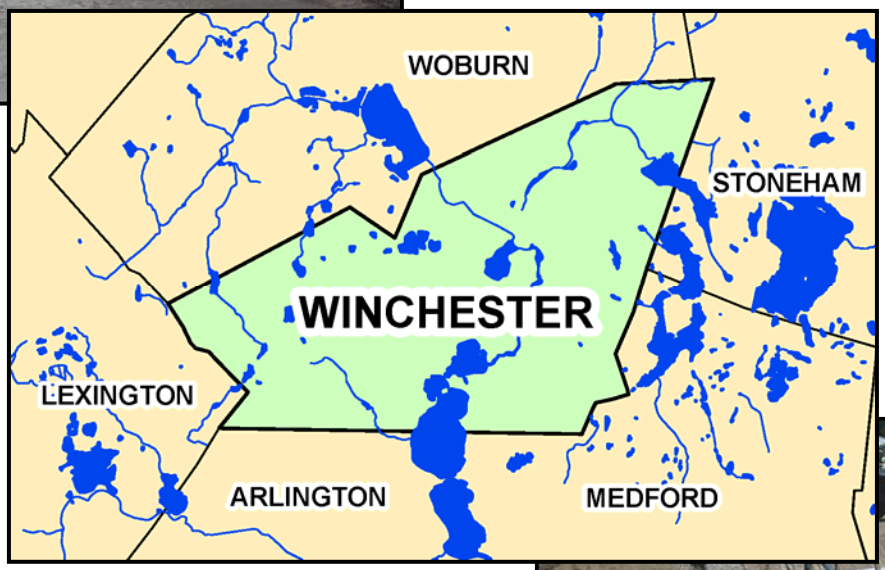
# All Hazards Mitigation Plan

*Town of Winchester, Massachusetts*



*April 2016*

# Town of Winchester

Lance R. Grenzeback, Chairman
E. James Whitehead, Vice Chairman
Stephen L. Powers
Michael Bettencourt
David P. Errico

Board of Selectmen
71 Mt. Vernon Street
Winchester, MA 01890
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## CERTIFICATE OF ADOPTION

**Winchester, MASSACHUSETTS**

BOARD OF SELECTMEN

**A RESOLUTION ADOPTING THE *"ALL HAZARDS MITIGATION PLAN – TOWN OF WINCHESTER, MASSACHUSETTS"***

WHEREAS, the Town of Winchester established a Committee to prepare the Hazard Mitigation plan; and

WHEREAS, the Town of Winchester participated in the development of the "*All Hazards Mitigation Plan – Town of Winchester, Massachusetts*";

and WHEREAS, the *"All Hazards Mitigation Plan – Town of Winchester, Massachusetts"* contains several potential future projects to mitigate potential impacts from natural hazards in the Town of Winchester, and

WHEREAS, a duly-noticed public meeting was held by the BOARD OF SELECTMEN on July 16, 2012 for the public and municipality to review prior to consideration of this resolution; and

WHEREAS, the Town of Winchester authorizes responsible departments and/or agencies to executes their responsibilities demonstrated in the plan, and

NOW, THEREFORE BE IT RESOLVED that the Town of Winchester BOARD OF SELECTMEN, formally approves and adopts the *"All Hazards Mitigation Plan – Town of Winchester, Massachusetts"*, in accordance with M.G.L. c. 40.

ADOPTED AND SIGNED this 11 day of April, 2016

TOWN OF WINCHESTER,
By its Board of Selectmen:

Lance R. Grenzeback

Lance R. Grenzeback, Chairman

E. James Whitehead, Vice Chairman

Stephen L. Powers

Michael Bettencourt

David P. Errico

**COMMONWEALTH OF MASSACHUSETTS**

Middlesex, ss.

On this 11th day of April, 2016, personally appeared Lance R. Grenzeback, E. James Whitehead, Stephen L. Powers, Michael Bettencourt, and David Errico, known to be members of the Winchester Board of Selectmen and acknowledged the foregoing instrument to be their free act and deed, and the free act and deed of the Board of Selectmen and of the Town of Winchester.

Notary Public
My commission expires:

PATRICIA MAWN
Notary Public
Commonwealth of Massachusetts
My Commission Expires April 8, 2022

# Table of Contents

**1.0 Introduction**

1.1 Background ..... 1-1
1.2 Plan Update Methodology ..... 1-1
1.3 Hazard Mitigation Goals ..... 1-3

**2.0 Community Profile**

2.1 Geographic and Demographic Profile ..... 2-1
2.2 Existing Land Use ..... 2-4
2.3 Critical Infrastructure ..... 2-6
2.4 Repetitive Loss Areas ..... 2-12
2.5 Potential Future Use ..... 2-14

**3.0 Hazard Identification, Risk Assessment, and Mitigation Measures**

3.1 Hazard Risk Levels and Vulnerability Assessment ..... 3-2
3.2 Flood-Related Hazards ..... 3-5
3.3 Atmospheric-Related Hazards ..... 3-20
3.4 Winter-Related Hazards ..... 3-24
3.5 Geologic Hazards ..... 3-27
3.6 Other Natural Hazards ..... 3-30
3.7 Prioritization and Implementation ..... 3-33

**4.0 Regional Considerations** ..... 4-1

**5.0 Monitoring, Evaluation, and Updating**

5.1 Annual Review ..... 5-1
5.2 Five Year Update ..... 5-1
5.3 Declared Disasters ..... 5-2

**Appendix A – Public Hearing Notices**

**Appendix B – Public Outreach Materials**

**Appendix C – Compilation of Plan Updates**

**Appendix D – Status of 2007 Existing and Proposed Hazard Mitigation Actions**

**Appendix E – October 2014 Annual Review Meeting Materials**

# List of Tables

2-1 2005 Land Use Summary Statistics....2-4
2-2 Critical Infrastructure....2-6

3-1 Hazard Identification and Analysis Matrix....3-4
3-2 Recent Flooding Events....3-6
3-3 Hurricane Categories....3-21
3-4 Northeast Snowfall Impact Scale (NESIS)....3-25
3-5 Severe Winter Storm Records for Massachusetts....3-26
3-6 Richter Scale....3-28
3-7 Prioritization of Future Mitigation Strategies....3-35

# List of Figures

2-1 Town Locus Map....2-1
2-2 Census Block Data....2-3
2-3 Land Use Map....2-5
2-4 Critical Infrastructure....2-10
2-5 Evacuation Routes and Emergency Shelters....2-11
2-6 Repetitive Loss Structures....2-13

3-1 Waterbodies and Flood Hazard Areas....3-8

# Section 1.0 Introduction

## 1.1 Background

The Federal Disaster Mitigation Act of 2000 requires that all municipalities wishing to qualify for future funding under the Federal Emergency Management Agency's (FEMA) Hazard Mitigation Grant Program (HMGP) must have a hazards mitigation plan in place by November 1, 2004. The hazards mitigation plan may also assist communities in applying for other hazard mitigation funding, such as FEMA's pre-disaster mitigation program, the Flood Mitigation Assistance (FMA) program, and other federal, state, or private funding sources. The Massachusetts Emergency Management Agency (MEMA) outlined a process whereby communities throughout the commonwealth may be eligible for grants and other assistance upon completion of a local hazard mitigation plan.

The Town of Winchester's *All Hazard Mitigation Plan* is intended to meet the requirements of the 2000 Disaster Mitigation Act.

## 1.2 Plan Update Methodology

The Town of Winchester's current *All Hazards Mitigation Plan* was approved by FEMA in 2007. This document represents an update to that original plan, in accordance with the five-year update requirement. We felt that the 2007 plan development went very well; therefore, tor this update, the Town followed a similar process, including stakeholder and public outreach plans. The primary change was putting together a more expansive and inclusive Planning Team, which included representatives from the community and public utilities, and expanding our public outreach. Additionally, the Town published several press releases on our website (www.wincehster.us), and in local and regional newspapers, outlining the update process and soliciting feedback from the local and neighboring communities.

A summary of the changes between this plan and the 2007 plan is provided in Appendix C of this document. The major highlights for this plan revision include:

- Expansion of the Community Planning Team to include additional staff and stakeholders;
- Development of a broad public outreach plan to ensure that members of the community were provided the opportunity to participate in the planning process and comment on the plan prior to approval. Outreach during the drafting stage and prior to plan approval included a press-release that was published on the front page of the local newspaper, the Daily Times Chronicle, and was posted on the Town's webpage.

- Identification of key stakeholders who may be interested or impacted by the natural hazards, including Winchester Hospital, NStar, the Chamber of Commerce, and the Arthur Griffin Museum.
- Modification to the layout and organization of the risk assessment in accordance with the hazard categories identified in the state's mitigation plan;
- Update to the Town's mitigation measures.

The first step in the update process was the assemblage of a Community Planning Team. The goal was to put together a team of professional staff and community members with a variety of different skills and expertise to assist with the plan update. Similar to the original plan development process, members of the Town's Conservation Commission and Board of Health were contacted and invited to join the Winchester Planning Team, as were staff from the Town's Fire Department, Police Department, Engineering Department, Planning Department, and Department of Public Works. In addition, the Town invited various community stakeholders, including Winchester Hospital, and the community representative from NStar. Ultimately, members of the Winchester Planning Team included the following:

- Captain Rick Tustin, Winchester Fire Department
- Beth Rudolph, P.E., Town Engineer
- Matt Shuman, P.E., Assistant Town Engineer
- Elaine Vreeland, Esq., Conservation Administrator
- Sargent Thomas Groux, Winchester Police Department Safety Officer
- Jennifer Murphy, Board of Health Director
- Chief John Nash, Winchester Fire Department
- Jay Gill, DPW Director
- Steve Swymer, Water and Sewer Superintendent
- Al Wile, Building Inspector
- Betsy Ware, Town Planner
- Steven Shea, Safety Coordinator, Winchester Hospital
- AnneMarie Walsh, Community Relations Representative, NStar
- Jim Whitehead, Conservation Commission member and resident

The Winchester Planning Team met three times during spring 2012 to develop and review the All Hazards Mitigation Plan. The last two meetings were posted by the Town Clerk as public meetings. Copies of the public meeting notices are provided in Appendix A, as well as the meeting sign-in sheets. Copies of the press release and newspaper article related to the project are provided in Appendix B. The plan was discussed by the Board of Selectman at a televised public meeting on July 16, 2012. The

Town held a public comment period from July 17 to July 24, 2012. During this time, the draft plan was posted on the Town's website for review. The public comment period was publicized in several local newspapers. The Town received comments from one resident during this time. An annual review meeting was held by the Planning Team on October 15, 2014. A copy of the agenda and minutes for this meeting are included in Appendix E.

The Town felt that the Community Planning Team worked well together and will look to keep a similar make up throughout the planning cycle. The composition of the team will be reassessed before the next 5-year update.

## 1.3 Hazard Mitigation Goals

During the plan review, the Winchester Community Planning Team reaffirmed the following goals for the Town of Winchester with respect to Hazard Mitigation:

(1) To improve upon the protection of the general population, the citizens of the Town of Winchester and guests, from all natural and man-made hazards.

(2) To reduce the potential impact of natural and man-made disasters on the Town of Winchester's Emergency Response Services.

(3) To reduce the potential impact of natural and man-made disaster on Critical Facilities in the Town of Winchester.

(4) To reduce the potential impact of natural and man-made disasters on the Town of Winchester's infrastructure.

(5) To improve the Town of Winchester's Emergency Preparedness and Disaster Response and Recovery Capability.

(6) To reduce the potential impact of natural and man-made disasters on private property in the Town of Winchester.

(7) To reduce the potential impact of natural and man-made disasters on the Town of Winchester's economy.

(8) To reduce the potential impact of natural and man-made disasters on the Town of Winchester's natural environment.

(9) To reduce the Town of Winchester's liability with respect to natural and man-made hazards through a community education program.

(10) To reduce the potential impact of natural and man-made disasters on the Town of Winchester's historic resources, such as the Town Center National Register Historic District.

(11) To identify, introduce, and implement cost-effective Hazard Mitigation measures so as to accomplish the Town's Goals and Objectives and to raise the awareness of and acceptance of Hazard Mitigation opportunities generally.

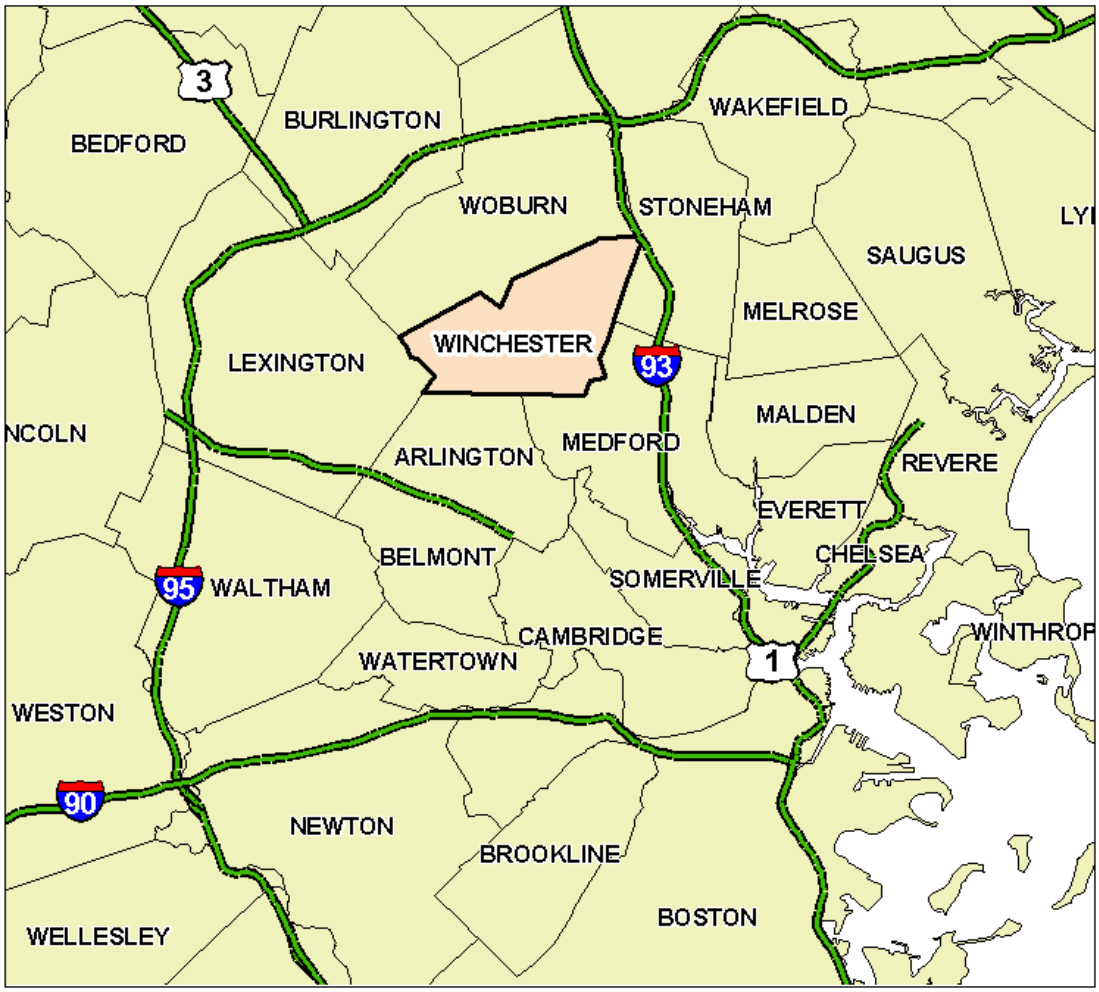
(12) The Town of Winchester will work in conjunction and cooperation with the State of Massachusetts' Hazard Mitigation Goals.

# Section 2.0 Community Profile

## Section 2.1 Geographic and Demographic Profile

The Town of Winchester is a primarily residential community located eight miles northwest of Boston. The Town covers an area of approximately 6.3 square miles; it is bordered by Woburn to the north, Stoneham and Medford to the east, Arlington amd Medford to the south, and Lexington to the west (see Figure 2-1). State Route 38 and US Route 3 run through Town in a north-south direction, as does the Boston-Maine rail line, which services both commuter rail and commercial freight lines. An approximately 300 to 400-foot section of Interstate 93 passes through the far northeastern portion of town; however, there are no access points to the interstate in this section.

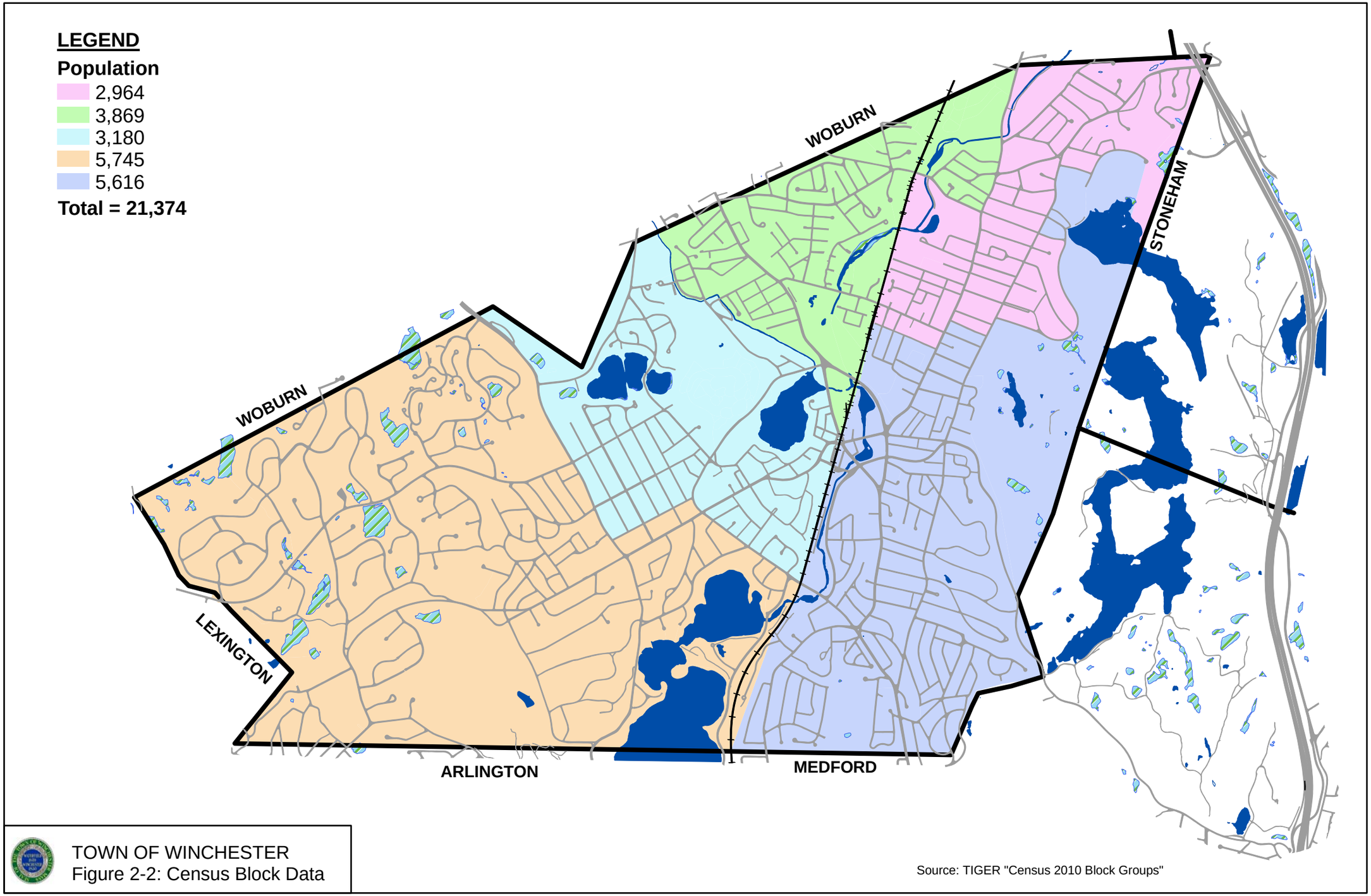
*Figure 2-1: Town Locus Map*



As a result of the adoption of the Winchester Home Rule Charter in 1975, the Town of Winchester is governed by a Board of Selectman, Town Manager, and representative Town Meeting form of government. In 2010, the population of Winchester was 21,374 and the total number of housing units was 7936. Figure 2-2 provides a graphical representation of the 2010 U.S. Census information using the Census block groups.

The Town of Winchester's water supply is derived primarily from a system of protected reservoirs located within the Middlesex Fells Reservation. Portions of the Town are also supplied by water from the MWRA. Numerous other ponds and streams are located wholly or partially within the town, most notably the Aberjona River and the Mystic Lakes. The United States Geological Survey (USGS) operates a streamflow gaging station along the Aberjona River near the Town Center.

The Town maintains a website at http://www.winchester.us/.




TOWN OF WINCHESTER
Figure 2-2: Census Block Data

## 2.2 Existing Land Use

The most recent land use statistics available for the Town of Winchester were developed by the Massachusetts Geographic Information System (MassGIS) based on aerial photography collected in 2005. Additional information on how the land use statistics were developed and the definition of the categories is available at http://www.mass.gov/mgis/lus2005.htm.

Table 2-1 provides a summary of the acreage and percentage of total land for the land use categories; land use patterns in Town are presented graphically in Figure 2-3. Based on this analysis, medium-density residential land comprises the largest percentage of total land area in town at 25.6%; the next largest category is forested land at 22.9%.

***Table 2-1: 2005 Land Use Summary Statistics***

| Category | Area (acres) | Percent of Total |
|---|---|---|
| Cropland | 12.2 | 0.3% |
| Cemetery | 58.9 | 1.4% |
| Golf Course | 85.9 | 2.1% |
| Forest | 932 | 22.9% |
| Forested Wetland | 38.6 | 0.9% |
| Non-forested Wetland | 24.1 | 0.6% |
| Nursery | 20.2 | 0.5% |
| Open Land | 21.6 | 0.5% |
| Participation Recreation | 85.5 | 2.1 % |
| Water-based Recreation | 13.1 | 0.3% |
| Multi-Family Residential | 271.0 | 6.7% |
| Very Low Density Residential | 12.3 | 0.3% |
| Low Density Residential | 294.4 | 7.2% |
| Medium Density Residential | 1045 | 25.6% |
| High Density Residential | 663.7 | 16.3% |
| Commercial | 92.6 | 2.3% |
| Industrial | 49.5 | 1.2% |
| Urban Public/Institutional | 112.1 | 2.8% |
| Transitional | 2.5 | 0.1% |
| Power line/Utility | 3.1 | 0.1% |
| Transportation | 21.6 | 0.5% |
| Waste Disposal | 4.3 | 0.1% |
| Marina | 2.8 | 0.1% |
| Water | 207.8 | 5.1% |
| **TOTAL** | **4075** | |

Source: MassGIS, 2005 (http://www.mass.gov/mgis/lus2005.htm)

# Legend

## Land Use Category

- Commercial
- Industrial
- Low Density Residential
- Medium Density Residential
- High Density Residential
- Multi-Family Residential
- Very Low Density Residential
- Open Land
- Forest
- Cemetery
- Cropland
- Golf Course
- Participation Recreation
- Nursery
- Transportation
- Urban Public/Institutional
- Waste Disposal
- Non-Forested Wetland
- Marina
- Water-Based Recreation
- Water

**Land Use Summary Statistics**

| Land Use Category | Area (acres) | Percent of Total |
|---|---|---|
| Cemetery | 58.9 | 1.4% |
| Commercial | 92.6 | 2.3% |
| Cropland | 12.2 | 0.3% |
| Forest | 932.3 | 22.9% |
| Forested Wetland | 38.6 | 0.9% |
| Golf Course | 85.9 | 2.1% |
| High Density Residential | 663.7 | 16.3% |
| Industrial | 49.5 | 1.2% |
| Low Density Residential | 294.4 | 7.2% |
| Marina | 2.8 | 0.1% |
| Medium Density Residential | 1044.6 | 25.6% |
| Multi-Family Residential | 271.0 | 6.7% |
| Non-Forested Wetland | 24.1 | 0.6% |
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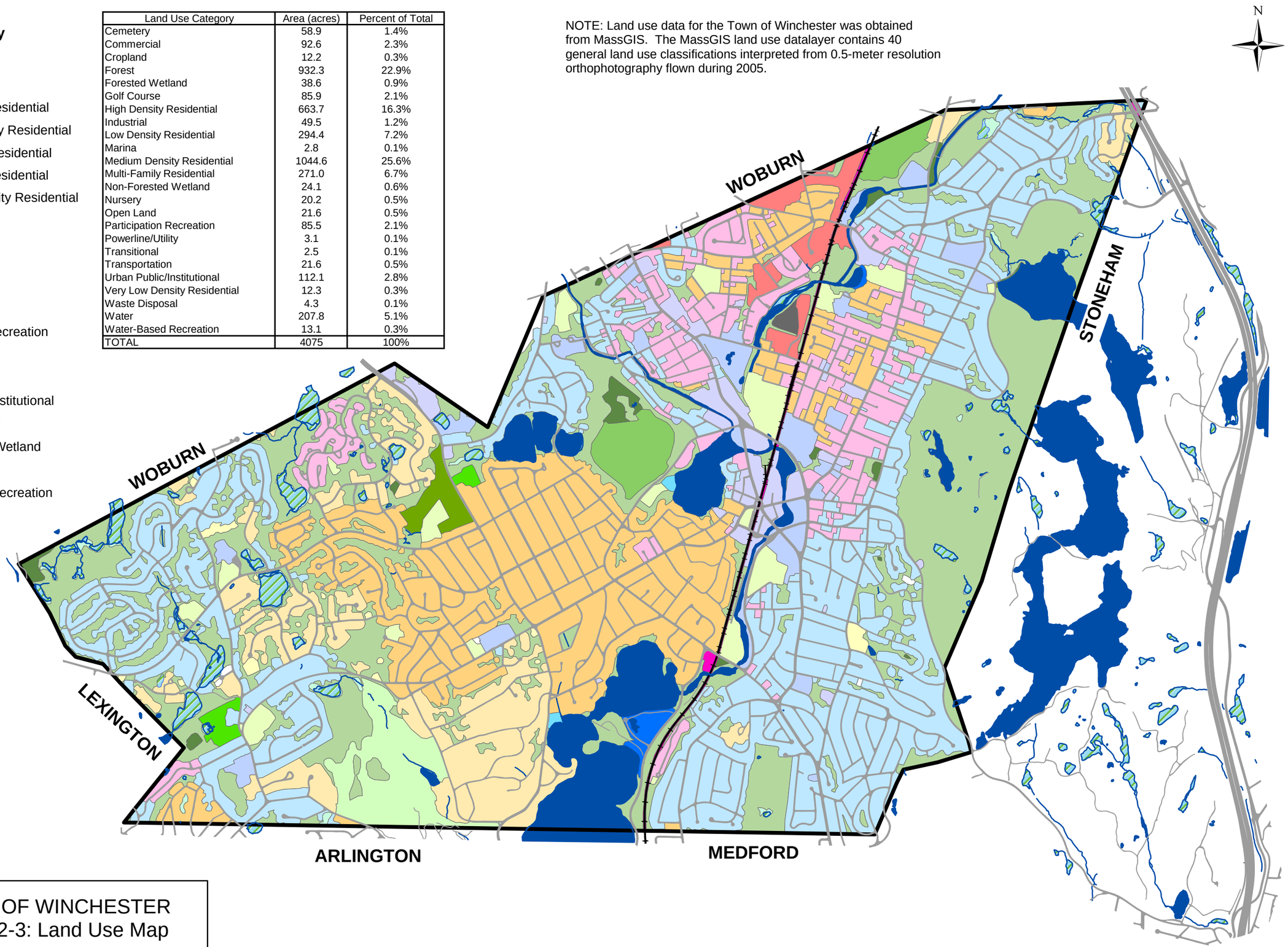
| Urban Public/Institutional | 112.1 | 2.8% |
| Very Low Density Residential | 12.3 | 0.3% |
| Waste Disposal | 4.3 | 0.1% |
| Water | 207.8 | 5.1% |
| Water-Based Recreation | 13.1 | 0.3% |
| TOTAL | 4075 | 100% |

NOTE: Land use data for the Town of Winchester was obtained from MassGIS. The MassGIS land use datalayer contains 40 general land use classifications interpreted from 0.5-meter resolution orthophotography flown during 2005.




TOWN OF WINCHESTER
Figure 2-3: Land Use Map

## 2.3 Critical Infrastructure

The critical infrastructure list for the Town of Winchester was originally developed by the LEPC as part of the development of the CEM Plan using the Critical Facilities List provided by the State Hazard Mitigation Officer. This list was review and revised as necessary by the Community Planning Team during the development of this All Hazards Plan.

The critical infrastructure list was divided into the following three categories:

- **Category 1: Emergency Response Facilities and Structures**- includes facilities needed for emergency response in the event of a disaster
- **Category 2: Facilities/Populations to Protect**- includes people and facilities that need to be protected in the event of a disaster
- **Category 3: Potential Resources**- includes facilities that can potentially provide supplies or services in the event of a disaster

Table 2-2 provides a summary of the Category 1, 2, and 3 infrastructure.

***Table 2-2: Critical Infrastructure***

| Category | Type of Facility | Site | Address |
|---|---|---|---|
| 1 | Town Offices | Department of Public Works | 15 Lake Street |
| | | Public Safety Building | 30 Mount Vernon Street |
| | | West Side Fire Station | 45 Lockeland Road |
| | | Winchester Town Hall | 71 Mount Vernon Street |
| | Hospital | Winchester Hospital | 41 Highland Avenue |
| 2 | Town Facilities | Water Treatment Facility | |
| | | Winchester Public Library | 80 Washington Street |
| | Schools | Ambrose School[1] | 15 High Street |
| | | Lincoln School[1] | 161 Mystic Valley Prkwy |
| | | Lynch School | 10 Brantwood Road |
| | | McCall Middle School[1] | 452 Main Street |
| | | Muarco School | 33 Bates Road |
| | | Winchester High School[1] | 80 Skillings Road |
| | | Vinson Owen School | 75 Johnson Road |
| | Nursing Homes | Aberjona Nursing Center | 184 Swanton Street |
| | | Mt. Vernon House | 110 Mt. Vernon Street |
| | | The Gables | 299 Cambridge Street |
| | | Winchester Nursing Center | 223 Swanton Street |

| Category | Type of Facility | Site | Address |
|---|---|---|---|
| | Churches | Crawford Memorial United Memorial Church | 34 Dix Street |
| | | First Church Christ Scientist | 114 Church Street |
| | | First Congregational Church | 21 Church Street |
| | | First Baptist Church | 90 Mount Vernon Street |
| | | Hope Christian Church | 58 Mt. Vernon Street |
| | | Parish of the Epiphany | 70 Church Street |
| | | Second Congregational Church | 485 Washington Street |
| | | St. Eulalia's Church | 50 Ridge Street |
| | | St. Mary's Church | 160 Washington Street |
| | | Temple Shir Tikva | 34 Vine Street |
| | | Unitarian Universalist Church | 478 Main Street |
| | Day Care Facilities | Children's Own School | 86 Main Street |
| | | Creative Corner | 12 Sheridan Circle |
| | | Family Tree Childcare | 39 Holton Street |
| | | Kid Connection/WRAP | 263 Main Street |
| | | Kids Corner After School Program | 263 Main Street |
| | | Neighborhood Cooperative Nursery School | 21 Church Street |
| | | Private Day Care Facilities (list maintained by state) | |
| | | United Methodist Nursery School | 34 Dix Street |
| | | Winchester Child Development Center | 259 Swanton Street |
| | | Winchester Cooperative Nursery | 478 Main Street |
| | | Winchester School of Chinese Culture After School Program | 478 Main Street |
| | Miscellaneous | Bridges & Evacuation Routes | |
| 3 | | Stop and Shop | 695 Main Street |

[1]Designated emergency shelters

A Critical Facilities Map is provides as Figure 2-4, showing the critical facilities located in Categories 1 and 2. Also shown on this map is the FEMA flood hazard zones, which allows for the identification of critical infrastructure located in the floodplain. This figure shows that several Category 1 facilities are located within or near areas that may flood. The DPW facility, for example, is located within the 100-year floodplain. The DPW staff are well versed in maintaining operations during times of flooding. In the past, equipment and resources have been relocated to Town-owned facilities that are located outside of floodprone areas, such as the nearby Wildwood Cemetery or to the Transfer Station.

**2.3.1 Evacuation Routes**

An emergency situation may require the evacuation of part or all of the community. The characteristics and scope of the emergency will determine where evacuation occurs, the number of people affected, and the measures needed to ensure safety. Additional information on responsibilities for evacuation operations is provided in the Town's CEM plan. The primary evacuation routes in town are as follows:

- Cambridge Street (Route 3)
- Main Street (Route 38)
- Washington Street
- South Border Road

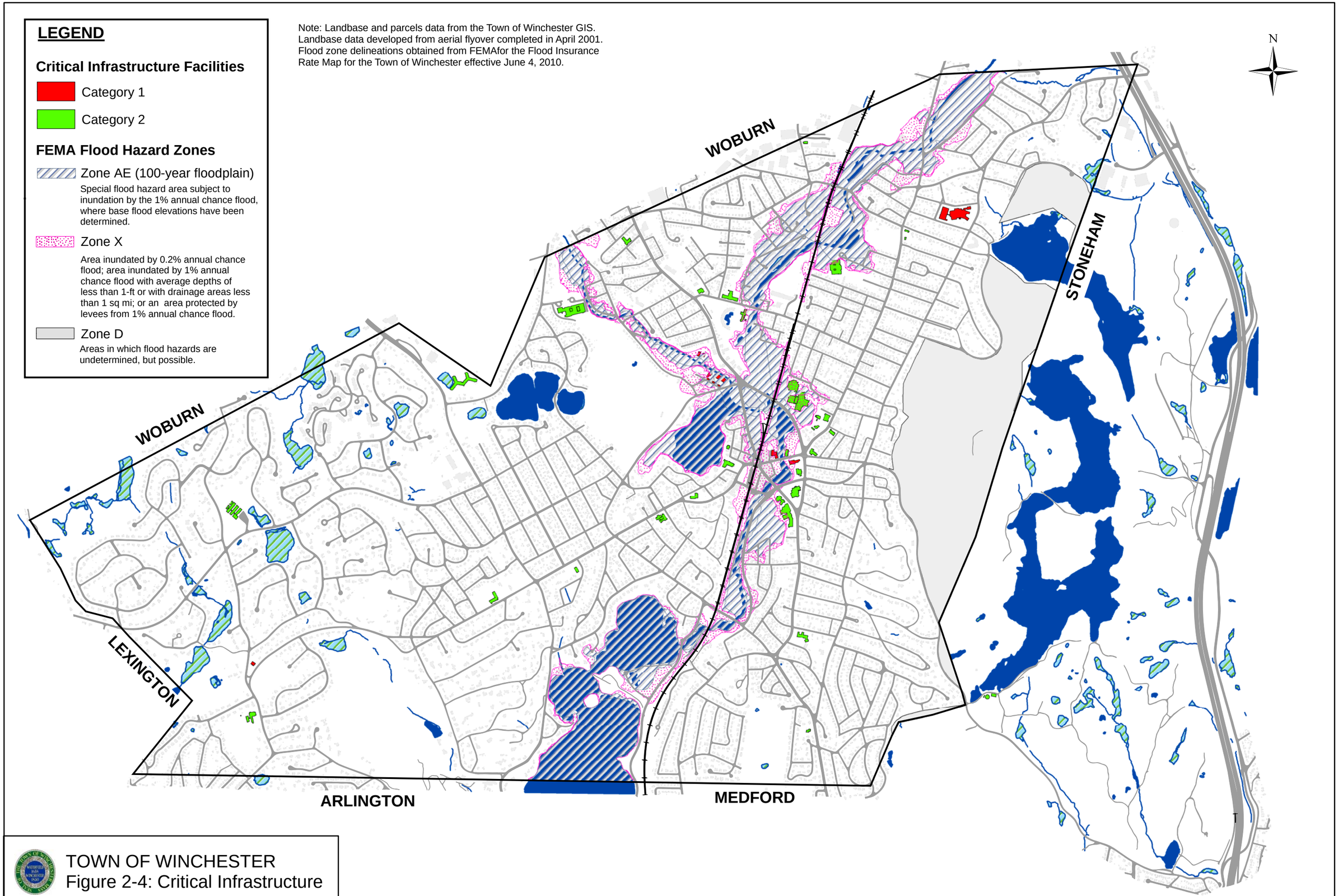
It should be noted that these evacuation routes are meant to be flexible and may be modified based on the emergency situation at hand. For example, portions of Main Street in the Town Center area and Washington Street near the Woburn line are located within the 100-year floodplain. If evacuations were required during a flooding event, alternate routes may be required, such as the use of South Border Road or Highland Avenue, both of which can be used to access Route 93.

Figure 2-5 provides a graphical representation of the key evacuation routes identified by the Town. The location of the Town's primary emergency shelters is also provided. These include the following:

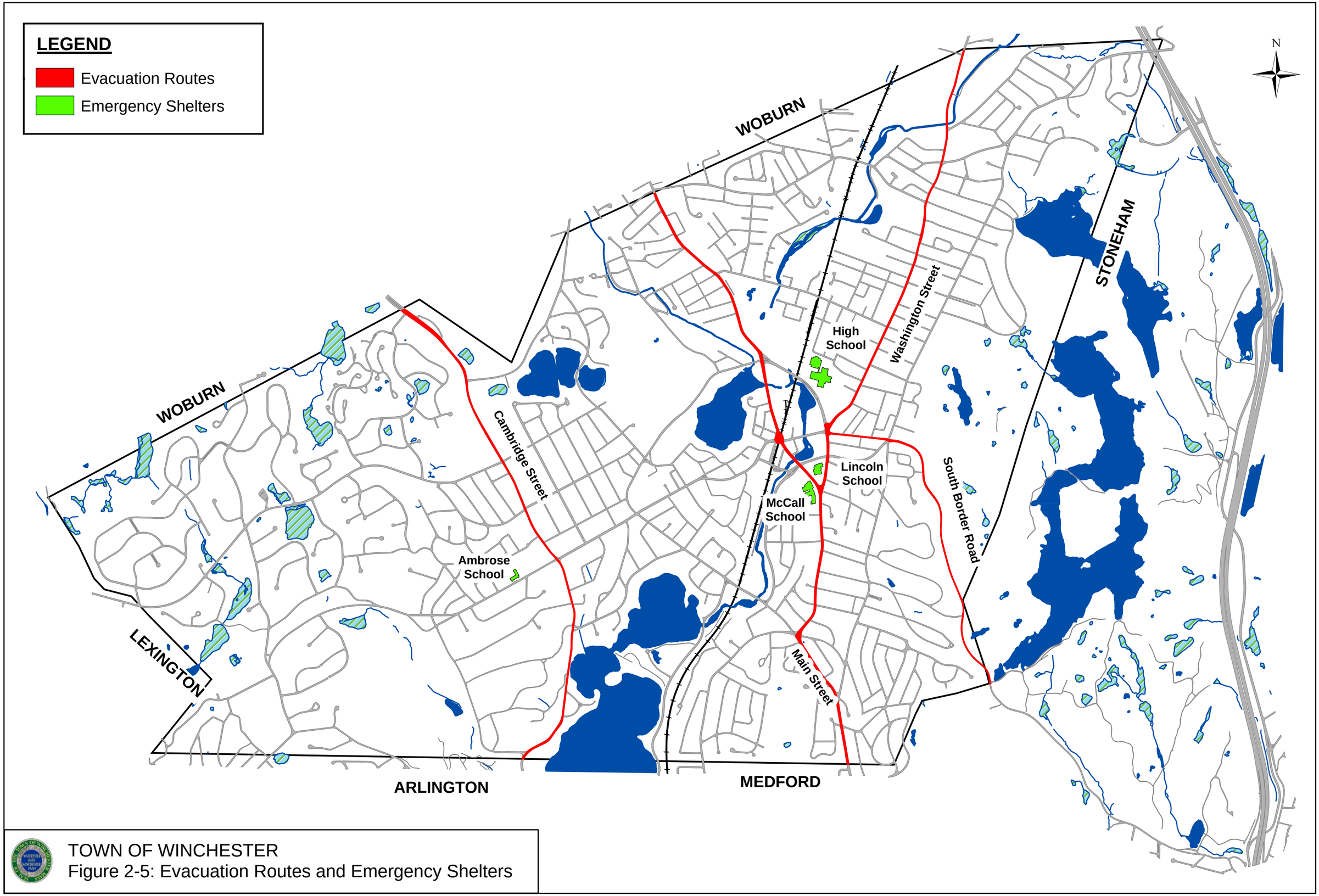
- Winchester High School
- Ambrose School
- Lincoln School
- McCall Middle School

It should be noted that the use of these various facilities would depend on the type and magnitude of disaster at hand. Winchester High School, for example, is located

partially within the 100-year floodplain, so that building would obviously not be a suitable shelter during periods of flooding. However, it could be used during other disasters, such as a as a cooling station during a heat wave.




TOWN OF WINCHESTER
Figure 2-4: Critical Infrastructure

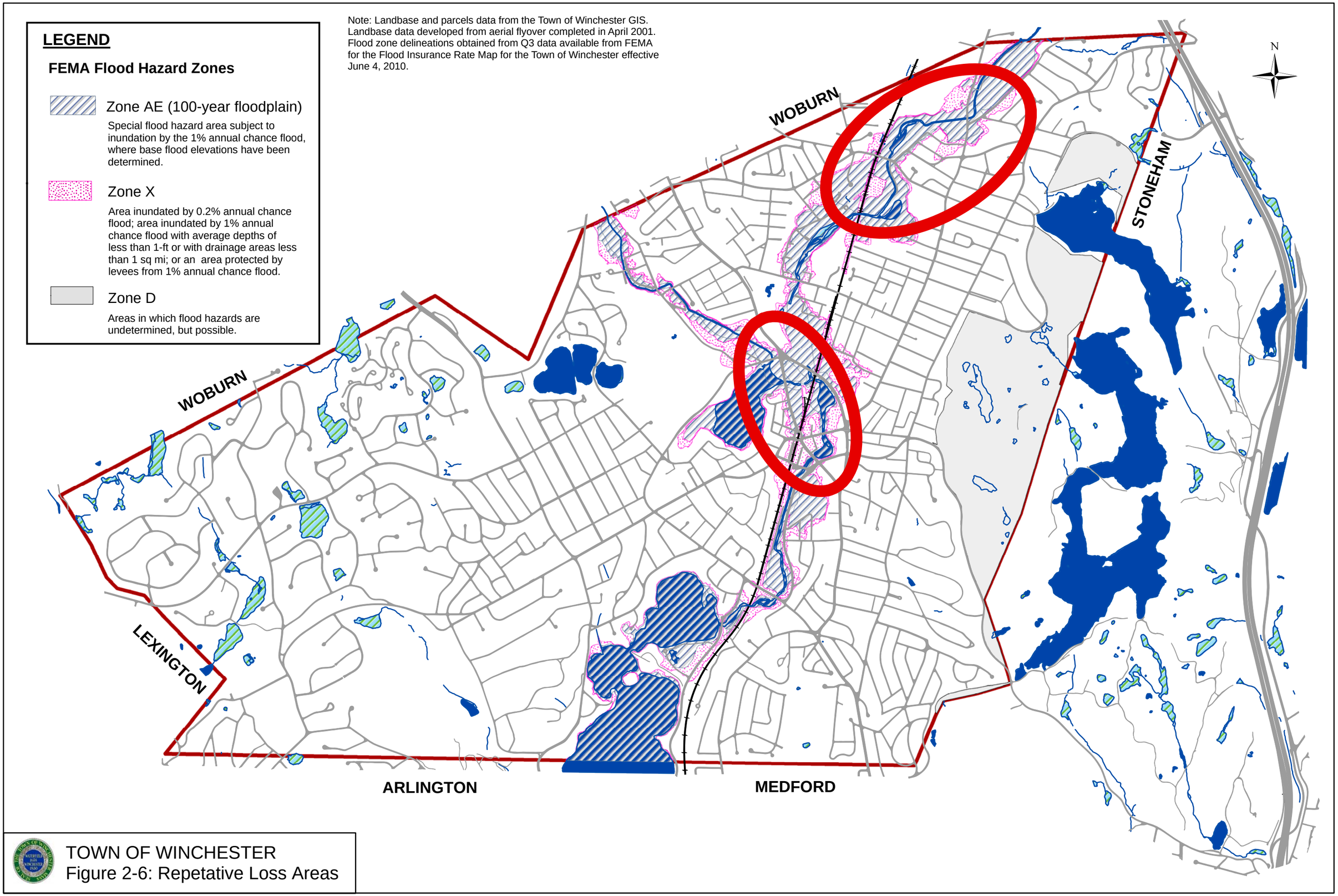



TOWN OF WINCHESTER
Figure 2-5: Evacuation Routes and Emergency Shelters

## 2.4 Repetitive Loss Areas

The Federal Emergency Management Agency (FEMA) defines any property that has sustained two or more claims over $1000 over a rolling 10-year period as a "repetitive loss property". Individual properties carrying flood insurance policies are tracked by the Federal Insurance Administration for claims of over $1000. According to FEMA's records there are 30 repetitive loss properties in the Town of Winchester. The areas most heavily impacted by repetitive losses are shown in Figure 2-6.

Due to privacy restrictions, the specific property addresses/locations are not identified; however, general areas are shown. The southern area is comprised of a cluster or properties located adjacent to Horn Pond Brook and the Aberjona River in the downtown area. These properties consist of a mix of residential, commercial, and municipal buildings. The northern area is comprised of a band of properties adjacent to the Aberjona River. The portion south of Cross Street consists of commercial and industrial buildings. The properties north of Cross Street are primarily residential, with one institutional property.




TOWN OF WINCHESTER
Figure 2-6: Repetative Loss Areas

## 2.5 Potential Future Use

### 2.5.1 Remaining Developable Land

The Town of Winchester is close to full build-out conditions based on the minimum lot size and density requirement laid out in the current zoning by-laws. The original AHMP prepared in 2007 outlined approximately 65-acres of potentially developable land (not including redevelopment of already developed areas). In the past five years several of these properties have been built upon. The bullets below provide an update of the development status for the properties listed in the 2007 report.

- **Pansy Patch Property (currently "Graystone at Winchester") –** An approximately 10-acre parcel located at the corner of Cambridge Street and Pond Street. The property, which was formerly occupied by a two-family dwelling and farmland, was sold in 2007 and developed under the Town's Attached Residential Cluster Development Overlay District (ARCDOD). The development is completely built-out and occupied, and contains 50, two-bedroom townhouse-style units. The original farmhouse was preserved and relocated on site and was sold as condominiums as well.
- **Wright-Locke Farm (78 & 82 Ridge Street) –** An approximately 20-acre piece of land comprised of two separate parcels – one containing a small, unoccupied single family home (approximately 0.84-acres) and the second, larger parcel containing farmland, a single family home, and associated farm outbuildings. The historic farmland and associated buildings were previously subject to the provisions of Chapter 61A. In 2007, the Town of Winchester exercised its right of first refusal and purchased the property for $13.5million. The Town's intent was to preserve a portion of the property, and sell the other portion for development purposes to recoup all or a portion of the purchase price. In fall 2011, the Winchester Town Meeting approved the lease of approximately 7.5-acres of the property to the Wright-Locke Farm Conservancy. This is a non-profit organization dedicated to maintaining agricultural activities on the property and expanding educational opportunities. In spring 2015, Winchester Town Meeting agreed to the sale of the remaining property to the Wright-Locke Land Trust, a non-profit entity who will preserve the majority of the parcel as open space and construct two to three detached condominium units.
- **Marotta Property-** An approximately 7.5-acre site located off of Cross Street adjacent to the Aberjona River. It is zoned RDB and is listed as an M.G.L. Chapter 21E (brownfields) site. A portion of the site lies within the floodplain of the Aberjona River. The Winchester Soccer Club recently purchased the property and is planning to redevelop the site into playfields and a covered field house. Permitting for this project was completed in 2014.
- **Winning Farm-** An approximately 45-acre parcel located off Thornberry Road, 12.5-acres of which is permitted for development of an 88-unit assisted living

facility, with the remainder serving as conservation land. The site is zoned SCI with a portion having an elderly housing overlay district.

- **Shannon Property-** A 9.15-acre parcel located off of Forest Circle, which is currently zoned RDB and is privately owned. The Winchester Planning Board rejected a proposed 10-lot subdivision of the property in 2007. The property remains undeveloped at this time.
- **Former Bill Mark Realty Trust-** A 4.3-acre parcel located off of North Border Road. The property is currently zoned RDB. It is contiguous with the Middlesex Fells Reservation and the Shannon Property discussed above.
- **620 Washington Street –** An approximately 8.9-acre piece of property, which was purchased by Winchester Hospital in 2005 and rezoned to the SCI district. The property originally contained a historic industrial building, but has been redeveloped by the Hospital as a cancer care center and ambulatory surgery center. The Hospital anticipates additional expansion on the site, as well, though no schedule has been provided.

Another piece of property worthy of noting for future development potential is the approximately 16.4-acre parcel currently owned by General Foods Corporation. The property is bounded by Washington Street and the Aberjona River to the west and Sunset Road to the east, and extends well into Woburn. The Winchester portion of the site currently serves as a well field for the General Foods manufacturing plant (located in Woburn); however General Foods has announced that they are planning to cease operations at this location in 2016. The portion of the property in Winchester is currently zoned for residential use.

### 2.5.2 Relationship of Potential Future Developable Land to Hazard Areas

Flooding was the primary hazard area analyzed with respect to future developable lands, due to its clearly definable boundaries. The flood maps issued by FEMA in 2010 included portions of the Marotta Property and 620 Washington Street within the revised 100-year floodplain. The Town worked closely with Winchester Hospital during the redevelopment of the 620 Washington Street property to mitigate any floodplain-related issues. Permitting and construction of this project was completed in 2010 and 2011. Similar diligence with respect to flood-related impacts was taken with the permitting of proposed outdoor playing fields and indoor field house/training facility on the Marotta site. Permitting for this project was completed in 2014; no information is currently available on when construction will begin on the project.

The risks associated with other hazards identified by the Planning Team are discussed in Section 3.0 of this plan.

# Section 3.0 Hazard Identification, Risk Assessment, and Mitigation Measures

FEMA defines a "hazard" as an act or phenomenon that has the potential to produce harm or other undesirable consequences to a person or thing. The following section provides an evaluation of the key natural and select man-made hazards that could potentially impact the Town of Winchester. These hazards were identified by the Winchester Planning Team, building on the analysis done in the prior AHMP and on the hazards identified in the "Commonwealth of Massachusetts State Hazard Mitigation Plan", dated October 2010.

The hazards were categorized into the following five general areas, following the methodology used in the State's 2010 plan:

- **Flood-related hazards**
  - Riverine flooding
  - Dam failure
- **Atmospheric-related hazards**
  - High Wind
  - Hurricanes/Tropical Storms
  - Thunderstorms
  - Tornadoes
  - Nor'easters
- **Winter-related hazards**
  - Snow and blizzards
  - Ice Storm
- **Geologic-related hazards**
  - Earthquakes
  - Landslides
- **Other hazards**
  - Urban Fires
  - Wildfires
  - Drought
  - Extreme Temperature

It should be noted that the hazard categories outlined in the 2007 plan were modified for the purposes of this plan to match those used in the State's Hazard Mitigation Plan, so a direct comparison between this plan and the 2007 is difficult. However, Appendix D provides a summary of the "existing" and "proposed" mitigation actions that were outlined in the Town's 2007 Plan, and describes the current status of each.

The following sections provide an overview of the risk levels and vulnerability assessment associated with each of the general hazard categories. An in-depth analysis of the existing mitigation, preparedness, response, and maintenance strategies, as well as the potential strategy enhancements, prioritization, and implementation plan is also provided for each identified hazard.

## 3.1 Hazard Risk Levels and Vulnerability Assessment

The first step in the update of the AHMP for the Town of Winchester was to complete a risk analysis and vulnerability assessment for the hazards identified above. To complete this assessment, the Winchester Planning Team built upon the evaluation presented in the Town's previous AHMP and the methodology used in the state's mitigation plan to assess potential vulnerabilities.

The Winchester Planning Team used "Table 15 – Massachusetts Potential Vulnerability to Future Natural Hazards" as the guide for updating the vulnerability assessment. The Team evaluated each of the identified hazards by the following criteria:

- **Frequency** – Very low, Low, Medium, or High
- **Severity** – Minor, Moderate, or Extensive
- **Area of Impact** – Isolated, Neighborhood, or Town-wide

The Town used the criteria adopted in the state plan as the basis for the analysis, as described below.

**Frequency Categorization**

**Very Low** – Events that occur less frequently than once in 100-years (< 1% per year).

**Low** – Events that occur from once in 50 to once in 100-years (1 to 2% per year).

**Medium** – Events that occur from once in 5 to once in 50-years (2 to 20% per year).

**High** – Events that occur more frequently than once in 5-years (>20% per year).

**Severity Categorization**

**Minor** – Limited and scattered property damage; limited damage to public infrastructure and essential services not interrupted; limited injuries and fatalities.

**Moderate** – Scattered major property damage; some minor infrastructure damage; essential services are briefly interrupted; some injuries and/or fatalities.

**Extensive** – Widespread major property damage; major public infrastructure damage (up to several days for repairs); essential services are interrupted from several hours to several days; many injuries and/or fatalities.

**Area of Impact**

**Isolated** – A single property or group of neighboring properties.

**Neighborhood** – Limited to a section of Town.

**Town-wide** – Entire community is impacted.

The results of the Planning Team's evaluation are presented in Table 3-1. As previously determined in the 2007 AHMP, riverine flooding poses the greatest risk to the Town of Winchester. Riverine flooding occurs with relatively high frequency, has a high severity, and impacts many neighborhoods within the Town. Other high frequency hazards include thunderstorms, nor'easters, and snow, though such events are typically less severe. Some very low or low frequency events, such as dam failure or earthquakes, were noted to have extensive severity.

**Table 3-1: Hazard Identification and Analysis Matrix**

| *Hazard* | *Frequency* | | | | *Severity* | | | *Area of Impact* | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | *Very Low* | *Low* | *Medium* | *High* | *Minor* | *Moderate* | *Extensive* | *Isolated* | *Neighborhood* | *Town-wide* |
| **Flood- Related Hazards** | | | | | | | | | | |
| ● Riverine Flooding | | | | ■ | | | ■ | | ■ | |
| ● Dam Failures | ■ | | | | | | ■ | | ■ | |
| **Atmospheric-Related Hazards** | | | | | | | | | | |
| ● High Wind | | | ■ | | | ■ | | | | ■ |
| ● Hurricanes/Tropical Storms | | | ■ | | | ■ | | | | ■ |
| ● Thunderstorms | | | | ■ | ■ | | | | | ■ |
| ● Tornadoes | ■ | | | | | ■ | | ■ | | |
| ● Nor'easters | | | | ■ | | ■ | | | | ■ |
| **Winter-Related Hazards** | | | | | | | | | | |
| ● Snow and Blizzard | | | | ■ | ■ | | | | | ■ |
| ● Ice Storm | | | ■ | | | ■ | | | | ■ |
| **Geologic Hazards** | | | | | | | | | | |
| ● Earthquakes | | ■ | | | | | ■ | | | ■ |
| ● Landslides | ■ | | | | | ■ | | ■ | | |
| **Other Natural Hazards** | | | | | | | | | | |
| ● Urban Fires | | ■ | | | ■ | | | ■ | | |
| ● Wildfires | | | ■ | | ■ | | | ■ | | |
| ● Drought | | ■ | | | ■ | | | | | ■ |
| ● Extreme Temperature | | ■ | | | ■ | | | | | ■ |

**Frequency Characterization**

**Very low:** Events that occur less frequently than once in 100-years (less than 1% per year).
**Low:** Events that occur from once in 50-years to once in 100-years (1 to 2% per year).
**Medium:** Events that occur from once in 5-years to once in 50-years (2 to 20% per year).
**High:** Events that occur more frequently than once in 5-years (greater than 20% per year).

**Severity Categorization**

**Minor:** Limited and scatterd property damage; limited damage to public infrastructure and essential services not interupted; limited injuries and fatalities.
**Moderate:** Scattered major property damage; some minor infrastructure damage; essential services are briefly interupted; some injuries and/or fatalities.
**Extensive:** Widespread major property damage; major public infrastructure damage (up to several days for repairs); essential services are interrupted from several hours to several days; many injuries and/or fatalities.

**Area of Impact:**

**Isolated:** A single property or group of neighboring properties.
**Neighborhood:** Limited to a section of Town.
**Town-wide:** Entire community is impacted.

## 3.2 Flood-Related Hazards

The Town of Winchester has long been plagued by flooding along the Aberjona River, which runs through town in a north-south direction from the Woburn border to its outlet at the Upper Mystic Lake. The Aberjona forms the headwaters of the Mystic River, which ultimately discharges to Boston Harbor. The Aberjona River passes through several densely populated residential neighborhoods and the major business center in Winchester Center. Significant flooding problems have also occurred along Horn Pond Brook, which outlets from Horn Pond, located just across the Winchester town line in Woburn. Discharge from Horn Pond is controlled by the Scalley Dam outlet structure, which can be raised or lowered to maintain a particular water level in the pond. Horn Pond Brook passes through a densely populated neighborhood in the northern section of Winchester and flows to its outlet at Wedge Pond near the intersection of Lake Street, Main Street, and Skillings Road; it is tributary to the Aberjona River.

Floodplains along the Aberjona River and Horn Pond Brook help mitigate flooding and also provide a number of natural and beneficial functions. By containing flood waters, floodplains provide flood storage and conveyance, reduce river velocities, reduce peak flows, and reduce sedimentation. Floodplains provide breeding and feeding grounds for animals, create and enhance waterfowl habitat, and help maintain biodiversity. Many parts of the floodplain in Winchester are used as open space for both active and passive recreation. Davidson Park and Leonard's Pond are examples. According to the Natural Heritage and Endangered Species program, the floodplain areas do not provide habitat for rare or endangered species.

Over the past 20 to 30 years, the Aberjona River watershed has experienced significant development, especially in the areas upstream of Winchester and north of Route 128. The resulting increase in impervious area and stormwater contributions has combined to produce a general increase in streamflow in the Aberjona River and Horn Pond Brook, particularly during storm events. These impacts are felt keenly during flooding events in Winchester, including the severe rainstorms of October 19 - 20, 1996; June 13 - 14, 1998; May 15, 2006; March 14, 2010; and March 30, 2010, as well as the combined rain/snowmelt event of March 21 - 23, 2001. Federal disasters were declared after each flooding event.

These flooding events have resulted in an estimated $25 million worth of damage, and severely impacted homes, business, and town infrastructure around the Aberjona River and Horn Pond Brook. This includes businesses in Winchester Center and along Cross Street, houses in the Brookside Avenue and Tufts Road/Nathaniel Road neighborhoods, Winchester High School and its associated playing fields, and bridges along Canal Street and Sylvester Avenue. The flood events have impacted Winchester's

historic Town Center, which is listed as a National Register Historic District; however, there has not been any permanent damage to the buildings within this area.

The table below provides a summary of the calculated recurrence interval for the respective storms outlined above based on streamflow, as well as a summary of the peak streamflows (in cubic feet per second, cfs) recorded at the USGS gaging station in Winchester. For comparison purposes, the average annual streamflow at this gage is approximately 25-cfs and average streamflows during the month of August, typically the lowest flow season, are approximately 7.5-cfs.

***Table 3-2: Recent Flooding Events***

| Date | Recurrence Interval | Peak Streamflow (cfs) |
|---|---|---|
| October 21, 1996 | 25-year event | 1150 |
| June 14, 1998 | 20-year event | 1070 |
| March 22, 2001 | 60-year event | 1590* |
| April 1, 2004 | 15-year event | 990 |
| May 15, 2006 | 30-year event | 1270 |
| March 14, 2010 | 50-year event | 1450 |
| March 30, 2010 | 25-year event | 1100 |

*Highest streamflow recorded at this location.

Following the 2001 flooding event, the Town of Winchester received a $237,000 grant from the Massachusetts Emergency Management Agency (MEMA) to rebuild the damaged bridges at Canal Street and Sylvester Avenue. These bridges were damaged as a result of flooding along Horn Pond Brook. Repair work was complete during fall 2004.

FEMA developed a new Flood Insurance Study (FIS) and issued new Flood Insurance Rate Maps (FIRMs) for Middlesex County, including the Town of Winchester, on June 6, 2010. These new maps replaced the previous maps, which dated back to 1980. It should be noted that the new maps differed significantly from the old, with many neighborhoods reclassified as being located within the 100-year floodplain. During heavy rainfalls, other parts of the Town not shown on the FIRM experience limited localized flooding, primarily involving roadway flooding. Locations include Wildwood

Street near Nutile Field and the Bacon Street and Cross Street railroad bridges. These areas are monitored during storms by the DPW.

### 3.2.1 Evaluation of Risk – Flood Related Hazards

Overall, based on the historical record, trend towards increased urbanization in the watershed, and FEMA remapping, there is a high risk of flooding for areas along the Aberjona River and Horn Pond Brook. Figure 3-1 shows the location of significant waterbodies throughout the Town, and the corresponding flood hazard zones as defined by the 2010 FIRM. This map was produced using the Town's GIS data as a basemap and the new floodplain boundaries supplied by FEMA in GIS format.

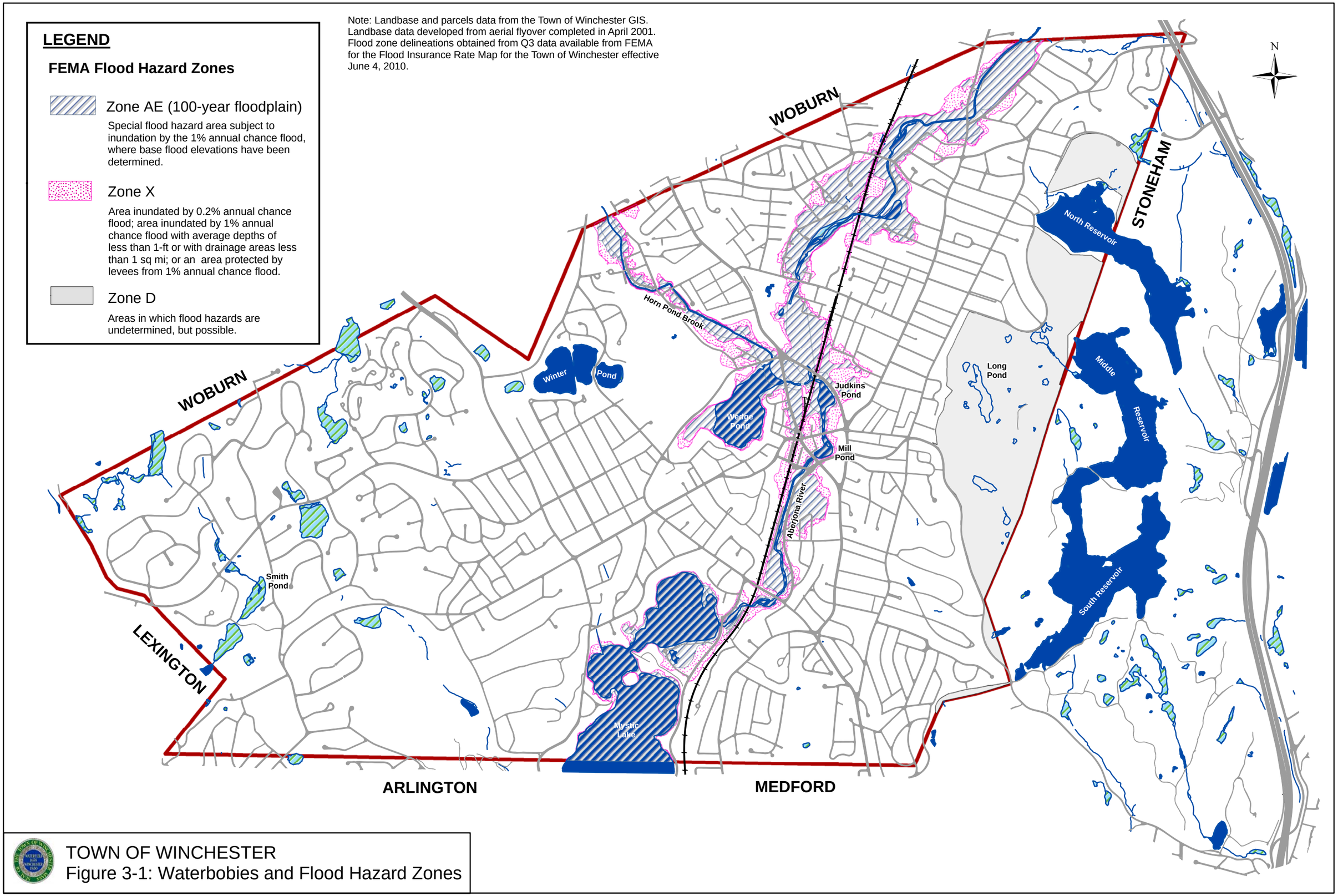
The Aberjona River watershed is highly developed with fewer opportunities for large new developments or population growth (see Section 2.5). The state now mandates runoff controls and compensatory floodplain storage for new developments. Climate change, more than development, is likely to increase flooding problems in the future. In eastern Massachusetts climate change is already causing more frequent floods, according to the Massachusetts Climate Change Report.

Dam breaches or failures also pose a less frequent, but potentially significant flood risk. A dam breach or failure at the Scalley Dam, located at the outlet of Horn Pond in Woburn, could cause significant flooding along Horn Pond Brook in Winchester. Dam breach is also a possibility at the outlet of the Upper Mystic Lake, as well as at the North and South Reservoirs. A breach at DCR's Upper Mystic Lake dam would severely impact properties in downstream of the dam in Arlington and Medford. A breach in the North Reservoir Dam would severely impact the residential neighborhoods in Winchester downstream of the Dam, including Winchester Hospital. A breach at the South Reservoir would not affect any properties in Winchester, but would impact the downstream community of Medford. Inundation maps for the North and South Reservoir dams have been prepared and are included in the respective Emergency Action Plans. To date, there have been no dam breeches in or around the Town of Winchester.

### 3.2.2 Impact – Flood Related Hazards

Flooding has a variety of impacts on Town resources:

- Critical facilities and infrastructure are impacted by flooding. Several Town properties, such as the DPW and High School are located within the 100-year floodplain.
- The Town sustained economic losses of $25 million due to the combined impacts of the October 1996, June 1998, March 2001, April 2004 and May 2006 storms. The Town Center business district is located partially in the 100-year floodplain and is extremely susceptible to flooding.




TOWN OF WINCHESTER
Figure 3-1: Waterbodies and Flood Hazard Zones

### 3.2.3 Existing Mitigation Strategies – Riverine Flooding

Due to the extensive flooding problems experienced in Winchester, the Town has developed several mitigation, preparedness, response and maintenance strategies aimed at reducing flooding impacts, limiting the impacts of new development projects, and educating the public on flooding issues. A summary of these items is provided in the list below:

- Participation in the National Flood Insurance Program (NFIP);
- Flood Mitigation Program;
- Horn Pond Flood Coordination;
- Policy-related strategies targeting new and redevelopment projects;
- Local drainage improvement and maintenance activities;
- Emergency response planning;
- EPA Phase II Stormwater permit requirements; and
- Public education.

The general goals of the Town's flood mitigation, preparedness, response and maintenance program is:

- Construct structural measures to reduce base flood elevations along the Aberjona River and Horn Pond Brook;
- Emphasize low-impact development techniques, as well as stormwater detention, infiltration, and other non-structural practices to mitigate the effects of stormwater (floodplain management regulatory strategies); and
- Increase awareness of the floodplain and flooding issues in the Town of Winchester.

A detailed description of each strategy is provided in the sections below. Several of these items are carried over from the mitigation activities outlined in the Town's 2007 Plan, including the participation in the NFIP, development and implementation of the Town's Flood Mitigation Program, regional flood coordination activities, localized drainage improvements, and implementation of the MS4 permit requirements. Since the 2007 Plan, priorities have shifted from permitting of Town's flood mitigation program to implementation of the specific projects, as outlined below.

<u>National Flood Insurance Program (NFIP) Participation</u>

Participation in the NFIP is voluntary for communities and is based on an agreement between each participating community and FEMA. The Town of Winchester has been a participant in the NFIP since the first flood maps were adopted in the early 1980s. Therefore, this mitigation strategy was not changed by the adoption of the Town's All

Hazard Mitigation Plan. Participation in the NFIP has three basic aspects, which are discussed below.

*Floodplain identification and mapping.* NFIP participation requires community adoption of flood maps. The current floodplain maps for Winchester were adopted and became effective in June 2010. Mapping flood hazards creates broad-based awareness of the flood hazards and provides the data needed for our community to effectively administer the floodplain management program. The flood maps can be viewed by the public and are located in the Engineering Department, Winchester Town Hall, 71 Mount Vernon Street (lower level). Maps may also be accessed form FEMA's website at http://msc.fema.gov/.

*Floodplain management.* Floodplain management can be defined as a community program of corrective and preventative measures for reducing flood damage. The program is led by the Town Engineer, in conjunction with the Building Inspector. These measures take a variety of forms and generally include requirements for zoning, subdivision or building, and special-purpose floodplain ordinances/bylaws. In Massachusetts a majority of the required regulations are covered under state laws, which are enforced locally. Those regulations are:

- Massachusetts State Building Code: 780 CMR 3107.0, "Flood Resistant Construction");
- Wetlands Protection Regulations: 310 CMR 10.00;
- Inland Wetlands Restriction: 302 CMR 6.00;
- Coastal Wetlands Restriction:302 CMR 4.00 (may only apply to certain communities); and
- Minimum Requirements for Subsurface Disposal of Sanitary Sewage 310 CMR 15, Title 5.

The Town of Winchester also has its own Floodplain Overlay District (Section 8.1 of the Town's Zoning Bylaw, effective November 4, 2010, as amended), which specifies the district boundaries and use regulations.

*Insurance.* Since Winchester participates in the NFIP, property owners and renters residing anywhere in the community (not only in a special flood hazard area) are eligible to purchase insurance as a protection against flood losses.

*Continued Compliance.* The Town of Winchester is dedicated to complying with the requirements of the NFIP over the next five-year planning horizon. The Town Engineer and Building Inspector/Zoning Enforcement Officer work in conjunction to ensure that the federal requirements and the local floodplain bylaw are met for all new and redevelopment projects. In addition, the Town has recently been approved for participation in FEMA's Community Rating System (CRS), see section below, which

qualifies property owners for a discount on their flood insurance premiums. The CRS program requires annual recertification.

Flood Mitigation Program

Following the significant flooding event in October 1996, the Town of Winchester contracted the services of the engineering consulting firm CDMSmith (formerly CDM) to evaluate the potential causes of flooding along the Aberjona River and Horn Pond Brook, and to develop a comprehensive solution to mitigate these flooding problems. The result of this study was the *Aberjona River Flood Study- Final Report*, dated July 1999, which proposed sixteen modifications to the Aberjona River for the purposes of flood mitigation, two of which were implemented immediately by the Town.

Due to the potential environmental impacts of the remaining projects, the Town was required to file an application with the state under the Massachusetts Environmental Policy Act (MEPA). In June 2002, the Town filed an Expanded Environmental Notification Form (ExENF) with MEPA, which grouped the remaining projects into three phases. Concurrently, the Town requested a waiver for the three projects indentified in "Phase I". The Town's waiver request was denied by the Secretary of the Executive Office of Environmental Affairs (EOEA) in June 2003. The ENF Certificate required the Town to file a full Environmental Impact Report (EIR) for the project. The ENF Certificate did, however, allow the relocation of the MWRA sipon near the Wedgemere Train Station, which was identified as Project 1. This project was completed in 2008 and was funded by the MWRA.

In December 2003, the Town filed a Notice of Project Change with MEPA for completion of Project 13, which involved construction of an additional box culvert at Cross Street where it crosses the Aberjona River. The filing was accepted by MEPA and the installation of the relief culvert was completed during summer 2005; the cost of the project was approximately $650,000.

In 2004, the Town of Winchester contracted with the consulting firm AECOM (formerly ENSR) to prepare the EIR. AECOM was also independently contracted by FEMA to reevaluate the FIRM for the Aberjona River, and as such, had developed a detailed model of the entire Mystic River watershed. AECOM used this model to reevaluate the remaining projects proposed in the ENF, to conduct an alternatives analysis, and to evaluate any potential flooding impacts in downstream communities. Subsequent to the this analysis, the Town filed a Draft EIR (DEIR), Supplemental DEIR, and Final EIR (FEIR) in February 2006, February 2007, and February 2010, respectively. The MEPA process concluded on April 2, 2010 with the issuance of the Executive Office of Energy and Environmental Affairs Secretary's Certificate on the Final Environmental Impact Report (FEIR). This approval allowed the Town to move into the detailed design and construction phases for the respective projects.

The approved flood mitigation program consists of six projects within the Town of Winchester to improve the conveyance capacity of the Aberjona River. It also requires the completion of the following three mitigation projects outside of Winchester to ensure that the program does not negatively impact downstream communities:

- **Downstream Mitigation –** Improvements to the Mid-Lakes Dam, which is located between the Upper and Lower Mystic Lakes and is owned by the Department of Conservation and Recreation (DCR), completed in spring 2011;
- **Downstream Mitigation –** Improvements to the Main Street Bridge (Craddock Locks) in Medford, to be completed by Massachusetts Department of Transportation (MassDOT); and
- **Upstream Mitigation –** Improvements to the Scalley Dam at the outlet of Horn Pond in Woburn. Construction expected 2015 – 2016.

The MEPA certificate requires the in-town projects to be completed generally in sequence from downstream to upstream, with the exception of improvements to the Center Falls Dam. This project was previously granted a waiver by MEPA to be constructed independently. The first of two gate valves was installed in 2004 and replacement of the second gate was completed in 2014.

The following presents a summary of the remaining flood mitigation projects in sequence from downstream to upstream:

- **Project 4: Mount Vernon Street Bridge Improvements –** Construction of a fourth culvert under the Mount Vernon Street Bridge. Construction is expected to begin in summer 2015.
- **Project 6: High School Playing Field –** Construction of a parallel box culvert adjacent to the three existing culverts under the High School playing field. Design of this project has been funded and is currently underway. Construction funding for this project was approved on June 9, 2015 through a debt exclusion override. Construction is expected to begin in 2016.
- **Project 8: Swanton Street Bridge Improvement –** Enlargement of the existing bridge opening under Swanton Street.
- **Project 10: Railroad Bridge near Muraco School –** Installation of two new culverts under the MBTA railroad near the Muraco School to supplement the two existing 6.5 by 7-foot bridge openings.

The Town of Winchester is exploring a variety of funding mechanisms to complete the design and construction of these remaining projects, including state and federal financial assistance, grant money, and municipal borrowing. Project 4 was financed through a combination of Town funds (Capital Planning Committee) and money obtained through the state environmental bond bill. For Project 6, the Town voters

approved funding for construction of this project through a debt exclusion override on June 9, 2015.

The following is a list of flood mitigation projects that have already been completed by the Town or other parties.

- **Project 1 –** Siphon Relocation (completed by MWRA in 2008);
- **Project 2 –** Widening of the Aberjona River channel between Waterfield Road and Manchester Road from an average bottom width of 15 to 20-feet to approximately 35-feet and addition of a low flow channel. Re-grading and deepening of the channel between Waterfield Road and Bacon Street. Removal of the USGS gage and associated weir (completed in fall 2012 except for final landscaping).
- **Project 3 –** Center Falls Dam (completed in 2014);
- **Project 5 –** Shore Road Culvert Addition (completed in 2002);
- **Project 12 –** Dam Removal near Muraco School (completed in 2002); and
- **Project 13 –** Cross Street Culvert (completed in 2005).

The planning and development of the Town's flood mitigation program was initiated well before FEMA's requirement for Town's to complete an all-hazard mitigation analysis. Winchester has made great progress on permitting and implementing the projects associated with the Flood Mitigation Program since the Town's first All Hazards Mitigation Plan was completed in 2007. However, these projects would have been completed regardless of FEMA's requirement to develop this plan. That being said, the Town has followed the strategy outlined in the 2007 plan, which called for the final permitting and implementation of these structural improvements. As noted above, construction has been completed on three of the projects, with construction of two additional projects expected in 2015.

<u>Horn Pond Flooding Coordination</u>

Following the flooding along Horn Pond Brook in March 2001, the Town of Winchester and the City of Woburn developed a coordinated plan of action for the operation of the Scalley Dam prior to storm events. Under this plan, the City of Woburn releases water from Horn Pond prior to the event in order to increase the storage capacity. Concurrently, the Town of Winchester opens the relief culverts at the Center Falls Dam to draw down the water levels and increase storage capacity in Wedge Pond, Judkins Pond, and Mill Pond. Following the event, the dams are restored to their normal operating capacities.

Similar to the Town's Flood Mitigation Program, this coordination was implemented well before FEMA's requirement for the completion of an all-hazards mitigation

analysis. The Town has continued to implement this mitigation strategy since the adoption of our 2007 All Hazards Mitigation Plan.

Floodplain Management Regulatory Standards

In addition to the proposed structural flood mitigation measures, the Town of Winchester has several policy-related restrictions on development in flood-prone areas in accordance with the requirements of the NFIP and the Wetlands Protection Act. These policies are summarized below:

- Adoption of a Floodplain Overlay District as part of the Town's Zoning By-laws to further restrict development within the 100-year floodplain. A revised by-law was adopted in 2010 as a result of FEMA's issuance of new Flood Insurance Rate Maps (FIRMs) for the Town of Winchester.
- The Board of Selectmen adopted "Rules and Regulations Regarding the Use of Public Sewers and Storm Drains in the Town of Winchester" in 2007. The document requires that the DPW Director issue a permit for any new discharge into the Town drainage system. It also requires separate building sewers and drains and does not permit any illicit connection to the drain system. For certain new and redevelopment projects, the Regulations require that projects match pre- and post-development peak rates and volumes. This was required as part of the EPA's Phase II NPDES permit, and was not a strategy discussed in the Town's 2007 Plan.
- The Planning Board adopted new "Rules and Regulations Governing the Subdivision of Land in the Town of Winchester" in 2011. The Rules and Regulations apply to new subdivisions of land. In addition to stormwater management design standards, the document requires that new subdivisions have homeowner's associations that will own and maintain the on-site drainage system, if the Town does not do so. A legally enforceable Operations and Maintenance Plan is to be created. The Town reserves the right to request written records, including receipts of inspection or cleaning, and to physically inspect the system to ensure that the proper maintenance has been carried out. In the event that the responsible party fails to maintain the system in reasonable order and condition, the Town reserves the right to perform the required maintenance and back-charge the association for fees incurred.
- The Town's Wetlands By-law supplements and enhances the State Wetlands Protection Act. The By-law is administered by the Conservation Commission. Any work that will remove, fill, dredge, alter, or build upon freshwater wetlands, swamps, banks, lakes, rivers, and streams, or land subject to flooding, as well as certain specified buffer zones, is required to obtain a permit. The By-law protects the natural and beneficial functions of the floodplain.
- The Town requires the use of precipitation values published in "Extreme Precipitation in New York and New England" developed jointly by the

Northeast Regional Climate Center (NRCC) at Cornell University and the Natural Resources Conservation Service (NRCS), in hydrologic analyses. The 100-year, 24-hour precipitation is 8.9-inches, based on data up to 2011.

The Town's existing practices are in compliance with the MEPA certificate for the flood mitigation program. With regards to stormwater management, they exceed state standards by requiring no net increase in stormwater volumes and using up-to-date precipitation statistics. The Town believes these standards are sufficient to meet current and future flooding problems.

Localized Drainage Improvements and Maintenance Activities

The Town of Winchester's drainage system only functions at maximum capacity when properly maintained. Therefore, routine maintenance and repair of the system is critical to help reduce localized and riverine flooding throughout Town. The Town of Winchester, through its DPW, actively maintains the Town's drainage system and waterbodies. This includes annual maintenance of the Town's catchbasins and water quality structures, such as sediment tanks, to remove accumulated sediment to ensure that the system is operating at its optimal capacity. Additionally, the DPW performs bi-annual street sweeping, trash rack cleaning and repairs, and other routine drainage repairs. The Town also actively monitors the major rivers and streams in Town to check for and remove downed trees or brush that could be swept downstream during a flood event and clog a culvert or further restrict the river capacity.

Additionally, each year the Town develops a Capital Improvement Plan for improvements to the Town's drainage system. Recent projects have included the installation of large-scale infiltration system under the Town-owned Manchester Field, providing approximately 2.35-acre feet of storage. This project was completed in 2011. This system is designed to reduce localized flooding problems in the adjacent Manchester Road neighborhood. Although the project was not explicitly called out in the Town's 2007 All Hazard Mitigation Plan, the Plan did list "Localized Drainage Improvements" as one of its "potential mitigation strategy enhancements, prioritization, and implementation" goals, and this project falls into that category.

Emergency Response Planning

The Town of Winchester's Comprehensive Emergency Management Plan (CEM Plan) provides detailed emergency planning and response procedures for the Town in the case of a flood event. The latest revision of this plan considered the recommendations and strategies outlined in the Town's 2007 All Hazard Mitigation Plan. Further, the DPW staff regularly clear debris from culverts and roadway crossings along the Aberjona River and Horn Pond Brook to ensure that all drainage structures are flowing at full capacity.

EPA Phase II Stormwater Permit Requirements

The Town of Winchester is currently in year 12 of its NPDES Phase II Stormwater permit, which was issued in 2003. As part of this program, the Town is required to comply with six minimum control measures laid out by EPA. Under Control Measure 5, the Town developed post-construction stormwater management regulations to apply to new and redevelopment projects under Subdivision Control or requiring Site Plan Review or a Special Permit. The Town's regulations contain peak flow rate and total volume requirements. Applicants must match existing and proposed runoff peak rates and volumes so that there is no net increase in stormwater runoff.

Property and Floodplain Habitat Protection

The Town currently owns a considerable amount of land in the 100-year floodplain, with the remainder of floodplain properties privately owned and primarily developed. Given property values in Winchester, acquisition of floodplain properties for flood mitigation is typically not feasible. Instead, the Town encourages uses with low flood damage potential, such as outdoor recreation, through the Town's Floodplain Overlay District By-law. The Marotta property, which has been permitted for playing fields and a field house, as discussed in Section 2, is one such example.

The Town of Winchester has worked cooperatively over the past several years with the General Foods Corporation, who owns a large, wooded parcel of land on the Winchester/Woburn town-line, which is traversed by the Aberjona River. In 2007, the Town funded a feasibility study to investigate the use of a portion of the General Foods property to for flood storage purposes. The study concluded that the site could be used to provide up to 6.5 million gallons of floodwater storage for the 25-year storm event, while at the same time improving the existing riparian habitat and providing water quality treatment of attenuated flood waters from a highly urbanized watershed.

The Town encourages retrofitting of existing properties by maintaining books on retrofitting practices at the Engineering Department and at the library. Additionally, the Town has applied on behalf of two individual homeowners for Hazard Mitigation Grants to retrofit their existing properties.

Public Education and Outreach

The Town of Winchester has developed an extensive public outreach campaign aimed at educating residents and businesses on the location of floodprone areas within the Town, flood insurance requirements, and ways in which they can protect their property. The Town has recently developed a Flood Hazard website at (http://www.winchester.us/floodhazardwebsite/index.htm) and has distributed mailings to residents who live in or near the 100-year floodplain.

### 3.2.3 Future Mitigation Strategies – Flood Related Hazards

The Town of Winchester will work through its municipal staff and appointed boards and committees, as appropriate to implement the following mitigation, preparedness, response and maintenance strategies. This work may include requests for capital funding, modifications to existing regulations, or continued implementation of existing programs.

Flood Mitigation Program

As discussed in Section 3.2.2, the Town is continuing to implement the Flood Mitigation Program as permitted through MEPA. The projects must be completed in order from downstream to upstream, except for the two mitigation projects outside of Winchester. The Town Manager's office and Board of Selectmen are responsible for management of the Town's flood mitigation program.

Below is a list of the projects that will be completed in the future as part of this project:

- **Project 4: Mount Vernon Street Bridge Improvements –** Construction of a fourth culvert under the Mount Vernon Street Bridge. Project design has been completed and construction is expected to begin in summer 2015.
- **Project 6: High School Playing Field –** Construction of a parallel box culvert adjacent to the three existing culverts under the High School playing field. Design of this project has been funded and is currently underway. Construction funding was approved by the voters on June 9, 2015 through a debt exclusion override. Construction is expected to begin in 2016.
- **Project 8: Swanton Street Bridge Improvement –** Enlargement of the existing bridge opening under Swanton Street. Funding for the design and construction of this project has not been secured.
- **Project 10: Railroad Bridge near Muraco School –** Installation of two new culverts under the MBTA railroad near the Muraco School to supplement the two existing 6.5 by 7-foot bridge openings. Funding for the design or construction of this project has not been secured.
- **Scalley Dam Improvements (Upstream Mitigation) –** Installation of a new outlet control structure at Scalley Dam on Horn Pond in Woburn. Construction is expected to begin in late 2015 or 2016.

Measures to Ensure Compliance with NFIP

The Town will continue to enforce the Floodplain Overlay District (Section 8 of the Zoning Bylaw) and associated State Building Code regulations for floodplain areas. As needed, the Town's Zoning Bylaw will be updated to remain consistent with FEMA guidelines and floodplain mapping. The Town will also maintain up-to-date maps of

local FEMA identified floodplains. FEMA last issued revised FIRMs for the Town of Winchester on June 4, 2010.

Representatives from FEMA and MEMA performed a Community Assistance Visit (CAV) in Winchester on January 12, 2012 to discuss the Town's participation in the NFIP program. Two recommendations were made to strengthen the Town's existing Floodplain Overlay District: (1) remove a reference in Section 8.1.4 to the Flood Boundary and Floodway Map as floodways are now delineated on the FIRM; and (2) remove a reference to Appendix 120.G of the State Building Code from Section 8.1.8, as this is an outdated reference. Instead a statement such as "Sections of the State Building Code applicable to construction in the floodplain" should be included.

The Planning Team recommends that the suggested changes to the Zoning By-law be brought to vote before Town Meeting.

Floodplain Management Regulatory Standards

The Town will continue to follow existing policy strategies, which meet or exceed NFIP standards. This requires coordination between the Building Department, Planning Department, Conservation Commission, and Engineering Department to enforce these policies. Additionally, the Planning Board and Engineering Department are working with the Zoning Board of Appeals to update their guidelines to be consistent with Subdivision and Wetlands Protection guidelines. The ZBA's guidelines were last revised in 1974. Although the ZBA generally utilizes the more current standards, correcting the outdated documents will provide better continuity between departments and provide clarity and streamlining for applicants. The Town expects to implement these changes in 2015.

Community Rating System Program

The Town of Winchester has recently been accepted into FEMA's Community Rating System (CRS) program. The CRS program is a voluntary incentive program that recognizes and encourages community floodplain management activities that exceed the minimum National Flood Insurance Program (NFIP) requirements. The goals of the program, as defined by FEMA, are to:

- Reduce flood losses;
- Facilitate accurate insurance rating; and
- Promote the awareness of flood insurance.

The CRS program recognizes community efforts beyond the minimum standards in the NFIP by reducing flood insurance premiums for eligible property owners. CRS discounts on flood insurance premiums range from 5% up to 45%, in 5% increments. Each community is scored on 18 creditable activities defined by FEMA under the CRS program to determine the premium discount.

As part of the Town's application, additional information and outreach has been made available to the public. This includes a portion of the Town's website dedicated to flooding issues. In addition, a targeted informational mailing was sent out to all residential and commercial properties located wholly or partially within the 100-year floodplain, as published by FEMA. The mailing included a description of the Town's floodplain, requirements for flood insurance, flood safety, and other flood-related topics.

The Town's CRS program is being implemented by the Engineering Department, who will be responsible for coordinating compliance with program requirements. The application process was completed in early 2013, which including the completion of a CAV by FEMA in summer 2012. There were no issues discovered at that time. Following a review of the CRS application by FEMA, the Town was issued a Class 8 rating. The CRS discount went into effect on October 1, 2013. The Town is required to complete the recertification process annually.

Property and Floodplain Habitat Protection

The Town will continue to work to obtain funding for the final design and construction of additional floodplain storage and habitat restoration at the General Foods property adjacent to the Aberjona River. The Town unsuccessfully applied for a 604b grant in 2009. Potential grant sources include 604b grants or grants through Natural Resource Damages Settlements in the Mystic River Watershed.

### 3.2.4 Existing Mitigation Strategies – Dam Failures

The Town of Winchester is responsible for operation and maintenance of dams associated with the Town's reservoir system – the North, Middle, and South Reservoirs. The Town complies fully with the Massachusetts Dam Safety Regulations (302 CMR). As part of the Town's program, dam inspections are performed and repairs are undertaken on an as-needed basis. In 2011, the Town completed repairs to the West Dike of the South Reservoir in accordance with the requirements of the Office of Dam Safety.

Emergency Action Plans (EAPs) have been prepared for the South Reservoir Dam and East Dike, as well as the North Reservoir Dam. Although the EAPs refer primarily to how to identify and respond to potential emergencies at each dam, the emergency notification procedures are tested and the plans updated each year. The EAPs also contain inundation maps that show the potential limits of flooding during a dam breach. These maps are critical for response during emergencies.

### 3.2.4 Future Mitigation Strategies – Dam Failures

The Town recently bid a project that includes repair of the 30-inch diameter low level outlet at the South Reservoir. The outlet pipe is used in the event of an emergency to lower the water level in the South Reservoir. Repairs will also include the installation of a new weir in the primary spillway to allow for release of water from the Reservoir prior to an anticipated rainfall event. This will help reduce uncontrolled discharges, which have contributed to downstream flooding in Medford. The project is expected to be complete by the end of 2015 or early 2016.

## 3.3 Atmospheric-Related Hazards

### 3.3.1 Evaluation of Risk – Atmospheric Related Hazards

Like other communities in eastern Massachusetts, the Town of Winchester is susceptible to a variety of atmospheric-related hazards common in this geographic region. As part of the AHMP update process, and building upon the analysis completed in the Station Mitigation Plan, the Winchester Planning Team identified the following potential atmospheric hazards:

- High wind
- Hurricanes and Tropical Storms
- Thunderstorms
- Tornados
- Nor'easters

Table 3-1 provides a summary of the estimated frequency, severity, and area of impact of such events. A summary of the Town's risk associated with each hazard is provided below.

***High Winds.*** According to the *State Hazard Mitigation Plan* (2010), winds sustained at 31 to 39 miles per hour (mph) for at least one-hour or any gusts 46 to 57 mph causes the National Weather Service (NWS) to issue a Wind Advisory. Winds 58 mph or higher would lead to the issuance of a High Wind Warning. Winds measuring less than 30 mph are typically not considered hazardous.

Massachusetts is susceptible to high wind from several types of weather events, including before and after frontal systems, hurricanes and tropical storms, severe thunderstorms, tornados, and Nor'easters. Adverse effects from high winds may include downed trees and power lines, power outages, and damage to roofs, windows, etc. The effects of moderately high winds (40 to 45 mph) can be further heightened during prolonged periods of drought or excessive rainfall; both of which can weaken tree roots.

High winds have medium occurrence in Winchester, but can affect the entire Town at once with moderate severity. The impacts from downed trees and power lines are of particular concern. There have been recent occurrences of high wind events in Winchester, particularly those associated with hurricanes (such as Hurricane Sandy in October 2012) and nor'easters (such as the blizzard in February 2013).

***Hurricanes and Tropical Storms.*** The NWS defines hurricanes as "a tropical system in which the maximum sustained surface wind is 74 mph or greater". They define a tropical storm as "a tropical system in which the maximum sustained surface wind ranges from 39 to 73 mph". Hurricanes typically have regional impacts beyond their immediate tracks, and numerous hurricanes have affected the communities of eastern Massachusetts. They can result in flooding rainfall and damaging winds, causing widespread power outages and building/infrastructure damage. Fallen trees and branches are a significant problem because they can result in power outages when they fall on power lines or block traffic and emergency routes.

Hurricane intensity is measured according to the Saffir/Simpson scale, which categorizes hurricane intensity linearly based upon maximum sustained winds, barometric pressure, and storm surge potential. These are combined to estimate potential damage. The following gives an overview of the wind speeds, surges, and range of damage caused by different hurricane categories:

***Table 3-3: Hurricane Categories***

| Scale No. (Category) | Winds (mph) | Storm Surge (ft) | Potential Damage |
|---|---|---|---|
| 1 | 74 – 95 | 4 - 5 | Minimal |
| 2 | 96 – 110 | 6 - 8 | Moderate |
| 3 | 111 – 130 | 9 - 12 | Extensive |
| 4 | 131 – 155 | 13 - 18 | Extreme |
| 5 | > 155 | > 18 | Catastrophic |

According to the *State Hazard Mitigation Plan* (2010), between 1851 and 2004, approximately 32 tropical storms, five Category 1 hurricanes, two Category 2 hurricanes, and three Category 3 hurricanes have made landfall in Massachusetts. The hurricane and tropical storm season runs from June 1 to November 30. However, between 1900 and 2009, there are no records of hurricanes reaching land in New England during the months of June or July. Hurricanes typically have the greatest occurrence in New England during August, September, and the first half of October.

Hurricanes and tropical storms occur with medium occurrence in Winchester, but typically have moderate severity when they occur and Town-wide, as well as regional impacts. Recent hurricanes that have impacted the Town of Winchester include Hurricane Sandy in October 2012, Hurricane Irene in August 2011, and Hurricane Earl in September, 2010.

***Thunderstorms.*** The *State Hazard Mitigation Plan* (2010) defines a thunderstorm as a "storm with lightning and thunder, produced by a cumulonimbus cloud, usually producing gusty winds, heavy rain, and sometimes hail." Severe thunderstorms are defined as those with "damaging wind gusts in excess of 58 mph, a tornado, or hail that is ¾-inch in diameter or larger".

Thunderstorms have high frequency, but are usually minor in severity with the potential for Town-wide impacts. According to the *State Hazard Mitigation Plan* (2010), Southern New England typically experiences about 10 to 15 days per year in which there are severe thunderstorms. On average, these storms are only around 15 miles in diameter and last for about 30 minutes. A severe thunderstorm can include winds of close to 60 mph and rain sufficient to produce flooding. Since thunderstorms are a fairly common occurrence in Winchester, there is no specific information on previous occurrences.

***Tornados.*** The NWS defines a tornado as "a violently rotating column of air, usually pendant to a cumulonimbus, with circulation reaching the ground." Tornados can form from individual cells within severe thunderstorm squall lines or from isolated "supercells". They are most common in the summer, June through August and most form in the afternoon or evening. The NWS notes that, on a local level, tornados are the most destructive of all atmospheric phenomena. The Fujita Scale is typically used for rating tornado intensity. The scale is determined by meteorologists and engineers after surveying the damage to the natural landscape and man-made infrastructure after a tornado has touched down. According to NOAA, the scale ranges from F0 to F5, with F0 representing "light damage" and F5 representing "incredible damage" with wind estimates between 261 and 318 MPH.

According to the *State Hazard Mitigation* Plan (2010), there are, on average, one to three tornadoes that touchdown somewhere in southeastern New England. The strongest tornado in Massachusetts history was the Worcester Tornado in 1953 (NESEC). The most recent tornado event in Massachusetts caused significant damage in the Springfield area and resulted in four deaths in June 2011. There have been no reported incidents of a tornado touching down in the Town of Winchester.

***Nor'easters.*** A northeast coastal storm, known as a "nor'easter", gets its name from strong northeasterly winds blowing off the ocean ahead of the storm onto land. It typically includes counter-clockwise wind circulation around a low pressure system

that produces snow or rain (depending on temperatures) and high winds. The storm radius of a nor'easter can be as much as 1,000 miles and these storms feature sustained winds of 10 to 40 mph with gusts of up to 70 mph.

Nor'easters are a common weather event in New England, occurring several times a year, and resulting in region-wide impacts from high winds, flooding or snow accumulation, and coastal erosion. Many of the historic flood events identified in the previous section were precipitated by nor'easters, including the "Perfect Storm" event in 1991. More recently, blizzards in December 2010, October 2011 and February 2013 and 2014 were all large nor'easters that caused significant snowfall amounts. Nor'easters occur with high frequency in Winchester; they impact the entire Town, and have moderate severity. Since Winchester is not located directly on the coast, the primary impacts are a result of high winds, riverine flooding, or snow accumulation.

### 3.3.2 Existing Mitigation Strategies – Atmospheric Related Hazards

The primary impacts from atmospheric-related hazards include loss of power, damage to private property from high wind and blowing debris, and blocking of roadways by fallen trees or utility lines. The existing mitigation and preparedness strategies followed by the Town of Winchester for these types of hazards are summarized below. All of these strategies apply to the five individual hazards identified under the umbrella of "atmospheric-related" hazards.

- Adherence to the Massachusetts State Building Code for all new construction and redevelopment projects, including new electrical code and wind load requirements.
- Implementation of the Town's CEM Plan, which outlines various mitigation, preparedness, and response strategies for atmospheric-related hazards including tornados and hurricanes.
- Cooperation with local utility companies to perform annual tree maintenance around utility lines.
- Coordination with local utility companies during storm events to remove downed trees and limbs that may be impacting or delaying necessary repair work.
- Placement of power lines underground for new construction to avoid storm-related damage.
- Inclusion of NStar, the public electric utility supplier, in the Town's Planning Team for the AHMP update. This was a direct result of the 2007 All Hazards Mitigation Plan strategies.

Several of these items are carried over from the Town's 2007 All Hazards Plan, including adherence to the State building code, implementation of the CEM plan, tree

maintenance around utilities, and placement of power lines underground for new construction.

### 3.3.3 Future Mitigation Strategies – Atmospheric Related Hazards

The following future mitigation, preparedness, and response strategies have been identified for all atmospheric related hazards:

- During discussions with NStar regarding updates to the Town's AHMP, it was discovered that NStar requires each individual property affected by a loss of power to notify NStar directly. One home cannot, for example, notify NStar of a power loss in their entire neighborhood and NStar cannot determine the extent of a power outage remotely. Therefore, the Planning Team recommends that prior to large storm events where widespread power outages are possible (such as hurricanes, tropical storms, and nor'easters), the Town utilize its reverse 911 system to remind residents that they are required to call NStar directly to report a power outage.
- Coordinate with public utility companies on tree trimming to reduce potential for the downing of overhead lines during storm events.
- Identify street trees through the Town's street tree planting program that are appropriate for underwire locations to prevent tree damage in the future.
- Place power lines underground for new construction to avoid storm-related damage.

## 3.4 Winter-Related Hazards

### 3.4.1 Evaluation of Risk – Winter Related Hazards

Winter-related hazards are a common occurrence in the New England region. The Winchester Planning Team identified snow storms, blizzards, and ice storms as the primary winter-related hazards. A summary of the risk associated with each hazard is provided below.

***Snow Storms.*** Storm storms are a common occurrence in New England and specifically Winchester. They vary in intensity and impact from minor to severe. Their impacts are typically felt Town-wide, though snowfall amounts often vary within the Town depending on location and elevation. The severity of a winter storm depends on several factors including temperature, wind speed, type of precipitation, rate of deposition, and time of day and/or year the storm occurs. Two of the greatest dangers during winter storms are the risk of automobile accidents and power outages. Heavy accumulations of snow can also cause roofs to collapse and knock down trees and power lines. Additionally, excess snow piled around residential buildings can also clog ventilation of heating systems, leading to potentially unsafe carbon monoxide

elevations. The cost of snow removal, repairing damages, and the loss of business can have an economic impact on the Town.

Winter storms are the most common and most familiar of the region's hazards that affect large geographic areas. The majority of snow storms in the region cause more inconvenience than they do serious property damage or personal injury. However, periodically, a storm will occur which is a true disaster, and necessitates intense large-scale emergency response.

The Northeast Snowfall Impact Scale (NESIS) developed by Paul Kocin of The Weather Channel and Louis Uccellini of the National Weather Service (Kocin and Uccellini, 2004) characterizes and ranks high impact northeast snowstorms. These storms have large areas of 10 inch snowfall accumulations and greater. NESIS has five categories: Extreme, Crippling, Major, Significant, and Notable. NESIS scores are a function of the area affected by the snowstorm, the amount of snow, and the number of people living in the path of the storm. The largest NESIS values result from storms producing heavy snowfall over large areas that include major metropolitan centers. The NESIS categories are summarized below:

***Table 3-4: Northeast Snowfall Impact Scale (NESIS)***

| Category | NESIS Value | Description |
|---|---|---|
| 1 | 1—2.499 | Notable |
| 2 | 2.5—3.99 | Significant |
| 3 | 4—5.99 | Major |
| 4 | 6—9.99 | Crippling |
| 5 | 10.0+ | Extreme |

Since 1958, Massachusetts has experienced two Category 5 (Extreme) snow storms, nine Category 4 (Crippling) storms, and 13 Category 3 (Major) snow storms. The most significant winter storm in recent history was the "Blizzard of 1978," which resulted in over 3 feet of snowfall and multiple day closures of roadways, businesses, and schools. Historically, severe winter storms have occurred in the following years (note that these records do not include tallies from the 2015 winter season, which broke the record for the most snow over the shortest duration):

***Table 3-5: Severe Winter Storm Records for Massachusetts***

| Type | Date |
|---|---|
| Blizzard | February 1978 |
| Blizzard | March 1993 |
| Blizzard | January 1996 |
| Blizzard | February 2013 |
| Severe Snow Storm | March 2001 |
| Severe Snow Storm | December 2003 |
| Severe Snow Storm | January 2004 |
| Severe Snow Storm | January 2005 |
| Severe Snow Storm | April, 2007 |
| Severe Snow Storm | December 2010 |

***Blizzards.*** According to the *State Hazard Mitigation Plan* (2010), blizzards are defined as winter storms with sustained or frequent wind gusts to 35 mph or more, accompanied by falling or blowing snow reducing visibility to or below ¼ mile. These conditions must be the predominant condition over a three-hour period. Extremely cold temperatures are often associated with blizzard conditions, but are not formally part of the definition. The impact from a blizzard may be more substantial than from a typical snow storm depending on the event duration and snow accumulation. According to the National Climatic Data Center, there was one blizzard reported in southeast Middlesex County, which includes the Town of Winchester, between January 1, 1996 and March 31, 2013. The blizzard occurred on February 8, 2013.

***Ice Storms.*** Ice storm conditions are defined by liquid rain falling and freezing on contact with cold objects creating ice build-ups of ¼ inch or more that can cause severe damage. Ice storms can also have a significant impact on the Town and region as a whole. Heavy accumulations of ice can bring down trees and topple utility poles and communication towers. Ice can disrupt communication and power for days while utility companies repair extensive damage. Even small accumulations of ice can be extremely dangerous to motorists and pedestrians. According to the National Climatic Data Center, there were no ice storms reported in southeast Middlesex County, which includes the Town of Winchester, between January 1, 1996 and March 31, 2013.[1]

[1] http://www.ncdc.noaa.gov/stormevents/choosedates.jsp?statefips=25%2CMASSACHUSETTS

### 3.4.2 Existing Mitigation Strategies – Winter Related Hazards

Existing mitigation, preparedness, and response strategies for winter related hazards include the following. These measures follow, for the most part, the mitigation strategies that were outlined as part of the Town's 2007 All Hazards Mitigation Plan.

- Staffing a full-time tree crew as part of the DPW that performs tree maintenance, including tree trimming and removal, where required. Maintenance is performed year-round and primarily addresses hazard trees or trees that have the potential to become a hazard.
- Working cooperatively with local utility companies to trim branches near power lines to ensure continuity of service.
- Pre-treatment of roads before a winter storm begins, in accordance with Town policies.
- Declaring and broadcasting snow emergencies and enforcing parking bans to keep vehicles off the roads and to aid in snow removal and maintaining emergency access.
- Using the Jenks Center as an emergency shelter during snow emergencies.

### 3.4.3 Future Mitigation Strategies – Winter Related Hazards

The following future mitigation, preparedness, and maintenance strategies have been identified for <u>all</u> winter-related hazards:

- Replacement of the Town's existing dilapidated salt shed with a new one (construction completed for fall 2014).
- In the past snow and ice loading on trees has led to falling branches and the downing of electrical and other overhead utility lines. The Tree Warden should coordinate with utility companies on tree trimming to reduce the potential for the downing of overhead lines during storm events.

## 3.5 Geologic Hazards

### 3.5.1 Evaluation of Risk – Geologic Hazards

The Planning Team identified earthquakes and landslides as the primary geologic hazards in Winchester. However, the local risk associated with both these hazards is generally low.

***Landslides.*** According to the USGS, "the term landslide includes a wide range of ground movement such as rock falls, deep failure of slopes, and shallow debris flows. Although gravity acting on an over steepened slope is the primary reason for a landslide, there are other contributing factors". These may include erosion by river or

ocean waves, slopes weakened by snowmelt or heavy rain, earthquake created stresses, and excess weight from stockpiled material or man-made structures. The extent or magnitude of a landslide may be measured by the size of the area impacted by the landslide, as well as the severity of any secondary hazards created, such as damaged infrastructure or blocked roads.

Although there are several areas with steep topography in Winchester, most are heavily wooded, which diminishes the risk of landslides. There have been no recorded landslides in Town and there are no known areas of subsidence. If a landslide was to occur, it would have isolated impacts. According to the National Climatic Data Center, there were no landslides reported in southeast Middlesex County, which includes the Town of Winchester, between January 1, 1996 and March 31, 2013.

***Earthquakes.*** The USGS defines earthquake as a "term used to describe both sudden slip on a fault, and the resulting ground shaking and radiated seismic energy caused by the slip, or by volcanic or magmatic activity, or other sudden stress change in the earth." Damage from an earthquake stems from ground motion, surface faulting, and ground failure in which weak or unstable soils, such as those composed primarily of saturated sand or silts, liquefy. The effects of an earthquake are mitigated by distance and ground materials between the epicenter and a given location. An earthquake in New England affects a much wider area than a similar earthquake in California due to New England's solid bedrock geology (NESEC).

The magnitude of an earthquake, or the amount of energy it releases, is measured by the Richter Scale. The Richter Scale is logarithmic, meaning that whole-number jumps represent a tenfold increase in severity. The impacts are assigned according the following scale:

***Table 3-6: Richter Scale***

| Magnitude Level | Effects |
|---|---|
| 2.5 or less | Not felt or felt mildly near the epicenter, but can be recorded by seismographs |
| 2.5 to 5.4 | Often felt, but only causes minor damage |
| 5.5 to 6.0 | Slight damage to buildings and other structures |
| 6.1 to 6.9 | May cause a lot of damage in very populated areas |
| 7.0 to 7.9 | Major earthquake; serious damage |
| 8.0 or greater | Great earthquake; can totally destroy communities near the epicenter |

*Source: Massachusetts 2013 State Hazard Mitigation Plan*

Earthquakes are a hazard with multiple impacts beyond the obvious building collapse. Buildings may suffer structural damage which may or may not be readily apparent. Earthquakes can cause major damage to roadways, making emergency response difficult. Water lines and gas lines can break, causing flooding and fires. Another potential vulnerability is equipment within structures. For example, a hospital may be structurally engineered to withstand an earthquake, but if the equipment inside the building is not 30 properly secured, the hospital operations could be severely impacted. Earthquakes may also trigger landslides.

According to the *State Hazard Mitigation Plan* (2010), New England experiences an average of five earthquakes per year. From 1668 to 2007, 355 earthquakes were recorded in Massachusetts (NESEC). New England has not experienced a damaging earthquake since 1755, though several less powerful earthquakes have been centered in Massachusetts and neighboring states. However, seismologists indicate that a serious earthquake occurrence is possible in the area. There are five seismological faults in Massachusetts, but no discernable pattern of earthquakes can be identified along these fault lines. There have been no recorded earthquake epicenters within Winchester. However, if an earthquake was to occur in Winchester, it would have potentially Town-wide impacts.

### 3.5.2 Existing Mitigation Strategies – Geologic Hazards

Existing mitigation and preparedness strategies for geologic hazards include the following:

- The Town of Winchester's CEM Plan outlines responsibilities for earthquake planning and response, which includes periodic training for all emergency management personnel. Similar procedures would apply for responding to landslides. This was a part of the CEM Plan prior to the adoption of the Town's 2007 All Hazards Mitigation Plan.
- The Town enforces the state building code, which has seismic provisions that apply to all new construction.

Both of the items outline above were also mentioned as existing mitigation strategies in the Town's 2007 Plan.

### 3.5.3 Future Mitigation Strategies – Geologic Hazards

The Town has proposed the following future mitigation and preparedness strategies for geologic hazards:

- The Town should develop materials aimed at educating the public on the proper response to earthquakes.
- Continued enforcement of the state building codes regarding earthquakes and landslides.

## 3.6 Other Natural Hazards

### 3.6.1 Evaluation of Risk – Other Natural Hazards

The Winchester Planning Team identified the following "other" hazards that may possibly occur in the Town of Winchester:

- Urban Fires;
- Wildfires;
- Drought; and
- Extreme Temperature.

***Urban Fires.*** The *State Hazard Mitigation Plan* (2010) defines urban fires as a large, destructive, and often uncontrollable fire that spreads substantial destruction. Urban fires typically occur on a low frequency in the Town of Winchester. The types of fires that typically occur in Winchester result in minor damage with localized impacts. If a large fire was to occur in the compact Town Center, however, it could have more widespread and serious consequences, particularly for the historic structures.

***Wildfires.*** Wildfires are typically broken down into three categories – naturally occurring (such as from lightning strikes), human caused, or prescribed fire. The magnitude/strength of a wildfire is typically measured by the size of the impacted area. However, the National Institute of Standards and Technology is currently in the process of developing a Richter-like scale to measure and predict the destructiveness of wildfires, similar to what is currently done for earthquakes.

The most common location of wildfires in Winchester is in the abutting Middlesex Fells Reservation, which includes the Town's three water-supply reservoirs and water treatment facility. Based on historic patterns, the Planning Team evaluated the frequency of wildfires as medium, with minor severity and isolated impacts. The following is a summary of recent municipal wildfire responses, based on information provided by the Winchester Fire Department:

- 2012: 32 responses, 13 acres impacted;
- 2013: 34 responses, 20 acres impacted; and
- 2014: 13 responses, 40 acres impacted.

***Drought.*** Drought is defined as a period characterized by long durations of below normal precipitation. Drought is a natural phenomenon that occurs uncommonly in the New England area. Under normal conditions, precipitation totals in Massachusetts generally range from 44 to 47-inches per year. According to the *State Hazard Mitigation*

*Plan* (2010), Massachusetts experienced multi-year droughts in the following years: 1879 – 1883, 1929 – 1932, 1939 – 1944, 1961 – 1969, and 1980 – 1983. The most severe drought on record in the New England area was during the 1960's.

Based on past history, the Planning Team identified the frequency of droughts in Winchester as very low. However, if one where to occur, it could have moderate severity, with town-wide impacts. The largest impact would likely be to the Town's drinking water supply, which is fed partially by water from the Town's reservoir system and partially by water from the MWRA. In the case of a severe drought where the Town's supply was potentially compromised, the Town has the ability to purchase water from the MWRA to supply the entire Town, though there are obvious financial implications if that scenario was to play-out.

***Extreme Temperature***. According to the State Hazard Mitigation Plan (2010), there is no universal definition for extreme temperatures. The term is relative to the usual weather in the region based on climatic averages. Extreme heat, for this climatic region, is usually defined as a period of three or more consecutive days above 90 °F, but more generally a prolonged period of excessively hot weather, which may be accompanied by high humidity. Extreme cold is also relative to the normal climatic lows in the region, and is impacted both by temperatures and wind speeds, which can cause harmful wind-chill factors. Wind chill is defined as the apparent temperature felt on exposed skin due to the combination of air temperature and wind speed.

Temperature extremes occur on a low frequency during the summer months in the New England area, and are commonly limited to a few days. According to the National Climatic Data Center, there were no excessive heat or cold days or reported in southeast Middlesex County, which includes the Town of Winchester, between January 1, 1996 and March 31, 2013. Based on historical patterns, the Planning Team felt that extreme temperatures had minor severity and isolated impacts.

### 3.6.2 Existing Mitigation Strategies – Other Natural Hazards

The Winchester Fire Prevention Division has a comprehensive plan for the prevention of fires with the Town. These procedures were in place prior to the adoption of the 2007 All Hazards Mitigation Plan. Existing mitigation and preparedness strategies are divided into three categories:

- <u>Engineering</u>
    - Review of all site plans and subdivision plans for adequate fire protection including access for fire department apparatus.
    - Review of fire alarm and sprinkler plans for new and existing occupancies for compliance with local, state and national codes and standards.
    - Testing of fire alarm and sprinkler systems in new or existing occupancies.

  - Testing of Town hydrant system in cooperation with Water Department to ensure adequate supply of water is available for fire suppression activities.

- Code Compliance
  - Issuance of permits for fire-related hazardous operations. Permits include, but are not limited to open burning; welding; blasting; and storage of flammable liquids, solids or gases, and oil burning equipment.
  - Inspection of occupancies for compliance with State Fire Prevention Regulations.
- Public Education
  - Recognizing that a key component to mitigating any fire-related hazard is educating the public, the Fire Prevention Division provides an extensive Public Fire and Life Safety Education program including school, community, and senior-based curriculums.
  - The education efforts also include on-going training of Fire Department personnel in fire prevention and suppression tactics.

Since the adoption of the 2007 All Hazards Mitigation Plan, the Town has upgraded its Public Safety Building, which houses the Police and Fire Departments, to enable the continued mitigation and response to fires and other man-made or natural disasters. The Town's Board of Health and Emergency Management Coordinator also address periods of extreme temperature by issuing advisories and opening cooling stations on an as-needed basis.

### 3.6.3 Future Mitigation Strategies – Other Natural Hazards

Due to the expanding mission of the Fire Service to meet the needs of the public, potential mitigation and preparedness strategies should include:

- Increased public education to lessen the likelihood of man-made fire related events (in the context of both urban fires and wildfires).
- Support and advocacy for adoption of enhanced codes for detection and suppression, such as fire alarm and increased use of sprinkler systems particularly in residential settings.
- Development of a public educational program on water conservation that could be utilized during periods of drought.
- Development of a public education program outlining how residents can protect themselves during periods of extreme temperatures (both cold and hot).

## 3.7 Prioritization and Implementation

The last step in developing the Town's mitigation strategy is to assign a level of priority to each mitigation measure to guide the Town's limited resources towards those actions with the greatest potential benefits in support of public health and safety. In developing the prioritization procedures, it was not the intent of the Winchester Planning Team to direct that the initiatives be accomplished in their prioritized order. Rather, the purpose of the ranking is to indicate the overall importance of the project to local mitigation efforts.

Prioritization occurred through subsequent review by the Winchester Planning Team and public comment. Priority setting was based on local knowledge of the hazard areas; including impacts of hazard events, the extent of the area impacted, and the relation of a given mitigation measure to the Town's identified goals. At this stage in the process, there has not been a formal cost-benefit analysis done for any of the mitigation projects, so prioritization is based on each member's knowledge of the existing and potential hazard impacts and an approximate sense of the costs associated with pursuing any given measure.

In addition, the Winchester Planning Team also took into consideration factors such as the number of homes and businesses affected, whether or not road/business/municipal service closures occurred and what impact those closures had on delivery of emergency services and the local economy, anticipated project costs, whether the Town currently had the technical and administrative capability to carry out the mitigation measures, whether any environmental constraints existed, and whether the Town would be able to justify the costs relative to the anticipated benefits.

The table below demonstrates the prioritization of future mitigation strategies. For each mitigation measure, the geographic extent of the potential benefiting area is identified as is an estimate of the overall benefit and cost of the measures. The benefits and costs were evaluated in terms of:

**Benefits**

- **High –** Action will result in significant reduction of hazard risk to people and/or property from a hazard event.
- **Medium –** Action will likely result in moderate reduction of hazard risk to people and/or property from a hazard event.
- **Low –** Action will result in a low reduction of hazard risk to people and/or property from a hazard event.

**Costs**

- **High –** Estimated costs greater than $50,000.

- **Medium** – Estimated costs between $10,000 and $50,000.
- **Low** – Estimated costs less than $10,000 or staff time.

With this assessment, an approximate timeframe has been identified in which the municipality would attempt to achieve the mitigation measure. Also included in the table is:

- Description of the Mitigation Measure – The description of each mitigation measure is brief and cost information is given only if cost data were already available from the community. The cost data represent a point in time and would need to be adjusted for inflation and for any changes or refinements in the design of a particular mitigation measure.
- Priority – The designation of high, medium, or low priority was done at the third Winchester Planning Team meeting. The designations reflect discussion and a general consensus developed at the meeting but could change as conditions in the community change. In determining project priorities, the local team considered potential benefits and project costs.
- Implementation Responsibility – The designation of implementation responsibility was based on a general knowledge of what each municipal department is responsible for. It is likely that most mitigation measures will require that several departments work together and assigning staff is the sole responsibility of the governing body of each community.
- Timeframe – The timeframe was based on a combination of the priority for that measure, the complexity of the measure and whether or not the measure is conceptual, in design, or already designed and awaiting funding. Because the timeframe for this plan is five years, the timing for all mitigation measures has been kept within this framework. The identification of a likely timeframe is not meant to constrain the community from taking advantage of funding opportunities as they arise.
- Potential Funding Sources – This column attempts to identify the most likely sources of funding for a specific measure. The information on potential funding sources in this table is preliminary and varies depending on a number of factors. These factors include whether or not a mitigation measure has been studied, evaluated or designed, or if it is still in the conceptual stages. Identification of a potential funding source in this table does not guarantee that a project will be eligible for, or selected for funding.

## Table 3-7: Prioritization of Future Mitigation Strategies

| Mitigation Measures | Measure Type | Geographic Area | Benefit | Estimated Cost | Priority | Implementation Responsibility | Timeframe | Potential Funding Source(s) |
|---|---|---|---|---|---|---|---|---|
| ***Flood-Related Hazards*** | | | | | | | | |
| Project 3 - Center Falls Dam | Structural | Floodplain | High | High | High | Town Manager/Selectmen | 2013 - 2014 | Capital Planning |
| Project 4 - Mount Vernon St Bridge | Structural | Floodplain | High | High | High | Town Manager/Selectmen | 2015 - 2016 | Capital Planning & Bond Bill |
| Project 6 - Skillings Field Culvert | Structural | Floodplain | High | High | High | Town Manager/Selectmen | 2016 - 2017[1] | Override Vote |
| Project 8 - Swanton Street Bridge | Structural | Floodplain | High | High | High | Town Manager/Selectmen | Design begin 2017[2] | Capital Planning or Override |
| Project 10 - Railroad Bridge near Muraco School | Structural | Floodplain | High | High | High | Town Manager/Selectmen | Design begin 2017[2] | Capital Planning or Override |
| Craddock Locks (D/S Mitigation) | Structural | Floodplain | High | High | High | MassDOT | 2017 | MassDOT |
| Scalley Dam (U/S Mitigation) | Structural | Floodplain | High | High | High | Town Manager/Selectmen | 2015 - 2016 | Bond Bill |
| South Reservoir Dam Repairs | Structural | Medford | High | High | High | Town Manager/Selectmen | 2015 - 2016 | Capital Planning |
| NFIP Participation | Prevention | Floodplain | High | Low | High | Town Manager/Engineering | 2015 - 2020 | Engineering Budget |
| Floodplain Zoning Revisions | Prevention | Floodplain | Low | Low | Lot | Engineering[3] | 2015 - 2020 | Engineering Budget |
| ***Atmospheric-Related Hazards*** | | | | | | | | |
| Power Outage Awareness | Response | Townwide | Medium | Low | Medium | Emergency Management Coordinator | 2015 - 2020 | Fire Department |
| Tree Trimming Coordination | Prevention | Townwide | High | Medium | Medium | DPW | 2015 - 2020 | DPW/Nstar |
| Underground utilities for new subdivisions. | Prevention | Townwide | High | High | High | Planning Board | 2015 - 2020 | Developers |
| Underwire Tree Planting Guidelines | Prevention | Townwide | Medium | Low | Low | DPW and Street Tree Committee | 2015 - 2020 | DPW budget |
| Salt Shed Replacement | Response | Townwide | Low | High | Medium | DPW | 2014 | Capital Planning |
| ***Geologic Hazards*** | | | | | | | | |
| Public Education | Prevention | Townwide | Low | Low | Low | Fire Department | 2015 - 2020 | Fire Department |
| Updated Codes | Prevention | Townwide | Low | Low | Low | Building Department | 2015 - 2020 | State |
| ***Other Natural Hazards*** | | | | | | | | |
| Fire Safety Public Education | Prevention | Townwide | Low | Low | Low | Fire Department | 2015 - 2020 | Fire Department |
| Water Conservation Public Education | Prevention | Townwide | Low | Low | Low | Engineering/DPW | 2015 - 2020 | Engineering Budget |
| Extreme Temperature Public Education | Prevention | Townwide | Low | Low | Low | Fire Department/ Board of Health | 2015 - 2020 | Board of Health |

[1]Timeframe is approximate and depends on the passage of a debt exclusion override by Winchester voters, scheduled for June 2015.

[2]Schedule depends on availability of design funds from either the Capital Planning Committee or override.

[3]Zoning revisions require adoption by Town Meeting.

# Section 4.0 Regional Considerations

Regional cooperation is a critical component of successful hazards planning and response. The Town of Winchester has been proactive in establishing regional connections with surrounding municipalities and other governmental agencies, particularly in relation to its flooding concerns. A summary of these partnerships is provided below:

- The Winchester Town Meeting adopted a Joint Powers Agreement, which allows communities to act as one entity to spend money to mitigate flood hazards.
- In July 1998, the Aberjona River – Mystic River Hazard Mitigation Group was formed to provide coordinated, multi-community response to flood issues. This group evolved into the Upper Mystic River Watershed Board, which in 1999 was formally designated as a Project IMPACT community by FEMA. In 2001, the Board of Selectman authorized Winchester to participate in the Upper Mystic River Watershed Board's initiative to examine regional solutions to ongoing flood problems. Winchester was the lead agency, with Fire Chief John Nash serving as chairman.
- In 2001, the Town of Winchester and City of Woburn jointly initiated a study to evaluate flooding along Horn Pond Brook (the outlet to Horn Pond is located in Woburn); this study was funded through the Project IMPACT grant. The engineering consulting firm CDM was hired to conduct a hydrologic/hydraulic study of Horn Pond and Horn Pond Brook. The resulting report outlined a series of structural and operating improvements both along Horn Pond Brook and at the outlet to Horn Pond aimed a reducing flooding. In accordance with these operational recommendations, the Town of Winchester and City of Woburn coordinate on a regular basis in anticipation of predicted rainfall events to lower the levels of the Horn Pond and Mill Pond to provide additional storage.
- In 2003, the Town of Winchester and MBTA jointly funded the replacement of a partially collapsed stormdrain culvert under the commuter rail line near Davidson Park off of Cross Street. This project was designed to improve drainage and reduce flood levels in the park.
- The Town of Winchester is currently working with the City of Medford to evaluate flooding concerns in Medford's Meetinghouse Brook watershed, which accepts runoff from the South Reservoir. During the March 2010 storm events, discharge from the reservoir spillway contributed to downstream flooding issues. The two communities are jointly evaluating reservoir operation protocols that may help mitigate future flooding impacts. In 2015, a new weir will be added to the primary spillway for the South Reservoir to help mitigate future flooding.

- In June 2004, the Town of Winchester joined with fourteen other communities to form the Mystic Region Emergency Planning Committee (Mystic REPC). The goal of this group is to establish a plan to handle Hazardous Materials incidents in any of the member communities. The intent is to pool enough resources to respond to a Hazardous incident quickly to lessen the impact of the event. In the event of an emergency, the Mystic REPC could supplement a community's existing Comprehensive Emergency Management Plan.
- The Town of Winchester is an active member of the Metropolitan Area Planning Council's (MAPC's) North Suburban Planning Council (NSPC). This group is comprised of the following nine member communities: Burlington, Lynnfield, North Reading, Reading, Stoneham, Wakefield, Wilmington, Winchester, and Woburn. The group generally meets monthly to review regional or local topics of concern.
- The Town of Winchester, through its Health Department, is a member of a regional, public health emergency preparedness group. It includes 34 communities that receive federal funding for emergency preparedness activities, such as responding to large-scale disease outbreaks.
- Copies of this Plan have been forwarded to the Mystic Regional Emergency Planning Council, Metropolitan Area Planning Council (MAPC), and the American Red Cross.

# Section 5.0 Monitoring, Evaluation, and Updating

## 5.1 Annual Review

Recognizing that this planning process is dynamic, the Town of Winchester understands that an integral component of the plan is an effective method of monitoring, evaluation, and updating. Following the initial plan approval and adoption, the Winchester Planning Team shall meet annually to review and update the plan as may be required. Current strategies shall be reviewed as to their successes or failures and revised as needed. The Emergency Management Director or his/her designee shall be responsible for scheduling the review process. Since continued public participation is crucial to the success of this plan, notice of this meeting shall be posted at the Town Hall, on the Town website, and on local cable access, allowing for opportunity for public feedback (either verbal or written) during this meeting. Public input obtained at the meeting will be incorporated into the findings and recommendations of the Winchester Planning Team and the plan, as appropriate.

Following the annual review, a report of findings and recommendations shall be forwarded to the Town Manager and Board of Selectman. Should a revision or update be required, the Board of Selectman shall vote to adopt the change and amend the plan. In addition, the approved All Hazards Mitigation Plan will be posted on the Town's website year-round, with instructions for submitting comments to the Engineering Department for consideration during the next annual review process.

An annual review meeting was held on October 15, 2015 by the Community Planning Team. A copy of the agenda and minutes from that meeting are provided in Appendix E. Since the Town's AHMP is still under review, the updates recommended during that meeting were included in this most recent version of the Plan.

## 5.2 Five-year Update

To comply with FEMA's five-year update requirement, every fifth year following the initial approval and adoption, at the conclusion of the annual review process, the complete plan with revisions shall be submitted to the Board of Selectman for their review. Following an opportunity for public input, which includes submission of verbal or written comments at the Selectmen's meeting and a public comment period where the document may be reviewed online and written comments submitted to the Board of Selectmen, the plan will be updated and an initial submittal to FEMA shall be made prior to Town adoption in order to request FEMA Approval Pending Adoption (APA). Following those stages, a plan and its adoption documentation will be resubmitted to FEMA for final approval. Prior to the initial submission to FEMA, the

Town will also consider direct solicitation of comments from adjacent communities and regional agencies, such as the Mystic River Watershed Association.

## 5.3 Declared Disasters

Following a disaster declaration, this Plan will be reviewed to reflect on lessons learned or to address specific circumstances arising out of the disaster. The Emergency Management Director or his/her designee shall be responsible to schedule this review meeting including posting of public notice. Should a revision or update be required, the Board of Selectman will vote to adopt the change and amend the plan, with a submission provided to FEMA for approval.

# Appendix A:
# Public Hearing Notices

**TOWN OF WINCHESTER**

RECEIVED AND FILED
12 FEB 16 AM 10: 39
TOWN CLERK
TOWN OF WINCHESTER

***PUBLIC MEETING NOTICE***

The Board or Committee named below will meet at the place and time stated:

- **All Hazard Mitigation Plan Update**
- **Friday, March 2, 2012**
- **9:00AM – 11:00AM**
- **Mystic Valley Room**

*Submitted by:*

Joan Murphy

*Recorded by Town Clerk*

**Agenda: Discuss Plan and Update**

**TOWN OF WINCHESTER**

***PUBLIC MEETING NOTICE***

The Board or Committee named below will meet at the place and time stated:

- **All Hazard Mitigation Plan Update**
- **Fridays, April 6 & May 4, 2012**
- **9:00AM**
- **Mystic Valley Room**

*Submitted by:*

Joan Murphy

*Recorded by Town Clerk*

All Hazards Mitigation Plan Mtg 3/2/11

| Name | Affiliation |
| --- | --- |
| Beth Rudolph | Engineering Dept. |
| JIM WHITEHEAD | CONSERVATION COMMISSION |
| NORMAN DOUCETTE | TRANSFER STATION |
| Thomas Groux | Winchester P.D. |
| JOHN DASH | FD |
| RICK TUSTIN | FD |
| Steven Shea | Winchester Hospital |
| Matt Shuman | Engineering |
| Steve Swymer | Winchester |
| JAY Gill | Winchester DPW |

All Hazards Mitigation Plan 4/6/12

| Name | Affiliation | Email |
| --- | --- | --- |
| Beth Rudolph | Engineering | brudolph@winchester.us |
| Rick Tustin | Fire | RTUSTIN@WINCHESTER.US |
| AL Wile | Building | Jwile@Winchester.us |
| Thomas Groux | Police | tgroux@winchesterpd.org |
| JOHN NASH | EM | JNASH@WINCHESTER.US |
| BETSY WARE | PLANNING BOARD | EWARE@WINCHESTER.US |
| Annemarie Walsh | NSTAR | annemarie.walsh@nstar.com |
| Steven Shea | Winchester Hospital | SSHEA@WINHOSP.org |
| James Gill | DPW | J.Gill@Winchester.US |
| Matt Shuman | Engineering | mshuman@Winchester.us |
| Evan MacDonald | Win. Star | emacdonald@wicklocal.com |

# Appendix B:
# Public Outreach Materials

TOWN OF WINCHESTER 71 MT. VERNON STREET, WINCHESTER, MA
DEPARTMENT OF ENGINEERING & PLANNING
ENGINEERING DIVISION
PHONE 781-721-7120 / FAX 781-721-7166

**PRESS RELEASE**

The Town of Winchester is updating its All Hazard Mitigation Plan, in accordance with the requirements of the Federal Emergency Management Agency (FEMA). The Plan, which was completed in 2007, documents the various potential natural disasters that could impact Winchester, as well as actions the Town is taking to reduce or mitigate them. Some of these include flooding, winter storms, and earthquakes.

Various department staff, including representatives from engineering, public safety, public works, the Conservation Commission, the Building Department, and the Board of Health, has formed a working group to update the plan. The Town is seeking additional public participation and comments. Monthly working group meetings have been scheduled on March 2, April 6, and May 4. They will take place at 9:00 in the Mystic Valley Room at the Winchester Town Hall, 71 Mt. Vernon Street. The public is invited.

A draft Plan will be presented to the Board of Selectmen at a public meeting, expected to be scheduled in June. Upon Town approval, the document must be submitted to FEMA for final review and approval.

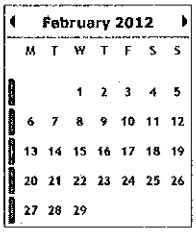
For additional information, please contact the Engineering Department at 781-721-7120.

**FAQS**

How can I get a copy of my Birth Certificate?

Where can I find my Property Assessment?

more





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WEDNESDAY
February 29, 2012

Winchester

$1.00

# Daily Times Chronicle

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30 Pages

*In the event of flooding, storms*

## Hazard plan gets updated by town

WINCHESTER - The Town of Winchester is updating its All Hazard Mitigation Plan, in accordance with the requirements of the Federal Emergency Management Agency (FEMA).

The plan, which was completed in 2007, documents the various potential natural disasters that could impact Winchester, as well as actions the town is taking to reduce or mitigate them. Some of these include flooding, winter storms, and earthquakes.

Various department staff, including representatives from engineering, public safety, public works, the Conservation Commission, the Building Department, and the Board of Health, has formed a working group

PLAN - PAGE A13

## • Plan (continued from A1)

to update the plan.

The town is seeking additional public participation and comments. Monthly working group meetings have been scheduled on March 2, April 6, and May 4. They will take place at 9 in the Mystic Valley Room at the Winchester Town Hall, 71 Mt. Vernon St. The public is invited.

A draft plan will be presented to the Board of Selectmen at a public meeting, expected to be scheduled in June. Upon town approval, the document must be submitted to FEMA for final review and approval.

For additional information, please contact the Engineering Department at 781-721-7120.

WICKED LOCAL WINCHESTER
WITH NEWS FROM THE WINCHESTER STAR

**Reader callout** Send us Opening Day photos!

# Winchester will post updated FEMA plan for review tomorrow

Residents have one week to comment

**By Staff reports**
**Wicked Local Winchester**
Posted Jul 16, 2012 @ 01:38 PM

**Suggested Stories**

Suicidal man leaps from building in downtown Plymouth

Drug overdose on Plymouth Beach

21-pound lobster hanging out in Orleans

**From the Web**

Pius EV Delivers 'Build-It-Yourself' Electric Car (The Inquisitr)

Reese Witherspoon Hit By Car Driven By 84-Year Old (MotorAuthority)

Mom Billed for Blood Cleanup After Son Killed by a Drunk Driver (CafeMom)

Sponsored content What's this?

Winchester, MA — The town will post its updated All Hazard Mitigation Plan tomorrow for a one-week review period.

The plan identifies potential natural hazards that could impact Winchester, as well as actions the town is taking to reduce or mitigate them.

The town must have a plan to be eligible for hazard mitigation project grants through the Federal Emergency Management Agency.

In 2007, the Federal Emergency Management Agency (FEMA) and the Massachusetts Emergency Management Agency (MEMA) approved the plan. Federal regulations require the town to review and update its plan every five years to continue to be eligible for mitigation project grant funding.

Winchester's plan expires in September 2012.

Town staff formed a working group to update the 2007 plan, and held three meetings in March and April. This effort was led by the Engineering Department and Fire Department. Other members of the Working Group include representatives from the Board of Health, Building Department, Conservation Commission, DPW, Police Department, and the Town Planner. A representative from Winchester Hospital and from NSTAR also attended the Working Group meetings.

The revised plan was posted on the town's website July 17.

After the public comment period ends on July 24, the document will be submitted to MEMA and FEMA for their final review and approval.

View the plan

On the town website, www.winchester.us

To comment

Submit comments to Engineering Department, Town Hall, 71 Mt. Vernon Street, Winchester, MA 01890 or via email to brudolph@winchester.us

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Comments (0)

Login or register to post a comment:
Login
Username:
Password:
Forgot password
Login
Register
Email:
First Name:
Last Name:
I agree to the terms of use
I am over 13 years of age
NOTE: Your inbox must accept emails from "no-reply@gatehousemedia.com"
Register

728x90
When you can turn to one source

EMERGENCY MANAGEMENT

# Town updates FEMA plan

The town posted its updated All Hazard Mitigation Plan on Tuesday for a one-week review period. The review period ends on July 24.

The plan identifies potential natural hazards that could impact Winchester, as well as actions the town is taking to reduce or mitigate them. The town must have a plan to be eligible for hazard mitigation project grants through the Federal Emergency Management Agency. In 2007, the Federal Emergency Management Agency (FEMA) and the Massachusetts Emergency Management Agency (MEMA) approved Winchester's plan. Federal regulations require towns to review and update their plans every five years to continue to be eligible for mitigation project grant funding.

Winchester's plan expires in September 2012.

Town staff formed a working group to update the 2007 plan and held three meetings in March and April. This effort was led by the Engineering Department and Fire Department. Other members of the Working Group include representatives from the Board of Health, Building Department, Conservation Commission, DPW, Police Department, and the Town Planner. A representative from Winchester Hospital and from NSTAR also attended the Working Group meetings.

The revised plan was posted on the town's website July 17. After the public comment period ends on July 24, the document will be submitted to MEMA and FEMA for their final review and approval.

**View the plan**

On the town website www.winchesterma.us

**To comment**

Submit comments to Engineering Department, Town Hall, 71 Mt. Vernon Street, Winchester, MA 01890 or via email to brudolph@winchesterma.us

Daily Times Chronicle
TUESDAY, JULY 17, 2012

*On the town website today*

# FEMA plan updated

WINCHESTER - Federal regulations require that communities have a locally-adopted and FEMA-approved mitigation plan in place to be eligible to apply for and/or receive FEMA hazard mitigation project grants. Winchester's "All Hazard Mitigation Plan" (AHMP) was approved by the Federal Emergency Management Agency (FEMA) and the Massachusetts Emergency Management Agency (MEMA) in 2007.

The Plan documents the various potential natural hazards that could impact Winchester, as well as actions the town is taking to reduce or mitigate them. FEMA requires that municipalities review and revise their plans every five years to continue to be eligible for mitigation project grant funding. Winchester's plan expires in September 2012.

Town staff formed a Working Group to facilitate updates to the 2007 plan and held three meetings to update the plan.

This effort was led by the Engineering Department and Fire Department. Other members of the Working Group include representatives from the Board of Health, Building Department, Conservation Commission, DPW, Police Department, and the Town Planner.

A representative from Winchester Hospital and from NSTAR also attended the Working Group meetings. Working group meetings were held in March and April.

The Working Group has completed a draft update to the AHMP and is issuing the document for a one-week public comment period. The document will be posted on the town's website starting Tuesday, July 17. Comments should be submitted in writing to the Engineering Department either via mail or email (brudolph@winchester.us).

Following the completion of the public comment period, the document will be submitted to MEMA and FEMA for their final review and approval. The Plan must be approved by FEMA prior to the September deadline in order for the town to remain eligibility for state and federal hazard mitigation grant opportunities.

TOWN OF WINCHESTER
71 MT. VERNON STREET, WINCHESTER, MA
DEPARTMENT OF ENGINEERING & PLANNING
ENGINEERING DIVISION
PHONE 781-721-7120 / FAX 781-721-7166

February 6, 2012

Brad Ross
Winchester Hospital
Via e-mail: bross@winhosp.org

Dear Mr. Ross:

The Town of Winchester is updating its *All Hazard Mitigation Plan*. The Plan, which was completed in 2007, documents the various potential natural disasters that could impact Winchester, as well as actions the Town is taking to reduce or mitigate them. Some of these include flooding, winter storms, and earthquakes.

Various department staff, including representatives from public safety, public works, the Conservation Commission, the Building Department, and the Board of Health, has formed a working group to update the plan. The Town is seeking additional public participation and comments. I am contacting you because you are a valuable community stakeholder and I hope that you will be able to provide insight and input into the plan.

Monthly working group meetings have been scheduled on March 2, April 6, and May 4. They will take place at 9:00 at the Winchester Town Hall, 71 Mt. Vernon Street. The intent is to finalize the plan by June, at which point it must be submitted to FEMA for approval.

Please contact me at 781-721-7120 and let me know if you can attend any of the meetings. I would be happy to forward you a copy of the current plan and discuss any comments or ideas you may have.

Sincerely,

Matt Shuman, P.E.
Assistant Town Engineer

TOWN OF WINCHESTER
71 MT. VERNON STREET, WINCHESTER, MA
DEPARTMENT OF ENGINEERING & PLANNING
ENGINEERING DIVISION
PHONE 781-721-7120 / FAX 781-721-7166

February 6, 2012

Gene Novak
State Building Inspector
Mass. Department of Public Safety
Via e-mail: gene.novak@state.ma.us

Dear Mr. Novak:

The Town of Winchester is updating its *All Hazard Mitigation Plan.* The Plan, which was completed in 2007, documents the various potential natural disasters that could impact Winchester, as well as actions the Town is taking to reduce or mitigate them. Some of these include flooding, winter storms, and earthquakes.

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Sincerely,

Matt Shuman, P.E.
Assistant Town Engineer

TOWN OF WINCHESTER
71 MT. VERNON STREET, WINCHESTER, MA
DEPARTMENT OF ENGINEERING & PLANNING
ENGINEERING DIVISION
PHONE 781-721-7120 / FAX 781-721-7166

February 6, 2012

Annemarie Walsh
NSTAR Community Relations
Via e-mail: Annemarie.Walsh@nstar.com

Dear Ms. Walsh:

The Town of Winchester is updating its *All Hazard Mitigation Plan*. The Plan, which was completed in 2007, documents the various potential natural disasters that could impact Winchester, as well as actions the Town is taking to reduce or mitigate them. Some of these include flooding, winter storms, and earthquakes.

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Sincerely,

Matt Shuman, P.E.
Assistant Town Engineer

TOWN OF WINCHESTER
71 MT. VERNON STREET, WINCHESTER, MA
DEPARTMENT OF ENGINEERING & PLANNING
ENGINEERING DIVISION
PHONE 781-721-7120 / FAX 781-721-7166

February 6, 2012

Steven Shea
Winchester Hospital
Via e-mail: sshea@winhosp.org

Dear Mr. Shea:

The Town of Winchester is updating its *All Hazard Mitigation Plan*. The Plan, which was completed in 2007, documents the various potential natural disasters that could impact Winchester, as well as actions the Town is taking to reduce or mitigate them. Some of these include flooding, winter storms, and earthquakes.

Various department staff, including representatives from public safety, public works, the Conservation Commission, the Building Department, and the Board of Health, has formed a working group to update the plan. The Town is seeking additional public participation and comments. I am contacting you because you are a valuable community stakeholder and I hope that you will be able to provide insight and input into the plan.

Monthly working group meetings have been scheduled on March 2, April 6, and May 4. They will take place at 9:00 at the Winchester Town Hall, 71 Mt. Vernon Street. The intent is to finalize the plan by June, at which point it must be submitted to FEMA for approval.

Please contact me at 781-721-7120 and let me know if you can attend any of the meetings. I would be happy to forward you a copy of the current plan and discuss any comments or ideas you may have.

Sincerely,

Matt Shuman, P.E.
Assistant Town Engineer

# Appendix C:
# Compilation of Plan Updates

# All Hazard Mitigation Plan – Compilation of Plan Updates

| Plan Section | Summary of Changes |
|---|---|
| Section 1.1 | No change. |
| Section 1.2 | Summarized changes made to the plan during this review and updated the Community Planning Team member list. |
| Section 1.3 | A minor change was made to goal (10) regarding historic resources. |
| | |
| Section 2.1 | Updated demographic data with 2010 Census information. |
| Section 2.2 | Updated land use data with 2005 land use information available from MassGIS. |
| Section 2.3 | Updated critical infrastructure information, particularly day care facilities. |
| Section 2.4 | Updated repetitive loss properties with new information provided by FEMA. General areas of loss were shown on Figure 2-6, as opposed to specific property locations in accordance with privacy restrictions. This section was updated based review comments made by FEMA. |
| Section 2.5 | Updates were made to the status of the potentially developable lands identified in the 2007 plan. |
| | |
| Section 3.1 | An updated risk analysis and vulnerability assessment was completed. This included identification of five categories of hazards in accordance with the categories established in the state mitigation plan. |
| Section 3.2 | The evaluation of flood-related hazards in Winchester was updated to reflect the changes to the flooding history since the plan was written in 2007. An extensive update to the existing mitigation strategies for riverine flooding and dam breaches was also provided. Figure 3-1 was updated to show the revised floodplain information based on new Flood Insurance Rate Maps (FIRMs) issued by FEMA in June 2010. General changes were made to this section based on review comments from FEMA. Section 3.2.4 was updated regarding the future improvements at |

| | |
|---|---|
| | the South Reservoir Dam Low Level Outlet. |
| Section 3.3 | Section 3.3 was updated to provide an evaluation of atmospheric-related hazards. This replaced the previous section on wind-related hazards in the 2007 plan. The existing and future mitigation strategies for this hazard category are provided. Additional information on tornado intensity scale was added based on comments from FEMA. |
| Section 3.4 | The previous section "Fire-Related Hazards" was replaced with a new section on "Winter-Related Hazards" in accordance with the reclassification of hazards using the model provided in the state mitigation plan. This section included an evaluation of risk, existing mitigation strategies, and potential mitigation enhancements. |
| Section 3.5 | The section on "Geologic Hazards" was updated specifically for landslides and earthquakes. Additional information on the Richter scale was added at the request of FEMA. |
| Section 3.6 | The section on "Other Hazards" was updated specifically for the following identified hazards: urban fires, wildfires, drought, and extreme temperature. This section was updated based on review comments from FEMA. |
| Section 3.7 | This section was added in response to comments received from MEMA in spring 2013. |
| | |
| Section 4.0 | This section was updated to include any changes to the regional activities that Winchester participates in with respect to hazard mitigation activities. |
| | |
| Section 5.0 | This section was updated based on review comments from FEMA. |

# Appendix D:

# Status of 2007 Existing & Proposed Hazard Mitigation Actions

# Appendix D - Status of 2007 Existing & Proposed Hazard Mitigation Actions

| Existing (2007) Strategy | Status | Proposed (2007) Strategy | Status |
|---|---|---|---|
| **Flood-related Hazards** | | | |
| Aberjona River Improvements | MEPA permitting complete, construction complete on Projects 1, 2, 3, & 7. Construction on Project 4 to begin Summer 2015. | Aberjona River Improvements | MEPA permitting complete, construction complete on Projects 1, 2, 3, & 7. Construction on Project 4 to begin Summer 2015. |
| Regional Flood Coordination | Coordination with City of Woburn is on-going in the period leading up to and during large precipitation events. | Localized Drainage Improvements | (1) Tufts Rd/Chester St - Completed in 2007. (2) Winter Pond Diversion - Study completed in 2008. Feasibilty of proposed project discounted due to permitting & water quality concerns. (3) Glen Rd/Glen Green - Completed in 2007. (4) Trash rack repairs - West Side Field work completed in 2008, all other locations put on hold in favor of increased maintenance. (5) New Meadows & Thornton Rd - Completed in 2006. (6) Pocahontas Dr - Completed in 2006. (7) Cross St - Completed in 2005, (8) Lockeland Rd/High St - Completed in 2006. |
| Policy-related Strategies | Continue to follow NFIP & Wetland Protection Act requirements. | | |
| Localized Drainage Improvements | Drainage system maintenance on-going. Phase III Drainage Improvement Program complete. | | |
| Emergency Response | Emergency planning and response procedures outlined in CEM Plan followed. | | |
| Phase II Stormwater | EPA released draft permit in fall 2014. Final permit is expected to be issued in 2016. Winchester continues to implement the 2003 permit requirements until the new permit is issued. | Other Measures | (1) Development of more stringent standards for buildings within the floodplain as compared to State Building Code - No action. It was determined that the existing building code requirements were adequate. |

| Existing (2007) Strategy | Status | Proposed (2007) Strategy | Status |
|---|---|---|---|
| | | Other Measures (cont'd) | (2) Increased public ed & outreach re: dam breaches - Winchester Hospital was included on the Planning Team for the 2012 AHMP update and in the CEM plan. The hospital is located within the breach area for the North Reservoir. |
| | | | (3) Increased public water supply protection - The Water Department & Board of Health have installed improved signage within the Town-owned water supply lands to discourage humans and dogs from entering the |
| **Wind-related Hazards** | | | |
| Adherence to State Building Code for all new construction. | Town continues to enforce State Building Code requirements. | Move existing utilities underground along major roadways. | No progress has been made since the 2007 AHMP. Funding has not been approved by Town Meeting and no grant funding is currently available to assist with this effort. |
| Implementation of the Town's CEM Plan re: preparedness & response to wind-related | Implementation of CEM Plan is on-going. | | |
| Work with utility companies to trim branches near power lines. | DPW coordinates regularly with Nstar regarding tree trimming. | | |
| Placement of power lines underground for new construction. | New subdivisions are required to place utilities underground. Many new single family homes are also choosing to place their services underground. | | |
| **Fire-related Hazards** | | | |
| Review of site plans & subdivisions for adequate fire protection. | On-going by Fire Department | Public Safety building upgrades. | Phase I and II of the building upgrades were completed in 2012. Phase III will be completed in 2015. |
| Review of fire alarm & sprinkler plans. | On-going by Fire Department | Support and advocacy for adoption of enhanced codes for detection suppression in residential settings. | Fire Department has supported code changes at the state level. |
| Testing of fire alarms & sprinkler systems. | On-going by Fire Department | | |

| Existing (2007) Strategy | Status | Proposed (2007) Strategy | Status |
|---|---|---|---|
| Test of municipal hydrants. | On-going by Fire & Water Departments | | |
| Issuance of permits for fire-related hazardous operations. | On-going by Fire Department | | |
| Inspection of occupancies for compliance with State Fire Prevention Regs | On-going by Fire Department | | |
| Implementation of Public Fire & Life Safety Education programs. | On-going by Fire Department | | |
| Training of Fire Dept staff in fire prevention & suppression tactics. | On-going by Fire Department | | |
| **Geologic-related Hazards** | | | |
| CEM Plan outlines responsibilities for earthquake planning & response. | Existing CEM plan includes this material. | Consider assessment of municipal buildings for seismic stability. | Several municipal buildings have been upgraded since the 2007 AHMP, including reconstruction of the Vinson-Owen School and renovation of the WHS. Both projects included upgrades to meet the current seismic codes. |
| Town enforces seismic provisions of state building code. | On-going enforcement by Building Department. | | |
| | | Consider assessment of municipally-owned dams for seismic stability. | Seismic stability reviewed as part of the 2011 dam inspection report for the South Reservoir Dam. |
| **Other Hazards (Man-made)** | | | |
| CEM Plan outlines preparedness and response for man-made hazards, such as civil disturbances, radiological, biological, or chemical releases, terrorism, and hazardous material incidents. | Review of CEM procedures and training is on-going. | Upgrade Public Safety Building | Phase I and II of the building upgrades were completed in 2012. Phase III will be completed in 2015. |

# Appendix E:

# October 15, 2014
# Annual Review Meeting

# All Hazards Mitigation Plan
# Annual Review Meeting
# October 15, 2014 – 10am

(1) Review status of 2012 All Hazards Mitigation Plan

   a. FEMA/MEMA comments

(2) Review of Planning Team membership

(3) Annual update of critical infrastructure

(4) Annual update of future potential developable land

(5) Evaluation of current mitigation strategies and prioritization

   a. Flood-related hazards (riverine flooding, dam failure);

   b. Atmospheric-related hazards (high wind, hurricanes/tropical storms, thunderstorms, tornadoes, nor'easters);

   c. Wind-related hazards (snow and blizzards, ice storms);

   d. Geologic-related hazards (earthquakes, landslides); and

   e. Other hazards (urban fires, wildfires, drought, extreme temperature).

(6) Public input

## Event Details

# ALL HAZARD MITIGATION PLAN ANNUAL MEETING

Wednesday, October 15

Date: October 15, 2014

Time: 10:00 AM - 11:00 AM

Location: Waterfield Room

Address: 71 Mt. Vernon Street, Lower Level
Winchester, MA 01890

Invite Friends

# All Hazards Mitigation Plan – Annual Meeting

# Meeting Minutes – October 15, 2014

**Meeting Attendees:**

| | |
|---|---|
| Beth Rudolph, P.E., Town Engineer | Brian Szekely, Town Planner |
| Matt Haringa, P.E., Assistant Town Engineer | Steve Swymer, DPW Operations Manager |
| Chief John Nash, Fire Department | Sgt. Tom Groux, Safety Officer |
| Jennifer Murphy, Heath Director | Elaine Vreeland, Conservation Administrator |

A meeting of the Winchester Planning Team was convened on October 15, 2014 for the annual review of Winchester's All Hazard Mitigation Plan. Key notes from the meeting are summarized below:

- Town Engineer Beth Rudolph noted that the Engineering Department was still working to finalize the draft plan developed in 2012 based on comments from FEMA and MEMA. It is our plan to have a revised draft submitted by early December.
- The composition of the Planning Team was reviewed. It was noted that there were new staff in the positions of Town Planner and Assistant Town Engineer since the 2012 update. It was also noted that AnneMarie Walsh had taken a new position with NStar. The new contact is Bill Zamparelli.
- The Critical Infrastructure list was reviewed. It was noted that Winchester Hospital's center at 620 Washington Street should be added to the list, and that the Parkhurst School as no longer being used as swing space for the Vinson Owen School as it was during the 2012 – 2013 renovation. The list of day care facilities will be confirmed by the Engineering Department following this meeting.
- A review of Section 2.5.1 Remaining Developable Land was completed. It was noted that the development at the Pansy Patch property (Graystone at Winchester) had been completed since the 2012 plan update. It was also noted that General Foods Corporation was planning close their Woburn plant in 2016. It is unclear at this time what will happen to the property they own in Winchester and Woburn, but as is noted in the Plan, the portion in Winchester is zoned residential.
- The Planning Team conducted a review of the current mitigation strategies and prioritization list. The following comments were made:
    - Riverine flooding – Repairs to the Center Falls Dam and Main Street bridge were completed in 2013.

- Dam Failures – Repairs to the East Dike were completed in 2011. The Town is also in the process of completing the final design for repairs to the Low Level Outlet at the South Reservoir. We will be seeking money for construction at the Fall 2014 Town Meeting.
- Atmospheric Related Hazards – It was noted that the Town's CEM plan is scheduled for an update in 2015.
- Winter Related Hazards – It was stated that the Ambrose School is the designated emergency shelter, though the Town prefers to rely on state resources were possible due to costs associated with opening a local emergency shelter.
- Other Hazards – It was noted that the Jenks Center is used as a cooling station during periods of extreme heat.
- The Fire Chief noted that the Town had recently implemented "Winchester AWARE", which is an emergency notification system used to alert residents of emergencies and other important community news, including severe weather, fires, floods, unexpected road closures, or evacuations. It allows residents or business owners to receive notifications via email; home, business, or cell phone; text messages, etc.

Minutes recorded by Beth Rudolph, Town Engineer