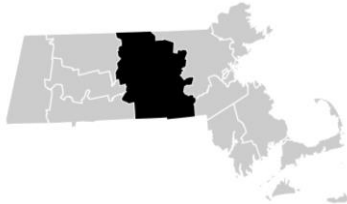


FLOOD INSURANCE STUDY

FEDERAL EMERGENCY MANAGEMENT AGENCY

VOLUME 1 OF 7



WORCESTER COUNTY, MASSACHUSETTS (ALL JURISDICTIONS)

COMMUNITY NAME	NUMBER	COMMUNITY NAME	NUMBER
ASHBURNHAM, TOWN OF*	250290	NEW BRAINTREE, TOWN OF*	250320
ATHOL, TOWN OF*	250291	NORTHBOROUGH, TOWN OF	250321
AUBURN, TOWN OF	250292	NORTHBRIDGE, TOWN OF	250322
BARRE, TOWN OF*	250293	NORTH BROOKFIELD, TOWN OF*	250323
BERLIN, TOWN OF	250294	OAKHAM, TOWN OF*	250324
BLACKSTONE, TOWN OF	250295	OXFORD, TOWN OF	250325
BOLTON, TOWN OF	250296	PAXTON, TOWN OF	250326
BOYLSTON, TOWN OF	250297	PETERSHAM, TOWN OF*	250327
BROOKFIELD, TOWN OF*	250298	PHILLIPSTON, TOWN OF*	250328
CHARLTON, TOWN OF	250299	PRINCETON, TOWN OF*	250329
CLINTON, TOWN OF	250300	ROYALSTON, TOWN OF*	250330
DOUGLAS, TOWN OF	250301	RUTLAND, TOWN OF*	250331
DUDLEY, TOWN OF	250302	SHREWSBURY, TOWN OF	250332
EAST BROOKFIELD, TOWN OF*	250303	SOUTHBOROUGH, TOWN OF	250333
FITCHBURG, CITY OF*	250304	SOUTHBRIDGE, TOWN OF	250334
GARDNER, CITY OF*	250305	SPENCER, TOWN OF	250335
GRAFTON, TOWN OF	250306	STERLING, TOWN OF*	250336
HARDWICK, TOWN OF*	250307	STURBRIDGE, TOWN OF	250337
HARVARD, TOWN OF	250308	SUTTON, TOWN OF	250338
HOLDEN, TOWN OF*	250309	TEMPLETON, TOWN OF*	250339
HOPEDALE, TOWN OF	250310	UPTON, TOWN OF	250340
HUBBARDSTON, TOWN OF*	250311	UXBRIDGE, TOWN OF	250341
LANCASTER, TOWN OF	250312	WARREN, TOWN OF*	250342
LEICESTER, TOWN OF	250313	WEBSTER, TOWN OF	250343
LEOMINSTER, CITY OF*	250314	WESTBOROUGH, TOWN OF	250344
LUNENBURG, TOWN OF*	250315	WEST BOYLSTON, TOWN OF	250345
MENDON, TOWN OF	250316	WEST BROOKFIELD, TOWN OF*	250346
MILFORD, TOWN OF	250317	WESTMINSTER, TOWN OF*	250347
MILLBURY, TOWN OF	250318	WINCHENDON, TOWN OF*	250348
MILLVILLE, TOWN OF	250319	WORCESTER, CITY OF	250349

*Community is not included in this partial countywide Flood Insurance Study and will retain its existing, separately published FIS and/or FIRM

REVISED: PRELIMINARY

[TBD]

07/17/2020

FLOOD INSURANCE STUDY NUMBER

25027CV001C

Version Number 2.6.3.6



FEMA

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Flood Insurance Rate Map (FIRM)

FLOOD INSURANCE STUDY REPORT WORCESTER COUNTY, MASSACHUSETTS (PARTIAL COUNTYWIDE)

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 Worcester 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)	If Not Included, Location of Flood Hazard Data
Ashburnham, Town of*	250290	01070004, 01070006, 01080202	N/A	Town of Ashburnham FIS Report, 12/15/1983
Athol, Town of*	250291	01080202, 01080204	N/A	Town of Athol FIS Report, 01/19/1982

* Community is not included in this partial countywide FIS Report

Table 1: Listing of NFIP Jurisdictions (continued)

Community	CID	HUC-8 Sub-Basin(s)	Located on FIRM Panel(s)	If Not Included, Location of Flood Hazard Data
Auburn, Town of	250292	01090003, 01100001	25027C0784F 25027C0792F 25027C0801E 25027C0802E 25027C0803E 25027C0804E 25027C0806E 25027C0808E 25027C0811F 25027C0812F	
Barre, Town of*	250293	1080204	N/A	Town of Barre FIS Report, 12/15/1981
Berlin, Town of	250294	01070004, 01070005	25027C0466F 25027C0467F 25027C0468F 25027C0469F 25027C0486F 25027C0488F 25027C0489F 25027C0631F 25027C0632F 25027C0651F	
Blackstone, Town of	250295	1090003	25027C1030E 25027C1033E 25027C1034E 25027C1037E 25027C1039E 25027C1041E 25027C1042E 25027C1043E 25027C1044E 25027C1055E 25027C1065E ¹	
Bolton, Town of	250296	01070004, 01070005	25027C0457E 25027C0459E 25027C0466F 25027C0467F 25027C0476E 25027C0478F 25027C0479F 25027C0483F 25027C0486F 25027C0487F 25027C0488F 25027C0489F 25027C0491E ¹	

* Community is not included in this partial countywide FIS Report

¹ Panel Not Printed

Table 1: Listing of NFIP Jurisdictions (continued)

Community	CID	HUC-8 Sub-Basin(s)	Located on FIRM Panel(s)	If Not Included, Location of Flood Hazard Data
Boylston, Town of	250297	01070004, 01070005, 01090003	25027C0444E 25027C0463E 25027C0464F 25027C0468F 25027C0607E 25027C0610E 25027C0620E 25027C0626E 25027C0627F 25027C0628F 25027C0629F 25027C0631F 25027C0633F	
Brookfield, Town of*	250298	01080204, 01100001	N/A	Town of Brookfield FIS Report, 07/02/1981
Charlton, Town of	250299	01080204, 01100001	25027C0767F 25027C0768F 25027C0769F 25027C0780F 25027C0783F 25027C0786F 25027C0787F 25027C0788F 25027C0789F 25027C0791F 25027C0793F 25027C0794F 25027C0931F 25027C0932F 25027C0951F 25027C0952F 25027C0953F 25027C0954F 25027C0956F 25027C0957F 25027C0958F	
Clinton, Town of	250300	01070004, 01070005	25027C0461E ¹ 25027C0462E 25027C0463E 25027C0464F 25027C0466F 25027C0468F	

* Community is not included in this partial countywide FIS Report

¹ Panel Not Printed

Table 1: Listing of NFIP Jurisdictions (continued)

Community	CID	HUC-8 Sub-Basin(s)	Located on FIRM Panel(s)	If Not Included, Location of Flood Hazard Data
Douglas, Town of	250301	01090003, 01100001	25027C0980F 25027C0982E 25027C0984E 25027C0985E 25027C0987F 25027C0995F 25027C1002E 25027C1003E 25027C1004E 25027C1008E 25027C1015E 25027C1020E	
Dudley, Town of	250302	1100001	25027C0953F 25027C0954F 25027C0957F 25027C0958F 25027C0959F 25027C0961F 25027C0962F 25027C0963F 25027C0964F 25027C0966F 25027C0967F 25027C0968F 25027C0969F	
East Brookfield, Town of*	250303	01080204, 01100001	N/A	Town of East Brookfield FIS Report, 12/15/1980
Fitchburg, City of*	250304	1070004	N/A	City of Fitchburg FIS Report, 09/18/1991
Gardner, City of*	250305	01070004, 01080202	N/A	City of Gardner FIS Report, 01/02/1981
Grafton, Town of	250306	01070005, 01090003	25027C0639F 25027C0643F 25027C0826E 25027C0827E 25027C0828E 25027C0829E 25027C0831F 25027C0832F 25027C0833E 25027C0834E 25027C0836E 25027C0837E 25027C0841E 25027C0842E	

* Community is not included in this partial countywide FIS Report

¹ Panel Not Printed

Table 1: Listing of NFIP Jurisdictions (continued)

Community	CID	HUC-8 Sub-Basin(s)	Located on FIRM Panel(s)	If Not Included, Location of Flood Hazard Data
Hardwick, Town of*	250307	1080204	N/A	Town of Hardwick FIS Report, 03/16/1981
Harvard, Town of	250308	01070004, 01070005, 01070006	25027C0292E 25027C0294E 25027C0311E 25027C0312E 25027C0313E 25027C0314E 25027C0316E 25027C0318E 25027C0319E ¹ 25027C0457E 25027C0476E 25027C0477F 25027C0478F 25027C0479F 25027C0481F 25027C0483F	
Holden, Town of*	250309	01070004, 01090003	N/A	Town of Holden FIS Report, 01/02/1981
Hopedale, Town of	250310	01090001, 01090003	25027C0862E 25027C0864E 25027C0866E 25027C0868E 25027C0869E 25027C1031E 25027C1032E 25027C1055E	
Hubbardston, Town of*	250311	01070004, 01080202, 01080204	N/A	Town of Hubbardston FIS Report, 12/01/1983
Lancaster, Town of	250312	1070004	25027C0287E 25027C0288E 25027C0289E 25027C0291E ¹ 25027C0293E 25027C0294E 25027C0451E 25027C0452E 25027C0454E 25027C0456E 25027C0457E 25027C0458E 25027C0459E 25027C0462E 25027C0466F 25027C0467F	

* Community is not included in this partial countywide FIS Report

¹ Panel Not Printed

Table 1: Listing of NFIP Jurisdictions (continued)

Community	CID	HUC-8 Sub-Basin(s)	Located on FIRM Panel(s)	If Not Included, Location of Flood Hazard Data
Leicester, Town of	250313	01080204, 01090003, 01100001	25027C0590F 25027C0595F 25027C0613E 25027C0780F 25027C0781F 25027C0782F 25027C0783F 25027C0784F 25027C0801E 25027C0803E	
Leominster, City of*	250314	1070004	N/A	City of Leominster FIS Report, 04/03/1989
Lunenburg, Town of*	250315	1070004	N/A	Town of Lunenburg FIS Report, 12/15/1981
Mendon, Town of	250316	01090001, 01090003	25027C0864E 25027C0868E 25027C1030E 25027C1031E 25027C1032E 25027C1033E 25027C1034E 25027C1055E	
Milford, Town of	250317	01090001, 01090003	25027C0858E 25027C0859E 25027C0862E 25027C0864E 25027C0866E 25027C0867E 25027C0868E 25027C0869E 25027C0886E 25027C0888E 25027C1032E 25027C1055E	
Millbury, Town of	250318	01090003, 01100001	25027C0804E 25027C0807E 25027C0808E 25027C0809E 25027C0812F 25027C0814F 25027C0816E 25027C0817E 25027C0820E 25027C0826E 25027C0828E 25027C0836E	

* Community is not included in this partial countywide FIS Report

¹ Panel Not Printed

Table 1: Listing of NFIP Jurisdictions (continued)

Community	CID	HUC-8 Sub-Basin(s)	Located on FIRM Panel(s)	If Not Included, Location of Flood Hazard Data
Millville, Town of	250319	1090003	25027C1030E 25027C1037E 25027C1039E	
New Braintree, Town of*	250320	1080204	N/A	Town of New Braintree FIS Report, 06/15/1984
Northborough, Town of	250321	1070005	25027C0629F 25027C0631F 25027C0632F 25027C0633F 25027C0634F 25027C0641F 25027C0642F 25027C0643F 25027C0651F 25027C0653F 25027C0654F 25027C0661F 25027C0662F	
Northbridge, Town of	250322	1090003	25027C0837E 25027C0840E 25027C0841E 25027C0842E 25027C0843E 25027C0844E 25027C0863E 25027C1002E 25027C1006E 25027C1007E 25027C1026E 25027C1030E	
North Brookfield, Town of*	250323	1080204	N/A	Town of North Brookfield FIS Report, 01/05/1982
Oakham, Town of	250324	1080204	N/A	Town of Oakham FIS Report, 10/03/1983
Oxford, Town of	250325	01090003, 01100001	25027C0783F 25027C0784F 25027C0791F 25027C0792F 25027C0793F 25027C0794F	

* Community is not included in this partial countywide FIS Report

¹ Panel Not Printed

Table 1: Listing of NFIP Jurisdictions (continued)

Community	CID	HUC-8 Sub-Basin(s)	Located on FIRM Panel(s)	If Not Included, Location of Flood Hazard Data
Oxford, Town of (continued)	250325	01090003, 01100001	25027C0811F 25027C0812F 25027C0813F 25027C0814F 25027C0956F 25027C0957F 25027C0958F 25027C0959F 25027C0976F 25027C0978F 25027C0980F 25027C0985E	
Paxton, Town of	250326	01070004, 01080204, 01090003	25027C0580E 25027C0585E 25027C0590F 25027C0595F	
Petersham, Town of*	250327	01080202, 01080204	N/A	Town of Petersham FIRM, 01/23/1979 (No FIS Report)
Phillipston, Town of*	250328	01080202, 01080204	N/A	Town of Phillipston FIS Report, 01/16/1984
Princeton, Town of*	250329	01070004, 01080204	N/A	Town of Princeton FIS Report, 01/02/1981
Royalston, Town of*	250330	01080201, 01080202	N/A	Town of Royalston FIS Report, 12/15/1982
Rutland, Town of*	250331	01070004, 01080204	N/A	Town of Rutland FIS Report, 01/16/1984
Shrewsbury, Town of	250332	01070005, 01090003	25027C0610E 25027C0620E 25027C0628F 25027C0629F 25027C0633F 25027C0636E 25027C0637F 25027C0638E 25027C0639F 25027C0641F 25027C0643F 25027C0826E 25027C0827E	

* Community is not included in this partial countywide FIS Report

Table 1: Listing of NFIP Jurisdictions (continued)

Community	CID	HUC-8 Sub-Basin(s)	Located on FIRM Panel(s)	If Not Included, Location of Flood Hazard Data
Southborough, Town of	250333	1070005	25027C0654F 25027C0658F 25027C0659F 25027C0662F 25027C0666F 25027C0667F 25027C0668F 25027C0669F 25027C0678F 25027C0686F	
Southbridge, Town of	250334	1100001	25027C0929F 25027C0931F 25027C0932F 25027C0933F 25027C0934F 25027C0936F 25027C0940F 25027C0941F 25027C0942F 25027C0945F 25027C0951F 25027C0953F 25027C0961F 25027C0963F	
Spencer, Town of	250335	01080204, 01100001	25027C0566E 25027C0567E 25027C0568E 25027C0569E 25027C0590F 25027C0757E 25027C0759E 25027C0767F 25027C0780F 25027C0786F 25027C0787F	
Sterling, Town of*	250336	1070004	N/A	Town of Sterling FIS Report, 12/15/1981
Sturbridge, Town of	250337	01080204, 01100001, 01100002	25027C0745F 25027C0761F 25027C0762F 25027C0763F 25027C0764F 25027C0766F 25027C0767F 25027C0768F 25027C0769F	

* Community is not included in this partial countywide FIS Report

Table 1: Listing of NFIP Jurisdictions (continued)

Community	CID	HUC-8 Sub-Basin(s)	Located on FIRM Panel(s)	If Not Included, Location of Flood Hazard Data
Sturbridge, Town of (continued)	250337	01080204, 01100001, 01100002	25027C0907F 25027C0909F 25027C0917F 25027C0919F 25027C0926F 25027C0927F 25027C0928F 25027C0929F 25027C0931F 25027C0933F 25027C0936F 25027C0940F	
Sutton, Town of	250338	01090003, 01100001	25027C0814F 25027C0816E 25027C0817E 25027C0820E 25027C0828E 25027C0836E 25027C0837E 25027C0840E 25027C0980F 25027C0982E 25027C0984E 25027C0985E 25027C1001E 25027C1002E 25027C1003E 25027C1004E 25027C1006E	
Templeton, Town of*	250339	01080202, 01080204	N/A	Town of Templeton FIS Report, 05/171982
Upton, Town of	250340	01070005, 01090003	25027C0832F 25027C0834E 25027C0842E 25027C0844E 25027C0851F 25027C0855E 25027C0858E 25027C0861E 25027C0862E 25027C0863E 25027C0864E 25027C0866E 25027C1026E 25027C1030E	

* Community is not included in this partial countywide FIS Report

Table 1: Listing of NFIP Jurisdictions (continued)

Community	CID	HUC-8 Sub-Basin(s)	Located on FIRM Panel(s)	If Not Included, Location of Flood Hazard Data
Uxbridge, Town of	250341	1090003	25027C1002E 25027C1004E 25027C1006E 25027C1007E 25027C1008E 25027C1009E 25027C1020E 25027C1026E 25027C1028E 25027C1030E 25027C1036E 25027C1037E 25027C1038E 25027C1039E	
Warren, Town of*	250342	01080204, 01100001	N/A	Town of Warren FIS Report, 06/01/1981
Webster, Town of	250343	01090003, 01100001	25027C0959F 25027C0967F 25027C0969F 25027C0978F 25027C0980F 25027C0986F 25027C0987F 25027C0988F 25027C0989F 25027C0995F	
Westborough, Town of	250344	01070005, 01090003	25027C0641F 25027C0642F 25027C0643F 25027C0644F 25027C0661F 25027C0662F 25027C0663F 25027C0664F 25027C0666F 25027C0668F 25027C0831F 25027C0832F 25027C0851F 25027C0852F	

* Community is not included in this partial countywide FIS Report

¹ Panel Not Printed

Table 1: Listing of NFIP Jurisdictions (continued)

Community	CID	HUC-8 Sub-Basin(s)	Located on FIRM Panel(s)	If Not Included, Location of Flood Hazard Data
West Boylston, Town of	250345	01070004, 01090003	25027C0439E 25027C0443E 25027C0444E 25027C0463E 25027C0602E ¹ 25027C0606E 25027C0607E 25027C0610E 25027C0620E	
West Brookfield, Town of*	250346	01080204, 01100001	N/A	Town of West Brookfield FIS Report, 12/01/1981
Westminster, Town of*	250347	01070004, 01080202, 01080204	N/A	Town of Westminster FIS Report, 01/19/1982
Winchendon, Town of*	250348	1080202	N/A	Town of Winchendon FIS Report, 06/15/1982
Worcester, City of	250349	01070004, 01090003	25027C0595F 25027C0605E ¹ 25027C0610E 25027C0611E 25027C0612E 25027C0613E 25027C0614E 25027C0616E 25027C0618E 25027C0620E 25027C0638E 25027C0801E 25027C0802E 25027C0806E 25027C0807E 25027C0808E 25027C0809E 25027C0826E	

* Community is not included in this partial countywide FIS Report

¹ Panel Not Printed

1.4 Considerations for using this Flood Insurance Study Report

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

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

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

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

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

The initial Countywide FIS Report for Worcester County became effective on July 4, 2011. Refer to Table 27 for information about subsequent revisions to the FIRMs.

- 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.
- Previous FIS Reports and FIRMs may have included levees that were accredited as reducing the risk associated with the 1-percent-annual-chance flood based on the information available and the mapping standards of the NFIP at that time. For FEMA to continue to accredit the identified levees, the levees must meet the criteria of the Code of Federal Regulations, Title 44, Section 65.10 (44 CFR 65.10), titled "Mapping of Areas Protected by Levee Systems."

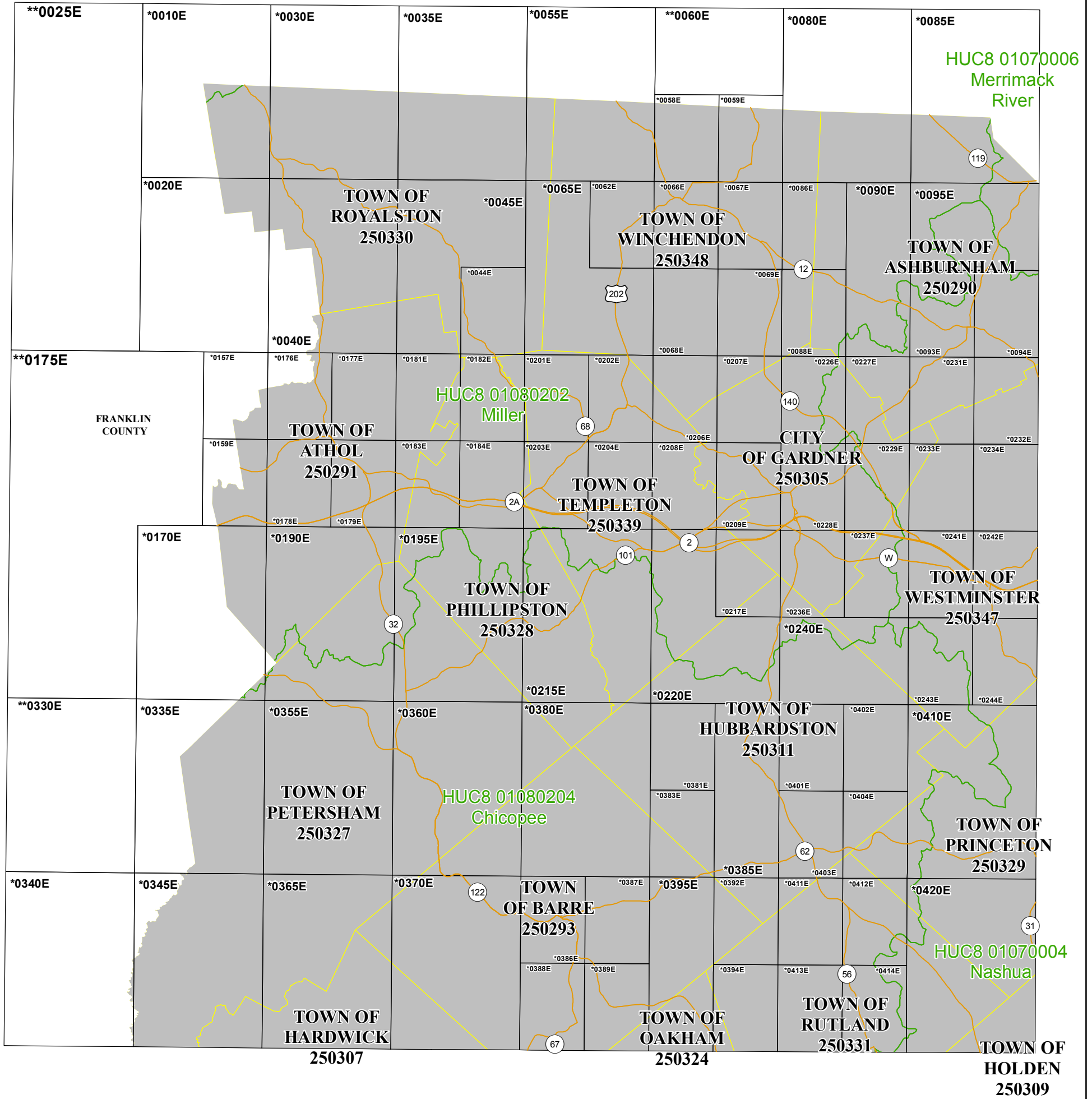
Since the status of levees is subject to change at any time, the user should contact the appropriate agency for the latest information regarding levees presented in Table 8 of this FIS Report. For levees owned or operated by the U.S. Army Corps of Engineers (USACE), information may be obtained from the USACE National Levee Database (nld.usace.army.mil). For all other levees, the user is encouraged to contact the appropriate local community.

- 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.

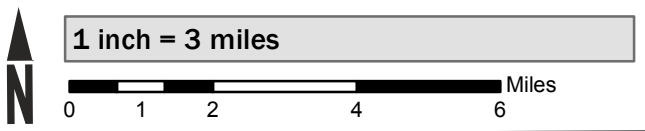
The FIRM Index in Figure 1 shows the overall FIRM panel layout within Worcester County, and also displays the panel number and effective date for each FIRM panel in the county. Other information shown on the FIRM Index includes community boundaries, watershed boundaries, and USGS HUC-8 codes.

Figure 1: FIRM Index

HUC8 01080201
Middle Connecticut



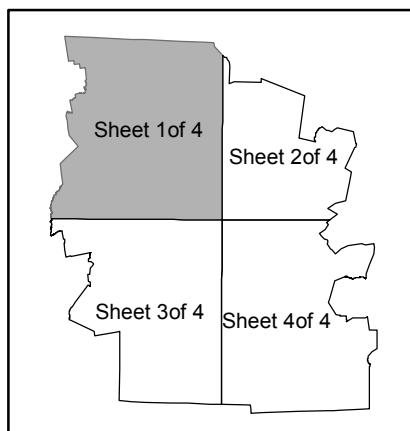
ATTENTION: The corporate limits shown on this FIRM Index are based on the best information available at the time of publication. As such, they may be more current than those shown on FIRM panels issued before [most recent FIRM panel date].



Map Projection:
NAD 1983 StatePlane 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](https://MSC.FEMA.GOV)

SEE FLOOD INSURANCE STUDY FOR ADDITIONAL INFORMATION
*PANEL NOT PRINTED - AREA NOT INCLUDED
**PANEL NOT PRINTED - AREA OUTSIDE COUNTY BOUNDARY



NATIONAL FLOOD INSURANCE PROGRAM
FLOOD INSURANCE RATE MAP INDEX (Sheet 1 of 4)

WORCESTER COUNTY, MASSACHUSETTS All Jurisdictions

PANELS PRINTED:

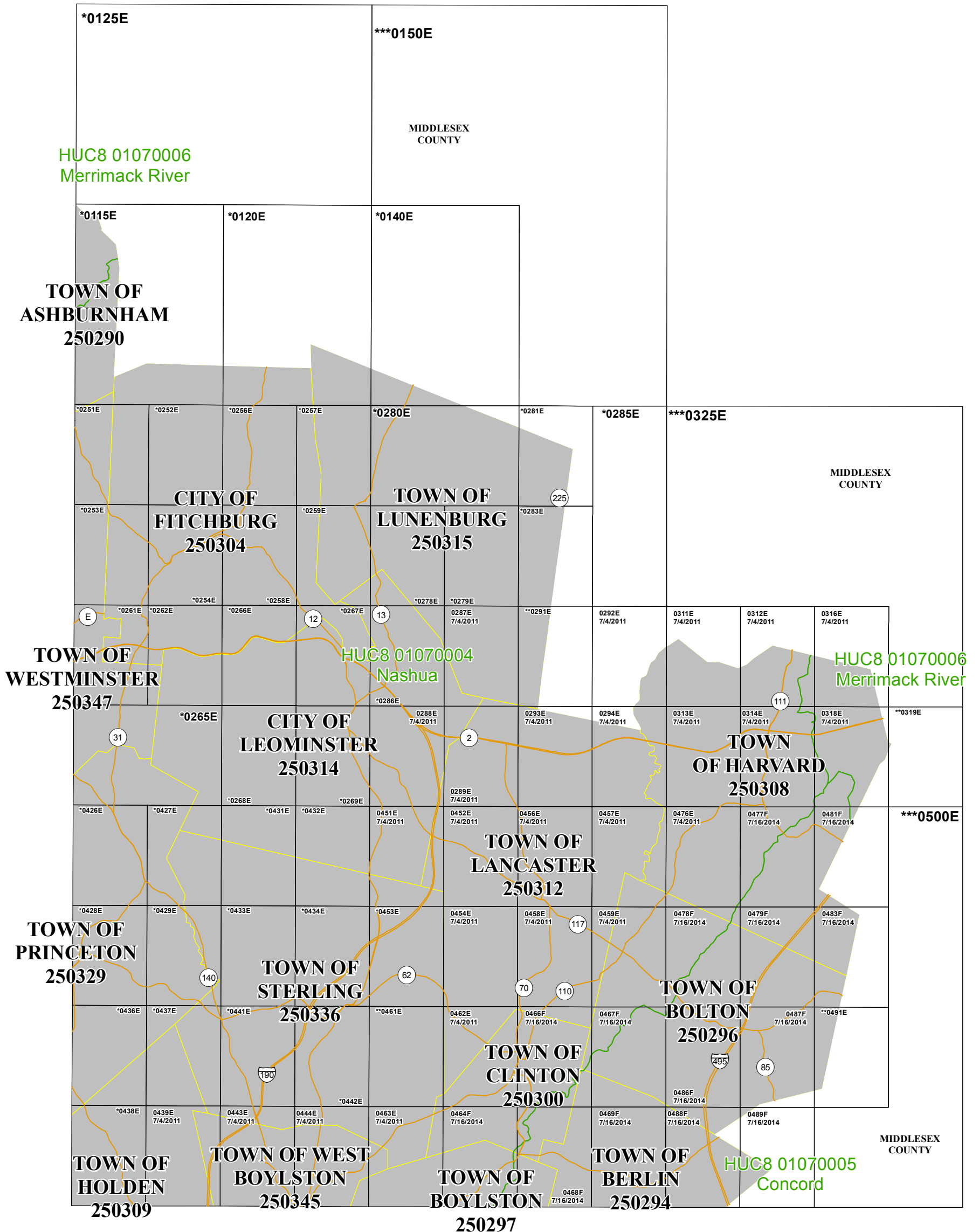


FEMA

PRELIMINARY
07/17/2020

MAP NUMBER
25027CIND1C
MAP REVISED

Figure 1: FIRM Index



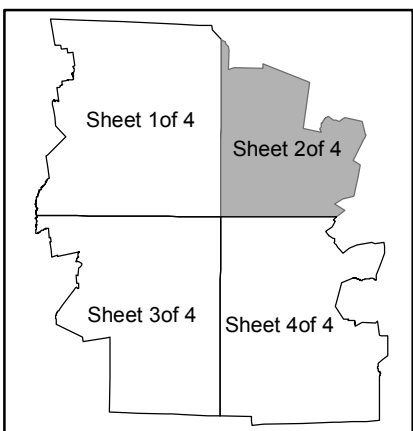
ATTENTION: The corporate limits shown on this FIRM Index are based on the best information available at the time of publication. As such, they may be more current than those shown on FIRM panels issued before [most recent FIRM panel date].



Map Projection:
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[HTTPS://MSC.FEMA.GOV](https://MSC.FEMA.GOV)

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



NATIONAL FLOOD INSURANCE PROGRAM
FLOOD INSURANCE RATE MAP INDEX (Sheet 2 of 4)
WORCESTER COUNTY, MASSACHUSETTS All Jurisdictions

PANELS PRINTED:
0287, 0288, 0289, 0292, 0293, 0294, 0311, 0312, 0313, 0314, 0316, 0318, 0439, 0443, 0444, 0451, 0452, 0454, 0456, 0457, 0458, 0459, 0462, 0463, 0464, 0466, 0467, 0468, 0469, 0476, 0477, 0478, 0479, 0481, 0483, 0486, 0487, 0488, 0489

PRELIMINARY
07/17/2020

FEMA
MAP NUMBER 25027CIND2C
MAP REVISED


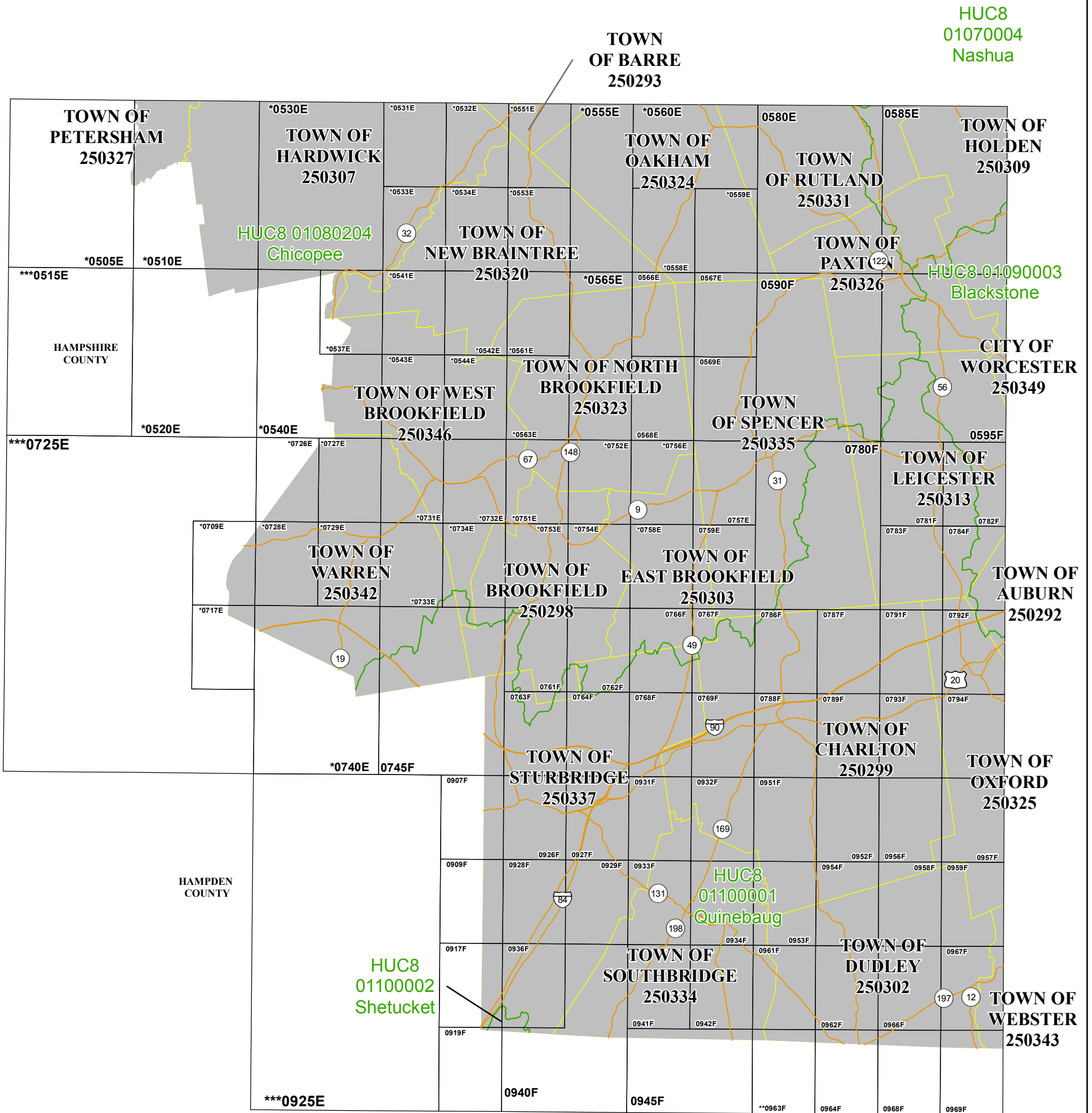


Figure 1: FIRM Index



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 [most recent FIRM panel date].

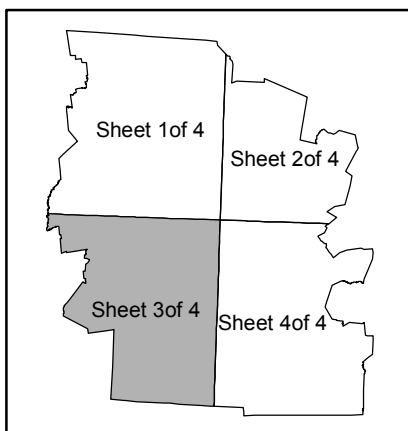


Map Projection:
NAD 1983 StatePlane Massachusetts Mainland FIPS 2001 Feet;
Western Hemisphere; Vertical Datum: NAVD 88

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

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



NATIONAL FLOOD INSURANCE PROGRAM

FLOOD INSURANCE RATE MAP INDEX (Sheet 3 of 4)

WORCESTER COUNTY, MASSACHUSETTS All Jurisdictions

PANELS PRINTED:

0566, 0567, 0568, 0569, 0580, 0585, 0590, 0595, 0745, 0757, 0759, 0761, 0762, 0763, 0764, 0766, 0767, 0768, 0769, 0780, 0781, 0782, 0783, 0784, 0786, 0787, 0788, 0789, 0791, 0792, 0793, 0794, 0907, 909, 0917, 0919, 0926, 0927, 0928, 0929, 0931, 0932, 0933, 0934, 0936, 0940, 0941, 0942, 0945, 0951, 0952, 0953, 0954, 0956, 0957, 0958, 0959, 0961, 0962, 0964, 0966, 0967, 0968, 0969

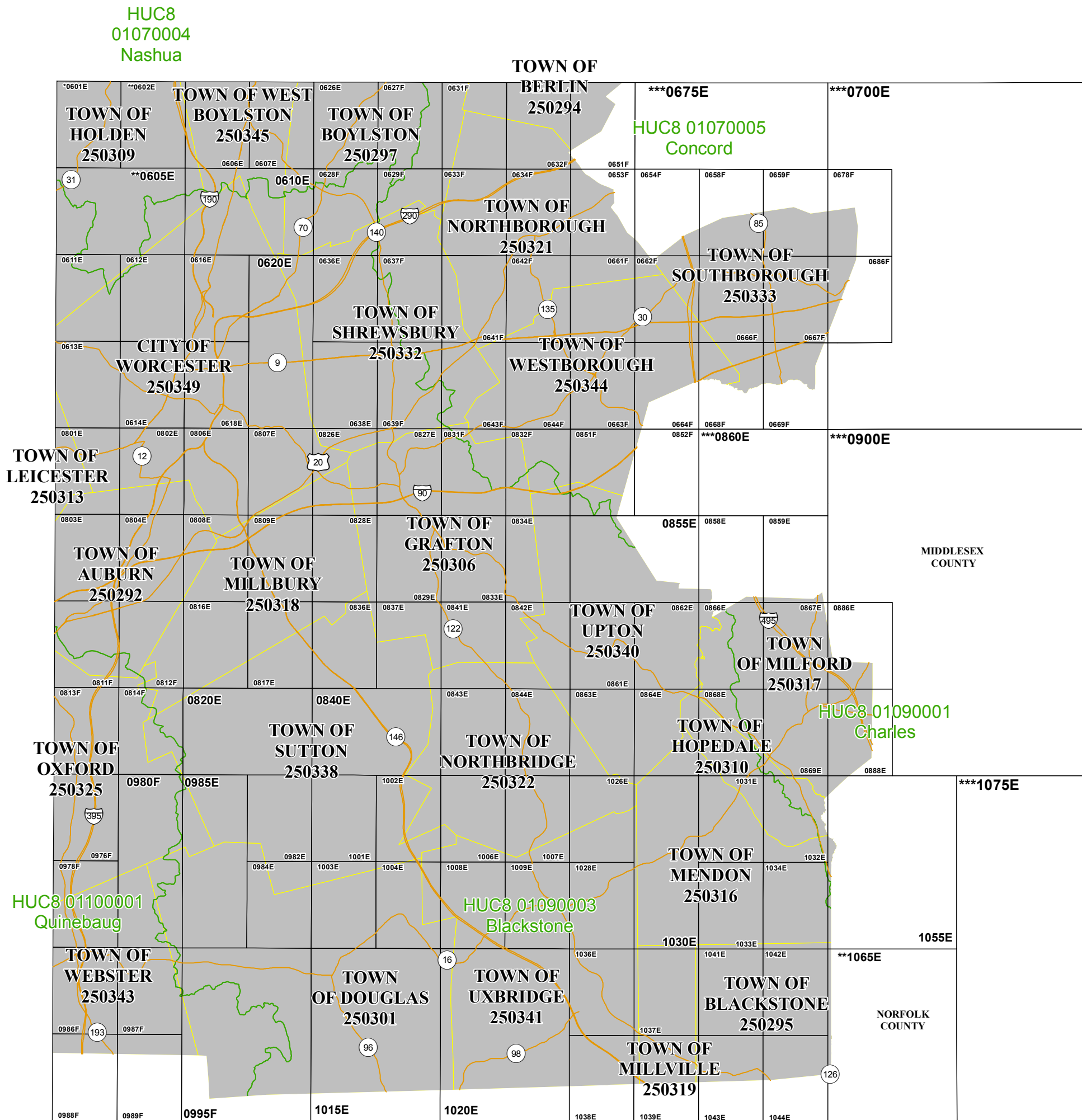


FEMA

PRELIMINARY
07/17/2020

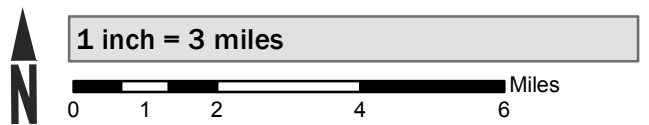
MAP NUMBER
25027CIND3C
MAP REVISED

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 [most recent FIRM panel date].

PRELIMINARY
07/17/2020

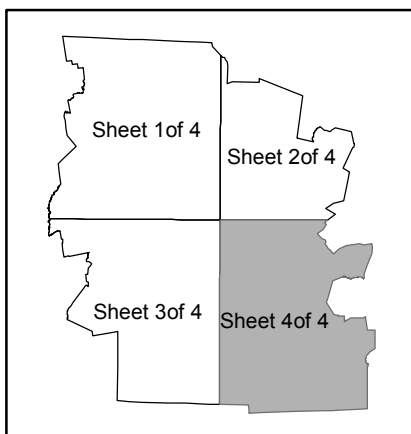


Map Projection:
NAD 1983 StatePlane Massachusetts Mainland FIPS 2001 Feet;
Western Hemisphere; Vertical Datum: NAVD 88

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

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SEE FLOOD INSURANCE STUDY FOR ADDITIONAL INFORMATION
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NATIONAL FLOOD INSURANCE PROGRAM

FLOOD INSURANCE RATE MAP INDEX (Sheet 4 of 4)

WORCESTER COUNTY, MASSACHUSETTS All Jurisdictions

PANELS PRINTED:

0601, 0602, 0605, 0606, 0607, 0610, 0611, 0612, 0613, 0614, 0616, 0618, 0620, 0626, 0627, 0628, 0629, 0631, 0632, 0633, 0634, 0636, 0637, 0638, 0639, 0641, 0642, 0643, 0644, 0651, 0653, 0654, 0658, 0659, 0661, 0662, 0663, 0664, 0666, 0667, 0668, 0669, 0675, 0678, 0686, 0700, 0801, 0802, 0803, 0804, 0806, 0807, 0808, 0809, 0811, 0812, 0813, 0814, 0816, 0817, 0820, 0826, 0827, 0828, 0829, 0831, 0832, 0833, 0834, 0836, 0837, 0840, 0841, 0842, 0843, 0844, 0851, 0852, 0855, 0858, 0859, 0860, 0861, 0862, 0863, 0864, 0866, 0867, 0868, 0869, 0886, 0888, 0900, 0976, 0978, 0980, 0982, 0984, 0985, 0986, 0987, 0988, 0989, 0995, 1001, 1002, 1003, 1004, 1006, 1007, 1008, 1009, 1015, 1020, 1026, 1028, 1030, 1031, 1032, 1033, 1034, 1036, 1037, 1038, 1039, 1041, 1042, 1043, 1044, 1055, 1065, 1075



FEMA

MAP NUMBER
25027CIND4C
MAP REVISED

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

<p style="text-align: center;">NOTES TO USERS</p> <p>For information and questions about this map, available products associated with this FIRM including historic versions of this FIRM, how to order products, or the National Flood Insurance Program in general, please call the FEMA Mapping and Insurance eXchange at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA Flood Map Service Center website at msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the website. Users may determine the current map date for each FIRM panel by visiting the FEMA Flood Map Service Center website or by calling the FEMA Mapping and Insurance eXchange.</p> <p>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.</p> <p>For community and countywide map dates, refer to Table 27 in this FIS Report.</p> <p>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.</p> <p><u>PRELIMINARY FIS REPORT:</u> FEMA maintains information about map features, such as street locations and names, in or near designated flood hazard areas. Requests to revise information in or near designated flood hazard areas may be provided to FEMA during the community review period, at the final Consultation Coordination Officer's meeting, or during the statutory 90-day appeal period. Approved requests for changes will be shown on the final printed FIRM.</p>
<p>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.</p> <p><u>BASE FLOOD ELEVATIONS:</u> 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.</p>
<p><u>FLOODWAY INFORMATION:</u> 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.</p> <p><u>FLOOD CONTROL STRUCTURE INFORMATION:</u> 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.</p>

Figure 2. FIRM Notes to Users

PROJECTION INFORMATION: The projection used in the preparation of the map was Massachusetts State Plane Massachusetts Mainland FIPS 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 derived from digital orthophotography. Base map files were provided in digital format by Massachusetts Geographic Information System (MassGIS). For panels dated July 11, 2011, ortho imagery was produced at a scale of 1:5,000, dated April 2005. For panels dated July 16, 2014, ortho imagery was produced at a scale of 1:5,000, dated April 2008. For panels dated [TBD], base map information shown on the FIRM was derived from digital orthophotography provided by the NAIP. The imagery was flown in 2018 and was produced at a 0.6 meter resolution. For information about base maps, refer to Section 6.2 "Base Map" in this FIS Report.

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

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

NOTES FOR FIRM INDEX

REVISIONS TO INDEX: As new studies are performed and FIRM panels are updated within Worcester 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.

Figure 2. FIRM Notes to Users

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 Worcester County.

Figure 3: Map Legend for FIRM



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

Figure 3: Map Legend for FIRM






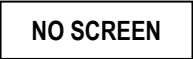




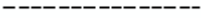
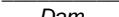

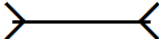
OTHER AREAS OF FLOOD HAZARD	
	Shaded Zone X: Areas of 0.2% annual chance flood hazards and areas of 1% annual chance flood hazards with average depths of less than 1 foot or with drainage areas less than 1 square mile.
	Future Conditions 1% Annual Chance Flood Hazard – Zone X: The flood insurance rate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

Figure 3: Map Legend for FIRM


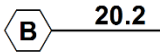
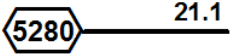
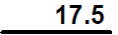
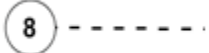













REFERENCE MARKERS	
	River mile Markers
CROSS SECTION & TRANSECT INFORMATION	
	Lettered Cross Section with Regulatory Water Surface Elevation (BFE)
	Numbered Cross Section with Regulatory Water Surface Elevation (BFE)
	Unlettered Cross Section with Regulatory Water Surface Elevation (BFE)
	Coastal Transect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

Figure 3: Map Legend for FIRM

	Horizontal Reference Grid Line
	Horizontal Reference Grid Ticks
	Secondary Grid Crosshairs
Land Grant	Name of Land Grant
7	Section Number
R. 43 W. T. 22 N.	Range, Township Number
4276^{000m}E	Horizontal Reference Grid Coordinates (UTM)
365000 FT	Horizontal Reference Grid Coordinates (State Plane)
80° 16' 52.5"	Corner Coordinates (Latitude, Longitude)

SECTION 2.0 – FLOODPLAIN MANAGEMENT APPLICATIONS

2.1 Floodplain Boundaries

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

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

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

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

Small areas within the floodplain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data. The procedures to remove these areas from the SFHA are described in Section 6.5 of this FIS Report.

Table 2: Flooding Sources Included in this FIS Report

Flooding Source	Community	Downstream Limit	Upstream Limit	HUC-8 Sub-Basin(s)	Length (mi) (streams or coastlines)	Area (mi ²) (estuaries or ponding)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Assabet River	Berlin, Town of; Northborough, Town of	County boundary	Approximately 2,300 feet downstream of Allen Street	01070005	2.3		Y	AE	10/2012
Assabet River	Northborough, Town of	Approximately 2,300 feet downstream of Allen Street	Upstream of Main Street (upstream of the confluence with Cold Harbor Brook (Lower Reach))	01070005	1.4		Y	AE	11/1977
Assabet River (Lower Reach)	Westborough, Town of	Approximately 29.6 miles upstream of Confluence with Concord River	Assabet River Dam (George Nichols Dam)	01070005	1.1		Y	AE	3/1978
Assabet River (Upper Reach)	Westborough, Town of	Mouth of the Assabet Reservoir	Approximately 1,800 feet upstream of Nourse Street	01070005	0.9		Y	AE	3/1978
Assabet River Branch No 2	Berlin, Town of	Berlin/Hudson corporate limits	Approximately 765 feet upstream of Gates Pond Road	01070005	0.6		Y	AE	11/1977
Auburn Pond	Auburn, Town of	entire shoreline	entire shoreline			0.01	Y	AE	1/1977
Axtell Brook	Grafton, Town of	Confluence at Lake Ripple	Downstream side of the Massachusetts Turnpike	01090003	1.0		Y	AE	11/1989
Beaver Brook	Worcester, City of	Confluence with Curtis Pond Outflow and Middle River	Approximately 1,855 feet upstream of May Street	01090003	1.5		Y	AE	9/6/2001
Bennetts Brook	Harvard, Town of	County boundary	Shaker Road	01070006	1.0		Y	AE	1/1978

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

Flooding Source	Community	Downstream Limit	Upstream Limit	HUC-8 Sub-Basin(s)	Length (mi) (streams or coastlines)	Area (mi ²) (estuaries or ponding)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Big Bummet Brook	Grafton, Town of; Shrewsbury, Town of	Confluence with Quinsigamond River	Approximately 2,140 feet upstream of Gold Street	01090003	4.1		Y	AE	3/1978
Blackstone River	Blackstone, Town of; Grafton, Town of; Millbury, Town of; Millville, Town of; Northbridge, Town of; Sutton, Town of; and Uxbridge, Town of; Worcester, City of	Providence County/ Worcester County boundary	Confluence with Middle River	01090003	29.5		Y	AE	3/30/2007
Bowers Brook	Harvard, Town of	Ayer, MA (Middlesex County)/ Harvard corporate limits	Woodside Road	01070004	6.6		Y	AE	1/1978
Brierly Pond	Millbury, Town of	Town of Millbury	Town of Millbury	01090003		0.04	N	AE	1/1978
Broad Meadow Brook	Worcester, City of	Millbury/ Worcester corporate limits	Approximately 8,630 feet upstream of U.S. Highway 20	01090003	1.8		Y	AE	2/2000
Cady Brook	Charlton, Town of	Charlton/ Southbridge corporate limits	Dam approximately 1,200 feet above U.S. Route 20	01100001	4.0		Y	AE	7/1980
Cady Brook	Southbridge, Town of	Confluence with Quinebaug River	Charlton/ Southbridge corporate limits	01100001	1.8		Y	AE	8/1980
Cedar Meadow Brook	Sturbridge, Town of	Confluence with Quinebaug River	Approximately 10 feet downstream from Cooper Road	01100001	1.7		Y	AE	11/1980
Cedar Pond	Sturbridge, Town of	Cedar Pond Dam	Approximately 1.6 miles above Cedar Pond Dam	01100001	1.7		Y	AE	11/1980

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

Flooding Source	Community	Downstream Limit	Upstream Limit	HUC-8 Sub-Basin(s)	Length (mi) (streams or coastlines)	Area (mi ²) (estuaries or ponding)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Center Brook	Upton, Town of	Station Street bridge	Pratt Pond Dam	01090003	0.9		Y	AE	8/1980
Charles River	Hopedale, Town of; Mendon, Town of; Milford, Town of	Norfolk County/ Worcester County, 4,450 feet upstream of Box Pond Dam	Town of Milford (Worcester County)/ Town of Hopkinton (Norfolk County) Boundary	01090001	8.00		Y	AE	7/1980
Cohasse Brook	Southbridge, Town of	Confluence with Quinebaug River	Approximately 500 feet downstream of Cohasse Brook Reservior	01100001	2.9		Y	AE	10/10/2019
Cold Harbor Brook (Lower Reach)	Northborough, Town of	Confluence with Assabet River	Approximately 1,800 feet upstream of Lincoln Street	01070005	1.7		Y	AE	11/1977
Cold Harbor Brook (Town of Boylston)	Boylston, Town of	Town of Northborough/Town of Boylston corporate limits	Approximately 1,700 feet upstream of Reservoir Road	01070005	0.7		Y	AE	6/1979
Cold Harbor Brook (Upper Reach)	Northborough, Town of	Cherry Street	Approximately 700 feet upstream of Fisher Street	01070005	1.4		Y	AE	11/1977
Cold Spring Brook (Town of Harvard)	Harvard, Town of	Confluence with Bowers Brook	Approximately 1,900 feet upstream of Boston and Maine Railroad	01070004	1.1		Y	AE	1/1978
Cold Spring Brook (Town of Sutton)	Sutton, Town of	Confluence with Blackstone River	Approximately 5,400 feet upstream of Confluence with Blackstone River	01090003	1.8		Y	AE	11/1980
Counterpane Brook	Clinton, Town of	Confluence with Nashua River	Coachlace Pond	01070004	1.6		Y	AE	5/1979

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

Flooding Source	Community	Downstream Limit	Upstream Limit	HUC-8 Sub-Basin(s)	Length (mi) (streams or coastlines)	Area (mi ²) (estuaries or ponding)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Cronin Brook	Grafton, Town of	Confluence with Blackstone River	Upstream of Millbury Street	01090003	1.8		Y	AE	11/1989
Curtis Pond	Worcester, City of	City of Worcester	City of Worcester	01090003		0.13	N	AE	1/1978
Dark Brook	Sutton, Town of	Confluence with Mumford River	Approximately 1,950 feet upstream of Tucker's Pond Dam	01090003	0.7		Y	AE	11/1980
Dark Brook #1 (Auburn Pond to Central Street)	Auburn, Town of	Confluence with Auburn Pond	Central Street	01090003	1.2		Y	AE	6/1989
Dark Brook #2 (Stoneville Pond to Leicester Street)	Auburn, Town of	Confluence with Stoneville Pond	Leicester Street bridge	01090003	1.4		Y	AE	1/1977
Deans Brook	Charlton, Town of	Charlton/ Southbridge corporate limits	Approximately 1,950 feet upstream of Mcintyre Road	01100001	2.9		Y	AE	7/1980
Denny Brook	Westborough, Town of	Confluence with Jackstraw Brook	South Street	01070005	0.7		Y	AE	10/1/2012
Denny Brook	Westborough, Town of	Approximately 700 feet above High School Road	Approximately 2,050 feet above Harvey Lane	01070005	0.6		N	AE	10/1/2012
Denny Brook	Westborough, Town of	South Street	Approximately 700 feet above High School Road	01070005	0.7		Y	AE	3/1/1978
Denny Brook Tributary 1	Westborough, Town of	Confluence with Denny Brook	Approximately 550 feet upstream of Chestnut Street	01070005	1.0		N	AE	10/2012
Dorothy Brook	Millbury, Town of	Confluence with Blackstone River	Approximately 1,030 feet upstream of mouth of Blackstone River	01090003	0.2		Y	AE	1/1978

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

Flooding Source	Community	Downstream Limit	Upstream Limit	HUC-8 Sub-Basin(s)	Length (mi) (streams or coastlines)	Area (mi ²) (estuaries or ponding)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Dorothy Pond	Millbury, Town of	Riverlin Street	Approximately 700 feet upstream of Wheelock Avenue	01090003	1.1		N	AE	6/1996
Dunn's Brook (Kettle Brook to Auburn Pond)	Auburn, Town of	Confluence with Kettle Brook	Auburn Pond	01090003	1.1		Y	AE	1/1977
Elizabeth Brook	Harvard, Town of	Approximately 100 feet downstream of Interstate 495	Approximately 1,000 feet upstream of Sherry Road	01070005	0.3		Y	AE	10/2012
Elizabeth Brook	Harvard, Town of	Approximately 4,500 feet upstream of Harvard Road	Approximately 100 feet downstream of Interstate 495	01070005	0.6		Y	AE	1/1978
Flagg Street Pond	Worcester, City of	Within the City of Worcester	Within the City of Worcester	01090003		0.01	N	AE	1/1978
French River	Dudley, Town of; Oxford, Town of; Webster, Town of	Confluence with Quinebaug River	Approximately 400 feet upstream of Augetteback Pond	01100001	9.1		Y	AE	10/10/2019
French River	Leicester, Town of; Oxford, Town of	Approximately 2550 feet downstream of Clara Barton Rd	Approximately 500 feet upstream of Pleasant St	01100001	5.1		Y	AE	10/10/2019
Gates Brook	West Boylston, Town of	Approximately 120 feet downstream of the Boston and Maine Railroad	Approximately 80 feet upstream of Pierce Street	01070004	1.0		Y	AE	5/1988
Godfrey Brook	Milford, Town of	Confluence with Charles River	Approximately 1,000 feet upstream of Congress Terrace	01090001	2.8		Y	AE	7/1980
Goodridge Brook	Clinton, Town of; Lancaster, Town of	Downstream of the Clinton/Lancaster corporate limits	Approximately 1,000 feet upstream of Parker Road	01070004	0.4		Y	AE	1/1978

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

Flooding Source	Community	Downstream Limit	Upstream Limit	HUC-8 Sub-Basin(s)	Length (mi) (streams or coastlines)	Area (mi ²) (estuaries or ponding)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Great Brook	Bolton, Town of	Town of Bolton	Town of Bolton	01070005	5.3		Y	AE	4/1978
Hamant Brook	Sturbridge, Town of	Access Road	Approximately 0.6 mile upstream of Interstate 84	01100001	3.9		N	AE	11/1980
Harris Pond	Blackstone, Town of	entire shoreline in the Town of Blackstone	entire shoreline in the Town of Blackstone	01090003		0.3	N	AE	11/1977
Hop Brook	Shrewsbury, Town of	Approximately 50 feet downstream of Main Street	Approximately 650 feet upstream of Spring Street	01070005	2.2		N	AE	10/2012
Hop Brook Tributary 4	Shrewsbury, Town of	Confluence with Hop Brook	Approximately 1,000 feet upstream of Flanagan Drive	01070005	2.8		N	AE	10/2012
Hop Brook Tributary 4.1	Shrewsbury, Town of	Confluence with Hop Brook Tributary 4	Approximately 200 feet downstream of Main Street	01070005	0.7		N	AE	10/2012
Howard Brook	Northborough, Town of	Confluence with Cold Harbor Brook (Lower Reach)	Just upstream of Brewer Street	01070005	1.9		Y	AE	11/1977
Howard Brook Split Flow	Northborough, Town of	Divergence from Cold Harbor Brook (Lower Reach)	Convergence with Howard Brook	01070005	0.2		Y	AE	10/2013
Huckleberry Brook	Milford, Town of	Confluence with Cedar Swamp Brook	Erin Street	01090001	1.7		Y	AE	7/1980
Indian Lake	Worcester, City of	entire shoreline in the City of Worcester	entire shoreline in the City of Worcester	01090003		0.4	N	AE	1/1978

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

Flooding Source	Community	Downstream Limit	Upstream Limit	HUC-8 Sub-Basin(s)	Length (mi) (streams or coastlines)	Area (mi ²) (estuaries or ponding)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Ivy Brook	Milford, Town of	Confluence with Huckleberry Brook	Approximately 1,300 feet upstream of Silver Hill Road	01090001	0.9		Y	AE	7/1980
Jackstraw Brook	Westborough, Town of	Confluence with Sullivan Brook	Approximately 650 feet upstream of Garfield Drive	01070005	2.8		Y	AE	10/2012
Kettle Brook (East)	Worcester, City of	Curtis Pond	Leesville Pond	01090003	0.4		N	AE	1/1978
Kettle Brook (Town of Auburn)	Auburn, Town of	Leesville Pond	Stoneville Pond	01090003	1.6		N	AE	1/1977
Kettle Brook (West)	Worcester, City of	James Street	Approximately 7,200 feet upstream	01090003	1.5		Y	AE	1/1978
Lake Webster	Webster, Town of	entire shoreline	entire shoreline	01100001		2.2	N	AE	10/10/2019
Lancaster Mill Pond	Clinton, Town of	A portion of Lancaster Mill Pond in Clinton	A portion of Lancaster Mill Pond in Clinton	01070004		N/A	N	AE	5/1979
Leadmine Brook	Sturbridge, Town of	County boundary	Approximately 3,000 feet upstream of Leadmine Road	01100001	2.5		N	AE	11/1980
Lebanon Brook	Sturbridge, Town of	Confluence with Quinebaug River	Approximately 6,500 feet upstream of State Route 169 (North Woodstock Road)	01100001	2.6		N	AE	11/1980
Leesville Pond	Auburn, Town of; Worcester, City of	entire shoreline	entire shoreline	01090003		0.1	N	AE	1/1978
Little Nugget Brook	Charlton, Town of	Pikes Pond Dam	Approximately 320 feet upstream from Nugget Drive	01100001	1.6		Y	AE	7/1980

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

Flooding Source	Community	Downstream Limit	Upstream Limit	HUC-8 Sub-Basin(s)	Length (mi) (streams or coastlines)	Area (mi ²) (estuaries or ponding)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Little River	Charlton, Town of	Just downstream from Turner Road	Approximately 2,700 feet upstream from Oxbow Road	01100001	2.4		Y	AE	7/1980
Lowes Brook	Oxford, Town of	Confluence with French River	Approximately 1,500 feet upstream from Sutton Ave	01100001	2.5		Y	AE	3/1980
Lynde Brook	Leicester, Town of	State Route 9 (Main Street)	Lynde Brook Reservoir	01090003	0.5		Y	AE	3/1980
McKinstry Brook	Southbridge, Town of	Confluence with Quinebaug River	Approximately 2,630 feet upstream from Pleasant Street	01100001	0.7		Y	AE	8/1980
Meadow Brook	Shrewsbury, Town of	Approximately 120 feet downstream of Oak Street	Approximately 4,480 feet upstream of Oak Street	01090003	0.9		Y	AE	3/1978
Middle River	Worcester, City of	Confluence with Blackstone River	Confluence with Curtis Pond Outflow and Beaver Brook	01090003	2.5		Y	AE	1/1978
Mill Brook (Town of Bolton)	Bolton, Town of	Town of Bolton/Town of Hudson corporate limits	Spectacle Hill Road	01070005	2.0		Y	AE	4/1978
Mill Brook (Town of Webster)	Webster, Town of	Confluence with French River	Approximately 1,266 feet upstream from Arkwright Road	01100001	0.7		Y	AE	2/1980
Mill Brook Conduit	Worcester, City of	Salisbury Pond	Indian Lake Outlet	01090003	1.7		N	AE	2/2000
Mill River	Blackstone, Town of; Mendon, Town of; Hopedale, Town of; Milford, Town of; Upton, Town of	Harris Pond	North Pond	01090003	14.5		Y	AE	7/1976

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

Flooding Source	Community	Downstream Limit	Upstream Limit	HUC-8 Sub-Basin(s)	Length (mi) (streams or coastlines)	Area (mi ²) (estuaries or ponding)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Miscoe Brook	Grafton, Town of	Silver Lake upstream of Old Upton Road	Upstream Side of Adams Road	01090003	2.4		Y	AE	11/1989
Muddy Brook	Mendon, Town of	Confluence with Mill River	Approximately 1,000 feet upstream of the Milford Road bridge	01090003	3.4		Y	AE	7/1980
Mumford River	Douglas, Town of; Northbridge, Town of; Sutton, Town of; Uxbridge, Town of	Confluence with Blackstone River	Downstream of Stevens Pond	01090003	13.3		Y	AE	11/1980
Nashua River	Bolton, Town of; Harvard, Town of; Lancaster, Town of	County boundary	Clinton/ Lancaster corporate boundary	01070004	13.5		Y	AE	1/1978
Nashua River	Clinton, Town of	Clinton/ Lancaster corporate boundary	Lancaster Mill Pond	01070004	2.7		Y	AE	5/1/1979
North Brook	Berlin, Town of	Confluence with Assabet River	Berlin/Boylston corporate limit	01070005	6.4		Y	AE	11/1977
North Nashua River	Lancaster, Town of	Confluence with Nashua River	Town of Lancaster upstream corporate limits	01070004	7.6		Y	AE	1/17/978
O'Brien Brook	Milford, Town of	Confluence with Godfrey Brook	Vincenzo Road	01090001	0.1		Y	AE	7/1980
Piccadilly Brook	Westborough, Town of	Approximately 1,100 feet downstream of the Town of Hopkinton (Middlesex County)/ Town of Westborough (Worcester County) corporate limits	Just upstream of Upton Road	01070005	1.2		Y	AE	3/1978

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

Flooding Source	Community	Downstream Limit	Upstream Limit	HUC-8 Sub-Basin(s)	Length (mi) (streams or coastlines)	Area (mi ²) (estuaries or ponding)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Pikes Pond Tributary	Charlton, Town of	Pikes Pond	Approximately 1,070 feet upstream from Railroad	01100001	1.3		Y	AE	7/1980
Pondville Pond	Auburn, Town of; Millbury, Town of	entire shoreline	entire shoreline	01090003		0.1	N	AE	1/1977
Quacumquasit Pond	Sturbridge, Town of	Entire area within the Town of Sturbridge	Entire area within the Town of Sturbridge	01080204		0.5	N	AE	11/1980
Quick Stream	Blackstone, Town of	Harris Pond	Approximately 3,200 feet upstream from Harris Pond	01090003	0.6		Y	AE	1/1976
Quinebaug River	Dudley, Town of; Southbridge, Town of; Sturbridge, Town of	Approximately 145 feet upstream of Fabyan Woodstock Rd	Approximately 4,200 feet upstream of Main Street	01100001	7.9		Y	AE	10/2019
Quinebaug River	Sturbridge, Town of	At Stallion Hill Road	Approximately 300 feet downstream of Long Pond	01100001	2.1		Y	AE	10/2019
Quinsigamond River	Grafton, Town of	Confluence with Blackstone River	Hovey Pond Dam	01090003	4.9		Y	AE	11/1989
Ramshorn Brook (Town of Auburn)	Auburn, Town of	Confluence with Auburn Pond	Pondville Pond	01090003	0.9		Y	AE	1/1977
Ramshorn Brook (Town of Millbury)	Millbury, Town of	Pondville Pond	Millbury/Sutton corporate limits	01090003	3.3		Y	AE	6/1996
Rawson Hill Brook	Shrewsbury, Town of	Upper reach (approximately 0.025 miles) downstream of Prospect Street	Shrewsbury/Boylston corporate limits	01070005	1.7		Y	AE	3/1978

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

Flooding Source	Community	Downstream Limit	Upstream Limit	HUC-8 Sub-Basin(s)	Length (mi) (streams or coastlines)	Area (mi ²) (estuaries or ponding)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Riverdale Mills Sluice Gates & Tail Race	Northbridge, Town of	Confluence with Blackstone River downstream of Mill Complex	Diversion from Blackstone River upstream of the Mill Complex	01090003	0.4		N	AE	9/1999
Rutters Brook	Westborough, Town of	Confluence with Sullivan Brook	Approximately 300 feet upstream of Wessonville Village Way	01070005	2.4		Y	AE	10/2012
Rutters Brook Tributary 1	Westborough, Town of	Confluence with Rutters Brook	Approximately 250 feet upstream of Walkup Street	01070005	2.2		N	AE	10/2012
Rutters Brook Tributary 1.1	Westborough, Town of	Confluence with Rutters Brook Tributary 1	Approximately 200 feet upstream of Research Drive	01070005	1.9		N	AE	10/2012
Saranac Canal	Blackstone, Town of	Within the Town of Blackstone	Within the Town of Blackstone	01090003		N/A	N	AE	11/1977
Sevenmile River	Spencer, Town of	Downstream corporate limits of East Brookfield/Spencer	Approximately 1,200 feet upstream of State Route 31	01080204	3.7		Y	AE	10/1988
Sewall Brook	Boylston, Town of	Approximately 1,400 feet downstream of Sewall Pond Outlet	New England Telephone Company culvert beneath Mill Road	01090003	1.8		Y	AE	5/1984
Singletary Brook	Millbury, Town of	Confluence with Blackstone River	Confluence with Unnamed Tributary to Mayo Pond	01090003	1.3		Y	AE	1/1978
Singletary Pond	Millbury, Town of	Within the Town of Millbury	Within the Town of Millbury	01090003		0.6	N	AE	1/1978

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

Flooding Source	Community	Downstream Limit	Upstream Limit	HUC-8 Sub-Basin(s)	Length (mi) (streams or coastlines)	Area (mi ²) (estuaries or ponding)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Southwick Brook	Douglas, Town of	Confluence with Mumford River	Weeks Pond	01090003	0.3		Y	AE	11/1980
Stall Brook	Milford, Town of	County boundary	Approximately 100 feet upstream of Beaver Street	01090001	0.5		Y	AE	7/1980
Still River	Bolton, Town of	Within the Town of Bolton	Within the Town of Bolton	01070004	N/A		N	AE	4/1978
Stone Brook	Auburn, Town of	Pondville Pond	South Street	01090003	1.6		Y	AE	1/1977
Stoneville Pond	Auburn, Town of	Entire shoreline within the Town of Auburn	Entire shoreline within the Town of Auburn	01090003		0.1	N	AE	1/1977
Stony Brook	Southborough, Town of	Confluence with Sudbury River in Middlesex County	Approximately 100 feet upstream of Deerfoot Road	01070005	4.8		N	AE	10/2012
Stony Brook Tributary 2	Southborough, Town of	Confluence with Sudbury Reservoir	Approximately 4,400 feet upstream of confluence with Sudbury Reservoir	01070005	0.8		Y	AE	11/1979
Sudbury River	Southborough, Town of; Westborough, Town of	Confluence with Concord River in Middlesex County	Approximately 200 feet upstream of Interstate 495 in Westborough	01070005	3.9		Y	AE	10/2012
Sudbury River Split 1	Southborough, Town of	Convergence from Sudbury River	Divergence with Sudbury River	01070005	0.1		Y	AE	10/2012
Sudbury River Tributary 12	Southborough, Town of	Confluence with Sudbury River	Approximately 80 feet upstream of Cordaville Road	01070005	0.2		Y	AE	11/1979
Sullivan Brook	Westborough, Town of	Confluence with Sudbury River	Confluence with Rutters Brook and Jackstraw Brook	01070005	1.9		Y	AE	10/2012

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

Flooding Source	Community	Downstream Limit	Upstream Limit	HUC-8 Sub-Basin(s)	Length (mi) (streams or coastlines)	Area (mi ²) (estuaries or ponding)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Tatnuck Brook	Worcester, City of	Confluence with Beaver Brook	Upstream City of Worcester corporate limits	01090003	4.2		Y	AE	1/1978
Town Meadow Brook	Leicester, Town of	Above confluence with French River	Sargent Pond/Ashwith Pond	01100001	3.6		Y	AE	3/1980
Tributary 1	Dudley, Town of	Upstream from New Pond outlet	Approximately 1,000 feet upstream from Mason Road Ext	01100001	0.7		Y	AE	2/1980
Tributary to Elizabeth Brook	Harvard, Town of	Confluence with Elizabeth Brook	Culvert at Stow Road	01070005	0.6		Y	AE	1/1978
Tributary to Waushacum Brook	West Boylston, Town of	Confluence with Waushacum Brook	Approximately 50 feet downstream of Fairbanks Road	01070004	0.7		Y	AE	5/1988
Tupperware Mill Canal	Blackstone, Town of	Within the Town of Blackstone	Within the Town of Blackstone	01090003	N/A		N	AE	7/1976
Unnamed Tributary	Auburn, Town of	Confluence with Leesville Pond	Rockland Road	01090003	0.6		Y	AE	1/1977
Unnamed Tributary to Mayo Pond	Millbury, Town of	Confluence with Mayo Pond/ Singletary Brook	Millbury/Sutton corporate limits	01090003	0.4		Y	AE	1/1978
Walker Pond	Sturbridge, Town of	Walker Pond Dam	Approximately 1.38 miles above Walker Pond Dam	01100001	1.5		N	AE	11/1980
Waushacum Brook	West Boylston, Town of	Approximately 150 feet upstream of its Confluence with Wachusett Reservoir	Boylston/Sterling River	01070004	1.0		Y	AE	5/1988
Weasel Brook	Worcester, City of	Boston and Maine Railroad	Brooks Street	01090003	1.2		N	AE, AH, AO	1/1978

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

Flooding Source	Community	Downstream Limit	Upstream Limit	HUC-8 Sub-Basin(s)	Length (mi) (streams or coastlines)	Area (mi ²) (estuaries or ponding)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
West Brook	Shrewsbury, Town of	Culvert entrance before Oregon Avenue	Approximately 1,000 feet upstream of Main Street	01090003	1.5		Y	AE	3/1978
West River	Grafton, Town of; Upton, Town of	Hartford Avenue	Approximately 2,700 feet upstream of Silver Lake Dam	01090003	3.4		Y	AE	11/1989
West River (Town of Uxbridge)	Uxbridge, Town of	Confluence with Blackstone River	West Hill Dam	01090003	4.3		Y	AE	8/1980
Whitins Pond	Sutton, Town of	Within the Town of Sutton	Within the Town of Sutton	01090003		0.3	N	AE	11/1980
Wrack Meadow Brook	Berlin, Town of	Confluence with North Brook	Berlin/Boylston corporate limit	01070005	0.9		Y	AE	11/1977
Zone A Flooding Sources – Concord River HUC-8 watershed	Berlin, Town of; Bolton, Town of; Boylston, Town of; Clinton, Town of; Harvard, Town of; Northborough, Town of; Shrewsbury, Town of; Southborough, Town of; Westborough, Town of	See FIRMs	See FIRMs	01070005	63		N	A	10/2012

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

Flooding Source	Community	Downstream Limit	Upstream Limit	HUC-8 Sub-Basin(s)	Length (mi) (streams or coastlines)	Area (mi ²) (estuaries or ponding)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Zone A Flooding Sources – Miscellaneous streams and ponds	Auburn, Town of; Blackstone, Town of; Boylston, Town of; Clinton, Town of; Douglas, Town of; Grafton, Town of; Harvard, Town of; Lancaster, Town of; Leicester, Town of; Mendon, Town of; Milford, Town of; Millbury, Town of; Northbridge, Town of; Paxton, Town of; Shrewsbury, Town of; Spencer, Town of; Sutton, Town of; Upton, Town of; Uxbridge, Town of; West Boylston, Town of; Worcester, City of	See FIRMs	See FIRMs	01070004 01070006 01080204 01090001 01090003		21	N	A	1977-2003
Zone A Flooding Sources – French River, Mill Brook, Quinebaug River	Oxford, Town of; Southbridge, Town of; Sturbridge, Town of; Webster Town of	See FIRMs	See FIRMs	01100001	10.2		N	A	10/2019
Zone A Flooding Sources – Quinebaug HUC-8 watershed	Auburn, Town of; Charlton, Town of; Douglas, Town of; Dudley, Town of; Leicester, Town of; Oxford, Town of; Southbridge, Town of; Spencer, Town of; Sturbridge, Town of; Webster Town of;	See FIRMs	See FIRMs	01100001 01090003	105.8		N	A	7/2019

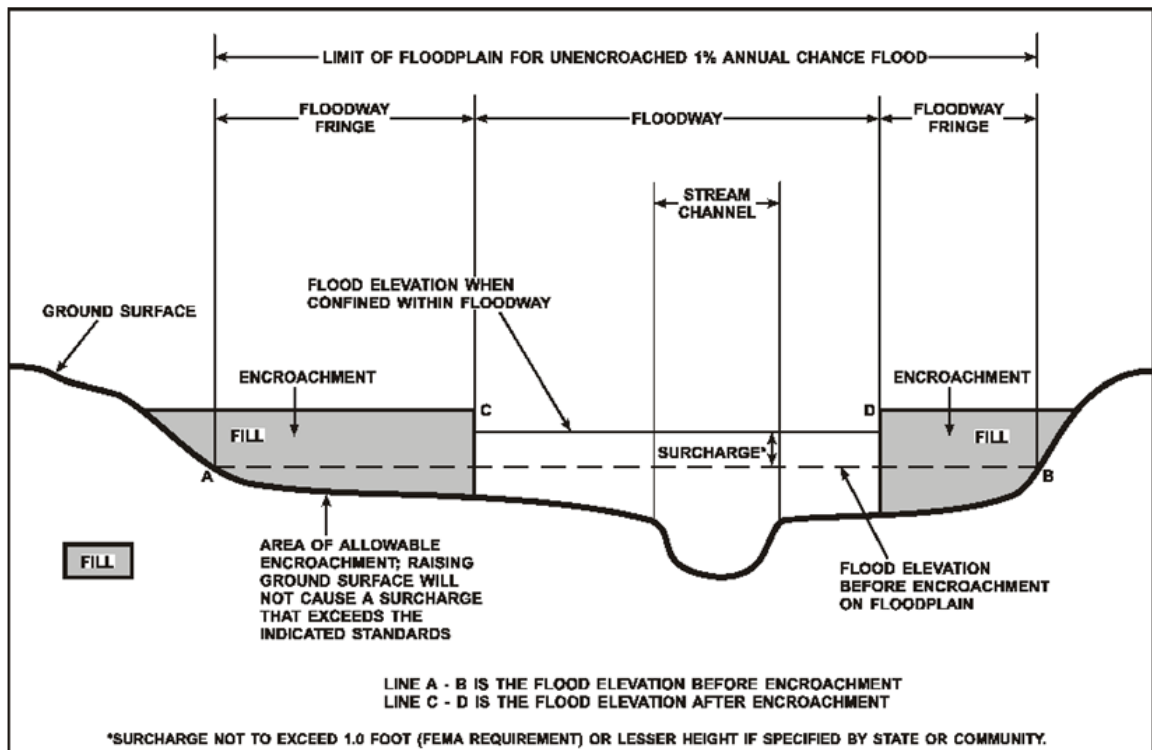
2.2 Floodways

Encroachment on floodplains, such as structures and fill, reduces flood-carrying capacity, increases flood heights and velocities, and increases flood hazards in areas beyond the encroachment itself. One aspect of floodplain management involves balancing the economic gain from floodplain development against the resulting increase in flood hazard.

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

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

Figure 4: Floodway Schematic



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

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

2.3 Base Flood Elevations

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

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

2.4 Non-Encroachment Zones

This section is not applicable to this Flood Risk Project.

2.5 Coastal Flood Hazard Areas

This section is not applicable to this Flood Risk Project.

2.5.1 Water Elevations and the Effects of Waves

This section is not applicable to this Flood Risk Project.

Figure 5: Wave Runup Transect Schematic

[Not applicable to this Flood Risk Project]

2.5.2 Floodplain Boundaries and BFEs for Coastal Areas

This section is not applicable to this Flood Risk Project.

2.5.3 Coastal High Hazard Areas

This section is not applicable to this Flood Risk Project.

Figure 6: Coastal Transect Schematic

[Not applicable to this Flood Risk Project]

2.5.4 Limit of Moderate Wave Action

This section is not applicable to this Flood Risk Project.

SECTION 3.0 – INSURANCE APPLICATIONS

3.1 National Flood Insurance Program Insurance Zones

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

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

Table 3 lists the flood insurance zones in Worcester County.

Table 3: Flood Zone Designations by Community

Community	Flood Zone(s)
Auburn, Town of	A, AE, X
Berlin, Town of	A, AE, X
Blackstone, Town of	A, AE, X
Bolton, Town of	A, AE, X
Boylston, Town of	A, AE, X
Charlton, Town of	A, AE, X
Clinton, Town of	A, AE, X
Douglas, Town of	A, AE, X
Dudley, Town of	A, AE, X

Table 3: Flood Zone Designations by Community (continued)

Community	Flood Zone(s)
Grafton, Town of	A, AE, X
Harvard, Town of	A, AE, X
Hopedale, Town of	AE, X
Lancaster, Town of	A, AE, X
Leicester, Town of	A, AE, X
Mendon, Town of	A, AE, X
Milford, Town of	A, AE, X
Millbury, Town of	A, AE, X
Millville, Town of	AE, X
Northborough, Town of	A, AE, X
Northbridge, Town of	A, AE, X
Oxford, Town of	A, AE, X
Paxton, Town of	A, X
Shrewsbury, Town of	A, AE, X
Southborough, Town of	A, AE, X
Southbridge, Town of	A, AE, X
Spencer, Town of	A, AE, X
Sturbridge, Town of	A, AE, X
Sutton, Town of	A, AE, X
Upton, Town of	A, AE, X
Uxbridge, Town of	A, AE, X
Webster, Town of	A, AE, X
West Boylston, Town of	A, AE, X
Westborough, Town of	A, AE, X
Worcester, City of	A, AE, AH, AO, 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)
Blackstone	01090003	Blackstone River	Inland basins draining to Blackstone River.	474
Charles	01090001	Atlantic Ocean	Coastal land along Massachusetts Bay drained by Charles River and other small coastal rivers and streams between the mouth of Merrimack River to the north and Cape Cod Bay drainages to the south	1,013
Chicopee	01080204	Chicopee River	Inland basins draining to Chicopee River	723
Concord	01070005	Concord River	Inland basins draining to Concord River	400
Merrimack River	01070006	Merrimack River	Inland basins draining to Merrimack River from mouth at Atlantic Ocean to headwaters at confluence of Pemigewasset River and Winnepesaukee River, not including basins of Contoocook River, Nashua River, and Concord River	1,801
Nashua	01070004	Nashua River	Inland basins draining to Nashua River	532
Quinebaug	01100001	Quinebaug River	Inland basins draining to Quinebaug River	739
Shetucket	01100002	Shetucket River	Inland basins draining to Shetucket River	526

4.2 Principal Flood Problems

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

Table 5: Principal Flood Problems

Flooding Source	Description of Flood Problems
Miscellaneous within Worcester County	<p>Past flooding on the streams within Worcester County indicates that flooding can occur during any season of the year. Most major floods have occurred during the spring, fall and winter seasons. Floods occurring in early spring are usually a result of snowmelt and heavy rains. Floods occurring during midsummer and fall are often associated with tropical storms moving up the Atlantic coastline. "Northeaster" storms generate very strong winds and heavy rain or snow and are one of the frequent causes of flooding. The most significant floods in this century were caused by the hurricanes of September 1938, August 1955, and September 1960, and the storms of November 1927, March 1936, November 1953, March 1963, and March 1968.</p> <p>Severe flooding in Worcester County generally occurs as a result of hurricanes or melting snows and spring rains, with more localized flooding caused by summer thunderstorms. Heavy thunderstorms can result in rapid runoff and flooding in the downstream portions of the small streams. Flood elevations in this region can also be raised by ice jams or by the accumulation of uprooted trees and other debris at bridges.</p> <p>Severe effects from the August 1955 flood were felt in many Worcester County communities. During the August 1955 flood, the flood of record was measured at USGS Survey Station No. 01109500, on Kettle Brook (East) in the City of Worcester. This flood had an approximately 1% annual chance flood. The Blackstone River attained a discharge of approximately 29,500 cfs.</p>
Charles River	<p>Charles River has caused flooding issues in Worcester County over the years as a result of hurricanes, snow melt combined with spring rains, and summer thunderstorms. The notable flood events along Charles River were the March 1936 snow melt and rainfall event, July 1938 rainfall event, August 1955 - two successive hurricanes in a one week span, March 1968 snow melt and rainfall event, and spring 2010 which involved three large rainfall events over a five week period. Some bridges were overtopped and numerous roads in low-lying areas along the river were flooded. The July 1938, August 1955, and March 1968 flood events were about at a 2-percent annual chance flood, and the spring 2010 event was about a 4-percent annual chance flood, based on peak-flow data at the USGS Charles River at Dover streamgage (01103500). At the USGS Charles River at Waltham streamgage (01104500) further downstream, the spring 2010 event was about a 1-percent annual chance flood, and the 1938, 1955, and 1968 were between a 20- and 10- percent annual chance flood.</p>
French River	<p>The maximum recorded discharge on the French River near Dudley occurred on August 19, 1955 when a flow of 14,400 cfs produced a flood elevation of 432.09 feet on the French River. The maximum recorded discharge on the French River since the operation of two USACE dams occurred on April 2, 1960 when a flow of 1,020 cfs produced a flood elevation of 413.60 feet (Reference 12).</p>
Quinebaug River	<p>The maximum recorded discharge near Dudley occurred on August 19, 1955 when a flow of 49,300 cfs produced a flood elevation of 359.78 feet on the Quinebaug River.</p>

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

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

4.3 Non-Levee Flood Protection Measures

Table 7 contains information about non-levee flood protection measures within Worcester 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
Cedar Meadow Brook, Cohasse Brook, Deans Brook, French River, Hamant Brook, Lake Webster, Lebanon Brook, Little Nugget Brook, Lowes Brook, Quinebaug River, Town Meadow Brook, Walker Pond	N/A	Dam	Various locations	These structures do not provide significant flood protection.

4.4 Levees

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

Levee systems that are determined to reduce the risk from the 1-percent-annual-chance flood are accredited by FEMA. FEMA can also grant provisional accreditation to a levee system that was previously accredited on an effective FIRM and for which FEMA is awaiting data and/or documentation to demonstrate compliance with Section 65.10. These levee systems are referred to as Provisionally Accredited Levees, or PALs. Provisional accreditation provides communities and levee owners with a specified timeframe to obtain the necessary data to confirm the levee’s certification status. Accredited levee systems and PALs are shown on the FIRM using the symbology shown in Figure 3 and in Table 8.

If the required information for a PAL is not submitted within the required timeframe, or if information indicates that a levee system no longer meets Section 65.10, FEMA will de-accredit the levee system and issue an effective FIRM showing the levee-impacted area as a SFHA.

FEMA coordinates its programs with USACE, who may inspect, maintain, and repair levee systems. The USACE has authority under Public Law 84-99 to supplement local efforts to repair flood control projects that are damaged by floods. Like FEMA, the USACE provides a program to allow public sponsors or operators to address levee system maintenance deficiencies. Failure to do so within the required timeframe results in the levee system being placed in an inactive status in the USACE Rehabilitation and Inspection Program. Levee systems in an inactive status are ineligible for rehabilitation assistance under Public Law 84-99.

FEMA coordinated with the USACE, the local communities, and other organizations to compile a list of levees that exist within Worcester County. Table 8, "Levees," lists all accredited levees, PALs, and de-accredited levees shown on the FIRM for this FIS Report. Other categories of levees may also be included in the table. The Levee ID shown in this table may not match numbers based on other identification systems that were listed in previous FIS Reports. Levees identified as PALs in the table are labeled on the FIRM to indicate their provisional status.

Please note that the information presented in Table 8 is subject to change at any time. For that reason, the latest information regarding any USACE structure presented in the table should be obtained by contacting USACE and accessing the USACE National Levee Database. For levees owned and/or operated by someone other than the USACE, contact the local community shown in Table 30.

Table 8: Levees

Community	Flooding Source	Levee Location	Levee Owner	USACE Levee	Levee ID	Covered Under PL84-99 Program?	FIRM Panel(s)
Southbridge, Town of	Quinebaug River	Between Cohasse Brook confluence and Cady Brook confluence along western bank	Private	No	1105000092	Unknown	25027C0934F
Auburn, Town of, Millbury, Town of, Worcester, City of	Kettle Brook	N/A	City of Worcester	Yes	4305000060	Unknown	25027C0613E 25027C0614E 25027C0618E 25027C0620E 25027C0801E 25027C0802E 25027C0803E 25027C0804E 25027C0806E 25027C0807E 25027C0808E 25027C0809E

SECTION 5.0 – ENGINEERING METHODS

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

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

In addition to these flood events, the “1-percent-plus”, or “1%+”, annual chance flood elevation has been modeled and included on the flood profile for certain flooding sources in this FIS Report. While not used for regulatory or insurance purposes, this flood event has been calculated to help illustrate the variability range that exists between the regulatory 1-percent-annual-chance flood elevation and a 1-percent-annual-chance elevation that has taken into account an additional amount of uncertainty in the flood discharges (thus, the 1% “plus”).

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. Stream gage information is provided in Table 11.

Table 9: Summary of Discharges

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)					
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	1%+ Annual Chance	0.2% Annual Chance
Assabet River	Approximately 400 feet downstream of Interstate 495	59.0	1,370	*	2,020	2,380	*	3,130
Assabet River	Approximately 250 feet downstream of Bridge Road	57.4	1,350	*	1,990	2,350	*	3,080
Assabet River	Above the confluence with North Brook	40.2	380	*	560	660	*	870
Assabet River	Approximately 100 feet downstream of Interstate 290	40.1	350	*	520	620	*	810
Assabet River	Approximately 375 feet upstream of Robin Hill Street	39.5	1,650	*	2,420	2,860	*	3,760
Assabet River	Approximately 900 feet downstream of Boundary Street	35.3	1,500	*	2,210	2,610	*	3,440
Assabet River	Approximately 400 feet upstream of Boundary Street	35.2	1,500	*	2,210	2,610	*	3,430
Assabet River	Approximately 2,550 feet upstream of Boundary Street	29.9	1,260	*	1,870	2,210	*	2,920
Assabet River	Below Cold Harbor Brook (Lower Reach)	29.7	860	*	1,490	1,850	*	2,970
Assabet River	Below Hop Brook	16.8	631	*	1,070	1,321	*	2,090
Assabet River	At Northborough/Westborough Corporate Limits	8.8	532	*	882	1,007	*	1,667
Assabet River (Lower Reach)	Below Dam in Westborough	6.9	368	*	605	736	*	1,130
Assabet River (Upper Reach)	At Assabet Reservoir in Westborough	1.3	54	*	86	114	*	178
Assabet River Branch No. 2	Northeast corporate limit in Berlin	2.0	92	*	138	159	*	220
Axtell Brook	At confluence with Lake Ripple	2.0	99	*	150	176	*	397

*Not calculated for this Flood Risk Project

Table 9: Summary of Discharges (continued)

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)					
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	1%+ Annual Chance	0.2% Annual Chance
Axtell Brook	At downstream side of Massachusetts Turnpike in Grafton	1.3	72	*	108	126	*	247
Beaver Brook	At the confluence with Curtis Pond Outflow and Middle River in Worcester	61.5	2,390	*	3,560	4,140	*	5,360
Beaver Brook	At Main Street in Worcester	10.8	1,430	*	2,330	2,700	*	3,450
Beaver Brook	At Maywood Street in Worcester	3.9	448	*	597	676	*	916
Beaver Brook	At May Street in Worcester	3.6	409	*	546	619	*	840
Beaver Brook	At Chandler Street in Worcester	3.1	337	*	453	513	*	700
Bennetts Brook	At the downstream Harvard corporate limits	2.6	120	*	180	210	*	280
Bennetts Brook	2,800 feet upstream of the Harvard/Ayer corporate limits	1.9	80	*	130	150	*	200
Big Bummet Brook	Upstream of confluence with Quinsigamond River	4.3	260	*	440	540	*	840
Big Bummet Brook	Upstream of Westborough Road in Grafton	2.6	180	*	310	380	*	590
Big Bummet Brook	At Shrewsbury Corporate Limits	2.5	169	*	289	355	*	556
Big Bummet Brook	At State Highway 140 in Shrewsbury	1.2	110	*	191	236	*	372
Blackstone River	At downstream end of Tupperware Mill Canal in Town of North Smithfield	358.0	9,520	*	14,900	17,600	*	24,900
Blackstone River	Just above Saranac Dam in Town of Blackstone	358.0	9,920	*	15,500	18,300	*	25,900
Blackstone River	Just upstream of confluence with Branch River	269.2	7,600	*	11,900	14,100	*	19,900
Blackstone River	Just above Tupperware Mill Dam in Town of Blackstone	269.0	8,000	*	12,500	14,800	*	20,900

*Not calculated for this Flood Risk Project

Table 9: Summary of Discharges (continued)

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)					
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	1%+ Annual Chance	0.2% Annual Chance
Blackstone River	Just downstream of Millville/Blackstone corporate limits	260.2	7,810	*	12,200	14,400	*	20,400
Blackstone River	Just upstream of Uxbridge/Millville corporate limits	256.0	7,710	*	12,100	14,200	*	20,100
Blackstone River	Just upstream of confluence with Bacon Brook	253.6	7,660	*	12,000	14,100	*	20,000
Blackstone River	Just upstream of confluence with Emerson Brook	244.0	7,440	*	11,700	13,700	*	19,400
Blackstone River	Just upstream of confluence with West River (Town of Uxbridge)	205.3	6,540	*	10,200	12,100	*	17,100
Blackstone River	Just upstream of confluence with Mumford River	148.3	4,220	*	6,540	7,730	*	11,000
Blackstone River	Approximately 3,800 feet upstream of Northbridge/Uxbridge corporate limit	146.0	4,170	*	6,470	7,640	*	10,900
Blackstone River	At confluence of Riverdale Mills sluice gates and tail race in the Town of Northbridge	*	4,080	*	6,330	7,480	*	10,700
Blackstone River	At divergence of Riverdale Mills sluice gates and tail race in the Town of Northbridge	*	3,535	*	5,215	6,213	*	9,212
Blackstone River	Just upstream of Riverdale Mills sluice gates and tail race in the Town of Northbridge	142.0	4,080	*	6,330	7,480	*	10,700
Blackstone River	Just upstream of Main Street Bridge (State Route 122)	139.0	4,020	*	6,230	7,360	*	10,500
Blackstone River	Approximately 600 feet downstream of Grafton/Northbridge corporate limits	137.0	3,970	*	6,170	7,280	*	10,400

*Not calculated for this Flood Risk Project

Table 9: Summary of Discharges (continued)

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)					
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	1%+ Annual Chance	0.2% Annual Chance
Blackstone River	Just upstream confluence of Quinsigamond River	96.0	3,050	*	5,660	7,220	*	12,300
Blackstone River	Just upstream of Pleasant Street bridge and Cronin Brook confluence in Grafton	94.0	3,010	*	5,580	7,110	*	12,100
Blackstone River	Just upstream of confluence with Cold Spring Brook in Town of Sutton	86.0	2,810	*	5,220	6,650	*	11,300
Blackstone River	At Millbury/Sutton corporate limits	85.0	2,790	*	5,170	6,590	*	11,200
Blackstone River	Just upstream of confluence with Dorothy Brook in Town of Millbury	77.8	2,610	*	4,840	6,170	*	10,500
Blackstone River	Just upstream of confluence with Singletary Brook	71.4	2,450	*	4,540	5,780	*	9,830
Blackstone River	At Worcester/Millbury corporate limits	63.4	2,240	*	4,150	5,290	*	9,010
Bowers Brook	At the Harvard downstream corporate limits	10.7	370	*	980	1,120	*	2,230
Bowers Brook	At the confluence of Cold Spring Brook	9.1	290	*	720	810	*	1,530
Bowers Brook	Upstream of Old Mill Road in Harvard	8.6	430	*	1,120	1,250	*	2,240
Bowers Brook	At Cruft Lane in Harvard	7.5	330	*	870	980	*	1,750
Bowers Brook	Downstream of Ayer Road in Harvard	5.2	130	*	380	440	*	810
Bowers Brook	At the confluence with Bare Hill Pond in Harvard	1.2	70	*	100	110	*	150
Broad Meadow Brook	At Worcester/Millbury corporate limits	2.1	246	*	333	378	*	523
Broad Meadow Brook	At Worcester/Millbury corporate limits	2.1	246	*	333	378	*	523

*Not calculated for this Flood Risk Project

Table 9: Summary of Discharges (continued)

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)					
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	1%+ Annual Chance	0.2% Annual Chance
Broad Meadow Brook	At U.S. Route 20 in Worcester	2.1	246	*	332	377	*	520
Broad Meadow Brook	At upstream end of culvert near Woodcliff Avenue in Worcester	1.5	225	*	302	341	*	464
Broad Meadow Brook	At intersection of Indiana Street and Everton Avenue in Worcester	0.8	174	*	231	260	*	349
Cady Brook	At the confluence with Quinebaug River in Southbridge	12.9	1,130	*	3,000	4,200	*	8,400
Cady Brook	At the downstream corporate limits in Charlton	11.1	1,015	*	2,690	3,765	*	7,530
Cady Brook	Upstream of confluence of stream from Prindle Lake in Charlton	9.8	925	*	2,450	3,435	*	6,865
Cady Brook	Upstream of confluence of stream from Sibley Ponds in Charlton	4.9	550	*	1,455	2,035	*	4,075
Cedar Meadow Brook	Upstream of Westville Reservoir easement in Sturbridge	1.7	135	*	233	287	*	452
Cedar Pond	Upstream of Westville Reservoir easement in Sturbridge	3.4	181	*	307	376	*	583
Center Brook	At Grove Street bridge in Upton	4.7	180	*	300	360	*	560
Charles River	At Box Pond in Mendon	12.9	430	*	820	1,130	*	1,720
Charles River	At the Hopedale/Mendon corporate limits	11.9	430	*	800	1,130	*	1,670
Charles River	At the Hopedale/Milford corporate limits in Milford	11.9	430	*	800	1,130	*	1,670
Charles River	At the confluence of Godfrey Brook in Milford	9.0	340	*	640	870	*	1,330
Charles River	At Depot Street Bridge in Milford	8.6	330	*	620	850	*	1,290
Charles River	At the head of Cedar Swamp Pond in Milford	3.0	180	*	360	500	*	770

*Not calculated for this Flood Risk Project

Table 9: Summary of Discharges (continued)

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)					
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	1%+ Annual Chance	0.2% Annual Chance
Cohasse Brook	At Chestnut Street	4.3	168	291	409	537	947	1,084
Cohasse Brook	At Lebanon Hill Road	3.7	141	248	353	469	798	974
Cohasse Brook	At outlet of Wells Pond	2.8	107	190	270	362	579	767
Cold Harbor Brook (Lower Reach)	At Hudson Street in Northborough	9.7	387	*	719	919	*	1,474
Cold Harbor Brook (Lower Reach)	At Church Street in Northborough	6.8	216	*	347	410	*	569
Cold Harbor Brook (Lower Reach)	At Lincoln Street in Northborough	6.3	144	*	202	231	*	303
Cold Harbor Brook (Town of Boylston)	At the downstream corporate limits in Boylston	3.9	535	*	710	820	*	1,120
Cold Harbor Brook (Town Of Boylston)	Above Reservoir Road in Boylston	1.3	385	*	615	725	*	1,000
Cold Harbor Brook (Upper Reach)	At Cherry Street in Northborough	5.3	550	*	687	821	*	1,155
Cold Harbor Brook (Upper Reach)	At West Street in Northborough	5.2	540	*	674	805	*	1,133
Cold Harbor Brook (Upper Reach)	At Crawford in Northborough	4.5	493	*	624	740	*	1,034
Cold Harbor Brook (Upper Reach)	At Reservoir in Northborough	4.4	504	*	645	759	*	1,055
Cold Spring Brook (Town of Harvard)	At the confluence with Bowers Brook in Harvard	1.2	160	*	440	490	*	920
Cold Spring Brook (Town of Sutton)	Upstream of confluence with Blackstone River	7.5	360	*	620	760	*	1,170
Counterpane Brook	At confluence with Nashua River in Clinton	5.7	280	*	480	585	*	900

*Not calculated for this Flood Risk Project

Table 9: Summary of Discharges (continued)

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)					
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	1%+ Annual Chance	0.2% Annual Chance
Cronin Brook	At confluence with Blackstone River in Grafton	2.9	127	*	191	224	*	508
Cronin Brook	At southern most crossing of Fitzpatrick Road in Grafton	2.5	111	*	166	194	*	446
Cronin Brook	At northern most crossing of Fitzpatrick Road in Grafton	2.1	96	*	142	165	*	400
Cronin Brook	At Millbury Street in Grafton	1.7	80	*	117	136	*	363
Dark Brook	Upstream of confluence with Mumford River	3.6	230	*	440	570	*	1,030
Dark Brook #1 (Auburn Pond To Central Street)	At Swanson Road	2.1	450	*	670	840	*	1,450
Dark Brook #1 (Auburn Pond To Central Street)	At Water Street	1.0	240	*	360	450	*	780
Dark Brook #2 (Stoneville Pond To Leicester Street)	At Stoneville Pond	2.8	230	*	320	400	*	740
Deans Brook	At the downstream corporate limits in Charlton	7.3	357	*	603	737	*	1,137
Deans Brook	At Blood Road in Charlton	5.9	333	*	565	692	*	1,073
Deans Brook	Downstream of Wabash Brook in Charlton	5.6	346	*	591	724	*	1,126
Deans Brook	Upstream of Wabash Brook in Charlton	3.0	207	*	356	437	*	684
Deans Brook	At McIntyre Pond outlet in Charlton	2.6	190	*	326	401	*	628
Denny Brook	At the confluence with Jackstraw Brook	1.1	140	*	210	250	*	330
Denny Brook	Approximately 1,250 feet downstream of South Street	0.6	100	*	160	180	*	240

*Not calculated for this Flood Risk Project

Table 9: Summary of Discharges (continued)

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)					
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	1%+ Annual Chance	0.2% Annual Chance
Denny Brook	At South Street in Westborough	0.6	54	*	95	117	*	187
Denny Brook Tributary 1	At confluence with Denny Brook	0.4	70	*	100	120	*	160
Dorothy Brook	At confluence with Blackstone River in Millbury	4.1	255	*	460	520	*	640
Dorothy Pond	At outflow structure in Millbury	3.4	155	*	405	565	*	1,334
Dunn's Brook (Kettle Brook To Auburn Pond)	At confluence with Kettle Brook (Town of Auburn)	11.4	1,025	*	1,500	1,900	*	3,300
Elizabeth Brook	At the downstream corporate limits in Harvard	6.5	110	*	210	220	*	590
Elizabeth Brook	At Eldridge Road in Harvard	4.6	210	*	340	400	*	560
Elizabeth Brook	At Interstate 495 in Harvard	4.4	230	*	380	450	*	620
Elizabeth Brook	At the upstream corporate limits in Harvard	1.1	90	*	160	190	*	260
French River	Approximately 120 feet upstream of Perryville Road	93.5	1,600	2,334	2,966	3,682	5,070	6,739
French River	At Massachusetts State Highway 12	90.5	1,446	2,096	2,670	3,267	4,251	5,611
French River	Approximately 690 feet downstream of North Main Street	82.9	1,079	1,576	2,012	2,468	3,067	3,967
French River	At confluence with French River Trib2	68.3	872	1,347	1,713	2,068	2,637	3,237
French River	At confluence with Little River	58.3	236	339	426	518	546	859
French River	At Hodges Village Dam	30.9	60	65	68	70	54	77
French River	At Interstate Highway 90	20.6	909	1,367	1,757	2,253	3,443	4,138
French River	At Stafford Street	19.5	857	1,221	1,575	2,044	3,130	3,749
French River	At outlet of Greenville Pond	14.6	356	572	767	979	1,493	1,852
Gates Brook	At Boston and Maine Railroad in West Boylston	1.9	211	*	325	384	*	556

*Not calculated for this Flood Risk Project

Table 9: Summary of Discharges (continued)

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)					
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	1%+ Annual Chance	0.2% Annual Chance
Gates Brook	At State Route 140 in West Boylston	1.6	191	*	294	347	*	503
Gates Brook	Above intersection of Worcester Road and Howard Avenue in West Boylston	1.2	159	*	241	282	*	404
Godfrey Brook	At the confluence with the Charles River in Milford	1.7	240	*	350	420	*	650
Godfrey Brook	At the confluence of O'Brien Brook in Milford	1.1	175	*	265	310	*	485
Godfrey Brook	At Water Street in Milford	0.6	110	*	165	195	*	300
Goodridge Brook	At Main Street (State Route 110) in Lancaster	2.8	148	*	229	266	*	360
Great Brook	Downstream of East Bolton Dam in Bolton	8.1	138	*	152	156	*	166
Great Brook	Upstream of East Bolton Dam in Bolton	8.0	292	*	478	573	*	861
Great Brook	East End Road in Bolton	5.2	206	*	330	391	*	575
Great Brook	State Route 117 in Bolton	4.1	167	*	264	310	*	450
Great Brook	Interstate Route 495 Exit Ramp in Bolton	1.8	86	*	130	151	*	212
Great Brook	Main Street, 3rd Crossing in Bolton	1.0	56	*	83	95	*	131
Hamant Brook	Upstream of Westville Reservoir easement in Sturbridge	3.8	191	*	322	394	*	610
Hamant Brook	Approximately 1,000 feet downstream of Hamant Pond in Sturbridge	1.6	81	*	137	168	*	261
Harris Pond	Spillway Discharge (cfs) in Blackstone	*	1,470	*	2,590	3,100	*	4,600

*Not calculated for this Flood Risk Project

Table 9: Summary of Discharges (continued)

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)					
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	1%+ Annual Chance	0.2% Annual Chance
Hop Brook	Approximately 80 feet downstream of Main Street	1.2	150	*	230	280	*	370
Hop Brook	Approximately 350 feet downstream of Brookway Drive	0.3	60	*	100	110	*	150
Hop Brook Tributary 4	At the confluence with Hop Brook	1.8	240	*	360	430	*	560
Hop Brook Tributary 4.1	At the confluence with Hop Brook Tributary 4	0.3	60	*	100	120	*	150
Hop Brook Tributary 5	Approximately 380 feet upstream of Walnut Street	1.3	190	*	290	340	*	450
Hop Brook Tributary 6	Approximately 500 feet downstream of Old Brook Road	0.3	70	*	110	130	*	170
Howard Brook	At Whitney Road in Northborough	2.7	249	*	436	527	*	846
Howard Brook	At Howard Street in Northborough	2.5	295	*	490	585	*	882
Howard Brook	At Church Street in Northborough	1.9	261	*	425	505	*	738
Huckleberry Brook	At the confluence with the Charles River at Cedar Swamp Pond in Milford	3.5	214	*	369	485	*	664
Huckleberry Brook	At the confluence of Ivy Brook in Milford	1.4	115	*	210	270	*	380
Ivy Brook	At the confluence with Huckleberry Brook in Milford	1.5	110	*	190	230	*	360
Ivy Brook	2,000 feet upstream of the confluence with Huckleberry Brook in Milford	1.2	100	*	160	200	*	310
Jackstraw Brook	At the confluence with Sullivan Brook	2.9	280	*	420	490	*	660
Jackstraw Brook	Approximately 270 feet downstream of Hopkington Road	1.7	190	*	290	340	*	460
Jackstraw Brook	Approximately 1,900 feet upstream of Warren Street	0.7	100	*	160	190	*	250

*Not calculated for this Flood Risk Project

Table 9: Summary of Discharges (continued)

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)					
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	1%+ Annual Chance	0.2% Annual Chance
Kettle Brook (East)	At Curtis Pond Outlet in Worcester	32.8	400	*	570	780	*	1,250
Kettle Brook (East)	At USGS Gage Station No. 01109500 in Worcester	31.3	260	*	310	330	*	1,670
Kettle Brook (Town of Auburn)	Interstate Route 290 in Auburn	30.1	950	*	2,100	2,850	*	5,500
Kettle Brook (West)	Between Auburn and Paxton in Worcester	18.1	930	*	2,050	2,770	*	5,380
Leadmine Brook	Upstream of state boundary in Sturbridge	2.9	173	*	295	361	*	562
Leadmine Brook	Upstream of Leadmine Road in Sturbridge	1.4	110	*	189	232	*	366
Lebanon Brook	At the confluence with Quinebaug River in Southbridge	10.0	440	*	740	905	*	1,390
Lebanon Brook	At Old North Woodstock Road in Southbridge	9.4	410	*	685	835	*	1,285
Lebanon Brook	800 feet downstream of Lebanon Hill Road in Southbridge	8.4	365	*	615	750	*	1,150
Little Nugget Brook	At Pikes Pond outlet in Charlton	7.0	382	*	817	1,097	*	2,079
Little Nugget Brook	At Pikes Pond inlet in Charlton	5.2	305	*	653	877	*	1,663
Little Nugget Brook	At Massachusetts Turnpike in Charlton	4.1	254	*	543	729	*	1,383
Little Nugget Brook	At Northside Turnpike in Charlton	3.2	213	*	457	613	*	1,163
Little River	About 400 feet downstream of Turner Road in Charlton	10.5	514	*	1,101	1,478	*	2,803
Little River	At U. S. Route 20 in Charlton	8.6	445	*	952	1,278	*	2,423
Lowes Brook	At the French River in Oxford	8.8	446	*	754	922	*	1,423
Lowes Brook	At Huguenot Road in Oxford	8.0	430	*	730	892	*	1,380
Lowes Brook	At Sutton Brook in Oxford	2.4	173	*	298	366	*	574

*Not calculated for this Flood Risk Project

Table 9: Summary of Discharges (continued)

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)					
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	1%+ Annual Chance	0.2% Annual Chance
Lynde Brook	Above State Route 9 (Main Street) in Leicester	3.0	200	*	343	422	*	660
Mckinstry Brook	At the confluence with Quinebaug River in Southbridge	8.0	405	*	680	835	*	1,285
Meadow Brook	At Oak Street in Shrewsbury	1.4	121	*	210	258	*	408
Middle River	At Worcester corporate limits	61.5	2,390	*	3,560	4,140	*	5,360
Mill Brook (Town of Bolton)	At Hudson/Bolton town line	4.9	190	*	305	362	*	536
Mill Brook (Town of Bolton)	Mill Road	3.5	145	*	226	262	*	360
Mill Brook (Town of Webster)	At the confluence with French River	10.7	163	*	210	233	*	317
Mill Brook Conduit	At Salisbury Pond in Worcester	6.4	903	*	1,144	1,303	*	1,587
Mill Brook Conduit	At Grove Street in Worcester	6.0	792	*	986	1,113	*	1,344
Mill Brook Conduit	At Mill Brook Street in Worcester	5.6	688	*	836	946	*	1,131
Mill Brook Conduit	At West Boylston Terrace in Worcester	5.1	545	*	664	737	*	872
Mill Brook Conduit	At Neponset Street in Worcester	4.5	453	*	542	602	*	705
Mill Brook Conduit	At the confluence with Weasel Brook in Worcester	4.3	414	*	498	554	*	656
Mill Brook Conduit	At the outflow from Indian Lake in Worcester	2.8	78	*	106	143	*	195
Mill Brook Conduit	At the inflow into Indian Lake in Worcester	2.8	603	*	783	860	*	1,152
Mill River	Harris Pond in Blackstone	*	1,470	*	2,590	3,100	*	4,600
Mill River	Above Hop Brook in Blackstone	*	1,300	*	2,250	2,750	*	3,850
Mill River	At the Blackstone/Mendon corporate limits	24.8	1,340	*	2,310	2,800	*	4,400

*Not calculated for this Flood Risk Project

Table 9: Summary of Discharges (continued)

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)					
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	1%+ Annual Chance	0.2% Annual Chance
Mill River	At the confluence of Round Meadow Brook in Mendon	22.3	1,100	*	1,870	2,270	*	3,540
Mill River	At the confluence of Muddy Brook in Mendon	13.7	510	*	830	1,000	*	1,520
Mill River	1,200 feet upstream of Neck Hill Road in Hopedale	13.1	470	*	760	910	*	1,390
Mill River	1,000 feet downstream of Mill Street in Hopedale	12.3	430	*	690	820	*	1,240
Mill River	400 feet upstream of Mendon Street in Hopedale	11.2	360	*	570	680	*	1,010
Mill River	At Hopedale Pond Dam	10.8	340	*	530	630	*	940
Mill River	At the head of Hopedale Pond	5.8	780	*	1,320	1,590	*	2,480
Mill River	Downstream of Milford Street Bridge in Milford	4.4	780	*	1,320	1,590	*	2,480
Mill River	400 feet below Milford Street bridge in Upton	4.4	670	*	1,110	1,330	*	2,070
Mill River	2,000 feet above Milford Street bridge in Upton	3.0	540	*	880	1,050	*	1,620
Mill River	Upstream of Fisk Pond in Milford in Milford	2.2	540	*	880	1,050	*	1,620
Mill River	At Fiske Pond in Upton	2.2	460	*	730	860	*	1,320
Mill River	800 feet upstream of Camp Road Bridge in Milford	1.0	300	*	450	520	*	760
Mill River	800 feet above Camp Road bridge in Upton	0.9	300	*	450	520	*	760
Miscoe Brook	At confluence with Silver Lake (West River) in Grafton	5.6	203	*	310	365	*	652
Miscoe Brook	Downstream of Cider Mill Pond Dam in Grafton	5.4	195	*	296	348	*	616
Miscoe Brook	Downstream of Merriam Road in Grafton	2.9	122	*	183	214	*	475

*Not calculated for this Flood Risk Project

Table 9: Summary of Discharges (continued)

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)					
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	1%+ Annual Chance	0.2% Annual Chance
Miscoe Brook	Downstream of Adams Road in Grafton	1.4	71	*	105	121	*	228
Muddy Brook	At the confluence with the Mill River in Mendon	6.3	350	*	600	740	*	1,140
Muddy Brook	At the confluence with Spring Brook in Mendon	3.8	250	*	420	520	*	800
Muddy Brook	At the George Street bridge in Mendon	2.0	160	*	270	330	*	510
Mumford River	At confluence with Blackstone River in Uxbridge	54.9	1,510	*	2,880	3,740	*	6,750
Mumford River	At confluence of Cold Spring Brook in Uxbridge	51.0	1,430	*	2,730	3,550	*	6,410
Mumford River	At State Route 122 bridge in Uxbridge	50.4	1,430	*	2,730	3,540	*	6,390
Mumford River	At Linwood Pond Dam in Northbridge	49.8	1,420	*	2,700	3,510	*	6,340
Mumford River	At head of Linwood Pond in Northbridge	48.5	1,390	*	2,650	3,440	*	6,200
Mumford River	At Meadow Pond Dam in Northbridge	47.4	1,370	*	2,620	3,400	*	6,130
Mumford River	Below confluence with Whitins Pond in Northbridge	34.3	1,090	*	2,090	2,710	*	4,890
Mumford River	At Uxbridge/Sutton corporate limits	33.3	1,060	*	2,030	2,640	*	4,750
Mumford River	At State Route 146 bridge in Uxbridge	31.6	1,030	*	1,970	2,560	*	4,620
Mumford River	Upstream of Gilboa Pond Dam in Douglas	29.8	990	*	1,880	2,440	*	4,410
Mumford River	Upstream of Charles Street bridge in Douglas	28.4	950	*	1,820	2,370	*	4,270

*Not calculated for this Flood Risk Project

Table 9: Summary of Discharges (continued)

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)					
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	1%+ Annual Chance	0.2% Annual Chance
Mumford River	Upstream of confluence of Centerville Brook in Douglas	23.0	830	*	1,590	2,060	*	3,720
Mumford River	Upstream of confluence of Caswell Brook in Douglas	21.9	800	*	1,530	1,990	*	3,580
Mumford River	Upstream of Douglas/Sutton corporate limits	12.0	520	*	1,000	1,300	*	2,340
Nashua River	At the downstream corporate limits of Harvard/Bolton	183.9	5,400	*	9,100	11,600	*	18,000
Nashua River	Above the confluence with Catacoonamug Brook in Harvard	161.0	5,100	*	8,600	11,800	*	17,000
Nashua River	At State Route 2 in Harvard	154.7	4,300	*	8,600	11,800	*	24,000
Nashua River	At Hudson/Harvard Town Line	153.0	5,200	*	10,000	14,000	*	28,000
Nashua River	At still River Depot Road in Harvard	150.0	5,200	*	10,000	14,000	*	28,000
Nashua River	At Harvard Road Bridge in Lancaster	149.45**	5,200	*	10,000	14,000	*	28,000
Nashua River	0.5 mile downstream of confluence with the North Nashua River in Lancaster	138.89**	6,400	*	13,200	17,900	*	35,100
Nashua River	At the downstream corporate limits in Clinton	113.4	1,100	*	2,900	4,900	*	7,000
Nashua River	At the confluence with the North Nashua River in Lancaster	7.98**	1,100	*	2,900	4,900	*	7,000
North Brook	Stream Mouth in Berlin	16.9	1,217	*	2,036	2,510	*	3,712
North Brook	Whitney Street in Berlin	15.3	1,192	*	1,999	2,460	*	3,636
North Brook	Crosby Street in Berlin	14.4	1,031	*	1,681	2,020	*	2,904
North Brook	Jones Road in Berlin	11.3	666	*	1,042	1,239	*	1,750

* Not calculated for this Flood Risk Project

** Does not include 107 square miles regulated by Wachusett Reservoir

Table 9: Summary of Discharges (continued)

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)					
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	1%+ Annual Chance	0.2% Annual Chance
North Brook	10.0 feet upstream of Linden Street in Berlin	10.3	636	*	970	1,131	*	1,546
North Brook	West Street in Berlin	7.4	1,409	*	2,300	2,736	*	3,825
North Brook	200 feet downstream of Randall Road in Berlin	7.3	1,403	*	2,291	2,725	*	3,810
North Brook	Randall Road in Berlin	3.5	672	*	115	1,336	*	1,889
North Brook	Conrail bridge in Berlin	2.0	494	*	809	963	*	1,253
North Brook	1,000 feet downstream of Asphalt Road in Berlin	1.5	385	*	622	735	*	944
North Nashua River	At the confluence with the Nashua River in Lancaster	130.5	6,060	*	12,350	16,700	*	31,200
North Nashua River	At the Lancaster/Leominster town boundary	107.7	6,000	*	13,000	18,000	*	34,500
O'Brien Brook	At the confluence with Godfrey Brook in Milford	0.4	90	*	130	160	*	240
Piccadilly Brook	At Hopkinton Road in Westborough	1.8	335	*	708	965	*	1,460
Piccadilly Brook	At Westborough Reservoir in Westborough	1.3	280	*	655	930	*	1,420
Pikes Pond Tributary	At Pikes Pond inlet in Charlton	1.6	125	*	267	358	*	679
Pikes Pond Tributary	About 1,200 feet downstream of Conrail right-of-way in Charlton	1.2	98	*	210	282	*	535
Quick Stream	In Town of Blackstone	*	130	*	360	440	*	630
Quinebaug River	At Fabyan Road	157.2	4,216	6,845	9,168	11,641	17,062	21,186
Quinebaug River	At confluence with Quinebaug River Tributary 2	130.2	3,275	5,353	7,296	9,382	14,600	17,255
Quinebaug River	At confluence with Cady Brook	115.8	2,549	4,184	5,741	7,394	9,712	13,666
Quinebaug River	Approximately 580 feet downstream of River Street	102.3	2,108	2,585	3,493	4,488	6,109	8,414
Quinebaug River	At Westville Dam	93.4	2,109	2,109	2,569	3,325	4,729	6,359

*Not calculated for this Flood Risk Project

Table 9: Summary of Discharges (continued)

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)					
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	1%+ Annual Chance	0.2% Annual Chance
Quinebaug River	At Stallion Hill Road	66.0	738	1,171	1,531	1,912	2,333	3,161
Quinebaug River	At East Brimfield Dam	61.8	43	44	45	46	30	48
Quinsigamond River	Upstream of confluence with Blackstone River in Grafton	37.3	650	*	1,105	1,330	*	2,290
Quinsigamond River	5,900 feet upstream of confluence with Blackstone River in Grafton	36.3	630	*	1,065	1,290	*	2,200
Quinsigamond River	Upstream of Pleasant Creek in Grafton	35.1	610	*	1,025	1,230	*	2,100
Quinsigamond River	Upstream of Lake Ripple Dam in Grafton	34.5	650	*	1,090	1,340	*	2,150
Quinsigamond River	Upstream of head of Lake Ripple in Grafton	31.2	570	*	950	1,160	*	1,840
Quinsigamond River	Upstream of confluence Big Bummet Brook in Grafton	28.1	390	*	580	680	*	980
Ramshorn Brook (Town of Auburn)	At Swanson Road in Auburn	8.3	700	*	1,070	1,360	*	2,500
Ramshorn Brook (Town of Auburn)	At Pondville Pond in Auburn	1.9	210	*	340	550	*	1,100
Ramshorn Brook (Town of Millbury)	At confluence with Pondville Pond in Millbury	4.8	760	*	1,210	1,560	*	2,040
Ramshorn Brook (Town of Millbury)	At Carleton Street in Millbury	4.2	465	*	720	950	*	1,280
Ramshorn Brook (Town of Millbury)	At West Main Street in Millbury	3.3	230	*	325	465	*	675
Ramshorn Brook (Town of Millbury)	At outflow structure from Ramshorn Pond in Millbury	2.5	103	*	200	261	*	453
Rawson Hill Brook	At Rawson Hill Dam in Shrewsbury	1.5	45	*	67	85	*	280
Riverdale Mills Sluice Gates And Tail Race	At Riverdale Street in Northbridge	*	445	*	1,075	1,284	*	2,060

*Not calculated for this Flood Risk Project

Table 9: Summary of Discharges (continued)

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)					
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	1%+ Annual Chance	0.2% Annual Chance
Rutters Brook	At the confluence with Sullivan Brook	3.9	360	*	540	640	*	840
Rutters Brook	At the confluence with Rutters Brook Tributary 1.1	1.2	160	*	240	290	*	380
Rutters Brook	Approximately 560 feet downstream of East Main Street	0.7	120	*	180	210	*	280
Rutters Brook Tributary 1	At the confluence with Rutters Brook Tributary 1.1	1.3	170	*	260	300	*	400
Rutters Brook Tributary 1	Approximately 0.8 miles downstream of Walkup Street	1.0	140	*	220	250	*	340
Rutters Brook Tributary 1	Approximately 1,150 feet downstream of Walkup Street	0.3	60	*	100	110	*	150
Rutters Brook Tributary 1.1	At the confluence with Rutters Brook Tributary 1	0.9	120	*	190	220	*	300
Sevenmile River	At Spencer/East Brookfield corporate limits	39.1	1,550	*	2,900	3,800	*	6,150
Sevenmile River	Upstream of the confluence of Cranberry River in Spencer	31.6	1,250	*	2,220	2,880	*	4,520
Sewall Brook	Below Sewall Pond in Boylston	2.7	189	*	325	399	*	624
Sewall Brook	Above Sewall Pond in Boylston	1.7	131	*	226	278	*	426
Sewall Brook	At the dam 2,000 feet below State Route 140 in Boylston	1.2	101	*	175	216	*	340
Singletery Brook	At confluence with Blackstone River in Millbury	6.3	520	*	895	1,040	*	1,380
Singletery Brook	At State Route 146 in Millbury	6.0	430	*	725	820	*	990
Southwick Brook	Upstream of confluence with Mumford River in Douglas	0.9	80	*	140	170	*	280
Stall Brook	At the Milford/Medway town boundary	1.5	100	*	160	200	*	360
Still River	At Hudson/Harvard Town Line	4.1	170	*	250	310	*	450

*Not calculated for this Flood Risk Project

Table 9: Summary of Discharges (continued)

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)					
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	1%+ Annual Chance	0.2% Annual Chance
Stone Brook	At Brook Street in Auburn	1.9	210	*	340	550	*	1,100
Stone Brook	Approximately 3,200 feet downstream of South Street in Auburn	0.6	120	*	190	310	*	610
Stony Brook	Approximately 1,400 feet downstream of Stony Brook Reservoir Dam	22.5	1,240	*	1,820	2,150	*	2,830
Stony Brook	Approximately 1.0 mile upstream of Stony Brook Reservoir Dam	12.7	760	*	1,130	1,340	*	1,770
Stony Brook	Approximately 1,900 feet downstream of Boston Road	12.0	750	*	1,120	1,320	*	1,750
Stony Brook	Approximately 1,600 feet upstream of Boston Road	11.2	720	*	1,070	1,260	*	1,670
Stony Brook	Approximately 1,200 feet downstream of White Bagley Road	10.5	680	*	1,020	1,210	*	1,600
Stony Brook	Approximately 470 feet downstream of Cordaville Road	9.7	670	*	1,000	1,180	*	1,550
Stony Brook	Approximately 830 feet downstream of Parkerville Road	7.9	580	*	870	1,030	*	1,360
Stony Brook Tributary 2	At the Sudbury Reservoir in Southborough	1.3	70	*	100	120	*	150
Sudbury River	Approximately 1,050 feet downstream of Howe Street	23.8	1,290	*	1,890	2,240	*	2,940
Sudbury River	Approximately 190 feet downstream of Cordaville Street	21.4	1,150	*	1,700	2,010	*	2,650
Sudbury River	Approximately 750 feet upstream of Fay Court	19.7	1,130	*	1,670	1,970	*	2,590
Sudbury River	Approximately 140 feet upstream of Fruit Street	18.4	1,080	*	1,590	1,880	*	2,470

*Not calculated for this Flood Risk Project

Table 9: Summary of Discharges (continued)

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)					
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	1%+ Annual Chance	0.2% Annual Chance
Sudbury River Tributary 12	At the confluence with Sudbury River in Southborough	1.4	90	*	130	150	*	200
Sullivan Brook	At Interstate 90/Massachusetts Turnpike	17.6	1,090	*	1,610	1,900	*	2,490
Sullivan Brook	Approximately 0.8 miles upstream of Interstate 495	9.4	680	*	1,010	1,190	*	1,570
Sullivan Brook	Approximately 1.2 miles upstream of Interstate 495	7.0	530	*	800	940	*	1,250
Tatnuck Brook	At Coes Reservoir Outlet in Worcester	10.8	1,430	*	2,330	2,770	*	3,450
Tatnuck Brook	At Patch Reservoir Outlet in Worcester	9.0	1,670	*	2,610	3,120	*	4,250
Tatnuck Brook	At Cook Pond Outlet in Worcester	7.0	1,100	*	1,830	2,250	*	3,300
Town Meadow Brook	Above Greenville Road in Leicester	8.7	452	*	765	935	*	1,444
Town Meadow Brook	Above Pine Street in Leicester	3.6	228	*	389	477	*	743
Town Meadow Brook	Above State Route 9 (Main Street) in Leicester	2.9	184	*	314	385	*	600
Tributary 1	At outlet from New Pond in Dudley	2.0	128	*	219	269	*	420
Tributary 1	At private road upstream of New Pond in Dudley	1.3	89	*	153	188	*	294
Tributary To Elizabeth Brook	At the confluence with Elizabeth Brook in Harvard	2.4	130	*	200	240	*	330
Tributary To Waushacum Brook	At confluence with Waushacum Brook in West Boylston	1.7	140	*	250	310	*	470
Tributary To Waushacum Brook	Upstream of confluence of unnamed brook in West Boylston	0.2	17	*	30	40	*	60
Unnamed Tributary	At Pondville Road in Auburn	0.3	250	*	270	310	*	340

*Not calculated for this Flood Risk Project

Table 9: Summary of Discharges (continued)

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)					
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	1%+ Annual Chance	0.2% Annual Chance
Unnamed Tributary To Mayo Pond	At confluence with Mayo Pond in Millbury	0.6	310	*	540	615	*	745
Walker Pond	Upstream of Massachusetts Turnpike in Sturbridge	3.8	213	*	362	443	*	688
Waushacum Brook	At confluence with Wachusett Reservoir in West Boylston	8.3	235	*	410	520	*	840
Waushacum Brook	Upstream of confluence of Tributary to Waushacum Brook in West Boylston	6.4	95	*	170	210	*	340
West Brook	At Entrance to Culvert in Shrewsbury	3.4	202	*	353	403	*	675
West Brook	At Main Street in Shrewsbury	2.5	174	*	298	366	*	574
West River	At Hartford Avenue bridge in Upton	13.1	560	*	950	1,160	*	1,770
West River	At confluence with Baker Pond in Upton	7.3	370	*	630	770	*	1,170
West River	At Upton/Grafton corporate limits	6.2	330	*	560	680	*	1,040
West River (Town of Uxbridge)	At confluence with Blackstone River in Uxbridge	37.9	510	*	790	940	*	1,400
West River (Town of Uxbridge)	At confluence of Rock Meadow Brook in Uxbridge	34.1	375	*	400	600	*	800
Wrack Meadow Brook	Stream Mouth in Berlin	7.3	1,403	*	2,291	2,725	*	3,810
Wrack Meadow Brook	West Street in Berlin	3.9	740	*	1,199	1,422	*	1,980
Wrack Meadow Brook	Boylston Road in Berlin	3.8	723	*	1,171	1,389	*	1,934

*Not calculated for this Flood Risk Project

Figure 7: Frequency Discharge-Drainage Area Curves

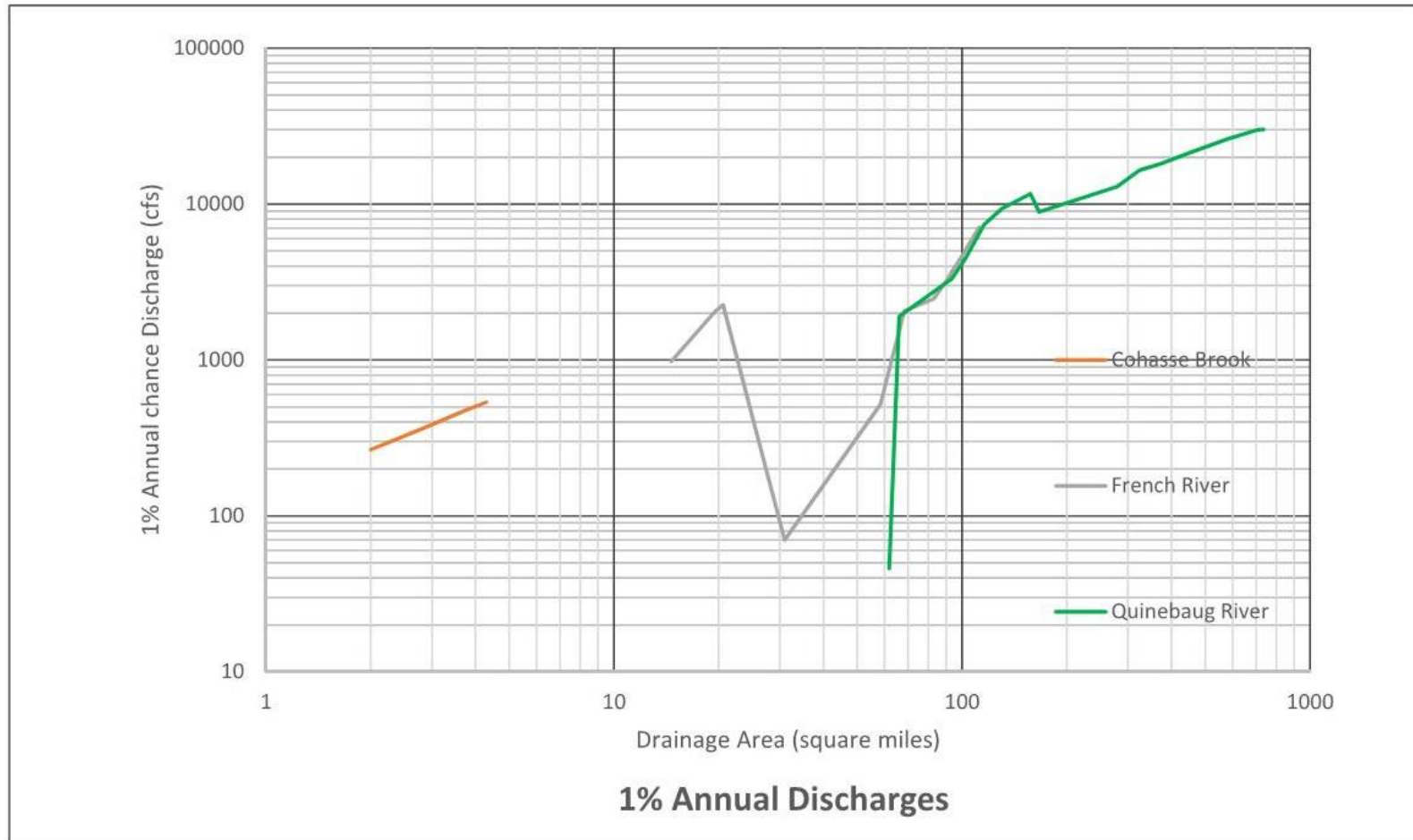


Table 10: Summary of Non-Coastal Stillwater Elevations

Flooding Source	Location	Elevations (feet NAVD88)					
		10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	1%+ Annual Chance	0.2% Annual Chance
Auburn Pond	At Auburn	498.7	*	499.7	500.5	*	502.1
Brierly Pond	At Millbury	518.2	*	518.8	519.0	*	519.5
Curtis Pond	At Worcester	471.4	*	474.5	475.4	*	477.4
Flagg Street Pond	At Worcester	566.0	*	566.3	566.4	*	566.6
Harris Pond	Above railroad embankment	168.9	*	172.7	175.1	*	180.5
Harris Pond	At dam	168.9	*	169.7	170.2	*	171.1
Indian Lake	At Worcester	540.6	*	541.4	542.4	*	542.9
Leesville Pond	Below Interstate 290	485.7	*	485.8	485.9	*	488.5
Leesville Pond	Above Interstate 290	486.6	*	486.8	487.1	*	492.7
Leesville Pond	At Worcester	485.7	*	485.8	485.9	*	488.5
Mill Brook/Lake Webster	At outlet of Lily Pond	477.8	479.0	479.7	480.3	481.7	482.2
Mill Brook Conduit	At Crompton Park	440.3	*	440.8	449.3	*	449.8
Pondville Pond	Above Washington Street	514.4	*	515.7	516.7	*	525.1
Pondville Pond	At Millbury	514.4	*	515.7	516.7	*	525.1
Quacumquasit Pond	Entire shoreline within Webster	602.5	*	604.1	605.6	*	608.2
Saranac Canal	At Saranac Inlet Wall	163.0	*	163.3	171.7	*	176.3
Saranac Canal	At St. Paul Street	161.3	*	161.5	168.5	*	171.0
Saranac Canal	At Blackstone corporate limits	158.7	*	159.6	167.5	*	168.1
Singleary Pond	At Millbury	558.3	*	558.9	559.1	*	559.4
Stoneville Pond	At Auburn	516.3	*	518.4	520.0	*	522.7
Tupperware Mill Canal	At Blackstone corporate limits	196.5	*	198.50	197.8	*	198.1
Tupperware Mill Canal	At Main Street (east crossing)	196.5	*	197.8	197.9	*	198.1
Tupperware Mill Canal	At Main Street (west crossing)	196.5	*	199.0	200.3	*	203.8
Whitins Pond	At Northbridge and Sutton	309.6	*	311.3	311.9	*	314.0

*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
Blackstone River	01110500	USGS	Blackstone River at Northbridge, MA	141	1936	2006
Blackstone River	01112500	USGS	Blackstone River at Woonsocket, RI	416	1929	2006
Browns Brook	01124750	USGS	Browns Brook near Webster, Ma	0.49	3/27/1963	3/13/1977
East Branch Tully River	01165000	USGS	East Branch Tully River near Athol	50.5	1949	1979
French River	01124350	USGS	French River Below Dam, at Hodges Village, Ma	31.2	4/4/1962	10/23/1989
French River	01125000	USGS	French River at Webster, Ma	86	3/19/1936	3/1/1981
Kettle Brook	01109500	USGS	Kettle Brook at Worcester, MA	31.6	1924	1959
Kettle Brook	01109500	USGS	Kettle Brook at Worcester, MA	31.6	1960	1979
Little River	01124500	USGS	Little River Near Oxford, Ma	27.4	4/13/1940	1/31/1990
Mumford River	01111000	USGS	Mumford River at East Douglas, MA	27.8	1966	1979
Nashua River	01096500	USGS	Nashua River at East Pepperell, MA	435	1936	1979
North Nashua River	01094500	USGS	North Nashua River near Leominster, MA	110	1936	1979
Quinebaug River	01123360	USGS	Quinebaug R BI E Brimfield Dam at Fiskdale, Ma	62.6	3/18/1936	2/26/2016

Table 11: Stream Gage Information used to Determine Discharges (continued)

Flooding Source	Gage Identifier	Agency that Maintains Gage	Site Name	Drainage Area (Square Miles)	Period of Record	
					From	To
Quinebaug River	01123500	USGS	Quinebaug River at Westville, Ma	93.6	9/1/1938	4/1/1962
Quinebaug River	01123600	USGS	Quinebaug R BI Westville Dam Nr Southbridge, Ma	94.4	3/30/1963	2/25/2016
Quinsigamond River	01110000	USGS	Quinsigamond River at North Grafton, MA	25.6	1940	1978
West River	01111200	USGS	West River below West Hill Dam near Uxbridge, MA	27.9	1962	1979

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.