



## Chapter 6: Mitigation Strategies

This section of the Plan describes the most challenging part of any such planning effort – the development of a Mitigation Strategy. It is a process of:

1. Setting mitigation goals;
2. Considering mitigation alternatives;
3. Identifying objectives and strategies; and
4. Developing a mitigation action plan.

In being comprehensive, the development of the strategy included a thorough review of all natural hazards and identified far-reaching policies and projects intended to not only reduce the future impacts of hazards, but also to assist counties and municipalities to achieve compatible economic, environmental, and social goals. In being strategic, the development of the strategy ensures that all policies and projects are linked to established priorities and assigned to specific departments or individuals responsible for their implementation with target completion deadlines. When necessary, funding sources are identified that can be used to assist in project implementation.

For the 2010 update, the regional goals, objectives, and strategies were re-examined by the committee and jurisdictions and new goals and strategies were included in this section of the plan update. Local jurisdiction strategies are included in Chapter 7.

### I. Planning Process for Setting Mitigation Goals

The hazard mitigation planning process conducted by the MAC is a typical problem-solving methodology:

- Describe the problem (Hazard Identification);
- Estimate the impacts the problem could cause (Vulnerability Assessment);
- Assess what safeguards exist that might already or could potentially lessen those impacts (Capability Assessment); and
- Using this information, determine what, if anything, can be done, and select those actions that are appropriate for the community in question (Develop an Action Plan).

When a community decides that certain risks are unacceptable and that certain mitigation actions may be achievable, the development of *goals* and *objectives* takes place. Goals and objectives help to describe what actions should occur, using increasingly narrow descriptors. Initially, long-term and general statements known as broad-based goals are developed. Goals then are accomplished by meeting objectives, which are specific and achievable in a finite time period. In most cases there is a third level, called *strategies*, which are detailed and specific methods to meet the objectives.

The MAC discussed regional goals and objectives for this plan at two points in the planning process. First, they attended a workshop on July 12, 2010, to discuss the results of the HIRAs and to begin developing the mitigation strategy by discussing the 2006 mitigation goals. These original goals were broad and applicable to the region and the committee felt that in general, they



still were applicable to the 2010 plan update. Then, during the final hazard identification and risk assessment presentation on October 18, 2010, the committee finalized the regional goals and developed one regional strategy per goal. This process was completed by looking at the jurisdiction-specific actions and the regional goals, and determining from there the type of objectives that would be the most logical extension.

Following the development of the regional goals, jurisdictional meetings were conducted during the months of September and early October 2010. During these separate jurisdictional meetings, the HIRA was presented to the attendees, and then strategies, or actions, were developed specific to each jurisdiction. Most of these actions are dynamic and can change and have been organized into a Mitigation Action Plan for the Region and its member jurisdictions.

Data collection supports the goals and recommended actions in two ways. First, the HIRA data identifies areas exposed to hazards, at-risk critical facilities, and future development at risk. Second, the Capability Assessment data identifies areas for integration of hazard mitigation into existing polices and plans.

The MAC members used the results of the data collection efforts to develop goals and prioritize actions for the region and their jurisdiction. The priorities differ somewhat from jurisdiction to jurisdiction. Each jurisdiction's priorities were developed based on past damages, existing exposure to risk, other community goals, and weaknesses identified by the local government capability assessments.

## II. Considering Mitigation Alternatives

During the separate jurisdictional meetings that occurred between September and early October 2010, members of each jurisdiction were presented with the HIRA findings. Discussions held during the meeting resulted in the generation of a range of potential mitigation goals and actions to address the hazards. A range of alternatives were then identified and prioritized by each jurisdiction. These alternatives are presented in Chapter 7.

### A. Identification and Analysis of Mitigation Techniques

In formulating Northern Virginia's mitigation strategy, a wide range of activities were considered in order to help achieve the general regional goals in addition to the specific hazard concerns of each participating jurisdiction. This includes the following activities as recommended by the Emergency Management Accreditation Program<sup>37</sup> (EMAP):

- 1) The use of applicable building construction standards;
- 2) Hazard avoidance through appropriate land-use practices;
- 3) Relocation, retrofitting, or removal of structures at risk;
- 4) Removal or elimination of the hazard;
- 5) Reduction or limitation of the amount or size of the hazard;
- 6) Segregation of the hazard from that which is to be protected;
- 7) Modification of the basic characteristics of the hazard;
- 8) Control of the rate of release of the hazard;
- 9) Provision of protective systems or equipment for both cyber or physical risks;
- 10) Establishment of hazard warning and communication procedures; and



- 11) Redundancy or duplication of essential personnel, critical systems, equipment, and information materials.

All activities considered by the MAC can be classified under one of the following six (6) broad categories of mitigation techniques:

#### *Prevention*

Preventative activities are intended to keep hazard problems from getting worse, and are typically administered through government programs or regulatory actions that influence the way land is developed and buildings are built. They are particularly effective in reducing a community's future vulnerability, especially in areas where development has not occurred or capital improvements have not been substantial. Examples of preventative activities include:

- Planning and zoning;
- Building codes;
- Open space preservation;
- Floodplain regulations;
- Stormwater management regulations;
- Drainage system maintenance;
- Capital improvements programming; and
- Shoreline / riverine / fault zone setbacks.

#### *Property Protection*

Property protection measures involve the modification of existing buildings and structures to help them better withstand the forces of a hazard, or removal of the structures from hazardous locations. Examples include:

- Acquisition;
- Relocation;
- Building elevation;
- Critical facilities protection;
- Retrofitting (e.g., windproofing, floodproofing, seismic design techniques, etc.);
- Safe rooms, shutters, shatter-resistant glass; and
- Insurance.

#### *Natural Resource Protection*

Natural resource protection activities reduce the impact of natural hazards by preserving or restoring natural areas and their protective functions. Such areas include floodplains, wetlands, steep slopes, and sand dunes. Parks, recreation, or conservation agencies and organizations often implement these protective measures. Examples include:

- Floodplain protection;
- Watershed management;
- Beach and dune preservation;
- Riparian buffers;
- Forest/vegetation management (e.g., fire resistant landscaping, fuel breaks, etc.);
- Erosion and sediment control;
- Wetland preservation and restoration;
- Habitat preservation; and



- Slope stabilization,

### *Structural Projects*

Structural mitigation projects are intended to lessen the impact of a hazard by modifying the environmental natural progression of the hazard event through construction. They are usually designed by engineers and managed or maintained by public works staff. Examples include:

- Reservoirs;
- Dams / levees / dikes / floodwalls / seawalls;
- Diversions / detention / retention;
- Channel modification;
- Beach nourishment; and
- Storm sewers.

### *Emergency Services*

Although not typically considered a “mitigation” technique, emergency service measures do minimize the impact of a hazard event on people and property. These commonly are actions taken immediately prior to, during, or in response to a hazard event. Examples include:

- Warning systems;
- Evacuation planning and management;
- Emergency response training and exercises;
- Sandbagging for flood protection; and
- Installing temporary shutters for wind protection.

### *Public Education and Awareness*

Public education and awareness activities are used to advise residents, elected officials, business owners, potential property buyers, and visitors about hazards, hazardous areas, and mitigation techniques they can use to protect themselves and their property. Examples of measures to educate and inform the public include:

- Outreach projects;
- Speaker series / demonstration events;
- Hazard map information;
- Real estate disclosure;
- Library materials;
- School children educational programs; and
- Hazard expositions.

## **B. Prioritizing Alternatives**

Through discussion and self analysis, each jurisdiction used the STAPLE/E (Social, Technical, Administrative, Political, Legal, Economic, and Environmental) Criteria when considering and prioritizing the most appropriate mitigation alternatives for the Region’s communities. This methodology requires that social, technical, administrative, political, legal, economic, and environmental considerations be taken into account when reviewing potential actions for the area’s jurisdictions to undertake. This process was used to help ensure that the most equitable and feasible actions would be undertaken based on a jurisdiction’s capabilities.



Table 6.1, below, provides information regarding the review and selection criteria for alternatives.

<b>Table 6.1. STAPLE/E Review and Selection Criteria for Alternatives</b>	
<b>Social</b>	
<ul style="list-style-type: none"> <li>▪ Is the proposed action socially acceptable to the community(s)?</li> <li>▪ Are there equity issues involved that would mean that one segment of a community is treated unfairly?</li> <li>▪ Will the action cause social disruption?</li> </ul>	
<b>Technical</b>	
<ul style="list-style-type: none"> <li>▪ Will the proposed action work?</li> <li>▪ Will it create more problems than it solves?</li> <li>▪ Does it solve a problem or only a symptom?</li> <li>▪ Is it the most useful action in light of other community(s) goals?</li> </ul>	
<b>Administrative</b>	
<ul style="list-style-type: none"> <li>▪ Can the community(s) implement the action?</li> <li>▪ Is there someone to coordinate and lead the effort?</li> <li>▪ Is there sufficient funding, staff, and technical support available?</li> <li>▪ Are there ongoing administrative requirements that need to be met?</li> </ul>	
<b>Political</b>	
<ul style="list-style-type: none"> <li>▪ Is the action politically acceptable?</li> <li>▪ Is there public support both to implement and to maintain the project?</li> </ul>	
<b>Legal</b>	
<ul style="list-style-type: none"> <li>▪ Is the community(s) authorized to implement the proposed action? Is there a clear legal basis or precedent for this activity?</li> <li>▪ Are there legal side effects? Could the activity be construed as a taking?</li> <li>▪ Is the proposed action allowed by a comprehensive plan, or must a comprehensive plan be amended to allow the proposed action?</li> <li>▪ Will the community(s) be liable for action or lack of action?</li> <li>▪ Will the activity be challenged?</li> </ul>	
<b>Economic</b>	
<ul style="list-style-type: none"> <li>▪ What are the costs and benefits of this action?</li> <li>▪ Do the benefits exceed the costs?</li> <li>▪ Are initial, maintenance, and administrative costs taken into account?</li> <li>▪ Has funding been secured for the proposed action? If not, what are the potential funding sources (public, non-profit, and private)?</li> <li>▪ How will this action affect the fiscal capability of the community(s)?</li> <li>▪ What burden will this action place on the tax base or local economy?</li> <li>▪ What are the budget and revenue effects of this activity?</li> <li>▪ Does the action contribute to other community goals, such as capital improvements or economic development?</li> <li>▪ What benefits will the action provide?</li> </ul>	
<b>Environmental</b>	
<ul style="list-style-type: none"> <li>▪ How will the action affect the environment?</li> <li>• Will the action need environmental regulatory approvals?</li> <li>• Will it meet local and state regulatory requirements?</li> </ul>	

**Table 6.1. STAPLE/E Review and Selection Criteria for Alternatives**

- Are endangered or threatened species likely to be affected?

Ranking was completed in order of relative priority based on the STAPLE/E criteria, as well as the strategy's potential to reduce vulnerability to natural hazards.

### III. Identifying Objectives and Strategies

#### A. Goals and Strategies

Through a series of jurisdictional meetings, the following goals and strategies for the region were accepted by the MAC. The goals and strategies form the basis for the development of a Mitigation Action Plan and specific mitigation projects to be considered for the Region. The process consisted of 1) setting goals, 2) considering mitigation alternatives, 3) identifying strategies, and 4) developing an action plan resulting in a mitigation strategy.

Community officials should consider the goals that follow before making community policies, public investment programs, economic development programs, or community development decisions for their communities. In addition, Regional strategies have been developed for each goal. These strategies state a more specific outcome that the jurisdictions of the Northern Virginia region expect to accomplish over the next five years. The strategies will outline the specific steps necessary to achieve that end.

#### *Regional Goals and Strategies*

- Goal 1: Improve the quality and utilization of best available data for conducting detailed hazard risk assessments and preparing meaningful mitigation action plans.
- Goal 2: Increase the capability of the Northern Virginia jurisdictions to successfully mitigate hazards to include participation in grant programs, revision of codes, expansion of programs such as the Community Rating System, and continuation or expansion of outreach programs.
- Goal 3: Develop and maintain specific plans to minimize the effects of known hazards in the region.
- Goal 4: Improve existing local policies, codes, and regulations to reduce or eliminate the impacts of known hazards. This includes maintaining continued compliance with the NFIP for all participating jurisdictions.
- Goal 5: Investigate and implement a range of structural projects that will reduce the effects of natural and human-caused hazards on public and private property throughout the region.
- Goal 6: Increase the public's awareness of natural and human-caused hazard risks in the Northern Virginia region, while also educating residents and businesses on the mitigation measures available to minimize those risks.

The previous regional strategy from the 2006 plan stated: Coordinate with participating local jurisdictions on the acquisition and/or development of improved GIS data layers for use in conducting enhanced risk assessment studies for future updates to the Northern Virginia Regional Hazard Mitigation Plan, in a continuing effort within the region. The region has



successfully increased is GIS capacity over the last five years and each community has coordinated with each other to ensure dataset synergies where appropriate.



Agency/Department: Mitigation Action	Lead Agency Department Organization	Flood	Winter Weather	Thunderstorm	Tornado	Hurricane	Drought	Wildfire	Earthquake	Extreme Temps	Dam Failure	Erosion	Landslides	Karst	Human-Caused	Funding Source	Target Completion Date	Interim Measure of Success	Priority
Develop an improved critical facility dataset to use in emergency planning efforts and the 2016 mitigation plan update.	Northern Virginia Emergency Managers Committee	X	X	X	X	X	X	X	X	X	X	X	X	X	X	EMPG Funds HMGP 7% PDM Planning Other DHS funds.	June 2016	Define critical facility and identify which DHS category will be included in dataset by June 2012	Critical
Coordinate with VDEM on obtaining funding opportunities to implement jurisdiction strategies.	Northern Virginia Emergency Managers Committee	X	X	X	X	X	X	X	X	X	X	X	X	X	X	N/A	June 2016	Identify at least two funding sources by June 2011	High
Conduct a regional commodity flow study and develop recommendations from these studies to implement effective mitigation actions.	Fairfax County Office of Emergency Management														X	EMPG DHS SARA Title II (EPA)	January 2014	Secure funding by June 2011	High
Educate elected officials and residents on the importance of the NFIP.	Jurisdictional Offices of Emergency Management	X		X		X										HMGP 5% Initiative Projects	June 2016	Develop informational memorandums to disseminate by June 2012	High
Acquire, elevate, retrofit properties located in the floodplain per local jurisdiction plans.	Jurisdictional Offices of Emergency Management	X		X		X										FEMA HMA Programs	June 2016	Acquire, elevate, and/or retrofit at least 3 properties per year in the region.	High
Update, print and distribute "NOVA EM Prep Guide" and include mitigation.	Loudoun County Office of Emergency Management	X	X	X	X	X	X	X	X	X	X	X	X	X	X	EMPG HMGP 5% Initiative Projects	January 2012	Update the guide by June 2011	High



### *Local Mitigation Strategies*

In formulating a mitigation strategy, a wide range of activities was considered in order to help achieve the goals and to lessen the vulnerability of the Northern Virginia area to the effects of natural hazards. Through a series of jurisdictional meetings, conference calls, and e-mail exchanges from August through December 2010, all of the jurisdictions (county, cities, and towns) participated in the development and review of the local mitigation strategy.

Strategies were ranked by each community. Ranking was completed in order of relative priority based on the STAPLE/E criteria, as well as the strategy's potential to reduce vulnerability to natural hazards. Actions were given a ranking of high, medium, or low, with the following meanings:

- High (H) – actions should be implemented in the short-term
- Medium (M) – actions should be implemented in the long-term
- Low (L) – actions should be implemented only as funding becomes available

When deciding on which strategies should receive priority in implementation, the communities considered:

- Time – Can the strategy be implemented quickly?
- Ease to implement – How easy is the strategy to implement? Will it require many financial or staff resources?
- Effectiveness – Will the strategy be highly effective in reducing risk?
- Lifespan – How long will the effects of the strategy be in place?
- Hazards – Does the strategy address a high priority hazard or does it address multiple hazards?
- Post-disaster implementation – Is this strategy easier to implement in a post-disaster environment?

In addition, the anticipated level of cost effectiveness of each measure was a primary consideration when developing mitigation actions. Because mitigation is an investment to reduce future damages, it is important to select measures for which the reduced damages over the life of the measure are likely to be greater than the project cost. For structural measures, the level of cost effectiveness is primarily based on the likelihood of damages occurring in the future, the severity of the damages when they occur, and the level of effectiveness of the selected measure. Although detailed analysis was not conducted during the mitigation action development process, these factors were of primary concern when selecting measures. For those measures that do not result in a quantifiable reduction of damages, such as public education and outreach, the relationship of the probable future benefits and the cost of each measure was considered when developing the mitigation actions. Each jurisdiction's mitigation strategy can be found in Chapter 7 and the status of the 2006 mitigation strategies can be found in Appendix E. Where a strategy's status is blank, updates were unable to be retrieved from the jurisdiction's representative.

Each of the strategies are numbered in the action plans below and listed in order of their prioritization (High, Medium, or Low). When a strategy number includes "(2010)", infers that particular strategy was developed for the 2010 plan update. A number with a "(2006)" after it,



denotes that that particular action was carried forward from the 2006 plan (utilizing the 2006 numbering system) and revised for the 2010 update.