

## **VII. POTENTIAL MITIGATION MEASURES**

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### **What is Hazard Mitigation?**

Hazard mitigation means to permanently reduce or alleviate the losses of life, injuries and property damage resulting from natural and human-made hazards through long-term strategies. These long-term strategies include planning, policy changes, programs, projects and other activities. FEMA currently has three mitigation grant programs: the Hazards Mitigation Grant Program (HMGP), the Pre-Disaster Mitigation program (PDM), and the Flood Mitigation Assistance (FMA) program. See <http://www.fema.gov/government/grant/government.shtm> for more information.

### **Identification and Prioritization of Potential Mitigation Measures**

During the local hazard mitigation team meetings, officials in Concord determined possible mitigation measures for the various natural hazards that have impacted or could impact the town. In addition, MAPC solicited suggestions for mitigation measures when it collected hazard information from town officials and from other town plans and studies. MAPC compiled all suggested strategies into a matrix.

MAPC staff attended the FEMA Benefit-Cost Analysis Training Course on October 31-November 1, 2005 and on November 15, 2007. Information from this training was shared with local officials in order to help them understand the role of a benefit/cost analysis in developing and evaluating potential mitigation projects.

Local officials then prioritized the measures using the matrix. Prior to choosing priorities, participants reviewed the project Goals and STAPLEE evaluation considerations, such as:

- The number of homes and businesses affected by the hazard
- Whether or not road closures occurred and what impact closures had on delivery of emergency services and the local economy
- Whether any environmental constraints existed
- Is there political support and public support to implement the mitigation measures?
- Can the town provide the necessary maintenance when the mitigation measure is completed?
- Does the cost seem reasonable when considering the size of the problem and likely benefits from mitigation?

The breakdown of high and medium priority measures, along with measures to ensure ongoing compliance with NFIP and other possible measures, is provided in the discussions below and summarized in Table 15.

## **High Priority Mitigation Measures**

### ***A. Drainage Improvements to the Cambridge Turnpike***

Alleviating the flooding, roadway closures and damage to the 2-mile stretch of the Cambridge Turnpike is a high priority for the town. Although drainage system upgrades and/or raising the roadway elevation would be expensive, the long-term savings in road repairs, safety, and emergency access could outweigh the costs.

### ***B. Establish Ability to Have a Portable Generator for the Town***

Several critical town facilities do not have an adequate generator for use in the event of a power outage. The Police and Fire Stations have a backup generator, but it runs on natural gas and would be inoperable in the event that the gas system were to go down. The designated community shelter at the high school does not have a generator at all. A priority for the town is to have the ability to use a portable generator for the various critical facilities in need. This would require installing connections on the facilities and would require mounting a generator on a trailer.

### ***C. Identify Options for Alternate Community Sheltering***

Another priority for the town is to identify alternate options for community sheltering, for both residents and non-traditional groups. The high school provides shelter, but it does not have a generator. The town also must coordinate options for shelters for the elderly, Emerson hospital, the prisons, and even farm animals. Not only will sheltering be important, but also transport of these non-traditional groups.

### ***D. Upgrades to Bridges that have Weight Restrictions***

The town of Concord has many bridges that cross the numerous waterways throughout the town. Many of these bridges are older structures that are not rated for the weights of the emergency vehicles such as fire trucks. As a result, the Fire Department must take alternate routes around these bridges to reach an emergency situation that can be a detour of up to 3 miles. This greatly hinders the emergency response efficiency for a natural hazard or any other emergency. The three bridges of greatest concern are as follows. Please note the numbers in parentheses refer to the Areas of Concern located on map 8 in Appendix A.

- *Pine Street Bridge (2)* – This bridge adds a two mile detour for emergency vehicles. This bridge is currently being upgraded by the state.
- *Flint's Bridge on Monument Street (26)* – This bridge has a 6 ton rating and a detour of 3 miles. This detour happens approximately 2-3 times per week. This bridge is scheduled for upgrades by the state.
- *Main Street Bridge between Elm & Wood (27)* – This bridge has a 7 ton rating and adds a 2 mile detour. This detour happens several times per week.

***E. Develop Resource for Backup Pump Capacity***

The Lowell Road wastewater pump station is located within floodplain and may be susceptible to infiltrating flows during large storm events, thus requiring a greater pump capacity to maintain wastewater services to important sections of the town. A priority for the town is to develop a backup resource pump for this site in order to avoid sewer failures during storm events. Options could include a rental backup pump, or a shared backup pump.

**Measures to Ensure Compliance with the National Flood Insurance Program**

***F. Continuation of Open Space Protection and Land Acquisition***

Although Concord already has a significant amount of protected land, further protection of open space in the wake of development is important in order to ensure future development does not increase vulnerability to natural hazards, such as flooding. The town should continue its efforts for open space protection and purchases as prioritized in the Open Space Plan, Long-Range plan, and Community Preservation Plan.

***G. Regulatory Revisions for Stormwater Management***

The current subdivision and site plan requirements do have basic standards for stormwater management, but they could be updated to reflect more current trends to help prevent flooding from new development and redevelopment. In particular, the regulations should include:

Requirements for aggressive and legally-binding operation and maintenance agreements, with enforcement mechanisms, for private drainage facilities.

Regulatory controls to encourage Low-Impact Development (LID) practices.

**Medium Priority Mitigation Measures**

***H. Update Hazardous Material Response Plan***

Concord is home to Route 2, rail lines, Hanscom Air Force Base and several other facilities that have the ability to release hazardous materials. Inclement weather could increase the chance of a chemical spill, which falls into the responsibility of the town's public works and emergency responders. The town already has a hazardous materials response plan, but it needs to update the plan to reflect the most current conditions and latest technologies.

***I. Assessment of Historic Structure Natural Hazard Vulnerability***

Building upon the town's database of historic structures, a complete analysis should be performed to determine the vulnerability of each structure to flooding, wind, snow, ice, earthquakes, and fire. Many of the buildings are located in flood zones, are not up to

earthquake or fire codes, or are susceptible to damage from high wind events. Techniques for mitigation should be determined, such as flood proofing of structures.

***J. Identify Potential back-up sites for Emergency Operations***

The Fire and Police Stations and Emergency Operation Center were all renovated in the 1990s, but the original building structures are from the 1950s and not likely to survive a higher magnitude earthquake. The town should identify potential backup sites for emergency operations in the event of an earthquake. These sites would need to accommodate services such as dispatching, communications and garaging of apparatuses.

**Other Potential Mitigation Measures**

A number of additional mitigation measures arose during the course of the project. These additional measures were either considered to be a low priority, a better alternative was deemed a medium or high priority, or they were not considered feasible. However, it is worth recording them in the plan, because they could be revisited in the future. They include:

***K. Assessment of Municipal Structures for Susceptibly to Snow Loads***

The town owns structures that may not be able to withstand snow loads during extreme conditions. A specific location of concern is at the Annursnac Hill Reservoir building. A priority for the town is to provide an assessment of those facilities that are at risk for collapses from snow loads, and what the best mitigation would be. In some cases the solution may be a structural retrofit, but in other cases it may just be a matter of knowing which buildings to clear snow from.

***L. Become Fully "Storm Ready"***

The town aims to become "storm ready" with respect to its alerting systems. One possible method that the town is currently investigating is notification via television. By subscribing to a service, the town would have the ability to overwrite any TV programming to alert residents of an impending emergency or bad weather.

## **Potential Mitigation Summary Table**

The following columns are included in the summary table:

Description of the Mitigation Measure – Brief description of each mitigation measure.

Priority – The designation of high, medium or other priority was determined by the Local Multiple Hazard Community Planning Team meeting. The designations could change as conditions in the community change. In some cases only the high and medium priority measures are provided in the table. In determining project priorities, the local team considered potential benefits and project costs.

Lead Implementation – MAPC designated implementation responsibility based on general knowledge of the community. 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. In some cases, a non-local entity would ideally be the lead implementer.

Time Frame – The time frame 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. The identification of a likely time frame is not meant to constrain a community from taking advantage of funding opportunities as they arise. “Short-term” is an item that generally would not take more than a year or two to complete, and could conceivably occur within the 5 years of this plan. “Long-term” is a project that will could take more than one to two years to complete, and may not be completed within the five years of this plan.

Estimated Cost – The cost data are estimates that 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. Cost information is approximate only and is either provided by the community or from MAPC staff experience.

Potential Funding Sources – This column attempts to identify possible sources of funding for a specific measure. This information is preliminary and varies depending on a number of factors such as whether a mitigation measure has been studied, evaluated or designed or is still in the conceptual stages. Each grant program and agency has specific eligibility requirements that would need to be taken into consideration. In most instances, the measure will require a number of different funding sources. Identification of a potential funding source in this table does not guarantee that a project will be eligible for or selected for funding. Upon adoption of this plan, the local committee responsible for its implementation should begin to explore the funding sources in more detail.

The best way to determine eligibility for a particular funding source is to review the project with the funding agency. The following websites provide an overview of programs and funding sources.

Army Corps of Engineers (ACOE) – The website for the North Atlantic district office is <http://www.nae.usace.army.mil/>. The ACOE provides assistance for a number of types of projects including shoreline/streambank protection, flood damage reduction, flood plain management services and planning services.

FEMA – As noted earlier, see <http://www.fema.gov/government/grant/government.shtm> for more information.

Massachusetts Emergency Management Agency (MEMA) – The grants page <http://www.mass.gov/dem/programs/mitigate/grants.htm> has a useful table that compares eligible projects for the Hazard Mitigation Grant Program and the Flood Mitigation Assistance Program.

United States Department of Agriculture – The USDA has programs by which communities can get grants for fire fighting needs. See the link below for examples. <http://www.rurdev.usda.gov/rhs/>

**Table 15: Potential Mitigation Measures in Concord**

Mitigation Measure	Priority	Lead Implementation	Time Frame	Estimated Cost Range	Potential Funding Sources
<b>High Priority Mitigation Measures</b>					
A. Drainage Improvements to the Cambridge Turnpike	High	Public Works	Long-Term	\$5-10 million	MHD, Town, FEMA
B. Establish Ability to Have a Portable Generator for the Town	High	Fire Department, Public Works	Short-Term	\$25k-\$75k	Town, FEMA, Public Safety Grants
C. Identify Options for Alternate Community Sheltering	High	Fire Department	Short-term	Town Staff Time or \$5-\$15k for a consultant	Town, FEMA
D. Upgrades to Bridges that have Weight Restrictions	High	Public Works / MHD	Ongoing & Long-Term	\$5-10 million	MHD, Town
E. Develop Resource for Backup Pump Capacity	High	Public Works	Short-Term	\$60-\$80k	Town
<b>Measures to Ensure Compliance with NFIP</b>					
F. Continuation of Open Space Protection and Land Acquisition	NFIP	Natural Resources / Planning	Ongoing	Varies from town staff time to up to \$750k to purchase land	Town, Community Preservation Act Funds, Gifts
G. Regulatory Revisions for Stormwater Management	NFIP	Planning / Natural Resources	Short-Term	Town Staff Time or \$5k-10k for consultant	Town, MET grants, EOE Smart Growth Grants
<b>Medium Priority Mitigation Measures</b>					
H. Update Hazardous Material Response Plan	Medium	Fire Department / Public Works	Short-Term	Town Staff Time or \$5-\$15k for a consultant	Town

**Table 15: Potential Mitigation Measures in Concord**

Mitigation Measure	Priority	Lead Implementation	Time Frame	Estimated Cost Range	Potential Funding Sources
I. Assessment of Historic Structures for Natural Hazard Vulnerability	Medium	Fire Department / Public Works / Building	Short-Term	Town Staff Time or \$10k-20k for consultant	Town, FEMA
J. Identify Potential back-up sites for Emergency Operations	Medium	Fire Department / Police Department	Short-term	Town Staff Time or \$5k-15k for consultant	Town, FEMA
<b>Other Mitigation Measures</b>					
K. Assessment of Municipal Structures for Susceptibility to Snow Loads	Other	Public Works / Building	Short-Term	Town Staff Time or \$2k-5k for consultant	Town, FEMA
L. Become Fully "Storm Ready" / TV alert notification	Other	Fire Department	Short-Term	\$5k-\$15k	Town or Public Safety Grants

**Abbreviations Summary**

FEMA Mitigation Grants:

- FMA Flood Mitigation Assistance Program
- HMGP Hazard Mitigation Grant Program
- PDM Pre-Disaster Mitigation Program
- RFC Repetitive Flood Claims
- SRL Severe Repetitive Loss

Other Potential Funding Sources:

- ACOE Army Corps of Engineers.
- CMRP Commonwealth of Massachusetts Riverways Program
- DCR Department of Conservation and Recreation
- DEP Massachusetts Department of Environmental Protection  
(SRF) Clean Water State Revolving Fund  
(NPS) Nonpoint Source Grant Program
- DHS Department of Homeland Security/Emergency Operations
- EEA Massachusetts Executive Office of Energy and Environmental Affairs
- EOT Executive Office of Transportation
- MET Massachusetts Environmental Trust
- MHD Massachusetts Highway Department.
- USDA United States Department of Agriculture