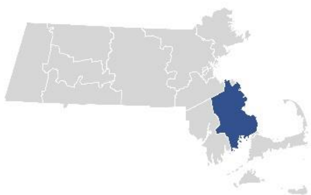
FLOOD INSURANCE STUDY

FEDERAL EMERGENCY MANAGEMENT AGENCY

VOLUME 1 OF 5



PLYMOUTH COUNTY, MASSACHUSETTS

(ALL JURISDICTIONS)

COMMUNITY NAME	NUMBER	COMMUNITY NAME	NUMBER
ABINGTON, TOWN OF	250259	MARSHFIELD, TOWN OF	250273
BRIDGEWATER, TOWN OF	250260	MATTAPOISETT, TOWN OF	255214
BROCKTON, CITY OF	250261	MIDDLEBOROUGH, TOWN OF	250275
CARVER, TOWN OF	250262	NORWELL, TOWN OF	250276
DUXBURY, TOWN OF	250263	PEMBROKE, TOWN OF	250277
EAST BRIDGEWATER, TOWN OF	250264	PLYMOUTH, TOWN OF	250278
HALIFAX, TOWN OF	250265	PLYMPTON, TOWN OF	250279
HANOVER, TOWN OF	250266	ROCHESTER, TOWN OF	250280
HANSON, TOWN OF	250267	ROCKLAND, TOWN OF	250281
HINGHAM, TOWN OF	250268	SCITUATE, TOWN OF	250282
HULL, TOWN OF	250269	WAREHAM, TOWN OF	255223
KINGSTON, TOWN OF	250270	WEST BRIDGEWATER, TOWN OF	250284
LAKEVILLE, TOWN OF	250271	WHITMAN, TOWN OF	250285
MARION, TOWN OF	255213		

REVISED:

JULY 6, 2021

FLOOD INSURANCE STUDY NUMBER
25023CV001D
Version Number 2.6.3.5

FEMA

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Beaver Brook	02-03 P

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Black Betty Brook	05 P
Black Brook	06 P
Black Pond Brook	07 P
Bound Brook	08-09 P
Branch of Eel River	10 P
Crane Brook	11-23 P
Crooked Meadow River	24-25 P
Drinkwater River	26-27 P
Drinkwater River Tributary	28-29 P
Eel River (Town of Hingham)	30-32 P
Eel River (Town of Plymouth)	33-34 P
First Herring Brook	35-37 P
French Stream	38-42 P
Halls Brook	43-46 P
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Exhibits

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Unnamed Tributary 3 to Shinglemill Brook	168 P
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West Meadow Brook	172-175 P
Weweantic River	176-179 P
Willow Brook	180 P
Winnetuxet River	181-185 P

Published Separately

Flood Insurance Rate Map (FIRM)

FLOOD INSURANCE STUDY REPORT
PLYMOUTH COUNTY, MASSACHUSETTS

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 Plymouth County, Massachusetts.

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) (*all prefixed by 25023C*)	If Not Included, Location of Flood Hazard Data
Abington, Town of	250259	01090001, 01090002, 01090004	0069J[1], 0088J, 0089K, 0093K, 0157J, 0176J, 0177J, 0178J, 0179J, 0181K	
Bridgewater, Town of	250260	01090004	0188J, 0189J, 0193J, 0281J, 0282J, 0283J, 0284J, 0292J[1], 0301J, 0302K, 0303K, 0304K, 0306K, 0307K, 0308K, 0311K, 0312K	
Brockton, City of	250261	01090001, 01090004	0069J[1], 0152J, 0154J, 0156J, 0157J, 0158J, 0159J, 0162J, 0166J, 0167J, 0176J, 0178J, 0186J	

[1]Panel not printed

Table 1: Listing of NFIP Jurisdictions

Community	CID	HUC-8 Sub-Basin(s)	Located on FIRM Panel(s) (*all prefixed by 25023C*)	If Not Included, Location of Flood Hazard Data
Carver, Town of	250262	01090002, 01090004	0333K, 0334K, 0337J, 0339K, 0341J, 0342K, 0343K, 0344K, 0361K, 0363K, 0364K, 0456K, 0457K, 0458K, 0459K, 0467K, 0476K, 0477K, 0478K, 0479K, 0485K, 0486K, 0487K	
Duxbury, Town of	250263	01090002	0207K, 0209K, 0216K, 0217K, 0219K, 0226L, 0228L, 0229L, 0233K, 0234K, 0236K, 0237L, 0238L, 0239L, 0241L, 0242K, 0243K, 0244K, 0263K, 0275J[1], 0356L, 0357K	
East Bridgewater, Town of	250264	01090004	0178J, 0179J, 0183J, 0186J, 0187J, 0188J, 0189J, 0191J, 0192J, 0193J, 0194J, 0306K, 0307K	
Halifax, Town of	250265	01090002, 01090004	0194J, 0213J, 0214K, 0218K, 0306K, 0307K, 0308K, 0309K, 0326J, 0327J, 0328J	
Hanover, Town of	250266	01090002	0094K, 0111K, 0113K, 0114K, 0118K, 0182K, 0184K, 0201K, 0202K, 0203K, 0206K	
Hanson, Town of	250267	01090002, 01090004	0183J, 0184K, 0191J, 0192J, 0194J, 0201K, 0202K, 0203K, 0204K, 0211K, 0212K, 0213J, 0214K	
Hingham, Town of	250268	01090001, 01090002	0016J, 0017J, 0018J, 0019J, 0038J, 0081J, 0082J, 0083J, 0084J, 0091K, 0092K, 0101K, 0102J, 0103K, 0104K, 0111K	
Hull, Town of	250269	01090001, 01090002	0012J, 0016J, 0017J, 0019J, 0036J, 0038J, 0039J	
Kingston, Town of	250270	01090002, 01090004	0218K, 0219K, 0238L, 0239L, 0243K, 0331K, 0332K, 0334K, 0342K, 0351L, 0352L, 0353K, 0354K, 0356L, 0361K	
Lakeville, Town of	250271	01090002, 01090004	0311K, 0313K, 0314J, 0318K, 0408J, 0409J, 0417J, 0419J, 0425J[1], 0426J, 0427K, 0428J, 0429K, 0431K, 0433K, 0434K, 0436J, 0437K, 0441L, 0442K	

[1]Panel not printed

Table 1: Listing of NFIP Jurisdictions

Community	CID	HUC-8 Sub-Basin(s)	Located on FIRM Panel(s) (*all prefixed by 25023C*)	If Not Included, Location of Flood Hazard Data
Marion, Town of	255213	01090002	0468K, 0469K, 0556K, 0557K, 0558K, 0559L, 0566K, 0567L, 0576K, 0578K, 0579K, 0586J, 0587J	
Marshfield, Town of	250273	01090002	0116K, 0117L, 0118K, 0119K, 0136L, 0137K, 0138L, 0139L, 0143K, 0207K, 0226L, 0227L, 0228L, 0229L, 0231K, 0232K, 0233K, 0234K, 0237L, 0241L	
Mattapoisett, Town of	255214	01090002	0553K, 0554K, 0558K, 0561K, 0562K, 0563J, 0564K, 0566K, 0567L, 0568K, 0569J, 0627J, 0650J	
Middleborough, Town of	250275	01090002, 01090004	0303K, 0304K, 0308K, 0309K, 0311K, 0312K, 0313K, 0314J, 0316K, 0317J, 0318K, 0319K, 0328J, 0329J, 0336J, 0337J, 0338J, 0339K, 0343K, 0431K, 0432K, 0433K, 0434K, 0442K, 0451J, 0452K, 0453J, 0454K, 0456K, 0458K, 0459K, 0461K, 0462K, 0466K, 0467K	
Norwell, Town of	250276	01090001, 01090002	0092K, 0094K, 0103K, 0104K, 0108L, 0111K, 0112K, 0113K, 0114K, 0116K, 0117L, 0118K, 0119K, 0206K, 0207K	
Pembroke, Town of	250277	01090002, 01090004	0201K, 0202K, 0203K, 0204K, 0206K, 0207K, 0208K, 0209K, 0211K, 0212K, 0214K, 0216K, 0217K, 0218K, 0219K, 0226L	
Plymouth, Town of	250278	01090002, 01090004	0244K, 0263K, 0342K, 0352L, 0353K, 0354K, 0356L, 0357K, 0358L, 0359K, 0361K, 0362K, 0363K, 0364K, 0366K, 0367K, 0370K, 0376K[1], 0378K, 0379K, 0386L, 0387L, 0388K, 0389K, 0391L, 0393L, 0394K[1], 0477K, 0479K, 0485K, 0487K, 0491K, 0492K, 0494K, 0505K, 0506L, 0507K, 0508L, 0509K, 0511K, 0512K, 0513K, 0514J[1], 0516L	

[1]Panel not printed

Table 1: Listing of NFIP Jurisdictions

Community	CID	HUC-8 Sub-Basin(s)	Located on FIRM Panel(s) (*all prefixed by 25023C*)	If Not Included, Location of Flood Hazard Data
Plympton, Town of	250279	01090002, 01090004	0214K, 0218K, 0326J, 0327J, 0328J, 0329J, 0331K, 0332K, 0333K, 0334K, 0337J, 0341J	
Rochester, Town of	250280	01090002, 01090004	0441L, 0442K, 0443K, 0444K, 0461K, 0462K, 0463K, 0464K, 0466K, 0467K, 0468K, 0469K, 0532K, 0551K, 0552K, 0553K, 0554K, 0556K, 0558K	
Rockland, Town of	250281	01090001, 01090002	0089K, 0091K, 0092K, 0093K, 0094K, 0181K, 0182K, 0183J, 0184K	
Scituate, Town of	250282	01090002	0044K, 0104K, 0106L, 0107K, 0108L, 0109L, 0116K, 0117L, 0126K, 0128L, 0129K, 0136L, 0137K, 0139L, 0143K	
Wareham, Town of	255223	01090002	0459K, 0467K, 0468K, 0469K, 0486K, 0487K, 0488K, 0489L, 0491K, 0492K, 0493K, 0494K, 0511K, 0513K, 0556K, 0557K, 0576K, 0577J, 0581K, 0582K, 0583J, 0584J, 0601J	
West Bridgewater, Town of	250284	01090004	0162J, 0164J, 0166J, 0167J, 0168J, 0169J, 0186J, 0188J, 0281J, 0282J, 0301J	
Whitman, Town of	250285	01090002, 01090004	0177J, 0178J, 0179J, 0181K, 0183J, 0184K, 0187J, 0191J	

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% annual chance flood elevation is also referred to as the Base Flood Elevation (BFE)); delineations of the 1% annual chance and 0.2% annual chance floodplains; and 1% 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 Plymouth County became effective on July 17, 2012. Refer to Table 27 for information about subsequent revisions to the FIRMs.

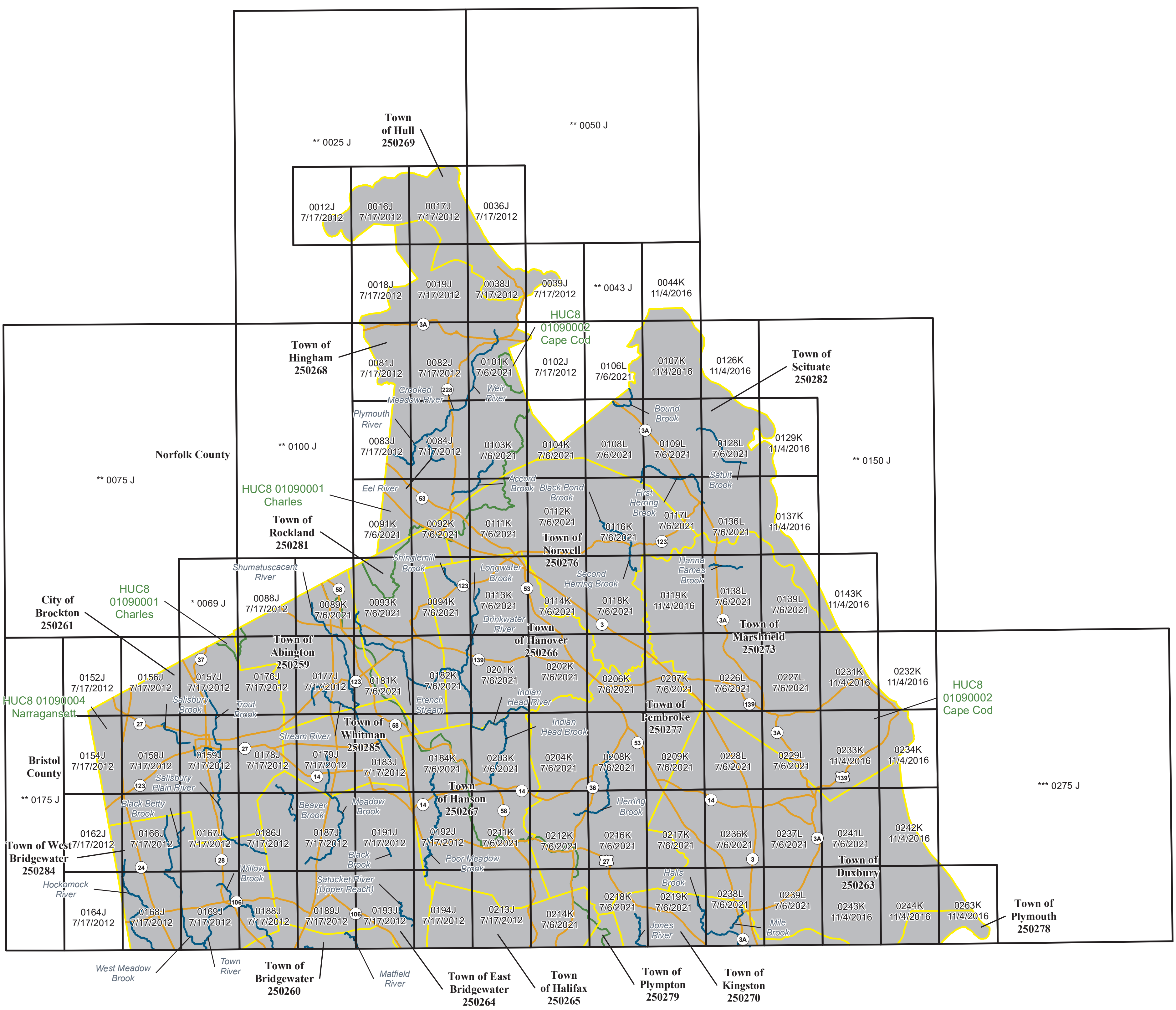
- FEMA does not impose floodplain management requirements or special insurance ratings based on Limit of Moderate Wave Action (LiMWA) delineations at this time. The LiMWA represents the approximate landward limit of the 1.5-foot breaking wave. If the LiMWA is shown on the FIRM, it is being provided by 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/national-flood-insurance-program-community-rating-system or contact your appropriate FEMA Regional Office for more information about this program.

- 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/online-tutorials.

The FIRM Index in Figure 1 shows the overall FIRM panel layout within Plymouth 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.

Figure 1. FIRM Index



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 July 6, 2021.

1 inch = 17,500 feet 1:210,000

0 7,000 14,000 28,000 Feet

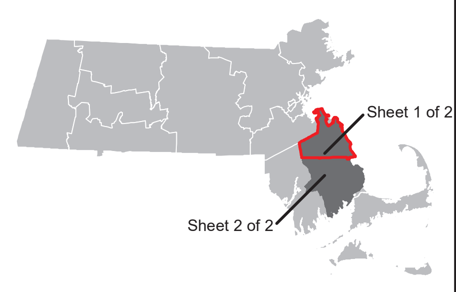
0 2,000 4,000 6,000 8,000 Meters

Map Projection:
NAD 1983 State Plane, Massachusetts Mainland, FIPS 2001, Feet; Western Hemisphere; Vertical Datum: NAVD 88

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

SEE FLOOD INSURANCE STUDY FOR ADDITIONAL INFORMATION

COUNTY LOCATOR



NATIONAL FLOOD INSURANCE PROGRAM
FLOOD INSURANCE RATE MAP INDEX
(SHEET 1 OF 2)

PLYMOUTH COUNTY, MASSACHUSETTS (ALL JURISDICTIONS)

PANELS PRINTED:

0012, 0016, 0017, 0018, 0019, 0036, 0038, 0039, 0044, 0081, 0082, 0083, 0084, 0088, 0089, 0091, 0092, 0093, 0094, 0101, 0102, 0103, 0104, 0106, 0107, 0108, 0109, 0111, 0112, 0113, 0114, 0116, 0117, 0118, 0119, 0126, 0128, 0129, 0136, 0137, 0138, 0139, 0143, 0152, 0154, 0156, 0157, 0158, 0159, 0162, 0164, 0166, 0167, 0168, 0169, 0176, 0177, 0178, 0179, 0181, 0182, 0183, 0184, 0186, 0187, 0188, 0189, 0191, 0192, 0193, 0194, 0201, 0202, 0203, 0204, 0206, 0207, 0208, 0209, 0211, 0212, 0213, 0214, 0216, 0217, 0218, 0219, 0226, 0227, 0228, 0229, 0231, 0232, 0233, 0234, 0236, 0237, 0238, 0239, 0241, 0242, 0243, 0244, 0263

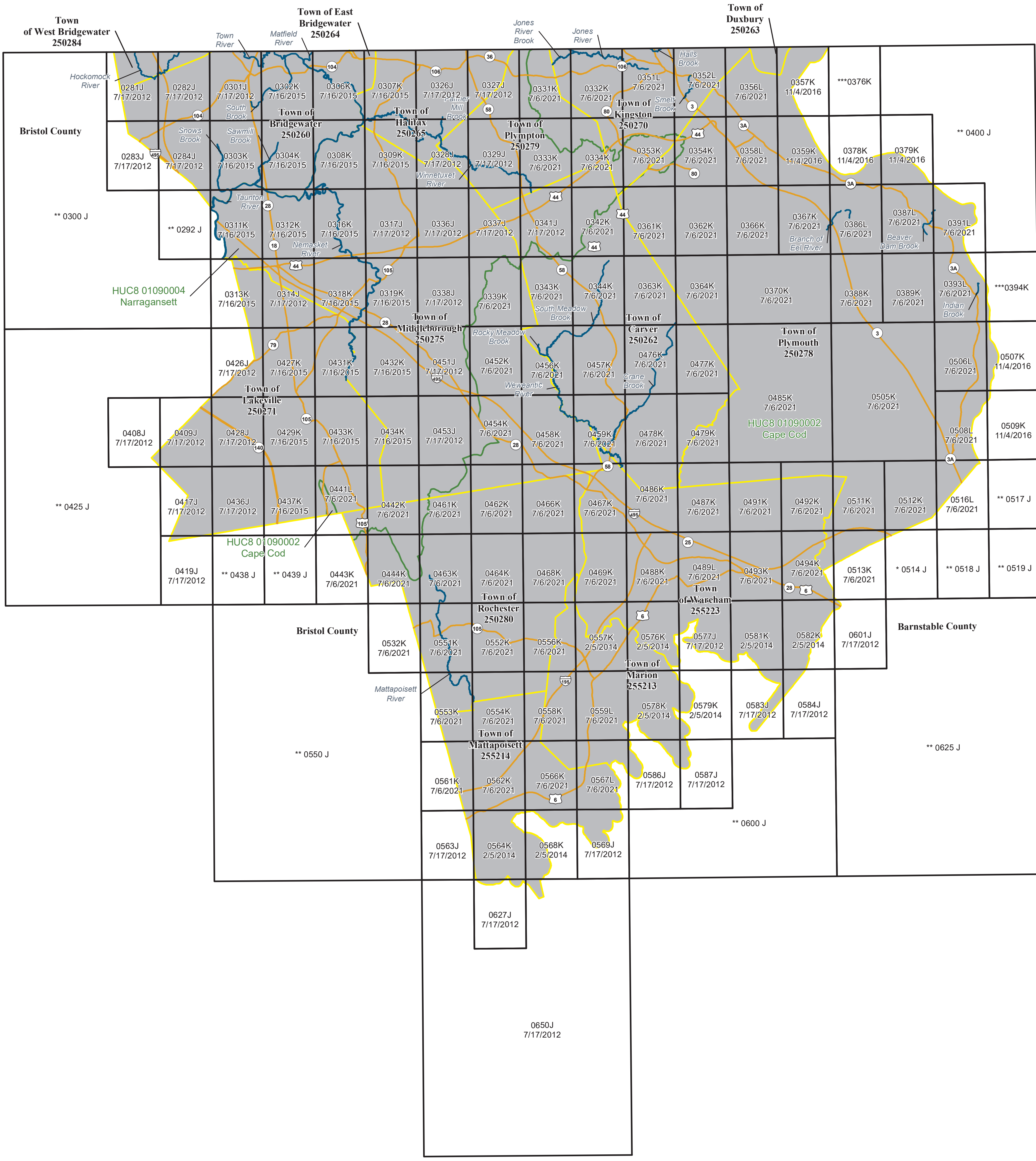
FEMA

MAP INDEX
25023CIND1E

MAP REVISED
July 6, 2021

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

Figure 1. FIRM Index



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 July 6, 2021.

N

1 inch = 17,500 feet 1:210,000

0 7,000 14,000 28,000 Feet

Meters

0 2,000 4,000 6,000 8,000

Map Projection:

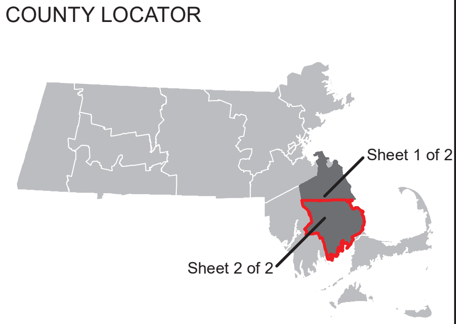
NAD 1983 State Plane, Massachusetts Mainland, FIPS 2001, Feet; Western Hemisphere; Vertical Datum: NAVD 88

THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT

HTTPS://MSC.FEMA.GOV

SEE FLOOD INSURANCE STUDY FOR ADDITIONAL INFORMATION

COUNTY LOCATOR



NATIONAL FLOOD INSURANCE PROGRAM

FLOOD INSURANCE RATE MAP INDEX

(SHEET 2 OF 2)

PLYMOUTH COUNTY, MASSACHUSETTS (ALL JURISDICTIONS)

PANELS PRINTED:

0281, 0282, 0283, 0284, 0301, 0302, 0303, 0304, 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, 0352, 0353, 0354, 0356, 0357, 0358, 0359, 0361, 0362, 0363, 0364, 0366, 0367, 0370, 0378, 0379, 0386, 0387, 0388, 0389, 0391, 0393, 0408, 0409, 0417, 0419, 0426, 0427, 0428, 0429, 0431, 0432, 0433, 0434, 0436, 0437, 0441, 0442, 0443, 0444, 0451, 0452, 0453, 0454, 0456, 0457, 0458, 0459, 0461, 0462, 0463, 0464, 0466, 0467, 0468, 0469, 0476, 0477, 0478, 0479, 0485, 0486, 0487, 0488, 0489, 0491, 0492, 0493, 0494, 0505, 0506, 0507, 0508, 0509, 0511, 0512, 0513, 0516, 0532, 0551, 0552, 0553, 0554, 0556, 0557, 0558, 0559, 0561, 0562, 0563, 0564, 0566, 0567, 0568, 0569, 0576, 0577, 0578, 0579, 0581, 0582, 0583, 0584, 0586, 0587,0601, 0627, 0650

FEMA

MAP INDEX
25023CIND2E

MAP REVISED
July 6, 2021

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

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

Figure 2: FIRM Notes to Users

NOTES TO USERS

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

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

For community and countywide map dates, refer to Table 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.

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 "Non-Levee Flood Protection Measures" of this FIS Report for information on flood control structures for this jurisdiction.

Figure 2. FIRM Notes to Users

PROJECTION INFORMATION: The projection used in the preparation of the map was Massachusetts State Plane, Mainland Zone (FIPSZONE 2001). The horizontal datum was the North American Datum of 1983 NAD83, GRS1980 spheroid. Differences in datum, spheroid, projection or State Plane zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of the FIRM.

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

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 Massachusetts Geographic Information System (MassGIS). Orthoimagery is from 2005 and is at a scale of 1:5,000. Vector data are undated. The following panels use 2013 imagery provided by the U.S. Geological Survey at a scale of 1:2,400 with all vector data unchanged from the previous FIRM: 0302K, 0303K, 0304K, 0306K, 0307K, 0308K, 0309K, 0311K, 0312K, 0313K, 0316K, 0318K, 0319K, 0427K, 0429K, 0431K, 0432K, 0433K, 0434K, and 0437K. The following panels use 2008 imagery provided by MassGIS at a resolution of 30 centimeters with all vector data unchanged from the previous FIRM: 0044K, 0107K, 0119K, 0126K, 0129K, 0137K, 0143K, 0231K, 0232K, 0233K, 0234K, 0242K, 0243K, 0244K, 0263K, 0357K, 0359K, 0378K, 0379K, 0507K, and 0509K. The following panels use 2013 and 2014 imagery provided by the U.S. Geological Survey and 2016 transportation data provided by the U.S. Census Bureau, with all other vector data unchanged from the previous FIRM: 0089K, 0091K, 0092K, 0093K, 0094K, 0101K, 0103K, 0104K, 0106L, 0108L, 0109L, 0111K, 0112K, 0113K, 0114K, 0116K, 0117L, 0118K, 0128L, 0136L, 0138L, 0139L, 0181K, 0182K, 0184K, 0201K, 0202K, 0203K, 0204K, 0206K, 0207K, 0208K, 0209K, 0211K, 0212K, 0214K, 0216K, 0217K, 0218K, 0219K, 0226L, 0227L, 0228L, 0229L, 0236K, 0237L, 0238L, 0239L, 0241L, 0331K, 0332K, 0333K, 0334K, 0339K, 0342K, 0343K, 0344K, 0351L, 0352L, 0353K, 0354K, 0356L, 0358L, 0361K, 0362K, 0363K, 0364K, 0366K, 0367K, 0370K, 0386L, 0387L, 0388K, 0389K, 0391L, 0393L, 0441L, 0442K, 0443K, 0444K, 0452K, 0454K, 0456K, 0457K, 0458K, 0459K, 0461K, 0462K, 0463K, 0464K, 0466K, 0467K, 0468K, 0469K, 0476K, 0477K, 0478K, 0479K, 0485K, 0486K, 0487K, 0488K, 0489L, 0491K, 0492K, 0493K, 0494K, 0505K, 0506L, 0508L, 0511K, 0512K, 0513K, 0516L, 0532K, 0551K, 0552K, 0553K, 0554K, 0556K, 0558K, 0559L, 0561K, 0562K, 0566K, and 0567L. 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 Plymouth County, Massachusetts, 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 on the 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 July 6, 2021.

SPECIAL NOTES FOR SPECIFIC FIRM PANELS

This Notes to Users section was created specifically for Plymouth County, Massachusetts, effective July 6, 2021.

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.

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 Plymouth County.

Figure 3: Map Legend for FIRM

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

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

Figure 3: Map Legend for FIRM

	Regulatory Floodway determined in Zone AE.
OTHER AREAS OF FLOOD HAZARD	
	Shaded Zone X: Areas of 0.2% annual chance flood hazards and areas of 1% annual chance flood hazards with average depths of less than 1 foot or with drainage areas less than 1 square mile.
	Future Conditions 1% Annual Chance Flood Hazard – Zone X: The flood insurance rate zone that corresponds to the 1% annual chance floodplains that are determined based on future-conditions hydrology. No base flood elevations or flood depths are shown within this zone.
	Area with Reduced Flood Risk due to Levee: Areas where an accredited levee, dike, or other flood control structure has reduced the flood risk from the 1% annual chance flood. See Notes to Users for important information.
	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	
Aqueduct *Channel* *Culvert* *Storm Sewer*	Channel, Culvert, Aqueduct, or Storm Sewer
Dam *Jetty* *Weir*	Dam, Jetty, Weir

Figure 3: Map Legend for FIRM

	Levee, Dike, or Floodwall
Bridge	Bridge
REFERENCE MARKERS	
22.0	River mile Markers
CROSS SECTION & TRANSECT INFORMATION	
B 20.2	Lettered Cross Section with Regulatory Water Surface Elevation (BFE)
5280 21.1	Numbered Cross Section with Regulatory Water Surface Elevation (BFE)
17.5	Unlettered Cross Section with Regulatory Water Surface Elevation (BFE)
8	Coastal Transect
	Profile Baseline: Indicates the modeled flow path of a stream and is shown on FIRM panels for all valid studies with profiles or otherwise established base flood elevation.
	Coastal Transect Baseline: Used in the coastal flood hazard model to represent the 0.0-foot elevation contour and the starting point for the transect and the measuring point for the coastal mapping.
513	Base Flood Elevation Line
ZONE AE (EL 16)	Static Base Flood Elevation value (shown under zone label)
ZONE AO (DEPTH 2)	Zone designation with Depth
ZONE AO (DEPTH 2) (VEL 15 FPS)	Zone designation with Depth and Velocity
BASE MAP FEATURES	
Missouri Creek	River, Stream or Other Hydrographic Feature
234	Interstate Highway
234	U.S. Highway
234	State Highway

Figure 3: Map Legend for FIRM

234	County Highway
MAPLE LANE	Street, Road, Avenue Name, or Private Drive if shown on Flood Profile
RAILROAD	Railroad
	Horizontal Reference Grid Line
	Horizontal Reference Grid Ticks
+	Secondary Grid Crosshairs
Land Grant	Name of Land Grant
7	Section Number
R. 43 W. T. 22 N.	Range, Township Number
^{42}76^{000m}E	Horizontal Reference Grid Coordinates (UTM)
365000 FT	Horizontal Reference Grid Coordinates (State Plane)
80° 16’ 52.5”	Corner Coordinates (Latitude, Longitude)

SECTION 2.0 – FLOODPLAIN MANAGEMENT APPLICATIONS

2.1 Floodplain Boundaries

To provide a national standard without regional discrimination, the 1% annual chance (100-year) flood has been adopted by FEMA as the base flood for floodplain management purposes. The 0.2% 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 Plymouth 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% 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% and 0.2% 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% annual chance floodplain boundary on the FIRM, without published water surface elevations. In cases where the 1% and 0.2% annual chance floodplain boundaries are close together, only the 1% 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 Plymouth 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% annual chance floodplain corresponds to the SFHAs. The 0.2% 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)	Area (mi^2) (estuaries or ponding)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Aaron River and Zone A tributaries	Hingham, Town of; Norwell, Town of; Scituate, Town of	Confluence with Bound Brook	Points of one square mile of drainage area	01090002	12.9		N	A	5/31/2017
Accord Brook	Hingham, Town of	2,100 feet downstream of Prospect Street	Approximately 125 feet upstream of Main Street	01090001	2.0		Y	AE	7/1/1983
Agawam River and Zone A tributaries	Plymouth, Town of; Wareham, Town of	Limit of coastal flooding on Agawam River	Points of one square mile of drainage area	01090002	11.3		N	A	5/31/2017
Agawam River Tributary A	Wareham, Town of	Confluence with Agawam River	Point of one square mile of drainage area	01090002	0.1		N	A	5/31/2017
Ashley Brook	Rochester, Town of	Confluence with Squam Brook	Point of one square mile of drainage area	01090002	2.5		N	A	5/31/2017
Assawompset Pond	Lakeville, Town of; Middleborough, Town of	Entire shoreline	Entire shoreline	01090004		3.8	N	AE	7/1/2014
Aucoot Creek	Marion, Town of	Mouth at Aucoot Cove	Point of one square mile of drainage area	01090002	1.4		N	A	5/31/2017
Bares Brook	Marshfield, Town of	Confluence with Hanna Eames Brook	Point of one square mile of drainage area	01090002	1.2		N	A	5/31/2017
Beaver Brook	East Bridgewater, Town of	Elm Street	2,355 feet upstream of Summer Street	01090004	1.6		Y	AE	11/1/1977
Beaver Dam Brook	Plymouth, Town of	Confluence with Bartlett Pond	Approximately 2,700 feet upstream of State Route 3A	01090002	1.1		Y	AE	6/1/1983
Beaver Dam Brook and Zone A tributaries	Plymouth, Town of	Approximately 2,700 feet upstream of State Route 3A on Beaver Dam Brook	Points of one square mile of drainage area	01090002	4.6		N	A	5/31/2017

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)	Area (mi^2) (estuaries or ponding)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Beaver Dam Brook Tributary A	Plymouth, Town of	Confluence with Beaver Dam Brook	Point of one square mile of drainage area	01090002	2.2		N	A	5/31/2017
Benson Brook	Marion, Town of	Confluence with Sippican River	Point of one square mile of drainage area	01090002	3.2		N	A	5/31/2017
Billington Sea	Plymouth, Town of	Entire shoreline	Entire shoreline	01090002		0.4	N	AE	2/1/2017
Billington Sea Zone A tributaries	Plymouth, Town of	Mouths at Billington Sea	Points of one square mile of drainage area	01090002	6.0		N	A	5/31/2017
Black Betty Brook	West Bridgewater, Town of	Confluence with West Meadow Brook	Approximately 4,600 feet upstream of confluence with West Meadow Brook	01090004	0.9		Y	AE	3/1/1979
Black Brook	East Bridgewater, Town of	500 feet downstream of Central Street	Approximately 1,200 feet upstream of Central Street	01090004	0.3		Y	AE	11/1/1977
Black Pond Brook	Norwell, Town of	Approximately 4,270 feet upstream of Central Street	Point of one square mile of drainage area	01090002	0.8		N	A	5/31/2017
Black Pond Brook	Norwell, Town of	Confluence with Second Herring Brook	Approximately 4,270 feet upstream of Central Street	01090002	1.2		Y	AE	7/1/1980
Bluefish River Tributary A	Duxbury, Town of	Limit of coastal flooding	Point of one square mile of drainage area	01090002	1.6		N	A	5/31/2017
Bound Brook	Scituate, Town of	Mordecai Lincoln Road	Scituate corporate limits	01090002	1.1		Y	AE	8/1/1983

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)	Area (mi^2) (estuaries or ponding)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Bourne Wharf River, Eel River, Green Harbor River, Herring River, Jones River, Little Wood Island River, Musquashcut Brook, Musquashcut Pond, North River, Pine Point River, South River, and The Gulf	Duxbury, Town of; Kingston, Town of; Marshfield, Town of; Plymouth, Town of; Scituate, Town of	Tidal portions	Tidal portions	N/A	*		N	AE	5/1/2013
Branch of Eel River	Plymouth, Town of	Confluence with Eel River	Approximately 115 feet upstream of Old Sandwich Road	01090002	0.4		Y	AE	6/1/1983
Branch of Eel River and Zone A tributaries	Plymouth, Town of	Old Sandwich Road	Points of one square mile of drainage area	01090002	7.0		N	A	5/31/2017
Branch of Eel River Tributary A	Plymouth, Town of	Confluence with Branch of Eel River	Point of one square mile of drainage area	01090002	0.9		N	A	5/31/2017
Buzzards Bay	Marion, Town of; Mattapoisett, Town of; Wareham, Town of	Entire coastline	Entire coastline	N/A	94.5		N	AE/VE	3/28/2008
Cape Cod Bay	Duxbury, Town of; Kingston, Town of; Marshfield, Town of; Plymouth, Town of; Scituate, Town of	Entire coastline	Entire coastline	N/A	114.7		N	AE/VE	5/1/2013

*Not calculated for this Flood Risk Project

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)	Area (mi^2) (estuaries or ponding)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Coastal Tributary A and Zone A tributaries	Plymouth, Town of	Mouth at Plymouth Harbor	Points of one square mile of drainage area	01090002	2.0		N	A	5/31/2017
Coastal Tributary C	Plymouth, Town of	Mouth at Plymouth Harbor	Point of one square mile of drainage area	01090002	0.4		N	A	5/31/2017
Coastal Tributary D	Plymouth, Town of	Mouth at Cape Cod Bay	Point of one square mile of drainage area	01090002	0.4		N	A	5/31/2017
Coastal Tributary E	Plymouth, Town of	Mouth at Cape Cod Bay	Point of one square mile of drainage area	01090002	2.3		N	A	5/31/2017
Coastal Tributary F	Plymouth, Town of	Mouth at Buttermilk Bay	Point of one square mile of drainage area	01090002	2.0		N	A	5/31/2017
Coastal Tributary G	Plymouth, Town of	Mouth at Buttermilk Bay	Point of one square mile of drainage area	01090002	0.8		N	A	5/31/2017
Coastal Tributary H	Marion, Town of; Mattapoisett, Town of	Mouth at Mattapoisett Harbor	Point of one square mile of drainage area	01090002	2.3		N	A	5/31/2017
Coastal Tributary I	Mattapoisett, Town of	Mouth at Mattapoisett Harbor	Point of one square mile of drainage area	01090002	1.0		N	A	5/31/2017
Coastal Tributary J	Mattapoisett, Town of	Mouth at Eel Pond	Point of one square mile of drainage area	01090002	3.4		N	A	5/31/2017
Crane Brook	Carver, Town of	Confluence with Weweantic River	18,140 feet upstream of Cranberry Road	01090002	5.9		Y	AE	7/1/1980
Crooked Meadow River	Hingham, Town of	Free Street	Cushing Pond Dam	01090001	1.0		Y	AE	7/1/1983
Cushing Brook and Zone A tributaries	Hanover, Town of; Rockland, Town of	Confluence of Cushing Brook with Longwater Brook	Points of one square mile of drainage area	01090002	11.6		N	A	5/31/2017
Doggett Brook and Zone A tributaries	Marion, Town of; Mattapoisett, Town of; Rochester, Town of	Confluence of Doggett Brook with Sippican River	Points of one square mile of drainage area	01090002	19.4		N	A	5/31/2017

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)	Area (mi^2) (estuaries or ponding)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Drinkwater River	Hanover, Town of	Confluence with Indian Head River	Confluence with Longwater Brook	01090002	3.5		Y	AE	7/1/1980
Drinkwater River	Hanover, Town of	Confluence with Longwater Brook	Point of one square mile of drainage area	01090002	0.9		N	A	5/31/2017
Drinkwater River Tributary	Hanover, Town of	Confluence with Drinkwater River	Divergence from Drinkwater River	01090002	0.8		Y	AE	7/1/1980
Drinkwater River Tributary A and Zone A tributaries	Hanover, Town of	Confluence of Drinkwater River Tributary A with Drinkwater River	Points of one square mile of drainage area	01090002	5.3		N	A	5/31/2017
Eel River (Hingham)	Hingham, Town of	Confluence with Plymouth River	Approximately 650 feet upstream of Brewster Road	01090001	1.2		Y	AE	7/1/1983
Eel River (Plymouth)	Plymouth, Town of	360 feet upstream of Old Sandwich Road	Approximately 60 feet upstream of dam at Russell Mill Pond	01090002	0.9		Y	AE	6/1/1983
Eel River and Zone A tributaries	Plymouth, Town of	Outlet of Russell Millpond	Points of one square mile of drainage area	01090002	8.6		N	A	5/31/2017
First Herring Brook	Norwell, Town of	Scituate corporate limits	Point of one square mile of drainage area	01090002	1.7		N	A	5/31/2017
First Herring Brook	Scituate, Town of	The Driftway	Scituate corporate limits	01090002	2.9		Y	AE	8/1/1983
First Herring Brook Tributary A	Scituate, Town of	Confluence with First Herring Brook	Point of one square mile of drainage area	01090002	0.8		N	A	5/31/2017
French Stream	Abington, Town of; Hanover, Town of; Rockland, Town of	Confluence with Drinkwater River	Approximately 2,760 feet upstream of North Avenue	01090002	4.9		Y	AE	3/1/1980
French Stream Zone A tributaries	Abington, Town of; Rockland, Town of	Confluences with French Stream	Points of one square mile of drainage area	01090002	3.6		N	A	5/31/2017

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)	Area (mi^2) (estuaries or ponding)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Furnace Brook No. 2	Kingston, Town of	Confluence with Jones River	Point of one square mile of drainage area	01090002	3.0		N	A	5/31/2017
Furnace Pond	Pembroke, Town of	Entire shoreline	Entire shoreline	01090002		0.2	N	AE	1/1/1978
Great Quittacas Pond	Lakeville, Town of; Middleborough, Town of; Rochester, Town of	Entire shoreline	Entire shoreline	01090004		1.9	N	AE	7/1/2014
Green Harbor Brook and Zone A tributaries	Duxbury, Town of; Marshfield, Town of	Limit of coastal flooding on Green Harbor Brook	Points of one square mile of drainage area	01090002	5.6		N	A	5/31/2017
Halls Brook	Duxbury, Town of	Approximately 645 feet upstream of Winter Street	Point of one square mile of drainage area	01090002	1.6		N	A	5/31/2017
Halls Brook	Kingston, Town of	200 feet downstream of Maple Street	Approximately 645 feet upstream of Winter Street	01090002	3.1		Y	AE	5/1/1983
Hanna Eames Brook	Marshfield, Town of	Damons Point Road	Approximately 1,030 feet upstream of New Main Street	01090002	1.0		Y	AE	6/1/1983
Harlow Brook No. 2 and Zone A tributaries	Plymouth, Town of; Wareham, Town of	Confluence of Harlow Brook No. 2 with Wankinco River	Points of one square mile of drainage area	01090002	6.8		N	A	5/31/2017
Herring Brook	Hanson, Town of; Pembroke, Town of	Furnace Pond	Point of one square mile of drainage area	01090002	1.3		N	A	5/31/2017
Herring Brook	Pembroke, Town of	Confluence with North River	Furnace Pond	01090002	2.8		Y	AE	1/1/1978
Herring River	Plymouth, Town of	Confluence with Cape Cod Canal	Point of one square mile of drainage area	01090002	6.1		N	A	5/31/2017
Hingham Bay and Massachusetts Bay	Hingham, Town of; Hull, Town of	Entire coastline	Entire coastline	N/A	35.1		N	AE/VE	3/28/2008

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)	Area (mi²) (estuaries or ponding)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Hockomock River	West Bridgewater, Town of	Confluence with Nippenicket Tributary	Approximately 900 feet upstream of abandoned railroad	01090004	5.3		Y	AE	3/1/1979
Indian Brook	Plymouth, Town of	50 feet downstream of Seaview Drive	State Route 3A	01090002	0.5		Y	AE	6/1/1983
Indian Brook and Zone A tributaries	Plymouth, Town of	State Route 3A	Points of one square mile of drainage area	01090002	8.1		N	A	5/31/2017
Indian Head Brook	Hanson, Town of	Outlet of Wampatuck Pond	Point of one square mile of drainage area	01090002	0.6		N	A	5/31/2017
Indian Head Brook	Hanson, Town of	Confluence with Indian Head River	Approximately 45 feet upstream of Liberty Street	01090002	2.4		Y	AE	6/1/1985
Indian Head River	Hanover, Town of; Hanson, Town of; Pembroke, Town of	Confluence with North River	Hanson/Hanover corporate limits	01090002	3.3		Y	AE	1/1/1978
Iron Mine Brook	Hanover, Town of	Confluence with North River	Point of one square mile of drainage area	01090002	2.2		N	A	5/31/2017
Island Creek and Zone A tributaries	Duxbury, Town of	Mouth at Kingston Bay	Points of one square mile of drainage area	01090002	5.5		N	A	5/31/2017
Jones River	Kingston, Town of	Limit of coastal flooding below Elm Street	Grove Street	01090002	4.3		Y	AE	2/1/2017
Jones River	Kingston, Town of	Grove Street	Silver Lake Dam	01090002	0.8		Y	AE	5/1/1983
Jones River and Zone A tributaries	Kingston, Town of; Pembroke, Town of; Plympton, Town of	Outlet of Silver Lake	Points of one square mile of drainage area	01090002	6.0		N	A	5/31/2017
Jones River Brook	Kingston, Town of	Confluence with Jones River	Kingston corporate limits	01090002	1.0		Y	AE	5/1/1983

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)	Area (mi^2) (estuaries or ponding)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Jones River Brook and Zone A tributaries	Kingston, Town of; Plympton, Town of	Kingston corporate limits on Jones River Brook	Points of one square mile of drainage area	01090002	11.4		N	A	5/31/2017
Jones River Tributary A	Kingston, Town of	Confluence with Jones River	Point of one square mile of drainage area	01090002	0.6		N	A	5/31/2017
Jones River Tributary B	Kingston, Town of	Confluence with Jones River	Point of one square mile of drainage area	01090002	1.2		N	A	5/31/2017
Kings Pond	Plymouth, Town of	Entire shoreline	Entire shoreline	01090002		0.1	N	AE	6/1/1983
Little Pudding Brook	Pembroke, Town of	Limit of coastal flooding	Point of one square mile of drainage area	01090002	2.4		N	A	5/31/2017
Littles Creek	Marshfield, Town of	Confluence with South River	Point of one square mile of drainage area	01090002	2.2		N	A	5/31/2017
Long Pond	Lakeville, Town of	Entire shoreline	Entire shoreline	01090004		2.7	N	AE	7/1/2014
Longwater Brook	Hanover, Town of	Confluence with Drinkwater River	Unnamed dam approximately 5,200 feet upstream of confluence with Drinkwater River	01090002	1.0		Y	AE	7/1/1980
Longwater Brook and Zone A tributaries	Hanover, Town of; Norwell, Town of	Outlet of Hackett Pond	Points of one square mile of drainage area	01090002	3.0		N	A	5/31/2017
Maple Springs Brook and Zone A tributaries	Plymouth, Town of; Wareham, Town of	Confluence of Maple Springs Brook with Agawam River	Points of one square mile of drainage area	01090002	3.8		N	A	5/31/2017
Matfield River	Bridgewater, Town of	Confluence with Taunton River	275 feet upstream of Bridge Street	01090004	1.4		Y	AE	11/1/1996
Mattapoisett River	Rochester, Town of	100 feet downstream of Wolf Island Road	Approximately 6,062 feet upstream of Snipatuit Road	01090002	6.6		Y	AE	5/1/1980

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)	Area (mi^2) (estuaries or ponding)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Mattapoisett River and Zone A tributaries	Mattapoisett, Town of; Middleborough, Town of; Rochester, Town of	Limit of coastal flooding on Mattapoisett River	Points of one square mile of drainage area	01090002	38.8		N	A	5/31/2017
Meadow Brook (East Bridgewater)	East Bridgewater, Town of	Central Street	East Bridgewater corporate limits	01090004	3.1		Y	AE	11/1/1977
Meadow Brook (Whitman)	Whitman, Town of	Whitman corporate limits	Approximately 2,658 feet upstream of Auburn Street	01090004	1.3		Y	AE	1/1/1980
Meadow Brook Tributary	Whitman, Town of	Confluence with Meadow Brook	4,124 feet upstream of Auburn Street	01090004	1.4		Y	AE	1/1/1980
Mile Brook	Duxbury, Town of	Approximately 150 feet south of Kingston corporate limits	Point of one square mile of drainage area	01090004	0.6		N	A	5/31/2017
Mile Brook	Kingston, Town of	Confluence with Halls Brook	Approximately 150 feet south of Kingston corporate limits	01090002	0.8		Y	AE	5/1/1983
Nemasket River	Lakeville, Town of; Middleborough, Town of	Confluence with Taunton River	Assawompset Pond Dam	01090004	11.0		Y	AE	7/1/2014
North River Tributary A	Marshfield, Town of	Confluence with North River	Point of one square mile of drainage area	01090002	3.4		N	A	5/31/2017
North Tributary to Shumatuscacant River	Abington, Town of	Confluence with Shumatuscacant River	Approximately 1,600 feet upstream of Wales Street	01090004	0.7		N	AE	9/1/1977
Northern Branch of Ben Mann Brook	Rockland, Town of	Hingham Street	Approximately 950 feet upstream of Hingham Street	01090002	0.2		N	AE	6/16/2008
Oldham Pond	Hanson, Town of; Pembroke, Town of	Entire shoreline	Entire shoreline	01090002		0.4		AE	1/1/1978

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)	Area (mi^2) (estuaries or ponding)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Palmer Mill Brook	Halifax, Town of	Confluence with Winnetuxet River	Approximately 1,660 feet upstream of Hayward Street	01090004	0.7		Y	AE	3/1/1980
Pine Brook and Zone A tributaries	Duxbury, Town of; Kingston, Town of; Pembroke, Town of	Confluence of Pine Brook with Jones River	Points of one square mile of drainage area	01090002	11.1		N	A	5/31/2017
Plymouth River	Hingham, Town of	Cushing Pond Dam	Approximately 2,068 feet upstream of Old Ward Street	01090001	2.5		Y	AE	7/1/1983
Pocksha Pond	Lakeville, Town of; Middleborough, Town of	Entire shoreline	Entire shoreline	01090004		0.4	N	AE	7/1/2014
Poor Meadow Brook	Hanson, Town of	Approximately 8,700 feet downstream of Main Street	Approximately 4,675 feet upstream of West Washington Street	01090004	4.5		Y	AE	6/1/1985
Pudding Brook and Zone A tributaries	Duxbury, Town of; Pembroke, Town of	Limit of coastal flooding on Pudding Brook	Points of one square mile of drainage area	01090002	5.4		N	A	5/31/2017
Red Brook and Zone A tributaries	Plymouth, Town of; Wareham, Town of	Mouth of Red Brook at Buttermilk Bay	Points of one square mile of drainage area	01090002	9.9		N	A	5/31/2017
Robinson Creek	Pembroke, Town of	Limit of coastal flooding	Point of one square mile of drainage area	01090002	2.5		N	A	5/31/2017
Rocky Meadow Brook	Carver, Town of	Confluence with Weweantic River	Approximately 2,868 feet upstream of France Street	01090002	1.4		Y	AE	7/1/1980
Rose Brook	Wareham, Town of	Confluence with Wankinco River	Point of one square mile of drainage area	01090002	1.2		N	A	5/31/2017

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)	Area (mi^2) (estuaries or ponding)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Salisbury Brook	Brockton, City of	Confluence with Salisbury Plain River	Approximately 450 feet upstream of Prospect Street	01090004	2.2		Y	AE	8/1/1977
Salisbury Plain River (Brockton)	Brockton, City of	Brockton corporate limits	Confluence with Salisbury Brook	01090004	3.1		Y	AE	8/1/1977
Salisbury Plain River (West Bridgewater)	West Bridgewater, Town of	West Bridgewater corporate limits	West Bridgewater corporate limits	01090004	1.1		Y	AE	3/1/1979
Satucket River	East Bridgewater, Town of	700 feet downstream of Plymouth Street	80 feet upstream of Pond Street	01090004	1.6		Y	AE	11/1/1977
Satuit Brook	Scituate, Town of	500 feet upstream of Front Street	Approximately 100 feet upstream of abandoned railroad	01090002	1.9		Y	AE	8/1/1983
Sawmill Brook	Bridgewater, Town of	Confluence with Taunton River	Approximately 4,826 feet upstream of Bedford Street	01090004	1.7		Y	AE	11/1/1996
Second Brook	Kingston, Town of	Confluence with Jones River	Point of one square mile of drainage area	01090002	2.2		N	A	5/31/2017
Second Herring Brook	Norwell, Town of	Confluence with Black Pond Brook	Point of one square mile of drainage area	01090002	1.7		N	A	5/31/2017
Second Herring Brook	Norwell, Town of	Confluence with North River	Confluence with Black Pond Brook	01090002	1.3		Y	AE	7/1/1980
Shinglemill Brook	Hanover, Town of	Confluence with Longwater Brook	Limit of detailed study	01090002	1.0		N	A	5/31/2017
Shinglemill Brook	Hanover, Town of	Webster Street	Whiting Street	01090002	0.7		N	AE	12/26/2007
Shumatuscacant River (Abington)	Abington, Town of	Abington corporate limits	Approximately 2,300 feet upstream of Summit Road	01090004	3.9		Y	AE	9/1/1977

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)	Area (mi^2) (estuaries or ponding)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Shumatuscacant River (Whitman)	Whitman, Town of	Confluence with Shumatuscacant Tributary	Whitman corporate limits	01090004	1.9		Y	AE	1/1/1980
Shumatuscacant Tributary	Whitman, Town of	Confluence with Shumatuscacant River	820 feet upstream of Franklin Street	01090004	0.9		Y	AE	1/1/1980
Sippican River and Zone A tributaries	Middleborough, Town of; Rochester, Town of	Limit of coastal flooding on Sippican River	Points of one square mile of drainage area	01090002	27.0		N	A	5/31/2017
Sippican River Tributary A	Marion, Town of; Rochester, Town of	Confluence with Sippican River	Point of one square mile of drainage area	01090002	1.1		N	A	5/31/2017
Smelt Brook	Kingston, Town of	State Route 3	Point of one square mile of drainage area	01090002	2.1		N	A	5/31/2017
Smelt Brook	Kingston, Town of	State Route 3A	60 feet upstream of Cranberry Road	01090002	1.0		Y	AE	5/1/1983
Snows Brook	Bridgewater, Town of	Confluence with Taunton River	50 feet upstream of Forest Street	01090004	2.0		Y	AE	3/1/1978
South Brook	Bridgewater, Town of	Confluence with Town River	25 feet upstream of Bedford Street	01090004	2.8		Y	AE	3/1/1978
South Meadow Brook	Carver, Town of	Confluence with Weweantic River	Approximately 1,145 feet upstream of Pond Street	01090002	5.2		Y	AE	7/1/1980
South River and Zone A tributaries	Duxbury, Town of; Marshfield, Town of	Limit of coastal flooding on South River	Points of one square mile of drainage area	01090002	27.2		N	A	5/31/2017

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)	Area (mi²) (estuaries or ponding)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Stream Channel to Unnamed Tributary to Third Herring Brook	Hanover, Town of	Confluence with Unnamed Tributary to Third Herring Brook	Confluence of Tributaries 1 and 2 to Stream Channel to Unnamed Tributary to Third Herring Brook	01090002	0.2		N	AE	9/7/2005
Stream River	Abington, Town of	Whitman/Abington corporate limits	Approximately 100 feet upstream of Ashland Street	01090004	2.0		Y	AE	12/1/1990
Taunton River	Bridgewater, Town of; Halifax, Town of; Middleborough, Town of	County limits	Cherry Street	01090004	11.4		Y	AE	7/1/2014
Third Herring Brook and Zone A tributaries	Hanover, Town of; Norwell, Town of	Confluence of Third Herring Brook with North River	Points of one square mile of drainage area	01090002	19.1		N	A	5/31/2017
Torrey Brook and Zone A tributaries	Hanover, Town of	Confluence of Torrey Brook with Drinkwater River	Points of one square mile of drainage area	01090002	2.5		N	A	5/31/2017
Town Brook (Hingham)	Hingham, Town of	Hingham Harbor	Approximately 1,100 feet upstream of South Street	01090001	0.9		Y	AE	7/1/1983
Town Brook (Plymouth)	Plymouth, Town of	Limit of coastal flooding below Water Street	Headwaters at Billington Sea	01090002	1.7		Y	AE	2/1/2017
Town River	Bridgewater, Town of; West Bridgewater, Town of	Confluence with Taunton River	Confluence with Lake Nippenicket Tributary	01090004	9.8		Y	AE	3/1/1979

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)	Area (mi^2) (estuaries or ponding)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Tributary 1 to Stream Channel to Unnamed Tributary to Third Herring Brook	Hanover, Town of	Confluence with Stream Channel to Unnamed Tributary to Third Herring Brook	Approximately 300 feet upstream of confluence with Stream Channel to Unnamed Tributary to Third Herring Brook	01090002	0.1		N	AE	9/7/2005
Tributary 1 to Unnamed Tributary to Iron Mine Brook	Hanover, Town of	Confluence with Unnamed Tributary to Iron Mine Brook	Ponding Area 1	01090002	0.2		N	AE	9/7/2005
Tributary 2 to Stream Channel to Unnamed Tributary to Third Herring Brook	Hanover, Town of	Confluence with Stream Channel to Unnamed Tributary to Third Herring Brook	Approximately 370 feet upstream of confluence with Stream Channel to Unnamed Tributary to Third Herring Brook	01090002	0.1		N	AE	9/7/2005
Tributary 2 to Unnamed Tributary to Iron Mine Brook	Hanover, Town of	Confluence with Unnamed Tributary to Iron Mine Brook	Ponding Area 2	01090002	0.3		N	AE	9/7/2005
Tributary A	Rockland, Town of	Confluence with French Stream	Levin Road	01090002	0.5		Y	AE	3/1/1980
Tributary A to Sawmill Brook	Bridgewater, Town of	Confluence with Sawmill Brook	Approximately 80 feet upstream of Colonial Drive	01090004	0.7		N	AE	11/1/1996
Tributary to Meadow Brook	East Bridgewater, Town of	Confluence with Meadow Brook	1,340 feet upstream of Whitman/East Bridgewater corporate limits	01090004	0.2		Y	AE	11/1/1977

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)	Area (mi^2) (estuaries or ponding)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Trout Brook	Brockton, City of	Confluence with Salisbury Brook	Approximately 415 feet upstream of Ames Street	01090004	2.0		Y	AE	8/1/1977
Turkey Hill Run	Hingham, Town of	Confluence with Weir River	Approximately 160 feet upstream of East Street	01090001	0.1		Y	AE	8/1/1983
Unnamed Tributary 2 to Shinglemill Brook	Hanover, Town of	Confluence with Shinglemill Brook	Approximately 1,300 feet upstream of confluence with Shinglemill Brook	01090002	0.3		N	AE	12/26/2007
Unnamed Tributary 3 to Shinglemill Brook	Hanover, Town of	Confluence with Shinglemill Brook	Approximately 1,600 feet upstream of confluence with Shinglemill Brook	01090002	0.3		N	AE	12/26/2007
Wankinco River and Zone A tributaries	Carver, Town of; Plymouth, Town of; Wareham, Town of	Limit of coastal flooding on Wankinco River	Points of one square mile of drainage area	01090002	25.0		N	A	5/31/2017
Weir River	Hingham, Town of	Foundry Pond Dam	Free Street	01090001	2.7		Y	AE	7/1/1983
West Brook	Duxbury, Town of	Limit of coastal flooding	Point of one square mile of drainage area	01090002	2.8		N	A	5/31/2017
West Meadow Brook	West Bridgewater, Town of	Confluence with Town River	West Bridgewater corporate limits	01090004	3.6		Y	AE	3/1/1979
Weweantic River	Carver, Town of; Middleborough, Town of; Wareham, Town of	Wareham/Carver corporate limits	Confluence of Rocky Meadow Brook and South Meadow Brook	01090002	7.4		Y	AE	7/1/1980
Weweantic River and Zone A tributaries	Carver, Town of; Middleborough, Town of; Plymouth, Town of; Wareham, Town of	Limit of coastal flooding on Weweantic River	Points of one square mile of drainage area	01090002	72.1		N	A	5/31/2017

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)	Area (mi^2) (estuaries or ponding)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Willow Brook	West Bridgewater, Town of	Confluence with Town River	Approximately 950 feet upstream of Main Street	01090004	0.9		Y	AE	3/1/1979
Winnetuxet River	Halifax, Town of; Plympton, Town of	Confluence with Taunton River	Approximately 4,888 feet upstream of Main Street	01090004	11.3		Y	AE	3/1/1980

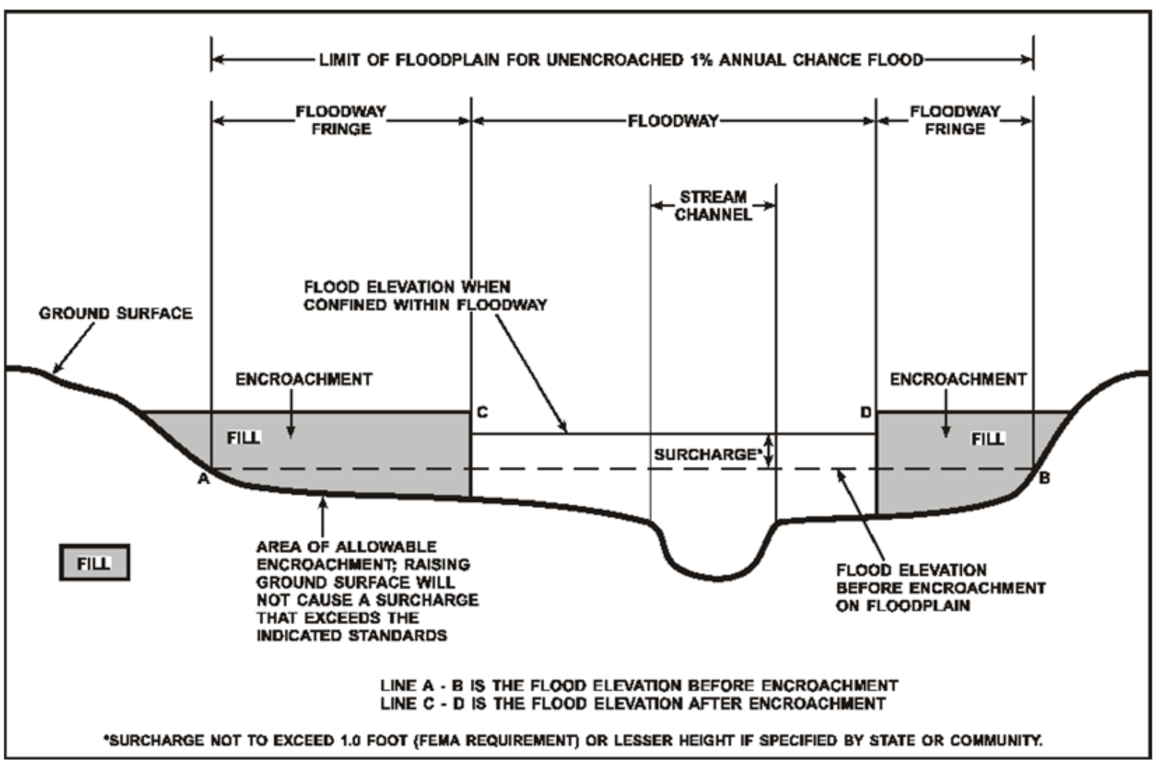
2.2 Floodways

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% 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% annual chance flood. The floodway fringe is the area between the floodway and the 1% 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% 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% 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 Base Flood Elevation (BFE) is the elevation of the 1% 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.

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. BFEs 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.

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% 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. Communities on or near ocean coasts face flood hazards caused by offshore seismic events as well as storm events.

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

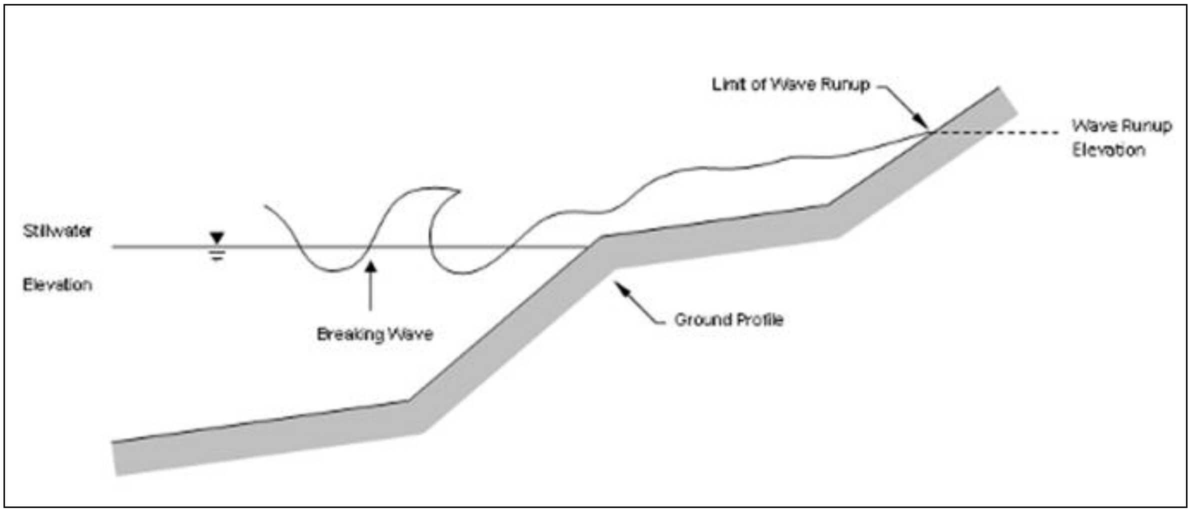
- *Wave setup* is the increase in stillwater elevation at the shoreline caused by the reduction of waves in shallow water. It occurs as breaking wave momentum is transferred to the water column.

Like the stillwater elevation, the total stillwater elevation is based on a storm of a particular frequency, such as the 1% 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% annual chance floodplain in these areas is derived from the total stillwater elevation (stillwater elevation including storm surge plus wave setup) for the 1% 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% annual chance floodplain is determined based on the limit of wave runup or wave overtopping for the 1% 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% 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% 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% 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% 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.

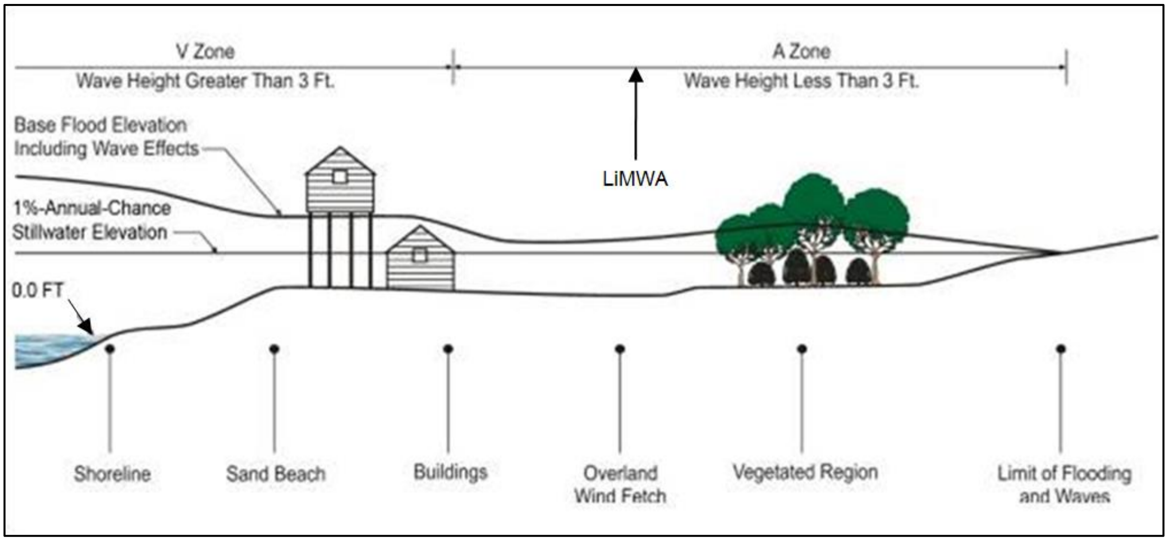
CHHAs are designated as “V” zones (for “velocity wave zones”) and are subject to more stringent regulatory requirements and a different flood insurance rate structure. The areas of greatest risk are shown as VE on the FIRM. Zone VE is further subdivided into elevation zones and shown with BFEs on the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

Where wave runup elevations dominate over wave heights, there is no evidence to date of significant damage to residential structures by runup depths less than 3 feet. Examples of these areas include areas with steeply sloped beaches, bluffs, or flood protection structures that lie parallel to the shore. In these areas, the FIRM shows the LiMWA immediately landward of the VE/AE boundary. Similarly, in areas where the zone VE designation is based on the presence of a primary frontal dune or wave overtopping, the LiMWA is delineated immediately landward of the Zone VE/AE boundary.

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% 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% annual chance floodplain boundary corresponds to the boundary of areas of additional flood hazards.

Table 3 lists the flood insurance zones in Plymouth County.

Table 3: Flood Zone Designations by Community

Community	Flood Zone(s)
Abington, Town of	A, AE, X
Bridgewater, Town of	A, AE, X
Brockton, City of	A, AE, X
Carver, Town of	A, AE, X
Duxbury, Town of	A, AE, AO, VE, X
East Bridgewater, Town of	A, AE, X
Halifax, Town of	A, AE, X
Hanover, Town of	A, AE, AH, X
Hanson, Town of	A, AE, X
Hingham, Town of	A, AE, VE, X
Hull, Town of	AE, AO, VE, X
Kingston, Town of	A, AE, VE, X
Lakeville, Town of	A, AE, X
Marion, Town of	A, AE, AO, VE, X
Marshfield, Town of	A, AE, AO, VE, X
Mattapoisett, Town of	A, AE, VE, X

Table 3: Flood Zone Designations by Community

Community	Flood Zone(s)
Middleborough, Town of	A, AE, X
Norwell, Town of	A, AE, X
Pembroke, Town of	A, AE, X
Plymouth, Town of	A, AE, VE, X
Plympton, Town of	A, AE, X
Rochester, Town of	A, AE, X
Rockland, Town of	A, AE, AH, X
Scituate, Town of	A, AE, AO, VE, X
Wareham, Town of	A, AE, AO, VE, X
West Bridgewater, Town of	A, AE, X
Whitman, Town of	A, AE, 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)
Cape Cod	01090002	Atlantic Ocean	Coastal land along Cape Cod Bay	1,204
Charles	01090001	Atlantic Ocean	Coastal land along Cape Cod Bay and Massachusetts Bay	1,013
Narragansett	01090004	Narragansett Bay and coastal rivers	The Narragansett Watershed is the watershed drained by all coastal rivers (such as the Pawtuxet, Providence, and Taunton Rivers and their tributaries) discharging into Narragansett Bay, Rhode Island, excluding the Blackstone River Watershed (HUC8)	1,379

4.2 Principal Flood Problems

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

Table 5: Principal Flood Problems

Flooding Source	Description of Flood Problems
Assawompsett Pond, Long Pond, and Nemasket River	The Assawompsett Pond, Long Pond, and Nemasket River have caused flooding in the Towns of Lakeville and Middleborough as as a result of hurricanes, snow melt combined with spring rains, and summer thunderstorms. The most recent flood event happened during the spring 2010 as a result of 17-23 inches of rain from three primary storms over a five-week period from mid-February through the end of March. It resulted in several bridges being overtopped and roads and homes near the river and ponds being flooded.
Atlantic Ocean - Buzzards Bay	The coastal communities in Plymouth County (Mattapoisett, Marion, and Wareham) on Buzzards Bay are primarily subject to coastal flooding caused by nor'easters and hurricanes. Nor'easters can occur at any time of the year but are more prevalent in the winter months, whereas hurricanes mostly occur in the late summer and early fall months. The southern side of Plymouth County on Buzzards Bay geneally would tend to only experience damages from hurricanes moving up the coast from the south-southwest to north-northeast. The coastal storm surge would affect these communities in Plymouth county. This area was significantly affected by Hurricane Bob in August 1991. The Hurricane of September 1938 and August 1954 also significantly affected this area of Plymouth County.
Atlantic Ocean - Cape Cod Bay	The coastal communities in Plymouth County (Hingham, Scituate, Marshfield, Duxbury, Kingston, and Plymouth) on Cape Cod Bay are primarily subject to coastal flooding caused by nor'easters and hurricanes. Nor'easters can occur at any time of the year but are more prevalent in the winter months, whereas hurricanes mostly occur in the late summer and early fall months. A nor'easter travels southwest to northeast along the Atlantic coast, collecting moisture over the ocean and sending it inland via northeast winds. Nor'easters differ from hurricanes in that they cover a larger area, have less intense winds, and move more slowly. Where a hurricane may last for several hours, a nor'easter may last for several days. For this reason, northeasters often last long enough to be accompanied by at least one high tide, which results in the most severe flooding conditions. In addition to flooding, damaging waves may occur from tidal surge in coastal areas. These high levels result from a drop in the barometric pressure and from strong winds that can blow out of the northeast across the considerable fetch of the Atlantic Ocean. The Blizzard of 1978 is the most famous nor'easter that caused significant coastal flooding. The Blizzard of 1978 is designated as a 1-percent annual chance coastal flood event.

Table 5: Principal Flood Problems

Flooding Source	Description of Flood Problems
Inland rivers and ponds in southern Plymouth County - Plymouth-Carver Aquifer Area	Typically the inland rivers and ponds in southern Plymouth County in the "Plymouth-Carver Aquifer" do not experience flooding, because of the extensive sand and gravel deposits that allow for infiltration of most rainfall events. On occasion, during an intense rainfall some very minor flooding can occur along rivers or ponds.
Salisbury Plain River	The Salisbury Plain River have caused flooding in the City of Brockton as as a result of hurricanes, snow melt combined with spring rains, and summer thunderstorms. The most recent flood event happened during the spring 2010 as a result of 17-23 inches of rain from three primary storms over a five-week period from mid-February through the end of March. It resulted in a few bridges being overtopped and roads near the river being flooded. The March 1968 flood resulted in significant bridge and road flooding.
Taunton River	The Taunton River has caused severe flooding in the Towns of Bridgewater, Middleborough, and Halifax as a result of hurricanes, snow melt combined with spring rains, and summer thunderstorms. The most recent flood event happened during the spring 2010 as a result of 17-23 inches of rain from three primary storms over a five-week period from mid-February through the end of March. It resulted in several bridges being overtopped and roads near the river being flooded. The USGS streamgage on the Taunton River near Bridgewater, Massachusetts (01108000) experienced a 1-percent chance flood event from the spring 2010 storm. Other notable floods on the Taunton River include the floods produced by hurricanes in September 1938 and August 1954, and the rain and snow melt event of March 1968.
Town River and Matfield River	The Town River and Matfield River have caused flooding in the Towns of Bridgewater, West Bridgewater, and East Bridgewater as as a result of hurricanes, snow melt combined with spring rains, and summer thunderstorms. The most recent flood event happened during the spring 2010 as a result of 17-23 inches of rain from three primary storms over a five-week period from mid-February through the end of March. It resulted in several bridges being overtopped and roads near the river being flooded.

Table 6 contains information about historic flood elevations in the communities within Plymouth County.

Table 6: Historic Flooding Elevations

Flooding Source	Location	Historic Peak (Feet NAVD88)	Event Date	Approximate Recurrence Interval (years)	Source of Data
Atlantic Ocean	Brant Rock in Marshfield	9.4	February 1978	100	USGS

Table 6: Historic Flooding Elevations

Flooding Source	Location	Historic Peak (Feet NAVD88)	Event Date	Approximate Recurrence Interval (years)	Source of Data
Atlantic Ocean	Carver Avenue in Scituate	16.8	February 1978	100	*
Atlantic Ocean	Central Avenue in Scituate	5.7	February 1978	100	*
Atlantic Ocean	Collier Avenue in Scituate	15.7	February 1978	100	*
Atlantic Ocean	Edward Foster Road in Scituate	8	February 1978	100	*
Atlantic Ocean	Fourth Avenue in Scituate	15.7	February 1978	100	*
Atlantic Ocean	Gannet Road in North Scituate	7.4	February 1978	100	*
Atlantic Ocean	Hatherly Road in Scituate	12.2	February 1978	100	*
Atlantic Ocean	Hollett Street in North Scituate	8.4	February 1978	100	*
Atlantic Ocean	Intersection of Graves Avenue and Montvale Avenue in Scituate	12.1	February 1978	100	*
Atlantic Ocean	Jawl Avenue in Scituate	11.3	February 1978	100	*
Atlantic Ocean	Lighthouse Road in Scituate	10.8	February 1978	100	*
Atlantic Ocean	Marina on Herring River just south of James Cemetery in Scituate	10.5	February 1978	100	*
Atlantic Ocean	North end of Fourth Cliff in Scituate	14.7	February 1978	100	*
Atlantic Ocean	Oceanside Drive in Scituate	17.8	February 1978	100	*
Atlantic Ocean	Otis Road in Scituate	13.7	February 1978	100	*
Atlantic Ocean	Peggotty Beach in Scituate	10.3	February 1978	100	*
Atlantic Ocean	Peggotty Beach Parking Lot in Scituate	7.9	February 1978	100	*

*Data not available

Table 6: Historic Flooding Elevations

Flooding Source	Location	Historic Peak (Feet NAVD88)	Event Date	Approximate Recurrence Interval (years)	Source of Data
Atlantic Ocean	South end of Second Cliff in Scituate	17.6	February 1978	100	*
Atlantic Ocean	South side of Driftway in Scituate	10.5	February 1978	100	*
Atlantic Ocean	Surfside Road in Scituate	10.71	February 1978	100	*
Atlantic Ocean	Tenth Avenue in Scituate	16.2	February 1978	100	*
Atlantic Ocean	Third Avenue in Scituate	17.2	February 1978	100	*
Atlantic Ocean	Town Way in Scituate	10.9	February 1978	100	*
Bass Creek	Marshfield	2.1	February 1978	100	USGS
Beaver Dam Brook	State Route 3A in Plymouth	11.4	February 1978	100	*
Bluefish River	Harrison Street in Duxbury	8.6	February 1978	100	*
Bluefish River	Powder Point Road in Duxbury	10	February 1978	100	*
Boston Harbor	Boston Harbor tide gage	8.3	November 1944	*	USACE 1978
Boston Harbor	Boston Harbor tide gage	8	March 1956	*	USACE 1978
Boston Harbor	Boston Harbor tide gage	6.1	March 1957	*	USACE 1978
Boston Harbor	Boston Harbor tide gage	7.9	April 1958	*	USACE 1978
Boston Harbor	Boston Harbor tide gage	8.7	December 1959	*	USACE 1978
Boston Harbor	Boston Harbor tide gage	7.4	March 1960	*	USACE 1978
Boston Harbor	Boston Harbor tide gage	8.1	January 1961	*	USACE 1978
Boston Harbor	Boston Harbor tide gage	6.6	March 1961	*	USACE 1978

*Data not available

Table 6: Historic Flooding Elevations

Flooding Source	Location	Historic Peak (Feet NAVD88)	Event Date	Approximate Recurrence Interval (years)	Source of Data
Boston Harbor	Boston Harbor tide gage	7.7	March 1962	*	USACE 1978
Boston Harbor	Boston Harbor tide gage	7.1	January 1966	*	USACE 1978
Boston Harbor	Boston Harbor tide gage	6.7	April 1967	*	USACE 1978
Boston Harbor	Boston Harbor tide gage	6.9	December 1967	*	USACE 1978
Boston Harbor	Boston Harbor tide gage	5.3	February 1968	*	USACE 1978
Boston Harbor	Boston Harbor tide gage	7	November 1968	*	USACE 1978
Boston Harbor	Boston Harbor tide gage	8.3	February 1972	*	USACE 1978
Boston Harbor	Boston Harbor tide gage	7.8	March 1976	*	USACE 1978
Boston Harbor	Boston Harbor tide gage	9.5	February 1978	100	USACE 1978
Boston Harbor	Boston Harbor tide gage	8.2	October 1991	*	USACE 1978
Bourne Wharf River	Duck Hill Lane in Marshfield	8.4	February 1978	100	USGS
Branch of Eel River	Clifford Road in Plymouth	11.06	February 1978	100	*
Branch of Eel River	Sandwich Road in Plymouth	11.4	February 1978	100	*
Cape Cod Canal	Cape Cod tide gage	8.2	March 1956	*	Tide gage
Cape Cod Canal	Cape Cod tide gage	5.8	March 1957	*	Tide gage
Cape Cod Canal	Cape Cod tide gage	7.4	April 1958	*	Tide gage
Cape Cod Canal	Cape Cod tide gage	8.2	December 1959	*	Tide gage
Cape Cod Canal	Cape Cod tide gage	6.7	March 1960	*	Tide gage

*Data not available

Table 6: Historic Flooding Elevations

Flooding Source	Location	Historic Peak (Feet NAVD88)	Event Date	Approximate Recurrence Interval (years)	Source of Data
Cape Cod Canal	Cape Cod tide gage	8	January 1961	*	Tide gage
Cape Cod Canal	Cape Cod tide gage	6	March 1961	*	Tide gage
Cape Cod Canal	Cape Cod tide gage	7.2	January 1966	*	Tide gage
Cape Cod Canal	Cape Cod tide gage	6.5	April 1967	*	Tide gage
Cape Cod Canal	Cape Cod tide gage	7.6	December 1967	*	Tide gage
Cape Cod Canal	Cape Cod tide gage	5.3	February 1968	*	Tide gage
Cape Cod Canal	Cape Cod tide gage	6.5	November 1968	*	Tide gage
Cape Cod Canal	Cape Cod tide gage	7.4	February 1972	*	Tide gage
Cape Cod Canal	Cape Cod tide gage	9.3	February 1978	*	Tide gage
Duck Hill River	0.2 mile north of St. George Street in Duxbury	9.8	February 1978	100	*
Duck Hill River	Duck Hill Road in Duxbury	8.4	February 1978	100	*
Duxbury Bay	Shipyard Lane in Duxbury	9.4	February 1978	100	*
Eel River	Sandwich Road in Plymouth	11.7	February 1978	100	*
Eel River	State Route 3A in Plymouth	11.1	February 1978	100	*
Green Harbor River	Avon Street in Marshfield	9.7	February 1978	100	Marshfield Town Engineer
Green Harbor River	Central Street in Marshfield	9.6	February 1978	100	USGS
Green Harbor River	Columbus Road in Marshfield	10.1	February 1978	100	Marshfield Town Engineer

*Data not available

Table 6: Historic Flooding Elevations

Flooding Source	Location	Historic Peak (Feet NAVD88)	Event Date	Approximate Recurrence Interval (years)	Source of Data
Green Harbor River	Dike Road in Marshfield	9.9	February 1978	100	Marshfield Town Engineer
Hingham Bay	Rose Cliff in Weymouth	12.5	February 1978	100	*
Hingham Harbor	Crow Point in Hingham	10.91	February 1978	100	*
Island Creek	Bay Road in Duxbury	7.9	February 1978	100	*
Jones River	Upstream side of State Route 3A in Kingston	7.8	February 1978	100	*
Jones River	USGS gaging station approximately 100 feet downstream of Elm Street in Kingston	9.8	February 1978	100	*
Kingston Bay	End of Landing Road in South Duxbury	9.75	February 1978	100	*
Kingston Bay	Landing Road in Duxbury	9.8	February 1978	100	*
Kingston Bay	Miramar, Island Creek in South Duxbury	7.9	February 1978	100	*
Kingston Bay	The Nook in Duxbury	9.1	February 1978	100	*
Kingston Bay	The Nook, Bay Road, 0.3 mile west of Standish Street in South Duxbury	9.07	February 1978	100	*
Little Wood Island River	Careswell Street in Duxbury	8.3	February 1978	100	*
Little Wood Island River	Careswell Street in Marshfield	8.3	February 1978	100	USGS
Massachusetts Bay	Pleasant Beach in Cohasset	12.29	February 1978	100	*
North River	State Route 3A in Marshfield	9.1	February 1978	100	USGS
North River	State Route 3A in Scituate	9.1	February 1978	100	*

*Data not available

Table 6: Historic Flooding Elevations

Flooding Source	Location	Historic Peak (Feet NAVD88)	Event Date	Approximate Recurrence Interval (years)	Source of Data
North River	Union Street in Marshfield	8.8	February 1978	100	USGS
Plymouth Harbor	End of Robbins Road in Plymouth	11.4	February 1978	100	*
South River	Feny Street in Marshfield	9.8	February 1978	100	USGS
South River	Field Street in Marshfield	8.4	February 1978	100	USGS
South River	Main Street (at Plain Street) in Marshfield	6.6	February 1978	100	USGS
South River	Ocean Street (0.5 mile east of Plain Street) in Marshfield	6.6	February 1978	100	USGS
South River	Willow Street in Marshfield	6.4	February 1978	100	USGS
Straits Pond	Atlantic Avenue in Hull	8.4	February 1978	100	*
Straits Pond	DPW Garage in Hull	10.1	February 1978	100	*
Straits Pond - Massachusetts Bay	Hull	10.11	February 1978	100	*
Warren Cove	Pilgrim Sands Motel on State Route 3A in Plymouth	20.3	February 1978	100	*
Weir River	Hingham	8.12	February 1978	100	*
Weir River	Hingham	8.1	February 1978	100	*
Weir River	Tidal Flat in Hull	9.8	February 1978	100	*
White Horse Beach	Manomet	13.4	February 1978	100	*

*Data not available

4.3 Non-Levee Flood Protection Measures

Table 7 contains information about non-levee flood protection measures within Plymouth County such as dams, jetties, and or dikes. Levees are addressed in Section 4.4 of this FIS Report.

Table 7: Non-Levee Flood Protection Measures

Flooding Source	Structure Name	Type of Measure	Location	Description of Measure
Atlantic Ocean	N/A	Private seawalls and jetties	Many coastal areas	Provides minimum protection from damage cause by the 1-percent-annual-chance floods.
Atlantic Ocean	N/A	Seawalls	Duxbury	Dissipates wave energy and provide some flood protection of low areas, and protect against bank erosion
Atlantic Ocean	N/A	Tide gate and seawalls	Broad Cove - Hingham and Hingham	Dissipates wave energy and provides some flood protection of low areas
Atlantic Ocean	N/A	Seawalls, breakwaters, and riprap	Hull	Dissipates wave energy and provide some flood protection of low areas, and protect against bank erosion
Atlantic Ocean	N/A	Seawalls, tide gates, and riprap	Marshfield	Dissipates wave energy and provide some flood protection of low areas, and protect against bank erosion
Atlantic Ocean	Plymouth Harbor Jetty	Jetty	Plymouth Harbor	Dissipates wave energy and provides some flood protection of low areas
Atlantic Ocean	N/A	Seawalls	Scituate	Dissipates wave energy and provide some flood protection of low areas, and protect against bank erosion
Riverine	N/A	Natural lake and pond storage	Most towns and cities in Plymouth County	Natural lakes and ponds provide some natural storage during flood events - slowly releasing flood waters and slowing velociities
Riverine	N/A	Cranberry bogs	Some riverine areas in Plymouth County	During much of the year, the cranberry bogs could be used for flood storage, as they can potentially provide a significant amount of storage. But, the storage may not always be available.

4.4 Levees

This section is not applicable to this Flood Risk Project.

Table 8: Levees

[Not Applicable to this Flood Risk Project]

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% 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.

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	0.2% Annual Chance
Accord Brook	At a point approximately 2,100 feet downstream of Prospect Street in Hingham	3.1	125	*	210	256	393
Beaver Brook	At Elm Street in East Bridgewater	2.3	319	*	436	498	614
Beaver Brook	At Summer Street in East Bridgewater	1.3	313	*	428	487	600
Beaver Dam Brook	At White Horse Beach	4.6	738	*	1,136	1,343	1,932
Beaver Dam Brook	Upstream of State Route 3A in Plymouth	2.3	603	*	899	1,049	1,469
Black Betty Brook	At the confluence with West Meadow Brook	0.8	64	*	88	101	124
Black Betty Brook	At the West Bridgewater/ Brockton town line	0.3	32	*	44	50	62
Black Brook	At Central Street in East Bridgewater	1.4	90	*	123	140	173
Black Pond Brook	At the confluence with Second Herring Brook	2.9	125	*	210	260	395
Bound Brook	At Mordecai Lincoln Road in Scituate	7.2	370	*	635	950	1,400
Bound Brook	At the culvert at State Route 3A in Scituate	6.6	300	*	550	800	1,200
Crane Brook	At the confluence with the Weweantic River	12.3	295	*	430	505	650

*Not calculated for this Flood Risk Project

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	0.2% Annual Chance
Crane Brook	At Cranberry Road in Carver	6.8	190	*	280	325	410
Crooked Meadow River	At the confluence of Fulling Mill Brook	4.3	177	*	297	362	556
Drinkwater River	At Factory Pond	22.6	850	*	1,260	1,470	2,030
Drinkwater River	At confluence with Drinkwater River Tributary	18	770	*	1,035	1,155	1,470
Drinkwater River	Upstream of French Stream	11.2	480	*	740	870	1,240
Drinkwater River	Upstream tributary from Hell Swamp	3.4	160	*	270	330	520
Drinkwater River Tributary	Upstream confluence with the Drinkwater River	4.5	80	*	225	315	560
Eel River (Town of Hingham)	At its confluence with the Plymouth River	0.6	53	*	91	112	177
Eel River (Town of Plymouth)	At Sandwich Road in Plymouth	3.7	222	*	377	463	724
Eel River (Town of Plymouth)	At Russell Millpond outlet	3	194	*	330	405	633
Eel River Branch	At Clifford Road in Plymouth	5.4	509	*	863	1,060	1,656
Eel River Branch	Approximately 1 mile upstream of Clifford Road	2.7	305	*	517	635	992
First Herring Brook	At the culvert at New Driftway	3	405	*	520	610	835
First Herring Brook	At Grove Street in Scituate	1.1	145	*	197	240	385

*Not calculated for this Flood Risk Project

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	0.2% Annual Chance
French Stream	At confluence with the Drinkwater River	8.6	390	*	590	700	1,000
French Stream	Upstream of Rockland corporate limits	8.4	340	*	530	620	890
French Stream	Upstream of Beech Hill Swamp Tributary	5.9	290	*	440	520	750
French Stream	Upstream of Tributary B	4.9	240	*	360	430	620
French Stream	Upstream of Studleys Pond Dam	4.1	200	*	310	360	520
French Stream	1,650 feet upstream of North Avenue in Rockland	2	110	*	180	220	340
Halls Brook	At confluence with Jones River	4.7	175	*	212	263	396
Halls Brook	Approximately 400 feet upstream of Blackwater Pond	2.5	147	*	187	220	345
Halls Brook	Approximately 2,500 feet downstream of Brookdale Road in Kingston	1.5	93	*	133	168	233
Hannah Eames Brook	At Damons Point Road in Marshfield	1.5	200	*	250	270	520
Hannah Eames Brook	At New Main Street in Marshfield	0.7	150	*	195	210	260
Herring Brook	At Mountain Avenue in Pembroke	1.6	92	*	162	217	374
Herring Brook	At Barker Street in Pembroke	2	118	*	208	278	480

*Not calculated for this Flood Risk Project

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	0.2% Annual Chance
Hingham Street Basins	At Hingham Street	0.1	*	*	*	10	*
Hockomock River	At West Bridgewater/Bridgewater town line	22.6	648	*	887	1,014	1,249
Hockomock River	At Maple Street in West Bridgewater	22.4	644	*	882	1,008	1,242
Hockomock River	At Dirt Road in West Bridgewater	20.5	605	*	828	946	1,166
Hockomock River	At West Center Street in West Bridgewater	20.3	601	*	823	941	1,159
Hockomock River	At Manley Street in West Bridgewater	19.3	580	*	794	907	1,118
Hockomock River	At West Street in West Bridgewater	18.4	562	*	769	879	1,083
Indian Brook	At State Route 3A in Plymouth	3.6	311	*	518	632	972
Indian Brook	Downstream of Island Pond	0.8	154	*	261	320	499
Indian Head Brook	At its confluence with the Indian Head River	4.7	155	*	260	315	485
Indian Head Brook	Downstream of Wamptatuck Pond	2.6	85	*	140	170	255
Indian Head River	At USGS gaging station in Pembroke	30.3	1,200	*	1,700	1,820	2,480
Indian Head River	Upstream of Indian Head Brook	23	950	*	1,380	1,580	2,130

*Not calculated for this Flood Risk Project

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	0.2% Annual Chance
Jones River	At USGS streamgage 01105870	20.1	357	442	509	580	765
Jones River	Upstream of confluence with Furnace Brook	17.6	322	399	460	524	692
Jones River	Upstream of confluence with Pine Brook and Jones River Brook	4.81	117	145	169	193	258
Jones River Brook	At confluence with Jones River	4.9	180	*	250	300	380
Longwater Brook	At confluence with the Drinkwater River	2.9	130	*	220	270	410
Matfield River	At High Street in Bridgewater	79.8	1,564	*	2,141	2,447	3,015
Mattapoisett River	At the downstream Rochester corporate limits	14.9	275	*	410	485	705
Mattapoisett River	1,600 feet upstream of Rounseville Road in Rochester	12.1	100	*	120	135	170
Mattapoisett River	3,000 feet downstream of the outlet of Snipatuit Pond	7.6	45	*	55	65	80
Meadow Brook	At North Central Street in East Bridgewater	7.6	308	*	421	482	593
Meadow Brook	At Water Street in East Bridgewater	6.9	297	*	407	465	573
Meadow Brook	At Highland Street in East Bridgewater	4	197	*	270	308	380
Meadow Brook	At downstream Whitman corporate limits	3.7	150	*	235	270	480

*Not calculated for this Flood Risk Project

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	0.2% Annual Chance
Meadow Brook Tributary	At confluence with Meadow Brook	1	50	*	85	105	160
Mile Brook	At confluence with Halls Brook	0.6	65	*	85	98	120
Nemasket River	At MBTA Commuter Railroad Bridge	70.1	694	*	1,063	1,256	1,628
Nemasket River	At Murdock Street	69.9	684	*	1,048	1,239	1,605
Nemasket River	At Plymouth Street	67.7	659	*	1,009	1,193	1,544
Nemasket River	At Nemasket Street	66	631	*	966	1,142	1,476
Nemasket River	At Wareham Street	62.1	579	*	886	1,048	1,353
Nemasket River	At Bridge Street	60.3	555	*	848	1,003	1,293
Nemasket River	At Vaughan Street	49.7	434	*	662	784	1,006
Nemasket River	At Assawompset Pond Dam	49.2	427	*	652	772	990
Nemasket River	At culvert at Route 105 and outlet of Long Pond into Assawompset Pond	23.4	224	*	348	414	533
Northern Branch of Ben Mann Brook	At Hingham Street	0.2	*	*	*	110	*
Palmer Mill Brook	At confluence with Winnetuxet River	8.6	250	*	415	505	765
Palmer Mill Brook	Upstream of confluence with Colchester Brook	5.1	165	*	270	330	500
Plymouth River	At the confluence of the Eel River	3.3	150	*	252	307	474

*Not calculated for this Flood Risk Project

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	0.2% Annual Chance
Plymouth River	At the confluence of Penniman Hill Tributary	1.4	81	*	137	168	262
Poor Meadow Brook	At the downstream Hanson corporate limits	14.2	420	*	650	780	1,080
Poor Meadow Brook	Upstream of its confluence with the Shumatuscacant River	2.2	120	*	200	240	330
Rocky Meadow Brook	At the confluence with the Weweantic River	5.9	170	*	255	290	370
Salisbury Brook	At Cross Pond	5.9	325	*	520	610	860
Salisbury Brook	At Newbury Street in Brockton	7.1	370	*	590	690	980
Salisbury Brook	At confluence with Trout Brook	7.7	390	*	630	740	1,040
Salisbury Plain River	At Grove Street in Brockton	14.2	1,180	*	1,730	1,950	2,410
Salisbury Plain River	At Meadow Lane in Brockton	16.4	1,310	*	1,870	2,160	2,660
Salisbury Plain River	At Belmont Street in West Bridgewater	19.8	591	*	809	924	1,139
Salisbury Plain River	At the Conrail bridge in West Bridgewater	19.3	580	*	794	907	1,118
Satucket River (Lower Reach)	At Plymouth Street in East Bridgewater	22.5	924	*	1,264	1,445	1,780
Satucket River (Upper Reach)	At confluence of Black Brook	18.1	806	*	1,103	1,260	1,553

*Not calculated for this Flood Risk Project

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	0.2% Annual Chance
Satucket River (Upper Reach)	At Pond Street in East Bridgewater	1.7	107	*	147	168	207
Satuit Brook	At Stockbridge Road in Scituate	930	410	*	480	620	780
Satuit Brook	At the culvert at the railroad bed in Scituate	185	112	*	130	170	213
Sawmill Brook	At confluence with Taunton River	3.7	172	*	277	332	496
Sawmill Brook	At Bedford Street	2.3	125	*	202	243	366
Second Herring Brook	At the confluence with North River	3.6	180	*	305	370	570
Shinglemill Brook	At the confluence with Unnamed Tributary 5 to Shinglemill Brook	0.6	*	*	*	532	*
Shumatuscacant River	Upstream of Tributary to Shumatuscacant River	6.6	301	*	502	611	935
Shumatuscacant River	Upstream of Hobart Pond	6.1	240	*	410	500	770
Shumatuscacant River	From Abington-Whitman corporate limits to Center Street in Abington	3.45	145	*	230	265	370
Shumatuscacant River	From Center Street to Ralph G. Hamlin, Jr. Boulevard in Abington	2.5	115	*	175	205	280
Shumatuscacant River	From Ralph G. Hamlin, Jr. Boulevard in Abington to the confluence of the North Tributary Shumatuscacant River	2.2	110	*	170	195	255

*Not calculated for this Flood Risk Project

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	0.2% Annual Chance
Shumatuscacant River	From confluence of the North Tributary Shumatuscacant River to Lincoln Street in Abington	1.65	90	*	135	150	200
Shumatuscacant River	From Lincoln Street to Wyman Road in Abington	0.72	45	*	65	70	90
Shumatuscacant River	From Wyman Road to study limits, approximately 2300 ft upstream from Summit Road in Abington	0.44	25	*	35	40	50
Shumatuscacant River - North Tributary	From confluence with Shumatuscacant River to approximately 1,700 feet upstream of Wales Street	0.44	25	*	30	35	45
Shumatuscacant Tributary	At confluence with Shumatuscacant River	1.2	65	*	110	140	220
Smelt Brook	At confluence with Jones River	1.3	89	*	153	188	294
Snows Brook	At South Street in Bridgewater	3.49	175	*	240	274	338
Snows Brook	At Cross Street in Bridgewater	2.16	125	*	172	196	242
Snows Brook	At Forest Street in Bridgewater	1.14	79	*	108	123	152
South Brook	At Hayward Street in Bridgewater	3.13	161	*	221	252	311
South Brook	At Plymouth Street in Bridgewater	3.1	161	*	221	252	311
South Brook	At Water Street (Downstream Crossing in Bridgewater)	3.09	161	*	221	252	311

*Not calculated for this Flood Risk Project

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	0.2% Annual Chance
South Brook	At Conrail Street in Bridgewater	2.08	122	*	167	190	235
South Brook	At Constant Street in Bridgewater	1.65	104	*	142	162	200
South Brook	At Bedford Street (State Route 18) in Bridgewater	1.04	75	*	103	118	145
South Meadow Brook	At the confluence with the Weweantic River	13.8	320	*	470	550	710
South Meadow Brook	At Main Street in Carver	6.3	175	*	265	360	390
Stream River	At confluence with the Shumatuscacant River	1.54	90	*	155	190	275
Taunton River	Plain Street above Threemile River, Taunton	363	4,890	*	7,260	8,420	11,100
Taunton River	County Street/Route 140 above Mill River, Taunton	317	4,230	*	5,940	6,770	8,690
Taunton River	Route 24 above Forge River, Raynham/Taunton	302	4,080	*	5,630	6,380	8,120
Taunton River	South Street, Taunton	293	3,970	*	5,430	6,120	7,750
Taunton River	US Route 44, Taunton	283	3,860	*	5,210	5,850	7,370
Taunton River	Green Street/Plymouth Street, Bridgewater	271	3,740	*	4,990	5,570	6,970
Taunton River	Titicut Street (Taunton River near Bridgewater streamgage 01108000)	262	3,660	*	4,830	5,380	6,690

*Not calculated for this Flood Risk Project

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	0.2% Annual Chance
Taunton River	Auburn Street, Bridgewater	183	2,820	*	4,140	4,780	6,260
Taunton River	Cherry Street, Bridgewater	129	2,280	*	3,590	4,230	5,720
Town Brook	At Water Street	9.02	127	147	162	179	223
Town River	At Hayward Street in Bridgewater	59.9	1,278	*	1,754	2,005	2,470
Town River	At Broad Street in Bridgewater	55	1,206	*	1,651	1,887	2,325
Town River	At Oak Street in Bridgewater	54.9	1,206	*	1,651	1,887	2,325
Town River	At High Street in Bridgewater	54.7	1,202	*	1,645	1,880	2,317
Town River	At the West Bridgewater corporate limit	54.2	1,196	*	1,637	1,870	2,305
Town River	At Main Street in West Bridgewater	50.7	1,142	*	1,563	1,786	2,201
Town River	At South Street in West Bridgewater	50.1	1,131	*	1,548	1,770	2,180
Town River	At Forest Street in West Bridgewater	42.5	1,010	*	1,382	1,579	1,946
Town River	At the old cart path in West Bridgewater	40.4	974	*	1,333	1,523	1,877
Town River	At Scotland Street in West Bridgewater	39.3	956	*	1,308	1,495	1,842
Town River	At State Route 24 in West Bridgewater	39.1	952	*	1,313	1,490	1,835
Tributary A	At confluence of French Stream	0.7	100	*	120	130	150

*Not calculated for this Flood Risk Project

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	0.2% Annual Chance
Tributary A	550 feet downstream of Levin Road in Rockland	0.5	240	*	310	350	415
Tributary A to Sawmill Brook	Above confluence with Sawmill Brook	0.8	63	*	104	126	192
Tributary to Meadow Brook	At East Bridgewater-Whitman corporate limits	0.2	24	*	35	46	57
Trout Brook	At Ames Street in Brockton	3.7	508	*	690	790	880
Trout Brook	At Ashland Street in Brockton	4.9	640	*	870	990	1,110
Trout Brook	At confluence with Salisbury Brook	6.5	790	*	1,100	1,210	1,370
Turkey Hill Brook	At its confluence with the Weir River	1.4	89	*	152	187	292
Unnamed Tributary 2 to Shinglemill Brook	At confluence with Unnamed Tributary 5 to Shinglemill Brook	0.04	*	*	*	57	*
Unnamed Tributary 3 to Shinglemill Brook	At confluence with Shinglemill Brook	0.25	*	*	*	319	*
Unnamed Tributary to Iron Mine Brook	At Hanover Street	0.36	*	*	*	61	*
Unnamed Tributary to Silver Brook	At Silver Street	0.03	*	*	*	22	*

*Not calculated for this Flood Risk Project

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	0.2% Annual Chance
Unnamed Tributary to Third Herring Brook	At Washington Street	0.27	*	*	*	104	*
Weir River	At Foundry Pond outlet in Hingham	13.9	417	*	688	836	1,267
Weir River	At the confluence of Accord Brook	7.5	266	*	442	538	821
Weir River	At the confluence of Tower Brook	6	266	*	377	459	702
West Meadow Brook	At South Elm Street in West Bridgewater	6.2	265	*	363	414	511
West Meadow Brook	At West Center Street in West Bridgewater	5.7	247	*	338	386	476
West Meadow Brook	At Crescent Street in West Bridgewater	5.4	243	*	333	381	469
West Meadow Brook	At dirt road in West Bridgewater	2.1	233	*	319	364	449
West Meadow Brook	At the corporate limit	0.8	69	*	88	101	124
Weweantic River	At the downstream Carver corporate limits	44.6	650	*	1,005	1,160	1,500
Weweantic River	Upstream of the confluence of Crane Brook	32.3	515	*	770	890	1,120
Weweantic River	At the confluence of South Meadow Brook and Rocky Meadow Brook	19.7	405	*	600	700	890

*Not calculated for this Flood Risk Project

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	0.2% Annual Chance
Willow Brook	At East Center Street in West Bridgewater	1.5	97	*	132	151	186
Willow Brook	At the railroad bridge in West Bridgewater	1.3	86	*	118	134	166
Winnetuxet River	At confluence with Taunton River	36.5	865	*	1,415	1,710	2,565
Winnetuxet River	Downstream of River Street bridge in Halifax	30.8	810	*	1,325	1,605	2,420
Winnetuxet River	Downstream of confluence with Palmer Mill Brook	23.8	730	*	1,210	1,465	2,220
Winnetuxet River	Upstream of confluence with Palmer Mill Brook	15.2	485	*	810	980	1,490
Winnetuxet River	At downstream Plympton corporate limits	15.1	485	*	810	980	1,490
Winnetuxet River	6,000 feet downstream of Winnetuxet Road bridge in Plympton	10.9	350	*	580	705	1,075

*Not calculated for this Flood Risk Project

Figure 7: Frequency Discharge-Drainage Area Curves

[Not Applicable to this Flood Risk Project]

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
Assawompset Pond	Entire shoreline in Towns of Lakeville and Middleborough	54.9	*	56.1	56.8	57.8
Area 1	Within the Town of Hanover	*	*	*	77.4	*
Area 2	Within the Town of Hanover	*	*	*	79.8	*
Area 3	Within the Town of Hanover	*	*	*	82.2	*
Area 4	Within the Town of Hanover	*	*	*	82.5	*
Area 5	Within the Town of Hanover	*	*	*	77.7	*
Area 6	Within the Town of Hanover	*	*	*	78.1	*
Area 7	Within the Town of Hanover	*	*	*	78.5	*
Area 8	Within the Town of Hanover	*	*	*	78.2	*
Area 9	Within the Town of Hanover	*	*	*	78.4	*
Billington Sea	Entire shoreline in Town of Plymouth	82.4	82.9	83.3	83.7	85.1
Furnace Pond	Along the entire shoreline in the Town of Pembroke	57.3	*	57.8	58	58.5

*Not calculated for this Flood Risk Project

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
Great Quittacas Pond	Entire shoreline in Towns of Lakeville and Middleborough	54.9	*	56.1	56.8	57.8
Hingham Street Basins	Within the Town of Rockland	*	*	*	140.1	*
Kings Pond	Entire shoreline in Town of Plymouth	118.3	*	120.9	122	124.3
Long Pond	Entire shoreline in Town of Lakeville	55.6	*	56.9	57.2	57.8
Oldham Pond	In Town of Pembroke	58.3	*	58.8	59	59.5
Pocksha Pond	Entire shoreline in Towns of Lakeville and Middleborough	54.9	*	56.1	56.8	57.8
Ponding Area 1	Within the Town of Hanover	*	*	*	80.2	*
Ponding Area 2	Within the Town of Hanover	*	*	*	81.2	*
Ponding Area 3	Within the Town of Hanover	*	*	*	84.2	*
Ponding Area 4	Within the Town of Hanover	*	*	*	86.2	*
Ponding Area 5	Within the Town of Hanover	*	*	*	84.2	*
Ponding Area 6	Within the Town of Hanover	*	*	*	81.2	*
Ponding Area 7	Within the Town of Hanover	*	*	*	77.2	*
Ponding Area 8	Within the Town of Hanover	*	*	*	64.2	*
Ponding Area 9	Within the Town of Hanover	*	*	*	66.2	*
Ponding Area 10	Within the Town of Hanover	*	*	*	74.2	*
Ponding Area 11	Within the Town of Hanover	*	*	*	77.2	*

*Not calculated for this Flood Risk Project

Table 10: Summary of Non-Coastal Stillwater Elevations

		Elevations (feet NAVD88)				
Flooding Source	Location	10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Ponding Area 12	Within the Town of Hanover	*	*	*	77.2	*
Ponding Area 13	Within the Town of Hanover	*	*	*	85.2	*
Ponding Area 14	Within the Town of Hanover	*	*	*	80.2	*

*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
Eel River	01105876	USGS	Eel River at Rt. 3A near Plymouth, MA	14.7	12/19/1969	9/30/2017
Indian Head River	01105730	USGS	Indian Head River at Hanover, MA	30.3	7/8/1966	9/30/2017
Jones River	01105870	USGS	Jones River at Kingston, MA	15.7	8/1/1966	9/30/2017

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
Aaron River and Zone A tributaries	Confluence with Bound Brook	Points of one square mile of drainage area	2017 state regression equations (Zarriello 2017)	HEC-RAS 4.1.0 (Brunner 2010)	5/31/2017	A	Flow-change locations were selected based on 50% change in drainage area. Sub-basin delineation used hydro-conditioned lidar topography (USGS 2011, 2014a). Cross sections were placed at entrances and exits of structures, at flow-change locations, and at significant changes in stream morphology. Overbank geometries were taken from lidar topography; channel geometries were calculated from regional bankfull equations (Bent 2006). Roughness was estimated from drainage area. Starting water-surface elevations were from normal depth using slope of lower end of reach. Ineffective flow was applied where applicable.
Accord Brook	2,100 feet downstream of Prospect Street	Approximately 125 feet upstream of Main Street	Regression equations (Wandle 1977)	HEC-2 (USACE 1974)	7/1/1983	AE w/Floodway	Overbank portions of cross sections and interpolated cross sections were taken from topographic maps (Avis 1979). Structures were field-surveyed. Starting water-surface elevations were from normal depth. Hydraulic model was calibrated to information from local residents and Hingham Flood Plain Maps (Perkins 1975). Recent modifications were taken into account when using historical high-water marks.
Agawam River and Zone A tributaries	Limit of coastal flooding on Agawam River	Points of one square mile of drainage area	Drainage-area-to-discharge ratio from USGS streamgage 01105870 (Jones River at Kingston, MA)	HEC-RAS 4.1.0 (Brunner 2010)	5/31/2017	A	Flow-change locations were selected based on 50% change in drainage area. Sub-basin delineation used hydro-conditioned lidar topography (USGS 2011, 2014a). Cross sections were placed at entrances and exits of structures, at flow-change locations, and at significant changes in stream morphology. Overbank geometries were taken from lidar topography; channel geometries were calculated from regional bankfull equations (Bent 2006). Roughness was estimated from drainage area. Starting water-surface elevations were from normal depth using slope of lower end of reach. Ineffective flow was applied where applicable.

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
Agawam River Tributary A	Confluence with Agawam River	Point of one square mile of drainage area	Drainage-area-to-discharge ratio from USGS streamgage 01105870 (Jones River at Kingston, MA)	HEC-RAS 4.1.0 (Brunner 2010)	5/31/2017	A	Flow-change locations were selected based on 50% change in drainage area. Sub-basin delineation used hydro-conditioned lidar topography (USGS 2011, 2014a). Cross sections were placed at entrances and exits of structures, at flow-change locations, and at significant changes in stream morphology. Overbank geometries were taken from lidar topography; channel geometries were calculated from regional bankfull equations (Bent 2006). Roughness was estimated from drainage area. Starting water-surface elevations were from normal depth using slope of lower end of reach. Ineffective flow was applied where applicable.
Ashley Brook	Confluence with Squam Brook	Point of one square mile of drainage area	2017 state regression equations (Zarriello 2017)	HEC-RAS 4.1.0 (Brunner 2010)	5/31/2017	A	Flow-change locations were selected based on 50% change in drainage area. Sub-basin delineation used hydro-conditioned lidar topography (USGS 2011, 2014a). Cross sections were placed at entrances and exits of structures, at flow-change locations, and at significant changes in stream morphology. Overbank geometries were taken from lidar topography; channel geometries were calculated from regional bankfull equations (Bent 2006). Roughness was estimated from drainage area. Starting water-surface elevations were from normal depth using slope of lower end of reach. Ineffective flow was applied where applicable.
Assawompset Pond	Entire shoreline	Entire shoreline	Regression equations (Zarriello et al. 2012)	HEC-RAS 4.1.0 (Brunner 2010)	7/1/2014	AE	Assawompset and Long Ponds were modeled as a continuous river system with Nemasket River. Regression equations were used to calculate peakflows at the outlet of Long Pond, the outlet of Assawompset Pond, and along Nemasket River to the mouth. Water-surface elevations at Assawompset Pond are controlled by tailwater from Nemasket River.

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
Aucoot Creek	Mouth at Aucoot Cove	Point of one square mile of drainage area	2017 state regression equations (Zarriello 2017)	HEC-RAS 4.1.0 (Brunner 2010)	5/31/2017	A	Flow-change locations were selected based on 50% change in drainage area. Sub-basin delineation used hydro-conditioned lidar topography (USGS 2011, 2014a). Cross sections were placed at entrances and exits of structures, at flow-change locations, and at significant changes in stream morphology. Overbank geometries were taken from lidar topography; channel geometries were calculated from regional bankfull equations (Bent 2006). Roughness was estimated from drainage area. Starting water-surface elevations were from normal depth using slope of lower end of reach. Ineffective flow was applied where applicable.
Bares Brook	Confluence with Hanna Eames Brook	Point of one square mile of drainage area	2017 state regression equations (Zarriello 2017)	HEC-RAS 4.1.0 (Brunner 2010)	5/31/2017	A	Flow-change locations were selected based on 50% change in drainage area. Sub-basin delineation used hydro-conditioned lidar topography (USGS 2011, 2014a). Cross sections were placed at entrances and exits of structures, at flow-change locations, and at significant changes in stream morphology. Overbank geometries were taken from lidar topography; channel geometries were calculated from regional bankfull equations (Bent 2006). Roughness was estimated from drainage area. Starting water-surface elevations were from normal depth using slope of lower end of reach. Ineffective flow was applied where applicable.
Beaver Brook	Elm Street	2,355 feet upstream of Summer Street	Drainage-area ratio	HEC-2 (USACE 1974)	11/1/1977	AE w/Floodway	Discharge estimates from regression equations were unreasonably high. Index used for ratio equation was 01108000 (Taunton River at State Farm). Drainage areas were taken from topographic maps (USGS various). Ratio equation used exponent of 0.7.

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
Beaver Dam Brook	Confluence with Bartlett Pond	Approximately 2,700 feet upstream of State Route 3A	TR-55 (SCS 1974)	HEC-2 (USACE 1974)	6/1/1983	AE w/Floodway	Watershed was divided into sub-basins. For each sub-basin, drainage, time of concentration, travel time, soil characteristics, land use, and runoff curve number were calculated. 24-hour rainfall (USWB 1961) was used. These factors were used to compute runoff (SCS 1976). Hydrographs were prepared from time of concentration and travel time. From runoff, CFSM hydrographs, and drainage area, peakflows for 10- and 1-percent-annual-chance floods were calculated. 2- and 0.2-percent-annual-chance floods were extrapolated. Underwater portions of cross sections were field-surveyed. Overbank portions of cross sections and interpolated cross sections were obtained from topographic maps (Avis 1979). Starting water-surface elevations were from normal depth.
Beaver Dam Brook and Zone A tributaries	Approximately 2,700 feet upstream of State Route 3A on Beaver Dam Brook	Points of one square mile of drainage area	Drainage-area-to-discharge ratio from USGS streamgage 01105870 (Jones River at Kingston, MA)	HEC-RAS 4.1.0 (Brunner 2010)	5/31/2017	A	Flow-change locations were selected based on 50% change in drainage area. Sub-basin delineation used hydro-conditioned lidar topography (USGS 2011, 2014a). Cross sections were placed at entrances and exits of structures, at flow-change locations, and at significant changes in stream morphology. Overbank geometries were taken from lidar topography; channel geometries were calculated from regional bankfull equations (Bent 2006). Roughness was estimated from drainage area. Starting water-surface elevations were from normal depth using slope of lower end of reach. Ineffective flow was applied where applicable.

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
Beaver Dam Brook Tributary A	Confluence with Beaver Dam Brook	Point of one square mile of drainage area	Drainage-area-to-discharge ratio from USGS streamgage 01105870 (Jones River at Kingston, MA)	HEC-RAS 4.1.0 (Brunner 2010)	5/31/2017	A	Flow-change locations were selected based on 50% change in drainage area. Sub-basin delineation used hydro-conditioned lidar topography (USGS 2011, 2014a). Cross sections were placed at entrances and exits of structures, at flow-change locations, and at significant changes in stream morphology. Overbank geometries were taken from lidar topography; channel geometries were calculated from regional bankfull equations (Bent 2006). Roughness was estimated from drainage area. Starting water-surface elevations were from normal depth using slope of lower end of reach. Ineffective flow was applied where applicable.
Benson Brook	Confluence with Sippican River	Point of one square mile of drainage area	2017 state regression equations (Zarriello 2017)	HEC-RAS 4.1.0 (Brunner 2010)	5/31/2017	A	Flow-change locations were selected based on 50% change in drainage area. Sub-basin delineation used hydro-conditioned lidar topography (USGS 2011, 2014a). Cross sections were placed at entrances and exits of structures, at flow-change locations, and at significant changes in stream morphology. Overbank geometries were taken from lidar topography; channel geometries were calculated from regional bankfull equations (Bent 2006). Roughness was estimated from drainage area. Starting water-surface elevations were from normal depth using slope of lower end of reach. Ineffective flow was applied where applicable.
Billington Sea	Entire shoreline	Entire shoreline	Maintenance of Variance Extension, type 1	HEC-RAS 5.0	2/1/2017	AE	BFE taken from upstream end of Town Brook (Plymouth)

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
Billington Sea Zone A tributaries	Mouths at Billington Sea	Points of one square mile of drainage area	Drainage-area-to-discharge ratio from USGS streamgage 01105870 (Jones River at Kingston, MA)	HEC-RAS 4.1.0 (Brunner 2010)	5/31/2017	A	Flow-change locations were selected based on 50% change in drainage area. Sub-basin delineation used hydro-conditioned lidar topography (USGS 2011, 2014a). Cross sections were placed at entrances and exits of structures, at flow-change locations, and at significant changes in stream morphology. Overbank geometries were taken from lidar topography; channel geometries were calculated from regional bankfull equations (Bent 2006). Roughness was estimated from drainage area. Starting water-surface elevations were from normal depth using slope of lower end of reach. Ineffective flow was applied where applicable.
Black Betty Brook	Confluence with West Meadow Brook	Approximately 4,600 feet upstream of confluence with West Meadow Brook	Drainage-area ratio	HEC-2 (USACE 1974)	3/1/1979	AE w/Floodway	Discharge estimates from regression equations were unreasonably high. Index used for ratio equation was 01108000 (Taunton River at State Farm). Drainage areas were taken from topographic maps (USGS various). Ratio equation used exponent of 0.7.
Black Brook	500 feet downstream of Central Street	Approximately 1,200 feet upstream of Central Street	Drainage-area ratio	HEC-2 (USACE 1974)	11/1/1977	AE w/Floodway	Discharge estimates from regression equations were unreasonably high. Index used for ratio equation was 01108000 (Taunton River at State Farm). Drainage areas were taken from topographic maps (USGS various). Ratio equation used exponent of 0.7.

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
Black Pond Brook	Approximately 4,270 feet upstream of Central Street	Point of one square mile of drainage area	2017 state regression equations (Zarriello 2017)	HEC-RAS 4.1.0 (Brunner 2010)	5/31/2017	A	Flow-change locations were selected based on 50% change in drainage area. Sub-basin delineation used hydro-conditioned lidar topography (USGS 2011, 2014a). Cross sections were placed at entrances and exits of structures, at flow-change locations, and at significant changes in stream morphology. Overbank geometries were taken from lidar topography; channel geometries were calculated from regional bankfull equations (Bent 2006). Roughness was estimated from drainage area. Starting water-surface elevations were from normal depth using slope of lower end of reach. Ineffective flow was applied where applicable.
Black Pond Brook	Confluence with Second Herring Brook	Approximately 4,270 feet upstream of Central Street	Log-Pearson type III flood frequency analysis, drainage-area ratio, and regression equations (Wandle 1977)	HEC-2 (USACE 1974)	7/1/1980	AE w/Floodway	Log-Pearson type III analysis was performed on USGS streamgage 01105870 (Jones River in Kingston). Drainage-area ratios were used to transpose results to study reach. Final peakflows were average of transposed LPIII results and results from regression equations. Cross section data were obtained from field survey and photogrammetric maps (Moore 1974). Starting water-surface elevations were from Second Herring Brook profiles assuming coincident peaks.

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
Bluefish River Tributary A	Limit of coastal flooding	Point of one square mile of drainage area	2017 state regression equations (Zarriello 2017)	HEC-RAS 4.1.0 (Brunner 2010)	5/31/2017	A	Flow-change locations were selected based on 50% change in drainage area. Sub-basin delineation used hydro-conditioned lidar topography (USGS 2011, 2014a). Cross sections were placed at entrances and exits of structures, at flow-change locations, and at significant changes in stream morphology. Overbank geometries were taken from lidar topography; channel geometries were calculated from regional bankfull equations (Bent 2006). Roughness was estimated from drainage area. Starting water-surface elevations were from normal depth using slope of lower end of reach. Ineffective flow was applied where applicable.
Bound Brook	Mordecai Lincoln Road	Scituate corporate limits	Rational method	HEC-2 (USACE 1974)	8/1/1983	AE w/Floodway	Rational Method computation used assumed hydrograph distributions. Water-surface elevations at road crossings were calculated using the Francis Formula with adopted “C” values for roads and weirs being 3.09 and 3.33, respectively. Starting water-surface elevations were from normal depth.

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
Branch of Eel River	Confluence with Eel River	Approximately 115 feet upstream of Old Sandwich Road	TR-55 (SCS 1974)	HEC-2 (USACE 1974)	6/1/1983	AE w/Floodway	Watershed was divided into sub-basins. For each sub-basin, drainage, time of concentration, travel time, soil characteristics, land use, and runoff curve number were calculated. 24-hour rainfall (USWB 1961) was used. These factors were used to compute runoff (SCS 1976). Hydrographs were prepared from time of concentration and travel time. From runoff, CFSM hydrographs, and drainage area, peakflows for 10- and 1-percent-annual-chance floods were calculated. 2- and 0.2-percent-annual-chance floods were extrapolated. Underwater portions of cross sections were field-surveyed. Overbank portions of cross sections and interpolated cross sections were obtained from topographic maps (Avis 1979). Starting water-surface elevations were from normal depth.
Branch of Eel River and Zone A tributaries	Old Sandwich Road	Points of one square mile of drainage area	Drainage-area-to-discharge ratio from USGS streamgage 01105870 (Jones River at Kingston, MA)	HEC-RAS 4.1.0 (Brunner 2010)	5/31/2017	A	Flow-change locations were selected based on 50% change in drainage area. Sub-basin delineation used hydro-conditioned lidar topography (USGS 2011, 2014a). Cross sections were placed at entrances and exits of structures, at flow-change locations, and at significant changes in stream morphology. Overbank geometries were taken from lidar topography; channel geometries were calculated from regional bankfull equations (Bent 2006). Roughness was estimated from drainage area. Starting water-surface elevations were from normal depth using slope of lower end of reach. Ineffective flow was applied where applicable.

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
Branch of Eel River Tributary A	Confluence with Branch of Eel River	Point of one square mile of drainage area	Drainage-area-to-discharge ratio from USGS streamgage 01105870 (Jones River at Kingston, MA)	HEC-RAS 4.1.0 (Brunner 2010)	5/31/2017	A	Flow-change locations were selected based on 50% change in drainage area. Sub-basin delineation used hydro-conditioned lidar topography (USGS 2011, 2014a). Cross sections were placed at entrances and exits of structures, at flow-change locations, and at significant changes in stream morphology. Overbank geometries were taken from lidar topography; channel geometries were calculated from regional bankfull equations (Bent 2006). Roughness was estimated from drainage area. Starting water-surface elevations were from normal depth using slope of lower end of reach. Ineffective flow was applied where applicable.
Coastal Tributary A and Zone A tributaries	Mouth at Plymouth Harbor	Points of one square mile of drainage area	Drainage-area-to-discharge ratio from USGS streamgage 01105870 (Jones River at Kingston, MA)	HEC-RAS 4.1.0 (Brunner 2010)	5/31/2017	A	Flow-change locations were selected based on 50% change in drainage area. Sub-basin delineation used hydro-conditioned lidar topography (USGS 2011, 2014a). Cross sections were placed at entrances and exits of structures, at flow-change locations, and at significant changes in stream morphology. Overbank geometries were taken from lidar topography; channel geometries were calculated from regional bankfull equations (Bent 2006). Roughness was estimated from drainage area. Starting water-surface elevations were from normal depth using slope of lower end of reach. Ineffective flow was applied where applicable.

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
Coastal Tributary C	Mouth at Plymouth Harbor	Point of one square mile of drainage area	Drainage-area-to-discharge ratio from USGS streamgage 01105870 (Jones River at Kingston, MA)	HEC-RAS 4.1.0 (Brunner 2010)	5/31/2017	A	Flow-change locations were selected based on 50% change in drainage area. Sub-basin delineation used hydro-conditioned lidar topography (USGS 2011, 2014a). Cross sections were placed at entrances and exits of structures, at flow-change locations, and at significant changes in stream morphology. Overbank geometries were taken from lidar topography; channel geometries were calculated from regional bankfull equations (Bent 2006). Roughness was estimated from drainage area. Starting water-surface elevations were from normal depth using slope of lower end of reach. Ineffective flow was applied where applicable.
Coastal Tributary D	Mouth at Cape Cod Bay	Point of one square mile of drainage area	Drainage-area-to-discharge ratio from USGS streamgage 01105870 (Jones River at Kingston, MA)	HEC-RAS 4.1.0 (Brunner 2010)	5/31/2017	A	Flow-change locations were selected based on 50% change in drainage area. Sub-basin delineation used hydro-conditioned lidar topography (USGS 2011, 2014a). Cross sections were placed at entrances and exits of structures, at flow-change locations, and at significant changes in stream morphology. Overbank geometries were taken from lidar topography; channel geometries were calculated from regional bankfull equations (Bent 2006). Roughness was estimated from drainage area. Starting water-surface elevations were from normal depth using slope of lower end of reach. Ineffective flow was applied where applicable.

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
Coastal Tributary E	Mouth at Cape Cod Bay	Point of one square mile of drainage area	Drainage-area-to-discharge ratio from USGS streamgage 01105870 (Jones River at Kingston, MA)	HEC-RAS 4.1.0 (Brunner 2010)	5/31/2017	A	Flow-change locations were selected based on 50% change in drainage area. Sub-basin delineation used hydro-conditioned lidar topography (USGS 2011, 2014a). Cross sections were placed at entrances and exits of structures, at flow-change locations, and at significant changes in stream morphology. Overbank geometries were taken from lidar topography; channel geometries were calculated from regional bankfull equations (Bent 2006). Roughness was estimated from drainage area. Starting water-surface elevations were from normal depth using slope of lower end of reach. Ineffective flow was applied where applicable.
Coastal Tributary F	Mouth at Buttermilk Bay	Point of one square mile of drainage area	Drainage-area-to-discharge ratio from USGS streamgage 01105870 (Jones River at Kingston, MA)	HEC-RAS 4.1.0 (Brunner 2010)	5/31/2017	A	Flow-change locations were selected based on 50% change in drainage area. Sub-basin delineation used hydro-conditioned lidar topography (USGS 2011, 2014a). Cross sections were placed at entrances and exits of structures, at flow-change locations, and at significant changes in stream morphology. Overbank geometries were taken from lidar topography; channel geometries were calculated from regional bankfull equations (Bent 2006). Roughness was estimated from drainage area. Starting water-surface elevations were from normal depth using slope of lower end of reach. Ineffective flow was applied where applicable.

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
Coastal Tributary G	Mouth at Buttermilk Bay	Point of one square mile of drainage area	Drainage-area-to-discharge ratio from USGS streamgage 01105870 (Jones River at Kingston, MA)	HEC-RAS 4.1.0 (Brunner 2010)	5/31/2017	A	Flow-change locations were selected based on 50% change in drainage area. Sub-basin delineation used hydro-conditioned lidar topography (USGS 2011, 2014a). Cross sections were placed at entrances and exits of structures, at flow-change locations, and at significant changes in stream morphology. Overbank geometries were taken from lidar topography; channel geometries were calculated from regional bankfull equations (Bent 2006). Roughness was estimated from drainage area. Starting water-surface elevations were from normal depth using slope of lower end of reach. Ineffective flow was applied where applicable.
Coastal Tributary H	Mouth at Mattapoisett Harbor	Point of one square mile of drainage area	2017 state regression equations (Zarriello 2017)	HEC-RAS 4.1.0 (Brunner 2010)	5/31/2017	A	Flow-change locations were selected based on 50% change in drainage area. Sub-basin delineation used hydro-conditioned lidar topography (USGS 2011, 2014a). Cross sections were placed at entrances and exits of structures, at flow-change locations, and at significant changes in stream morphology. Overbank geometries were taken from lidar topography; channel geometries were calculated from regional bankfull equations (Bent 2006). Roughness was estimated from drainage area. Starting water-surface elevations were from normal depth using slope of lower end of reach. Ineffective flow was applied where applicable.

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
Coastal Tributary I	Mouth at Mattapoisett Harbor	Point of one square mile of drainage area	2017 state regression equations (Zarriello 2017)	HEC-RAS 4.1.0 (Brunner 2010)	5/31/2017	A	Flow-change locations were selected based on 50% change in drainage area. Sub-basin delineation used hydro-conditioned lidar topography (USGS 2011, 2014a). Cross sections were placed at entrances and exits of structures, at flow-change locations, and at significant changes in stream morphology. Overbank geometries were taken from lidar topography; channel geometries were calculated from regional bankfull equations (Bent 2006). Roughness was estimated from drainage area. Starting water-surface elevations were from normal depth using slope of lower end of reach. Ineffective flow was applied where applicable.
Coastal Tributary J	Mouth at Eel Pond	Point of one square mile of drainage area	2017 state regression equations (Zarriello 2017)	HEC-RAS 4.1.0 (Brunner 2010)	5/31/2017	A	Flow-change locations were selected based on 50% change in drainage area. Sub-basin delineation used hydro-conditioned lidar topography (USGS 2011, 2014a). Cross sections were placed at entrances and exits of structures, at flow-change locations, and at significant changes in stream morphology. Overbank geometries were taken from lidar topography; channel geometries were calculated from regional bankfull equations (Bent 2006). Roughness was estimated from drainage area. Starting water-surface elevations were from normal depth using slope of lower end of reach. Ineffective flow was applied where applicable.

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
Crane Brook	Confluence with Weweantic River	18,140 feet upstream of Cranberry Road	Drainage-area-CFSM curve	HEC-2 (USACE 1974)	7/1/1980	AE w/Floodway	Log-Pearson type III flood frequency analysis was performed on all streamgages in vicinity. All results were plotted for drainage area versus CSFM. Envelope curves were drawn around plotted data. Final curve selected by engineering judgment was on the low side of plotted data since characteristics of study reach are different than those of gages used to develop curve. Starting water-surface elevations were from Weweantic River profiles.
Crooked Meadow River	Free Street	Cushing Pond Dam	Regression equations (Wandle 1977)	HEC-2 (USACE 1974)	7/1/1983	AE w/Floodway	Overbank portions of cross sections and interpolated cross sections were taken from topographic maps (Avis 1979). Structures were field-surveyed. Starting water-surface elevations were from hydraulic analysis of Foundry Pond Dam. Hydraulic model was calibrated to information from local residents and Hingham Flood Plain Maps (Perkins 1975). Recent modifications were taken into account when using historical high-water marks.
Cushing Brook and Zone A tributaries	Confluence of Cushing Brook with Longwater Brook	Points of one square mile of drainage area	2017 state regression equations (Zarriello 2017)	HEC-RAS 4.1.0 (Brunner 2010)	5/31/2017	A	Flow-change locations were selected based on 50% change in drainage area. Sub-basin delineation used hydro-conditioned lidar topography (USGS 2011, 2014a). Cross sections were placed at entrances and exits of structures, at flow-change locations, and at significant changes in stream morphology. Overbank geometries were taken from lidar topography; channel geometries were calculated from regional bankfull equations (Bent 2006). Roughness was estimated from drainage area. Starting water-surface elevations were from normal depth using slope of lower end of reach. Ineffective flow was applied where applicable.

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
Doggett Brook and Zone A tributaries	Confluence of Doggett Brook with Sippican River	Points of one square mile of drainage area	2017 state regression equations (Zarriello 2017)	HEC-RAS 4.1.0 (Brunner 2010)	5/31/2017	A	Flow-change locations were selected based on 50% change in drainage area. Sub-basin delineation used hydro-conditioned lidar topography (USGS 2011, 2014a). Cross sections were placed at entrances and exits of structures, at flow-change locations, and at significant changes in stream morphology. Overbank geometries were taken from lidar topography; channel geometries were calculated from regional bankfull equations (Bent 2006). Roughness was estimated from drainage area. Starting water-surface elevations were from normal depth using slope of lower end of reach. Ineffective flow was applied where applicable.
Drinkwater River	Confluence with Longwater Brook	Point of one square mile of drainage area	2017 state regression equations (Zarriello 2017)	HEC-RAS 4.1.0 (Brunner 2010)	5/31/2017	A	Flow-change locations were selected based on 50% change in drainage area. Sub-basin delineation used hydro-conditioned lidar topography (USGS 2011, 2014a). Cross sections were placed at entrances and exits of structures, at flow-change locations, and at significant changes in stream morphology. Overbank geometries were taken from lidar topography; channel geometries were calculated from regional bankfull equations (Bent 2006). Roughness was estimated from drainage area. Starting water-surface elevations were from normal depth using slope of lower end of reach. Ineffective flow was applied where applicable.

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
Drinkwater River	Confluence with Indian Head River	Confluence with Longwater Brook	Log-Pearson type III flood frequency analysis (WRC 1977) and regression equations (Wandle 1977)	HEC-2 (USACE 1974)	7/1/1980	AE w/Floodway	The upstream portion of the reach used the regression equations; the downstream portion used the average of log-Pearson type III analysis on USGS streamgage 01105730 (Indian Head River in Hanover) and regression equations. Starting water-surface elevations were from generalized weir flow equation (Chow 1959) for Factory Pond.
Drinkwater River Tributary	Confluence with Drinkwater River	Divergence from Drinkwater River	Log-Pearson type III flood frequency analysis (WRC 1977) and regression equations (Wandle 1977)	HEC-2 (USACE 1974)	7/1/1980	AE w/Floodway	Peakflows were calculated as the average of log-Pearson type III analysis on USGS streamgage 01105730 (Indian Head River in Hanover) and regression equations.
Drinkwater River Tributary A and Zone A tributaries	Confluence of Drinkwater River Tributary A with Drinkwater River	Points of one square mile of drainage area	2017 state regression equations (Zarriello 2017)	HEC-RAS 4.1.0 (Brunner 2010)	5/31/2017	A	Flow-change locations were selected based on 50% change in drainage area. Sub-basin delineation used hydro-conditioned lidar topography (USGS 2011, 2014a). Cross sections were placed at entrances and exits of structures, at flow-change locations, and at significant changes in stream morphology. Overbank geometries were taken from lidar topography; channel geometries were calculated from regional bankfull equations (Bent 2006). Roughness was estimated from drainage area. Starting water-surface elevations were from normal depth using slope of lower end of reach. Ineffective flow was applied where applicable.

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
Eel River (Hingham)	Confluence with Plymouth River	Approximately 650 feet upstream of Brewster Road	Regression equations (Wandle 1977)	HEC-2 (USACE 1974)	7/1/1983	AE w/Floodway	Overbank portions of cross sections and interpolated cross sections were taken from topographic maps (Avis 1979). Structures were field-surveyed. Starting water-surface elevations were from Plymouth River profiles assuming coincident peaks. Hydraulic model was calibrated to information from local residents and Hingham Flood Plain Maps (Perkins 1975). Recent modifications were taken into account when using historical high-water marks.
Eel River (Plymouth)	360 feet upstream of Old Sandwich Road	Approximately 60 feet upstream of dam at Russell Mill Pond	TR-55 (SCS 1974)	HEC-2 (USACE 1974)	6/1/1983	AE w/Floodway	Watershed was divided into sub-basins. For each sub-basin, drainage, time of concentration, travel time, soil characteristics, land use, and runoff curve number were calculated. 24-hour rainfall (USWB 1961) was used. These factors were used to compute runoff (SCS 1976). Hydrographs were prepared from time of concentration and travel time. From runoff, CFSM hydrographs, and drainage area, peakflows for 10- and 1-percent-annual-chance floods were calculated. 2- and 0.2-percent-annual-chance floods were extrapolated. Underwater portions of cross sections were field-surveyed. Overbank portions of cross sections and interpolated cross sections were obtained from topographic maps (Avis 1979). Starting water-surface elevations were from normal depth.

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
Eel River and Zone A tributaries	Outlet of Russell Millpond	Points of one square mile of drainage area	Drainage-area-to-discharge ratio from USGS streamgage 01105870 (Jones River at Kingston, MA)	HEC-RAS 4.1.0 (Brunner 2010)	5/31/2017	A	Flow-change locations were selected based on 50% change in drainage area. Sub-basin delineation used hydro-conditioned lidar topography (USGS 2011, 2014a). Cross sections were placed at entrances and exits of structures, at flow-change locations, and at significant changes in stream morphology. Overbank geometries were taken from lidar topography; channel geometries were calculated from regional bankfull equations (Bent 2006). Roughness was estimated from drainage area. Starting water-surface elevations were from normal depth using slope of lower end of reach. Ineffective flow was applied where applicable.
First Herring Brook	Scituate corporate limits	Point of one square mile of drainage area	2017 state regression equations (Zarriello 2017)	HEC-RAS 4.1.0 (Brunner 2010)	5/31/2017	A	Flow-change locations were selected based on 50% change in drainage area. Sub-basin delineation used hydro-conditioned lidar topography (USGS 2011, 2014a). Cross sections were placed at entrances and exits of structures, at flow-change locations, and at significant changes in stream morphology. Overbank geometries were taken from lidar topography; channel geometries were calculated from regional bankfull equations (Bent 2006). Roughness was estimated from drainage area. Starting water-surface elevations were from normal depth using slope of lower end of reach. Ineffective flow was applied where applicable.
First Herring Brook	The Driftway	Scituate corporate limits	Rational method	HEC-2 (USACE 1974)	8/1/1983	AE w/Floodway	Rational Method computation used assumed hydrograph distributions. Water-surface elevations at road crossings were calculated using the Francis Formula with adopted "C" values for roads and weirs being 3.09 and 3.33, respectively. Starting water-surface elevations were from normal depth.

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
First Herring Brook Tributary A	Confluence with First Herring Brook	Point of one square mile of drainage area	2017 state regression equations (Zarriello 2017)	HEC-RAS 4.1.0 (Brunner 2010)	5/31/2017	A	Flow-change locations were selected based on 50% change in drainage area. Sub-basin delineation used hydro-conditioned lidar topography (USGS 2011, 2014a). Cross sections were placed at entrances and exits of structures, at flow-change locations, and at significant changes in stream morphology. Overbank geometries were taken from lidar topography; channel geometries were calculated from regional bankfull equations (Bent 2006). Roughness was estimated from drainage area. Starting water-surface elevations were from normal depth using slope of lower end of reach. Ineffective flow was applied where applicable.
French Stream	Confluence with Drinkwater River	Approximately 2,760 feet upstream of North Avenue	Log-Pearson type III flood frequency analysis (WRC 1977) and regression equations (Wandle 1977)	HEC-2 (USACE 1974)	3/1/1980	AE w/Floodway	Peakflows were calculated as the average of log-Pearson type III analysis on USGS streamgage 01105730 (Indian Head River in Hanover) and regression equations. Starting water-surface elevations for lower reach were from Drinkwater River profiles. Starting water-surface elevations for upper reach were from lower reach profiles.

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
French Stream Zone A tributaries	Confluences with French Stream	Points of one square mile of drainage area	2017 state regression equations (Zarriello 2017)	HEC-RAS 4.1.0 (Brunner 2010)	5/31/2017	A	Flow-change locations were selected based on 50% change in drainage area. Sub-basin delineation used hydro-conditioned lidar topography (USGS 2011, 2014a). Cross sections were placed at entrances and exits of structures, at flow-change locations, and at significant changes in stream morphology. Overbank geometries were taken from lidar topography; channel geometries were calculated from regional bankfull equations (Bent 2006). Roughness was estimated from drainage area. Starting water-surface elevations were from normal depth using slope of lower end of reach. Ineffective flow was applied where applicable.
Furnace Brook No. 2	Confluence with Jones River	Point of one square mile of drainage area	2017 state regression equations (Zarriello 2017)	HEC-RAS 4.1.0 (Brunner 2010)	5/31/2017	A	Flow-change locations were selected based on 50% change in drainage area. Sub-basin delineation used hydro-conditioned lidar topography (USGS 2011, 2014a). Cross sections were placed at entrances and exits of structures, at flow-change locations, and at significant changes in stream morphology. Overbank geometries were taken from lidar topography; channel geometries were calculated from regional bankfull equations (Bent 2006). Roughness was estimated from drainage area. Starting water-surface elevations were from normal depth using slope of lower end of reach. Ineffective flow was applied where applicable.
Furnace Pond	Entire shoreline	Entire shoreline	Reservoir routing	unknown	1/1/1978	AE	10-, 2-, and 1-percent-annual-chance peakflows into Oldham and Furnace Ponds (CDM 1964) were routed through the ponds. 0.2-percent-annual-chance peakflows were extrapolated.
Great Quittacas Pond	Entire shoreline	Entire shoreline	Regression equations (Zarriello et al. 2012)	HEC-RAS 4.1.0 (Brunner 2010)	7/1/2014	AE	Great Quittacas Pond was not directly modeled. Elevations were taken from adjacent Pocksha Pond given information on the hydraulic connectivity between the two waterbodies.

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
Green Harbor Brook and Zone A tributaries	Limit of coastal flooding on Green Harbor Brook	Points of one square mile of drainage area	2017 state regression equations (Zarriello 2017)	HEC-RAS 4.1.0 (Brunner 2010)	5/31/2017	A	Flow-change locations were selected based on 50% change in drainage area. Sub-basin delineation used hydro-conditioned lidar topography (USGS 2011, 2014a). Cross sections were placed at entrances and exits of structures, at flow-change locations, and at significant changes in stream morphology. Overbank geometries were taken from lidar topography; channel geometries were calculated from regional bankfull equations (Bent 2006). Roughness was estimated from drainage area. Starting water-surface elevations were from normal depth using slope of lower end of reach. Ineffective flow was applied where applicable.
Halls Brook	Approximately 645 feet upstream of Winter Street	Point of one square mile of drainage area	2017 state regression equations (Zarriello 2017)	HEC-RAS 4.1.0 (Brunner 2010)	5/31/2017	A	Flow-change locations were selected based on 50% change in drainage area. Sub-basin delineation used hydro-conditioned lidar topography (USGS 2011, 2014a). Cross sections were placed at entrances and exits of structures, at flow-change locations, and at significant changes in stream morphology. Overbank geometries were taken from lidar topography; channel geometries were calculated from regional bankfull equations (Bent 2006). Roughness was estimated from drainage area. Starting water-surface elevations were from normal depth using slope of lower end of reach. Ineffective flow was applied where applicable.
Halls Brook	200 feet downstream of Maple Street	Approximately 645 feet upstream of Winter Street	HEC-1 (USACE 1973)	HEC-2 (USACE 1974)	5/1/1983	AE w/Floodway	HEC-1 model was calibrated to March 1968 flood, slightly greater than a 10-percent-annual-chance event at USGS streamgage 01105870. Rainfall hydrographs were from USWB (1961). Starting water-surface elevations were from the slope-area method.

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
Hanna Eames Brook	Damons Point Road	Approximately 1,030 feet upstream of New Main Street	Rational method	HEC-2 (USACE 1974)	6/1/1983	AE w/Floodway	Hydrograph distributions were assumed in specific areas. Rainfall was from USWB (1961).
Harlow Brook No. 2 and Zone A tributaries	Confluence of Harlow Brook No. 2 with Wankinco River	Points of one square mile of drainage area	Drainage-area-to-discharge ratio from USGS streamgage 01105870 (Jones River at Kingston, MA)	HEC-RAS 4.1.0 (Brunner 2010)	5/31/2017	A	Flow-change locations were selected based on 50% change in drainage area. Sub-basin delineation used hydro-conditioned lidar topography (USGS 2011, 2014a). Cross sections were placed at entrances and exits of structures, at flow-change locations, and at significant changes in stream morphology. Overbank geometries were taken from lidar topography; channel geometries were calculated from regional bankfull equations (Bent 2006). Roughness was estimated from drainage area. Starting water-surface elevations were from normal depth using slope of lower end of reach. Ineffective flow was applied where applicable.
Herring Brook	Furnace Pond	Point of one square mile of drainage area	2017 state regression equations (Zarriello 2017)	HEC-RAS 4.1.0 (Brunner 2010)	5/31/2017	A	Flow-change locations were selected based on 50% change in drainage area. Sub-basin delineation used hydro-conditioned lidar topography (USGS 2011, 2014a). Cross sections were placed at entrances and exits of structures, at flow-change locations, and at significant changes in stream morphology. Overbank geometries were taken from lidar topography; channel geometries were calculated from regional bankfull equations (Bent 2006). Roughness was estimated from drainage area. Starting water-surface elevations were from normal depth using slope of lower end of reach. Ineffective flow was applied where applicable.

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
Herring Brook	Confluence with North River	Furnace Pond	Hydrograph routing (SCS 1972)	HEC-2 (USACE 1974)	1/1/1978	AE w/Floodway	Hydrograph was developed for Herring Brook excluding Furnace Pond outflow. Flows were routed downstream to confluence. 10-, 2-, and 1-percent-annual-chance peakflows into Oldham and Furnace Ponds (CDM 1964) were routed through the ponds. 0.2-percent-annual-chance peakflows were extrapolated. Final Herring Brook peakflows were sum of two methods. Cross sections were field-surveyed.
Herring River	Confluence with Cape Cod Canal	Point of one square mile of drainage area	Drainage-area-to-discharge ratio from USGS streamgage 01105870 (Jones River at Kingston, MA)	HEC-RAS 4.1.0 (Brunner 2010)	5/31/2017	A	Flow-change locations were selected based on 50% change in drainage area. Sub-basin delineation used hydro-conditioned lidar topography (USGS 2011, 2014a). Cross sections were placed at entrances and exits of structures, at flow-change locations, and at significant changes in stream morphology. Overbank geometries were taken from lidar topography; channel geometries were calculated from regional bankfull equations (Bent 2006). Roughness was estimated from drainage area. Starting water-surface elevations were from normal depth using slope of lower end of reach. Ineffective flow was applied where applicable.
Hockomock River	Confluence with Nippenicket Tributary	Approximately 900 feet upstream of abandoned railroad	Drainage-area ratio	HEC-2 (USACE 1974)	3/1/1979	AE w/Floodway	Discharge estimates from regression equations were unreasonably high. Index used for ratio equation was 01108000 (Taunton River at State Farm). Drainage areas were taken from topographic maps (USGS various). Ratio equation used exponent of 0.7.

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
Indian Brook	50 feet downstream of Seaview Drive	State Route 3A	TR-55 (SCS 1974)	HEC-2 (USACE 1974)	6/1/1983	AE w/Floodway	Watershed was divided into sub-basins. For each sub-basin, drainage, time of concentration, travel time, soil characteristics, land use, and runoff curve number were calculated. 24-hour rainfall (USWB 1961) was used. These factors were used to compute runoff (SCS 1976). Hydrographs were prepared from time of concentration and travel time. From runoff, CFSM hydrographs, and drainage area, peakflows for 10- and 1-percent-annual-chance floods were calculated. 2- and 0.2-percent-annual-chance floods were extrapolated. Underwater portions of cross sections were field-surveyed. Overbank portions of cross sections and interpolated cross sections were obtained from topographic maps (Avis 1979). Starting water-surface elevations were from normal depth.
Indian Brook and Zone A tributaries	State Route 3A	Points of one square mile of drainage area	Drainage-area-to-discharge ratio from USGS streamgage 01105870 (Jones River at Kingston, MA)	HEC-RAS 4.1.0 (Brunner 2010)	5/31/2017	A	Flow-change locations were selected based on 50% change in drainage area. Sub-basin delineation used hydro-conditioned lidar topography (USGS 2011, 2014a). Cross sections were placed at entrances and exits of structures, at flow-change locations, and at significant changes in stream morphology. Overbank geometries were taken from lidar topography; channel geometries were calculated from regional bankfull equations (Bent 2006). Roughness was estimated from drainage area. Starting water-surface elevations were from normal depth using slope of lower end of reach. Ineffective flow was applied where applicable.