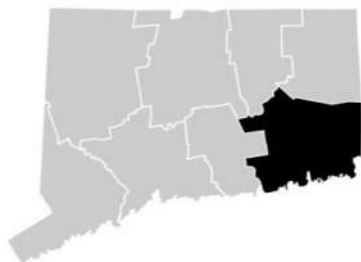


FLOOD INSURANCE STUDY

FEDERAL EMERGENCY MANAGEMENT AGENCY

VOLUME 1 OF 5



NEW LONDON COUNTY, CONNECTICUT

(ALL JURISDICTIONS)

COMMUNITY NAME	NUMBER	COMMUNITY NAME	NUMBER
BOZRAH, TOWN OF	090094	OLD LYME, TOWN OF	090103
COLCHESTER, TOWN OF	090095	PRESTON, TOWN OF	090139
EAST LYME, TOWN OF	090096	SALEM, TOWN OF	090156
FRANKLIN, TOWN OF	090154	SPRAGUE, TOWN OF	090105
GRISWOLD, TOWN OF	090173	STONINGTON, BOROUGH OF	090193
GROTON LONG POINT ASSOCIATION	090167	STONINGTON, TOWN OF	090106
GROTON, CITY OF	090126	VOLUNTOWN, TOWN OF	090143
GROTON, TOWN OF	090097	WATERFORD, TOWN OF	090107
JEWETT CITY, BOROUGH OF	090098		
LEBANON, TOWN OF	090155		
LEDYARD, TOWN OF	090157		
LISBON, TOWN OF	090172		
LYME, TOWN OF	090127		
MONTVILLE, TOWN OF	090099		
NEW LONDON, CITY OF	090100		
NOANK FIRE DISTRICT	090129		
NORTH STONINGTON, TOWN OF	090101		
NORWICH, CITY OF	090102		

REVISED:

August 1, 2023

FLOOD INSURANCE STUDY NUMBER

09011CV001D

Version Number 2.6.3.6



FEMA

TABLE OF CONTENTS

Volume 1

	<u>Page</u>
SECTION 1.0 – INTRODUCTION	1
1.1 The National Flood Insurance Program	1
1.2 Purpose of this Flood Insurance Study Report	2
1.3 Jurisdictions Included in the Flood Insurance Study Project	2
1.4 Considerations for using this Flood Insurance Study Report	11
SECTION 2.0 – FLOODPLAIN MANAGEMENT APPLICATIONS	22
2.1 Floodplain Boundaries	22
2.2 Floodways	32
2.3 Base Flood Elevations	33
2.4 Non-Encroachment Zones	34
2.5 Coastal Flood Hazard Areas	34
2.5.1 Water Elevations and the Effects of Waves	34
2.5.2 Floodplain Boundaries and BFEs for Coastal Areas	36
2.5.3 Coastal High Hazard Areas	37
2.5.4 Limit of Moderate Wave Action	38
SECTION 3.0 – INSURANCE APPLICATIONS	39
3.1 National Flood Insurance Program Insurance Zones	39
SECTION 4.0 – AREA STUDIED	40
4.1 Basin Description	40
4.2 Principal Flood Problems	44
4.3 Dams and Other Flood Hazard Reduction Measures	49
4.4 Levee Systems	49
SECTION 5.0 – ENGINEERING METHODS	52
5.1 Hydrologic Analyses	52
5.2 Hydraulic Analyses	64
5.3 Coastal Analyses	79
5.3.1 Total Stillwater Elevations	80
5.3.2 Waves	81
5.3.3 Coastal Erosion	82
5.3.4 Wave Hazard Analyses	82
5.4 Alluvial Fan Analyses	88
SECTION 6.0 – MAPPING METHODS	88
6.1 Vertical and Horizontal Control	88
6.2 Base Map	89
6.3 Floodplain and Floodway Delineation	89

TABLE OF CONTENTS

Volume 1 (continued)

Figures

	<u>Page</u>
Figure 1: FIRM Index	13
Figure 2: FIRM Notes to Users	15
Figure 3: Map Legend for FIRM	18
Figure 4: Floodway Schematic	33
Figure 5: Wave Runup Transect Schematic	35
Figure 6: Coastal Transect Schematic	38
Figure 7: Frequency Discharge-Drainage Area Curves	62
Figure 8: 1% Annual Chance Total Stillwater Elevations for Coastal Areas	81
Figure 9: Transect Location Map	87

Tables

	<u>Page</u>
Table 1: Listing of NFIP Jurisdictions	2
Table 2: Flooding Sources Included in this FIS Report	23
Table 3: Flood Zone Designations by Community	39
Table 4: Basin Characteristics	40
Table 5: Principal Flood Problems	44
Table 6: Historic Flooding Elevations	48
Table 7: Dams and Other Flood Hazard Protection Measures	49
Table 8: Levee Systems	51
Table 9: Summary of Discharges	54
Table 10: Summary of Non-Coastal Stillwater Elevations	63
Table 11: Stream Gage Information used to Determine Discharges	64
Table 12: Summary of Hydrologic and Hydraulic Analyses	66
Table 13: Roughness Coefficients	78
Table 14: Summary of Coastal Analyses	79
Table 15: Tide Gage Analysis Specifics	81
Table 16: Coastal Transect Parameters	83
Table 17: Summary of Alluvial Fan Analyses	88
Table 18: Results of Alluvial Fan Analyses	88
Table 19: Countywide Vertical Datum Conversion	88
Table 20: Stream-Based Vertical Datum Conversion	89
Table 21: Base Map Sources	89
Table 22: Summary of Topographic Elevation Data used in Mapping	90

TABLE OF CONTENTS

Volume 2

	<u>Page</u>
6.4 Coastal Flood Hazard Mapping	160
6.5 FIRM Revisions	165
6.5.1 Letters of Map Amendment	166
6.5.2 Letters of Map Revision Based on Fill	166
6.5.3 Letters of Map Revision	166
6.5.4 Physical Map Revisions	167
6.5.5 Contracted Restudies	167
6.5.6 Community Map History	167

Tables

	<u>Page</u>
Table 23: Floodway Data	93
Table 24: Flood Hazard and Non-Encroachment Data for Selected Streams	160
Table 25: Summary of Coastal Transect Mapping Considerations	161
Table 26: Incorporated Letters of Map Change	167
Table 27: Community Map History	168

Volume 3

	<u>Page</u>
SECTION 7.0 – CONTRACTED STUDIES AND COMMUNITY COORDINATION	171
7.1 Contracted Studies	171
7.2 Community Meetings	178
SECTION 8.0 – ADDITIONAL INFORMATION	183
SECTION 9.0 – BIBLIOGRAPHY AND REFERENCES	185

Tables

	<u>Page</u>
Table 28: Summary of Contracted Studies Included in this FIS Report	171
Table 29: Community Meetings	179
Table 30: Map Repositories	183
Table 31: Additional Information	185
Table 32: Bibliography and References	186

TABLE OF CONTENTS

Volume 4

Exhibits

Flood Profiles	<u>Panel</u>
Anguilla Brook	01-04 P
Ashaway River	05 P
Beaver Brook (Town of Lyme)	06-07 P
Beaver Brook (Town of Sprague)	08-09 P
Birch Plain Creek	10-13 P
Blissville Brook	14-16 P
Bobbin Mill Brook	17 P
Copps Brook	18-19 P
Day Meadow Brook	20 P
Denison Brook	21-22 P
East Branch Eight Mile River	23-25 P
Eccleston Brook	26-27 P
Eight Mile River	28-30 P
Fishtown Brook	31-32 P
Flat Brook	33-34 P
Ford Brook	35-37 P
Fort Hill Brook	38-43 P
Fourmile River	44-47 P
Gardner Brook	48-50 P
Goldmine Brook	51 P
Great Meadow Brook	52-54 P
Great Plain Brook	55 P
Green Fall River	56-58 P
Harris Brook	59-62 P
Hunter Brook	63 P
Jeremy River	64 P
Joe Clark Brook	65-66 P
Jordan Brook	67-71 P
Judd Brook	72-75 P
Latimer Brook	76-83 P
Little River	84-85 P
Meadow Brook	86-89 P
Nevins Brook	90-91 P
Norwichtown Brook	92 P

TABLE OF CONTENTS

Volume 5

Exhibits

Flood Profiles	<u>Panel</u>
Oxoboxo Brook	93-96 P
Pachaug River	97-102 P
Pachaug River (Town of Voluntown)	103-105 P
Pattagansett River	106-110 P
Pawcatuck River	111-116 P
Pine Swamp Brook	117 P
Quinebaug River	118-121 P
Shetucket River	122-125 P
Shewville Brook	126 P
Shunock River	127-132 P
Spaulding Pond Brook	133-135 P
Susquetonscut Brook (Town of Franklin)	136-138 P
Susquetonscut Brook (Town of Lebanon)	139-141 P
Tenmile River	142-144 P
Thames River and Shetucket River	145 P
Trading Cove Brook	146-147 P
Tributary A	148-150 P
Tributary B	151 P
Tributary C	152 P
Tributary D	153 P
Tributary F	154 P
Whitford Brook (Town of Groton)	155-156 P
Whitford Brook (Town of Ledyard)	157 P
Williams Brook	158-159 P
Wyassup Brook	160 P
Yantic River	161-167 P
Yantic River East Channel	168 P

Published Separately

Flood Insurance Rate Map (FIRM)

FLOOD INSURANCE STUDY REPORT NEW LONDON COUNTY, CONNECTICUT

SECTION 1.0 – INTRODUCTION

1.1 The National Flood Insurance Program

The National Flood Insurance Program (NFIP) is a voluntary Federal program that enables property owners in participating communities to purchase insurance protection against losses from flooding. This insurance is designed to provide an alternative to disaster assistance to meet the escalating costs of repairing damage to buildings and their contents caused by floods.

For decades, the national response to flood disasters was generally limited to constructing flood-control works such as dams, levees, sea-walls, and the like, and providing disaster relief to flood victims. This approach did not reduce losses nor did it discourage unwise development. In some instances, it may have actually encouraged additional development. To compound the problem, the public generally could not buy flood coverage from insurance companies, and building techniques to reduce flood damage were often overlooked.

In the face of mounting flood losses and escalating costs of disaster relief to the general taxpayers, the U.S. Congress created the NFIP. The intent was to reduce future flood damage through community floodplain management ordinances, and provide protection for property owners against potential losses through an insurance mechanism that requires a premium to be paid for the protection.

The U.S. Congress established the NFIP on August 1, 1968, with the passage of the National Flood Insurance Act of 1968. The NFIP was broadened and modified with the passage of the Flood Disaster Protection Act of 1973 and other legislative measures. It was further modified by the National Flood Insurance Reform Act of 1994 and the Flood Insurance Reform Act of 2004. The NFIP is administered by the Federal Emergency Management Agency (FEMA), which is a component of the Department of Homeland Security (DHS).

Participation in the NFIP is based on an agreement between local communities and the Federal Government. If a community adopts and enforces floodplain management regulations to reduce future flood risks to new construction and substantially improved structures in Special Flood Hazard Areas (SFHAs), the Federal Government will make flood insurance available within the community as a financial protection against flood losses. The community's floodplain management regulations must meet or exceed criteria established in accordance with Title 44 Code of Federal Regulations (CFR) Part 60, *Criteria for Land Management and Use*.

SFHAs are delineated on the community's Flood Insurance Rate Maps (FIRMs). Under the NFIP, buildings that were built before the flood hazard was identified on the community's FIRMs are generally referred to as "Pre-FIRM" buildings. When the NFIP was created, the U.S. Congress recognized that insurance for Pre-FIRM buildings would be prohibitively expensive if the premiums were not subsidized by the Federal Government. Congress also recognized that most of these floodprone buildings were

built by individuals who did not have sufficient knowledge of the flood hazard to make informed decisions. The NFIP requires that full actuarial rates reflecting the complete flood risk be charged on all buildings constructed or substantially improved on or after the effective date of the initial FIRM for the community or after December 31, 1974, whichever is later. These buildings are generally referred to as “Post-FIRM” buildings.

1.2 Purpose of this Flood Insurance Study Report

This Flood Insurance Study (FIS) Report revises and updates information on the existence and severity of flood hazards for the study area. The studies described in this report developed flood hazard data that will be used to establish actuarial flood insurance rates and to assist communities in efforts to implement sound floodplain management.

In some states or communities, floodplain management criteria or regulations may exist that are more restrictive than the minimum Federal requirements. Contact your State NFIP Coordinator to ensure that any higher State standards are included in the community’s regulations.

1.3 Jurisdictions Included in the Flood Insurance Study Project

This FIS Report covers the entire geographic area of New London County, Connecticut.

The jurisdictions that are included in this project area, along with the Community Identification Number (CID) for each community and the United States Geological Survey (USGS) 8-digit Hydrologic Unit Code (HUC-8) sub-basins affecting each, are shown in Table 1. The FIRM panel numbers that affect each community are listed. If the flood hazard data for the community is not included in this FIS Report, the location of that data is identified.

Table 1: Listing of NFIP Jurisdictions

Community	CID	HUC-8 Sub-Basin(s)	Located on FIRM Panel(s)	If Not Included, Location of Flood Hazard Data
Bozrah, Town of	090094	01100003	09011C0179G 09011C0183G 09011C0184G 09011C0186G 09011C0187G 09011C0188G 09011C0189G 09011C0191G 09011C0192G 09011C0193G 09011C0194G	

Table 1: Listing of NFIP Jurisdictions (continued)

Community	CID	HUC-8 Sub-Basin(s)	Located on FIRM Panel(s)	If Not Included, Location of Flood Hazard Data
Colchester, Town of	090095	01100003	09011C0130G 09011C0131G ¹ 09011C0132G 09011C0133G 09011C0134G 09011C0140G 09011C0145G 09011C0151G 09011C0152G 09011C0153G 09011C0154G 09011C0160G 09011C0165G 09011C0166G 09011C0167G 09011C0168G 09011C0169G 09011C0178G 09011C0186G	
East Lyme, Town of	090096	01100003	09011C0309G 09011C0316G 09011C0317G 09011C0318G 09011C0319G 09011C0328G 09011C0336G 09011C0337G 09011C0338G 09011C0339G 09011C0457G 09011C0459J 09011C0467J 09011C0476G 09011C0477J 09011C0478J 09011C0479J 09011C0481J 09011C0483J 09011C0486J 09011C0487J	
Franklin, Town of	090154	01100002, 01100003	09011C0041G ¹ 09011C0042G 09011C0043G 09011C0044G 09011C0061G 09011C0063G 09011C0177G 09011C0179G	

Table 1: Listing of NFIP Jurisdictions (continued)

Community	CID	HUC-8 Sub-Basin(s)	Located on FIRM Panel(s)	If Not Included, Location of Flood Hazard Data
Franklin, Town of (continued)	090154	01100002, 01100003	09011C0181G 09011C0182G 09011C0183G 09011C0184G 09011C0201G 09011C0203G	
Griswold, Town of	090173	01100001	09011C0088H 09011C0089H 09011C0093H 09011C0094H 09011C0226H 09011C0227H 09011C0228H 09011C0229H 09011C0231H 09011C0232H 09011C0233H 09011C0234H 09011C0237H 09011C0241H 09011C0242H 09011C0243H 09011C0244H 09011C0253H 09011C0261H 09011C0263H	
Groton Long Point Association	090167	01100003	09011C0509J 09011C0517J	
Groton, City of	090126	01100003	09011C0502J 09011C0504J 09011C0508J 09011C0512G ¹ 09011C0516J	
Groton, Town of	090097	01100003	09011C0363J 09011C0364J 09011C0368G 09011C0369G 09011C0388J 09011C0389J 09011C0502J 09011C0504J 09011C0506J 09011C0507J 09011C0508J 09011C0509J	

Table 1: Listing of NFIP Jurisdictions (continued)

Community	CID	HUC-8 Sub-Basin(s)	Located on FIRM Panel(s)	If Not Included, Location of Flood Hazard Data
Groton, Town of (continued)	090097	01100003	09011C0516J 09011C0517J 09011C0526J 09011C0527J 09011C0528J 09011C0536J	
Jewett City, Borough of	090098	01100001	09011C0226H	
Lebanon, Town of	090155	01100002, 01100003	09011C0009G 09011C0014G 09011C0016G ¹ 09011C0017G 09011C0018G 09011C0019G 09011C0028G 09011C0029G 09011C0036G 09011C0037G 09011C0038G 09011C0039G 09011C0041G ¹ 09011C0043G 09011C0152G 09011C0160G 09011C0176G 09011C0177G 09011C0178G 09011C0179G 09011C0181G 09011C0186G 09011C0187G	
Ledyard, Town of	090157	01100003	09011C0352G 09011C0354G 09011C0356G 09011C0357G 09011C0358G 09011C0359G 09011C0361J 09011C0362J 09011C0363J 09011C0364J 09011C0366G 09011C0367G 09011C0368G 09011C0369G 09011C0376G 09011C0377G	

Table 1: Listing of NFIP Jurisdictions (continued)

Community	CID	HUC-8 Sub-Basin(s)	Located on FIRM Panel(s)	If Not Included, Location of Flood Hazard Data
Ledyard, Town of (continued)	090157	01100003	09011C0378G 09011C0379G 09011C0386G 09011C0387G 09011C0388J 09011C0389J	
Lisbon, Town of	090172	01100001, 01100002	09011C0068G 09011C0069G ¹ 09011C0088H 09011C0206G 09011C0207G 09011C0208G 09011C0209H 09011C0216H 09011C0217H 09011C0226H 09011C0228H	
Lyme, Town of	090127	01100003	09011C0291G 09011C0292G 09011C0293G 09011C0294G 09011C0308G 09011C0309G 09011C0311G 09011C0312G 09011C0313G 09011C0314G 09011C0316G 09011C0317G 09011C0318G 09011C0319G 09011C0432G 09011C0451J 09011C0452J 09011C0453J 09011C0456G 09011C0457G	
Montville, Town of	090099	01100003	09011C0188G 09011C0189G 09011C0193G 09011C0194G 09011C0213G 09011C0326G 09011C0327G 09011C0328G 09011C0329G	

Table 1: Listing of NFIP Jurisdictions (continued)

Community	CID	HUC-8 Sub-Basin(s)	Located on FIRM Panel(s)	If Not Included, Location of Flood Hazard Data
Montville, Town of (continued)	090099	01100003	09011C0331G 09011C0332G 09011C0333G 09011C0334G 09011C0336G 09011C0337G 09011C0341G 09011C0342G 09011C0351G 09011C0352G 09011C0353G 09011C0354G 09011C0361J 09011C0362J	
New London, City of	090100	01100003	09011C0363J 09011C0364J 09011C0482G 09011C0501J 09011C0502J 09011C0503J 09011C0504J 09011C0511J 09011C0512G ¹	
Noank Fire District	090129	01100003	09011C0507J 09011C0509J 09011C0526J 09011C0528J	
North Stonington, Town of	090101	01090005, 01100001, 01100003	09011C0239H 09011C0243H 09011C0244H 09011C0263H 09011C0264J 09011C0270H 09011C0377G 09011C0379G 09011C0381H 09011C0382J 09011C0383H 09011C0384H 09011C0387G 09011C0391H 09011C0392H 09011C0401H 09011C0402H 09011C0403H 09011C0404H 09011C0406H 09011C0408H	

Table 1: Listing of NFIP Jurisdictions (continued)

Community	CID	HUC-8 Sub-Basin(s)	Located on FIRM Panel(s)	If Not Included, Location of Flood Hazard Data
North Stonington, Town of (continued)	090101	01090005, 01100001, 01100003	09011C0411H 09011C0412H 09011C0416H	
Norwich, City of	090102	01100002, 01100003	09011C0184G 09011C0192G 09011C0194G 09011C0201G 09011C0202G 09011C0203G 09011C0204G 09011C0206G 09011C0208G 09011C0211G 09011C0212G 09011C0213G 09011C0214G 09011C0216H 09011C0218G 09011C0351G 09011C0352G	
Old Lyme, Town of	090103	01100003	09011C0451J 09011C0452J 09011C0453J 09011C0454J 09011C0456G 09011C0457G 09011C0458J 09011C0459J 09011C0461J 09011C0462J 09011C0464J 09011C0466J 09011C0467J 09011C0468J 09011C0469G ¹ 09011C0486J	
Preston, Town of	090139	01100001, 01100002, 01100003	09011C0209H 09011C0214G 09011C0216H 09011C0217H 09011C0218G 09011C0219H 09011C0228H 09011C0229H 09011C0236H 09011C0237H 09011C0238H 09011C0239H	

Table 1: Listing of NFIP Jurisdictions (continued)

Community	CID	HUC-8 Sub-Basin(s)	Located on FIRM Panel(s)	If Not Included, Location of Flood Hazard Data
Preston, Town of (continued)	090139	01100001, 01100002, 01100003	09011C0241H 09011C0243H 09011C0244H 09011C0352G 09011C0354G 09011C0356G 09011C0357G 09011C0376G 09011C0377G	
Salem, Town of	090156	01100003	09011C0165G 09011C0167G 09011C0168G 09011C0169G 09011C0186G 09011C0188G 09011C0189G 09011C0305G ¹ 09011C0306G 09011C0307G 09011C0308G 09011C0309G 09011C0316G 09011C0326G 09011C0327G 09011C0328G 09011C0329G	
Sprague, Town of	090105	01100002	09011C0061G 09011C0062G ¹ 09011C0063G 09011C0064G 09011C0068G 09011C0069G ¹ 09011C0201G 09011C0202G 09011C0206G	
Stonington, Borough of	090193	01100003	09011C0533J 09011C0534J	
Stonington, Town of	090106	01090005, 01100003	09011C0387G 09011C0389J 09011C0391H 09011C0392H 09011C0393G 09011C0394G 09011C0411H 09011C0412H 09011C0413H 09011C0414K 09011C0526J 09011C0527J	

Table 1: Listing of NFIP Jurisdictions (continued)

Community	CID	HUC-8 Sub-Basin(s)	Located on FIRM Panel(s)	If Not Included, Location of Flood Hazard Data
Stonington, Town of (continued)	090106	01090005, 01100003	09011C0528J 09011C0529J 09011C0531J 09011C0532J 09011C0533J 09011C0534J 09011C0536J 09011C0551J 09011C0552K 09011C0553J 09011C0554J	
Voluntown, Town of	090143	01090005, 01100001	09011C0094H 09011C0115J 09011C0120J 09011C0232H 09011C0234H 09011C0251H 09011C0252H 09011C0253H 09011C0254H 09011C0256J 09011C0258H 09011C0261H 09011C0262J 09011C0263H 09011C0264J 09011C0270H	
Waterford, Town of	090107	01100003	09011C0336G 09011C0337G 09011C0339G 09011C0341G 09011C0342G 09011C0343G 09011C0344G 09011C0361J 09011C0362J 09011C0363J 09011C0364J 09011C0477J 09011C0481J 09011C0482G 09011C0483J 09011C0484J 09011C0491J 09011C0492J 09011C0501J 09011C0503J 09011C0511J	

¹ Panel Not Printed

1.4 Considerations for using this Flood Insurance Study Report

The NFIP encourages State and local governments to implement sound floodplain management programs. To assist in this endeavor, each FIS Report provides floodplain data, which may include a combination of the following: 10-, 4-, 2-, 1-, and 0.2-percent annual chance flood elevations (the 1-percent-annual-chance flood elevation is also referred to as the Base Flood Elevation (BFE)); delineations of the 1-percent-annual-chance and 0.2-percent-annual-chance floodplains; and 1-percent-annual-chance floodway. This information is presented on the FIRM and/or in many components of the FIS Report, including Flood Profiles, Floodway Data tables, Summary of Non-Coastal Stillwater Elevations tables, and Coastal Transect Parameters tables (not all components may be provided for a specific FIS).

This section presents important considerations for using the information contained in this FIS Report and the FIRM, including changes in format and content. Figures 1, 2, and 3 present information that applies to using the FIRM with the FIS Report.

- Part or all of this FIS Report may be revised and republished at any time. In addition, part of this FIS Report may be revised by a Letter of Map Revision (LOMR), which does not involve republication or redistribution of the FIS Report. Refer to Section 6.5 of this FIS Report for information about the process to revise the FIS Report and/or FIRM.

It is, therefore, the responsibility of the user to consult with community officials by contacting the community repository to obtain the most current FIS Report components. Communities participating in the NFIP have established repositories of flood hazard data for floodplain management and flood insurance purposes. Community map repository addresses are provided in Table 30, "Map Repositories," within this FIS Report.

- New FIS Reports are frequently developed for multiple communities, such as entire counties. A countywide FIS Report incorporates previous FIS Reports for individual communities and the unincorporated area of the county (if not jurisdictional) into a single document and supersedes those documents for the purposes of the NFIP.

The initial Countywide FIS Report for New London County became effective on July 18, 2011. Refer to Table 27 for information about subsequent revisions to the FIRMs.

- Selected FIRM panels for the community may contain information (such as floodways and cross sections) that was previously shown separately on the corresponding Flood Boundary and Floodway Map (FBFM) panels. In addition, former flood hazard zone designations have been changed as follows:

<u>Old Zone</u>	<u>New Zone</u>
A1 through A30	AE
V1 through V30	VE
B	X (shaded)
C	X (unshaded)

- FEMA does not impose floodplain management requirements or special insurance ratings based on Limit of Moderate Wave Action (LiMWA) delineations at this time. The LiMWA represents the approximate landward limit of the 1.5-foot breaking wave. If the LiMWA is shown on the FIRM, it is being provided by FEMA as information only. For communities that do adopt Zone VE building standards in the area defined by the LiMWA, additional Community Rating System (CRS) credits are available. Refer to Section 2.5.4 for additional information about the LiMWA.

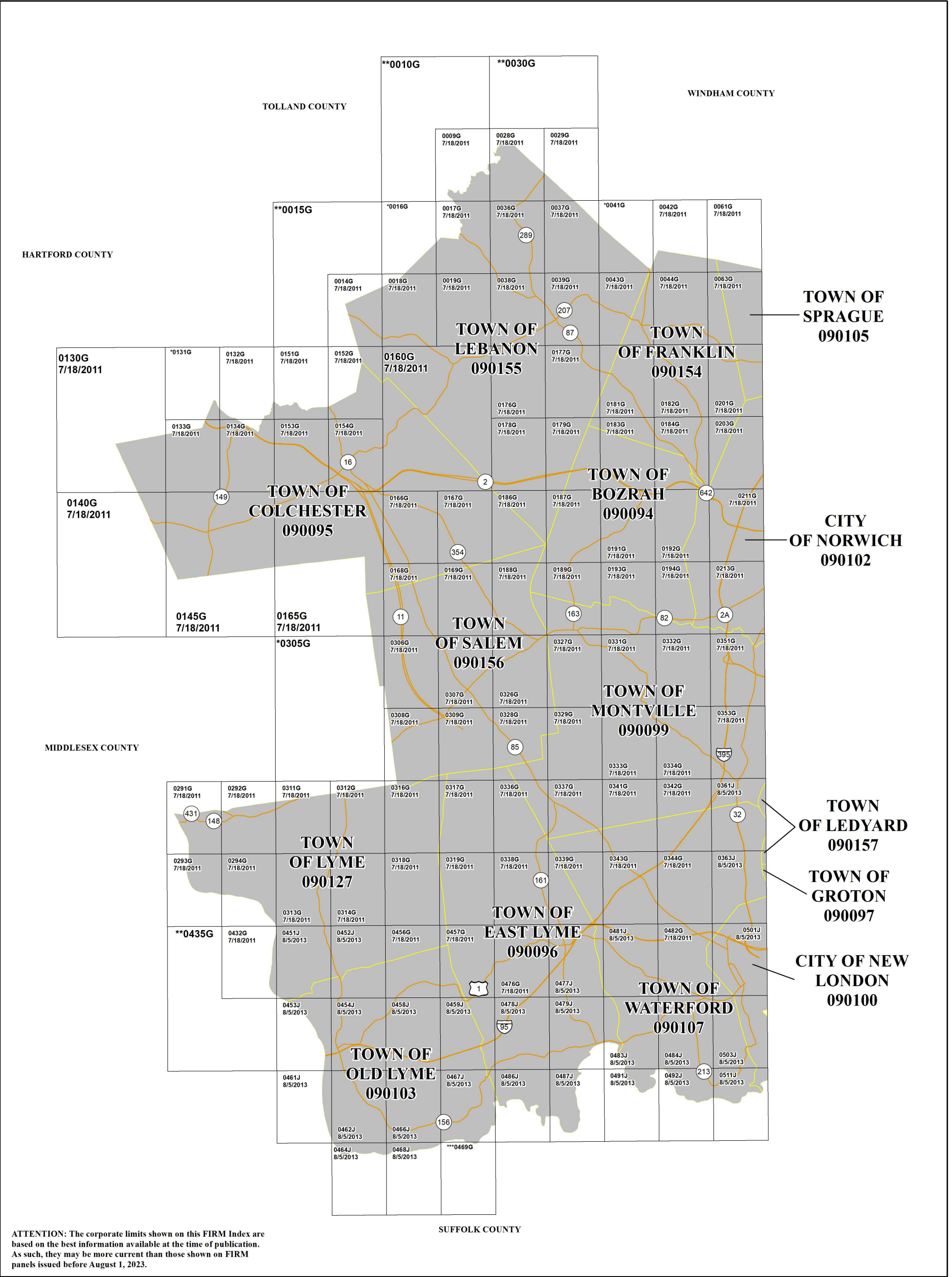
The CRS is a voluntary incentive program that recognizes and encourages community floodplain management activities that exceed the minimum NFIP requirements. Visit the FEMA Web site at www.fema.gov/flood-insurance/rules-legislation/community-rating-system or contact your appropriate FEMA Regional Office for more information about this program.

FEMA does not design, build, inspect, operate, maintain, or certify levees. FEMA is responsible for accurately identifying flood hazards and communicating those hazards and risks to affected stakeholders. FEMA has identified one or more levee systems in this jurisdiction summarized in Table 8 of this FIS Report. For FEMA to accredit the identified levee systems, the levee systems must meet the criteria of the Code of Federal Regulations, Title 44, Section 65.10 (44 CFR 65.10), titled "Mapping of Areas Protected by Levee Systems."

Information on the levee systems in this jurisdiction can be obtained from the USACE National Levee Database (<https://levees.sec.usace.army.mil/>). For additional information, the user should contact the appropriate jurisdiction floodplain administrator and the levee owner or sponsor.

- FEMA has developed a *Guide to Flood Maps* (FEMA 258) and online tutorials to assist users in accessing the information contained on the FIRM. These include how to read panels and step-by-step instructions to obtain specific information. To obtain this guide and other assistance in using the FIRM, visit the FEMA Web site at www.fema.gov/flood-maps/tutorials.

The FIRM Index in Figure 1 shows the overall FIRM panel layout within New London County, and also displays the panel number and effective date for each FIRM panel in the county. Other information shown on the FIRM Index includes community boundaries, flooding sources, watershed boundaries, and USGS HUC-8 codes.



N

1 inch = 3 miles

0

1.5

3

6

Miles

Map Projection:
State Plane Connecticut FIPS 0600 Feet
North American Datum 1983

THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT
[HTTPS://MSC.FEMA.GOV](https://MSC.FEMA.GOV)

SEE FLOOD INSURANCE STUDY FOR ADDITIONAL INFORMATION

*PANEL NOT PRINTED - NO SPECIAL FLOOD HAZARD AREAS
**PANEL NOT PRINTED - AREA OUTSIDE COUNTY BOUNDARY
***PANEL NOT PRINTED - OPEN WATER AREA

NEW LONDON COUNTY
INDEX LOCATOR DIAGRAM

SHEET
1 OF 2

THIS AREA
SHOWN ON
INDEX
SHEET
2 OF 2

NATIONAL FLOOD INSURANCE PROGRAM

FLOOD INSURANCE RATE MAP INDEX

NEW LONDON COUNTY, CONNECTICUT (All Jurisdictions)
SHEET 1 OF 2

PANELS PRINTED:
0009, 0014, 0017, 0018, 0019, 0028, 0029, 0036, 0037, 0038, 0039, 0042, 0043, 0044, 0061, 0063, 0130, 0132, 0133, 0134, 0140, 0145, 0151, 0152, 0153, 0154, 0160, 0165, 0166, 0167, 0168, 0169, 0176, 0177, 0178, 0179, 0181, 0182, 0183, 0184, 0186, 0187, 0188, 0189, 0191, 0192, 0193, 0194, 0201, 0203, 0211, 0213, 0291, 0292, 0293, 0294, 0306, 0307, 0308, 0309, 0311, 0312, 0313, 0314, 0316, 0317, 0318, 0319, 0326, 0327, 0328, 0329, 0331, 0332, 0333, 0334, 0336, 0337, 0338, 0339, 0341, 0342, 0343, 0344, 0351, 0353, 0361, 0363, 0432, 0451, 0452, 0453, 0454, 0456, 0457, 0458, 0459, 0461, 0462, 0464, 0466, 0467, 0468, 0476, 0477, 0478, 0479, 0481, 0482, 0483, 0484, 0486, 0487, 0491, 0492, 0501, 0503, 0511

MAP NUMBER
09011CIND1D
MAP REVISED
AUGUST 1, 2023

WINDHAM COUNTY

KENT COUNTY

HUC8 01090005
Pawcatuck-Wood

HUC8 01100002
Shetucket

HUC8 01090005
Pawcatuck-Wood

WASHINGTON COUNTY

TOWN OF
MONTVILLE
090099

TOWN OF
WATERFORD
090107

CITY OF NEW
LONDON
090100

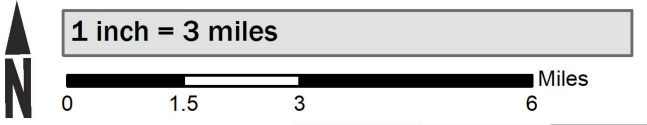
CITY OF
GROTON
090126

HUC8 02030203
Long Island
Sound

GROTON
LONG POINT
ASSOCIATION
090167

NOANK FIRE
DISTRICT
090129

ATTENTION: The corporate limits shown on this FIRM Index are based on the best information available at the time of publication. As such, they may be more current than those shown on FIRM panels issued before August 1, 2023.

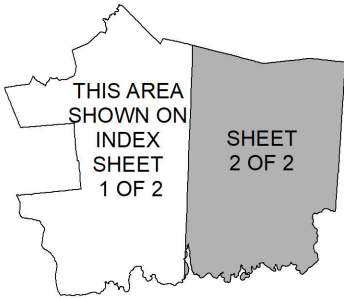


Map Projection:
State Plane Connecticut FIPS 0600 Feet
North American Datum 1983

THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT
[HTTPS://MSC.FEMA.GOV](https://MSC.FEMA.GOV)

SEE FLOOD INSURANCE STUDY FOR ADDITIONAL INFORMATION
*PANEL NOT PRINTED - NO SPECIAL FLOOD HAZARD AREAS
**PANEL NOT PRINTED - AREA OUTSIDE COUNTY BOUNDARY
***PANEL NOT PRINTED - OPEN WATER AREA

NEW LONDON COUNTY
INDEX LOCATOR DIAGRAM



NATIONAL FLOOD INSURANCE PROGRAM

FLOOD INSURANCE RATE MAP INDEX

NEW LONDON COUNTY, CONNECTICUT (All Jurisdictions)
SHEET 2 OF 2

PANELS PRINTED:

0064, 0068, 0088, 0089, 0093, 0094, 0115, 0120, 0202, 0204, 0206, 0207, 0208, 0209, 0212, 0214, 0216, 0217, 0218, 0219, 0226, 0227, 0228, 0229, 0231, 0232, 0233, 0234, 0236, 0237, 0238, 0239, 0241, 0242, 0243, 0244, 0251, 0252, 0253, 0254, 0256, 0258, 0261, 0262, 0263, 0264, 0270, 0352, 0354, 0356, 0357, 0358, 0359, 0362, 0364, 0366, 0367, 0368, 0369, 0376, 0377, 0378, 0379, 0381, 0382, 0383, 0384, 0386, 0387, 0388, 0389, 0391, 0392, 0393, 0394, 0401, 0402, 0403, 0404, 0406, 0408, 0411, 0412, 0413, 0414, 0416, 0502, 0504, 0506, 0507, 0508, 0509, 0516, 0517, 0526, 0527, 0528, 0529, 0531, 0532, 0533, 0534, 0536, 0551, 0552, 0553, 0554



MAP NUMBER
09011CIND2D
MAP REVISED
AUGUST 1, 2023

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

Figure 2: FIRM Notes to Users

NOTES TO USERS For information and questions about this map, available products associated with this FIRM including historic versions of this FIRM, how to order products, or the National Flood Insurance Program in general, please call the FEMA Mapping and Insurance eXchange at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA Flood Map Service Center website at msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the website. Users may determine the current map date for each FIRM panel by visiting the FEMA Flood Map Service Center website or by calling the FEMA Mapping and Insurance eXchange. Communities annexing land on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM Index. These may be ordered directly from the Flood Map Service Center at the number listed above. For community and countywide map dates, refer to Table 27 in this FIS Report. To determine if flood insurance is available in the community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.
The map is for use in administering the NFIP. It may not identify all areas subject to flooding, particularly from local drainage sources of small size. Consult the community map repository to find updated or additional flood hazard information. BASE FLOOD ELEVATIONS: For more detailed information in areas where Base Flood Elevations (BFEs) and/or floodways have been determined, consult the Flood Profiles and Floodway Data and/or Summary of Non-Coastal Stillwater Elevations tables within this FIS Report. Use the flood elevation data within the FIS Report in conjunction with the FIRM for construction and/or floodplain management. Coastal Base Flood Elevations shown on the map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD88). Coastal flood elevations are also provided in the Coastal Transect Parameters table in the FIS Report for this jurisdiction. Elevations shown in the Coastal Transect Parameters table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on the FIRM.

Figure 2. FIRM Notes to Users

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

FLOOD CONTROL STRUCTURE INFORMATION: Certain areas not in Special Flood Hazard Areas may be protected by flood control structures. Refer to Section 4.3 "Dams and Other Flood Reduction Measures" of this FIS Report for information on flood control structures for this jurisdiction.

PROJECTION INFORMATION: The projection used in the preparation of the map was Connecticut State Plane FIPS 0600 Feet. The horizontal datum was NAD83, GRS1980 spheroid. Differences in datum, spheroid, projection or State Plane zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of the FIRM.

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

Local vertical monuments may have been used to create the map. To obtain current monument information, please contact the appropriate local community listed in Table 30 of this FIS Report.

BASE MAP INFORMATION: Base map information shown on the FIRM was provided by the Connecticut Department of Environmental Protection at a scale of 1:12,000. The following panels used base map information provided by the the Capitol Region Council of Governments of Connecticut at a resolution of 0.25 foot, dated 2017: 0270H, 0383H, 0384H, 0391H, 0392H, 0401H, 0402H, 0403H, 0404H, 0406H, 0408H, 0411H, 0412H, 0413H, 0414K, 0416H, and 0552K. Base map information shown on FIRMs dated August 1, 2023 was derived from digital orthophotography provided by the NAIP. The imagery was flown in 2018 and was produced at 0.6 meter resolution. For information about base maps, refer to Section 6.2 "Base Map" in this FIS Report.

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

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

Figure 2. FIRM Notes to Users

NOTES FOR FIRM INDEX

REVISIONS TO INDEX: As new studies are performed and FIRM panels are updated within New London County, Connecticut, corresponding revisions to the FIRM Index will be incorporated within the FIS Report to reflect the effective dates of those panels. Please refer to Table 27 of this FIS Report to determine the most recent FIRM revision date for each community. The most recent FIRM panel effective date will correspond to the most recent index date.

ATTENTION: The corporate limits shown are based on the best information available at the time of publication of this FIRM index. As such, they may be more current than those shown on FIRM panels issued before August 1, 2023.

SPECIAL NOTES FOR SPECIFIC FIRM PANELS

This Notes to Users section was created specifically for New London County, Connecticut, effective August 1, 2023.

LIMIT OF MODERATE WAVE ACTION: Zone AE has been divided by a Limit of Moderate Wave Action (LiMWA). The LiMWA represents the approximate landward limit of the 1.5-foot breaking wave. The effects of wave hazards between Zone VE and the LiMWA (or between the shoreline and the LiMWA for areas where Zone VE is not identified) will be similar to, but less severe than, those in Zone VE.

ACCREDITED LEVEE SYSTEM: Check with your local community to obtain more information on the levee system(s) shown as providing flood hazard reduction on this panel. To mitigate flood hazards in residual risk areas, property owners and residents are encouraged to review the community's emergency preparedness plan and to consider flood insurance and floodproofing or other risk reduction measures. For more information on flood insurance, interested parties should visit www.fema.gov/flood-insurance.

FLOOD RISK REPORT: A Flood Risk Report (FRR) may be available for many of the flooding sources and communities referenced in this FIS Report. The FRR is provided to increase public awareness of flood risk by helping communities identify the areas within their jurisdictions that have the greatest risks. Although non-regulatory, the information provided within the FRR can assist communities in assessing and evaluating mitigation opportunities to reduce these risks. It can also be used by communities developing or updating flood risk mitigation plans. These plans allow communities to identify and evaluate opportunities to reduce potential loss of life and property. However, the FRR is not intended to be the final authoritative source of all flood risk data for a project area; rather, it should be used with other data sources to paint a comprehensive picture of flood risk.

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

Figure 3: Map Legend for FIRM

SPECIAL FLOOD HAZARD AREAS: The 1% annual chance flood, also known as the base flood or 100-year flood, has a 1% chance of happening or being exceeded each year. Special Flood Hazard Areas are subject to flooding by the 1% annual chance flood. The Base Flood Elevation is the water surface elevation of the 1% annual chance flood. The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights. See note for specific types. If the floodway is too narrow to be shown, a note is shown.	
	Special Flood Hazard Areas subject to inundation by the 1% annual chance flood (Zones A, AE, AH, AO, AR, A99, V and VE)
Zone A	The flood insurance rate zone that corresponds to the 1% annual chance floodplains. No base (1% annual chance) flood elevations (BFEs) or depths are shown within this zone.
Zone AE	The flood insurance rate zone that corresponds to the 1% annual chance floodplains. Base flood elevations derived from the hydraulic analyses are shown within this zone.
Zone AH	The flood insurance rate zone that corresponds to the areas of 1% annual chance shallow flooding (usually areas of ponding) where average depths are between 1 and 3 feet. Whole-foot BFEs derived from the hydraulic analyses are shown at selected intervals within this zone.
Zone AO	The flood insurance rate zone that corresponds to the areas of 1% annual chance shallow flooding (usually sheet flow on sloping terrain) where average depths are between 1 and 3 feet. Average whole-foot depths derived from the hydraulic analyses are shown within this zone.
Zone AR	The flood insurance rate zone that corresponds to areas that were formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
Zone A99	The flood insurance rate zone that corresponds to areas of the 1% annual chance floodplain that will be protected by a Federal flood protection system where construction has reached specified statutory milestones. No base flood elevations or flood depths are shown within this zone.
Zone V	The flood insurance rate zone that corresponds to the 1% annual chance coastal floodplains that have additional hazards associated with storm waves. Base flood elevations are not shown within this zone.
Zone VE	Zone VE is the flood insurance rate zone that corresponds to the 1% annual chance coastal floodplains that have additional hazards associated with storm waves. Base flood elevations derived from the coastal analyses are shown within this zone as static whole-foot elevations that apply throughout the zone.
	Regulatory Floodway determined in Zone AE.

Figure 3: Map Legend for FIRM

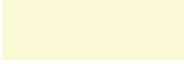
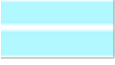
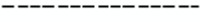
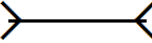
OTHER AREAS OF FLOOD HAZARD	
	Shaded Zone X: Areas of 0.2% annual chance flood hazards and areas of 1% annual chance flood hazards with average depths of less than 1 foot or with drainage areas less than 1 square mile.
	Future Conditions 1% Annual Chance Flood Hazard – Zone X: The flood insurance rate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

Figure 3: Map Legend for FIRM

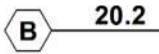
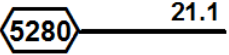
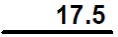
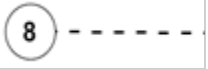
REFERENCE MARKERS	
	River mile Markers
CROSS SECTION & TRANSECT INFORMATION	
	Lettered Cross Section with Regulatory Water Surface Elevation (BFE)
	Numbered Cross Section with Regulatory Water Surface Elevation (BFE)
	Unlettered Cross Section with Regulatory Water Surface Elevation (BFE)
	Coastal Transect
 	Profile Baseline: Indicates the modeled flow path of a stream and is shown on FIRM panels for all valid studies with profiles or otherwise established base flood elevation. Coastal Transect Baseline: Used in the coastal flood hazard model to represent the 0.0-foot elevation contour and the starting point for the transect and the measuring point for the coastal mapping.
	Base Flood Elevation Line
ZONE AE (EL 16)	Static Base Flood Elevation value (shown under zone label)
ZONE AO (DEPTH 2)	Zone designation with Depth
ZONE AO (DEPTH 2) (VEL 15 FPS)	Zone designation with Depth and Velocity
BASE MAP FEATURES	
	River, Stream or Other Hydrographic Feature
	Interstate Highway
	U.S. Highway
	State Highway
	County Highway
	Street, Road, Avenue Name, or Private Drive if shown on Flood Profile
	Railroad

Figure 3: Map Legend for FIRM

	Horizontal Reference Grid Line
	Horizontal Reference Grid Ticks
	Secondary Grid Crosshairs
Land Grant	Name of Land Grant
7	Section Number
R. 43 W. T. 22 N.	Range, Township Number
⁴² 76 ^{000m} E	Horizontal Reference Grid Coordinates (UTM)
365000 FT	Horizontal Reference Grid Coordinates (State Plane)
80° 16' 52.5"	Corner Coordinates (Latitude, Longitude)

SECTION 2.0 – FLOODPLAIN MANAGEMENT APPLICATIONS

2.1 Floodplain Boundaries

To provide a national standard without regional discrimination, the 1-percent-annual-chance (100-year) flood has been adopted by FEMA as the base flood for floodplain management purposes. The 0.2-percent-annual-chance (500-year) flood is employed to indicate additional areas of flood hazard in the community.

Each flooding source included in the project scope has been studied and mapped using professional engineering and mapping methodologies that were agreed upon by FEMA and New London County as appropriate to the risk level. Flood risk is evaluated based on factors such as known flood hazards and projected impact on the built environment. Engineering analyses were performed for each studied flooding source to calculate its 1-percent-annual-chance flood elevations; elevations corresponding to other floods (e.g. 10-, 4-, 2-, 0.2-percent annual chance, etc.) may have also been computed for certain flooding sources. Engineering models and methods are described in detail in Section 5.0 of this FIS Report. The modeled elevations at cross sections were used to delineate the floodplain boundaries on the FIRM; between cross sections, the boundaries were interpolated using elevation data from various sources. More information on specific mapping methods is provided in Section 6.0 of this FIS Report.

Depending on the accuracy of available topographic data (Table 22), study methodologies employed (Section 5.0), and flood risk, certain flooding sources may be mapped to show both the 1-percent and 0.2-percent-annual-chance floodplain boundaries, regulatory water surface elevations (BFEs), and/or a regulatory floodway. Similarly, other flooding sources may be mapped to show only the 1-percent-annual-chance floodplain boundary on the FIRM, without published water surface elevations. In cases where the 1-percent and 0.2-percent-annual-chance floodplain boundaries are close together, only the 1-percent-annual-chance floodplain boundary is shown on the FIRM. Figure 3, “Map Legend for FIRM”, describes the flood zones that are used on the FIRMs to account for the varying levels of flood risk that exist along flooding sources within the project area. Table 2 and Table 3 indicate the flood zone designations for each flooding source and each community within New London County, respectively.

Table 2, “Flooding Sources Included in this FIS Report,” lists each flooding source, including its study limits, affected communities, mapped zone on the FIRM, and the completion date of its engineering analysis from which the flood elevations on the FIRM and in the FIS Report were derived. Descriptions and dates for the latest hydrologic and hydraulic analyses of the flooding sources are shown in Table 12. Floodplain boundaries for these flooding sources are shown on the FIRM (published separately) using the symbology described in Figure 3. On the map, the 1-percent-annual-chance floodplain corresponds to the SFHAs. The 0.2-percent-annual-chance floodplain shows areas that, although out of the regulatory floodplain, are still subject to flood hazards.

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. The procedures to remove these areas from the SFHA are described in Section 6.5 of this FIS Report.

Table 2: Flooding Sources Included in this FIS Report

Flooding Source	Community	Downstream Limit	Upstream Limit	HUC-8 Sub-Basin(s)	Length (mi) (streams or coastlines)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Anguilla Brook	Stonington, Town of	Confluence with Wequetequock Cove, Stonington, CT	Approximately 6,300 feet upstream of Interstate 95 in Stonington, CT	01100003	4.5	Y	AE	January 1983
Ashaway River	North Stonington, Town of	County boundary	Headwaters at confluence of Green Fall River and Parmenter Brook	01090005	0.5	Y	AE	July 2014
Beaver Brook (Town of Lyme)	Lyme, Town of	Confluence with Eight Mile River	Approximately 6,075 feet upstream of Route 156	01080205	1.7	Y	AE	November 1976
Beaver Brook (Town of Sprague)	Sprague, Town of	Confluence with Shetucket River	Sprague-Franklin corporate limits	01100002	1.5	Y	AE	July 1983
Birch Plain Creek	Groton, Town of	Confluence with Baker Cove	Just upstream of the Town of Groton-City of Groton corporate limits	01100003	0.5	Y	AE	March 1979
Blissville Brook	Lisbon, Town of	Confluence with Shetucket River	Approximately 400 feet upstream of Ames Road	01100002	2.5	Y	AE	April 1983
Bobbin Mill Brook	Norwich, City of	Confluence with Yantic River	Just upstream of Scotland Road in Norwich	01100003	0.5	Y	AE	March 1992
Copps Brook	Stonington, Borough of	Confluence with Quiambog Cove, Stonington, CT	Interstate 95, Stonington, CT	01100003	1.2	Y	AE	January 1983

Table 2: Flooding Sources Included in this FIS Report (continued)

Flooding Source	Community	Downstream Limit	Upstream Limit	HUC-8 Sub-Basin(s)	Length (mi) (streams or coastlines)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Day Meadow Brook	Colchester, Town of	River Road	Approximately 3,800 feet upstream (near State Route 2)	01080205	0.6	N	AE	December 1990
Denison Brook	Voluntown, Town of	State Route 138	Fish Road	01100001	2.2	N	AE	September 1985
East Branch Eightmile River	Salem, Town of	Approximately 900 feet downstream of Darling Road	Confluence with Harris Brook	01080205	3.1	Y	AE	January 1980
Eccleston Brook	Groton, Town of	Brook Street, approximately 1800 feet downstream of State Route 215 in Groton, CT	New London Road (U.S. Route 1) in Groton, CT	01100003	1.4	Y	AE	March 1983
Eightmile River	Lyme, Town of	Confluence with Connecticut River in Lyme, CT	Lyme-East Haddam corporate limit	01080205	4.4	Y	AE	November 1976
Fishtown Brook	Groton, Town of	Fishtown Road	U.S. Route 1	01100003	0.8	Y	AE	March 1983
Flat Brook	Ledyard, Town of	Mouth at Mill Cove	Approximately 100 feet upstream of Baldwin Hill Road	01100003	1.0	Y	AE	April 1979
Ford Brook	Norwich, City of	Confluence with Trading Cove Brook	Approximately 100 feet upstream of Newton Street	01100003	2.0	Y	AE	March 1992
Fort Hill Brook	Groton, Town of	Mouth at Mumford Cove	Interstate 95	01100003	2.1	Y	AE	March 1983
Fourmile River	East Lyme, Town of	Mouth at Long Island Sound	Boston Post Road	01100003	2.6	Y	AE	March 1979

Table 2: Flooding Sources Included in this FIS Report (continued)

Flooding Source	Community	Downstream Limit	Upstream Limit	HUC-8 Sub-Basin(s)	Length (mi) (streams or coastlines)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Gardner Brook	Bozrah, Town of	Confluence with Yantic River	Approximately 13,700 feet upstream	01100003	2.7	Y	AE	March 1980
Goldmine Brook	Norwich, City of	Confluence with Trading Cove Brook	Approximately 100 feet upstream of Salem Turnpike	01100003	0.3	Y	AE	March 1992
Great Meadow Brook	Voluntown, Town of	Confluence with Pachaug River	Approximately 4,850 feet upstream of Wyle School Road	01100001	2.4	N	AE	September 1985
Great Plain Brook	Montville, Town of	Confluence with Trading Cove Brook	Approximately 700 feet upstream of Norman Road	01100003	1.1	Y	AE	March 1992
Green Fall River	North Stonington, Town of	Confluence with Parmenter Brook	Putker Road	01090005	3.1	Y	AE	March 2016
Harris Brook	Salem, Town of	Confluence with East Branch Eight Mile River	Approximately 4,500 feet upstream of dam	01080205	3.4	Y	AE	January 1980
Hunter Brook	Norwich, City of	Confluence with Shetucket River	Approximately 1,800 feet upstream of the second crossing of Hunters Road	01100002	0.9	Y	AE	March 1992
Jeremy River	Colchester, Town of	4,600 feet upstream of State Route 149	Old Hartford Road	01080205	0.7	Y	AE	March 1980
Joe Clark Brook	Ledyard, Town of	Mouth at Poquetanuck Cove	Approximately 7,600 feet upstream from the Preston-Ledyard corporate limits	01100003	1.7	Y	AE	April 1979

Table 2: Flooding Sources Included in this FIS Report (continued)

Flooding Source	Community	Downstream Limit	Upstream Limit	HUC-8 Sub-Basin(s)	Length (mi) (streams or coastlines)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Jordan Brook	Waterford, Town of	Mouth at Jordan Cove	Approximately 1,600 feet upstream from Douglas Lane	01100003	5.1	Y	AE	March 1979
Judd Brook	Colchester, Town of	Old Hebron Road	Approximately 2,350 feet upstream of Norwich Avenue	01080205	3.2	Y	AE	June 1996
Latimer Brook	East Lyme, Town of	Confluence with Niantic River	Upstream corporate limit of East Lyme, CT	01100003	5.1	Y	AE	March 1979
Latimer Brook	Montville, Town of	Downstream corporate limit of Montville, CT	Approximately 400 feet upstream of Beckwith Road	01100003	2.8	Y	AE	February 1994
Little River	Lisbon, Town of	Confluence with Shetucket River	Approximately 2,750 feet upstream of State Route 138	01100002	2.3	Y	AE	July 1983
Long Island Sound	East Lyme, Town of; Groton, City of; Groton Long Point Association; Groton, Town of; Noank Fire District; Old Lyme, Town of; New London, City of; Stonington, Borough of; Stonington, Town of; Waterford, Town of	Entire coastline	Entire coastline			N	AE	July 2011
Meadow Brook	Colchester, Town of	Confluence with Jeremy River	Approximately 2,140 feet downstream of Levy Road	01080205	2.4	Y	AE	March 1980

Table 2: Flooding Sources Included in this FIS Report (continued)

Flooding Source	Community	Downstream Limit	Upstream Limit	HUC-8 Sub-Basin(s)	Length (mi) (streams or coastlines)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Meadow Brook	Colchester, Town of	Approximately 2,140 feet downstream of Levy Road	Approximately 3,250 feet upstream of State Route 16	01080205	1.3	Y	AE	December 1990
Nevins Brook	Waterford, Town of	Confluence with Jordan Brook	Approximately 4,950 feet upstream of Fog Plain Road	01100003	2.3	Y	AE	March 1979
Norwichtown Brook	Norwich, City of	Confluence with Yantic River	Approximately 550 feet upstream of Case Street	01100003	0.6	Y	AE	March 1992
Oxoboxo Brook	Montville, Town of	Horton Cove	Rockland Pond Dam	01100003	2.5	Y	AE	March 1979
Pachaug River	Jewett City, Borough of; Griswold, Town of	Confluence with Quinebaug River	Dam at Pachaug Pond	01100001	6.6	Y	AE	May 1983
Pachaug River (Town of Voluntown)	Voluntown, Town of	Approximately 800 feet upstream of Carol Road	5,000 feet upstream of Beach Pond Dam	01100001	5.5	N	AE	September 1985
Pattagansett River	East Lyme, Town of	Mouth at Long Island Sound	Pattagansett Lake Dam	01100003	4.0	Y	AE	March 1979
Pawcatuck River	North Stonington, Town of; Stonington, Town of	Gayitt Point	North Stonington, Connecticut/ Hopkinton, Rhode Island boundary	01090005	7.2	Y	AE	March 2016
Pine Swamp Brook	Ledyard, Town of	Confluence with Thames River	Approximately 1,300 feet upstream of Harvard Terrace	01100003	1.1	Y	AE	April 1979

Table 2: Flooding Sources Included in this FIS Report (continued)

Flooding Source	Community	Downstream Limit	Upstream Limit	HUC-8 Sub-Basin(s)	Length (mi) (streams or coastlines)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Quinebaug River	Griswold, Town of; Jewett City, Borough of; Libson, Town of; Preston, Town of	Confluence with Shetucket River	New London County/ Windham County boundary	01100001	9.57	Y	AE	November 2019
Shetucket River	Lisbon, Town of	16,000 feet upstream of Route 2A	Approximately 300 feet upstream of North Main Street in Town of Sprague	01100002	8.35	Y	AE	December 1989
Shewville Brook	Ledyard, Town of	10,650 feet upstream of confluence with Hewitt Brook	Approximately 750 feet upstream of Shewville Road	01100003	0.35	Y	AE	April 1979
Shunock River	North Stonington, Town of	Confluence with Pawcatuck River	Approximately 5,200 feet upstream of Main Street	01090005	5.77	Y	AE	August 1983
Spaulding Pond Brook	Norwich, City of	Confluence with Shetucket River	Approximately 150 feet upstream of dam	01100002	1.41	Y	AE	March 1992
Susquetonscut Brook (Town of Franklin)	Franklin, Town of	2,000 feet upstream of confluence with Yantic River	Champion Road	01100003	2.89	Y	AE	May 1980
Susquetonscut Brook (Town of Lebanon)	Lebanon, Town of	15,000 feet upstream of confluence with Yantic River	Bender Road	01100003	6.09	N	AE	December 1986
Tenmile River	Lebanon, Town of	Confluence with Willimantic River	Palmer Pond	01100002	6.27	N	AE	December 1986

Table 2: Flooding Sources Included in this FIS Report (continued)

Flooding Source	Community	Downstream Limit	Upstream Limit	HUC-8 Sub-Basin(s)	Length (mi) (streams or coastlines)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Thames River and Shetucket River	Norwich, City of	Just downstream of Norwich - Montville, CT corporate limit	Just upstream of the confluence with Yantic River, Norwich, CT	01100002	2.3	N	AE	December 1989
Trading Cove Brook	Bozrah, Town of	Confluence with Thames River	Approximately 300 feet upstream of confluence with Goldmine Brook	01100003	2.46	Y	AE	March 1992
Tributary A	Groton, Town of	Confluence with Birch Plain Creek	Approximately 2,070 feet upstream of Tower Road	01100003	0.21	Y	AE	March 1983
Tributary B	Norwich, City of	Confluence with Yantic River	Approximately 75 feet upstream of Mediterranean Lane	01100003	0.71	Y	AE	March 1992
Tributary C	Lisbon, Town of	Confluence with Shetucket River	Approximately 60 feet upstream of Main Street	01100002	0.09	Y	AE	March 1992
Tributary D	Norwich, City of	Confluence with Shetucket River	Approximately 600 feet upstream of Saint Regis Avenue	01100002	0.68	Y	AE	March 1992
Tributary F	Norwich, City of	Confluence with Thames River	Albert Street	01100003	0.36	Y	AE	March 1992
Whitford Brook (Town of Groton)	Groton, Town of	Confluence with Mystic River	Groton-Stonington corporate limits	01100003	0.43	N	AE	March 1983

Table 2: Flooding Sources Included in this FIS Report (continued)

Flooding Source	Community	Downstream Limit	Upstream Limit	HUC-8 Sub-Basin(s)	Length (mi) (streams or coastlines)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Whitford Brook (Town of Ledyard)	Ledyard, Town of	Approximately 1,800 feet upstream of Lantern Hill Road	Approximately 400 feet upstream of second crossing of Lantern Hill Road	01100003	0.41	Y	AE	April 1979
Williams Brook	Ledyard, Town of	Approximately 750 feet upstream of confluence with Whitford Brook Swamp	Approximately 4,950 feet upstream of Town Farm Drive	01100003	2.09	Y	AE	April 1979
Wyassup Brook	North Stonington, Town of	Confluence with Green Fall River	Clark Falls Pond Dam, North Stonington, CT	01090005	N/A	Y	AE	August 1983
Yantic River	Norwich, City of	Confluence with Thames River, Norwich, CT	Downstream corporate limit of Lebanon, CT	01100003	9.91	Y	AE	July 1984
Yantic River	Lebanon, Town of; Norwich, City of	Downstream corporate limit of Lebanon, CT	Sisson and Camp Moween Road, Lebanon, CT	01100003	2.45	Y	AE	December 1986
Yantic River East Channel	Norwich, City of	Approximately 1000 feet upstream of confluence with Thames River, Norwich, CT	A point approximately 3,700 feet upstream, Norwich, CT	01100003	0.70	Y	AE	July 1984

Table 2: Flooding Sources Included in this FIS Report (continued)

Flooding Source	Community	Downstream Limit	Upstream Limit	HUC-8 Sub-Basin(s)	Length (mi) (streams or coastlines)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Zone A Flooding Sources within New London County – precountywide miscellaneous	Bozrah, Town of; Colchester, Town of; East Lyme, Town of; Franklin, Town of; Groton, Town of; Lebanon, Town of; Ledyard, Town of; Lisbon, Town of; Lyme, Town of; Montville, Town of; North Stonington, Town of; Norwich, City of; Old Lyme, Town of; Preston, Town of; Salem, Town of; Sprague, Town of; Stonington, Town of; Waterford, Town of	See FIRMs	See FIRMs	01080205 01100002 01100003	N/A	N	A	varies
Zone A Flooding Sources within Pawcatuck-Wood HUC-8 Watershed	North Stonington, Town of; Stonington, Town of; Voluntown, Town of	See FIRMs	1 square mile drainage area of all Zone A streams	01090005	N/A	N	A	March 2016
Zone A Flooding Sources within Quinebaug HUC-8 Watershed	Griswold, Town of; Jewett City, Borough of; Libson, Town of; North Stonington, Town of; Preston, Town of; Voluntown, Town of	See FIRMs	1 square mile drainage area of all Zone A streams	01100001	69.5	N	A	November 2019

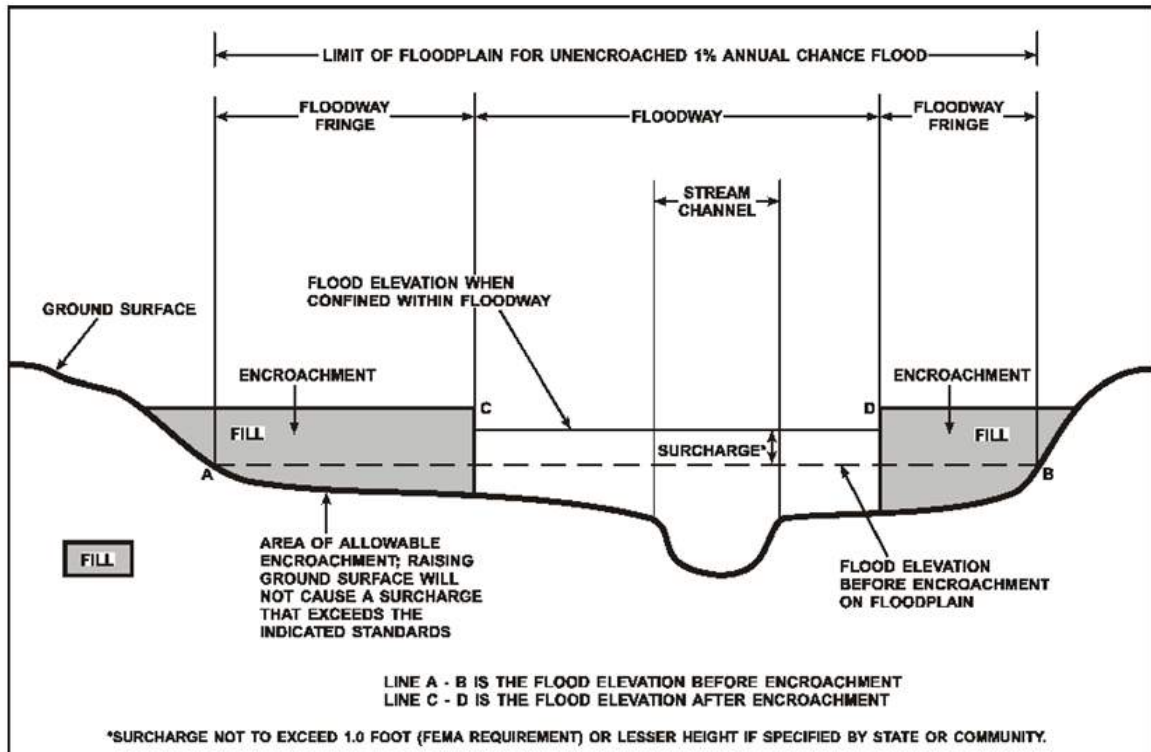
2.2 Floodways

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 balancing floodplain development against increasing flood hazard. With this approach, the area of the 1-percent-annual-chance floodplain on a river is divided into a floodway and a floodway fringe based on hydraulic modeling. The floodway is the channel of a stream, plus any adjacent floodplain areas, that must be kept free of encroachment in order to carry the 1-percent-annual-chance flood. The floodway fringe is the area between the floodway and the 1-percent-annual-chance floodplain boundaries where encroachment is permitted. The floodway must be wide enough so that the floodway fringe could be completely obstructed without increasing the water surface elevation of the 1-percent-annual-chance flood more than 1 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to floodplain development are shown in Figure 4.

To participate in the NFIP, Federal regulations require communities to limit increases caused by encroachment to 1.0 foot, provided that hazardous velocities are not produced. The floodways in this project are presented to local agencies as minimum standards that can be adopted directly or that can be used as a basis for additional floodway projects.

Figure 4: Floodway Schematic



Floodway widths presented in this FIS Report and on the FIRM were computed at cross sections. Between cross sections, the floodway boundaries were interpolated. For certain stream segments, floodways were adjusted so that the amount of floodwaters conveyed on each side of the floodplain would be reduced equally. The results of the floodway computations have been tabulated for selected cross sections and are shown in Table 23, "Floodway Data."

All floodways that were developed for this Flood Risk Project are shown on the FIRM using the symbology described in Figure 3. In cases where the floodway and 1-percent-annual-chance floodplain boundaries are either close together or collinear, only the floodway boundary has been shown on the FIRM. For information about the delineation of floodways on the FIRM, refer to Section 6.3.

2.3 Base Flood Elevations

The hydraulic characteristics of flooding sources were analyzed to provide estimates of the elevations of floods of the selected recurrence intervals. The BFE is the elevation of the 1-percent-annual-chance flood. These BFEs are most commonly rounded to the whole foot, as shown on the FIRM, but in certain circumstances or locations they may be rounded to 0.1 foot. Cross section lines shown on the FIRM may also be labeled with the BFE rounded to 0.1 foot. Whole-foot BFEs derived from engineering analyses that apply to coastal areas, areas of ponding, or other static areas with little elevation change may also be shown at selected intervals on the FIRM.

BFEs are primarily intended for flood insurance rating purposes. Cross sections with BFEs shown on the FIRM correspond to the cross sections shown in the Floodway Data table and Flood Profiles in this FIS Report. For construction and/or floodplain management purposes, users are cautioned to use the flood elevation data presented in this FIS Report in conjunction with the data shown on the FIRM. For example, the user may use the FIRM to determine the stream station of a location of interest and then use the profile to determine the 1-percent annual chance elevation at that location. Because only selected cross sections may be shown on the FIRM for riverine areas, the profile should be used to obtain the flood elevation between mapped cross sections. Additionally, for riverine areas, whole-foot elevations shown on the FIRM may not exactly reflect the elevations derived from the hydraulic analyses; therefore, elevations obtained from the profile may more accurately reflect the results of the hydraulic analysis.

2.4 Non-Encroachment Zones

This section is not applicable to this Flood Risk Project.

2.5 Coastal Flood Hazard Areas

For most areas along rivers, streams, and small lakes, BFEs and floodplain boundaries are based on the amount of water expected to enter the area during a 1-percent-annual-chance flood and the geometry of the floodplain. Floods in these areas are typically caused by storm events. However, for areas on or near ocean coasts, large rivers, or large bodies of water, BFE and floodplain boundaries may need to be based on additional components, including storm surges and waves.

Coastal flooding sources that are included in this Flood Risk Project are shown in Table 2.

2.5.1 Water Elevations and the Effects of Waves

Specific terminology is used in coastal analyses to indicate which components have been included in evaluating flood hazards.

The stillwater elevation (SWEL or still water level) is the surface of the water resulting from astronomical tides, storm surge, and freshwater inputs, but excluding wave setup contribution or the effects of waves.

- *Astronomical tides* are periodic rises and falls in large bodies of water caused by the rotation of the earth and by the gravitational forces exerted by the earth, moon and sun.
- *Storm surge* is the additional water depth that occurs during large storm events. These events can bring air pressure changes and strong winds that force water up against the shore.
- *Freshwater inputs* include rainfall that falls directly on the body of water, runoff from surfaces and overland flow, and inputs from rivers.

The 1-percent-annual-chance stillwater elevation is the stillwater elevation that has been calculated for a storm surge from a 1-percent-annual-chance storm. The 1-percent-

annual-chance storm surge can be determined from analyses of tidal gage records, statistical study of regional historical storms, or other modeling approaches. Stillwater elevations for storms of other frequencies can be developed using similar approaches.

The total stillwater elevation (also referred to as the mean water level) is the stillwater elevation plus wave setup contribution but excluding the effects of waves.

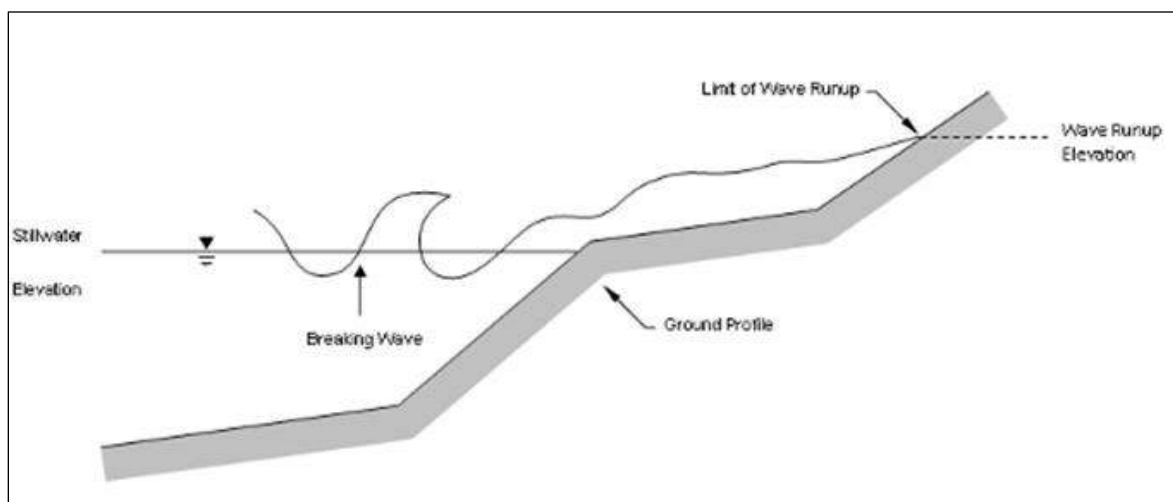
- *Wave setup* is the increase in stillwater elevation at the shoreline caused by the reduction of waves in shallow water. It occurs as breaking wave momentum is transferred to the water column.

Like the stillwater elevation, the total stillwater elevation is based on a storm of a particular frequency, such as the 1-percent-annual-chance storm. Wave setup is typically estimated using standard engineering practices or calculated using models, since tidal gages are often sited in areas sheltered from wave action and do not capture this information.

Coastal analyses may examine the effects of overland waves by analyzing storm-induced erosion, overland wave propagation, wave runup, and/or wave overtopping.

- *Storm-induced erosion* is the modification of existing topography by erosion caused by a specific storm event, as opposed to general erosion that occurs at a more constant rate.
- *Overland wave propagation* describes the combined effects of variation in ground elevation, vegetation, and physical features on wave characteristics as waves move onshore.
- *Wave runup* is the uprush of water from wave action on a shore barrier. It is a function of the roughness and geometry of the shoreline at the point where the stillwater elevation intersects the land.
- *Wave overtopping* refers to wave runup that occurs when waves pass over the crest of a barrier.

Figure 5: Wave Runup Transect Schematic



2.5.2 Floodplain Boundaries and BFEs for Coastal Areas

For coastal communities along the Atlantic and Pacific Oceans, the Gulf of Mexico, the Great Lakes, and the Caribbean Sea, flood hazards must take into account how storm surges, waves, and extreme tides interact with factors such as topography and vegetation. Storm surge and waves must also be considered in assessing flood risk for certain communities on rivers or large inland bodies of water.

Beyond areas that are affected by waves and tides, coastal communities can also have riverine floodplains with designated floodways, as described in previous sections.

Floodplain Boundaries

In many coastal areas, storm surge is the principle component of flooding. The extent of the 1-percent-annual-chance floodplain in these areas is derived from the total stillwater elevation (stillwater elevation including storm surge plus wave setup) for the 1-percent-annual-chance storm. The methods that were used for calculation of total stillwater elevations for coastal areas are described in Section 5.3 of this FIS Report. Location of total stillwater elevations for coastal areas are shown in Figure 8, “1% Annual Chance Total Stillwater Levels for Coastal Areas.”

In some areas, the 1-percent-annual-chance floodplain is determined based on the limit of wave runup or wave overtopping for the 1-percent-annual-chance storm surge. The methods that were used for calculation of wave hazards are described in Section 5.3 of this FIS Report.

Table 25 presents the types of coastal analyses that were used in mapping the 1-percent-annual-chance floodplain in coastal areas.

Coastal BFEs

Coastal BFEs are calculated as the total stillwater elevation (stillwater elevation including storm surge plus wave setup) for the 1-percent-annual-chance storm plus the additional flood hazard from overland wave effects (storm-induced erosion, overland wave propagation, wave runup and wave overtopping).

Where they apply, coastal BFEs are calculated along transects extending from offshore to the limit of coastal flooding onshore. Results of these analyses are accurate until local topography, vegetation, or development type and density within the community undergoes major changes.

Parameters that were included in calculating coastal BFEs for each transect included in this FIS Report are presented in Table 16, “Coastal Transect Parameters.” The locations of transects are shown in Figure 9, “Transect Location Map.” More detailed information about the methods used in coastal analyses and the results of intermediate steps in the coastal analyses are presented in Section 5.3 of this FIS Report. Additional information on specific mapping methods is provided in Section 6.4 of this FIS Report.

2.5.3 Coastal High Hazard Areas

Certain areas along the open coast and other areas may have higher risk of experiencing structural damage caused by wave action and/or high-velocity water during the 1-percent-annual-chance flood. These areas will be identified on the FIRM as Coastal High Hazard Areas.

- *Coastal High Hazard Area (CHHA)* is a SFHA extending from offshore to the inland limit of the primary frontal dune (PFD) or any other area subject to damages caused by wave action and/or high-velocity water during the 1-percent-annual-chance flood.
- *Primary Frontal Dune (PFD)* is a continuous or nearly continuous mound or ridge of sand with relatively steep slopes immediately landward and adjacent to the beach. The PFD is subject to erosion and overtopping from high tides and waves during major coastal storms.

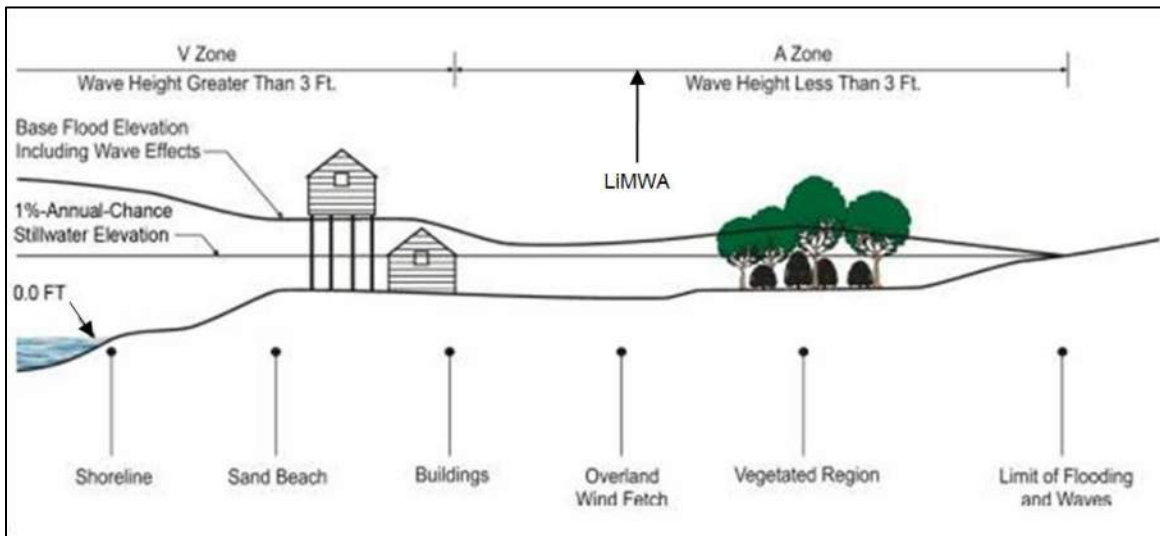
CHHAs are designated as “V” zones (for “velocity wave zones”) and are subject to more stringent regulatory requirements and a different flood insurance rate structure. The areas of greatest risk are shown as VE on the FIRM. Zone VE is further subdivided into elevation zones and shown with BFEs on the FIRM.

The landward limit of the PFD occurs at a point where there is a distinct change from a relatively steep slope to a relatively mild slope; this point represents the landward extension of Zone VE. Areas of lower risk in the CHHA are designated with Zone V on the FIRM. More detailed information about the identification and designation of Zone VE is presented in Section 6.4 of this FIS Report.

Areas that are not within the CHHA but are SFHAs may still be impacted by coastal flooding and damaging waves; these areas are shown as “A” zones on the FIRM.

Figure 6, “Coastal Transect Schematic,” illustrates the relationship between the base flood elevation, the 1-percent-annual-chance stillwater elevation, and the ground profile as well as the location of the Zone VE and Zone AE areas in an area without a PFD subject to overland wave propagation. This figure also illustrates energy dissipation and regeneration of a wave as it moves inland.

Figure 6: Coastal Transect Schematic



Methods used in coastal analyses in this Flood Risk Project are presented in Section 5.3 and mapping methods are provided in Section 6.4 of this FIS Report.

Coastal floodplains are shown on the FIRM using the symbology described in Figure 3, “Map Legend for FIRM.” In many cases, the BFE on the FIRM is higher than the stillwater elevations shown in Table 16 due to the presence of wave effects. The higher elevation should be used for construction and/or floodplain management purposes.

2.5.4 Limit of Moderate Wave Action

Laboratory tests and field investigations have shown that wave heights as little as 1.5 feet can cause damage to and failure of typical Zone AE building construction. Wood-frame, light gage steel, or masonry walls on shallow footings or slabs are subject to damage when exposed to waves less than 3 feet in height. Other flood hazards associated with coastal waves (floating debris, high velocity flow, erosion, and scour) can also damage Zone AE construction.

Therefore, a LiMWA boundary may be shown on the FIRM as an informational layer to assist coastal communities in safe rebuilding practices. The LiMWA represents the approximate landward limit of the 1.5-foot breaking wave. The location of the LiMWA relative to Zone VE and Zone AE is shown in Figure 6.

The effects of wave hazards in Zone AE between Zone VE (or the shoreline where Zone VE is not identified) and the limit of the LiMWA boundary are similar to, but less severe than, those in Zone VE where 3-foot or greater breaking waves are projected to occur during the 1-percent-annual-chance flooding event. Communities are therefore encouraged to adopt and enforce more stringent floodplain management requirements than the minimum NFIP requirements in the LiMWA. The NFIP Community Rating System provides credits for these actions.

SECTION 3.0 – INSURANCE APPLICATIONS

3.1 National Flood Insurance Program Insurance Zones

For flood insurance applications, the FIRM designates flood insurance rate zones as described in Figure 3, “Map Legend for FIRM.” Flood insurance zone designations are assigned to flooding sources based on the results of the hydraulic or coastal analyses. Insurance agents use the zones shown on the FIRM and depths and base flood elevations in this FIS Report in conjunction with information on structures and their contents to assign premium rates for flood insurance policies.

The 1-percent-annual-chance floodplain boundary corresponds to the boundary of the areas of special flood hazards (e.g. Zones A, AE, V, VE, etc.), and the 0.2-percent-annual-chance floodplain boundary corresponds to the boundary of areas of additional flood hazards.

Table 3 lists the flood insurance zones in New London County.

Table 3: Flood Zone Designations by Community

Community	Flood Zone(s)
Bozrah, Town of	A, AE, X
Colchester, Town of	A, AE, AH, X
East Lyme, Town of	A, AE, VE, X
Franklin, Town of	A, AE, X
Griswold, Town of	A, AE, X
Groton Long Point Association	AE, VE, X
Groton, City of	AE, VE, X
Groton, Town of	A, AE, VE, X
Jewett City, Borough of	AE, X
Lebanon, Town of	A, AE, X
Ledyard, Town of	A, AE, X
Lisbon, Town of	A, AE, X
Lyme, Town of	A, AE, X
Montville, Town of	A, AE, X
New London, City of	A, AE, VE, X
Noank Fire District	A, AE, VE, X
North Stonington, Town of	A, AE, X
Norwich, City of	A, AE, X
Old Lyme, Town of	A, AE, VE, X
Preston, Town of	A, AE, X
Salem, Town of	A, AE, X
Sprague, Town of	A, AE, X
Stonington, Borough of	AE, VE, X
Stonington, Town of	A, AE, VE, X
Voluntown, Town of	A, AE, X
Waterford, Town of	A, AE, VE, X

SECTION 4.0 – AREA STUDIED

4.1 Basin Description

Table 4 contains a description of the characteristics of the HUC-8 sub-basins within which each community falls. The table includes the main flooding sources within each basin, a brief description of the basin, and its drainage area.

Table 4: Basin Characteristics

HUC-8 Sub-Basin Name	HUC-8 Sub-Basin Number	Primary Flooding Source	Description of Affected Area	Drainage Area (square miles)
Long Island Sound	02030203	Long Island Sound (coastal flooding)	Coastal watershed extends from New York and along the entire Connecticut coastline.	1,190
Lower Connecticut	01080205	Connecticut River	The Connecticut River is the longest river in New England. Flowing roughly southward for 406 miles through four states, the Connecticut River starts at the U.S. border with Quebec, Canada, and discharges at Long Island Sound. Its watershed encompasses five states and one Canadian province – 11,260 square miles – via 148 tributaries, 38 of which are major rivers. Throughout southern Connecticut, the Connecticut passes through a thinly populated, hilly, wooded region before again widening and discharging into Long Island Sound between Old Saybrook and Old Lyme. There is a presence of large, shifting sandbars at its mouth. The Connecticut River Flood Control Compact was established in 1953 to help prevent serious flooding. The Connecticut River's flow is slowed by main stem dams, which create a series of slow-flowing basins from Lake Francis Dam in Pittsburg, New Hampshire, to the Holyoke Dam at South Hadley Falls in Massachusetts. The river is among the most extensively dammed rivers in the United States and less subject to flooding than the smaller rivers and streams.	1,085

Table 4: Basin Characteristics (continued)

HUC-8 Sub-Basin Name	HUC-8 Sub-Basin Number	Primary Flooding Source	Description of Affected Area	Drainage Area (square miles)
Pawcatuck-Wood	01090005	Pawcatuck River	The Pawcatuck River starts at Worden Pond, situated in the Great Swamp in South Kingstown, and follows a 33-mile-long course, meandering mostly through open and sparsely settled country having a multitude of lakes and swamps. The river flows in a generally southwesterly direction into Little Narragansett Bay at the Rhode Island-Connecticut state line. The lower part of the river forms the boundary between Stonington and North Stonington, Connecticut, and Westerly, Rhode Island. The Pawcatuck-Wood Watershed encompasses a 300-square-mile area of land in southern Rhode Island and southeastern Connecticut. Its seven major drainage basins include the Queen, Wood, Chickasheen, Chipuxet, Shunock, Green Fall, and Pawcatuck Rivers and their tributaries. It is one of the few remaining relatively pristine natural areas along the northeast corridor between New York and Boston.	369
Quinebaug	01100001	Quinebaug River	The Quinebaug River is a river in south-central Massachusetts and eastern Connecticut, with watershed extending into western Rhode Island. The river is about 69 miles in length. It originates from East Brimfield Lake and ponds northwest of Sturbridge, Massachusetts, flows generally southeast and south through Connecticut (Putnam, Danielson, Plainfield, Canterbury, and Jewett City), and joins Aspinook Pond which begins in Canterbury and ends in Jewett City.	739

Table 4: Basin Characteristics (continued)

HUC-8 Sub-Basin Name	HUC-8 Sub-Basin Number	Primary Flooding Source	Description of Affected Area	Drainage Area (square miles)
Quinebaug (continued)	01100001	Quinebaug River	The river then continues to the Shetucket River northeast of Norwich. That river flows from there into the Thames River and drains into Long Island Sound. It is dammed in its upper reaches at East Brimfield Dam, Westville Dam, and West Thompson Dam - all for flood control - as well as numerous mill dams which powered mills along the river's course. Some of these still provide hydroelectric power today. The Quinebaug River watershed covers 850 square miles and extends into western Rhode Island. There are 29 named streams in the watershed including six major tributaries (the French, Moosup, and Five Mile Rivers and Wales, Mill and Cady Brooks). The watershed also contains 54 lakes and ponds, 31 of which have an area of 10 acres or more, for a total of about 3,000 acres; the largest is East Brimfield Reservoir in Brimfield and Sturbridge (420 acres).	739
Shetucket	01100002	Shetucket River	The Shetucket River is a tributary of the Thames River, 20.4 miles long, in eastern Connecticut. It is formed at Willimantic by the junction of the Willimantic and Natchaug Rivers. It flows southeast and south. Approximately 4 miles northeast of Norwich it receives the Quinebaug River and broadens into a wide estuary which stretches southeast for approximately 5 miles and joins the Thames estuary on the south side of Norwich. The river flows through an especially unspoiled rural section of southern New England, despite the historical prevalence of industry in the surrounding region. Parts of the rivers have been designated by the federal government as the Quinebaug and Shetucket Rivers Valley National Heritage Corridor.	526

Table 4: Basin Characteristics (continued)

HUC-8 Sub-Basin Name	HUC-8 Sub-Basin Number	Primary Flooding Source	Description of Affected Area	Drainage Area (square miles)
Thames	01100003	Thames River	The Thames River is a short river and tidal estuary in Connecticut. It flows south for 15 miles through eastern Connecticut from the junction of the Yantic and Shetucket rivers at Norwich, to New London and Groton, which flank its mouth at Long Island Sound. The Thames River watershed includes a number of smaller basins and the 80-mile long Quinebaug River, which rises in southern Massachusetts and joins the Shetucket River about four miles northeast of Norwich. There are 6 flood-control dams throughout the Thames River Basin.	369

4.2 Principal Flood Problems

Table 5 contains a description of the principal flood problems that have been noted for New London County by flooding source.

Table 5: Principal Flood Problems

Flooding Source	Description of Flood Problems
General	Floods in the New London County have occurred in every season of the year. Floods in late summer and fall are usually the result of hurricanes or other storms moving northeast along the Atlantic coast. The most severe flooding occurs during hurricanes or coastal storms. These storms, with their intense winds and rainfall, can create abnormally high tidal surges, wave runup, and peak runoff. The low-lying tidal shoreline areas of New London County are subjected to periodic flooding by severe storms.
Connecticut River	Areas adjacent to the Eight Mile River are subject to flooding caused by the overflow of the river or water from the tidally affected Connecticut River. The most severe flooding is the result of the rainfall from hurricanes. The flood events that had the most effect on the Town of Lyme occurred in 1936, 1938, 1944, 1950, 1954, and 1955.
East Branch Eight Mile River	The USGS gaging station at North Lyme recorded high stages on September 21, 1938, October 16, 1955, and August 19, 1955. This gaging station is located downstream of Salem on the East Branch Eight Mile River. There has been significant flooding in the past at Salem Four Corners, where State Routes 82 and 85 intersect, particularly at the area on State Route 82 immediately west of the intersection. This route was described as having been overtopped by approximately one foot of water during a past flood.
Eight Mile River	Areas adjacent to the Eight Mile River are subject to flooding caused by the overflow of the river or water from the tidally affected Connecticut River. The most severe flooding is the result of the rainfall from hurricanes. The flood events that had the most effect on the Town of Lyme occurred in 1936, 1938, 1944, 1950, 1954, and 1955.
Fishers Island Sound	The low elevation of Groton Long Point Association makes it very susceptible to tidal flooding. Residences are heavily concentrated along the coastline and they are subject to damage from tidal flooding with wave action. Many residential and commercial structures are located in low-lying areas further inland and, though not subject to damage from the surf, they are subject to tidal flooding. The southern portion of the point, in the Shore Avenue area, is exposed to the wave action from Fishers Island Sound and it is here that the most damage has occurred in the past. The shoreline structures along Mumford and Palmer Coves have also experienced wave action damage, but to a lesser degree.
Fourmile River	In 1982, a major riverine flooding event occurred in Montville and East Lyme, which caused damage to bridges and structures along the Fourmile River, Latimer Brook, and the surrounding area. The event is the highest on record at the USGS gaging station on the Fourmile River in East Lyme. A regional storm drainage study confirmed reports that localized inland flooding occurred in the Oxoboxo, Stony, and Trading Cove Brooks due to culverts with inadequate capacity being inundated (Cahn Engineers, 1968).

Table 5: Principal Flood Problems (continued)

Flooding Source	Description of Flood Problems
Horton Cove	Flooding problems exist in the Horton Cove area in the community of Montville. Also, tidal flooding is a recurring problem in the industrial area at Montville Station, just south of the mouth of Horton Cove. . In 1982, a major riverine flooding event occurred in Montville and East Lyme, which caused damage to bridges and structures along the Fourmile River, Latimer Brook, and the surrounding area. The event is the highest on record at the USGS gaging station on the Fourmile River in East Lyme. A regional storm drainage study confirmed reports that localized inland flooding occurred in the Oxoboxo, Stony, and Trading Cove Brooks due to culverts with inadequate capacity being inundated (Cahn Engineers, 1968).
Latimer Brook	In 1982, a major riverine flooding event occurred in Montville and East Lyme, which caused damage to bridges and structures along the Fourmile River, Latimer Brook, and the surrounding area. The event is the highest on record at the USGS gaging station on the Fourmile River in East Lyme. A regional storm drainage study confirmed reports that localized inland flooding occurred in the Oxoboxo, Stony, and Trading Cove Brooks due to culverts with inadequate capacity being inundated (Cahn Engineers, 1968).
Long Island Sound	The shoreline along Long Island Sound, with its high concentration of residential structures, is highly susceptible to heavy damage. When the hurricane's track is west of the coastal communities, the hurricane's counterclockwise winds tend to increase the adverse effect of the tidal surge. Shoreline damages in the Town of East Lyme resulted in losses of \$1,070,000 and \$990,000 during the 1938 and 1954 hurricanes, respectively (U.S. Army Corps, 1964). In addition, the Town of Montville suffered losses of \$900,000 and \$700,000 during the 1938 and 1954 hurricanes, respectively due to shoreline damages. At the CCO meetings for the March 1979 study for the Town of East Lyme, comments were made regarding repeated coastal and riverine flooding. Tidal flooding occurs along Shore Drive, Shore Road, and Atlantic Street, just off Niantic Bay. Also, tidal flooding was reported on both the east and west shores of Black Point. Flooding at Giants Neck Road because of Bride Brook overflowing its banks was reported. 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 NAVD 88 measured in Bridgeport, CT eroded shorelines and damaged homes (DEP, 2007).

Table 5: Principal Flood Problems (continued)

Flooding Source	Description of Flood Problems
Niantic River	The hurricanes of 1938 and 1954 caused some of the worst flooding in New London County. The 1938 hurricane resulted in the greatest disaster in Connecticut's history up to that time, because of the combined effects of flooding, gale winds, and storm surge. The tide was high when the storm surge struck and resulted in a maximum tidal elevation of 8.8 feet. The recurrence interval of this flood height is approximately 2.2-percent-annual-chance. The hurricane of 1954 moved up the Atlantic coast and entered Connecticut in the New London area causing a maximum tidal elevation of 8.0 feet, with a recurrence interval of approximately 5-percent-annual-chance (Brumback, 1965). Tidal surges during severe storms cause flooding along both the Niantic and the Thames Rivers, the larger rivers in the area, and along other smaller streams flowing into either these rivers or Long Island Sound. Where structures are located in the floodplains, damage occurs. In Waterford, hurricane tidal flood damages for the 1938 and 1954 hurricanes were scattered along the entire shoreline, with principal concentrations at the head of Niantic Bay and in the Ridgewood area on the west bank of Alewife Cove. Much of the loss in 1954 was from damage to boats (U.S. Army Corps, 1964).
Oxoboxo Brook and Stony Brook	In 1982, a major riverine flooding event occurred in Montville and East Lyme, which caused damage to bridges and structures along the Fourmile River, Latimer Brook, and the surrounding area. The event is the highest on record at the USGS gaging station on the Fourmile River in East Lyme. A regional storm drainage study confirmed reports that localized inland flooding occurred in the Oxoboxo, Stony, and Trading Cove Brooks due to culverts with inadequate capacity being inundated (Cahn Engineers, 1968).
Pawcatuck River	Streamflow records collected in the vicinity of North Stonington by the USGS indicate that annual peak flow can occur during any season of the year; however, it occurs most frequently during the months of December through April. The highest peak flows usually occur during March or April because of runoff from spring rains, which are often increased by snowmelt; or during September or October, due to runoff from tropical storms. Flooding has not been a major problem on the Pawcatuck River. The vast amount of swampland within the basin has caused very slow flood formation with only minor peak floods (U. S. Army Corps, 1979). Based on historical information obtained from the USGS gaging station No. 01118500 on the Pawcatuck River at Westerly, the worst flood since gage operation began in 1886 was that of November 1927. This flood was caused by a tropical storm. No discharges were calculated for this flood; however, it is estimated to have been a 0.5-percent-annual-chance flood. The flood of March 1968 was the second most severe. Peak discharges for this flood were 4,470 cfs on the Pawcatuck River at the Westerly gage. This was estimated to be approximately 3.3-percent-annual-chance flood. More recent floods in January 1978 and January 1979 at the Westerly gage produced peak discharges of 4,110 cfs and 4,010 cfs, respectively. Both of these storms had an estimated recurrence interval of approximately 5-percent-annual-chance (USGS, 1980).

Table 5: Principal Flood Problems (continued)

Flooding Source	Description of Flood Problems
Quinebaug River	The most notable flood along the Quinebaug River occurred in August, 1955, as the result of Hurricane Diane. The peak discharge caused by that storm was 40,700 cubic feet per second (cfs). Other notable floods were the two floods of March 1936, which were caused by extra-tropical storms. These had peak discharges of 22,800 cfs and 25,000 cfs. Also, a peak discharge of 2,240 cfs was recorded for the Pauchaug River in 1938 at a gage near the borough of Jewett City. Flooding also occurred in July and September of 1938 as the result of hurricanes. Severe flooding also occurred along the Shetucket and Quinebaug Rivers as the result of Hurricane Diane which occurred on August 19, 1955.
Salmon River	Major floods in the Town of Lebanon occurred in March 1936, September 1938, and August 1955. Of these, the flood of September 1938, caused by a hurricane, was the most severe. Streamflow records at USGS gaging station No. 01193500 on the Salmon River at East Hampton. In the Town of Colchester, major floods have occurred in March 1913, November 1927, March 1936, September 1938, August 1955, February 1973, January 1978, and January 1979. Streamflow records at the USGS gaging station on the Salmon River in the nearby Town of East Hampton indicate that the September 1938 and January 1979 floods had approximate recurrence intervals of 1-percent-annual-chance.
Shetucket River	The September 1938 storm was the maximum flood of record for the Town of Norwich. If this flood were to occur at the present time, it would have an estimated recurrence interval of approximately 0.3-percent-annual-chance flood. During the September 1938 flood, high water marks of 8 feet and 1 inch were recorded at the corner of Bath and Franklin Streets and marks of 5 feet and 5 inches were recorded above the railroad tracks to Laurel Hill at the Shetucket River. The flood of record for the Shetucket River, affecting the Towns of Preston, Sprague, Norwich, and Lisbon occurred in September 1938 as the result of a hurricane. This hurricane is often referred to as the "New England Hurricane." Severe flooding also occurred along the Shetucket and Quinebaug Rivers as the result of Hurricane Diane which occurred on August 19, 1955.
Spaulding Pond Brook	A small dam failure occurred on March 6, 1963 on Spaulding Pond Brook. This failure occurred during a moderate storm on the Spaulding Pond Dam, 400 feet above the center of the City of Norwich. Thousands of gallons of water poured into the city, leaving 6 dead and property damage in the millions of dollars (Dewey and Kropper Engineers 1963A)

Table 5: Principal Flood Problems (continued)

Flooding Source	Description of Flood Problems
Thames River	The hurricanes of 1938 and 1954 caused some of the worst flooding in New London County. The 1938 hurricane resulted in the greatest disaster in Connecticut's history up to that time, because of the combined effects of flooding, gale winds, and storm surge. The tide was high when the storm surge struck and resulted in a maximum tidal elevation of 8.8 feet. The recurrence interval of this flood height is approximately 2.2-percent-annual-chance. The hurricane of 1954 moved up the Atlantic coast and entered Connecticut in the New London area causing a maximum tidal elevation of 8.0 feet, with a recurrence interval of approximately 5-percent-annual-chance (Brumback, 1965). Tidal surges during severe storms cause flooding along both the Niantic and the Thames Rivers, the larger rivers in the area, and along other smaller streams flowing into either these rivers or Long Island Sound. Where structures are located in the floodplains, damage occurs. In Waterford, hurricane tidal flood damages for the 1938 and 1954 hurricanes were scattered along the entire shoreline, with principal concentrations at the head of Niantic Bay and in the Ridgewood area on the west bank of Alewife Cove. Much of the loss in 1954 was from damage to boats (U.S. Army Corps, 1964). Hurricane Gloria hit the Town of Waterford on September 27, 1985. Total damages, estimated at \$650,000, were a result of one or a combination of the following: previous shoreline instability, wind and wave action during the storm, and the degree of exposure at the shoreline. Rainfall was insignificant compared to other storm effects due to the location of the town east of the eye of the storm. Damages were generally classified as dock damage, structural damage (sea walls, retaining walls, and bulkhead damage), and beach erosion (approximately 4,000 linear feet) (Wagner, 1985). In Waterford, further inland, riverine flooding, not directly related to tidal surges of the Niantic and the Thames Rivers, has occurred with resulting damage incurred.
Trading Cove Brook	In 1982, a major riverine flooding event occurred in Montville and East Lyme, which caused damage to bridges and structures along the Fourmile River, Latimer Brook, and the surrounding area. The event is the highest on record at the USGS gaging station on the Fourmile River in East Lyme. A regional storm drainage study confirmed reports that localized inland flooding occurred in the Oxoboxo, Stony, and Trading Cove Brooks due to culverts with inadequate capacity being inundated (Cahn Engineers, 1968).
Yantic River	Major floods in the Town of Lebanon occurred in March 1936, September 1938, and August 1955. Of these, the flood of September 1938, caused by a hurricane, was the most severe. Streamflow records at USGS gaging station No. 01193500 on the Salmon River at East Hampton and No. 01127500 on the Yantic River at Yantic, which are in the vicinity of Lebanon, indicate that the September 1938 flood has a recurrence interval of approximately 1-percent-annual-chance. The small segment of the Yantic River within the Town of Franklin has been a source of frequent overbank flooding, due at least in part to a dike which was built to protect a sanitary sewer siphon. There are several houses in the floodplain in this area.

Table 6: Historic Flooding Elevations
[Not Applicable to this Flood Risk Project]

4.3 Dams and Other Flood Hazard Reduction Measures

Table 7 contains information information about non-levee flood hazard reduction measures within New London County such as dams, jetties, and or dikes. Levee systems are addressed in Section 4.4 of this FIS Report.

Table 7: Dams and Other Flood Hazard Reduction Measures

Flooding Source	Structure Name	Type of Measure	Location	Description of Measure
Long Island Sound	Stonington Harbor breakwaters	seawalls	Various places along shoreline	Seawalls, bulkheads, and groins in multiple locations along the shoreline
Spaulding Pond Brook	-	flood-control reservoir	Norwich	Reconstruction by the SCS in 1963 and 1964 after the dam break which caused flash flooding in Norwich

4.4 Levee Systems

For purposes of the NFIP, FEMA only recognizes levee systems that meet, and continue to meet, minimum design, operation, and maintenance standards that are consistent with comprehensive floodplain management criteria. The Code of Federal Regulations, Title 44, Section 65.10 (44 CFR 65.10) describes the information needed for FEMA to determine if a levee system reduces the flood hazard from the 1-percent-annual-chance flood. This information must be supplied to FEMA by the community or other party when a flood risk study or restudy is conducted, when FIRMs are revised, or upon FEMA request. FEMA reviews the information for the purpose of establishing the appropriate flood hazard zone.

Levee systems that are determined to reduce the hazard from the 1-percent-annual-chance flood are accredited by FEMA. FEMA can also grant provisional accreditation to a levee system that was previously accredited on an effective FIRM and for which FEMA is awaiting data and/or documentation to demonstrate compliance with 44 CFR 65.10. These levee systems are referred to as Provisionally Accredited Levees, or PALs. Provisional accreditation provides communities and levee owners with a specified timeframe to obtain the necessary data to confirm the levee system's accreditation status. Accredited levee systems and PALs are shown on the FIRM using the symbology shown in Figure 3 . If the required information for a PAL is not submitted within the required timeframe, or if information indicates that a levee system no longer meets 44 CFR 65.10, FEMA will consider the levee system as non-accredited and issue an effective FIRM showing the levee-impacted area as a SFHA or Zone D.

FEMA coordinated with the USACE, the local communities, and other organizations to compile a list of levees that exist within New London County. Table 8, "Levee Systems," lists all accredited levee systems, PALs, and non-accredited levee systems shown on the FIRM for this FIS Report. Other categories of levees may also be included in the

table. The Levee ID shown in this table may not match numbers based on other identification systems that were listed in previous FIS Reports. Levee systems identified in the table are displayed on the FIRM with notes to users to indicate their flood hazard mapping status.

Please note that the information presented in Table 8 is subject to change at any time. For that reason, the latest information regarding the levee systems presented in the table may be obtained by accessing the National Levee Database. For additional information, contact the levee owner/sponsor or the local community shown in Table 30.

Table 8: Levee Systems

Community	Flooding Source(s)	NLD Levee System ID	NLD Levee System Name	Levee System Status on Effective FIRM	FIRM Panel(s)	Levee Owner(s) / Sponsor(s)
New London, City of	Shaw Cove	4305000049	Shaw's Cove - New London, CT	Accredited	09011C0501J	USACE - New England District

SECTION 5.0 – ENGINEERING METHODS

For the flooding sources in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude that are expected to be equaled or exceeded at least once on the average during any 10-, 25-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for floodplain management and for flood insurance rates. These events, commonly termed the 10-, 25-, 50-, 100-, and 500-year floods, have a 10-, 4-, 2-, 1-, and 0.2-percent-annual-chance, respectively, of being equaled or exceeded during any year.

Although the recurrence interval represents the long-term, average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood that equals or exceeds the 100-year flood (1-percent chance of annual exceedance) during the term of a 30-year mortgage is approximately 26 percent (about 3 in 10); for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

In addition to these flood events, the “1-percent-plus”, or “1%+”, annual chance flood elevation has been modeled and included on the flood profile for certain flooding sources in this FIS Report. While not used for regulatory or insurance purposes, this flood event has been calculated to help illustrate the variability range that exists between the regulatory 1-percent-annual-chance flood elevation and a 1-percent-annual-chance elevation that has taken into account an additional amount of uncertainty in the flood discharges (thus, the 1% “plus”). For flooding sources whose discharges were estimated using regression equations, the 1%+ flood elevations are derived by taking the 1-percent-annual-chance flood discharges and increasing the modeled discharges by a percentage equal to the average predictive error for the regression equation. For flooding sources with gage- or rainfall-runoff-based discharge estimates, the upper 84-percent confidence limit of the discharges is used to compute the 1%+ flood elevations.

The engineering analyses described here incorporate the results of previously issued Letters of Map Change (LOMCs) listed in Table 26, “Incorporated Letters of Map Change”, which include Letters of Map Revision (LOMRs). For more information about LOMRs, refer to Section 6.5, “FIRM Revisions.”

5.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak elevation-frequency relationships for floods of the selected recurrence intervals for each flooding source studied. Hydrologic analyses are typically performed at the watershed level. Depending on factors such as watershed size and shape, land use and urbanization, and natural or man-made storage, various models or methodologies may be applied. A summary of the

hydrologic methods applied to develop the discharges used in the hydraulic analyses for each stream is provided in Table 12. Greater detail (including assumptions, analysis, and results) is available in the archived project documentation.

A summary of the discharges is provided in Table 9. Frequency Discharge-Drainage Area Curves used to develop the hydrologic models may also be shown in Figure 7 for selected flooding sources. A summary of stillwater elevations developed for non-coastal flooding sources is provided in Table 10. (Coastal stillwater elevations are discussed in Section 5.3 and shown in Table 16.) Stream gage information is provided in Table 11.

Table 9: Summary of Discharges

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)					
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	1% Plus Annual Chance	0.2% Annual Chance
Anguilla Brook	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Ashaway River	Below headwaters at confluence of Green Fall River and Parmenter Brook	26.3	979	1,330	1,620	1,930	*	2,720
Beaver Brook (Town of Sprague)	At confluence with Shetucket River	11	697	*	1,064	1,254	*	1,763
Birch Plain Creek	At the Contrail tracks	3.12	410	*	670	800	*	1,200
Birch Plain Creek	At Thomas Road	1.73	230	*	370	450	*	670
Birch Plain Creek	At Poquonnock Road	0.98	160	*	250	300	*	450
Birch Plain Creek	At Clarence B. Sharp Highway	0.62	150	*	240	290	*	430
Blissville Brook	At confluence with Shetucket River	4.09	245	*	387	461	*	674
Blissville Brook	Upstream of Graham Pond	3.4	215	*	340	400	*	590
Bobbin Mill Brook	At junction at Yantic River	0.98	240	*	430	560	*	670
Bobbin Mill Brook	At junction at Tributary B	0.46	130	*	230	300	*	360
Copps Brook	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Day Meadow Brook	At River Road	0.49	*	*	*	200	*	*
Denison Brook	At confluence with Pachaug River	4.21	*	*	*	375	*	*
East Branch Eight Mile River	At downstream Salem corporate limits	19.6	1,160	*	1,920	2,300	*	3,350
East Branch Eight Mile River	Below Harris Brook	14.3	930	*	1,540	1,860	*	2,700
Eccleston Brook	At State Route 215	2.70	510	*	840	1,000	*	1,550
Eccleston Brook	At U.S. Route 1	0.80	185	*	305	365	*	550
Eight Mile River	*	*	*	*	*	*	*	*
Fishtown Brook	At confluence with Eccleston Brook	0.80	185	*	305	365	*	550

Table 9: Summary of Discharges (continued)

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)					
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	1% Plus Annual Chance	0.2% Annual Chance
Flat Brook	At mouth	1.45	195	*	315	380	*	575
Ford Brook	At junction at Trading Cove Brook	2.96	430	*	700	820	*	1,200
Ford Brook	At junction at Gardner Brook	1.83	300	*	480	570	*	830
Ford Brook	At New London Turnpike	0.34	85	*	140	160	*	240
Fort Hill Brook	At the Contrail Tracks	2.21	290	*	470	560	*	830
Fort Hill Brook	At U.S. Route 1	1.61	250	*	410	490	*	730
Fort Hill Brook	At Interstate 95	0.56	140	*	230	270	*	400
Fourmile River	At Long Island Sound	6.57	450	*	740	910	*	1,400
Fourmile River	At State Route 156	6.25	430	*	700	860	*	1,300
Fourmile River	At Interstate Route 95	5.8	410	*	680	830	*	1,250
Fourmile River	At State Route 51	5.26	400	*	660	800	*	1,200
Gardner Brook	At confluence with Yantic River	13.5	725	*	1,250	1,500	*	2,200
Gardner Brook	Below Parson Brook	10.4	600	*	1,040	1,250	*	1,830
Goldmine Brook	At junction at Trading Cove Brook	2.58	340	*	550	650	*	1,000
Great Meadow Brook	At confluence with Pachaug River	6.33	*	*	*	860	*	*
Great Plain Brook	At junction at Trading Cove Brook	0.6	290	*	525	695	*	830
Great Plain Brook	At New London Turnpike	0.4	215	*	390	510	*	610
Great Plain Brook	At cross section F	0.2	130	*	230	300	*	360
Green Fall River	Above confluence with Parmenter Brook	23.7	857	1,170	1,420	1,690	*	2,380
Green Fall River	Above confluence with Glade Brook	19.8	694	946	1,149	1,369	*	1,921
Green Fall River	Below confluence with Wyassup Brook	19.2	657	895	1,086	1,295	*	1,814
Green Fall River	Above confluence with Wyassup Brook	7.65	593	831	1,028	1,231	*	1,810
Green Fall River	Below unnamed tributary 1,000 feet above Putker Road	6.79	530	742	920	1,102	*	1,621

Table 9: Summary of Discharges (continued)

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)					
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	1% Plus Annual Chance	0.2% Annual Chance
Harris Brook	At confluence with East Branch Eight Mile River	7	500	*	800	1,000	*	1,400
Harris Brook	Above Fraser Brook	3	275	*	440	550	*	770
Hunter Brook	At cross section 1	0.64	100	*	160	210	*	260
Hunter Brook	At junction at Shetucket River	1.13	150	*	250	320	*	390
Jeremy River	At confluence with Meadow Brook	23.9	1,450	*	2,450	3,000	*	4,150
Joe Clark Brook	At confluence with Poquetanuck Cove	3.35	270	*	480	610	*	950
Jordan Brook	At confluence with Jordan Cove	6.39	760	*	1,200	1,500	*	2,200
Jordan Brook	Above confluence with Nevins Brook	4.53	420	*	680	820	*	1,200
Jordan Brook	Approximately 900 feet downstream of Boston Post Road	3.85	370	*	600	730	*	1,100
Jordan Brook	At Interstate Route 95	2.66	300	*	500	600	*	900
Jordan Brook	Approximately 3,500 feet downstream of State Route 52	1.76	220	*	350	430	*	640
Jordan Brook	At State Route 52	0.72	160	*	270	330	*	480
Judd Brook	At Hebron Avenue	3.93	300	*	500	600	*	900
Judd Brook	Approximately 2,500 feet upstream of Hebron Avenue	2.6	200	*	350	400	*	600
Judd Brook	Approximately 2,000 feet upstream of State Route 85	1.27	100	*	160	200	*	300
Latimer Brook	At downstream Montville corporate limits	11.48	945	*	1,595	1,965	*	2,790
Latimer Brook	At State Route 85	6.8	735	*	1,295	1,600	*	2,350
Latimer Brook	At confluence with Niantic River	17.18	1,100	*	1,800	2,100	*	3,200
Latimer Brook	Above confluence with Cranberry Meadow Brook	11.74	945	*	1,595	1,965	*	2,780
Latimer Brook	At Grassy Hill Road	9.11	880	*	1,525	1,890	*	2,770

Table 9: Summary of Discharges (continued)

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)					
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	1% Plus Annual Chance	0.2% Annual Chance
Little River	Downstream of confluence with Negro Brook	43.2	2,390	*	3,920	4,770	*	6,990
Meadow Brook	At Interchange 16 State Route 2	35.2	2,450	*	4,000	4,800	*	6,650
Meadow Brook	At confluence with Jeremy River	11.3	1,000	*	1,550	1,800	*	2,500
Meadow Brook	Upstream of Mill Hill Road	7.58	700	*	1,150	1,400	*	1,950
Meadow Brook	At Levy Road	6.39	*	*	*	750	*	*
Nevins Brook	Above confluence with Jordan Brook	1.86	220	*	360	440	*	660
Nevins Brook	At Fog Plain Road	1.23	180	*	280	350	*	510
Nevins Brook	At Interstate Route 95	0.29	90	*	150	180	*	270
Norwichtown Brook	At junction at Yantic River	2.51	290	*	530	650	*	820
Norwichtown Brook	At junction at Tributary A	1.59	130	*	250	300	*	400
Oxoboxo Brook	At confluence with Horton Cove	11.92	860	*	1,400	1,700	*	2,600
Oxoboxo Brook	At Connecticut Turnpike (State Route 52)	10.86	840	*	1,400	1,700	*	2,500
Oxoboxo Brook	At outlet of Rockland Pond	9.33	780	*	1,300	1,600	*	2,300
Pachaug River	At confluence with Quinebaug River	63.1	1,150	*	1,825	2,150	*	3,050
Pachaug River	At Gage 1269.5 (Griswold)	53	1,000	*	1,575	1,875	*	2,650
Pachaug River	At Glasgo Dam between Pachaug and Glasgo Ponds	37.8	763	*	1,206	1,435	*	2,022
Pachaug River (Town of Voluntown)	At downstream Griswold-Voluntown corporate limits	29.6	*	*	*	2,100	*	*
Pachaug River (Town of Voluntown)	Upstream of confluence with Mount Misery Brook	15.2	*	*	*	1,300	*	*
Pachaug River (Town of Voluntown)	Upstream of confluence with Great Meadow Brook	7.11	*	*	*	400	*	*
Pattagansett River	At Long Island Sound	8.91	610	*	1,000	1,200	*	1,800

Table 9: Summary of Discharges (continued)

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)					
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	1% Plus Annual Chance	0.2% Annual Chance
Pattagansett River	At State Route 156	7.53	560	*	930	1,100	*	1,700
Pattagansett River	At confluence with Dodge Pond Branch	6.7	500	*	840	1,000	*	1,500
Pattagansett River	At Interstate Route 95	4.98	450	*	740	900	*	1,400
Pattagansett River	At Pattagansett Lake outfall	3.83	390	*	640	780	*	1,200
Pawcatuck River	At USGS gage 01118500	295	4,090	5,290	6,320	7,480	*	10,500
Pawcatuck River	Above confluence with Shunock River	275	3,880	5,000	6,000	7,100	*	9,980
Pine Swamp Brook	Above Mill Cove	2.13	210	*	375	475	*	790
Quinebaug River	Approximately 1,650 feet above confluence with the Shetucket River	736	11,595	18,048	23,725	30,109	45,280	57,197
Quinebaug River	At confluence with Pachaug River	707	11,446	17,900	23,576	29,951	45,109	57,009
Shetucket River	Upstream of confluence with Quinebaug River	516	13,200	*	25,200	32,400	*	57,600
Shetucket River	At junction at Quinebaug River (Norwich)	516	13,200	*	25,200	32,400	*	57,600
Shetucket River	At junction at Tributary D (Norwich, Preston)	1,269	22,100	*	36,300	45,100	*	76,600
Shetucket River	At junction at Little River (Norwich, Sprague)	465	12,100	*	23,100	29,700	*	52,800
Shewville Brook	At Shewville Road	11.8	550	*	1,010	1,290	*	2,150
Shunock River	At confluence with Pawtucket River	16	1,036	*	1,586	2,016	*	3,058
Shunock River	At State Route 184	13.8	944	*	1,456	1,853	*	2,819
Shunock River	At Rocky Hollow Road (North Stonington)	8	596	*	917	1,165	*	1,775
Spaulding Pond Brook	At Chestnut Avenue (Norwich)	0.98	140	*	230	300	*	370

Table 9: Summary of Discharges (continued)

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)					
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	1% Plus Annual Chance	0.2% Annual Chance
Spaulding Pond Brook	At Mohegan Park Road No. 2 (Norwich)	0.5	85	*	140	180	*	220
Susquetonscut Brook (Town of Franklin)	At Franklin corporate limits	15.8	1,080	*	1,790	2,180	*	3,200
Susquetonscut Brook (Town of Franklin)	At Meeting House Hill Road (Franklin)	12.7	930	*	1,540	1,870	*	2,750
Susquetonscut Brook (Town of Lebanon)	At Franklin-Lebanon corporate limits	10.9	*	*	*	2,470	*	*
Susquetonscut Brook (Town of Lebanon)	Upstream of Route 207	5.65	*	*	*	1,900	*	*
Susquetonscut Brook (Town of Lebanon)	Upstream of Chappel Road (Lebanon)	4.41	*	*	*	1,500	*	*
Susquetonscut Brook (Town of Lebanon)	Upstream of confluence with Burgess Brook	2.53	*	*	*	822	*	*
Tenmile River	At confluence with Williamantic River	17	*	*	*	3,000	*	*
Tenmile River	Upstream of confluence with Giffords Brook	6.09	*	*	*	1,500	*	*
Thames River		*	*	*	*	*	*	*
Trading Cove Brook	At confluence with Trading Cove	13.4	1,240	*	2,100	2,380	*	400
Trading Cove Brook	At Connecticut Turnpike (State Route 52)	8.57	900	*	1,540	1,740	*	2,980
Tributary A	At confluence with Birch Plain Creek	1.39	170	*	270	330	*	500
Tributary A	At U.S. Route 1	0.90	150	*	250	300	*	440
Tributary A	At junction at Norwichtown Brook	0.72	160	*	270	350	*	420
Tributary B	At junction at Yantic River	0.98	240	*	430	560	*	670
Tributary B	At junction at Bobbin Mill Brook	0.52	110	*	200	260	*	310
Tributary C	At junction at Shetucket River	0.09	30	*	60	80	*	90

Table 9: Summary of Discharges (continued)

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)					
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	1% Plus Annual Chance	0.2% Annual Chance
Tributary D	At Saint Regis Avenue (Norwich)	0.22	70	*	130	175	*	200
Tributary D	At junction at Shetucket River	0.47	130	*	240	315	*	375
Tributary E	At junction at Tributary D	0.09	35	*	60	80	*	90
Tributary F	At Dunham Street (Norwich)	0.13	50	*	98	130	*	153
Tributary F	At Woodside Street (Norwich)	0.05	24	*	48	65	*	75
Whitford Brook (Town of Groton)	At confluence with Mystic River	15.03	1,400	*	2,200	2,700	*	4,000
Whitford Brook (Town of Ledyard)	At inlet to Hyde Pond	13.79	1,250	*	1,950	2,400	*	3,550
Whitford Brook (Town of Ledyard)	Downstream of Long Pond	4.6	620	*	800	900	*	1,110
Whitford Brook (Town of Ledyard)	Below Long Pond	4.56	620	*	800	884	*	1,100
Whitford Brook (Town of Ledyard)	Below Lee Brook	4.31	620	*	800	900	*	1,110
Williams Brook	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Wyassup Brook	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Yantic River	At junction at Bobbin Mill Brook	95.65	5,650	*	10,360	11,530	*	23,655
Yantic River	At USGS gaging station (Norwich)	90	5,400	*	9,900	11,015	*	22,600
Yantic River	At Franklin-Norwich corporate limits	89.3	5,400	*	9,900	11,015	*	22,600
Yantic River	At Bozrah-Norwich corporate limits	88.3	5,400	*	9,900	11,015	*	22,600
Yantic River	Below Susquetonscut Brook	86.5	5,300	*	9,700	10,800	*	22,100
Yantic River	Above Susquetonscut Brook	70.7	4,560	*	8,360	9,300	*	19,000
Yantic River	At Fitchville Road	52.7	3,700	*	6,800	7,600	*	15,500
Yantic River	Upstream of confluence with Pease Brook	39.4	3,030	*	5,550	6,180	*	12,680

Table 9: Summary of Discharges (continued)

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)					
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	1% Plus Annual Chance	0.2% Annual Chance
Yantic River	At Gilman Dam	38.6	2,990	*	5,470	6,020	*	12,500
Yantic River	Upstream of confluence with Polly Brook	37	*	*	*	5,690	*	*
Yantic River	Upstream of confluence with Waterman Brook	36.4	*	*	*	5,460	*	*
Yantic River	Upstream of confluence with Gillette Brook	34.7	*	*	*	4,580	*	*
Yantic River	Upstream of confluence with Goshen Brook	33	*	*	*	4,100	*	*

*Not calculated for this Flood Risk Project

Figure 7: Frequency Discharge-Drainage Area Curves

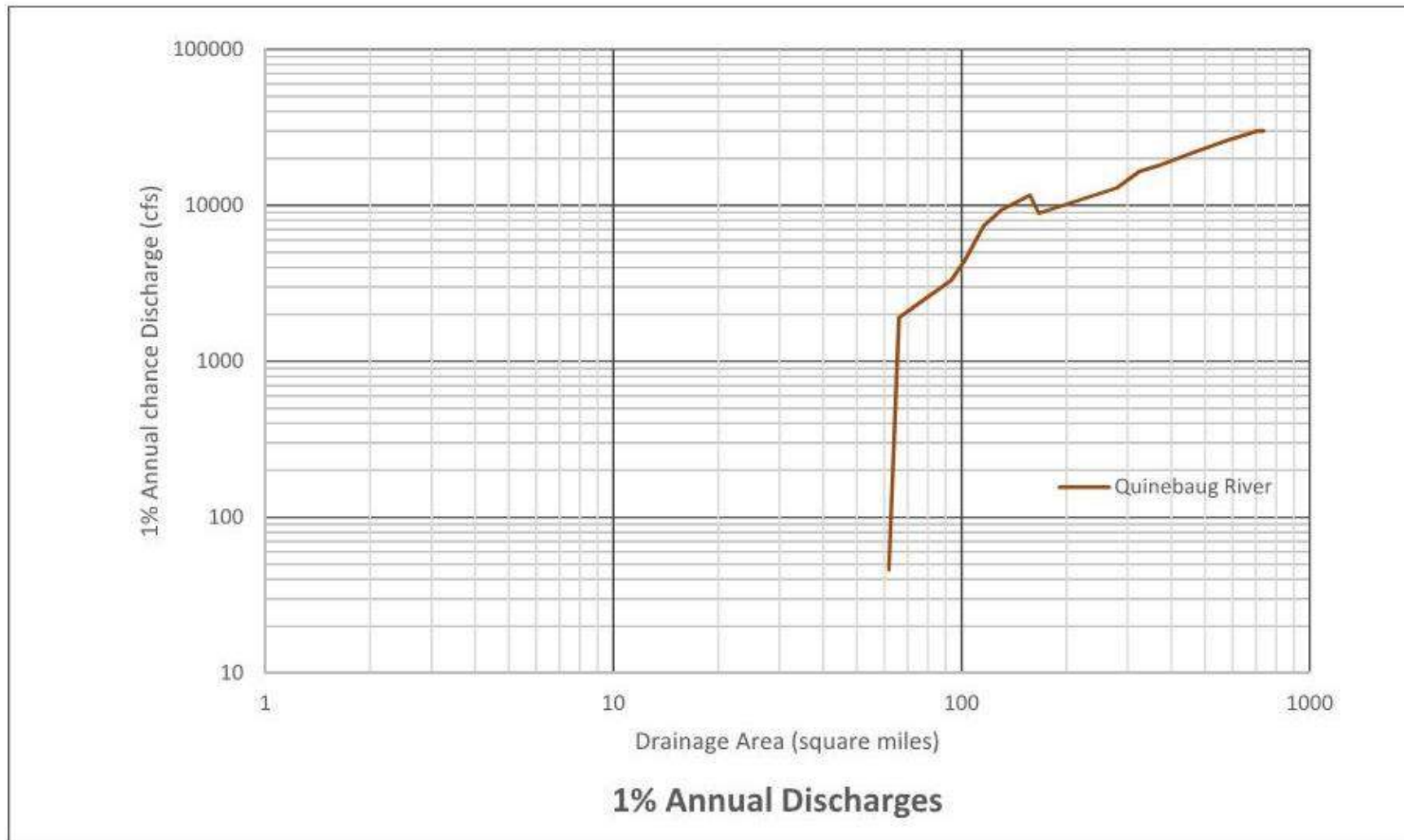


Table 10: Summary of Non-Coastal Stillwater Elevations

Flooding Source	Location	Elevations (feet NAVD88)				
		10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Amston Lake	Entire shoreline within Town of Lebanon	*	*	*	526.1	*
Glasgo Pond	Entire shoreline within Town of Griswold	184.7	*	185.3	185.6	186.3
Pachaug Pond	Entire shoreline within Town of Griswold	158.1	*	158.6	158.8	159.3
Red Cedar Lake	Entire shoreline within Town of Lebanon	*	*	*	440.1	*
Williams Pond	Entire shoreline within Town of Lebanon	*	*	*	446.1	*

*Not calculated for this Flood Risk Project

Table 11: Stream Gage Information used to Determine Discharges

Flooding Source	Gage Identifier	Agency that Maintains Gage	Site Name	Drainage Area (Square Miles)	Period of Record	
					From	To
Denison Brook	01126923	USGS	Denison Brook at Voluntown CT	4.07	3/6/1963	3/6/1963
East Branch Eightmile River	01194500	USGS	East Branch Eightmile River near North Lyme, CT	22.3	10/01/1937	09/30/1966
Eightmile River	01194000	USGS	Eightmile River at North Plain, CT	20.1	10/01/1937	09/30/1966
Little River	01123000	USGS	Little River near Hanover, CT	30.0	10/01/1951	09/30/1982
Lowden Brook	01126910	USGS	Lowden Brook Near Voluntown, CT	2.31	10/6/1962	10/6/1962
Pachaug River	01126950	USGS	Pachaug River at Pachaug, CT	53.0	08/01/1961	10/04/1973
Pawcatuck River	01118500	USGS	Pawcatuck River at Westerly, RI	295	11/27/1940	09/30/2010
Quinebaug River	01127000	USGS	Quinebaug River at Jewett City, CT	713	04/18/1919	03/28/2015
Shetucket River	01122500	USGS	Shetucket River near Willimantic, CT	404	10/01/1928	09/30/1953
Pendelton Hill Brook	01118300	USGS	Pendelton Hill Brook near Clarks Falls, CT	4.02	10/01/1958	09/30/1982

5.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of flooding from the sources studied were carried out to provide estimates of the elevations of floods of the selected recurrence intervals. Base flood elevations on the FIRM represent the elevations shown on the Flood Profiles and in the Floodway Data tables in the FIS Report. Rounded whole-foot

elevations may be shown on the FIRM in coastal areas, areas of ponding, and other areas with static base flood elevations. These whole-foot elevations may not exactly reflect the elevations derived from the hydraulic analyses. Flood elevations shown on the FIRM are primarily intended for flood insurance rating purposes. For construction and/or floodplain management purposes, users are cautioned to use the flood elevation data presented in this FIS Report in conjunction with the data shown on the FIRM. The hydraulic analyses for this 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.

For streams for which hydraulic analyses were based on cross sections, locations of selected cross sections are shown on the Flood Profiles (Exhibit 1). For stream segments for which a floodway was computed (Section 6.3), selected cross sections are also listed in Table 23, "Floodway Data."

A summary of the methods used in hydraulic analyses performed for this project is provided in Table 12. Roughness coefficients are provided in Table 13. Roughness coefficients are values representing the frictional resistance water experiences when passing overland or through a channel. They are used in the calculations to determine water surface elevations. Greater detail (including assumptions, analysis, and results) is available in the archived project documentation.

Table 12: Summary of Hydrologic and Hydraulic Analyses

Flooding Source	Study Limits Downstream Limit	Study Limits Upstream Limit	Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
Anguilla Brook	Confluence with Wequetequock Cove, Stonington, CT	Approximately 6,300 feet upstream of Interstate 95 in Stonington, CT	unknown	unknown	January 1983	AE w/ floodway	
Ashaway River	County boundary	Headwaters at confluence of Green Fall River and Parmenter Brook	USGS Regional Regression Equation (Zarriello, 2012)	HEC-RAS River Analysis System Version 4.1 (U.S. Army Corps, 2010)	July 2014	AE w/ floodway	
Beaver Brook (Town of Lyme)	Confluence with Eight Mile River, Lyme, CT	Approximately 6,075 feet upstream of Route 156, Lyme, CT	Synthetic rainfall-runoff method, TR20 (U.S. Dept. Ag., 1965)	Step- backwater computer model WSP-2 (U.S. Dept. Ag., 1976)	November 1976	AE w/ floodway	
Beaver Brook (Town of Sprague)	Confluence with Shetucket River, Sprague, CT	Sprague-Franklin corporate limit	USGS Floodflow Formulas (Weiss, 1975A) revised by Biscuti (1977)	HEC-2 Water Surface Profiles Program (U.S. Army Corps, 1991)	July 1983	AE w/ floodway	
Birch Plain Creek	Confluence with Baker Cove, Groton, CT	Just upstream of the City of Groton- Town of Groton corporate limit, approximately 1,400 feet downstream of State Route 349	USGS Floodflow Formulas (Weiss, 1975A)	HEC-2 Water Surface Profiles Program (U.S. Army Corps, 1973)	March 1979	AE w/ floodway	
Blissville Brook	Confluence with Shetucket River, Lisbon, CT	Approximately 400 feet upstream of Ames Road, Lisbon, CT	USGS Floodflow Formulas (Weiss, 1975A) revised by Biscuti (1977)	HEC-2 Water Surface Profiles Program (U.S. Army Corps, 1991)	April 1983	AE w/ floodway	

Table 12: Summary of Hydrologic and Hydraulic Analyses (continued)

Flooding Source	Study Limits Downstream Limit	Study Limits Upstream Limit	Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
Bobbin Mill Brook	Confluence with Yantic River, Norwich, CT	Upstream side of Scotland Road, Norwich, CT	USGS Floodflow Formulas (Weiss, 1975B)	HEC-2 Water Surface Profiles Program (U.S. Army Corps, 1991)	March 1992	AE w/ floodway	
Copps Brook	Confluence with Quiambog Cove, Stonington, CT	Interstate 95, Stonington, CT	unknown	unknown	January 1983	AE w/ floodway	
Day Meadow Brook	River Road in Colchester, CT	To a point 3800 feet upstream near State Route 2, Colchester, CT	USGS Floodflow Formulas (Weiss, 1983A)	unknown	December 1990	AE	
Denison Brook	State Route 138 in Voluntown, CT	Fish Road in Voluntown, CT	USGS Floodflow Formulas (Weiss, 1983A)	Depth-drainage area relation	September 1985	AE	
East Branch Eight Mile River	Approximately 900 feet downstream of Darling Road at corporate limit of Salem and East Haddam, CT	Confluence with Harris Brook in Salem, CT	LPIII analysis of gaging record	HEC-2 Water Surface Profiles Program (U.S. Army Corps, 1991)	January 1980	AE w/ floodway	
Eccleston Brook	Brook Street, approximately 1800 feet downstream of State Route 215 in Groton, CT	New London Road (U.S. Route 1) in Groton, CT	USGS Floodflow Formulas (Weiss, 1975A)	HEC-2 Water Surface Profiles Program (U.S. Army Corps, 1991)	March 1983	AE w/ floodway	
Eight Mile River	Confluence with Connecticut River in Lyme, CT	Lyme-East Haddam corporate limit	Synthetic rainfall-runoff method, TR20 (U.S. Dept. Ag., 1965)	Step- backwater computer model WSP-2 (U.S. Dept. Ag., 1976)	November 1976	AE w/ floodway	

Table 12: Summary of Hydrologic and Hydraulic Analyses (continued)

Flooding Source	Study Limits Downstream Limit	Study Limits Upstream Limit	Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
Fishtown Brook	Fishtown Road	New London Road (U.S. Route 1) in Groton, CT	USGS Floodflow Formulas (Weiss, 1975A)	HEC-2 Water Surface Profiles Program (U.S. Army Corps, 1991)	March 1983	AE w/ floodway	
Flat Brook	Confluence with Mill Cove, Ledyard, CT	Approximately 100 feet upstream of Baldwin Hill Road, Ledyard, CT	USGS Floodflow Formulas (Weiss, 1975A) revised by Biscuti (1977)	HEC-2 Water Surface Profiles Program (U.S. Army Corps, 1991)	April 1979	AE w/ floodway	
Ford Brook	Confluence with Trading Cove Brook, Norwich, CT	Approximately 100 feet upstream of Newton Street, Norwich, CT.	USGS Floodflow Formulas (Weiss, 1975B)	HEC-2 Water Surface Profiles Program (U.S. Army Corps, 1991)	March 1992	AE w/ floodway	
Fort Hill Brook	Confluence with Mumford Cove, Groton, CT	Downstream side of Interstate 95, Groton, CT	USGS Floodflow Formulas (Weiss, 1975A)	HEC-2 Water Surface Profiles Program (U.S. Army Corps, 1991)	March 1983	AE w/ floodway	
Fourmile River	Confluence with Long Island Sound, Old Lyme, CT	Upstream side of Boston Post Road (U.S. Route 1), East Lyme, CT	USGS Floodflow Formulas (Weiss, 1975B)	HEC-2 Water Surface Profiles Program (U.S. Army Corps, 1991)	March 1979	AE w/ floodway	
Gardner Brook	Confluence with Yantic River, Bozrah, CT	Approximately 950 feet downstream of confluence with Pearson Brook, Bozrah, CT	USGS Floodflow Formulas (Weiss, 1975A)	HEC-2 Water Surface Profiles Program (U.S. Army Corps, 1991)	March 1980	AE w/ floodway	
Goldmine Brook	Confluence with Trading Cove Brook, Norwich, CT	Approximately 100 feet upstream of Salem Turnpike (State Route 82) in Norwich, CT	USGS Floodflow Formulas (Weiss, 1975B)	HEC-2 Water Surface Profiles Program (U.S. Army Corps, 1991)	March 1992	AE w/ floodway	

Table 12: Summary of Hydrologic and Hydraulic Analyses (continued)

Flooding Source	Study Limits Downstream Limit	Study Limits Upstream Limit	Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
Great Meadow Brook	Confluence with Pachaug River, Voluntown, CT	Approximately 4850 feet upstream of Wylie School Road, Voluntown, CT	USGS Floodflow Formulas (Weiss, 1983A)	Depth- drainage area relation	September 1985	AE	
Great Plain Brook	Confluence with Trading Cove Brook, Norwich, CT	Approximately 700 feet upstream of Norman Road, Norwich, CT	USGS Floodflow Formulas (Weiss, 1975B)	HEC-2 Water Surface Profiles Program (U.S. Army Corps, 1991)	March 1992	AE w/ floodway	
Green Fall River	Rhode Island-Connecticut state boundary	Puttker Road, North Stonington, CT	USGS floodflow regression equations (USGS, 2012)	HEC-RAS River Analysis System Version 4.1 (U.S. Army Corps, 2010)	March 2016	AE w/ floodway	
Harris Brook	Confluence with East Branch Eight Mile River, Salem, CT	Approximately 4500 feet upstream of dam, Salem, CT	USGS Floodflow Formulas (Weiss, 1975A)	HEC-2 Water Surface Profiles Program (U.S. Army Corps, 1991)	January 1980	AE w/ floodway	
Hunter Brook	Confluence with Shetucket River, Norwich, CT	Approximately 1800 feet upstream of the second crossing of Hunters Road, Norwich CT	USGS Floodflow Formulas (Weiss, 1975B)	HEC-2 Water Surface Profiles Program (U.S. Army Corps, 1991)	March 1992	AE w/ floodway	
Jeremy River	Approximately 4600 upstream of Westchester Road (State Route 149), Colchester, CT	Old Hartford Road, Colchester, CT	LPIII analysis of gaging record	unknown	March 1980	AE w/ floodway	
Joe Clark Brook	Confluence with Poquetanuck Cove, Preston and Ledyard, CT	Colonel Ledyard Highway (State Route 117), Ledyard, CT	USGS Floodflow Formulas (Weiss, 1975A) revised by Biscuti (1977)	HEC-2 Water Surface Profiles Program (U.S. Army Corps, 1991)	April 1979	AE w/ floodway	

Table 12: Summary of Hydrologic and Hydraulic Analyses (continued)

Flooding Source	Study Limits Downstream Limit	Study Limits Upstream Limit	Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
Jordan Brook	Confluence with Jordan Cove, Waterford, CT	Approximately 1600 feet upstream of Douglas Lane and downstream side of Interstate 395, Waterford, CT	USGS Floodflow Formulas (Weiss, 1975A)	HEC-2 Water Surface Profiles Program (U.S. Army Corps, 1991)	March 1979	AE w/ floodway	
Judd Brook	Old Hebron Road at Colchester-Hebron corporate limit	Halls Hill Road, Colchester, CT	LPIII analysis of gaging record	unknown	June, 1996	AE w/ floodway	
Latimer Brook	Confluence with Niantic River, East Lyme, CT	Upstream corporate limit of East Lyme, CT	USGS Floodflow Formulas (Weiss, 1975B)	HEC-2 Water Surface Profiles Program (U.S. Army Corps, 1991)	March 1979	AE w/ floodway	
Latimer Brook	Approximately 2800 feet upstream of Darrow Pond, East Lyme, CT	Upstream corporate limit of East Lyme, CT	USGS Floodflow Formulas (Weiss, 1983A)	HEC-2 Water Surface Profiles Program (U.S. Army Corps, 1991)	March 1979	AE w/ floodway	
Latimer Brook	Downstream corporate limit of Montville, CT	Approximately 400 feet upstream of Beckwith Road, Montville, CT	USGS Floodflow Formulas (Weiss, 1983A)	HEC-2 Water Surface Profiles Program (U.S. Army Corps, 1991)	February 1994	AE w/ floodway	
Little River	Confluence with Shetucket River, Lisbon and Sprague, CT	Downstream of Papermill Pond Dam, Sprague, CT	USGS Floodflow Formulas (Weiss, 1983A) adjusted by LPIII analysis of gaging record at station 01123000 with 31 years of record	HEC-2 Water Surface Profiles Program (U.S. Army Corps, 1991)	July 1983	AE w/ floodway	

Table 12: Summary of Hydrologic and Hydraulic Analyses (continued)

Flooding Source	Study Limits Downstream Limit	Study Limits Upstream Limit	Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
Meadow Brook	Confluence with Jeremy River, Colchester, CT	Approximately 3,250 feet upstream of Middletown Road (State Route 16), Colchester, CT	LPIII analysis of gaging record	unknown	March 1980	AE w/ floodway	
Meadow Brook (restudy)	Approximately 2,140 feet downstream of Levy Road, Colchester, CT	Approximately 3,250 feet upstream of State Route 16, Colchester, CT	USGS Floodflow Formulas (Weiss, 1983A)	unknown	December 1990	AE w/ floodway	
Nevins Brook	Confluence with Jordan Brook, Waterford, CT	Interstate 95, Waterford, CT	USGS Floodflow Formulas (Weiss, 1975A)	HEC-2 Water Surface Profiles Program (U.S. Army Corps, 1991)	March 1979	AE w/ floodway	
Norwichtown Brook	Confluence with Yantic River, Norwich, CT	Approximately 550 feet upstream of Case Street, Norwich, CT	USGS Floodflow Formulas (Weiss, 1975B)	HEC-2 Water Surface Profiles Program (U.S. Army Corps, 1991) and step-backwater computer model WSP-2 (U.S. Dept. Ag., 1976)	March 1992	AE w/ floodway	
Oxoboxo Brook	Confluence with Horton Cove, Montville, CT	Rockland Pond Dam, Montville, CT	USGS Floodflow Formulas (Weiss, 1975B)	HEC-2 Water Surface Profiles Program (U.S. Army Corps, 1991)	March 1979	AE w/ floodway	
Pachaug River	Confluence with Quinebaug River, Griswold, CT	Pachaug Pond dam in Griswold, CT	LPIII analysis of gaging record at station 01126950 with 11 years of record	HEC-2 Water Surface Profiles Program (U.S. Army Corps, 1991)	May 1983	AE w/ floodway	

Table 12: Summary of Hydrologic and Hydraulic Analyses (continued)

Flooding Source	Study Limits Downstream Limit	Study Limits Upstream Limit	Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
Pachaug River (Town of Voluntown)	Approximately 800 feet upstream of Carol Road at the Voluntown - Griswold, CT corporate limit	Approximately 5000 feet upstream of Beach Pond Dam at the Voluntown, CT-Exeter, RI corporate limit	USGS Floodflow Formulas (Weiss, 1983A)	Depth-drainage area relation	September 1985	AE	
Pattagansett River	Confluence with Long Island Sound, East Lyme, CT	Pattagansett Lake Dam, East Lyme, CT	USGS Floodflow Formulas (Weiss, 1975B)	HEC-2 Water Surface Profiles Program (U.S. Army Corps, 1991)	March 1979	AE w/ floodway	
Pawcatuck River	Gayitt Point, Stonington, CT	North Stonington, CT - Hopkinton, RI corporate limit	USGS floodflow regression equations (USGS, 2012)	HEC-RAS River Analysis System Version 4.1 (U.S. Army Corps, 2010)	March 2016	AE w/ floodway	
Pine Swamp Brook	Confluence with Thames River, Ledyard, CT	Approximately 1300 feet upstream of Harvard Terrace, Ledyard, CT	USGS Floodflow Formulas (Weiss, 1975A) revised by Biscuti (1977) (Weiss, 1975A) revised by Biscuti (1977)	HEC-2 Water Surface Profiles Program (U.S. Army Corps, 1991) and step-backwater computer model WSP-2 (U.S. Dept. Ag., 1976)	April 1979	AE w/ floodway	
Quinebaug River	Confluence with Shetuck River in Lisbon and Preston, CT	Lisbon Canterbury, CT corporate limit	HEC-HMS 3.0 and up (Dec 2005)	HEC-RAS 5.0 and up	November 2019	AE w/ floodway	
Shetucket River	Confluence with Yantic and Thames River in Norwich, CT	Approximately 300 feet upstream of State Route 97, Sprague, CT	LPIII analysis of gaging record at station 01122500 with 25 years of record and adjusted for flood control	HEC-2 Water Surface Profiles Program (U.S. Army Corps, 1991)	December 1989	AE w/ floodway	

Table 12: Summary of Hydrologic and Hydraulic Analyses (continued)

Flooding Source	Study Limits Downstream Limit	Study Limits Upstream Limit	Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
Shewville Brook	Approximately 10650 feet upstream of confluence with Hewett Brook and 1,000 feet downstream of Shewville Road, Ledyard, CT	Approximately 750 feet upstream of Shewville Road, Ledyard, CT	unknown	HEC-2 Water Surface Profiles Program (U.S. Army Corps, 1991)	April 1979	AE w/ floodway	
Shunock River	Confluence with Pawcatuck River in North Stonington, CT	Approximately 5200 feet upstream of Main Street, North Stonington, CT	USGS Floodflow Formulas (Weiss, 1983A) and adjusted for storage	HEC-2 Water Surface Profiles Program (U.S. Army Corps, 1991)	August 1983	AE w/ floodway	
Spaulding Pond Brook	Confluence with Shetucket River, Norwich, CT	Approximately 150 feet upstream of dam, Norwich, CT	USGS Floodflow Formulas (Weiss, 1975B)	HEC-2 Water Surface Profiles Program (U.S. Army Corps, 1991)	March 1992	AE w/ floodway	
Susquetonscut Brook (Town of Franklin)	Approximately 2000 feet upstream of confluence with Yantic River, Franklin, CT	Champion Road, Franklin, CT	LPIII analysis of gaging record	HEC-2 Water Surface Profiles Program (U.S. Army Corps, 1991)	May 1980	AE w/ floodway	
Susquetonscut Brook (Town of Lebanon)	Lebanon - Franklin, CT corporate limit	Bender Road, Lebanon, CT	USGS Floodflow Formulas (Weiss, 1983A)	Depth-drainage area relation	December 1986	AE	
Tenmile River	Confluence with Willimatic River near downstream corporate limit of Lebanon, CT	Palmer Pond, Lebanon, CT	USGS Floodflow Formulas (Weiss, 1983A)	Depth-drainage area relation	December 1986	AE	

Table 12: Summary of Hydrologic and Hydraulic Analyses (continued)

Flooding Source	Study Limits Downstream Limit	Study Limits Upstream Limit	Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
Thames River and Shetucket River	Just downstream of Norwich - Montville, CT corporate limit	Just upstream of the confluence with Yantic River, Norwich, CT	unknown	HEC-2 Water Surface Profiles Program (U.S. Army Corps, 1991)	December 1989	AE	
Trading Cove Brook	Confluence with Thames River in Norwich, CT	Approximately 300 feet upstream of the confluence with Goldmine Brook in Norwich, CT	USGS Floodflow Formulas (Weiss, 1975B)	HEC-2 Water Surface Profiles Program (U.S. Army Corps, 1991)	March 1992	AE w/ floodway	
Tributary A	Confluence with Birch Plain Creek, Groton, CT	Approximately 2070 feet upstream of Tower Avenue, Groton, CT	USGS Floodflow Formulas (Weiss, 1975B)	HEC-2 Water Surface Profiles Program (U.S. Army Corps, 1991)	March 1983	AE w/ floodway	
Tributary B	Confluence with Yantic River, Norwich, CT	Approximately 75 feet upstream of Mediterranean Lane, Norwich, CT	USGS Floodflow Formulas (Weiss, 1975B)	HEC-2 Water Surface Profiles Program (U.S. Army Corps, 1991)	March 1992	AE w/ floodway	
Tributary C	Confluence with Shetucket River, Norwich, CT	Approximately 60 feet upstream of Main Street Culvert, Norwich, CT	USGS Floodflow Formulas (Weiss, 1975B)	HEC-2 Water Surface Profiles Program (U.S. Army Corps, 1991)	March 1992	AE w/ floodway	
Tributary D	Confluence with Shetucket River, Norwich, CT	Approximately 600 feet upstream of Saint Regis Avenue, Norwich, CT	USGS Floodflow Formulas (Weiss, 1975B)	HEC-2 Water Surface Profiles Program (U.S. Army Corps, 1991)	March 1992	AE w/ floodway	
Tributary E	No description provided, Norwich, CT	No description provided, Norwich, CT	USGS Floodflow Formulas (Weiss, 1975B)	HEC-2 Water Surface Profiles Program (U.S. Army Corps, 1991)	March 1992	AE	

Table 12: Summary of Hydrologic and Hydraulic Analyses (continued)

Flooding Source	Study Limits Downstream Limit	Study Limits Upstream Limit	Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
Tributary F	Confluence with Thames River, Norwich, CT	Albert Street, Norwich, CT	USGS Floodflow Formulas (Weiss, 1975B)	HEC-2 Water Surface Profiles Program (U.S. Army Corps, 1991)	March 1992	AE w/ floodway	
Whitford Brook (Town of Groton)	Confluence with Mystic River, Groton, CT	Groton Stonington, CT corporate limit	USGS Floodflow Formulas (Weiss, 1975A)	unknown	March 1983	AE	
Whitford Brook (Town of Ledyard)	Approximately 1800 feet upstream of Lantern Hill Road at Stonington-Ledyard, CT corporate limit	Approximately 400 feet upstream of second crossing of Lantern Hill Road and downstream of Long Pond outflow, Ledyard, CT	USGS Floodflow Formulas (Weiss, 1975A) revised by Biscuti (1977)	HEC-2 Water Surface Profiles Program (U.S. Army Corps, 1991)	April 1979	AE w/ floodway	
Williams Brook	Approximately 750 feet upstream of confluence with Whitford Brook Swamp and 1500 feet downstream of Shewville Road, Ledyard, CT	Approximately 4,950 feet upstream of Town Farm Drive, Ledyard, CT	USGS Floodflow Formulas (Weiss, 1975A) revised by Biscuti (1977)	HEC-2 Water Surface Profiles Program (U.S. Army Corps, 1991)	April 1979	AE w/ floodway	
Wyassup Brook	Confluence with Green Fall River	Clark Falls Pond Dam, North Stonington, CT	USGS Floodflow Formulas (Weiss, 1983A) and adjusted with comparison of LPIII analysis at station 01118300 with 24 years of record	HEC-2 Water Surface Profiles Program (U.S. Army Corps, 1991)	August 1983	AE w/ floodway	

Table 12: Summary of Hydrologic and Hydraulic Analyses (continued)

Flooding Source	Study Limits Downstream Limit	Study Limits Upstream Limit	Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
Yantic River	Confluence with Thames River, Norwich, CT	Downstream corporate limit of Lebanon, CT	From previous studies	HEC-2 Water Surface Profiles Program (U.S. Army Corps, 1991)	July 1984	AE w/ floodway	
Yantic River	Downstream corporate limit of Lebanon, CT	Sisson and Camp Moween Road, Lebanon, CT	USGS Floodflow Formulas (Weiss, 1983A)	HEC-2 Water Surface Profiles Program (U.S. Army Corps, 1991)	December 1986	AE w/ floodway	
Yantic River East Channel	Approximately 1000 feet upstream of confluence with Thames River, Norwich, CT	A point approximately 3700 feet upstream, Norwich, CT	USGS Floodflow Formulas (Weiss, 1975B)	HEC-2 Water Surface Profiles Program (U.S. Army Corps, 1991)	July 1984	AE w/ floodway	
Zone A Flooding Sources within New London County – precountywide miscellaneous	See FIRMs	See FIRMs	Other	Other	varies	A	Hydrology completed using approximate methods. Hydraulics completed using a version of HEC-2 that predates version 4.6.2.
Zone A Flooding Sources within Pawcatuck-Wood HUC-8 Watershed	See FIRMs	1 square mile drainage area of all Zone A streams	Regression Equations	HEC-RAS version 3.1.1 and up	March 2016	A	

Table 12: Summary of Hydrologic and Hydraulic Analyses (continued)

Flooding Source	Study Limits Downstream Limit	Study Limits Upstream Limit	Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
Zone A Flooding Sources within Quinebaug HUC-8 Watershed	See FIRMs	1 square mile drainage area of all Zone A streams	Regression Equations	HEC-RAS 5.0 and up	November 2019	A	

Table 13: Roughness Coefficients

Flooding Source	Channel "n"	Overbank "n"
Ashaway River	0.030 - 0.060	0.080 - 0.180
Beaver Brook (Town of Lyme)	0.025 - 0.075	0.025 - 0.075
Beaver Brook (Town of Sprague)	0.035 - 0.045	0.040 - 0.090
Birch Plain Creek	0.018 - 0.030	0.020 - 0.070
Blissville Brook	0.025 - 0.055	0.050 - 0.070
Bobbin Mill Brook	0.040 - 0.060	0.060 - 0.120
Day Meadow Brook	0.040	0.070 - 0.080
Denison Brook	*	*
East Branch Eight Mile River	0.035	0.070
Eccleston Brook	0.015 - 0.070	0.020 - 0.100
Eight Mile River	0.025 - 0.075	0.025 - 0.075
Fishtown Brook	0.015 - 0.070	0.020 - 0.100
Flat Brook	0.015 - 0.050	0.050 - 0.080
Ford Brook	0.040 - 0.060	0.060 - 0.120
Fort Hill Brook	0.030 - 0.080	0.015 - 0.080
Fourmile River	0.020 - 0.080	0.030 - 0.070
Gardner Brook	0.030 - 0.040	0.070 - 0.085
Goldmine Brook	0.040 - 0.060	0.060 - 0.120
Great Meadow Brook	*	*
Great Plain Brook	0.040 - 0.060	0.060 - 0.120
Green Fall River	0.035 - 0.046	0.060 - 0.150
Harris Brook	0.035	0.070
Hunter Brook	0.040 - 0.060	0.030 - 0.200
Jeremy River	0.030 - 0.040	0.045 - 0.080
Joe Clark Brook	0.030 - 0.035	0.050 - 0.060
Jordan Brook	0.015 - 0.080	0.030 - 0.080
Judd Brook	0.025 - 0.050	0.060 - 0.080
Latimer Brook	0.030 - 0.100	0.010 - 0.120
Little River	0.040 - 0.050	0.050 - 0.060
Meadow Brook	0.035 - 0.040	0.060 - 0.070
Nevins Brook	0.015 - 0.060	0.030 - 0.080
Norwichtown Brook	0.035 - 0.045	0.050 - 0.085
Oxoboxo Brook	0.009 - 0.060	0.030 - 0.080
Pachaug River	0.020 - 0.050	0.025 - 0.060
Pachaug River (Town of Voluntown)	*	*
Pattagansett River	0.010	0.010 - 0.020
Pawcatuck River	0.025 - 0.055	0.040 - 0.180
Pine Swamp Brook	0.030 - 0.055	0.050 - 0.075
Quinebaug River	0.035 - 0.550	0.040 - 0.120
Shetucket River	0.030 - 0.080	0.040 - 0.120
Shewville Brook	0.035 - 0.050	0.035 - 0.080

Table 13: Roughness Coefficients (continued)

Flooding Source	Channel "n"	Overbank "n"
Shunock River	0.030 - 0.055	0.030 - 0.100
Spaulding Pond Brook	0.040 - 0.060	0.060 - 0.120
Susquetonscut Brook (Town of Franklin)	0.035 - 0.060	0.060 - 0.120
Susquetonscut Brook (Town of Lebanon)	*	*
Ten Mile River	*	*
Thames River and Shetucket River	*	*
Trading Cove Brook	0.060 - 0.100	0.080 - 0.120
Tributary A	0.016 - 0.080	0.030 - 0.080
Tributary B	0.040 - 0.060	0.060 - 0.120
Tributary C	0.040 - 0.060	0.060 - 0.120
Tributary D	0.040 - 0.060	0.060 - 0.120
Tributary E	0.040 - 0.060	0.060 - 0.120
Tributary F	0.040 - 0.060	0.060 - 0.120
Whitford Brook (Town of Groton)	0.015 - 0.050	0.030 - 0.090
Whitford Brook (Town of Ledyard)	0.020 - 0.050	0.040 - 0.065
Williams Brook	0.024 - 0.060	0.035 - 0.080
Yantic River	0.025 - 0.070	0.025 - 0.120
Yantic River East Channel	0.040 - 0.060	0.060 - 0.120
Zone A Flooding Sources within Quinebaug HUC-8 Watershed	0.030 - 0.070	0.013 - 0.120

5.3 Coastal Analyses

For the areas of New London County that are impacted by coastal flooding processes, coastal flood hazard analyses were performed to provide estimates of coastal BFEs. Coastal BFEs reflect the increase in water levels during a flood event due to extreme tides and storm surge as well as overland wave effects.

The following subsections provide summaries of how each coastal process was considered for this FIS Report. Greater detail (including assumptions, analysis, and results) is available in the archived project documentation. Table 14 summarizes the methods and/or models used for the coastal analyses. Refer to Section 2.5.1 for descriptions of the terms used in this section.

Table 14: Summary of Coastal Analyses

Flooding Source	Study Limits From	Study Limits To	Hazard Evaluated	Model or Method Used	Date Analysis was Completed
Long Island Sound	Entire coastline	Entire coastline	Extremal Analysis	Peaks Over Threshold (POT)	August 2013

Table 14: Summary of Coastal Analyses (continued)

Flooding Source	Study Limits From	Study Limits To	Hazard Evaluated	Model or Method Used	Date Analysis was Completed
Long Island Sound	Entire coastline	Entire coastline	Stillwater Elevation	Tide Gage Analysis	August 2013
Long Island Sound	Entire coastline	Entire coastline	Wave Setup	Direct Integration Method (DIM)	August 2013
Long Island Sound	Unrestricted fetches in New London County	Unrestricted fetches in New London County	Waves	USACE Coastal Engineering Manual Empirical Wave Growth equations	August 2013
Long Island Sound	Entire coastline in New London County	Entire coastline in New London County	Waves	USACE Automated Coastal Engineering System	August 2013
Long Island Sound	Entire coastline	Entire coastline	Overland Wave Propagation	WHAFIS	August 2013
Long Island Sound	Vertical coastal protection structures	Vertical coastal protection structures	Wave runup	Shore Protection Manual (SPM)	August 2013
Long Island Sound	Coastal protection structures sloping from 1:1 to 1:8	Coastal protection structures sloping from 1:1 to 1:8	Wave runup	TAW	August 2013
Long Island Sound	Coastal protection structures sloping gentler than 1:8 and natural beaches	Coastal protection structures sloping gentler than 1:8 and natural beaches	Wave runup	RUNUP 2.0	August 2013
Long Island Sound	Entire coastline	Entire coastline	Coastal Erosion	Coastal Hazard Analysis and Modeling Program (CHAMP)	August 2013

5.3.1 Total Stillwater Elevations

The total stillwater elevations (stillwater including storm surge plus wave setup) for the 1-percent-annual-chance flood were determined for areas subject to coastal flooding.

The models and methods that were used to determine storm surge and wave setup are listed in Table 14.

Figure 8: 1% Annual Chance Total Stillwater Elevations for Coastal Areas
[Not Applicable to this Flood Risk Project]

Tidal gages can be used instead of historic records of storms when the available tidal gage record for the area represents both the astronomical tide component and the storm surge component. Table 15 provides the gage name, managing agency, gage type, gage identifier, start date, end date, and statistical methodology applied to each gage used to determine the stillwater elevations. For areas between gages, peak stillwater elevations for selected recurrence intervals were estimated by combining interpolation between gages and observed high water marks during major storms. A regionalized statistical approach was applied to the gage data so that stillwater elevations in areas between gages could be identified.

Table 15: Tide Gage Analysis Specifics

Gage Name	Managing Agency of Tide Gage Record	Gage Type	Start Date	End Date	Statistical Methodology
New London tide gage station 8461490	NOAA	Tide	unknown	unknown	L-Moments with a Wakeby distribution
New Haven tide gage station 8465705	NOAA	Tide	unknown	unknown	L-Moments with a Wakeby distribution
Newport tide gage station 8452660	NOAA	Tide	unknown	unknown	L-Moments with a Wakeby distribution
Groton Airport KGON	NOAA	ASOS (Wind)	unknown	unknown	Weibull distribution

Wave Setup Analysis

Wave setup was computed during transect-based analysis through the methods listed in Table 14.

5.3.2 Waves

Empirical wind wave growth equations were used to calculate the deepwater bulk wave parameters required for transect-based analysis in unrestricted and fetch-restricted settings. Table 14 provides the wind observation station name, managing agency, gage type, start date, end date, and statistical methodology applied to each gage used to determine the wind speeds for use in wind wave growth.

5.3.3 Coastal Erosion

A single storm episode can cause extensive erosion in coastal areas. Storm-induced erosion was evaluated to determine the modification to existing topography that is expected to be associated with flooding events. Erosion was evaluated using the methods listed in Table 14.

5.3.4 Wave Hazard Analyses

Overland wave hazards were evaluated to determine the combined effects of ground elevation, vegetation, and physical features on overland wave propagation and wave runup. These analyses were performed at representative transects along all shorelines for which waves were expected to be present during the floods of the selected recurrence intervals. The results of these analyses were used to determine elevations for the 1-percent-annual-chance flood.

Transect locations were chosen with consideration given to the physical land characteristics as well as development type and density so that they would closely represent conditions in their locality. Additional consideration was given to changes in the total stillwater elevation. Transects were spaced close together in areas of complex topography and dense development or where total stillwater elevations varied. In areas having more uniform characteristics, transects were spaced at larger intervals. Transects shown in Figure 9, "Transect Location Map," are also depicted on the FIRM. Table 16 provides the location, stillwater elevations, and starting wave conditions for each transect evaluated for overland wave hazards. In this table, "starting" indicates the parameter value at the beginning of the transect.

Wave Height Analysis

Wave height analyses were performed to determine wave heights and corresponding wave crest elevations for the areas inundated by coastal flooding and subject to overland wave propagation hazards. Refer to Figure 6 for a schematic of a coastal transect evaluated for overland wave propagation hazards.

Wave heights and wave crest elevations were modeled using the methods and models listed in Table 14, "Summary of Coastal Analyses".

Wave Runup Analysis

Wave runup analyses were performed to determine the height and extent of runup beyond the limit of stillwater inundation for the 1-percent-annual-chance flood. Wave runup elevations were modeled using the methods and models listed in Table 14.

Table 16: Coastal Transect Parameters

Flood Source	Coastal Transect	Starting Wave Conditions for the 1% Annual Chance		Starting Stillwater Elevations (ft NAVD88)				
		Significant Wave Height H_s (ft)	Peak Wave Period T_p (sec)	10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Connecticut River	1	2.23	2.70	5.3	*	7.6	9.3	15.8
Long Island Sound	2	3.13	3.18	5.3	*	7.6	9.3	15.9
Long Island Sound	3	14.17	6.01	5.2	*	7.6	9.3	16.1
Long Island Sound	4	14.28	6.04	5.2	*	7.6	9.3	16.2
Long Island Sound	5	11.34	5.18	5.2	*	7.6	9.3	16.3
Long Island Sound	6	11.01	5.08	5.2	*	7.6	9.3	16.3
Long Island Sound	7	11.11	5.11	5.1	*	7.6	9.3	16.4
Long Island Sound	8	11.29	5.17	5.1	*	7.6	9.3	16.5
Long Island Sound	9	10.84	5.03	5.1	*	7.5	9.3	16.6
Long Island Sound	10	10.92	5.05	5.1	*	7.5	9.3	16.7
Long Island Sound	11	11.15	5.12	5.0	*	7.5	9.3	16.8
Long Island Sound	12	10.98	5.07	5.0	*	7.5	9.3	16.9
Long Island Sound	13	11.35	5.18	5.0	*	7.5	9.3	16.9
Long Island Sound	14	11.61	5.26	5.0	*	7.5	9.3	17.0
Long Island Sound	15	11.94	5.36	5.0	*	7.5	9.4	17.0
Long Island Sound	16	10.17	4.82	5.0	*	7.5	9.4	17.1
Niantic Bay	17	10.37	4.88	4.9	*	7.5	9.4	17.1
Niantic Bay	18	11.08	5.10	4.9	*	7.5	9.4	17.2
Niantic Bay	19	11.28	5.16	4.9	*	7.5	9.4	17.2
Niantic Bay	20	11.03	5.13	4.9	*	7.5	9.4	17.3
Niantic Bay	21	10.98	5.07	4.9	*	7.5	9.4	17.3

Table 16: Coastal Transect Parameters (continued)

Flood Source	Coastal Transect	Starting Wave Conditions for the 1% Annual Chance		Starting Stillwater Elevations (ft NAVD88)				
		Significant Wave Height H _s (ft)	Peak Wave Period T _p (sec)	10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Niantic Bay	22	11.52	5.24	4.9	*	7.5	9.4	17.4
Niantic Bay	23	11.19	5.14	4.8	*	7.5	9.4	17.4
Long Island Sound	24	10.68	4.98	4.8	*	7.4	9.4	17.5
Long Island Sound	25	10.72	4.99	4.8	*	7.4	9.4	17.6
Long Island Sound	26	11.31	5.17	4.8	*	7.4	9.4	17.6
Long Island Sound	27	6.60	4.95	4.8	*	7.4	9.4	17.7
Long Island Sound	28	10.19	4.83	4.8	*	7.4	9.4	17.7
Long Island Sound	29	10.14	4.81	4.8	*	7.4	9.4	17.7
Long Island Sound	30	9.58	4.63	4.8	*	7.4	9.4	17.8
Long Island Sound	31	8.85	4.39	4.8	*	7.4	9.4	17.8
Long Island Sound	32	8.86	4.40	4.8	*	7.4	9.4	17.8
Long Island Sound	33	8.29	4.20	4.8	*	7.5	9.5	17.8
Long Island Sound	34	8.68	4.33	4.8	*	7.5	9.5	17.9
New London Harbor	35	9.09	4.47	4.8	*	7.5	9.5	17.9
New London Harbor	36	3.85	3.43	4.8	*	7.5	9.5	17.9
New London Harbor	37	4.32	3.63	4.8	*	7.5	9.5	17.9
New London Harbor	38	9.53	5.77	4.8	*	7.5	9.5	17.9
New London Harbor	39	4.25	3.59	4.8	*	7.5	9.5	17.9
Thames River	40	3.22	3.15	4.8	*	7.5	9.5	18.0
Thames River	41	2.06	2.51	4.8	*	7.5	9.5	18.0
Thames River	42	2.36	2.70	4.8	*	7.5	9.6	18.0
New London Harbor	43	2.89	3.03	4.8	*	7.5	9.5	17.9

Table 16: Coastal Transect Parameters (continued)

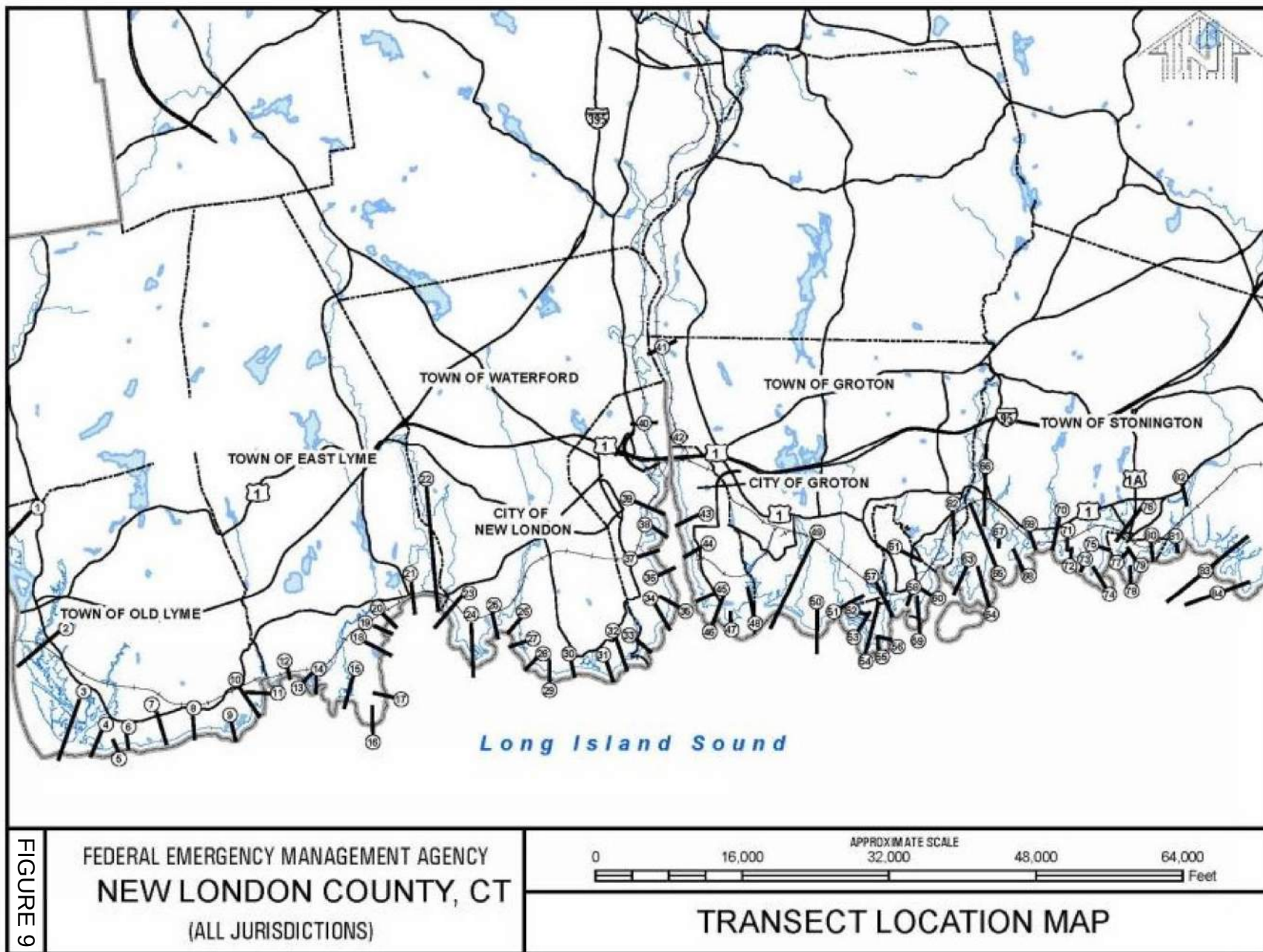
Flood Source	Coastal Transect	Starting Wave Conditions for the 1% Annual Chance		Starting Stillwater Elevations (ft NAVD88)				
		Significant Wave Height H _s (ft)	Peak Wave Period T _p (sec)	10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
New London Harbor	44	5.56	4.57	4.9	*	7.6	9.6	18.1
New London Harbor	45	11.95	5.37	4.9	*	7.6	9.6	18.1
Long Island Sound	46	11.37	5.19	4.9	*	7.6	9.6	18.1
Fishers Island Sound	47	8.77	4.37	4.9	*	7.6	9.6	18.1
Fishers Island Sound	48	7.15	4.80	4.9	*	7.6	9.6	18.1
Fishers Island Sound	49	11.39	5.20	4.9	*	7.6	9.6	18.2
Fishers Island Sound	50	7.20	3.83	4.9	*	7.6	9.6	18.2
Fishers Island Sound	51	8.83	5.66	4.9	*	7.6	9.7	18.2
Fishers Island Sound	52	6.60	4.95	4.9	*	7.6	9.7	18.2
Fishers Island Sound	53	10.92	5.05	4.9	*	7.6	9.7	18.2
Fishers Island Sound	54	11.26	6.34	4.9	*	7.6	9.7	18.2
Fishers Island Sound	55	6.32	3.51	4.9	*	7.6	9.7	18.3
Fishers Island Sound	56	7.12	3.80	4.9	*	7.6	9.7	18.3
Fishers Island Sound	57	7.83	5.08	4.9	*	7.6	9.7	18.3
Fishers Island Sound	58	8.28	5.22	4.9	*	7.7	9.7	18.3
Fishers Island Sound	59	8.50	5.57	4.9	*	7.7	9.7	18.3
Fishers Island Sound	60	7.35	3.88	4.9	*	7.7	9.7	18.3
Fishers Island Sound	61	4.57	3.73	4.9	*	7.7	9.7	18.4
Fishers Island Sound	62	4.12	3.52	4.9	*	7.7	9.8	18.4
Fishers Island Sound	63	7.80	4.04	4.9	*	7.7	9.8	18.4
Fishers Island Sound	64	5.99	3.39	4.9	*	7.7	9.8	18.4
Fishers Island Sound	65	8.46	5.27	5.0	*	7.7	9.8	18.5

Table 16: Coastal Transect Parameters (continued)

Flood Source	Coastal Transect	Starting Wave Conditions for the 1% Annual Chance		Starting Stillwater Elevations (ft NAVD88)				
		Significant Wave Height H _s (ft)	Peak Wave Period T _p (sec)	10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Fishers Island Sound	66	3.17	3.05	5.0	*	7.7	9.8	18.5
Fishers Island Sound	67	7.22	4.82	5.0	*	7.7	9.8	18.5
Fishers Island Sound	68	6.68	3.64	5.0	*	7.7	9.8	18.5
Fishers Island Sound	69	6.82	3.69	5.0	*	7.7	9.8	18.5
Fishers Island Sound	70	7.38	3.89	5.0	*	7.7	9.8	18.5
Fishers Island Sound	71	6.64	3.63	5.0	*	7.8	9.8	18.5
Fishers Island Sound	72	6.44	3.55	5.0	*	7.8	9.8	18.5
Fishers Island Sound	73	7.09	3.79	5.0	*	7.8	9.8	18.5
Fishers Island Sound	74	6.35	4.59	5.0	*	7.8	9.8	18.6
Fishers Island Sound	75	5.52	4.22	5.0	*	7.8	9.8	18.6
Fishers Island Sound	76	4.14	3.53	5.0	*	7.8	9.9	18.6
Fishers Island Sound	77	9.64	5.67	5.0	*	7.8	9.9	18.6
Fishers Island Sound	78	6.79	4.83	5.0	*	7.8	9.9	18.6
Fishers Island Sound	79	6.52	4.56	5.0	*	7.8	9.9	18.6
Fishers Island Sound	80	5.77	4.37	5.0	*	7.8	9.9	18.6
Fishers Island Sound	81	5.91	4.36	5.0	*	7.8	9.9	18.7
Fishers Island Sound	82	2.51	2.67	5.0	*	7.8	9.9	18.7
Fishers Island Sound	83	3.43	3.33	5.0	*	7.8	9.9	18.7
Fishers Island Sound	84	5.98	4.56	5.0	*	7.8	9.9	18.7

*Not calculated for this Flood Risk Project

Figure 9: Transect Location Map



5.4 Alluvial Fan Analyses

This section is not applicable to this Flood Risk Project.

Table 17: Summary of Alluvial Fan Analyses
[Not Applicable to this Flood Risk Project]

Table 18: Results of Alluvial Fan Analyses
[Not Applicable to this Flood Risk Project]

SECTION 6.0 – MAPPING METHODS

6.1 Vertical and Horizontal Control

All FIS Reports and FIRMs are referenced to a specific vertical datum. The vertical datum provides a starting point against which flood, ground, and structure elevations can be referenced and compared. Until recently, the standard vertical datum used for newly created or revised FIS Reports and FIRMs was the National Geodetic Vertical Datum of 1929 (NGVD29). With the completion of the North American Vertical Datum of 1988 (NAVD88), many FIS Reports and FIRMs are now prepared using NAVD88 as the referenced vertical datum.

Flood elevations shown in this FIS Report and on the FIRMs are referenced to NAVD88. These flood elevations must be compared to structure and ground elevations referenced to the same vertical datum. For information regarding conversion between NGVD29 and NAVD88 or other datum conversion, visit the National Geodetic Survey website at www.ngs.noaa.gov.

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 archived project documentation associated with the FIS Report and the FIRMs for this community. Interested individuals may contact FEMA to access these data.

To obtain current elevation, description, and/or location information for benchmarks in the area, please visit the NGS website at www.ngs.noaa.gov.

The datum conversion locations and values that were calculated for New London County are provided in Table 19.

Table 19: Countywide Vertical Datum Conversion

Quadrangle Name	Quadrangle Corner	Latitude	Longitude	Conversion from NGVD29 to NAVD88 (feet)
All in New London County	-	-	-	-0.9
Average Conversion from NGVD29 to NAVD88 = -0.9 feet				

Table 20: Stream-Based Vertical Datum Conversion
[Not Applicable to this Flood Risk Project]

6.2 Base Map

The FIRMs and FIS Report for this project have been produced in a digital format. The flood hazard information was converted to a Geographic Information System (GIS) format that meets FEMA's FIRM Database specifications and geographic information standards. This information is provided in a digital format so that it can be incorporated into a local GIS and be accessed more easily by the community. The FIRM Database includes most of the tabular information contained in the FIS Report in such a way that the data can be associated with pertinent spatial features. For example, the information contained in the Floodway Data table and Flood Profiles can be linked to the cross sections that are shown on the FIRMs. Additional information about the FIRM Database and its contents can be found in FEMA's *Guidelines and Standards for Flood Risk Analysis and Mapping*, www.fema.gov/flood-maps/guidance-partners/guidelines-standards.

Base map information shown on the FIRM was derived from the sources described in Table 21.

Table 21: Base Map Sources

Data Type	Data Provider	Data Date	Data Scale	Data Description
Digital Orthophoto, National Agriculture Imagery Program (NAIP)	U.S. Geological Survey	2018	1: 6,000	Orthoimagery used for 8/1/2023 HUC-8 0110001 Quinebaug Watershed updated
Digital Orthophoto	Capitol Region Council of Governments	2016	1:150	Orthoimagery used for 04/03/2020 riverine update
Digital Orthophoto	Connecticut Department of Environmental Protection	2000, 2004, 2005	1:12,000	Orthoimagery used for original countywide study and 2013 coastal update
Political Boundaries	Connecticut Department of Energy and Environmental Protection	2017	1: 6,000	Municipal and county boundaries
Surface Water Features	U.S. Geological Survey	2016	1: 6,000	Streams, rivers, and lakes
Transportation Features	U.S. Census	2016	1: 6,000	Roads and railroads

6.3 Floodplain and Floodway Delineation

The FIRM shows tints, screens, and symbols to indicate floodplains and floodways as well as the locations of selected cross sections used in the hydraulic analyses and floodway computations.

For riverine flooding sources, the mapped floodplain boundaries shown on the FIRM have been delineated using the flood elevations determined at each cross section; between cross sections, the boundaries were interpolated using the topographic elevation data described in Table 22. For each coastal flooding source studied as part of this FIS Report, the mapped floodplain boundaries on the FIRM have been delineated using the flood and wave elevations determined at each transect; between transects, boundaries were delineated using land use and land cover data, the topographic elevation data described in Table 22, and knowledge of coastal flood processes. In ponding areas, flood elevations were determined at each junction of the model; between junctions, boundaries were interpolated using the topographic elevation data described in Table 22.

In cases where the 1-percent and 0.2-percent-annual-chance floodplain boundaries are close together, only the 1-percent-annual-chance floodplain boundary has been shown. Small areas within the floodplain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data.

The floodway widths presented in this FIS Report and on the FIRM were computed for certain stream segments on the basis of equal conveyance reduction from each side of the floodplain. Floodway widths were computed at cross sections. Between cross sections, the floodway boundaries were interpolated. Table 2 indicates the flooding sources for which floodways have been determined. The results of the floodway computations for those flooding sources have been tabulated for selected cross sections and are shown in Table 23, "Floodway Data."

Certain flooding sources may have been studied that do not have published BFEs on the FIRMs, or for which there is a need to report the 1-percent-annual-chance flood elevations at selected cross sections because a published Flood Profile does not exist in this FIS Report. These streams may have also been studied using methods to determine non-encroachment zones rather than floodways. For these flooding sources, the 1-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 the topographic elevation data described in Table 22. All topographic data used for modeling or mapping has been converted as necessary to NAVD88. The 1-percent-annual-chance elevations for selected cross sections along these flooding sources, along with their non-encroachment widths, if calculated, are shown in Table 24, "Flood Hazard and Non-Encroachment Data for Selected Streams."

Table 22: Summary of Topographic Elevation Data used in Mapping

Community	Flooding Source	Source for Topographic Elevation Data			
		Description	Vertical Accuracy	Horizontal Accuracy	Citation
Griswold, Town of; Jewett City, Borough of; Libson, Town of; North Stonington, Town of; Preston, Town of; Voluntown, Town of	All flooding sources in Quinebaug HUC-8 01100001	Terrain data obtained from Connecticut Department of Energy and Environmental Protection	19.6cm NVA or better at 95 percent confidence level	1m	CT DEEP 2017b

Table 22: Summary of Topographic Elevation Data used in Mapping (continued)

Community	Flooding Source	Source for Topographic Elevation Data			
		Description	Vertical Accuracy	Horizontal Accuracy	Citation
North Stonington, Town of; Stonington, Town of; Voluntown, Town of	Pawcatuck River, Ashaway River, Green Fall River, other flooding sources in Pawcatuck-Wood Watershed HUC-8 01090005	2011 lidar data for Northeast	10 cm RMSEz	2 ft contours	
Multiple	Long Island Sound	2004 lidar data for coastal update	2 ft contours	Not Provided	Spectrum 2004
Multiple	Long Island Sound	2006 lidar data for coastal update	2 ft contours	Not Provided	Terrapoint USA of Dewberry & Davis LLC., 2006b
Bozrah, Town of	All flooding sources in community	Topographic maps	5 ft contours	1:2,400	
Multiple	Yantic River	Topographic maps	2 ft contours	1:2,400	Topographic Data Consultants, Inc., 1980
Multiple	Multiple	Topographic maps	10 ft contours	1:24,000	
East Lyme, Town of	All flooding sources in community	Topographic maps	4 ft contours	1:2,400	
Multiple	Multiple	Topographic maps	10 ft contours	1:24,000	
Norwich, City of	All flooding sources in community	Topographic maps	4 ft contours	1:4,800	
Waterford, Town of	All flooding sources in community	Topographic maps	5 ft contours	1:4,800	
Groton, Town of	Long Island Sound	Topographic maps	4 ft contours	1:2,400	
Groton, Town of	Tributary A	Topographic maps	25 ft	1:2,400	Groton, 1981

Table 22: Summary of Topographic Elevation Data used in Mapping (continued)

Community	Flooding Source	Source for Topographic Elevation Data			
		Description	Vertical Accuracy	Horizontal Accuracy	Citation
Groton, Town of	Tributary A and other flooding sources studied with approximate methods	Topographic maps	10 ft	1:24,000	USGS 1970, 1970O, 1970P, 1970Q

BFEs shown at cross sections on the FIRM represent the 1-percent-annual-chance water surface elevations shown on the Flood Profiles and in the Floodway Data tables in the FIS Report. Rounded whole-foot elevations may be shown on the FIRM in coastal areas, areas of ponding, and other areas with static base flood elevations.