



# Discovery Report

Middle Connecticut Watershed, HUC-8 01080201  
Franklin, Hampden, Hampshire and Worcester Counties, Massachusetts and  
Windham County, Vermont

*Communities listed inside cover*

Report Number 01

03/06/2020



## Project Area Community List

Community Name	Community Name	Community Name
<b>State of Massachusetts</b>	<b>State of Massachusetts (Continued)</b>	<b>State of New Hampshire*</b>
<b>Franklin County, MA</b>	<b>Hampshire County, MA</b>	<b>Cheshire County, NH</b>
Town of Bernardston, MA	Town of Amherst, MA	<i>Town of Alstead, NH</i>
Town of Conway, MA	Town of Belchertown, MA	<i>Town of Chesterfield, NH</i>
Town of Deerfield, MA	Town of Chesterfield, MA	<i>Town of Dublin, NH</i>
Town of Erving, MA	City of Easthampton, MA	<i>Town of Fitzwilliam, NH</i>
Town of Gill, MA	Town of Goshen, MA	<i>Town of Gilsum, NH</i>
City of Greenfield, MA	Town of Granby, MA	<i>Town of Harrisville, NH</i>
Town of Leverett, MA	Town of Hadley, MA	<i>Town of Hinsdale, NH</i>
Town of Leyden, MA	Town of Hatfield, MA	<i>Town of Jaffrey, NH</i>
Town of Montague, MA	Town of Huntington, MA	<i>City of Keene, NH</i>
Town of Northfield, MA	Town of Montgomery, MA	<i>Town of Marlow, NH</i>
Town of Shutesbury, MA	City of Northampton, MA	<i>Town of Marlborough, NH</i>
Town of Sunderland, MA	Town of South Hadley, MA	<i>Town of Nelson, NH</i>
Town of Warwick, MA	Town of Southampton, MA	<i>Town of Richmond, NH</i>
Town of Wendell, MA	Town of Westhampton, MA	<i>Town of Roxbury, NH</i>
Town of Whately, MA	Town of Williamsburg, MA	<i>Town of Stoddard, NH</i>
		<i>Town of Sullivan, NH</i>
<b>Hampden County, MA</b>	<b>Worcester County, MA</b>	<i>Town of Surry, NH</i>
City of Chicopee, MA	Town of Pelham, MA	<i>Town of Swanzey, NH</i>
City of Holyoke, MA		<i>Town of Troy, NH</i>
Town of Ludlow, MA	<b>State of Vermont</b>	<i>Town of Winchester, NH</i>
City of Springfield, MA	<b>Windham County, VT</b>	<b>Sullivan County, NH</b>
City of West Springfield, MA	Town of Guilford, VT	<i>Town of Goshen, NH</i>
City of Westfield, MA	Town of Vernon, VT	<i>Town of Lempster, NH</i>
		<i>Town of Washington, NH</i>

*State of New Hampshire\*:* Discovery was completed for communities in the Middle Connecticut Watershed in New Hampshire in August 2017. Information from the prior NH Discovery efforts was incorporated in the stream prioritization. The New Hampshire communities did not receive outreach as part of the 2018-2019 Discovery effort that focused on Massachusetts and Vermont communities.

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## Acronym List

AEP	Annual Exceedance Probability
BFE	Base Flood Elevation
BLE	Base Level Engineering
CID	Community Identification number
CNMS	Coordinated Needs Management Strategy
CRS	Community Rating System
DFIRM	Digital Flood Insurance Rate Map
°F	Fahrenheit
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FIS	Flood Insurance Study
FOA	First Order Approximation
GIS	Geographic Information Systems
HEC-RAS	Hydrologic Engineering Center's River Analysis System
LFD	Letter of Final Determination
LiDAR	Light Detection and Ranging
LOMA	Letter of Map Amendment
LOMC	Letter of Map Change
MAP	Mapping, Assessment and Planning
NFIP	National Flood Insurance Program
NHD	National Hydrography Dataset
NLD	National Levee Database
NRCS	Natural Resources Conservation Service
SOMA	Summary of Map Actions
USGS	United States Geological Survey

## Preface

Through Risk Mapping Assessment and Planning, or Risk MAP, the Federal Emergency Management Agency (FEMA) is collaborating with States, Tribes, and local stakeholders to help make communities safer and stronger by working with them to identify real hazards, actions that can reduce their impact, and available resources and solutions. This report captures the first step in this process—Discovery.

During the Discovery phase, FEMA and the collaborators work to gather community knowledge, apply the best scientific modeling, and begin to look at where the safety of residents and security of communities may be at risk. This report can be used as the community moves forward in identifying and taking risk reducing actions, and FEMA will continue to coordinate and communicate with the Middle Connecticut Watershed communities to identify potential partnership opportunities in the process of building resilience.

This Discovery Report documents the data that has been collected, as well as information on community needs and priorities obtained as a part of Discovery Meetings. It includes a summary of the findings of the first step of the Discovery process including flood mapping priorities.

## I. Discovery Overview

The Discovery process, which identifies the priorities and areas of concern for communities within a watershed, helps FEMA and the communities better understand the projects that may help reduce their risk from natural disasters. Through the Discovery process, FEMA can determine which areas of a watershed may be funded for further flood risk identification and assessment. These can be big decisions for a community, and the Discovery process helps to ensure that FEMA works in a collaborative manner, taking into consideration the information collected from local communities.

During Discovery, FEMA and the State reach out to local communities to:

- Gather information about local flood hazards and risk
- Document needs related to flood hazard mapping and the National Flood Insurance Program (NFIP)
- Involve multi-disciplinary staff from within communities to participate and assist in the identification and mitigation of risk

The result of the Discovery process is the data and community knowledge captured in this Discovery Report, which was used to develop a Risk MAP project scope of work.

## II. General Information

### General Watershed Information

The Middle Connecticut HUC8 Watershed is one of the largest of the 27 Massachusetts watersheds and covers approximately 651,500 acres (1,017 square miles). It drains a substantial portion of central Massachusetts, central to southern New Hampshire, and a small portion of southeastern Vermont. It is comprised of three main river systems: the Connecticut, the Ashuelot and the Mill Rivers. The southern portion of the watershed encompasses Springfield and is heavily urbanized with areas of suburban sprawl. As you travel north through the watershed, the land use changes to more forested and undeveloped land, with areas of agriculture directly adjacent to the Connecticut River. The topography within the watershed is generally characterized by rolling hills and valleys with a mean elevation of 760.37 feet NAVD88, a maximum elevation of 3,164.95 feet NAVD88, and a mean slope of 7.04 degrees. The Middle Connecticut Watershed drains more than 1,017 square miles through 809 total stream miles. The major rivers draining the watershed include the Connecticut, the Ashuelot and the Mill Rivers. The Middle Connecticut Watershed is located at a centroid latitude of 42 degrees (Coordinates of Northfield are 42°41'47.54"N and 72°27'41.58"W, Google Earth, August 2019). The typical climate is an average Winter temperature of 25 degrees Fahrenheit (°F), an average of 67.9°F in the Summer and an average annual precipitation total of 46.4 inches (Northeast Climate Adaptation Center, 2018).

There are 62 communities in seven counties and three states that are within the study area in the Middle Connecticut Watershed. Refer to the report cover and Project Area Community List. The communities of Agawam, Ashfield, and Royalston have very limited portions of the town within the Middle Connecticut watershed and lack a significant flooding source. Therefore, these three communities were omitted from the Discovery Planning Process. According to the 2010 census (U.S. Census, 2010), the 62 communities have a total population of 413,742. Many of the communities have some area outside the watershed, so the total population inside the watershed is likely less. The Middle Connecticut Watershed study area has a population density of about 406.41 people per square mile.

FEMA's Discovery effort in the Middle Connecticut Watershed study area involves data collection, cursory analysis, and community outreach for the purpose of prioritizing work for new engineering analysis (surveying, hydrology, and hydraulics) and floodplain mapping within a limited financial budget. The Discovery process was performed for the New Hampshire portion of the Middle Connecticut watershed in March 2017. This report summarizes the efforts for the Massachusetts and Vermont portions of the Middle Connecticut watershed.

### CNMS Overview

The NFIP Reform Act of 1994 requires FEMA to assess each participating community's flood hazard information on a regular basis. The Coordinated Needs Management Strategy, or CNMS, provides a way for FEMA to track and inventory flood study needs, by community, in a spatial format. Through completing annual State business plans and 5-year map needs assessments, and validating its effective flood risk studies, FEMA is able to maintain a record of stakeholder mapping needs for reference during Discovery, project scoping, and project kickoff. The most recent CNMS validation of effective Zones AE in FEMA Region 1 (New England) was completed in October 2016.

CNMS can show watershed stakeholders where flood hazard information exists that has been “verified” by looking at factors such as the amount of development and physical and hydrological changes in the drainage. Flood mapping needs indicated by CNMS will be verified and adjusted based on input received during the Discovery process, as documented in this report.

Based on previous studies, the rivers and streams within the Middle Connecticut Watershed are currently mapped as Zones A (approximate), AE (detailed), and X. According to CNMS (FEMA, 2016), portions of large rivers and most small rivers totaling 416 miles are currently mapped as Zone A with approximate levels of detail in available flooding information. Approximately 335 stream miles have had detailed studies completed and are mapped as Zone AE.

**Table 1** summarizes the results of the validation status obtained from the CNMS.

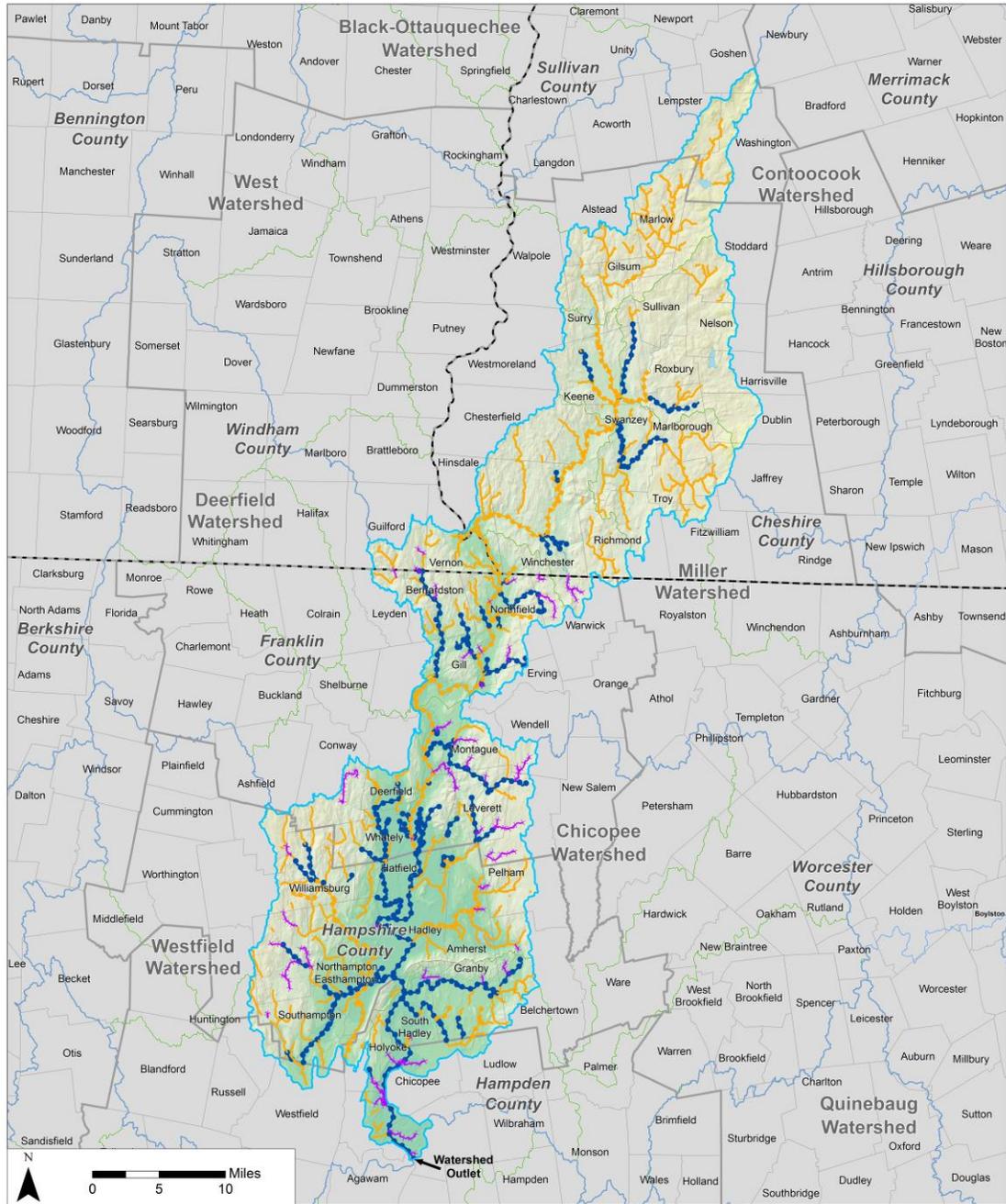
*Table 1. CNMS Validation Status (Distance in Stream Miles)*

	New Hampshire	Massachusetts	Vermont	Total
AE Valid	33.4	176.2	0	209.6
AE Unverified	51.4	74.0	0	125.4
A Unverified	184.0	216.0	16.0	416.0
Unmapped	0	67.1	1.1	68.2
Total				819.2

**Figure 1** shows the current CNMS overview of flood study needs within the Middle Connecticut Watershed plus the additional one mile not from CNMS.

Figure 1. CNMS Overview of Flood Study Needs

# Middle Connecticut Watershed CNMS Overview



**MAP SYMBOLOLOGY**

- |                           |                                |
|---------------------------|--------------------------------|
| Watershed Boundary        | <b>Average Annualized Loss</b> |
| HUC10 Watershed Boundary  | Very Low                       |
| Neighboring Watersheds    | Low                            |
| Water Bodies              | Medium                         |
| Communities               | High                           |
| State Boundary            | Very High                      |
| County Boundary           |                                |
| Valid Study Lines         |                                |
| Unverified AE Study Lines |                                |
| Unverified A Study Lines  |                                |
| Unmapped Study Lines      |                                |

**WATERSHED LOCATOR**



**NATIONAL FLOOD INSURANCE PROGRAM**  
**Discovery Map**  
**MIDDLE CONNECTICUT WATERSHED**

Total Stream Miles:	819 Miles
Valid AE Study Lines:	210 Miles
Unverified AE Study Lines:	125 Miles
Unverified A Study Lines:	416 Miles
Unmapped Study Lines:	68 Miles
Population:	413,742

**FEMA**

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### III. Watershed Community and Stakeholder Coordination

As part of the Discovery process, FEMA reached out to community officials and stakeholders. These stakeholders represent organizations such as government agencies and other associations that are involved with the Middle Connecticut Watershed. Stakeholders included representatives of community emergency officials (police and fire departments), community land use departments, selectmen, and building inspectors. In addition to representatives of the 62 communities within the Middle Connecticut Watershed, the States of New Hampshire, Massachusetts and Vermont were identified as stakeholders. A list of community and stakeholder contacts was prepared and kept current throughout the Discovery process.

Several community contacts were elected officials whose terms may have expired during the Discovery process. Up-to-date contact information was maintained via telephone conversations so that information reached the proper community officials and stakeholder contacts. See **Appendix A** for the most current list of community and stakeholder contacts at the time of this report. The list of communities is shown on the inside cover at the front of this report.

The Discovery process was performed for the New Hampshire portion of the Middle Connecticut watershed in March 2017. This report summarizes the efforts for the Massachusetts and Vermont portions of the Middle Connecticut watershed. The communities and stakeholders were contacted by letter, email, and telephone in the first and second weeks of November 2018 and were invited to participate in data collection questionnaires to be conducted at the Discovery Meetings held on November 27, and November 28, 2018.

Data collection questionnaires were available as an attachment via email and as a hardcopy paper form available at the meeting. Community maps were also available for annotation by community representatives. Of the 39 communities within the watershed in Massachusetts and Vermont, 22 responded by at least one of these means or a regional planning organization provided information on their behalf. The remaining communities provided no response. Meetings were held in Turners Falls, Massachusetts on November 27 and Amherst, Massachusetts, on November 28, 2018. The attendance list, as well as information presented during the meeting (PowerPoint presentation and meeting handouts), are included in **Appendix B**.

## IV. Discovery Meeting

To communicate the Discovery process and include the expertise of key local stakeholders, Discovery Meetings for the Middle Connecticut Watershed were held at the Great Falls Discovery Center at 2 Avenue A, Turners Falls, MA on November 27, 2018 and at the Jones Library at 43 Amity Street, Amherst, MA on November 28, 2018. Twenty of the 39 invited communities were represented at these meetings. Also in attendance were the Franklin Regional Council of Governments and the Pioneer Valley Planning Commission. See **Appendix B** for the attendance list from each meeting.

Identical information was presented at each Discovery Meeting. The community and stakeholder representatives were first introduced to their local FEMA Region I contacts, State partners, and Compass, FEMA's consultant team. The information provided during the meeting included an overview of Risk MAP, a description of the outreach that will occur over the course of the study, the scope of work for the Middle Connecticut Watershed project, and the status of each community's mitigation plan. The communities were informed of the best available data including the following;

- LiDAR (Light Detection and Ranging) elevation data;
- U.S. Geological Survey (USGS) data for peakflows;
- Orthophotography data;
- Natural Resources Conservation Service (NRCS) Dam Rehabilitation Program data;
- USGS Streamgage data; and
- Existing Digital Flood Insurance Rate Maps (DFIRMs).

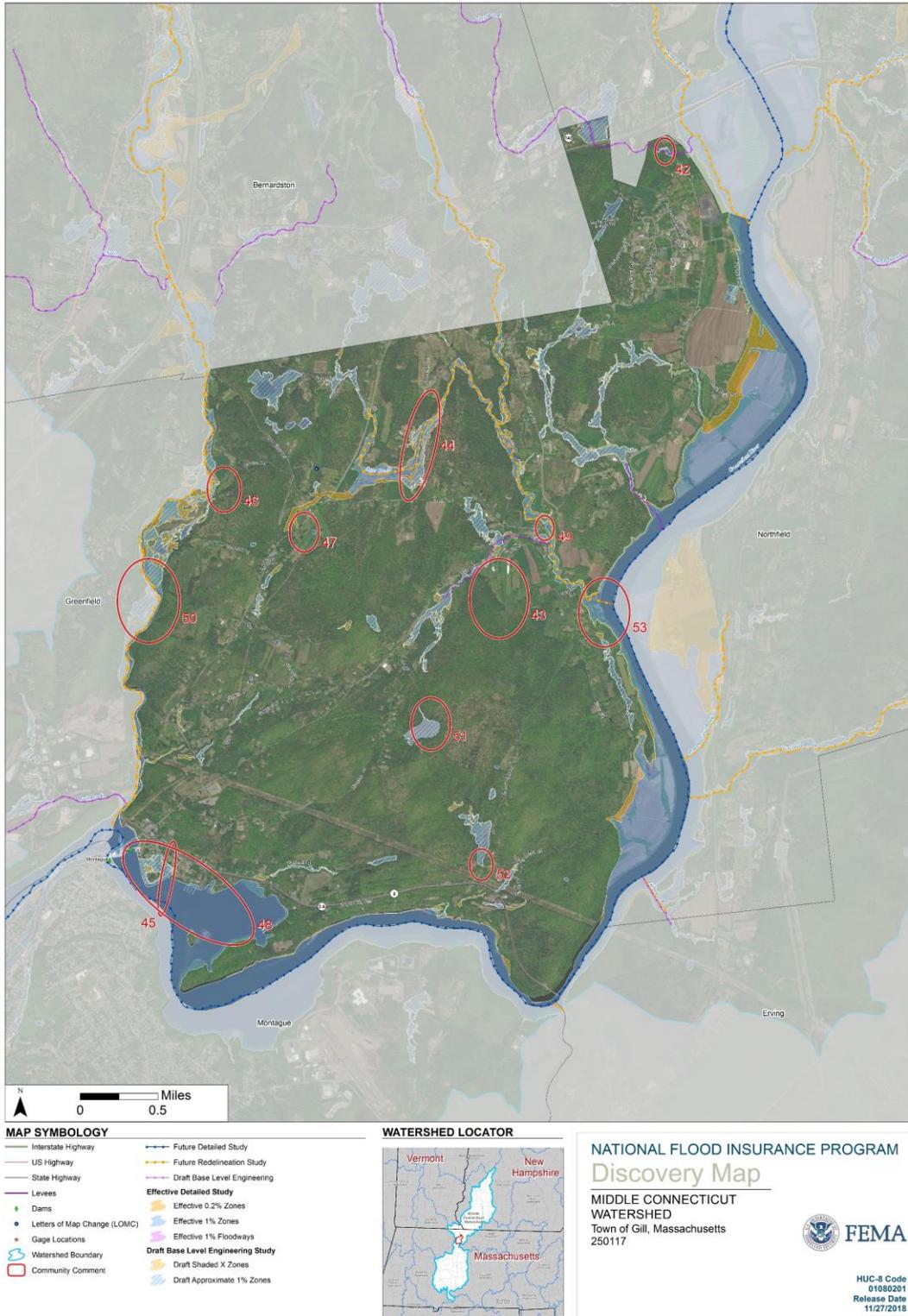
To help the attendees understand the components of the potential flood hazard study for this watershed, the presenters described the three different levels of study that may be used. Each level of study has a different methodology. These methodologies are summarized in Section VI – Next Step: Prioritization of Study Area, which discusses the scope of the Middle Connecticut Watershed study. To further illustrate these study types, each community was given a map showing the Preliminary study designations for the streams in their municipality. **Figure 2** shows the map for the Town of Gill, Massachusetts as an example.

The community representatives in attendance received a Discovery Map to review and indicate their areas of interest. This information was discussed in detail during the Discovery meeting. Communities were encouraged to participate in the outreach meetings that would take place throughout the life of the Risk MAP study and to communicate with FEMA and their local officials, because enhanced communication is one of the primary goals of Risk MAP.

A question and answer session followed the presentation, and attendees broke into groups to review and discuss any areas of interest they wanted to flag for potential study. See **Appendix C** for the Discovery Meeting synopses.

Figure 2. Sample Areas of Interest for Potential Study (Gill, MA)

## Town of Gill - Middle Connecticut Watershed



## V. Data Collection

### Introduction

Data collected by Compass for the Discovery meeting planning process, both during and after completion of the Discovery Meetings, are summarized below. Data are broken into two categories: (1) data that can be used for flood risk projects and (2) other data. Other data include data that provide information that assists in the selection during Discovery of high priority reaches for study in a potential flood risk project but that are likely not useful to the analysis in any other way.

### Data That Can Be Used for Flood Risk Projects

#### *Information Provided by Communities*

Twenty-three communities provided data and/or information during the Discovery process. This was received in several different formats: paper and digital copies of the Discovery Map with written notes, emails, memorandums, verbal feedback, and completed online questionnaires. This included coordination and communication with the City of Amherst and their contractor on an ongoing floodplain mapping effort. The questionnaires completed by communities are provided in **Appendix D**. Information gathered as of February 2019 was included in this report.

Additional information from the 2017 Discovery efforts for communities in New Hampshire was gathered and reviewed. Recommendations from the NH Discovery Report listed proposed stream reaches, proposed study types, study length, number of structures, and number of cross-sections for the portions of New Hampshire within the Middle Connecticut watershed.

#### *Annotated Maps*

The comments and areas of concern collected from the communities at the two Discovery Meetings and other feedback mechanisms were digitized and considered for prioritization. There were 11 areas highlighted for their critical infrastructure, 9 areas of development or other concern, 21 areas of hydraulic or hydrologic importance or change (such as bridge replacements or significantly developed areas), 46 areas impacted by flooding, and 15 areas with requests for new or updated study.

Of the 155 comments logged, 27 were for the Connecticut River from multiple communities in Massachusetts. The comments for the Connecticut River included areas of development, flooding issues, hydraulic changes, and requests for detailed study. In addition, communities provided comments on other flooding sources such the Mill River, Sawmill River, and Hop Brook.

All of the comments will be entered into the CNMS database as requests that will be tracked and updated as new studies are initiated or additional information becomes available.

#### *Community Profiles*

Each community profile (a one-sheet document with information about the community) included the following: Community Identification number (CID); NFIP status; current map date; NFIP regulation level (based on its flood map); number of Letters of Map Change (LOMCs); participation in the NFIP Community Rating System (CRS); dates of Community Assistance Contacts and Community Assistance Visits; demographics and industry information according to the U.S. Census; presidentially declared disasters; NFIP policy data; levees and flood-control structures; environmentally sensitive, Tribal, and coastal areas; and hazard mitigation plans and

grants. See **Appendix E** for Hazard Mitigation Plan status and **Appendix F** for the community profiles for communities in Massachusetts and Vermont.

#### *Letters of Map Change (LOMC)*

Many of the existing Letters of Map Revision (LOMR) in the Middle Connecticut Watershed (NH, MA, and VT) are clustered near rivers, including the Ashuelot River in Winchester and Keene; and the confluence of Ash Swamp Brook and Ashuelot River in Keene and Swanzey. There was also a cluster of LOMCs in Hadley.

If a study is initiated in a community, all LOMCs in the study area will be assessed and communities will be informed if the LOMCs are anticipated to remain in effect or be superseded, first by the Preliminary Summary of Map Actions (SOMA) at a study's preliminary release and then by the Final SOMA, when the Letter of Final Determination (LFD) is issued. When a new study becomes effective, the communities receive a Revalidation Letter that officially indicates which LOMCs are still effective.

#### *Levee Information*

The U.S. Army Corps of Engineers' National Levee Database (NLD) indicates that there are 31 accredited levees in the Middle Connecticut Watershed. Other flood-control structures exist within the Middle Connecticut Watershed, including 146 mapped dams. These may also be assessed in more detail if it is determined that the associated flood sources require further study or restudy.

#### *Topographic Data*

Light Detection and Ranging (LiDAR) elevation data are available for the Middle Connecticut Watershed study area and were used in First Order Approximation (FOA) (described in the Base Level Engineering section below). The source for the Massachusetts LiDAR data was obtained from a report titled Maine and Massachusetts 2015 QL1 and QL2 LiDAR Project Report (March 2018) prepared by Quantum Spatial, Inc. of Lexington, Kentucky on behalf of the USGS. The 2016 Eastern VT Windham County is the source for the LiDAR data for Vermont. A mosaicked LiDAR dataset for the entire watershed was created and will be available for floodplain mapping and analysis in a flood risk project.

#### *Basemap Data*

Transportation, hydrography, and political boundary features shown on the Discovery and Community Information Maps were obtained from the online state Geographic Information System (GIS) depot for Massachusetts (<https://www.mass.gov/service-details/massgis-data-layers>) and Vermont in 2018 (<http://geodata.vermont.gov/>). The hydrography features are sourced from the U.S. Geological Survey's National Hydrography Dataset (NHD). All basemap features will be useful in the FIRM database for a potential flood risk project.

#### *Base Level Engineering*

Base Level Engineering (BLE) FOA is a FEMA initiative, taking place during Discovery, that involves performing an approximate engineering analysis, updated floodplain mapping, and CNMS validation for all Zones A in the watershed (FEMA, 2014). In the Middle Connecticut Watershed study, FOA was performed in part for all Zones A (FEMA, 2016). Updated floodplain mapping was not performed for these zones. The results of the analysis and mapping could be very useful in a potential flood risk project. Current results include water surfaces for the 10, 4, 2, 1, and 0.2

percent Annual Exceedance Probability (AEP) floods for all analyzed reaches. Once generated from the surfaces, the floodplains can be used directly in updated regulatory mapping (e.g., FIRM panels), and the water surfaces and depth grids can be used directly in nonregulatory products to assist with planning. Water surfaces can also be used in the validation of LOMCs that FEMA receives regarding properties that are mapped in Zones A. Currently, it is difficult to determine if a property or structure is actually above the flood level because no numerical water surface is available. With the creation of these new water surfaces, a numerical value for the flood height is now available for comparison with the property and structure elevations to determine the validity of LOMCs.

### **Other Data and information**

#### *Effective Flood Insurance Study/Flood Insurance Rate Map Data*

##### Hydrology

Effective discharges were obtained from the Cheshire County (All Jurisdictions) (Federal Emergency Management Agency 2006), Town of Easthampton (Federal Emergency Management Agency 1979a), Town of South Hadley (Federal Emergency Management Agency 1979d), Town of Vernon (Federal Emergency Management Agency 2007), Hampden County (All Jurisdictions) (Federal Emergency Management Agency 2014), Town of Williamsburg (Federal Emergency Management Agency 1980), Town of Shutesbury (Federal Emergency Management Agency 1979c), and Town of Leverett (Federal Emergency Management Agency 1979b) FIS reports. Generally, effective flows were determined using either regional regression equations or gage analyses. Although the FIS report is dated 2007, the effective flows reported were calculated from earlier studies between 1979 and 1997.

##### Hydraulics

The most notable flooding events for the study reaches in the watershed were floods in March 1936, September 1938, and October 2005. The 1936 event was caused by spring rains and snow melting, whereas the 1938 event was caused by a week of heavy rains followed by a hurricane. The 2005 event was primarily isolated to the New Hampshire portion of the watershed, but represented the greatest discharge over the period of record at multiple gages along the Ashuelot River (No. 01160350 and No. 01157000). The watershed was also impacted by major floods in 1927, 1960, 1969, and 2011.

#### *National Flood Insurance Program Claims Data*

FEMA furnished a dataset of all claims made against the NFIP since its inception in the 1970s until December 31, 2015. In the Massachusetts and Vermont communities in the Middle Connecticut Watershed study area, the data pull returned 368 NFIP claims in that period, totaling \$6,204,839 with an average reimbursement of \$16,960.22 per claim filed.

Often, a successful NFIP claim occurs when a property is flooded that, according to the effective FIRM, is at risk of flooding during the base flood. (The exceptions are claims against “discount” policies for properties that are located outside the Special Flood Hazard Area. The percentage of claims in this category could not be ascertained with the data provided, but is assumed to be small.) Therefore, NFIP claims data cannot be used to draw any conclusions for Discovery about reaches that may be high priorities for restudy because of outdated hydrology, hydraulics, topography, or structure inventories. However, high concentrations of NFIP claims (especially expensive ones)

may draw attention to hotspots where population, structure inventories, and flood hazard are all unusually high, highlighting the high-priority opportunities for mitigation.

NFIP claims hotspots were determined by a point density analysis that calculated the cumulative dollar value of claims within a one-kilometer radius. Note that this analysis does not take the timing of claims into account, so mitigation efforts may have already been undertaken on some or all of these reaches in response to flood events early in the history of the NFIP.

#### *Reach Selection*

By synthesizing the results of all analyses presented above, as well as study age, map age, and risk (how many structures and people are in the effective floodplain), a final list of stream reaches was selected for updated engineering and mapping. **Appendix G** includes figures showing areas of interest for potential study as identified by communities, a community feedback table with numbered comments corresponding to those figures, and a list of the 141 miles of prioritized streams that will be studied in the Middle Connecticut Watershed.

## VI. Next Step: Prioritization of Study Areas

As discussed during the Discovery Meeting, three different levels of study may be used during the study of the Middle Connecticut Watershed: (1) detailed study, (2) approximate study/base level engineering, and (3) redelineation. Information and stakeholder feedback from the 2017 New Hampshire Discovery effort and the 2018 Massachusetts/Vermont Discovery effort were utilized. **Figure 3** shows the type of studies that will be conducted on the streams within the Middle Connecticut Watershed.

Each level of study uses a different methodology, as summarized below:

### (1) Riverine Zone AE (Detailed Study)

- Most detailed and most expensive riverine study
- Structures and cross-sections are field surveyed
- Streamgage data or regression equations used for hydrology, and Hydrologic Engineering Center's River Analysis System (HEC-RAS) modeling used for hydraulics
- Flood way data table and flood profiles are included in the FIS
- Mapping:
  - *Base Flood Elevations (BFEs), appeal eligible*
  - *Cross sections*
  - *Flood way*
  - *1 percent annual exceedance probability (100-year flood) floodplain*
  - *0.2 percent annual exceedance probability (500-year flood) floodplain*

### (2) Riverine Zone A (Base Level Engineering)

- Hydrologic and hydraulic modeling analysis based on new terrain data
- Streamgage data or regression equations used for hydrology, and HEC-RAS modeling used for hydraulics
- No field survey
- Cross-sectional values derived from new LiDAR terrain data
- Mapping: Approximate delineation for the 1-percent annual-chance event, no BFEs
- Also available: Delineations and analysis grids for 0.2-, 2-, 4-, 10-, and 1-percent ± annual-chance events

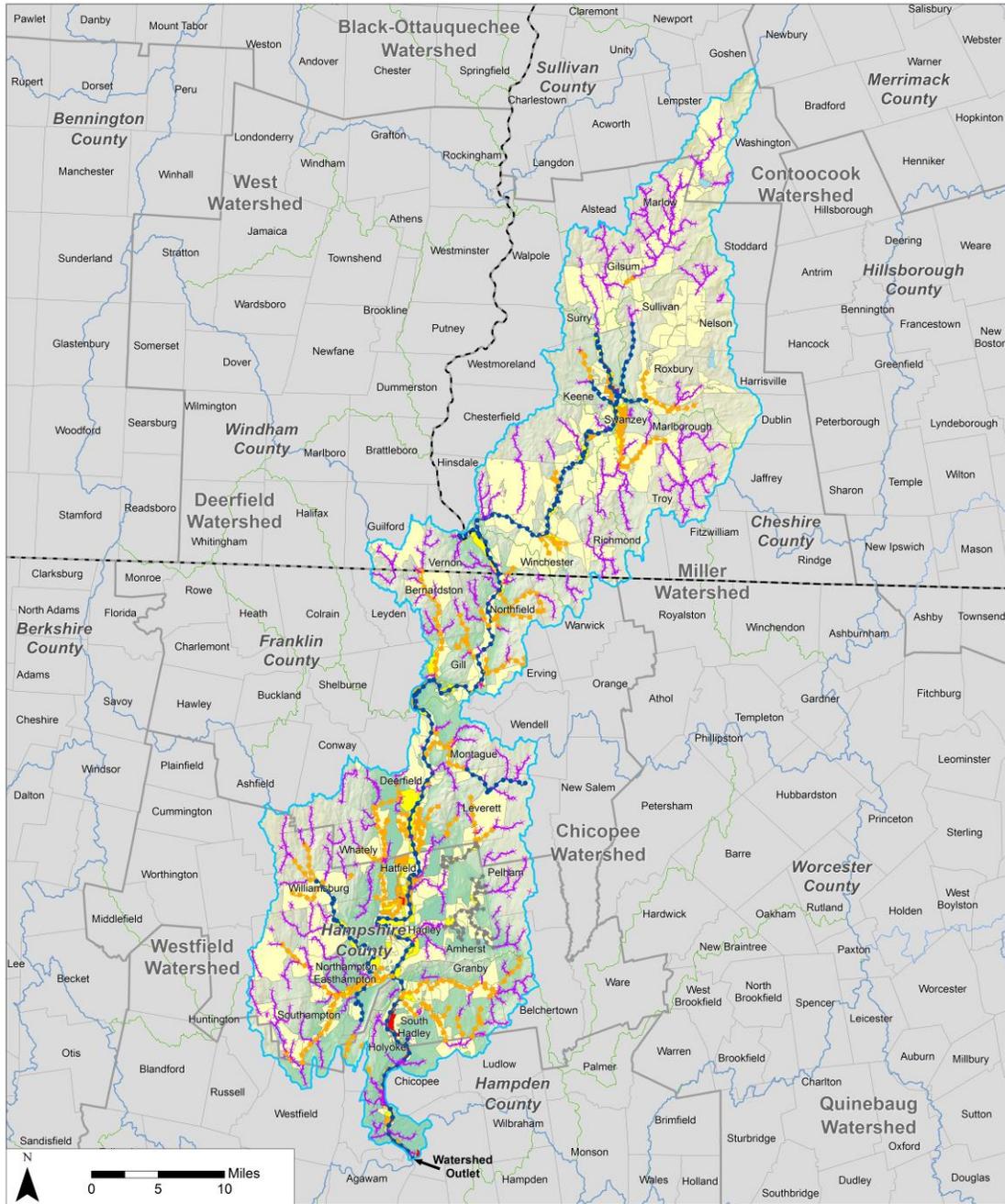
### (3) Redelineation (Zone AE)

- No new engineering analysis
- Acceptable when effective BFEs are considered accurate
- Effective elevation data are transferred to new LiDAR terrain data to create new floodplain delineations for a FIRM
- FIS data: same as effective study

FEMA Region I used the information provided by communities—as shared in this Discovery Report—to help determine priority areas for study in the next phase of the Risk MAP process. The final selection and prioritization of areas for new study depends on the funds that Congress allocates to Region I for this purpose. Additionally, individual communities may choose to conduct their own studies of priority areas and/or take mitigation actions, and provide that information to FEMA Region I for consideration as part of the updated maps the communities may receive in the future.

Figure 3. Discovery Map, Middle Connecticut Watershed

# Middle Connecticut Watershed Prioritization Overview



**MAP SYMBOLOLOGY**

- Watershed Boundary
- HUC10 Watershed Boundary
- Neighboring Watersheds
- Water Bodies
- Communities
- State Boundary
- County Boundary
- High Priority Detailed Study
- Medium Priority Detailed Study
- Draft Approximate Study
- Ongoing Study

- Average Annualized Loss**
- Very Low
  - Low
  - Medium
  - High
  - Very High

**WATERSHED LOCATOR**



**NATIONAL FLOOD INSURANCE PROGRAM**  
**Discovery Map**  
**MIDDLE CONNECTICUT WATERSHED**

<b>Total Stream Miles:</b>	819 Miles
<b>Future Detailed Study (AE):</b>	141 Miles
<b>Future Redefinition Study (AE):</b>	181 Miles
<b>Draft Base Level Engineering (A):</b>	467 Miles
<b>Ongoing Study:</b>	30 Miles
<b>Population:</b>	413,742

**FEMA**

HUC-8 Code: 01080201  
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## VII. Close

Local officials in the Middle Connecticut Watershed communities were willing participants in the Discovery process and were open to learning more about how they can begin to develop resiliency to flood, storm, and manmade hazard events. They identified areas for map updates and areas in which they could use additional technical support from FEMA.

Using the input from the Discovery Meeting, the project team finalized the Discovery Report and Map. From this information, FEMA Region I has developed a scope of work and budget for the Middle Connecticut Watershed Risk MAP project. The Region assessed the mapping needs in the Middle Connecticut Watershed against the mapping needs across the entire Region before selecting and initiating this Risk MAP project. Project selection is contingent upon the level of funding FEMA Region I receives, which varies yearly. FEMA Region I will communicate with the communities about project selections, when appropriate.

If the mapping needs have changed since the information was provided during Discovery, or if the need for a new project is identified after the publication of the Discovery Report, the affected community is responsible for providing updates to the Region. Additionally, if a community has the capacity to provide leveraged data or contribute funding toward the completion of a Risk MAP project, FEMA Region I took that information into consideration when prioritizing its projects.

With the completion of the Discovery process for the Middle Connecticut Watershed project, the project will move into the next phase which includes the following Risk MAP project workflow:

- Data development procedures, which includes engineering-related activities, such as hydrologic and hydraulic analyses, floodplain mapping, and risk assessments
- Development of Preliminary FIRMs, which will be distributed to the communities upon completion of the revisions
- Post-preliminary processing tasks, which include initiating the appeal and comment period, community ordinance updates, and distributing the effective FIRM products
- Outreach meetings and community engagement for the entire project life cycle
- Mitigation planning support for the entire project

## VIII. Literature Cited

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## **IX. Appendices**

### **Appendix A: Watershed Community and Stakeholder Outreach**

- I. Stakeholder Database
- II. Sample Letters
- III. Sample Email
- IV. Sample Post-Meeting Emails
- V. Questionnaire Form

### **Appendix B: Discovery Meeting Materials**

- I. Presentation
- II. Meeting Attendees

### **Appendix C: Meeting Synopses**

### **Appendix D: Community Feedback**

- I. Community Completed Questionnaires

### **Appendix E: Hazard Mitigation Plan Status**

- I. Hazard Mitigation Plan Status

### **Appendix F: Community Profiles**

### **Appendix G: Areas of Interest for Potential Study**

- I. Community Feedback Maps
- II. Community Feedback Table
- III. Stream Prioritization Table



# Appendix A

## Watershed Community and Stakeholder Outreach

# Appendix B

## Discovery Meeting Materials

# Appendix C

## Meeting Synopses

# Appendix D

## Community Feedback

# Appendix E

## Hazard Mitigation Plan Status

# Appendix F

## Community Profiles

# Appendix G

## Areas of Interest for Potential Study