether or not an area is located within the CBRS, or for any questions regarding the CBRS, please contact the FWS field office at (603) 223-2541.

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 risk zones as described in Section 5.0 and, in the 1-percent-annual-chance (100-year) floodplains that were studied by detailed methods, shows selected whole-foot BFEs or average depths. Insurance agents use zones and BFEs in conjunction with information on structures and their contents to assign premium rates for flood insurance policies.

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

The countywide FIRM presents flooding information for the entire geographic area of Fairfield County. Previously, FIRMs were prepared for each incorporated community of the County identified as flood-prone. This countywide FIRM also includes flood-hazard information that was presented separately on Flood Boundary and Floodway Maps (FBFMs), where applicable. Historical data relating to the maps prepared for each community are presented in Table 12, "Community Map History."

COMMUNITY NAME	INITIAL IDENTIFICATION	FLOOD HAZARD BOUNDARY MAP REVISION DATE(S)	FLOOD INSURANCE RATE MAP EFFECTIVE DATE	FLOOD INSURANCE RATE MAP REVISION DATE(S)
Bethel, Town of	April 5, 1974	February 18, 1977	February 15, 1984	None
Bridgeport, City of	September 13, 1974	February 11, 1977	October 15, 1980	October 1, 1983 March 1, 1984 September 6, 1989 June 16, 1992
Brookfield, Town of	July 26, 1974	September 17, 1976	June 15, 1979	None
Danbury, City of	August 2, 1974	None	May 2, 1977	April 16, 1982
Darien, Town of	July 26, 1974	May 17, 1977 November 8, 1977	January 2, 1981	November 17, 1982 September 2, 1993
Easton, Town of	October 18, 1974	September 17, 1976	September 30, 1983	None
Fairfield, Town of	August 2, 1974	None	August 15, 1978	August 19, 1986 October 6, 1998
Greenwich, Town of	October 18, 1974	None	September 30, 1977	August 19, 1986 February 22, 1999
Monroe, Town of	August 16, 1974	September 24, 1976	April 17, 1985	March 4, 1991
New Canaan, Town of	July 19, 1974	None	May 16, 1977	June 4, 1990
New Fairfield, Town of	January 31, 1975	None	February 15, 1984	None

TABLE 12

FEDERAL EMERGENCY MANAGEMENT AGENCY

FAIRFIELD COUNTY, CT
(ALL JURISDICTIONS)

COMMUNITY MAP HISTORY

COMMUNITY NAME	INITIAL IDENTIFICATION	FLOOD HAZARD BOUNDARY MAP REVISION DATE(S)	FLOOD INSURANCE RATE MAP EFFECTIVE DATE	FLOOD INSURANCE RATE MAP REVISION DATE(S)
Newtown, Town of	October 18, 1974	May 31, 1977	June 15, 1979	April 16, 2003
Norwalk, City of	October 25, 1974	None	April 3, 1978	August 19, 1986 June 2, 1992
Redding, Town of	August 23, 1974	December 10, 1976	June 15, 1982	None
Ridgefield, Town of	September 13, 1974	December 10, 1976 November 26, 1980	September 30, 1982	August 23, 1999
Shelton, City of	May 24, 1974	None	September 29, 1978	July 2, 1991 September 7, 2000
Sherman, Town of	February 21, 1975	None	June 18, 1987	None
Stamford, City of	August 2, 1974	May 23, 1978	January 16, 1981	March 1, 1984 November 17, 1993
Stratford, Town of	February 28, 1975	None	June 1, 1978	August 1, 1980 March 15, 1984 April 16, 1990 June 16, 1992
Trumbull, Town of	June 28, 1974	April 1, 1977	December 4, 1979	December 19, 1997

TABLE 12

FEDERAL EMERGENCY MANAGEMENT AGENCY

FAIRFIELD COUNTY, CT
(ALL JURISDICTIONS)

COMMUNITY MAP HISTORY

COMMUNITY NAME	INITIAL IDENTIFICATION	FLOOD HAZARD BOUNDARY MAP REVISION DATE(S)	FLOOD INSURANCE RATE MAP EFFECTIVE DATE	FLOOD INSURANCE RATE MAP REVISION DATE(S)
Weston, Town of	March 8, 1974	None	October 17, 1978	May 15, 1984 December 19, 1997
Westport, Town of	July 19, 1974	None	July 2, 1980	December 4, 1984 January 7, 1998 June 30, 1999
Wilton, Town of	March 15, 1974	July 23, 1976	November 17, 1982	June 4, 1990

TABLE 12

FEDERAL EMERGENCY MANAGEMENT AGENCY

FAIRFIELD COUNTY, CT
(ALL JURISDICTIONS)

COMMUNITY MAP HISTORY

7.0 OTHER STUDIES

This FIS report either supersedes or is compatible with all previous studies published on streams studied in this report and should be considered authoritative for the purposes of the NFIP.

Because it is based on more up-to-date analysis, this FIS supersedes the previously printed FISs for the Town of Sherman, Town of New Fairfield, Town of Brookfield, Town of Danbury, Town of Bethel, Town of Newtown, Town of Ridgefield, Town of Redding, Town of Monroe, Town of New Canaan, Town of Wilton, Town of Weston, Town of Easton, Town of Trumbull, Town of Shelton, Town of Greenwich, City of Stamford, Town of Darien, City of Norwalk , Town of Westport, City of Fairfield, City of Bridgeport, and Town of Stratford (References 48, 49, 58, 59, 61, 68, 95, 111, 128, & 129).

For coastal flooding in the Town of Greenwich, City of Stamford, Town of Darien, City of Norwalk, Town of Westport, City of Fairfield, City of Bridgeport, and Town of Stratford, this FIS supersedes the June 18, 2010 countywide FIS.

8.0 LOCATION OF DATA

Information concerning the pertinent data used in preparation of this study can be obtained by contacting Federal Insurance and Mitigation Division, FEMA Region I, 99 High Street, 6th Floor, Boston, Massachusetts 02110.

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