

# Town of Wilbraham

*Massachusetts*



## FLOOD HAZARD MITIGATION PLAN

Prepared under a Grant from the  
Massachusetts Emergency Management Agency  
with assistance of the  
Commonwealth of Massachusetts  
Department of Environmental Management.  
Prepared by  
The Town of Wilbraham  
Flood Mitigation Community Planning Committee

**Wilbraham Emergency Management**

**February 2003**

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WILBRAHAM PLANNING

**Town of Wilbraham  
FLOOD HAZARD MITIGATION PLAN**

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## Town of Wilbraham Flood Mitigation Plan Distribution

<u>Agency/Organization</u>	<u>Number of Copies Provided</u>
Chicopee River Watershed Council	1
Consolidated Edison Energy Massachusetts, Inc	1
East Longmeadow, Town of	1
Federal Emergency Management Agency, Region I	1
Hamden, Town of	1
Ludlow, Town of	1
Massachusetts Department of Environmental Management	1
Massachusetts Department of Environmental Protection	1
Massachusetts Turnpike Authority	1
Massachusetts Water Resources Authority	1
Monson, Town of	1
Palmer, Town of	1
Pioneer Valley Planning Commission	1
Springfield, City of	1
Swift River Hydro Operations, L.L.C.	1
U.S. Army Corps of Engineers	1
U.S. Fish and Wildlife Service	1
Wilbraham Public Library	2
Spare Copies	10



**Town of Wilbraham  
Flood Mitigation Plan**

**Local Official Signatures**

The Wilbraham Office of Emergency Management has developed, in partnership with Departments that have primary responsibility for severe weather preparedness, a flood mitigation plan. This plan has been approved by the Town's government. A copy of the plan has been submitted to the Massachusetts Emergency Management Agency by the Wilbraham Emergency Manager in coordination with the undersigned officials or legally appointed successors. It is understood that the Federal Emergency Management Agency will review this plan for compliance with all federal and state requirements.

As authorized local government officials, we understand and support the following Flood Mitigation Plan.

Kevin J. Moriarty  
Signature                      Date

Kevin J. Moriarty  
Board of Selectmen

David W. Barry 3/12/03  
Signature                      Date

David W. Barry  
Board of Selectmen

\_\_\_\_\_  
Signature                      Date

James E. Thompson  
Board of Selectmen

[Signature] 3/10/03  
Signature                      Date

Kenneth R. Willette  
Signature                      Date

Kenneth R. Willette  
Emergency Manager

Edward W. Miga Jr.  
Signature                      Date

Edward W. Miga Jr.  
Director of Public Works

\_\_\_\_\_  
Signature                      Date

Lance Trevallion  
Building Inspector/Zoning Officer

[Signature]  
Signature                      Date

## **FOREWARD**

This flood mitigation plan is developed to ensure prior mitigation and preparedness from flood-related disasters that may affect the Town of Wilbraham. The plan was written and organized based on the flood mitigation assistance and planning guidelines provided by the Federal Emergency Management Agency and the Massachusetts Department of Environmental Management. The plan contains the essential steps to planning, assessment of current conditions, and recommendations for future flood mitigation activities.

One of the most essential steps in the planning process included identifying and organizing interested members of the community as well as the technical expertise required to complete the plan, into a planning committee. By understanding the risks posed by natural hazards, the Committee has determined what the priorities should be for the Town of Wilbraham and developed ways to avoid or minimize the undesired effects. The result is a flood mitigation plan and strategy for implementation.

For this plan to remain effective, it must be implemented and monitored. Wilbraham's inhabitants can bring the plan to life in a variety of ways ranging from implementing specific mitigation projects to creating changes in the day-to-day operation of the local government. To insure success of the on-going flood mitigation program, it is critical that the plan remains effective. Thus, it is important to conduct periodic evaluations and make revisions as needed.

## Executive Summary

The Town of Wilbraham initiated this Flood Mitigation Plan with the aid of a Flood Mitigation Assistance Grant (FMA) from the Massachusetts Emergency Management Agency. Wilbraham Emergency Management sponsored the planning grant application, launched the planning process and conducted the meetings and prepared this report.

This report is based on a process that was conceived and codified by the Department of Environmental Management (DEM) Flood Hazard Management Program. Under DEM Guidelines, the planning process requires the organization of a diverse Committee to review findings and produce a written plan.

By exploring future mitigation projects and activities, this plan provides guidelines for flood mitigation in the Town of Wilbraham and will result in:

- Reduced public and private damage costs
- Reduced social, emotional, and economic disruption
- Better access to funding for flood mitigation projects
- Improved ability to implement post-disaster recovery projects

Through the process, specific locations were identified as “at-risk” locations for low-probability – high-consequence potential for excessive storm flow or riverine flooding based on FEMA flood zone designations and local knowledge provided by the Committee and written and oral histories provided by Town residents. These areas include the following:

- Twelvemile Brook
- Chicopee River
- Nine Mile Pond
- Memorial School
- Great Swamp
- Dipping Hole
- Stony Hill North
- Bennett Road
- Woodland Dell
- High Moor
- Apple Hill
- Minnechaug
- North Branch II
- Sawmill Brook
- North Branch III

The Committee identified land uses that have experienced flood damage and land uses that are most likely to experience flood damage in the future.

In general, few critical facilities (Schools, police, fire, etc.) are considered flood risks in the Town of Wilbraham. Instead, most of the severe flood risk properties are in areas of residential use.

Types of damage which occur during flooding events were identified and include the following:

- Structural damage to residences and businesses
- Flooding of streets and structures
- Street blockage from flooding
- Interruption of utilities and services
- Impediment of emergency services

The Town conducts and promotes flood hazard mitigation through several types of activities reducing flood risks and future damages. The following statements reflect the flood mitigation goals of the Town of Wilbraham:

- Protect lives and property
- Educate the community about flood hazards and protection measures
- Reduce the Town's National Flood Insurance Program Community Rating Score
- Effect appropriate and efficient solutions to the Town's flooding problems
- Implement the Flood Mitigation Plan in coordination with other community goals

## **Priority Activities**

The planning process provided the Committee with a number of projects to evaluate for implementation. The following activities were determined to be the best overall activities for flood damage reduction.

- Construct a debris diversion rack/grate at the Woodland Dell culvert
- Clean out the floodwater drainage system adjacent to Federal Lane to Minnechaug Regional High School
- Construct a storm runoff detention Basin above Brookmont
- Conduct a direct mail campaign to notify property and business owners that their structures are located in the 100-year or 500-year floodplain and the availability of flood insurance to prevent catastrophic financial losses
- Develop a Flood mitigation outreach program to inform at-risk property owner's about mitigation strategies to prevent or reduce

- losses due to flooding and the availability of flood insurance under the National Flood Insurance Program
- Apply and be accepted into the National Weather Service's StormReady program (CRS points available) to enhance community flood warning capability
- Implement Geographic Information System HAZUS modeling of flooding hazards and loss estimates
- Merge the Geographic Information System Q3 data with the Tax Assessor's database to help identify at-risk properties in the floodplain
- Reduce Wilbraham's Community Rating System Score in order to provide reduced National Flood Insurance Program insurance premiums for property owners
- Improve the awareness of Flood Zone management practices among elected boards
- Develop a standard approach for review of development and construction in identified Flood Plain areas
- Develop a guideline for the Zoning Board of Appeals and Planning Board to consider when reviewing development issues in the Flood Plain area
- Train selected staff of the Wilbraham Building Inspector on the National Flood Insurance Program requirements for structures located in the floodplain that are undergoing substantial improvement or have been subject to substantial damage

## **Secondary Activities**

- Evaluate additional properties for future mitigation projects
- Construct a flood water detention basin near the Minnechaug Regional High School
- Construct a debris diversion rack/grate at the Sunset Rock culvert
- Excavate the Pond at Danforth Farms to create a storm water detention holding capability
- Replace the headworks and overflow pipe for the Nine Mile Pond drainage system

**Town of Wilbraham**  
**Flood Mitigation Plan**  
**February 2003**

**Chapter 1: Introduction**

**1. Purpose**

The Town of Wilbraham initiated this Flood Mitigation Plan because it is recognized that floods can be costly, and that flood mitigation efforts to save lives and property in Wilbraham could be improved. The purpose of this plan is to prioritize flood mitigation activities.

**2. Laws and Authorities**

The Town of Wilbraham entered the National Flood Insurance Program (NFIP) in August 1975. NFIP is a Federal Program enabling property owners in participating communities to purchase insurance protection against losses from flooding. Participation in the NFIP is based on an agreement between the Town of Wilbraham and the Federal Government that states that if a community will adopt and enforce a floodplain management ordinance to reduce future flood risks to new construction in Special Flood Hazard Areas, the Federal Government will make flood insurance available within the community as a financial protection against flood losses. The NFIP has three interrelated components: flood hazard mapping, floodplain management, and flood insurance.

This plan is issued under the authority of Federal Emergency Management Agency (FEMA) in compliance with the Flood Mitigation Assistance (FMA) Program. FMA provides funding to assist States and communities in implementing measures to reduce or eliminate the long-term risk of flood damage to buildings, manufactured homes, and other structures under the NFIP. FMA was created as part of the National Flood Insurance Reform Act of 1994 (42 U.S.C. 4101) with the goal of reducing or eliminating claims under the NFIP.

**3. Area Covered By The Plan**

The area covered by this plan includes all residential structures located within the Town of Wilbraham's 100-Year Floodplain (See Map 1). The plan includes all rivers, streams, brooks, ponds and intermittent waterways in the Town of Wilbraham, as shown in Map 2.

The Town of Wilbraham is in Region I of the Federal Emergency Management Agency, and for local emergency management purposes, is part of Region 3 within the Massachusetts Emergency Management Agency (MEMA).

#### **4. Description of Flood Hazard Mitigation**

Flood hazard mitigation is any sustained action that reduces the flood risk to citizens and minimizes flood damages to structures, infrastructure, and other resources. The term hazard mitigation means preventive actions a community can take to help reduce the destruction caused in a major flood or other potentially hazardous events. Hazard elimination and loss prevention is not the same thing as emergency response. Some flood loss reduction can be achieved by components of response plans and preparedness plans, such as a flood warning system or a plan to evacuate flood prone areas. However, warning and evacuation deal only with the immediate needs during and following a flood event. Hazard mitigation is much more effective when it is directed toward reducing the need to respond to emergencies, by lessening the impact of the hazard ahead of time.

By exploring future mitigation projects and activities, this plan will provide the guidelines for enhanced flood mitigation. With an effective plan, the Town may be able to realize significant benefits once it is implemented. There are four types of benefits that can be derived through implementation of the plan:

##### **Benefits of Flood Mitigation Planning:**

1. Reduced public and private damage costs
2. Reduced social, emotional, and economic disruption
3. Better access to funding for flood mitigation projects
4. Improved ability to implement post-disaster recovery projects

## **Chapter II: Planning Steps for Hazard Mitigation**

This plan is based on a ten-step planning process that was recommended by the Massachusetts Department of Environmental Management's (MDEM) Flood Management Hazard Program. Under the MDEM guidelines, the planning process requires the guidance of a diverse public committee (Wilbraham Community Flood Mitigation Planning Committee) to review municipal staff findings and produce the plan. In early April 2002 Wilbraham Emergency Management (WEM) hosted a meeting bringing Town of Wilbraham officials and a diverse group of planners and engineers to focus on Wilbraham's current floodplain issues. The kickoff meeting was initiated on 3 April 2002. By early May the Committee had been established and a volunteer planner from Wilbraham Emergency Management was assigned to the project. The Wilbraham Community Flood Mitigation Planning Committee met during that month in order to organize itself and prepare for the first public outreach (See Appendix A for additional dates and times of Committee meetings).

The Committee adhered to the ten-step planning process as recommended by MDEM and started to identify threats to key flood risk areas. The first public outreach was held at the Wilbraham Public Library on 17 June 2002<sup>1</sup> to publicize the project and to solicit input to the project from Town residents. In the interim, a Flood Mitigation Resource Reference Section was established at the Wilbraham Public Library to provide a wide-ranging selection of flood mitigation references for property owners, and the Committee operated a flood mitigation display with reference materials and a Committee member, to answer flood mitigation related inquiries, at the Wilbraham Fire Department Open House on 19 October. A second public outreach was held on 16 January 2003<sup>2</sup> to allow the Committee to disclose their evaluation of existing flood mitigation to the community and to consider future mitigation activities and priorities that might result from the public review process.

Members of the Wilbraham Flood Mitigation Community Planning Committee:

- Joan Beardsley - Mill River Watershed
- Caroline Cunningham - Community Public Access TV
- Bill Fogarty - Selectmen's Office
- Eric Fuller – Planning
- Mike Gorski & Steve Halderman – DEP
- Bob Hassett – Volunteer
- Paul Lyons & John O'Leary - Exec. Office Environmental Affairs
- Peg McDonough - Conn. River Watershed
- Ed Miga & Tonya Bosch – DPW
- Marilyn Patenaude - Chicopee River Watershed
- Stoughton Smead - Conservation Commission
- Lance Trevallion - Building Inspector
- Ken Willette - Emergency Manager

### **Chapter III: Flood Hazard Mitigation Plan**

The most widely distributed flood map product is the Flood Insurance Rate Map (FIRM)<sup>3</sup> (See Map 1). Flood risk information presented on the FIRM is based on historic, hydrologic, and hydraulic data, as well as open space conditions, flood control works, and development. To prepare FIRMs that illustrate the extent of flood hazard in a flood prone community, the Federal Emergency Management Agency (FEMA) conducts engineering studies referred to as Flood Insurance Studies (FIS).

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<sup>1</sup> In addition, this session was filmed by Wilbraham's Public Access Television and was broadcast at frequent intervals throughout the summer and early fall, inclusive of different viewing times to accommodate the widest possible viewing audience within the community.

<sup>2</sup> This session was also filmed by Wilbraham Public Access Television and was broadcast to expand public awareness of the plan and to invite public input to the planning process.

<sup>3</sup> **Flood Insurance Rate Map (FIRM)**--Official map of a community on which the FIMA Administrator has delineated both the special hazard areas and the risk premium zones applicable to the community.

Using information gathered in these studies, FEMA engineers and cartographers delineate Special Flood Hazard Areas (SFHA) on FIRMS. SFHAs are those areas subject to inundation by a flood that has a 1% or greater chance of being equaled or exceeded during any given year. This type of flood is referred to as a base flood or 100-Year Flood. A base flood has a 26% chance of occurring during a 30-year period, the length of many mortgages. The base flood is a regulatory standard used by federal agencies and most states to administer floodplain management programs and is also used by the National Flood Insurance Program (NFIP)<sup>4</sup> as the basis for flood insurance requirements nationwide.

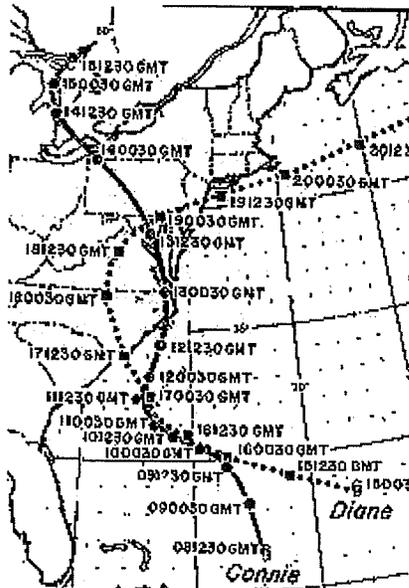


Figure 1. Tracks of Hurricanes Connie & Diane 1955

Now that the purpose and process for this plan has been described as well as the institutional and personnel background provided, the plan continues with local information identifying current flood risks and current flood mitigation activities.

### 1. Where Are The Risks?

The climate of Western Massachusetts is predominately continental, modified by proximity to the Atlantic Ocean, altitude and terrain. Frontal systems moving across the continent and through the Northeast affect Western Massachusetts. The region has frequent weather changes and abundant precipitation. Average annual precipitation averages from 40 to 50 inches in the Connecticut River Valley. Average rainfall in Hampden County is 50.6 inches annually with an average snowfall of 40 inches.

Wilbraham has been subject to flooding in all seasons of the year; the most common period for floods has been early spring, late summer and early fall when the area is subject to hurricane-type storms of tropical origin. Localized street flooding and basement flooding occurs occasionally from severe thundershowers. Extensive spring flooding is rare, but disastrous floods are possible if intense spring rains combine with warm, humid winds to release water rapidly from a thick snow pack.

Two examples of this occurred in 1954 and 1955. In August of 1954 Hurricanes Carol and Edna followed each other up the New England coast and pounded Southern New England causing inland flooding. Similarly, in the summer of 1955, Hurricane Diane made landfall in North Carolina

Hurricane Connie Rainfall - August 11-14, 1955

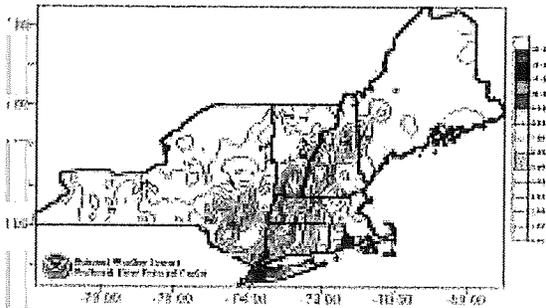
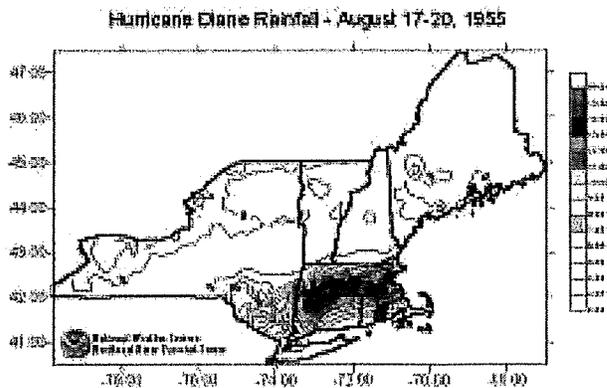


Figure 2. Soil is saturated by rains from Hurricane Connie

<sup>4</sup> National Flood Insurance Program (NFIP)--The program of flood insurance coverage and floodplain management administered under the National Flood Insurance Act of 1968 and applicable Federal regulations promulgated in Title 44 of the Code of Federal Regulations, Subchapter B.



**Figure 3. Almost 19" of rain falls in the area causing extensive flooding.**

of Connecticut and Massachusetts. Lesser amounts fell on the rest of the Northeast and Mid-Atlantic. The Connecticut River reached its all-time record level, causing the worst flooding in the state's history. In New England, close to \$1 billion in damage resulted and 82 people were killed.

In June of 2001 the remnants of Tropical Storm Allison passed through Southern New England with heavy rains causing the most severe flooding in Wilbraham since 1955. Though the damage was wide spread, the most severe flood impacts were at Twelvemile Brook and along Woodland Dell. A tornado in Worcester County resulted from the same storm system after it passed through the Connecticut River Valley.

Flooding in spring is historically less severe, but is compounded by snowmelt and ice jams. Damaging floods occurred in 1869, 1889, 1936, 1938, 1954, 1955 and 2001. The 21 September 1938 flood, also the result of a hurricane, was the second largest flood of record, with a recurrence interval slightly greater than 100 years.

Wilbraham lies within two watersheds. The northernmost section lies in the Chicopee watershed, while the majority of the Town lies in the lower Connecticut Watershed. (See map 10) North Wilbraham is in the floodplain of the Chicopee River, which is a historically flood-prone area. The Chicopee River basin (Figure 4) is the largest contributor to the Connecticut River watershed. The basin is characterized by low, rolling hills with several upland plains. The eastern portion of the Town lies in the central upland area of Massachusetts. The highest elevation in the Town is 285.6 Meters (937 Feet) at Mount Chapin.

Chicopee River, which originates at the confluence of the Ware and Quaboag Rivers in Palmer, flows in a southwestern direction to its confluence with the Connecticut River at Chicopee. The Chicopee River has a drainage area of 1867 square kilometers (721 square miles) and flows along the northern portion of Wilbraham forming the corporate limits with the Town of Ludlow.

just one week after Hurricane Connie brought heavy rains to the Mid-Atlantic States. Diane quickly weakened after landfall, moved north and unleashed some of the heaviest rains ever recorded in New England.

As much as 19 inches of rain fell across Massachusetts (Figures 1, 2 and 3), setting rivers on a rampage that left several New England towns looking like



The Massachusetts Water Resources Authority operates and manages Quabbin Reservoir (Figure 5) and Winsor Dam, which were completed in 1946. It contains flow from the Swift River and flood skimming from the Ware River during eight months of the year. At the time of its completion, the 412 billion gallon reservoir was the largest man-made reservoir in the world that was devoted solely to water supply. The reservoir provides water for Metropolitan Boston, and the communities of Chicopee, South Hadley and Wilbraham.

However, Quabbin Reservoir was not designed as, nor was it intended to serve as a flood control project. Clearly, Wilbraham has received the benefits of the Project's ability to attenuate flooding of the Chicopee River due to its tremendous storage capacity over the past several decades. This was especially demonstrated during the 1954 and 1955 events. However, if significant precipitation events occur when the Reservoir is full, potential flooding situations can occur at locations downstream of the Quabbin Spillway discharge. The most noteworthy discharge through the Quabbin Spillway occurred in 1984, with a resulting flow of 2.4 billion gallons per day.

Catastrophic failure of Winsor Dam, Goodnough Dike or the simultaneous failure of both provides the most severe flooding threat that Wilbraham could encounter. This is an extremely unlikely event. Modeling simulations indicate that even if a severe earthquake destroyed the earthen embankments of these two structures, the shell of the dam and dike should remain strong enough to keep the water impounded.

Wilbraham is located 15.9 miles from Quabbin Reservoir. Computer modeling has estimated various flood wave characteristics (See Figure 6.) for dam failure involving the Town of Wilbraham. Although the entire population of Wilbraham will not be

Distance From Quabbin	15.9 Miles
Leading Edge Arrival Time <sup>5</sup>	2 Hrs.
Peak Flood Arrival Time <sup>6</sup>	6 Hrs
Max Flood Elevation <sup>7</sup>	274 Ft.
Discharge (cfs)	1,254,000

located within the hazard zone, all residents will be impacted by utility and infrastructure destruction. Estimates indicate that flow from a catastrophic failure would take up to two (2) hours to impact locations in North Wilbraham. A sophisticated Emergency Action plan is in place to monitor, detect, and mitigate problems and provide evacuation warnings for downstream communities. The plan is tested and updated frequently.

**Figure 6. Characteristics of Quabbin Dam Break at North Wilbraham**

The low probability event of total failure would release a flow of approximately 3.3 million cfs through the breach. The acceleration of the initial flow would slow as the wave spread out and the momentum would be reduced by the backwater effects of the

<sup>5</sup> The interval between the time when the dam failure first begins until the flood wave starts to create a significant rise in the level (5 to 10 feet above normal level) at a particular location.

<sup>6</sup> The maximum stage arrival time is the duration between initial dam failure and maximum surface elevation at a particular location along the river.

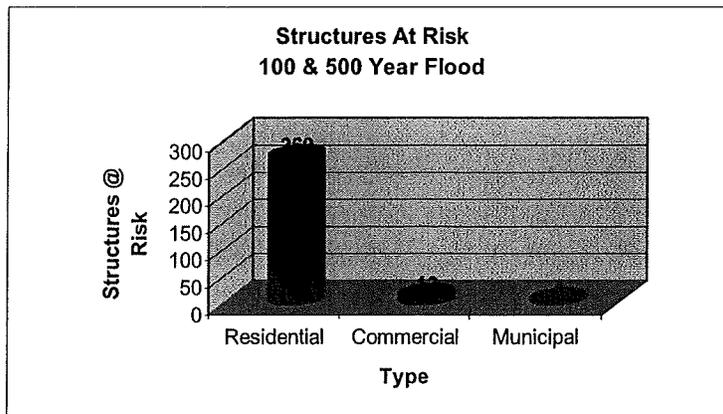
<sup>7</sup> The peak elevation is the maximum stage the flood wave reaches as it progresses through a section of the river valley.

Quabog River. As the surge reaches the Chicopee River in North Wilbraham (Figure 6), the topography allows the flood waters to split into two separate flows, one continuing down the Chicopee River Valley (Peak Flow 250,000 cfs), while the remainder (Peak Flow 350,000 cfs) moves through the Mill River system in Wilbraham on its way to the Connecticut River.

Flood recession times for locations along the Swift, Ware, and Chicopee Rivers are approximately 26 to 32 hours. Due to the vast volume of water released from Quabbin Reservoir as a result of a dam break, flood stages in these areas are anticipated to be sustained for one (1) to three (3) days. Flood recession time for areas along the Mill River is approximately 16 hours, significantly less time than for areas adjacent to the Chicopee River. The resultant peak flows from a catastrophic release from Quabbin are so large that the attenuating effects resulting from Red Bridge Dam, Collins Dam, and any bridges or embankments are minimized. All downstream bridge structures are assumed to be washed out, and thus are not considered an impediment to flow.

## 2. What Are The Risks?

The Committee identified and cataloged (Appendix B - Structures and Critical Facilities At Risk To Flooding) land uses that have experienced flood damage and land uses (Figure 7) that are most likely to experience flood damage in future floods.



**Figure 7. Wilbraham structures at risk for**

There are some 269 residential and 17 non-residential structures in Wilbraham's floodplains. In general, no critical facilities (school, police, fire, hospitals, etc.) are considered extreme flood hazard risks in the Town of Wilbraham. Instead, most of severe flood risks to properties are residential.

There have been five NFIP paid losses since 1978. The number of uninsured losses is not known. Outside the floodplains, residential properties also face flooding risks, especially where steep drainage courses overlay high-risk topographical locations such as Mountain Road, Glendale Road, and Crane Hill Road.

## 3. What Hazard Mitigation Is Already Being Done?

The Town of Wilbraham conducts and promotes flood hazard mitigation through several types of activities. Flood mitigation is at work through the actions of Wilbraham Emergency Management, Wilbraham Public Works, The Wilbraham Planning and

Zoning Boards and the Conservation Commission, the goals of the *Town of Wilbraham Open Space and Recreation Plan 2000–2005*, and all floodplain conservation acquisitions. Additionally, the Town's flood mitigation activities, to include regulatory floodplain development and building code enforcement, are conducted through the Wilbraham Departments of Public Works and the Building Inspector.

The Town of Wilbraham has been a participating community in the National Flood Insurance Program since it entered the Emergency Phase in August of 1975. It entered the Regular Program in March 1979. Currently there are 20 flood insurance policies active, with an estimated \$2,660,500 of insurance coverage in force.

There are no flood protection measures existing within the Town; however, there are major flood control measures at the Conant Brook and Barre Falls Dams and Reservoirs which are part of a network of flood control dams on tributaries to the Connecticut River. The Barre Falls Dam, an earth and rock-fill dam with a flood control storage capacity of 24,000 square acre-feet, is located on the Ware River and operated by the U.S. Army Corps of Engineers. Construction was completed in 1958 to prevent devastating floods like those that occurred in 1936 and 1938. Operation of the dam reduces flood stages downstream on the Ware and Chicopee rivers. This facility is a dry bed reservoir with a storage capacity of 7.9 billion gallons of water. During flood events water releases are coordinated with the Massachusetts Water Resources Authority to provide maximum flood protection to downstream communities. Floodwaters can be diverted from the Ware River via the R.H. Lonergan Intake via the Quabbin Aqueduct to either the Quabbin or Wachusett Reservoirs.

The Massachusetts Water Resources Authority operates and manages Quabbin Reservoir and Windsor Dam, which were completed in 1946. The Reservoir contains flow from the Swift River and flood skimming from the Ware River during eight months of the year. At the time of its completion, the 412 billion gallon reservoir was the largest man-made reservoir in the world that was devoted solely to water supply. The reservoir provides water for Metropolitan Boston, and the communities of Chicopee, South Hadley and Wilbraham.

Conant Brook Dam, also operated by the U.S. Army Corps of Engineers, is a smaller flood control reservoir with a storage capacity of 3,740 square acre-feet of floodwaters at a maximum pool level of 64 feet, and is located in Monson. Operation of this structure reduces flood stages downstream on the Quaboag and Chicopee rivers. Water from flood control storage is released automatically as downstream river levels recede.

Nonstructural measures to reduce flood damage consist of floodplain building restrictions and land use controls. The Town of Wilbraham has a floodplain zoning ordinance that prohibits new development in flood-prone areas. The ordinances also require erosion and sediment runoff control from construction areas along with controlling increases in runoff due to construction projects.

Other flood mitigation program elements currently included in the Town of Wilbraham's efforts to reduce flood losses to the community include:

- Flood ordinance building code requirements
- Flood Map Determinations
- Open space preservation
- Wetlands protection and mitigation
- Dam Safety Program
- Drainage ditch and culvert maintenance program
- Stormwater management
- Text of this report posted to the Town's web site
- Scheduled drainage maintenance
- Scheduled street sweeping
- Flood Mitigation Library

In addition, the Town has established an Office of Emergency Management charged with the responsibility to develop and implement a Comprehensive Emergency Management Plan (CEMP). The plan, currently in development to encompass all-hazards to include natural, technological, and terrorism events, addresses situations in which actions of many different agencies must be coordinated. Based on the data developed in this action plan and the CEMP plans, emergency response Standard Operating Procedures (SOPs) are being developed for local emergency response personnel. These SOPs will be maintained separately as supporting analog, digital and GIS files.

#### **4. Where Are The Gaps In Wilbraham's Flood Protection?**

The Committee conducted an evaluation of potential flood threats and actual flood damage occurring within the Town of Wilbraham (Appendix B - Structures and Critical Facilities At Risk To Flooding). Current flood damage to properties in Wilbraham is largely concentrated in developments on the Twelvemile Brook, Brookmont, and Woodland Dell areas. In these areas, steep drainage overlays high-risk topography. All this is exacerbated by the lack of past adequate site planning before regulatory flood zoning practices went into effect.

Clearly, the Committee has concluded, that based on the above statistics what is absent are two general elements essential to an effective flood mitigation program:

- Awareness of the potential flooding threat to properties by the at-risk communities
- Physical and financial protection against flood loss<sup>8</sup>

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<sup>8</sup> Physical protection through protection provided by siting, design, construction, and maintenance; and financial protection provided by flood insurance

## 5. What Flood Mitigation Actions Should Wilbraham Take?

With the Town of Wilbraham's goals in mind for flood mitigation, the Committee brainstormed for future actions. This component requires every reasonable action that the community could take to reduce flood losses and minimize hazard damages. Potential actions were listed under four general categories: Hazard Awareness, Mitigation Planning, Maintenance, and Flood Engineering Projects.

### Hazard Awareness

- Educate property owners and business owners on the local flood threat and mitigation concepts:
  - Establish a community flood awareness outreach program
  - Establish a flood library\*
  - Flood Insurance direct mailing campaign
  - Advertise the availability of the NFIP in local media
  - Establish a flood mitigation and awareness web page
  
- Provide advanced training opportunity for the Building Inspector in Substantial Damage/Substantial Improvement Rule under the NFIP
- Improve the awareness of Flood Zone management practices among elected boards
  
- Reduce Wilbraham's Community Rating System (CRS)<sup>9</sup> Score
- Apply for and be accepted into the National Weather Service's StormReady<sup>10</sup> Community program
- Implement GIS HAZUS<sup>11</sup> modeling of flooding hazards and loss estimates

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<sup>9</sup> **Community Rating System (CRS)**--A program developed by FIMA to provide incentives for those communities in the Regular Program that have gone beyond the minimum floodplain management requirements to develop extra measures to provide protection from flooding.

<sup>10</sup> **StormReady**--A program aimed at preparing cities, counties and towns across the nation with the communication and safety tools necessary to save lives and property. As voluntary program created in 1998 by the National Weather Service, StormReady provides clear-cut advice to Town leaders, emergency managers and media that would improve their local hazardous weather operations. The top goal of StormReady is to prepare communities with an action plan that responds to the threat of all types of severe weather.

<sup>11</sup> **HAZUS**-- a multi-hazard methodology module for estimating potential losses from wind, flood (riverine and coastal) and earthquake hazards. Using Geographic Information Systems (GIS) technology, HAZUS allows users to compute estimates of damage and losses that can result from natural disasters. The HAZUS Flood Loss Estimation Model allows users to determine flood depths, estimate damages and losses, and define floods of varying magnitudes. Users may also assess riverine, coastal and alluvial fan flooding, and estimate potential damages to buildings, essential facilities, transportation and utility lifelines, and agricultural areas. The HAZUS Flood Loss Estimation Model also addresses debris generation and shelter requirements and can estimate direct losses based on physical damage to structures, contents, and building interiors. Finally, it allows users to simulate the effects of a disaster and determine the level and type of damage and economic loss people may suffer.

### **Mitigation Planning**

- Increase the number of structures covered by flood insurance to reduce catastrophic financial loss to homeowners and businesses
- Develop a standard approach for review of development and construction in identified Flood Plain areas
- Develop a guideline for the Zoning Board of Appeals and Planning Board to consider when reviewing development issues in the watershed area
- Enforce Substantial Damage/Substantial Improvement<sup>12</sup> requirements under the NFIP
- Encourage use of the Increased Cost of Compliance (ICC)<sup>13</sup> coverage to assist homeowners in compliance with Wilbraham's flood ordinances after a flood loss
- Merge GIS Q3<sup>14</sup> data with the Tax Assessor's database to help identify at-risk properties in the floodplain

### **Maintenance**

- Clean out the floodwater drainage system adjacent to Federal lane to Minnechaug Regional High School
- Excavate and clean out debris in Bruuer Pond\*

### **Flood Engineering Projects**

- Construct a debris diversion rack/grate at the Woodland Dell culvert
- Construct a storm runoff detention Basin above Brookmont
- Construct a debris diversion rack/grate at the Sunset Rock culvert
- Replace the headworks and overflow pipe for the Nine Mile Pond drainage system

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<sup>12</sup> **Substantial Improvement**--Any reconstruction, rehabilitation, addition, or other improvement of a building, the cost of which equals or exceeds 50 percent of the market value of the building before the "start of construction" of the improvement. Substantial improvement includes buildings that have incurred "substantial damage," regardless of the actual repair work performed. The term does not, however, include either any project for improvement of a building to correct existing state or local code violations or any alteration to a "historic building," provided that the alteration will not preclude the building's continued designation as a "historic building."

<sup>13</sup> **Increased Cost of Compliance (ICC)**--Coverage for expenses a property owner must incur, above and beyond the cost to repair the physical damage the structure actually sustained from a flooding event, to comply with mitigation requirements of State or local floodplain management ordinances or laws. Acceptable mitigation measures are elevation, floodproofing, relocation, demolition, or any combination thereof.

<sup>14</sup> **Q3 Flood Data**-- product is a digital representation of certain features of FEMA's Flood Insurance Rate Map (FIRM) product, intended for use with desktop mapping and Geographic Information Systems technology. Digital Q3 Flood Data has been developed by scanning the existing FIRM hardcopy, vectorizing a thematic overlay of flood risks. The vector Q3 Flood Data files contain only certain features from the existing FIRM hardcopy.

- Construct a storm runoff detention Basin above Brookmont
- Construct a flood water detention basin near the Minnechaug Regional High School
- Create a Stormwater runoff diversion on Mountain Road\*
- Excavate the Pond at Danforth Farms to create a floodwater detention holding capability
- Elevate the culverts on Springfield Street\*

**Note** - \* Indicates that project has been completed within the time interval since the Committee was established

## **6. What Flood Mitigation Actions Are Currently Feasible?**

This section describes a list of actions with information on how each action fits in with community criteria and the benefits of each action. Potential projects were evaluated through several tests including whether or not the activities address flood risks/flood loss and whether or not the activities provide full solutions or partial solutions. A full assessment of these actions is reviewed in Appendix D.

## **7. What Other Federal, State, and County Organizations Should The Town of Wilbraham Coordinate With For Flood Mitigation Issues?**

The Wilbraham Flood Planning Committee recognizes that the actions the community wants to take to mitigate future flood damages should be coordinated with other priorities as well as with flood hazard mitigation goals of surrounding communities, and State and Federal agencies. Notification of all parties who may be affected by or who may be able to assist in helping the community with selected actions will be conducted. The following agencies will be contacted to make them aware of Wilbraham's Flood Mitigation Plan:

- **Adjacent Communities:**
  - East Longmeadow
  - Hamden
  - Ludlow
  - Monson
  - Springfield
  - Palmer
- **Chicopee River Watershed Council**
- **Consolidated Edison Energy Massachusetts, Inc**
- **Federal Emergency Management Agency, Region I**
- **Massachusetts Department of Environmental Management**
- **Massachusetts Department of Environmental Protection**
- **Massachusetts GIS**

- Massachusetts Turnpike Authority
- Massachusetts Water Resources Authority
- Pioneer Valley Planning Commission
- Swift River Hydro Operations, L.L.C.
- U.S. Army Corps of Engineers
- U.S. Fish and Wildlife Service
- U.S. Geological Survey

## **8. What Are Wilbraham's Flood Mitigation priorities? (Results of the planning process)**

The planning process provided the Committee with a number of projects to evaluate for implementation. The following activities were determined to be the best overall activities for flood damage reduction and are listed in the recommended order of implementation by the Committee. These activities are listed below as "priority activities" and "secondary activities." The Town of Wilbraham will accept these activities as the plan of action for current and future flood hazard mitigation. The other activities listed in Chapter III, Section 5 can be revisited during plan updates and perhaps elevated to priority or secondary status.

### **Priority Flood Mitigation Activities**

1. Construct a debris diversion rack/grate at the Woodland Dell culvert
2. Clean out the floodwater drainage system adjacent to Federal Lane to Minnechaug Regional High School
3. Construct a storm runoff detention Basin above Brookmont
4. Conduct a direct mail campaign to notify property and business owners that their structures are located in the 100-year or 500-year floodplain and the availability of flood insurance to prevent catastrophic financial losses.
5. Develop a Flood mitigation outreach program to inform at-risk property owner's about mitigation strategies to prevent or reduce losses due to flooding and the availability of flood insurance under the NFIP
6. Apply and be accepted into the National Weather Service's StormReady program (CRS points available) to enhance community flood warning capability
7. Implement GIS HAZUS modeling of flooding hazards and loss estimates
8. Merge GIS Q3 data with the Tax Assessor's database to help identify at-risk properties in the floodplain
9. Reduce Wilbraham's Community Rating System Score in order to provide reduced NFIP insurance premiums for property owners

10. Improve the awareness of Flood Zone management practices among elected boards
11. Develop a standard approach for review of development and construction in identified Flood Plain areas
12. Develop a guideline for the Zoning Board of Appeals and Planning Board to consider when reviewing development issues in the watershed area
13. Train selected staff of the Wilbraham Building Inspector on the NFIP requirements for structures located in the floodplain that are undergoing substantial improvement or have been subject to substantial damage.

- **Secondary Flood Mitigation Activities**

1. Evaluate additional properties for future mitigation projects
2. Construct a flood water detention basin near the Minnechaug Regional High School
3. Construct a debris diversion rack/grate at the Sunset Rock culvert
4. Excavate the Pond at Danforth Farms to create a storm water detention holding capability
5. Replace the headworks and overflow pipe for the Nine Mile Pond drainage system

## **9. Strategy For Implementation**

To this point, the plan has determined why, where, and what flood mitigation should take place. The implementation strategy answers flood mitigation questions regarding who, when, and how. A strategy for implementing the priority flood mitigation actions is outlined below. The following table also includes information on how actions will be funded.

**Priority Flood Mitigation Activities**

Priority #	Project	Agency	Agent	Time	Funding
1	Construct a debris diversion rack/grate at the Woodland Dell culvert	Public Works	Chief DPW	Fall 2003	HMGP
2	Clean out the floodwater drainage system adjacent to Federal lane to Minnechaug Regional High School	Public Works	Chief DPW	Fall 2003	HMGP
3	Construct a storm runoff detention Basin above Brookmont	Public Works	Chief DPW	Summer 2004	HMGP
4	Conduct a direct mail campaign to notify property and business owners that their structures are located in the 100-year or 500-year floodplain and the availability of flood insurance to prevent catastrophic financial losses.	Emergency Management	Emergency Manager	Spring 2003	Emergency Management
5	Develop a Flood mitigation outreach program to inform at-risk property owner's about mitigation strategies to prevent or reduce losses due to flooding and the availability of flood insurance under the NFIP	Emergency Management	Emergency Manager	Winter 2003	Emergency Management
6	Apply and be accepted into the National Weather Service's StormReady program (CRS points available) to enhance community flood warning capability	Emergency Management	Emergency Manager	Spring 2003	National Weather Service  Emergency Management
7	Implement GIS HAZUS modeling of flooding hazards and loss estimates	Emergency Management Information Management	Emergency Manager Information Management	Winter 2003	FEMA Information Management
8	Merge GIS Q3 data with the Tax Assessor's database to help identify at-risk properties in the floodplain	Information Management Tax Assessor	Information Management Officer	Winter 2003	Information Management

Priority #	Project	Agency	Agent	Time	Funding
9	Reduce Wilbraham's Community Rating System Score in order to provide reduced NFIP insurance premiums for property owners	Emergency Management	Emergency Manager  Town Manager	Summer 2003	Emergency Management  NFIP
10	Train selected staff of the Wilbraham Building Inspector on the NFIP requirements for structures located in the floodplain that are undergoing substantial improvement or have been subject to substantial damage	Building Inspector	Building Inspector	Summer 2003	FEMA's – Emergency Management Institute (EMI)  Building Inspector
11	Evaluate additional properties for future mitigation projects	Emergency Management Public Works Building Inspector	Chief DPW	Fall 2003	Public Works
12	Construct a flood water detention basin near the Minnechaug Regional High School	Public Works	Chief DPW	2005	Corps of Engineers Grant
13	Construct a debris diversion rack/grate at the Sunset Rock culvert	Public Works	Chief DPW	2004	HMGP
14	Excavate the Pond at Danforth Farms to create a storm water detention holding capability	Public Works	Chief DPW	2004	Corps of Engineers Grant
15	Replace the head works and overflow pipe for the Nine Mile Pond drainage system	Public Works		2006	HMGP

- NWS - National Weather Service
- FEMA – Federal Emergency Management Agency

#### **Chapter IV: Conclusion and Additional Information Sources**

The strategy of implementation concludes the Flood Mitigation Plan. Wilbraham Emergency Management, along with other departments within Wilbraham Town government, intends to monitor the Plan as projects and activities are completed. As the Emergency Manager observes flood conditions and changing mitigation requirements within Wilbraham, the staff will organize a collective effort to monitor the Plan for updates and changes.

Residents, business owners, property owners, and Town of Wilbraham staff may contact the Floodplain Coordinator at Wilbraham Emergency Management for questions, comments, or ideas for future revisions of this plan.

For more local information about this Plan, flood mitigation opportunities, or the Flood Mitigation Library contact the Wilbraham Emergency Management.

Wilbraham Emergency Management  
2770 Boston Road  
Wilbraham, MA 01095

Phone: (413) 596-3122  
Fax: (413) 596-2632

Flood protection reference materials can be found at the Wilbraham Public Library located at 2 Crane Park Drive, Wilbraham, MA 01095. These publications are sourced from Federal and State governments, as well as private organizations, on a variety of flooding and flood mitigation topics.

**For more Massachusetts resources, contact the Massachusetts Department of Environmental Management**

**National Flood Insurance Program (NFIP) State Coordinator:**

Richard Zingarelli  
Department of Environmental Management  
626-1406  
Flood Hazard Management Program  
1349  
Commonwealth of Massachusetts  
Office of Water Resources  
251 Causeway Street  
Suite 700  
Boston, MA 02114

Phone: (617)  
Fax: (617) 626-

**For more Federal resources, contact the Region I office of the Federal  
Emergency Management Agency.**

**National Flood Insurance Program, FEMA Region I-Mitigation Division:**

Paul Ford  
9571

Phone: (617) 223-

Mitigation Division  
Federal Emergency Management Agency  
Room 442  
J.W. McCormack POCH  
Boston, MA 02109

Paul.ford@fema.gov

**Hazard Identification and Risk Assessment Branch, FEMA Region I (Engineering  
and Mapping Issues)**

Mike Goetz, Chief Engineer

Phone: (617) 223-

9571

Hazard Identification and Risk Assessment Branch

Michael.goetz@fema.gov

Federal Emergency Management Agency  
Room 442  
J.W. McCormack POCH  
Boston, MA 02109

**FEMA Grants Assistance, FEMA Region I (FMA Grants Technical Assistance):**

Kathleen Sweeney  
4179

Phone: (617) 223-

Hazard Identification and Risk Assessment Branch

daisy.Sweeney@fema.gov

Federal Emergency Management Agency  
Room 442  
J.W. McCormack POCH  
Boston, MA 02109

**Community Rating System Technical Assistance:**

Jimmy Chin, ISO/CRS Specialist  
734-9424

Phone: (671)

Steadman Street  
Brookline, MA 02446-3009

**To obtain NFIP Customer Service for Flood Insurance Policies:**

565

1-800-638-6620 Ext.

**To obtain Flood Insurance Rate Maps and Flood Insurance Studies:**

FEMA Map Service Center  
P. O. Box 1038  
358-9620  
Baltimore, Maryland 21227-5623

1-800-358-9616  
FAX: 1-800-

**To obtain NFIP Technical Publications and Bulletins:**

Federal Emergency Management Agency  
2520  
Publications Department  
www.fema.gov/mit/tsd  
Jessup, MD 20794

1-800-480-

**To obtain LOMA/LOMR Assistance:**

FEMA LOMA DEPOT  
MAP  
P.O. Box 2210  
Merrifield, VA 22031

1-877-FEMA-

**To obtain LOMA/LOMR Assistance:**

FEMA LOMA DEPOT  
MAP  
P.O. Box 2210  
Merrifield, VA 22031

1-877-FEMA-

**To obtain Assistance From the U.S. Army Corps of Engineers**

**Regulatory and Permit Activities**

1-978-318-8338

Regulatory Division  
U.S. Corps of Engineers  
New England District  
696 Virginia Road  
Concord MA 01742-2751

**Flood Control Operations**

1-978-318-8630

Mr. Paul Marinelli  
Chief, Reservoir Regulation Team  
Engineering-Planning Division  
U.S. Army Corps of Engineers  
New England District  
969 Virginia Road  
Concord, MA 01742-2751

**Barre Falls Dam**

1-978318-8256

Mr. Ralph Gendron  
Project Manager  
Barre Falls Dam  
U.S. Army Corps of Engineers  
Hubbardston, MA 01452

**Lower Connecticut River Basin**

1-987-318-8252

Mr. Joseph Faloretti  
Operations Manager  
Lower Connecticut River Basin Office  
U.S. Army Corps of Engineers  
New England District  
Athol-Richmond Road  
Royalston, MA 01368-8900

**Emergency Management**

1-978-318-8274

Mr. David Schafer  
Chief, Emergency Operations  
U.S. Army Corps of Engineers  
New England District  
696 Virginia Road  
Concord, MA 01742-2751

**Appendix A**  
**Dates of Community Flood Mitigation Planning  
Committee Meetings**

The Wilbraham Community Flood Mitigation Planning Committee held meetings on the following dates to discuss project strategy, develop and select mitigation projects, and to approve the Plan for submission to the Board Of Selectmen:

- 03 April 2002 – Project kickoff meeting
- 7 May 2002
- 22 May 2002
- 18 September 2002
- 08 October 2002
- 03 December 2002
- 14 January 2003

## Appendix B

### Town of Wilbraham Structures and Critical Facilities At Risk To Flooding 2002 – 2003

100 and 500-Year Floods Sector Name	Zone Boundaries/Description	Structures At Risk	Infrastructure At Risk	Comment
<p><b>Twelvemile Brook</b></p> <p><b>Source:</b> Caldwell Brook, Calkins Brook, Spear Brook, Twelvemile Brook and associated minor tributaries</p>	<p>Structures North of Monson Road and South of Boston Road; on the East by the Monson Town line and on the West by Ridge &amp; Mountain Road</p>	<p>Residential – 15 Commercial – 2 Municipal - 0</p>	<ul style="list-style-type: none"> <li>• Boston Road</li> <li>• Glendale Road</li> <li>• Danforth Farms</li> <li>• Mobile Gas Pipeline</li> <li>• CSX Railroad bridge</li> <li>• Natural Gas Pipeline</li> </ul>	<p>Catastrophic or significant flooding in this sector has impacts beyond the community. A major highway and rail line would be put out of services; Two major gas pipelines are impacted. Rt. 20 is a major evacuation artery for Monson, Palmer, and towns beyond.</p>
<p><b>Chicopee River</b></p> <p><b>Source:</b> Chicopee River</p>	<p>Structures abutting the Chicopee River flood plain and North of Boston Road</p>	<p>Residential – 41 Commercial – 8 Municipal - 4</p>	<ul style="list-style-type: none"> <li>• Red Bridge</li> <li>• Red Bridge Dam &amp; Power House</li> <li>• Municipal water &amp; Wastewater pumps</li> <li>• Power sub-station</li> <li>• Mobile petroleum pipeline</li> <li>• Water/MN6 pipeline bridge</li> <li>• Mass Turnpike Bridge</li> <li>• Boston Road (RT 20)</li> <li>• Northeast Utilities Grid Supply Pipeline</li> <li>• CSX Railroad</li> <li>• Collins Dam Project</li> <li>• Green Bridge</li> </ul>	<p>Catastrophic or significant flooding in this sector has impacts beyond the community. Two major highways and rail line would be put out of services; A major gas pipeline and power lines are impacted; sewer service for the Town would be terminated. The bridge and dam complexes at Red Bridge and Green Bridge could be damaged. Floating debris dislodged from industries along the River could impact down-river structures.</p>

100 and 500-Year Floods Sector Name	Zone Boundaries/Description	Structures At Risk	Infrastructure At Risk	Comment
<p><b>Memorial School</b></p> <p><b>Source:</b> Runoff from Sunset Ridge</p>	<p>Structures North and West of Mountain road and East of Main Street to Fox Hill Drive, and Structures North of Fox Hill Drive West of Main Street</p>	<p>Residential – 26 Commercial – 0 Municipal - 0</p>	<ul style="list-style-type: none"> <li>• Main Street</li> <li>• Memorial School evacuation route cut off</li> <li>• Wilbraham Academy evacuation route diverted</li> <li>• Historic structures impacted</li> </ul>	<p>During a catastrophic flood event access to the Memorial School, a significant shelter facility, is cut off. Flooding of Northern sections of Main Street requires re-routing of emergency response equipment.</p>
<p><b>Great Swamp</b></p> <p><b>Source:</b> Great Cedar Swamp</p>	<p>East of Stony Hill Road and West of Main Street; North of Springfield Street/Faculty Road and South of Manchonis Road</p>	<p>Residential – 37 Commercial – 0 Municipal - 0</p>	<ul style="list-style-type: none"> <li>• NE Utilities Power Line</li> </ul>	<p>Power Line may survive all but catastrophic flood events</p>
<p><b>Dipping Hole</b></p> <p><b>Source:</b> North Branch of The Mill River</p>	<p>Structures North of Dipping Hole Road and South of Boston Road; on the East by Stony Hill Road and on the West with the Springfield City limits.</p>	<p>Residential – 15 Commercial – 0 Municipal - 0</p>	<ul style="list-style-type: none"> <li>• Sunnyside Terrace</li> <li>• FIC Warehouse</li> </ul>	<p>During severe conditions portions of Sunnyside Terrace are impassable.</p>
<p><b>Stony Hill North</b></p> <p><b>Source:</b> North Branch of The Mill River</p>	<p>Structures North of Springfield Street and South of Dipping Hole Road; on the East by Stony Hill Road and on the West with the Springfield City limits.</p>	<p>Residential – 5 Commercial – 0 Municipal - 0</p>	<ul style="list-style-type: none"> <li>• Westwood Drive</li> <li>• Springfield Street</li> </ul>	<p>During severe conditions portions of Springfield Street and Westwood Drive are impassable. Springfield Street is a critical evacuation route to Springfield area medical centers.</p>

100 and 500-Year Floods Sector Name	Zone Boundaries/Description	Structures At Risk	Infrastructure At Risk	Comment
<p><b>Woodland Dell</b></p> <p><b>Source:</b> Drainage from Brookmont and Drive and Sunset Ridge areas</p>	<p>Structures abutting Woodland Dell</p>	<p>Residential – 19 Commercial – 2 Municipal - 1</p>	<ul style="list-style-type: none"> <li>• Main Street</li> <li>• Woodland Dell</li> <li>• Fire Station</li> <li>• Masonic Temple</li> <li>• Church</li> <li>• Historic Buildings</li> </ul>	<p>During severe conditions Main Street is flooded closing a key evacuation and emergency artery. Woodland Dell is a location where repetitive loss flooding is likely to occur. The Masonic Hall, two churches, an auxiliary fire station and numerous historic structures are at risk.</p>
<p><b>Highmoor</b></p> <p><b>Source:</b> Drainage from Sunset Ridge</p>	<p>Structures abutting Highmoor Drive.</p>	<p>Residential – 7 Commercial – 0 Municipal - 1</p>	<ul style="list-style-type: none"> <li>• Highmoor Drive</li> <li>• Main Street</li> </ul>	<p>During severe conditions portions of Main Street, Highmoor Drive and Main Street are impassable. Then road may be washed out where the watercourse crosses Main Street. This is a key emergency response artery for the town.</p>

100 and 500-Year Floods Sector Name	Zone Boundaries/Description	Structures At Risk	Infrastructure At Risk	Comment
<p><b>Apple Hill</b></p> <p><b>Source:</b>                      Drainage from Rattlesnake Peak and vicinity</p>	<p>Structures within an area bounded on the North by Tinkham Road and on the South by Burleigh Road; On the east by Rattlesnake Peak and on the West by Main Street</p>	<p>Residential – 7                      Commercial – 0                      Municipal - 1</p>	<ul style="list-style-type: none"> <li>• Main Street</li> <li>• Apple Hill</li> <li>• McIntosh Drive</li> </ul>	<p>During severe conditions portions of Main Street, Apple Hill, and McIntosh Drive are inundated and not accessible. Main Street may be flooded where the watercourse crosses in the vicinity of Rice Drive This is a key emergency response artery for the Town.</p>

100 and 500-Year Floods Sector Name	Zone Boundaries/Description	Structures At Risk	Infrastructure At Risk	Comment
<p><b>Minnechaug</b></p> <p><b>Source:</b> North Branch of The Mill River</p>	<p>Structures within an area bounded on the North by Springfield Street and on the South by Tinkham Road; On the East by Main Street and on the West by Stony Hill Road.</p>	<p>Residential – 7 Commercial – 0 Municipal - 1</p>	<ul style="list-style-type: none"> <li>• Minnechaug Regional High School (MRHS)</li> <li>• Mile Tree School</li> <li>• Church Lane</li> <li>• Main Street</li> </ul>	<p>During severe conditions access to MRHS will be cut off. MRHS is the primary shelter facility for the Town. Portions of Mile Tree Elementary School may be flooded as well as portions of Church lane. Main Street may be flooded where the watercourse enters the flood plain in the vicinity of Brewer Pond. This is a key emergency response artery for the town.</p>
<p><b>North Branch III</b></p> <p><b>Source:</b> Surface runoff and ponding</p>	<p>Structures within an area bounded on the North by Tinkham Road and on the South by Longmeadow Road; On the East by Stony Hill Road and on the West by the East Longmeadow town line</p>	<p>Residential – 27 Commercial – 0 Municipal - 0</p>	<ul style="list-style-type: none"> <li>• Oldwood Road</li> <li>• Tinkham Road</li> </ul>	<p>During severe conditions Tinkam and Oldwood Roads are inundated and not accessible.</p>

## Appendix C

### Glossary

This list of terms is intended to include those that have specific meaning to the National Flood Insurance Program (NFIP). In a few instances, standard industry terms have been added for additional focus and emphasis.

## A

- **Act**--The National Flood Insurance Act of 1968 and any amendments to it.

## B

- **Base Flood**--The flood having a one percent chance of being equaled or exceeded in any given year.
- **Base Flood Depth (BFD)**--The depth shown on the Flood Insurance Rate Map (FIRM) for Zone AO that indicates the depth of water above highest adjacent grade resulting from a flood that has a one percent chance of equaling or exceeding that level in any given year.
- **Base Flood Elevation (BFE)**--The elevation shown on the Flood Insurance Rate Map for Zones AE, AH, A1-A30, AR, AR/A, AR/AE, AR/A1-A30, AR/AH, AR/AO, V1-V30, and VE that indicates the water surface elevation resulting from a flood that has a one percent chance of equaling or exceeding that level in any given year.

## C

- **Closed Basin Lake**--A natural lake from which water leaves primarily through evaporation and whose surface area exceeds or has exceeded one square mile at any time in the recorded past. NFIP-insured buildings that are subject to continuous lake flooding from a closed basin lake are covered under the provisions of Standard Flood Insurance Policy.
- **Community**--A political entity that has the authority to adopt and enforce floodplain ordinances for the area under its jurisdiction.
- **Community Number**--A 6-digit designation identifying each NFIP community. The first two numbers are the state code. The next four are the FIMA-assigned community number. An alphabetical suffix is added to a community number to identify revisions in the Flood Insurance Rate Map for that community.
- **Community Rating System (CRS)**--A program developed by FIMA to provide incentives for those communities in the Regular Program that have gone beyond the minimum floodplain management requirements to develop extra measures to provide protection from flooding.
- **Condominium**--That form of ownership of real property in which each unit owner has an undivided interest in common elements.

- **Condominium Association**--The entity made up of the unit owners responsible for the maintenance and operation of:
  - Common elements owned in undivided shares by unit owners;
  - Other real property in which the unit owners have use rights;

where membership in the entity is a required condition of unit ownership.

## E

- **Elevated Building**--A building that has no basement and has its lowest elevated floor raised above the ground level by foundation walls, shear walls, posts, piers, pilings, or columns. Solid foundation perimeter walls are not an acceptable means of elevating buildings in V and VE zones.
- **Emergency Program**--The initial phase of a community's participation in the National Flood Insurance Program. During this phase, only limited amounts of insurance are available under the Act.
- **Enclosure**--That portion of an elevated building below the lowest elevated floor that is either partially or fully shut-in by rigid walls.
- **Erosion**--The collapse, undermining, or subsidence of land along the shore of a lake or other body of water. Erosion is a covered peril if it is caused by waves or currents of water exceeding their cyclical levels which result in flooding.

## F

- **Federal Emergency Management Agency (FEMA)**--The federal agency under which the National Flood Insurance Program is administered.
- **Federal Insurance and Mitigation Administration (FIMA)**--The federal entity within FEMA that directly administers the National Flood Insurance Program.
- **Finished (Habitable) Area**--An enclosed area having more than 20 linear feet of finished walls (paneling, etc.) or used for any purpose other than solely for parking of vehicles, building access, or storage.
- **Flood**--
  - A general and temporary condition of partial or complete inundation of two or more acres of normally dry land area or of two or more properties (at least one of which is the policyholder's property) from:
    - Overflow of inland or tidal waters; or
    - Unusual and rapid accumulation or runoff of surface waters from any source; or
    - Mudflow; or
  - Collapse or subsidence of land along the shore of a lake or similar body of water as a result of erosion or undermining caused by waves or currents of water exceeding anticipated cyclical levels that result in a flood as defined above.

- **Flood Hazard Boundary Map (FHBM)**--Official map of a community issued by the Administrator, where the boundaries of the flood, mudflow, and related erosion areas having special hazards have been designated.
- **Flood Insurance Rate Map (FIRM)**--Official map of a community on which the FIMA Administrator has delineated both the special hazard areas and the risk premium zones applicable to the community.
- **Floodplain**--Any land area susceptible to being inundated by flood waters from any source.
- **Floodplain Management**--The operation of an overall program of corrective and preventive measures for reducing flood damage, including but not limited to, emergency preparedness plans, flood control works, and floodplain management regulations.
- **Floodproofing**--Any combination of structural and nonstructural additions, changes, or adjustments to structures, which reduce or eliminate risk of flood damage to real estate or improved real property, water and sanitation facilities, or structures with their contents.
- **Freeboard**--An additional amount of height above the Base Flood Elevation used as a factor of safety (e.g., 2 feet above the Base Flood) in determining the level at which a structure's lowest floor must be elevated or floodproofed to be in accordance with State or community floodplain management regulations.

## G

- **Grade Elevation**--The lowest or highest finished ground level that is immediately adjacent to the walls of the building. Use natural (pre-construction), ground level, if available, for Zone AO and Zone A (without BFE).
- **Grandfathering**--An exemption based on circumstances previously existing. Under the NFIP, buildings located in Emergency Program communities and Pre-Flood Insurance Rate Map buildings in the Regular Program are eligible for subsidized flood insurance rates. Post-Flood Insurance Rate Map buildings in the Regular Program built in compliance with the floodplain management regulations in effect at the start of construction will continue to have favorable rate treatment even though higher base flood elevations or more restrictive, greater risk zone designations result from Flood Insurance Rate Map revisions.

## H

- **High-Rise Building**--High-rise condominium buildings have five or more units and at least three floors excluding enclosure even if it is the lowest floor for rating purposes. An enclosure below an elevated building, even if it is the lowest floor for rating purposes, cannot be counted as a floor to avoid classifying the building as low rise.

- **Historic Building**--Any building that is:
  - Listed individually in the National Register of Historic places (a listing maintained by the Department of the Interior) or preliminarily determined by the Secretary of the Interior as meeting the requirements for individual listing on the National Register; or
  - Certified or preliminarily determined by the Secretary of the Interior as contributing to the historical significance of a registered historic district or a district preliminarily determined by the Secretary to qualify as a registered historic district; or
  - Individually listed in a state inventory of historic places in states with preservation programs that have been approved by the Secretary of the Interior; or
  - Individually listed on a local inventory of historic places in communities with historic preservation programs that have been certified either:
    - By an approved state program as determined by the Secretary of the Interior; or
    - Directly by the Secretary of the Interior in states without approved programs.

- **Improvements**--Fixtures, alterations, installations, or additions comprising a part of the insured building, including the units within the insured condominium building.
- **Increased Cost of Compliance (ICC)**--Coverage for expenses a property owner must incur, above and beyond the cost to repair the physical damage the structure actually sustained from a flooding event, to comply with mitigation requirements of State or local floodplain management ordinances or laws. Acceptable mitigation measures are elevation, floodproofing, relocation, demolition, or any combination thereof.

- **Letter of Map Amendment (LOMA)**--An amendment to the currently effective FEMA map which establishes that a property is not located in a Special Flood Hazard Area. A LOMA is issued only by FEMA.
- **Letter of Map Revision (LOMR)**--An official amendment to the currently effective FEMA map. It is issued by FEMA and changes flood zones, delineations, and elevations.
- **Lowest Adjacent Grade**--The lowest point of the ground level next to the building.
- **Lowest Floor**--The lowest floor of the lowest enclosed area (including a basement). An unfinished or flood-resistant enclosure, usable solely for parking of vehicles, building access, or storage in an area other than a basement area, is not

considered a building's lowest floor provided that such enclosure is not built so as to render the structure in violation of requirements. (Formerly called "reference level" or "reference level floor.")

- **Lowest Floor Elevation (LFE)**--The measured distance of a building's lowest floor above the National Geodetic Vertical Datum (NGVD) or other datum specified on the FIRM for that location.
- **Low-Rise Building**--Low-rise condominium buildings having fewer than five units regardless of the number of floors or five or more units with fewer than three units including basement. All townhouses/rowhouses, regardless of the number of floors or units, and all single-family detached condominium buildings are classified as low rise. An enclosure below an elevated building, even if it is the lowest floor for rating purposes, cannot be counted as a floor to avoid classifying the building as a low rise.

## M

- **Mandatory Purchase**--Under the provisions of the Flood Disaster Protection Act of 1973, individuals, businesses, and others buying, building, or improving property located in identified areas of special flood hazards within participating communities are required to purchase flood insurance as a prerequisite for receiving any type of direct or indirect federal financial assistance (e.g., any loan, grant, guaranty, insurance, payment, subsidy, or disaster assistance) when the building or personal property is the subject of or security for such assistance.
- **Map Revision**--A change in the FHBM or FIRM for a community which reflects revised zone, base flood, or other information.
- **Mean Sea Level**--See National Geodetic Vertical Datum (NGVD).
- **Modular Building**--A building that is usually transported to its site on a steel frame or special trailer because it does not have a permanent chassis like a manufactured (mobile) home. A modular building is classified and rated under one of the other building types.
- **Mudflow**--A river of liquid and flowing mud on the surfaces of normally dry land areas, as when earth is carried by a current of water. Other earth movements, such as landslide, slope failure, or a saturated soil mass moving by liquidity down a slope, are not mudflows.

## N

- **National Flood Insurance Program (NFIP)**--The program of flood insurance coverage and floodplain management administered under the Act and applicable Federal regulations promulgated in Title 44 of the Code of Federal Regulations, Subchapter B.
- **National Geodetic Vertical Datum (NGVD)**--National standard reference datum for elevations, formerly referred to as Mean Sea Level (MSL) of 1929. NGVD is used as the reference datum on most FIRMs.

- **Natural Grade**--The grade unaffected by construction techniques such as fill, landscaping, or berming.
- **New Construction**--Buildings for which the "start of construction" commenced on or after the effective date of an initial FIRM or after December 31, 1974, whichever is later, including any subsequent improvements.
- **Non-Residential**--Includes, but is not limited to: small business concerns, churches, schools, farm buildings (including grain bins and silos), poolhouses, clubhouses, recreational buildings, mercantile structures, agricultural and industrial structures, warehouses, hotels and motels with normal room rentals for less than 6 months' duration, and nursing homes.

## O

- **Other Residential**--Hotels or motels where the normal occupancy of a guest is 6 months or more; a tourist home or rooming house which has more than four roomers. A residential building (excluding hotels and motels with normal room rentals for less than 6 months' duration) containing more than four dwelling units. Incidental occupancies such as office, professional private school, or studio occupancy, are permitted if the total area of such incidental occupancies are limited to less than 25 percent of the total floor area within the building.

## P

- **Participating Community**--A community for which the FIMA Administrator has authorized the sale of flood insurance under the NFIP.
- **Policy**--The entire written contract between the insured and the insurer. It includes:
  - The printed policy form;
  - The application and Declarations Page;
  - Any endorsement(s) that may be issued; and
  - Any renewal certificate indicating that coverage has been instituted for a new policy and new policy term.
- Only one dwelling, specifically described by the prospective policyholder in the application, may be insured under a policy.
- **Ponding Hazard**--A flood hazard that occurs in flat areas when there are depressions in the ground that collect "ponds" of water. The ponding hazard is represented by the zone designation AH on the FIRM.
- **Post-FIRM Building**--a building for which construction or substantial improvement occurred after December 31, 1974, or on or after the effective date of an initial Flood Insurance Rate Map (FIRM), whichever is later.
- **Pre-FIRM Building**--a building for which construction or substantial improvement occurred on or before December 31, 1974, or before the effective date of an initial Flood Insurance Rate Map (FIRM).

- **Preferred Risk Policy (PRP)**--A package policy offering nine coverage combinations for both building and contents at a fixed premium. It is available only to owners of 1-4 family residential buildings located in B, C, and X Zones that meet eligibility requirements based on an entire flood loss history.
- **Principal Residence**--A single-family dwelling in which, at the time of loss, the named insured or the named insured's spouse has lived for either 80 percent of the 365 days immediately preceding the loss, or 80 percent of the period of ownership, if less than 365 days.
- **Principally Above Ground Building**--A building that has at least 51 percent of its actual cash value, including machinery and equipment, above ground.
- **Probation**--A means of formally notifying participating communities of violations and deficiencies in the administration and enforcement of the local floodplain management regulations.
- **Proper Openings - Enclosures (Applicable to Zones A, A1-A30, AE, AO, AH, AR, and AR Dual)**--All enclosures below the lowest elevated floor must be designed to automatically equalize hydrostatic flood forces on exterior walls by allowing for the entry and exit of floodwaters. A minimum of two openings, with positioning on at least two walls, having a total net area of not less than 1 square inch for every square foot of enclosed area subject to flooding must be provided. The bottom of all openings must be no higher than 1 foot above grade.

## **R**

- **Regular Program**--The final phase of a community's participation in the National Flood Insurance Program. In this phase, a Flood Insurance Rate Map is in effect and full limits of coverage are available under the Act.
- **Regular Program Community**--A community wherein a FIRM is in effect and full limits of coverage are available under the Act.
- **Repetitive Loss Structure**--A structure, covered by a contract of flood insurance issued under the NFIP, that has suffered flood damage on two occasions during a 10-year period that ends on the date of the second loss, in which the cost to repair the flood damage, on average, equaled or exceeded 25% of the market value of the structure at the time of each flood loss.
- **Residential Condominium Building**--A building, owned and administered as a condominium, containing one or more family units and in which at least 75 percent of the floor area is residential.
- **Residential Condominium Building Association Policy (RCBAP)**--See "Standard Flood Insurance Policy-Residential Condominium Building Association Policy (RCBAP)."

## S

- **Sheet Flow Hazard**--A type of flood hazard with flooding depths of 1 to 3 feet that occurs in areas of sloping land. The sheet flow hazard is represented by the zone designation AO on the FIRM.
- **Single Building**--A building that is separated from other buildings by intervening clear space or solid, vertical, load-bearing division walls.
- **Single-Family Residence**--A residential single-family dwelling. Incidental office, professional, private school, or studio occupancies, including a small service operation, are permitted if such incidental occupancies are limited to less than 50 percent of the building's total floor area.
- **Solid Foundation Perimeter Walls**--Walls that are used as a means of elevating a building in A Zones and that must contain sufficient openings to allow for the unimpeded flow of floodwaters more than 1 foot deep.
- **Special Flood Hazard Area (SFHA)**--An area having special flood, mudflow, or flood-related erosion hazards, and shown on a Flood Hazard Boundary Map or a Flood Insurance Rate Map as Zone A, AO, A1-A30, AE, A99, AH, AR, AR/A, AR/AE, AR/AH, AR/AO, AR/A1-A30, V1-V30, VE, or V. For the purpose of determining Community Rating System premium discounts, all AR and A99 zones are treated as non-SFHAs.
- **Substantial Damage**--Damage of any origin sustained by a building whereby the cost of restoring the building to its before-damaged condition would equal or exceed 50 percent of the market value of the building before the damage occurred.
- **Substantial Improvement**--Any reconstruction, rehabilitation, addition, or other improvement of a building, the cost of which equals or exceeds 50 percent of the market value of the building before the "start of construction" of the improvement. Substantial improvement includes buildings that have incurred "substantial damage," regardless of the actual repair work performed. The term does not, however, include either any project for improvement of a building to correct existing state or local code violations or any alteration to a "historic building," provided that the alteration will not preclude the building's continued designation as a "historic building."
- **Suspension**--Removal of a participating community from the NFIP because the community has not enacted and/or enforced the proper floodplain management regulations required for participation in the NFIP.

## T

- **2-to 4-Family Residence**--A residential building (excluding hotels and motels with normal room rentals for less than 6 months' duration) containing no more than four dwelling units. Incidental occupancies such as office, professional, private school, or studio space are permitted if the total area of such occupancies is limited to less than 25 percent of the total floor area within the building.

## U

- **Unit**--A single-family unit owned by the policyholder in a condominium building.

## V

- **Variance**--A grant of relief by a participating community from the terms of its floodplain management regulations.

## W

- **Waiting Period**--The time between the date of application and the policy effective date.
- **Write Your Own (WYO) Program**--A cooperative undertaking of the insurance industry and the Federal Insurance and Mitigation Administration begun in October 1983. The WYO Program operates within the context of the NFIP and involves private insurance carriers who issue and service National Flood Insurance Program policies.

## Z

- **Zone**--A geographical area shown on a Flood Hazard Boundary Map or a Flood Insurance Rate Map that reflects the severity or type of flooding in the area.
- **Zone A**  
Zone A is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study by approximate methods. Because detailed hydraulic analyses are not performed for such areas, no Base Flood Elevations or depths are shown within this zone. Mandatory flood insurance purchase requirements apply.
- **Zone AE and A1-A30**  
Zones AE and A1-A30 are the flood insurance rate zones that correspond to the 100-year floodplains that are determined in the Flood Insurance Study by detailed methods. In most instances, Base Flood Elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone. Mandatory flood insurance purchase requirements apply.
- **Zone AH**  
Zone AH is the flood insurance rate zone that corresponds to the areas of 100-year shallow flooding with a constant water-surface elevation (usually areas of ponding) where average depths are between 1 and 3 feet. The BFEs derived from the detailed hydraulic analyses are shown at selected intervals within this zone. Mandatory flood insurance purchase requirements apply.

- **Zone AO**  
Zone AO is the flood insurance rate zone that corresponds to the areas of 100-year shallow flooding (usually sheet flow on sloping terrain) where average depths are between 1 and 3 feet. The depth should be averaged along the cross section and then along the direction of flow to determine the extent of the zone. Average flood depths derived from the detailed hydraulic analyses are shown within this zone. In addition, alluvial fan flood hazards are shown as Zone AO on the FIRM. Mandatory flood insurance purchase requirements apply.
- **Zone AR**  
Zone AR is the flood insurance rate zone used to depict areas protected from flood hazards by flood control structures, such as a levee, that are being restored. FEMA will consider using the Zone AR designation for a community if the flood protection system has been deemed restorable by a Federal agency in consultation with a local project sponsor; a minimum level of flood protection is still provided to the community by the system; and restoration of the flood protection system is scheduled to begin within a designated time period and in accordance with a progress plan negotiated between the community and FEMA. Mandatory purchase requirements for flood insurance will apply in Zone AR, but the rate will not exceed the rate for unnumbered A zones if the structure is built in compliance with Zone AR floodplain management regulations. For floodplain management in Zone AR areas, elevation is not required for improvements to existing structures. However, for new construction, the structure must be elevated (or floodproofed for non-residential structures) such that the lowest floor, including basement, is a maximum of 3 feet above the highest adjacent existing grade if the depth of the base flood elevation (BFE) does not exceed 5 feet at the proposed development site. For infill sites, rehabilitation of existing structures, or redevelopment of previously developed areas, there is a 3 foot elevation requirement regardless of the depth of the BFE at the project site. The Zone AR designation will be removed and the restored flood control system shown as providing protection from the 1% annual chance flood on the NFIP map upon completion of the restoration project and submittal of all the necessary data to FEMA.
- **Zone A99**  
Zone A99 is the flood insurance rate zone that corresponds to areas of the 100-year floodplains that will be protected by a Federal flood protection system where construction has reached specified statutory milestones. No BFEs or depths are shown within this zone. Mandatory flood insurance purchase requirements apply.
- **Zone D**  
The Zone D designation on NFIP maps is used for areas where there are possible but undetermined flood hazards. In areas designated as Zone D, no analysis of flood hazards has been conducted. Mandatory flood insurance purchase requirements do not apply, but coverage is available. The flood insurance rates for properties in Zone D are commensurate with the uncertainty of the flood risk.
- **Zones B, C, and X**  
Zones B, C, and X are the flood insurance rate zones that correspond to areas outside the 100-year floodplains, areas of 100-year sheet flow flooding where average depths are less than 1 foot, areas of 100-year stream flooding where the

contributing drainage area is less than 1 square mile, or areas protected from the 100-year flood by levees. No BFEs or depths are shown within this zone.

- **Zone A**  
Zone A is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study by approximate methods. Because detailed hydraulic analyses are not performed for such areas, no Base Flood Elevations or depths are shown within this zone. Mandatory flood insurance purchase requirements apply.
- **Zone AE and A1-A30**  
Zones AE and A1-A30 are the flood insurance rate zones that correspond to the 100-year floodplains that are determined in the Flood Insurance Study by detailed methods. In most instances, Base Flood Elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone. Mandatory flood insurance purchase requirements apply.
- **Zone AH**  
Zone AH is the flood insurance rate zone that corresponds to the areas of 100-year shallow flooding with a constant water-surface elevation (usually areas of ponding) where average depths are between 1 and 3 feet. The BFEs derived from the detailed hydraulic analyses are shown at selected intervals within this zone. Mandatory flood insurance purchase requirements apply.
- **Zone AO**  
Zone AO is the flood insurance rate zone that corresponds to the areas of 100-year shallow flooding (usually sheet flow on sloping terrain) where average depths are between 1 and 3 feet. The depth should be averaged along the cross section and then along the direction of flow to determine the extent of the zone. Average flood depths derived from the detailed hydraulic analyses are shown within this zone. In addition, alluvial fan flood hazards are shown as Zone AO on the FIRM. Mandatory flood insurance purchase requirements apply.
- **Zone AR**  
Zone AR is the flood insurance rate zone used to depict areas protected from flood hazards by flood control structures, such as a levee, that are being restored. FEMA will consider using the Zone AR designation for a community if the flood protection system has been deemed restorable by a Federal agency in consultation with a local project sponsor; a minimum level of flood protection is still provided to the community by the system; and restoration of the flood protection system is scheduled to begin within a designated time period and in accordance with a progress plan negotiated between the community and FEMA. Mandatory purchase requirements for flood insurance will apply in Zone AR, but the rate will not exceed the rate for unnumbered A zones if the structure is built in compliance with Zone AR floodplain management regulations.
- For floodplain management in Zone AR areas, elevation is not required for improvements to existing structures. However, for new construction, the structure must be elevated (or floodproofed for non-residential structures) such that the lowest floor, including basement, is a maximum of 3 feet above the highest adjacent existing grade if the depth of the base flood elevation (BFE) does not exceed 5 feet at the proposed development site. For infill sites, rehabilitation of

existing structures, or redevelopment of previously developed areas, there is a 3 foot elevation requirement regardless of the depth of the BFE at the project site.

- The Zone AR designation will be removed and the restored flood control system shown as providing protection from the 1% annual chance flood on the NFIP map upon completion of the restoration project and submittal of all the necessary data to FEMA.
- **Zone A99**  
Zone A99 is the flood insurance rate zone that corresponds to areas of the 100-year floodplains that will be protected by a Federal flood protection system where construction has reached specified statutory milestones. No BFEs or depths are shown within this zone. Mandatory flood insurance purchase requirements apply.
- **Zone D**  
The Zone D designation on NFIP maps is used for areas where there are possible but undetermined flood hazards. In areas designated as Zone D, no analysis of flood hazards has been conducted. Mandatory flood insurance purchase requirements do not apply, but coverage is available. The flood insurance rates for properties in Zone D are commensurate with the uncertainty of the flood risk.
- **Zone V**  
Zone V is the flood insurance rate zone that corresponds to the 100-year coastal floodplains that have additional hazards associated with storm waves. Because approximate hydraulic analyses are performed for such areas, no BFEs are shown within this zone. Mandatory flood insurance purchase requirements apply.
- **Zone VE**  
Zone VE is the flood insurance rate zone that corresponds to the 100-year coastal floodplains that have additional hazards associated with storm waves. BFEs derived from the detailed hydraulic analyses are shown at selected intervals within this zone. Mandatory flood insurance purchase requirements apply.
- **Zones B, C, and X**  
Zones B, C, and X are the flood insurance rate zones that correspond to areas outside the 100-year floodplains, areas of 100-year sheet flow flooding where average depths are less than 1 foot, areas of 100-year stream flooding where the contributing drainage area is less than 1 square mile, or areas protected from the 100-year flood by levees. No BFEs or depths are shown within this zone.

## Appendix C

### Evaluation of Recommended Actions

The focus of flood mitigation projects in Wilbraham is to save lives and prevent property loss due to flooding. This section describes a list of mitigation actions with information on how each action fits in with community criteria and the benefits of each action. Potential projects were evaluated through several tests, including whether or not the activities address flood risks/flood loss, and whether or not the activities provide full solutions or partial solutions. See attachments: **Evaluating The Options, Sheets 1 and 2** to review an evaluation matrix of recommended actions selected for implementation by this flood plan.

### **Woodland Dell Debris Diversion Rack/Grate**

This project consists of the construction of a series of angled grates designed to screen and deflect flood debris from entering the culvert that crosses Main Street at Woodland Dell Road. In the past, flood debris such as sticks, logs and brush have blocked the culvert at Woodland Dell and Main causing floodwaters to overflow the intended channel and inundate adjacent structures and properties. In addition, passage of Main Street, which is a major evacuation route, is precluded until floodwaters naturally recede.

In concert with a request that property owners adjacent to Woodland Dell Road and Brookmont Drive keep the course of this intermittent stream bed free from forest and yard debris, the project will consist of a reinforced concrete and steel grate designed to deflect potentially clogging materials up and over the culvert allowing continued passage of flood waters. Due to the steep hydraulic gradient of this stream, the flow and volume during heavy rainfall are sufficient to deposit the resulting debris above the culvert. These materials can then temporarily be pushed aside to allow traffic to continue on Main Street until the debris is removed.

Vigilant maintenance of the grates will be required to remove accumulated debris following low flow events and to remove ice buildup during the winter. Project cost is estimated at \$25,000.

### **Federal Lane Drainage System Cleanout**

This is a continuation of a regular streambed and drainage maintenance project initiated by the Town designed to remove naturally occurring and floodwater transported debris from the natural streambed. This cleaning project allows peak flows to migrate unobstructed to natural wetlands.

### **Brookmont Runoff Detention Basin**

A detention basin is needed to control runoff flow from Brookmont Drive. This project uses a 20,000 cubic foot, double-outlet detention basin to regulate the flow of runoff from Brookmont Drive and Hilltop Drive during high-volume and normal rain and

snow melt events. During peak rain events, runoff from this drainage area torrents through the residential area threatening structures and access to the major evacuation route of Main Street. A detention basin would regulate peak flow and allow the natural streambeds to contain the surge within their confines. Project cost for excavation and construction is estimated at \$75,000.

## **Flood Insurance Direct Mailing Campaign**

There are approximately 278 structures within Wilbraham's floodplain. Only 17 flood insurance policies are in force. This results in the fact that approximately 94% of the structures in the floodplain are uninsured. This also reveals that property owners may be unaware that their structures are within the Special Flood Hazard Area or that they may not be fully apprised of the dangers flooding poses to them.

A direct mail campaign should be initiated to advise all residents of Wilbraham's Special Flood Hazard Area (SFHA), which is shown on the community's Flood Insurance Rate Maps (FIRMs). The notices should also be sent to other areas known to have flooding problems. These include flood-prone areas, local drainage problem areas, and other areas of surface water flooding that are not shown as floodplain on the FIRM.

The notice **MUST** clearly explain that the property is subject to flooding, the availability of flood insurance to the property owner, and that assistance and a list of contacts within the Town of Wilbraham that can provide information and guidance to the property owner on flood mitigation issues. In addition, the notice should include information on flood safety and ongoing mitigation efforts within the community. The notices should be distributed annually to account for turnover in the population and to keep awareness elevated in flood-risk neighborhoods. The notices should be endorsed by Wilbraham's Selectmen and prior notice of their distribution should be announced at monthly meetings.

## **Flood Information Outreach Program**

In addition to a direct mailing campaign to advise property owners in the Special Flood Hazard Area, an outreach program to enhance awareness of flood risk and associated flood safety measures should be implemented. Programs to be included, but are not limited to:

- Flood mitigation information on local cable access channels. This may include interviews with Town officials
- Flood mitigation information booths at community functions
- Speakers or static displays at community functions and the Town Hall
- School outreach programs which feature an all-hazards approach to weather events
- Flood mitigation information on the Town of Wilbraham web site

Particular attention should be directed towards special needs populations and facilities such as nursing homes, schools, daycare centers, medical treatment facilities, and housing for the elderly. The outreach should focus on flood mitigation measures directed on the owners/operators of these facilities and flood safety and evacuation for the occupants.

## **Apply For Entry Into The National Weather Service's StormReady Program**

The 2002 NFIP Community rating System allows communities to earn CRS credit for participation in the National Oceanic and Atmospheric Administration's "Storm Ready" program operated by the National Weather Service. The program promotes flood preparedness and the effective use of warnings in flood-prone communities. The program is aimed at preparing towns, like Wilbraham, with communication and safety tools necessary to save lives and property.

The top goal of StormReady is to prepare communities with an action plan that responds to the threat of all types of severe weather. StormReady provides clear-cut advice to community officials, emergency managers and media that improves their local hazardous weather operations. The goal of StormReady is to make sure everyone knows about severe weather, know what to do, do it, and live through the severe weather situation.

Once a community meets preparedness criteria, outlined by a partnership between the National Weather Service, and state and local emergency managers, it is pronounced "StormReady." However, before that happens, communities must:

- Establish a 24-hour warning point and emergency operations center;
- Have more than one method of receiving severe weather forecasts and warnings and alerting the public;
- Create a system that monitors local weather conditions;
- Promote the significance of public readiness through community seminars;
- Develop a formal hazardous weather plan, which includes training severe weather spotters and holding exercises.

An advisory board, comprised of National Weather Service Office warning coordination meteorologists (Tauton, MA Office), and state emergency managers, will review Wilbraham's application and visit the locations to verify the steps made in the process to become StormReady. After the advisory board approves certification, the Town will receive a formal letter, along with StormReady signs that can be displayed along its major roadways. StormReady communities must stay freshly prepared, because the designation is only valid for two years.

## **Implement GIS HAZUS Modeling**

Wilbraham Emergency Management is developing a Geographic Information System (GIS) to manage and model potential emergencies impacting the Town. This GIS capability will have the capacity to operate as part of the Town's information management network as well as a stand-alone capability during times of crisis. The use of HAZUS loss estimation technology will assist emergency planners to further refine contingency and operational plans to help save lives and mitigate property damage during floods and other natural hazard events.

Using GIS technology, HAZUS allows users to compute estimates of damage and losses that could result from an earthquake. To support FEMA's mitigation and emergency preparedness efforts, HAZUS is being expanded into HAZUS-MH, a multi-hazard methodology with new modules for estimating potential losses from wind and flood hazards. The HAZUS Flood Loss Estimation Model allows users to determine flood depths, estimate damages and losses, and define floods of varying magnitudes. Users may also assess and estimate potential damages to buildings, essential facilities, transportation and utility lifelines, and agricultural areas. The HAZUS Flood Loss Estimation Model also addresses debris generation and shelter requirements and can estimate direct losses based on physical damage to structures, contents, and building interiors. Finally, it allows users to simulate the effects of a disaster and determine the level and type of damage and economic loss people may suffer.

The flood loss estimation methodology consists of two basic analytical processes: flood hazard analysis and flood loss estimation analysis. In the hazard analysis module, characteristics such as frequency, discharge, and ground elevation are used to estimate flood depth, flood elevation, and velocity. In the loss estimation module, physical damage and economic loss is calculated based on the results of the hazard analysis. The results are displayed using a series of reports and maps.

Users may perform three levels of analysis using HAZUS Flood. The following describe the information and expertise needed for each level:

- Level 1. All of the information needed to produce a basic estimate of local flood losses will be included as default data, based on national databases and nationally applicable methods.
- Level 2. More accurate estimates will be needed including detailed information on local conditions. Modification of default databases will be required, along with the inclusion of local data and analyses.
- Level 3. Detailed and site-specific input data will be used to create state-of-the-art damage estimates and situation assessment profiles. Level 3 is intended for the expert user.

## **Merge GIS Q3 Data With The Tax Assessor's Database**

The Wilbraham Department of Public Works and Office of Emergency Management are working to merge the data from the Tax Assessors's Database with the Q3 Flood Data product.<sup>15</sup> This project will allow timely and accurate damage estimation in the case of large or small scale flood disasters and provides accurate data for modeling impacts of proposed mitigation measures. The project is almost 90% complete.

## **Reduce Wilbraham's Community Rating System (CRS) Score**

The Town of Wilbraham should reduce its Community Rating System Score to lessen its vulnerability to floods while reducing the cost of flood insurance premiums for all policyholders. The Community Rating System originated in 1990 as a voluntary program for recognizing and encouraging community floodplain management activities that exceed the minimum NFIP Requirements. Under the CRS, flood insurance premium rates for policyholders are discounted to reflect the reduced flood risk brought about by community activities to reduce flooding hazards. The CRS is a "win-win" program for Wilbraham because it reduces vulnerability to floods while reducing the cost of flood insurance premiums for all policyholders within the Town. The CRS is similar to community fire insurance ratings and is administered by the same risk management corporation, Insurance Services Office, Inc.

The Town of Wilbraham was automatically enrolled in the CRS with a rating of "10" when it entered the NFIP under the Regular Program. There is an established number of "points" for activities that are determined to reduce flood damages and increase education. For every 500 points earned, the CRS number for that jurisdiction drops by one. For each one-point drop in the CRS number, the cost of the flood insurance premium for each property owner in the floodplain in that community drops by 5%. For homeowners who own property outside of the floodplain but still maintain a flood insurance premium, the CRS reduction is more modest since their risk is already lower. At any rate, aggressive community leaders who wish to reduce the cost of flood insurance premiums for his/her community's NFIP policy holders can do so through the CRS, potentially up to 45% with a "1" ranking. The potential for savings is greatest in communities that have a large number of NFIP premiums and have a comprehensive floodplain management program.

In addition to reduced flood insurance premiums for Wilbraham's policy holders, CRS floodplain management activities provide enhanced public safety, a reduction in damage to property and public infrastructure, avoidance of economic disruption and

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<sup>15</sup> The Q3 Flood Data product is a digital representation of certain features of FEMA's Flood Insurance Rate Map (FIRM) product, intended for use with desktop mapping and Geographic Information Systems technology. Digital Q3 Flood Data has been developed by scanning the existing FIRM hardcopy, vectorizing a thematic overlay of flood risks. The vector Q3 Flood Data files contain only certain features from the existing FIRM hardcopy.

losses, reduction of human suffering, and protection of the environment. This allows the Town to evaluate the effectiveness of its flood program against a nationally recognized benchmark.

Technical assistance in designing and implementing some activities is available at no charge through the offices of the Federal Emergency Management Agency (Region I). Also, a CRS community's flood program benefits from having an added incentive to maintain its flood programs over the years. The fact that the community's CRS status can be affected by the elimination of a flood-related activity or a weakening of the regulatory requirements for new development should be taken into account by the Selectmen when considering such actions. A similar system used in fire insurance rating has had a strong impact on the level of support local governments give to their fire protection programs.

Finally, implementing some CRS activities, such as floodplain management planning, can help projects covered under this plan qualify for certain other federal assistance programs such as the Flood Mitigation Assistance Program (FMA), the Hazard Mitigation Grant Program (HMGP), and the U.S. Army Corps of Engineers.

The CRS has 18 floodplain management activities available for credit divided into four categories. The Town of Wilbraham is already performing many of these functions. Application to the CRS for a lower rating would best serve Wilbraham by claiming credit for these activities and passing the savings and benefits on to its citizens living in or near the Special Flood Hazard Areas. Listed below are the types of CRS activities listed by series:

- **Public Information (Series 300)** - This series credits programs that advise people about the flood hazard, flood insurance, and ways to reduce flood damage. These activities also provide data needed by insurance agents for accurate flood insurance rating. They generally serve all members of the community and work toward all three goals of the CRS.
- **Mapping and Regulations (Series 400)** - This series credits programs that provide increased protection to new development. These activities include mapping areas not shown on the FIRM, preserving open space, enforcing higher regulatory standards, and managing storm water. The credit is increased for growing communities. These activities work toward the first and second goals of the CRS, damage reduction and accurate insurance rating.
- **Flood Damage Reduction (Series 500)** - This series credits programs for areas in which existing development is at risk. Credit is provided for a comprehensive floodplain management plan, relocating or retrofitting floodprone structures, and maintaining drainage systems. These activities work toward the first goal of the CRS, damage reduction.
- **Flood Preparedness (Series 600)** - This series credits flood warning, levee safety, and dam safety programs. These activities work toward the first and third goals of the CRS, damage reduction and hazard awareness.

## **Improve the awareness of Flood Zone management practices among elected boards**

The Town of Wilbraham relies on several elected boards and commissions to provide direction to the Town in matters of development, land use, and growth in the community. The Planning Board and Zoning Board of Appeals have oversight of all new development projects and possess the ability to set conditions upon the project. The Board of Selectmen, as the Executive Authority of the Town, look at projects from a broader perspective, considering overall benefit/gain versus loss/impact to the Town.

These officials are key stakeholders in the future of Wilbraham and must be made aware of the benefits provided by consideration of development in flood zone areas and the impact on the community. This can be achieved by working with them to enact Planning Board Regulations inclusive of sound Flood Plain Management practices and maintaining open lines of communication with these Boards and Commissions.

## **Develop a standard approach for review of development and construction in identified Flood Plain areas and develop a guideline for the Zoning Board of Appeals and Planning Board to consider when reviewing development issues in the watershed area**

Currently, there is little regard given to the presence of the Flood Plain in major development projects. The focus is mainly on flooding from a wetlands and conservation point of view, with secondary concern for storm water run off and control

Using the guidelines of the Federal Emergency management Agency and The national Flood Plain Managers Association, along with those of the National Flood Insurance Program, model regulations for the Planning Board can be drafted. If adopted, it would be the first time Flood Zone Management was recognized for the positive impact it can have on community public safety and emergency risk management.

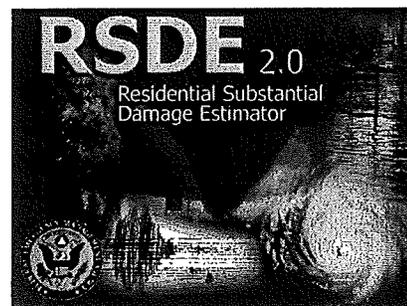
## **National Flood Insurance Program Training For Building Department Inspector**

Proper administration of the substantial improvement requirements under the NFIP by a community calls for considerable judgment by a community's permit official. Wilbraham's building official must make decisions about market value, cost of improvements, code-related exemptions, historic structures, and other issues. These decisions frequently become a source of concern for local officials after a community has experienced serious damage to many structures as a result of a flood or other disaster, or in communities undergoing rapid development where there is reinvestment in much of the existing structure and housing stock.

Many policy questions arise concerning the improvement and repair of damage to existing structures and how to make substantial improvement determinations. Enhanced training for Wilbraham's building official in Substantial Damage/Substantial Improvement requirements under the NFIP will assist the building inspector and code enforcement officials in responding to questions regarding NFIP regulations, policy, and guidelines for determining and enforcing substantial improvement requirements at the local level.

The failure of a community to adequately enforce the provisions in its flood damage prevention ordinance dealing with substantially improved structures can lead to compliance problems and may ultimately result in enforcement action, such as probation or suspension from the NFIP. In communities suspended from the NFIP, the Flood Disaster Protection Act of 1973 prohibits Federal agencies from making grants, loans, guarantees, insurance payments, rebates, subsidies, or disaster assistance loans or grants for the acquisition or construction of structures located in an identified flood hazard area.

Training should also include instruction on the use of the CD software package entitled *Residential Substantial Damage Estimator* (RSDE 2.0). FEMA has developed this computer program to assist state local officials in estimating building value and damage costs for both single family and manufactured homes. This computer application is based on regulatory requirements of the NFIP and may be used in conjunction with industry-accepted cost-estimating guides.<sup>16</sup>



Damage of any origin sustained by a building whereby the cost of restoring the building to its before-damaged condition would equal or exceed 50 percent of the market value of the building before the damage occurred is considered substantial damage. The emphasis of the NFIP floodplain management requirements is directed toward investments in flood hazard areas. These investments include not only the construction of new buildings, but also the improvements made to existing structures that surpass a certain established threshold. An improvement that surpasses this threshold is called a substantial improvement.

*“Substantial improvement means any reconstruction, rehabilitation, addition, or other improvement of a structure, the cost of which equals or exceeds 50 percent of the market value of the structure before the “start of construction” of the improvement. This term includes structures which have incurred “substantial damage”, regardless of the repair work performed. The term does not, however, include either (1) any project for improvement of a structure to correct existing violations of state or local health, sanitary, or safety code specifications which have been identified by the local code enforcement official and which are the minimum necessary to assure safe living conditions or (2) any*

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<sup>16</sup> Industry-accepted residential cost-estimating guides include publications such as the *Marshall & Swift Residential Cost Handbook*©.

*alteration of a "historic structure, provided that the alteration will not preclude the structure's continued designation as a "historic structure".*

The 50% threshold is chosen as a compromise between the extremes of prohibiting all investment to existing structures in flood hazard areas that do not meet minimum NFIP floodplain management requirements, and allowing existing structures to be improved in any fashion, without meeting any regulatory standards. The threshold attempts to strike a balance between the competing demands for sound floodplain management and the needs of owners of existing structures.

To coordinate training in Substantial Damage/Substantial Improvement requirements under the NFIP contact Massachusetts' State Coordinator for the National Flood Insurance Program:

Richard Zingarelli  
Department of Environmental Management  
Flood Hazard Management Program  
Commonwealth of Massachusetts  
Office of Water Resources  
251 Causeway Street  
Suite 700  
Boston, MA 02114

Phone: (617) 626-1406  
Fax: (617) 626-1349

## **Secondary Mitigation Activities**

### **Evaluate Properties For Future Mitigation Projects**

The Wilbraham Public Works in coordination with the Wilbraham Building Inspector and Wilbraham Emergency Management should continue to aggressively monitor at-risk structures within and near Special Flood Hazard Areas in Wilbraham to identify potential or repetitive flood losses. As the number of flood insurance policies increases in Wilbraham, the number of structures subject to repetitive loss requirements may increase. Additionally, uninsured structures may also be experiencing repetitive loss events due to flooding in some Wilbraham neighborhoods. Town regulatory officials and the building inspector should advise at-risk property owners of programs and sources of information to assist them in flood mitigation measures.

### **Flood Detention Basin Near Minnechaug Regional High School**

The natural floodwater detention basin adjacent to Church Lane has filled in with sediment over the last 40 years due to development and natural sedimentation. Rehabilitation of this site to its original capability would enhance the retention of

floodwaters to regulate surge flows and provide additional groundwater recharge capability and wetlands. Cost for the excavation and rehabilitation of this basin is estimated at \$100,000. Currently, runoff crossing Main Street passes through this area unrestricted, is diverted to underground culverts and is channeled underground to the South Branch of the Mill River.

### **Sunset Rock Debris Diversion Rack/Grate**

This project consists of the construction of a series of angled grates designed to screen and deflect flood debris from entering the culvert that crosses Mountain Road at Sunset Rock Road. In the past, flood debris such as sticks, logs and brush have blocked the culvert at Sunset Rock and Mountain Road causing flood waters to overflow the intended channel and inundate adjacent properties. In addition, passage of Mountain Road, which is an evacuation route, is precluded until floodwaters naturally recede.

In concert with a request that property owners adjacent to Sunset Rock Road keep the course of this intermittent stream bed free from forest and yard debris, the project will consist of a reinforced concrete and steel grate designed to deflect potentially clogging materials up and over the culvert allowing continued passage of flood waters. Due to the steep hydraulic gradient of this stream, the flow and volume during heavy rainfall are sufficient to deposit the resulting debris above the culvert. These materials can then temporarily be pushed aside to allow traffic to continue on Mountain Road until the debris is removed.

Vigilant maintenance of the grates will be required to remove accumulated debris following low flow events and to remove ice buildup during the winter. Project cost is estimated at \$25,000.

### **Flood Detention Basin Near Danforth Farms**

The natural runoff detention basin near Danforth Farms has silted in over the course of the last 20 years through development in the area and natural causes. Restoration of this floodwater detention capability will serve to control the release of flood surge and restore wetlands. Project cost for restoration and dredging is estimated at \$15,000. The addition of a dry hydrant for enhanced fire protection services would cost an additional \$15,000.

### **Headworks Replacement At Nine Mile Pond**

Nine Mile Pond receives its fill water from streams and runoff from adjacent lands. There is no natural outlet. The Pond is surrounded by residential and commercial structures that pre-date the Flood Insurance Rate Map. Initially seasonal cottages, most

of these structures have been developed into year-round residences. In 1952 the Massachusetts Department of Waterways constructed headworks and installed a 24-inch, reinforced concrete drainage pipe that extends 4,100 feet down Manchonis Road and into a catch basin that eventually empties the Pond's overflow into the Chicopee River. Without this system to manage the Pond's seasonal and storm overflow, the surrounding structures and a small portion of Route 20 would experience flooding. The pipeline has begun to deteriorate and sections of the pipe have experienced damage from tree root intrusion. Currently, the roots must be mechanically removed from the pipeline approximately every two years to allow unobstructed passage of the overflow. Project cost for rehabilitation of the headworks, pipeline, and tree removal is estimated at \$250,000.

# Appendix E

## Grant Information: How This Mitigation Plan Was Funded

In June of 2001 the Town of Wilbraham suffered over \$100,000 of infrastructure damage from Tropical Storm Allison. In addition, several residential structures also sustained flood related damages. In the aftermath, the Town of Wilbraham initiated a grant application to the Massachusetts Emergency Management Agency (MEMA) and the Massachusetts Department of Environmental Management (DEM) on the 3d of July 2001 for a Flood Mitigation Assistance (FMA) Grant to assess serious flood risks within the Town and to seek effective ways to prevent flood damage to neighborhoods and commercial structures. The estimated project cost was \$8,913.00 with a request for \$6,685.00 in MEMA grants and the remainder (\$2,228.00) being provided by the Town of Wilbraham.

The grant proposal was forwarded by MEMA to the Federal Emergency Management Agency (FEMA), Region I where it was given final approval as a Flood Mitigation Assistance (FMA) Planning Grant on 06 December 2001 in the amount of \$8,913.00, consisting of \$6,685.00 - 75% Federal Cost Share, and \$2,228.00- 25% Applicant (Town of Wilbraham) Cost Share. The project must be completed no later than 30 June 2003.

## Appendix F

# The Ten-Step Community Rating System (CRS) Planning Process For Creating A Community Flood Mitigation Plan

## The Ten-Step Community Rating System (CRS) Planning Process For Creating A Community Flood Mitigation Plan

The Flood Mitigation Community Planning Committee has adopted the use of the Community Rating System's (CRS) ten-step flood mitigation planning process, as recommended by the Massachusetts Department of Environmental Management (DEM), to develop the Town of Wilbraham's Flood Mitigation Plan. The CRS is a program developed by Federal Insurance and Mitigation Administration (FIMA)<sup>17</sup> to provide incentives for those communities in the Regular Program<sup>18</sup> that have gone beyond the minimum floodplain management requirements to develop extra measures to provide community-wide protection from flooding. Use of the planning process and creation of a flood mitigation plan is encouraged under the Federal Emergency Management Agency's (FEMA) CRS program. Having an approved flood mitigation plan is a prerequisite for Federal aid, including assistance provided by the Flood Mitigation Assistance and Hazard Mitigation Grant Programs, and several flood control programs of the U.S. Army Corps of Engineers. In addition, under the CRS, flood insurance premiums for policy holders are reduced based on a community's floodplain management activities.

As the name implies, there are ten steps to the CRS planning process. It utilizes the classic planning approach of gathering information, setting goals, reviewing alternatives, and deciding on a course(s) of action. The ten steps are:

- Organize to prepare the plan
- Involve the public
- Coordinate with other agencies
- Assess the hazard
- Evaluate the problem
- Set goals
- Review possible strategies and measures
- Draft an action Plan
- Adopt the plan
- Implement, evaluate, and revise the plan

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<sup>17</sup> **Federal Insurance and Mitigation Administration (FIMA)**--The federal entity within FEMA that directly administers the National Flood Insurance Program

<sup>18</sup> **Regular Program** -- The final phase of a community's participation in the National Flood Insurance Program. In this phase, a Flood Insurance Rate Map is in effect and full limits of insurance coverage are available under the National Flood Insurance Act of 1968

## Appendix H

### Critical Facilities

# TOWN OF WILBRAHAM CRITICAL BUILDINGS

Building Name	Address
01	100 Main Street
02	201 Main Street
03	301 Main Street
04	401 Main Street
05	501 Main Street
06	601 Main Street
07	701 Main Street
08	801 Main Street
09	901 Main Street
10	1001 Main Street

Building Name	Address
11	1101 Main Street
12	1201 Main Street
13	1301 Main Street
14	1401 Main Street
15	1501 Main Street
16	1601 Main Street
17	1701 Main Street
18	1801 Main Street
19	1901 Main Street
20	2001 Main Street

Building Name	Address
21	2101 Main Street
22	2201 Main Street
23	2301 Main Street
24	2401 Main Street
25	2501 Main Street
26	2601 Main Street
27	2701 Main Street
28	2801 Main Street
29	2901 Main Street
30	3001 Main Street

Building Name	Address
31	3101 Main Street
32	3201 Main Street
33	3301 Main Street
34	3401 Main Street
35	3501 Main Street
36	3601 Main Street
37	3701 Main Street
38	3801 Main Street
39	3901 Main Street
40	4001 Main Street

Building Name	Address
41	4101 Main Street
42	4201 Main Street
43	4301 Main Street
44	4401 Main Street
45	4501 Main Street
46	4601 Main Street
47	4701 Main Street
48	4801 Main Street
49	4901 Main Street
50	5001 Main Street

Building Name	Address
51	5101 Main Street
52	5201 Main Street
53	5301 Main Street
54	5401 Main Street
55	5501 Main Street
56	5601 Main Street
57	5701 Main Street
58	5801 Main Street
59	5901 Main Street
60	6001 Main Street

Building Name	Address
61	6101 Main Street
62	6201 Main Street
63	6301 Main Street
64	6401 Main Street
65	6501 Main Street
66	6601 Main Street
67	6701 Main Street
68	6801 Main Street
69	6901 Main Street
70	7001 Main Street

Building Name	Address
71	7101 Main Street
72	7201 Main Street
73	7301 Main Street
74	7401 Main Street
75	7501 Main Street
76	7601 Main Street
77	7701 Main Street
78	7801 Main Street
79	7901 Main Street
80	8001 Main Street

Building Name	Address
81	8101 Main Street
82	8201 Main Street
83	8301 Main Street
84	8401 Main Street
85	8501 Main Street
86	8601 Main Street
87	8701 Main Street
88	8801 Main Street
89	8901 Main Street
90	9001 Main Street

Building Name	Address
91	9101 Main Street
92	9201 Main Street
93	9301 Main Street
94	9401 Main Street
95	9501 Main Street
96	9601 Main Street
97	9701 Main Street
98	9801 Main Street
99	9901 Main Street
100	10001 Main Street

Building Name	Address
101	10101 Main Street
102	10201 Main Street
103	10301 Main Street
104	10401 Main Street
105	10501 Main Street
106	10601 Main Street
107	10701 Main Street
108	10801 Main Street
109	10901 Main Street
110	11001 Main Street

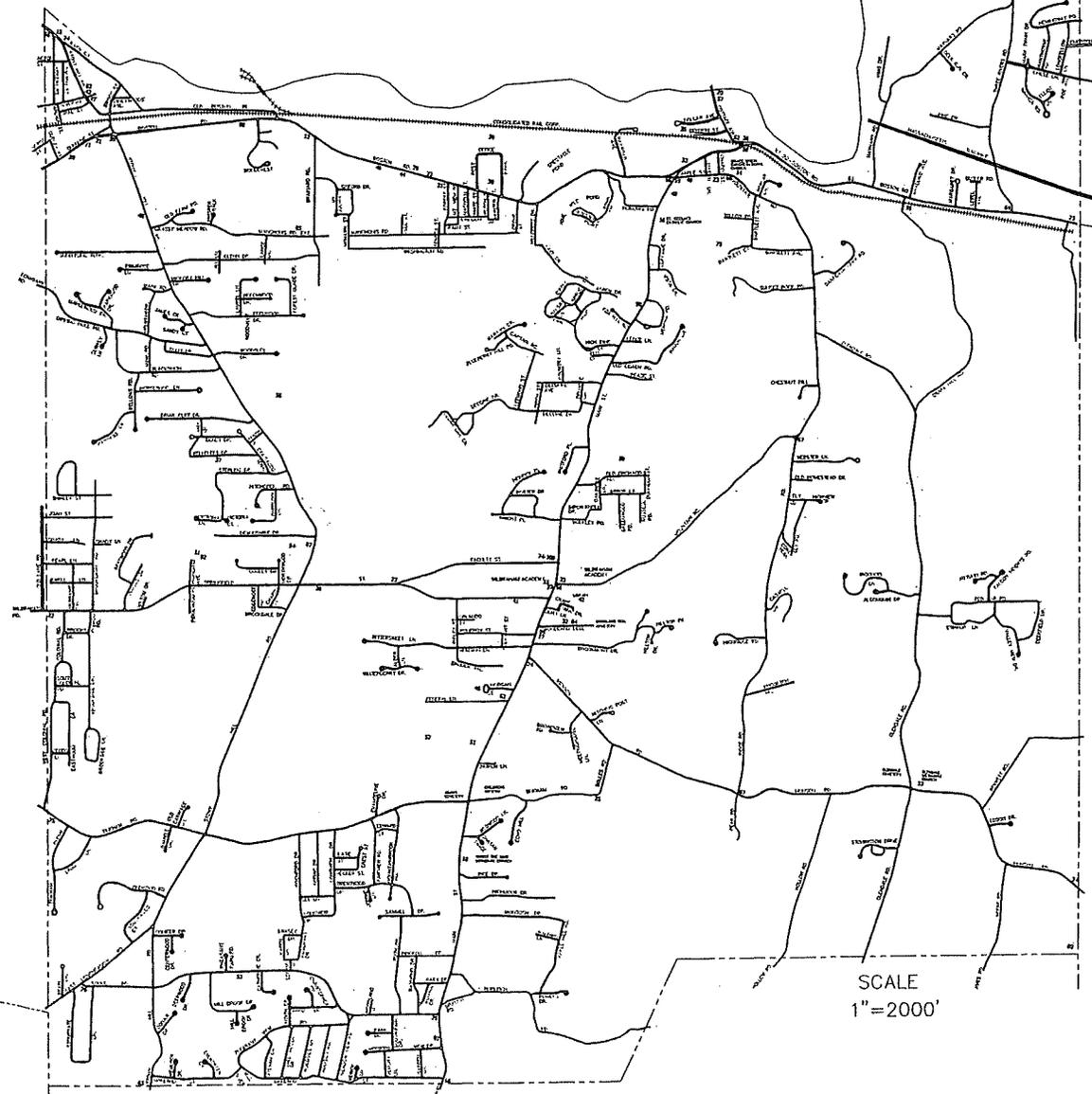
Building Name	Address
111	11101 Main Street
112	11201 Main Street
113	11301 Main Street
114	11401 Main Street
115	11501 Main Street
116	11601 Main Street
117	11701 Main Street
118	11801 Main Street
119	11901 Main Street
120	12001 Main Street

Building Name	Address
121	12101 Main Street
122	12201 Main Street
123	12301 Main Street
124	12401 Main Street
125	12501 Main Street
126	12601 Main Street
127	12701 Main Street
128	12801 Main Street
129	12901 Main Street
130	13001 Main Street

Building Name	Address
131	13101 Main Street
132	13201 Main Street
133	13301 Main Street
134	13401 Main Street
135	13501 Main Street
136	13601 Main Street
137	13701 Main Street
138	13801 Main Street
139	13901 Main Street
140	14001 Main Street

Building Name	Address
141	14101 Main Street
142	14201 Main Street
143	14301 Main Street
144	14401 Main Street
145	14501 Main Street
146	14601 Main Street
147	14701 Main Street
148	14801 Main Street
149	14901 Main Street
150	15001 Main Street

Building Name	Address
151	15101 Main Street
152	15201 Main Street
153	15301 Main Street
154	15401 Main Street
155	15501 Main Street
156	15601 Main Street
157	15701 Main Street
158	15801 Main Street
159	15901 Main Street
160	16001 Main Street



SCALE  
1" = 2000'

### Child Care Centers

Facility Name	Address
Burch Tree Nursery	971 Main Street
Church of The Epiphany	20 Highland Avenue
Country Day School	88 Stony Hill Road
Discovery Child Care	08 Woodland Dell
Learning Links	215 Manchonis Road Extension
Nature's Window	
Scantic Valley YMCA Δ	675 Stony Hill Road
Village Pre-School	2149 Boston Road
Wilbraham United Church Nursery	500 Main Street

### Churches

Facility Name	Address
Christ The king Lutheran Church	758 main Street
Church of The Epiphany	Highland Avenue
Evangel Assembly of God	2341 Boston Road
Glendale United Methodist Church	944 Glendale Road
Grace Union Church	10 Chapel Street
Saint Cecilia Catholic Church	42 Main Street
United Church	500 Main Street

### Evacuation Routes and Bridges

Route or Bridge	Location or Direction of Evacuation
CSX Railroad Trestle	Crane Hill Road
Red Bridge	Red bridge Road
Greene Bridge	Cottage Avenue
Boston Road (Rt. 20)	East-West
Springfield Street	East-West
Mountain Road	East-West
Monson Road	East-West
Tinkham Road	East-West
Soule Road	East-West
Red Bridge Road	East-West

### HAZMAT

Facility Name	Address
Construction Service	2420 Boston Road
Friendly Ice Cream Corp.	1855 Boston Road
US Post Office	40 Post Office park
Utility Manufacturing	2443 Boston Road

**Municipal Buildings**

<b>Facility Name</b>	<b>Address</b>
Fire Station # 2	Woodland Dell Road
Fire Station #1	2770 Boston Road
Public Works Garage	2420 Wilbraham Road
School Bus Garage	10 Dollar Street
Sewage Pumping Station	Boston Road & Cottage Ave.
Sewage Pumping Station	Wellfleet Drive
Town Offices	240 Springfield Street
U.S. Post Office	40 Post Office Park
Waste Water Storage Plant	Behind Post Office Park
Wilbraham Police Station and Emergency Operations Center	16 Main Street
Wilbraham Public Access Television	28 Springfield Street
Wilbraham Public Library	2 Crane Park
Wilbraham Senior Center *	88 Stony Hill Road

\* Emergency Shelter

**Nursing Homes – Assisted Living**

<b>Facility Name</b>	<b>Address</b>
Life Care Center of Wilbraham	2399 Boston Road
Miles Morgan Court	Miles Morgan Court
Orchard Valley	23787 Boston Road
The Pines	88 Stony Hill Road
Wilbraham Commons	269 Stony Hill Road
Wingate of Wilbraham	09 Maple Street

**Schools**

<b>Facility Name</b>	<b>Address</b>
Memorial School Δ	301 Main Street
Mile Tree School Δ	625 Main Street
Minnechaug Regional High School*	621 Main Street
Soule Road School* Δ	300 Soule Road
Stony Hill Elementary School Δ	675 Stony Hill Road
Wilbraham & Monson Academy	423 Main Street
Wilbraham Middle School	466 Stony Hill Road

\*Emergency Shelter

Δ After-School Program

**Utilities**

<b>Facility Name</b>	<b>Address</b>
Collins Dam Hydro-Electric Project	Cottage Avenue
High Pressure LPG Line	Boston Road to Cottage Avenue
High Pressure LPG Line	Boston Rd, Main St, Stony Hill Road to East Longmeadow
Northeast Utilities Power Transmission Line	North – South entire length of Town
Petroleum Line	Rt. 20 – Crosses at Co-Ed Billiards under Chicopee River to Ludlow
Power Sub Station	Boston Road & Cottage Street
Power Sub-Station	Main Street & Federal Lane
Red Bridge Hydro Electric Project	Red Bridge Road
Stony Hill Road	North-South
Main Street	North-South
Ridge Road	North-South
Mountain Road	North-South
Three Rivers Road	North-South
Chilson Road	North-South

**Veterinary Facilities**

<b>Facility Name</b>	<b>Address</b>
Eastfield Hospital For Animals	1964 Boston Road
Main Street Cat Clinic	451 main Street
Wilbraham Animal Hospital	2424 Boston Road

## Appendix G

### Reference Publications

## References

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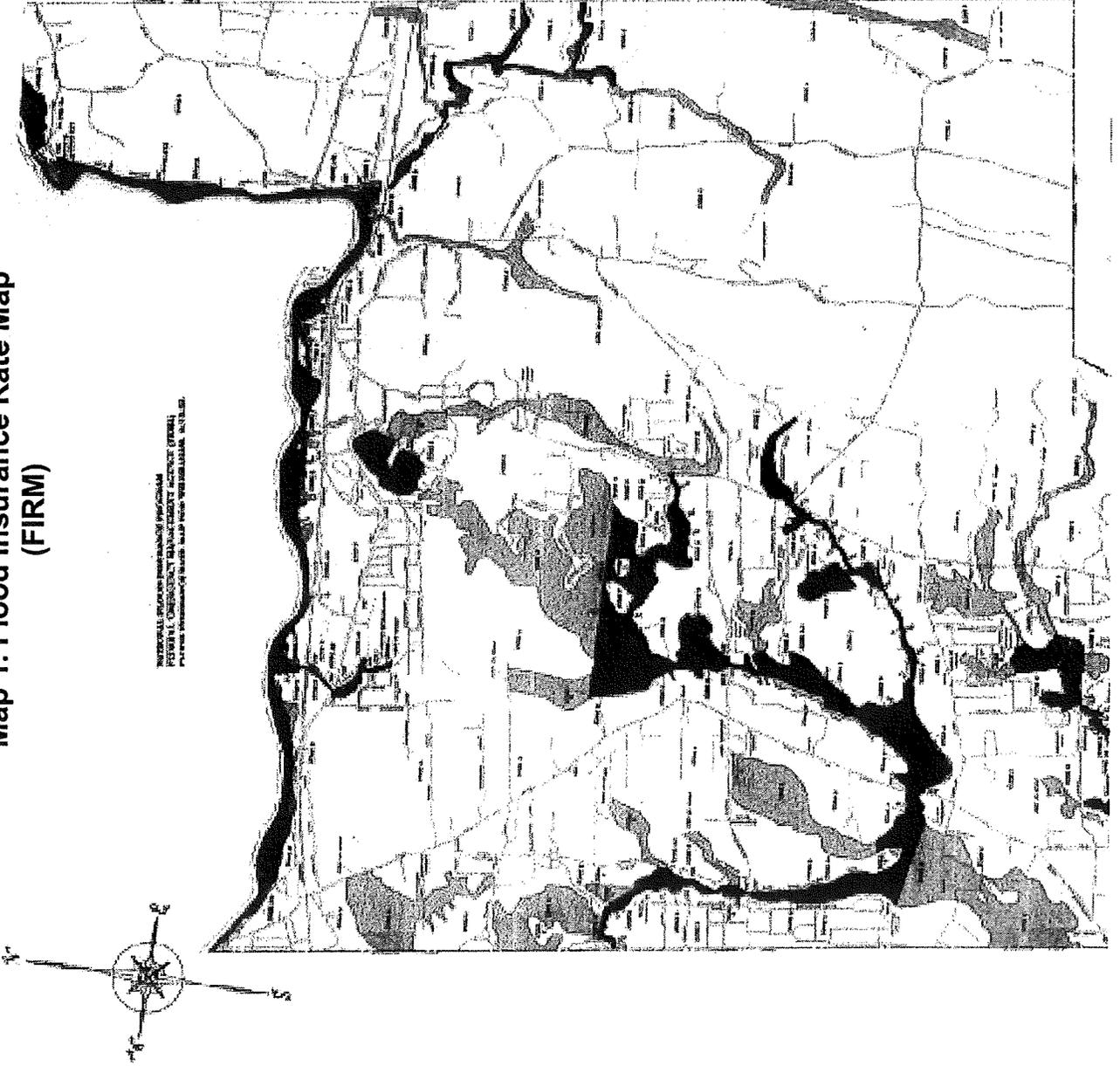
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Map 1. Flood Insurance Rate Map (FIRM)



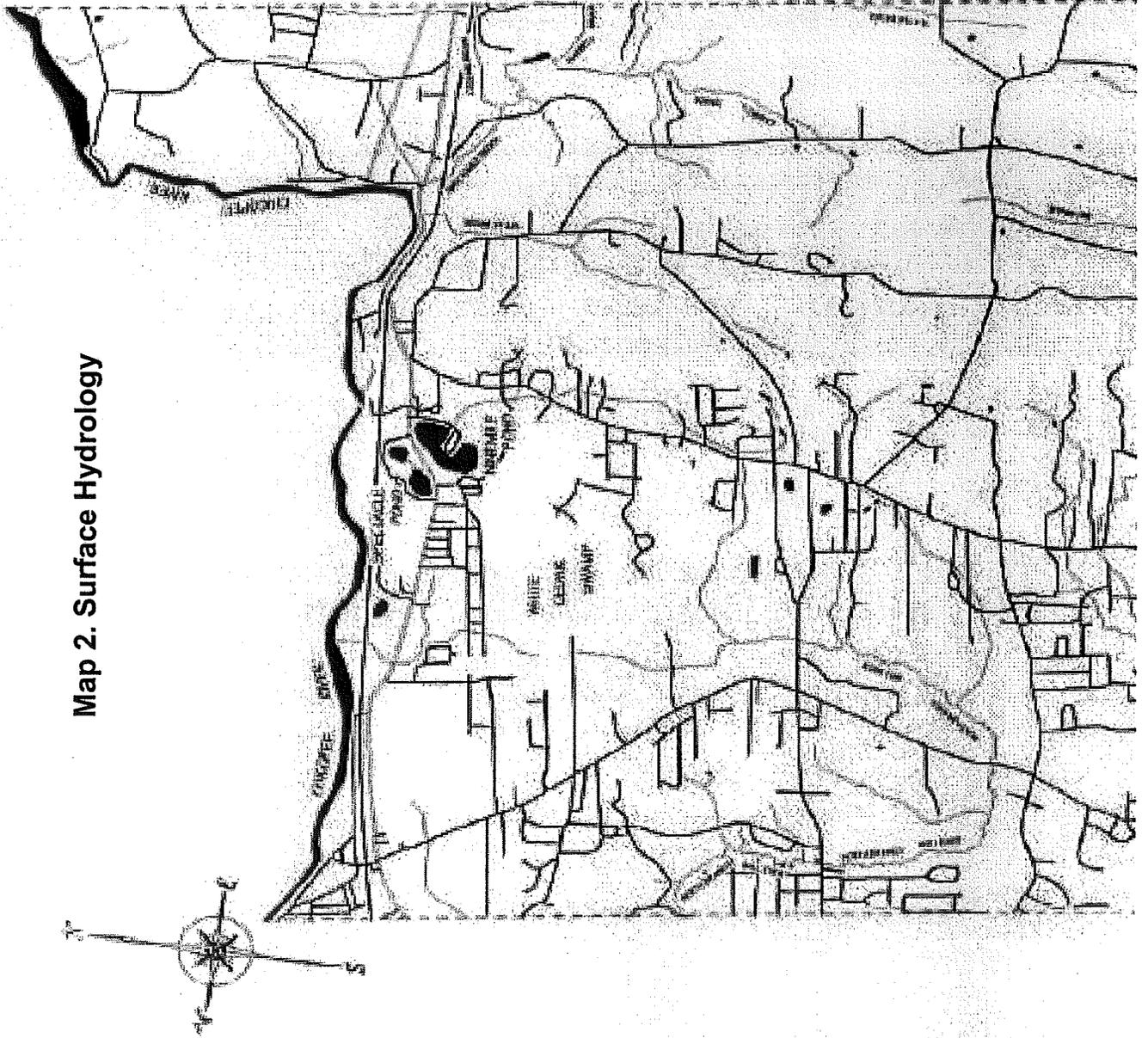
LEGEND

NOTE: THIS MAP IS FOR INFORMATIONAL PURPOSES ONLY.

NOTE: THIS MAP IS FOR INFORMATIONAL PURPOSES ONLY.

FLOOD PLAIN ARE  
OF  
WILBRAHAM

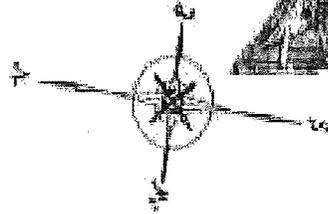
Map 2. Surface Hydrology



SURFACE  
HYDROLOGY  
OF  
WILBRAHAM



### Map4. Wetlands



Notes: Data taken from the Wetlands Map of Wilbraham prepared in 1994 by Electronic Environmental Consulting Inc.



#### Legend

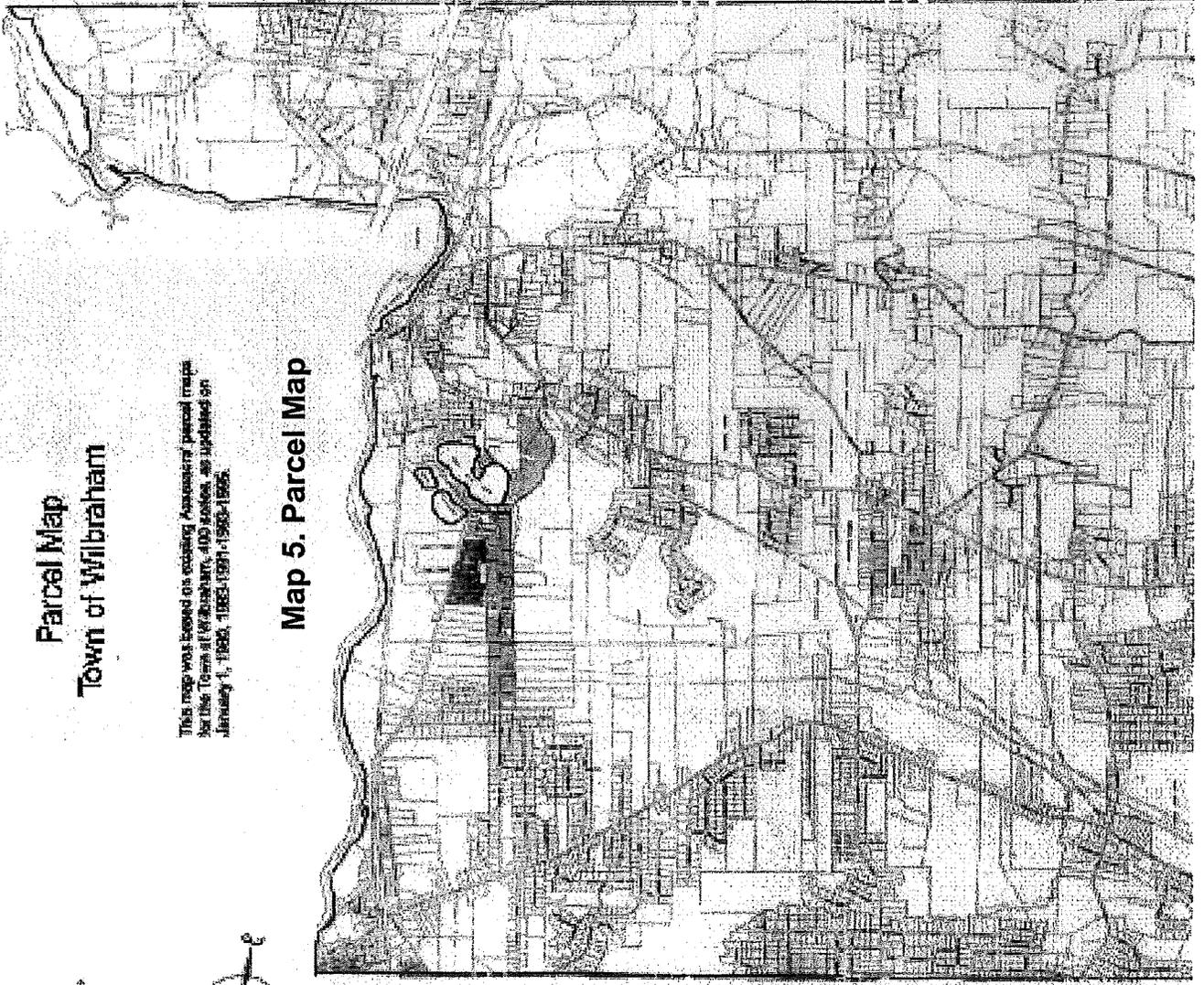
-  OPEN SPACE - WETLANDS
-  OPEN SPACE - WETLANDS
-  OPEN SPACE - WETLANDS
-  OPEN SPACE - WETLANDS
-  OPEN SPACE - WETLANDS

WETLANDS  
OF  
WILBRAHAM

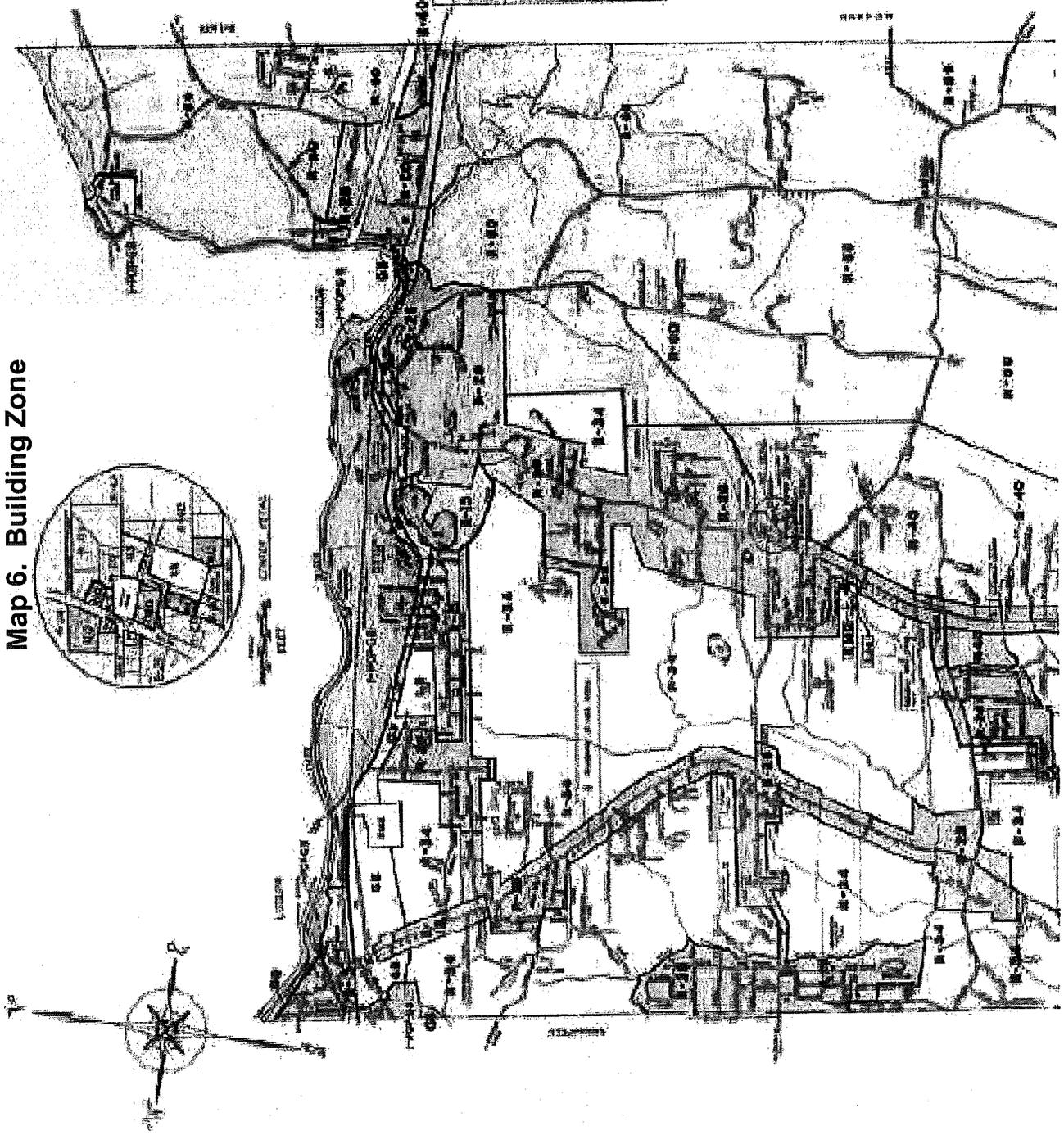
**Parcel Map  
Town of Wilbraham**

This map was based on existing Massachusetts parcel maps for the Town of Wilbraham, 409 Boston, and updated on January 1, 1990, 1993, 1997, 1998, and 1999.

**Map 5. Parcel Map**



Map 6. Building Zone



- LEGEND**
- B-15 RESIDENCE DISTRICT
  - B-16 RESIDENCE DISTRICT
  - B-17 RESIDENCE DISTRICT
  - B-18 RESIDENCE DISTRICT
  - B-19 RESIDENCE DISTRICT
  - B-20 RESIDENCE DISTRICT
  - B-21 RESIDENCE DISTRICT
  - B-22 RESIDENCE DISTRICT
  - B-23 RESIDENCE DISTRICT
  - B-24 RESIDENCE DISTRICT
  - B-25 RESIDENCE DISTRICT
  - B-26 RESIDENCE DISTRICT
  - B-27 RESIDENCE DISTRICT
  - B-28 RESIDENCE DISTRICT
  - B-29 RESIDENCE DISTRICT
  - B-30 RESIDENCE DISTRICT
  - B-31 RESIDENCE DISTRICT
  - B-32 RESIDENCE DISTRICT
  - B-33 RESIDENCE DISTRICT
  - B-34 RESIDENCE DISTRICT
  - B-35 RESIDENCE DISTRICT
  - B-36 RESIDENCE DISTRICT
  - B-37 RESIDENCE DISTRICT
  - B-38 RESIDENCE DISTRICT
  - B-39 RESIDENCE DISTRICT
  - B-40 RESIDENCE DISTRICT

ZONE	AREA	PERCENTAGE	LAND USE	HEIGHT	REMARKS
B-15	RESIDENCE DISTRICT	50 FT	RES	35 FT	
B-16	RESIDENCE DISTRICT	50 FT	RES	35 FT	
B-17	RESIDENCE DISTRICT	50 FT	RES	35 FT	
B-18	RESIDENCE DISTRICT	50 FT	RES	35 FT	
B-19	RESIDENCE DISTRICT	50 FT	RES	35 FT	
B-20	RESIDENCE DISTRICT	50 FT	RES	35 FT	
B-21	RESIDENCE DISTRICT	50 FT	RES	35 FT	
B-22	RESIDENCE DISTRICT	50 FT	RES	35 FT	
B-23	RESIDENCE DISTRICT	50 FT	RES	35 FT	
B-24	RESIDENCE DISTRICT	50 FT	RES	35 FT	
B-25	RESIDENCE DISTRICT	50 FT	RES	35 FT	
B-26	RESIDENCE DISTRICT	50 FT	RES	35 FT	
B-27	RESIDENCE DISTRICT	50 FT	RES	35 FT	
B-28	RESIDENCE DISTRICT	50 FT	RES	35 FT	
B-29	RESIDENCE DISTRICT	50 FT	RES	35 FT	
B-30	RESIDENCE DISTRICT	50 FT	RES	35 FT	
B-31	RESIDENCE DISTRICT	50 FT	RES	35 FT	
B-32	RESIDENCE DISTRICT	50 FT	RES	35 FT	
B-33	RESIDENCE DISTRICT	50 FT	RES	35 FT	
B-34	RESIDENCE DISTRICT	50 FT	RES	35 FT	
B-35	RESIDENCE DISTRICT	50 FT	RES	35 FT	
B-36	RESIDENCE DISTRICT	50 FT	RES	35 FT	
B-37	RESIDENCE DISTRICT	50 FT	RES	35 FT	
B-38	RESIDENCE DISTRICT	50 FT	RES	35 FT	
B-39	RESIDENCE DISTRICT	50 FT	RES	35 FT	
B-40	RESIDENCE DISTRICT	50 FT	RES	35 FT	

BUILDING ZONE MAP  
TOWN OF  
WILBRAHAM, MASS.

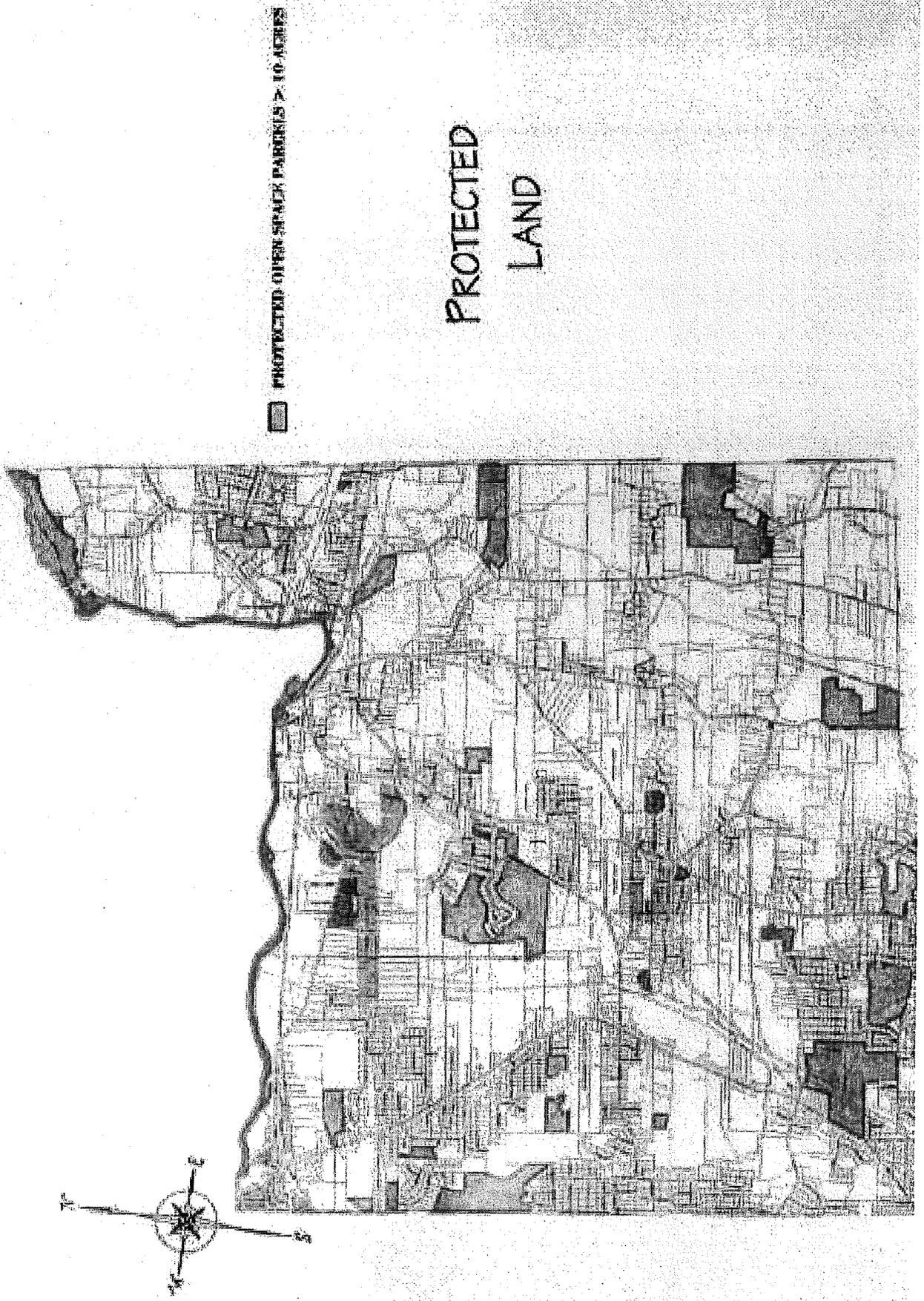


JANUARY 2004

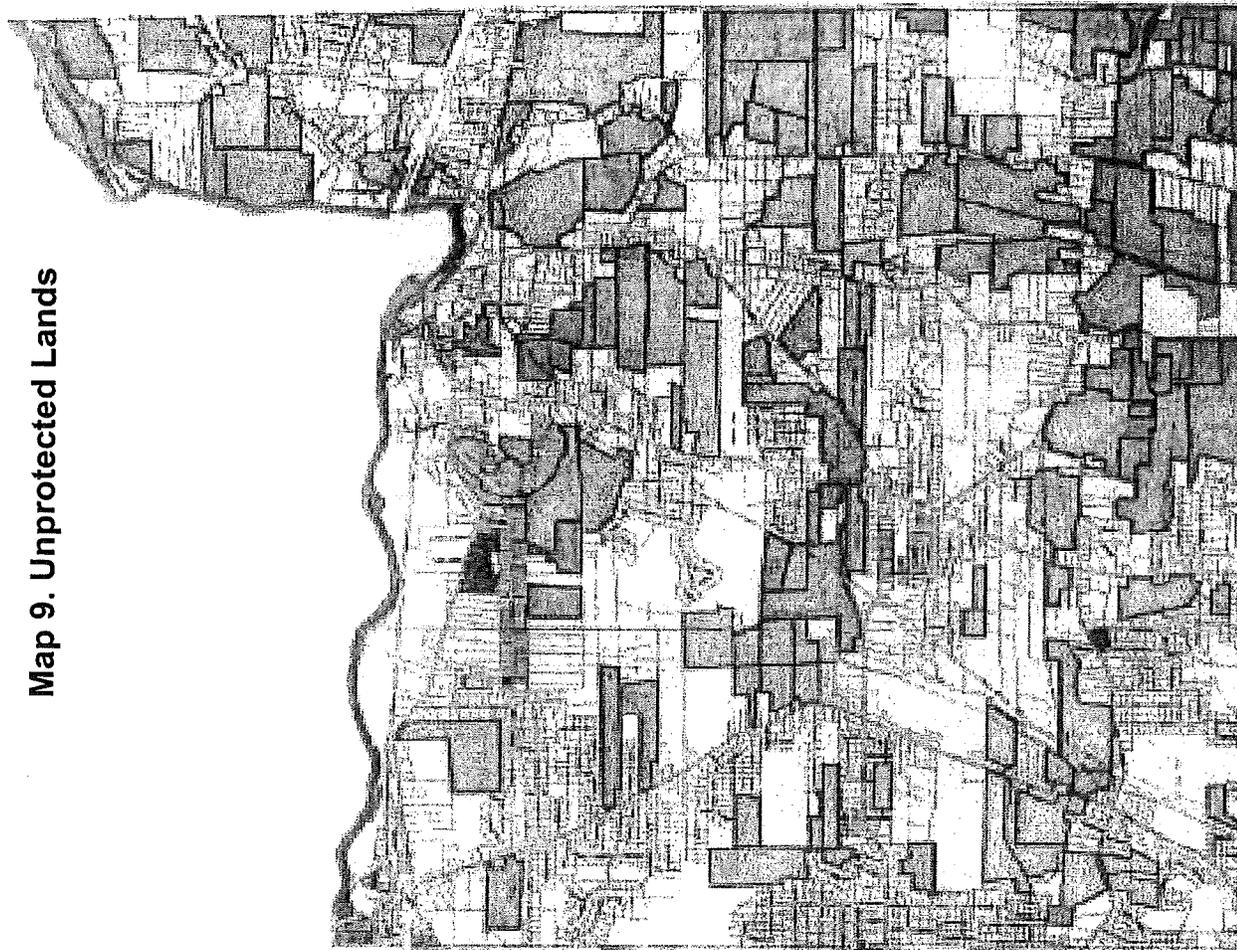
**Map 7. Protected Lands**



Map 8. Semi-Protected Lands



Map 9. Unprotected Lands



UNPROTEI  
LAND

# Watershed Key

**Chicopee River** →

**Connecticut River** →

**Chicopee River**

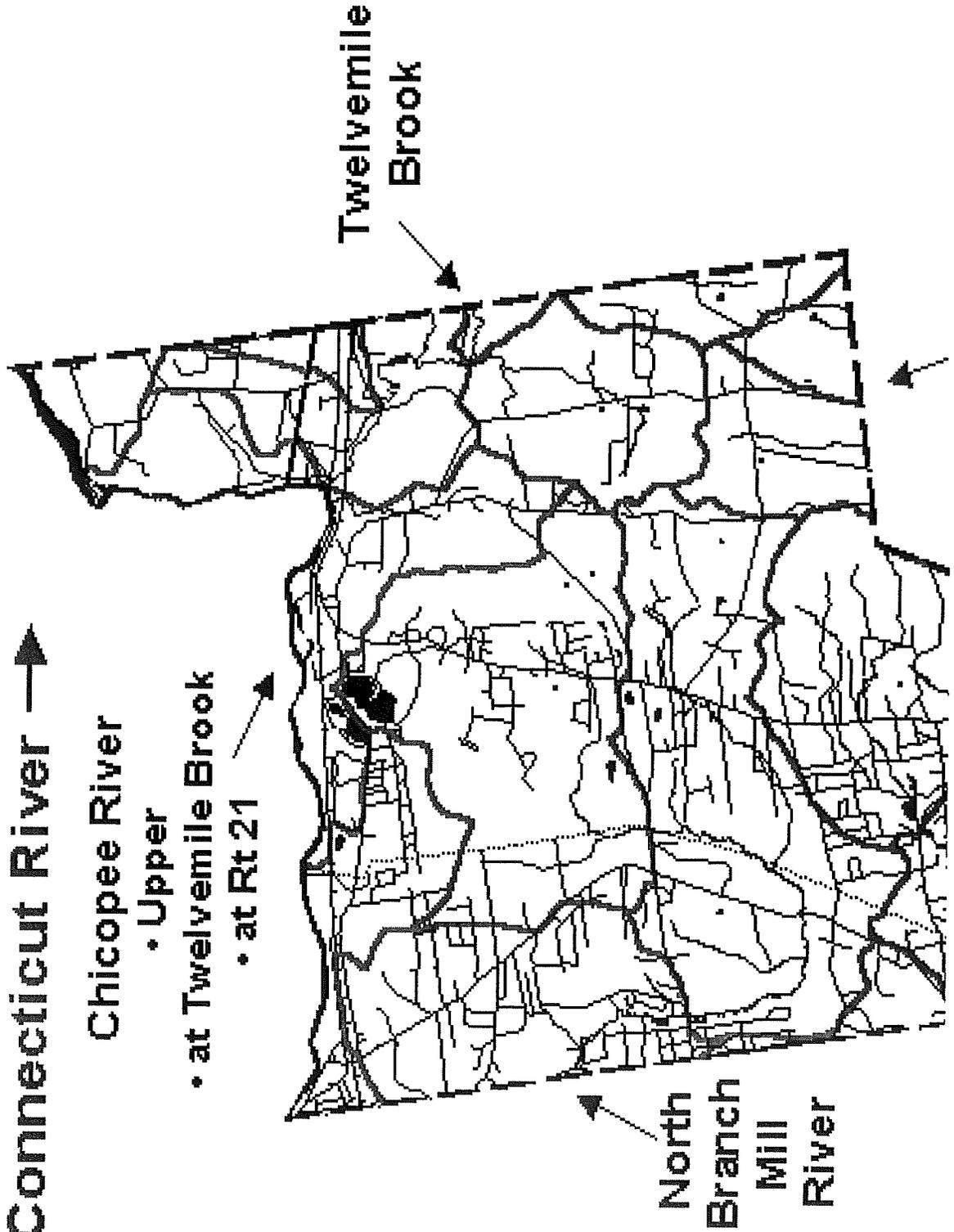
• Upper

• at Twelvemile Brook

• at Rt 21

Map 10. Chicopee and Connecticut River

Watersheds in Wilbraham



***This report was made possible through the supportive efforts of many people, but I wish to specifically acknowledge:***

Mr. William Fogarty, Town Administrator

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Ms. Tonya Bosch, Assistant Town Engineer

Mr. Frank Shea, Highway Superintendent

Mr. Kevin Moriarty, Selectman

Mr. James Thompson, Selectman

Mr. David Barry, Selectmen

Mr. Paul Lyons, Executive Office of Environmental Affairs

Ms. Donna Nelson, Department of Environmental Management

Mr. Robert Nadeau, Mass. Emergency Management

***Special recognition is due to Mr. Robert Hassett, Assistant Emergency Management Director, who single-handedly transformed this report from a basic, flat narrative to a document of unparalleled style, focus and professionalism***

Respectfully;

**Kenneth R. Willette  
Emergency Manager  
Town of Wilbraham**