Plan Integration Guide

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PLAN INTEGRATION GUIDE

Introduction

Building safe and smart communities can be accomplished through effective Plan Integration. Plan Integration involves a two-way exchange of information and incorporation of ideas and concepts between Hazard Mitigation Plans (State and local) and other community plans. Specifically, Plan Integration involves the incorporation of hazard mitigation principles and actions into community plans and community planning mechanisms into Hazard Mitigation Plans.

Plan Integration is specific to your community and depends on the vulnerability of your built environment. Community-wide Plan Integration supports risk reduction through various planning and development measures, both before and after a disaster. Plan Integration involves your community's plans, policies, codes, and programs that guide development and the roles of people and government in implementing these capabilities. Successful integration occurs through collaboration among a diverse set of stakeholders in your community.

There are two primary ways to effectively accomplish Plan Integration:

1. Integrate natural hazard information and mitigation policies and principles into local planning mechanisms and vice versa.
    - Include information on natural hazards (past events, potential impacts, and vulnerabilities).
    - Identify hazard-prone areas throughout the community.
    - Develop appropriate goals, objectives, policies, and projects.
2. Encourage collaborative planning and implementation and inter-agency coordination.
    - Involve key community officials who have the authority to execute policies and programs to reduce risk.
    - Collaborate across departments and agencies with key staff to help share knowledge and build relationships that are important to the successful implementation of mitigation activities.

Goal

Effectively integrate plans and policies across disciplines and agencies in your community by considering the potential of hazards as one of the key factors in future development.

Objectives

- Integrate hazard mitigation into areas such as land use, transportation, climate change, sustainability, natural and cultural resource protection, watershed management, and economic development;
- Solicit more participation and provide an opportunity for various departments within local government to work together on a regular basis; and
- Better define the roles of, and improve intergovernmental coordination between planners, emergency managers, engineers, other local government staff, and regional partners in improving disaster resiliency.

Benefits to Your Community

Plan Integration enhances risk reduction through community-wide planning by:

- Improving coordination;
- Developing specific recommendations for integration into community-wide plans;
- Compiling existing plan measures to include in your Hazard Mitigation Plan to illustrate that integration is being performed; and
- Meeting the Local Mitigation Plan Review Tool requirement to integrate hazard mitigation, per Elements A4 and C6.
    - A4. Does the Plan describe the review and incorporation of existing plans, studies, reports, and technical information? (Req. §201.6(b)(3))
    - C6. Does the Plan describe a process by which local governments will integrate the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans, when appropriate? (Req. §201.6(c)(4)(ii))

Plan Integration Guide Organization and Structure

The Plan Integration Guide is a tool developed to help your community analyze local plans to document existing integration and further integrate hazard mitigation principles into local planning mechanisms and vice versa. Any level of government—Federal, State, tribal, or local—should be able to perform Plan Integration. The Guide consists of the following components and includes specific steps to conduct Plan Integration:

Part 1 – Integration of Hazard Mitigation Principles into other Local Planning Mechanisms

1. Collect Documents
2. Review Guide Questions
3. Review Best Practices/Examples

Part 2 – Integration of Hazard Mitigation Principles into Comprehensive Plan Elements

1. Collect Documents
2. Review Guide Questions
3. Review Best Practices/Examples

Part 3 – Integration across Agencies

1. List Agencies/Departments
2. Review Guide Questions
3. Review Best Practices/Examples

The Plan Integration Guide includes instructions, examples, and illustrations to assist in gathering and developing the information necessary from your community for the Plan Integration document.

- **Instructions**, marked by the symbol to the right, are included to guide you through a step-by-step process. These instructions should not appear in the final version.

- **Examples**, marked by the symbol to the right, show how other communities have performed Plan Integration. These examples can be considered as best practices in Plan Integration. They may also be used as sample verbiage for your plans. Examples are contained in gray boxes to separate them from the body of the main text.

- **Illustrations**, marked by the symbol to the right, are provided to assist in developing sections of the Plan Integration document. The language provided may be expanded, deleted, or modified as necessary to fit your community's situation and requirements. Remember to substitute "(insert name of department or agency)" with your community's name throughout the Guide. Illustrations include tables, checklists, or other tools within the Guide that are created to assist in gathering information that could then be summarized. Illustrations are contained in gray boxes to separate them from the body of the main text.

PART 1 – INTEGRATION OF HAZARD MITIGATION PRINCIPLES INTO OTHER LOCAL PLANNING MECHANISMS

Step 1: Collect Documents

Make a list of all relevant and most recent plans and ordinances for your community to review for Plan Integration purposes.

Product: Bulleted list of all relevant documents for review

A list of sample plans and ordinances is included below. This list is not comprehensive so others should be added as necessary:

- Building Code
- Capital Improvement Program and Budget
- Comprehensive Emergency Management Plan
- Continuity of Operations Plan
- Emergency Operations Plan
- Floodplain Ordinance
- Long-Range Transportation Plan
- Parks, Open Space, and Recreation Plan
- Post Disaster Redevelopment Plan
- Stormwater Management Plan
- Subdivision and Land Development Ordinance
- Zoning Ordinance
- Any other relevant plan or ordinance

Step 2: Review Guide Questions

Refer to your plan/ordinance and review and answer relevant Guide questions from Appendix A. The questions, which are ordered by category, will help you identify what to look for in the various documents. Each department should answer the set of questions that are pertinent to them. If the answer is yes, then you are currently performing Plan Integration. Identify where it is addressed and document the page number and section. Also identify any inconsistencies between plans. If the answer is no, you have identified a gap. Make a recommendation to address the potential gap using the examples listed in Step 3.

Product: List of inconsistencies, gaps, and recommendations

Examples

Below are some specific phrases to look for in your plans and ordinances:

- Zoning Ordinance – Zones that limit the density of developments in the floodplain; requirements that floodplains be kept as open space; rezoning procedures that limit zoning changes that allow greater intensity or density of use in natural hazard impact areas.
- Subdivision Ordinance – Requirement of elevation data collection during the platting process; requirements for lots to have buildable space above the base flood elevation; regulations that provide for conservation subdivisions or cluster subdivisions in order to

conserve environmental resources; regulations that allow density transfers in hazard areas.

- Building Code – Requirements for building design standards and enforcement for residential structures to be elevated; requirements for non-residential structure to be elevated or flood-proofed; requirements for wind-resistant construction practices.
- Stormwater Management – Policies that regulate development in upland areas in order to reduce stormwater run-off; requirements for erosion control techniques that may be employed within a watershed area such as proper bank stabilization with sloping, terracing hillsides, installing riprap.
- Post Disaster Recovery Ordinance – Regulations for repair activity, generally depending on property location and requiring citizens to obtain permits for repairs or make repairs using standard methods
- Floodplain Ordinance – Policies that meet minimum Federal and State requirements; adopting more stringent ordinances to reduce risk further; policies to prohibit development within, or filling of, wetlands, floodways, and floodplains.
- Capital Improvement Plan – Decisions to extend roads or utilities to high hazard areas. Budgeting for future infrastructure or facility new construction, rehabilitation, expansion, and/or improvements

Step 3: Review Examples/Best Practices

Review the best practices examples provided in Appendix B for language, format, terminology, etc. This exercise will help you in drafting the recommendations. Included below are a few selected plan types; the list includes only suggestions for consideration and is not intended to be comprehensive. Some hazards are experienced nationwide, while others are location specific. Use the Guide for each document as a starting point, tailor it to the hazards in your area, and modify the language as appropriate.

Product: List of actions/recommendations

For each document that you review, develop the following sections:

- An overview (3–5 sentences), rather than including a complete recap section by section
- Plan strengths
- Options to integrate hazard mitigation principles

The following examples are provided to spark ideas and provide sample language for your community's plans and ordinances.

Best Practice Examples

Examples 1 and 2 are derived from a local Hazard Mitigation Plan and demonstrate how this section can be developed.

Example 1: Master Plan

Overview: The main purpose of the Master Plan is to determine where and how all planned and anticipated construction can be accommodated within a well-defined urban design and open space network and to guide the prioritization of individual projects by suggesting their most appropriate location.

Plan Strengths: The Plan's objective is to determine how much future development can be accommodated through the campus and to establish who and where this growth should be sited. Therefore, this Plan provides an excellent avenue to incorporate general hazard mitigation principles.

Options for Integration of Hazard Mitigation Principles into the Master Plan

- In Plan section (1.1), include a sentence that states "Location in proximity to forested areas and the floodplain."
- Incorporate into the Planning and Design Issues section (1.7): "High hazard areas."
- In Section 1.8 – Facility Master Plan Concept, expand the 1st point to include "The nature of the buildings and open spaces should reflect the existing patterns and work around natural barriers and topography and consider the potential effects of natural hazards such as wildfires and floods."
- Include a reference to the Design Manual, indicating that the location of future structures on campus will conform to design guidelines and be located away from high hazard areas and/or those that are vulnerable to the effects of wind and water.

Example 2: Design Construction Facilities Manual

Overview: The UM Design Criteria/Facility Standards (DCFS) Manual is the document that is used by all campuses of the University of Maryland system, including the UMES uses to guide development at the various campus locations throughout the State. The DCFS include specific guidance and references to many other documents. These Standards and Guidelines are intended to serve as a guide for renovation and new construction projects at the University.

Plan Strengths: A goal identified in the Manual is to create facilities that will last 50-100 years, which should take into consideration, adequate hazard mitigation measures. Therefore, this Manual may serve as a good platform to incorporate mitigation measures and practices into the Campus' long-term development process.

Options for Integration of Hazard Mitigation Principles into the DFCS Manual

- In Section 1.01 (Building Goals and Design Principles), include hazard mitigation as a design principle.
- In Section 1.03 (Codes), include references to FEMA engineering guidelines for shelters.
- In the Mechanical and Electrical Equipment subsection (1.07 F 2), as appropriate, include language-specifying standards for attaching mechanical and electrical equipment to roofs and exteriors.
- Section 2.16 – The University follows the 1990 Maryland Standards and Specifications for Soil Erosion and Sediment Control. Continue to enforce the requirement of sediment and erosion control approval to be obtained from the State Department of the

Environment if more than 5,000 square feet of surface area or more than 100 cubic yards is disturbed to reduce flooding problems related to run-off.

- Section 2.19 – Continue to design and construct stormwater drainage systems to convey the 10-year storm in accordance with the Maryland State Highway standards.
- Modify Section 8.01 (Doors and Frames), Section 8.02 (Glass and Glazing), Section 8.03 (Windows) to include requirements for wind-resistant construction practices.
- Modify Section 15.02 (HVAC) to include requirements to properly secure and raise HVAC systems.
- Add a section to the Manual that discusses sheltering-in-place and include locations and specifications for shelters within the community.

Example 3: Zoning Elements

Overview: The Zoning Ordinance may include hazard specific sections that address flood, earthquake, and wildfire.

Plan Strengths: Transfer of development rights is a zoning-based technique that allows property owners in defined sending areas (natural hazard areas that are downzoned to a lower density) to sell their development rights to property owners in receiving areas (growth areas that are up zoned to a higher density that is permitted only when purchased development rights are applied).

Options for Integration of Hazard Mitigation Principles into the Zoning Ordinance

Flood Zoning:

- Regulations that permit only open space uses within floodplains;
- Setbacks to minimize flood exposure of buildings and provide waterfront buffers, maintain natural vegetation, and limit runoff;
- Non-conforming use regulations that prescribe standards for permissible reconstruction of flood-damaged structures;
- Special-use permits that require development to meet set criteria or conditions to minimize future flooding;
- Prohibiting development within the most hazardous parts of the floodplain (floodway channel) and limiting density (or the amount of obstruction) that can occur in the flood fringe area, which is still within the floodplain but outside of the floodway; and
- Overlay districts that add a separate level of regulation to sensitive areas such as floodplains.

Earthquake Zoning:

- Regulations that prohibit development on soils susceptible to liquefaction;
- Regulations that restrict development near earthquake faults and on steep slopes;
- Non-conforming use regulations that prescribe standards for permissible reconstruction of earthquake-damaged structures;
- Requiring that uses and facilities which are vulnerable to geologic hazards be protected against collapse or severe damage at the time of construction or placement in the zone; and
- Regulations that require development located in high-hazard seismic zones to meet set criteria or building standards to minimize future earth- quake damage.

Wildfire Zoning:

- Regulations that limit development in the wildland-urban interface;

- Setbacks to maintain a defensible buffer between buildings and grasses, trees, shrubs, or any wildland area;
- Special-use permits that require development to meet set criteria or conditions to minimize future wildfire risk;
- Overlay districts that add a separate level of regulation to sensitive areas such as the wildland-urban interface;
- Regulations can reduce residential densities or encourage cluster development patterns in the most vulnerable interfaces; and
- Requirements to use nonflammable building materials, plant fire-resistant vegetation, and construct firebreaks and safety zones around residential areas and public facilities in the urban-wildland interface.

At this point, you should be ready to develop the Plan Integration language to include in your Hazard Mitigation Plan Update. Illustrations 1 through 5 provide directions and include suggested language for specific plans/ordinances. Use this as a guide and modify as necessary.

Illustration 1: State Stormwater Management Guidelines

Overview: Include purpose and goal of the Stormwater Management Guidelines.

Plan Strengths: Summarize the Plan's link to hazard mitigation.

Options for Integration of Hazard Mitigation Principles into the Stormwater Management Guidelines

- *(Insert name of community) will develop a Stormwater Master Plan that would consider low impact development techniques to manage storm water by incorporating techniques such as bio-retention areas, dry wells, infiltration trenches, filter/buffer strips, vegetated swales, rain barrels, and cisterns. This will reduce the impact of flooding in xxx flood-prone areas within the community.*
- *The stormwater impact review processes that is currently established by a review committee comprising staff from the (insert name of State) Department of the Environment, (insert name of County), and (insert name of Town) should be formalized.*

Illustration 2: Emergency Evacuation and Operations Plan

Overview:

The document discusses coordination with the Emergency Operations Plan and other Departmental Emergency Operations Plans as well as coordination with Departmental Health and Safety Plans. (Insert name of community) emergency resources and contacts from various departments are listed as well as expectation for departments and staff. The Plan's appendix includes detailed evacuation procedures for persons with disabilities and procedures for conducting, critiquing, recording, and reporting fire drills.

Plan Strengths**:** List the Plan's strengths.

Options for Integration of Hazard Mitigation Principles into the Emergency Evacuation and Operations Plan (EEOP):

- *The EEOP outlines emergency procedures for fire, bomb threats, chemical spills or release and earthquakes. Emergency procedures for floods should be included in this section since the community is particularly vulnerable to flooding. Procedures would include: moving vital records and essential supplies and equipment to safer areas (from lower floor to upper floor or offsite); shutting off all ignition, heat, and gas sources, etc.*

Note: This would also be covered in a Continuity of Operations Plan.

Illustration 3: Capital Improvement Plan

Overview: *The Master Plan draft identifies 17 capital projects and 11 system funded projects that are slated for construction between 2014 and 2019.The major portion of funding for these projects is from State funds (general obligation bonds).*

Plan Strengths: Insert Plan's strengths and links to hazard mitigation.

Options for Integration of Hazard Mitigation Principles into the Capital Improvement Plan:

- *Emphasize those projects that mitigate the impact of natural hazards and elevate them to high priority projects.*
- *Consider a more unified approach to better integrate efforts between the Master Plan, Hazard Mitigation Plan, Design Manual and CIP by including a staff member who is knowledgeable about hazard mitigation, to be involved in the CIP.*

Illustration 4: State Hazard Mitigation Plan

Overview: The (insert name of State) Hazard Mitigation Plan addresses risks, mitigation capabilities, strategies and actions on a State level. There are a few areas of the State Plan that suggest possible actions on the part of both the State and (insert name of community) that would help to align their mitigation goals and strategies, and would foster cooperation between the groups to advance mitigation efforts.

Note: This illustration shows how a State Hazard Mitigation Plan could be used in the Plan Integration process. The State Plan includes risk information and mitigation strategies for State-owned facilities and provides a roll up for risk and strategies for local communities. In addition to this State Plan, your community may wish to access the regional or local plan that has been developed for your area.

Plan Strengths: Insert State Plan's strengths.

Options for Integration of Hazard Mitigation Principles into the State Hazard Mitigation Plans:

Section *(insert section no.)* of the State Plan states an objective to "identify and explore the implementation of mitigation activities for State-owned facilities that are most at-risk to multiple hazards and most valuable in terms of use and cost." The Plan states that the State should "begin the development of facility specific mitigation actions with the facilities that are at risk from one or more hazards." The strategy related to this objective is for the State to approach the agencies with responsibility for the facilities in order that potential mitigation projects can be included in the 2015 State Plan Update. The numbers in parentheses after the goals refer to sections in the (insert name of State) Plan.

- One of the goals in the State Plan is to have the State Mitigation Planner serve on other boards and committees. (Insert name of community) should continue to invite State mitigation representative to participate in their annual hazard mitigation project update meeting. This would improve understanding of mitigation principles and may improve (insert name of University) opportunities for securing FEMA mitigation grants.
- Expand mitigation education and outreach efforts.
- Undertake and sustain efforts to identify and analyze projects that reduce wind risk to (insert name of University) assets and operations.

Source: Integrating Local Mitigation Plans into Comprehensive Plans – A Guide for Local Officials

Table 1.1 includes specific county plans/ordinances (column A) and the sections from these plans that are included in the Hazard Mitigation Plan (column B). Develop a similar table to show linkages.

Table 1.1: Plan Elements Incorporated into the Hazard Mitigation Plan

Plan Name	Element Incorporated into the Hazard Mitigation Plan
County Emergency Operations Plan	All-hazards approach to event response, evacuation, and recovery
County Comprehensive Plan	Demographic data, land use policies, development trends
County Capital Improvement Plan	Hazard area and critical facility construction
Building Code	Higher standards at the local level than required by States or Federal Government
Zoning Ordinance	Flooding hazards and land use
County Capital Improvements Program	Stormwater projects
Stormwater Management Plan	Public outreach and watershed education

Table 1.2 below helps determine where mitigation plays or does not play a role in the standard daily practice of your jurisdiction. This table should be used to identify which plans are or are not concurrent with one another. For example, based on the illustrations above, the Capital Improvement Plan addresses hazard mitigation principles, as does the State Stormwater Management Guidelines. For plans that are concurrent or integrated, indicate “Y.” For plans that are not integrated, indicate “N.” This will clearly show where you need to focus your future efforts.

Note: Including an action in the mitigation strategy of your Hazard Mitigation Plan to “review and update this table annually” is also beneficial.

Table 1.2: Integrating Hazard Mitigation Principles into Local Planning Mechanisms

Plan/Ordinances	Hazard Mitigation Principles
Disaster Recovery Plan	N
Comprehensive Plan	N
Continuity of Operations Plan	N
Emergency Operations Plan	Y
Long Range Transportation Plan	N
Capital Improvements Program	Y
Zoning Ordinance	N
Subdivision Regulations	N
Building Code	N
Local Stormwater Management Regulations	N
Floodplain Regulations	N
Historic Preservation Plan	N
State Stormwater Management Regulations	Y
State Hazard Mitigation Plan	Y
Other (Tsunami Plan, Volcanic Plan, etc.)	N
Other	
Other	
Other	

Conclusion

Plan Integration is a way to ensure consistency and harmony between the Hazard Mitigation Plan and other local planning mechanisms. It helps identify conflicts and inconsistencies among codes and other ordinances. It provides leveraging opportunities for one planning goal or project to fulfill multiple requirements so that resources are maximized and duplication of efforts is avoided.

This concludes Part 1. At this time you should have:

- Collected relevant documents;
- Reviewed guide questions;
- Reviewed examples of best practices as well as illustrations; and
- Developed opportunities to integrate hazard mitigation into other planning mechanisms.

You are now ready to integrate hazard mitigation principles into comprehensive plan elements.

PART 2 – INTEGRATION OF HAZARD MITIGATION PRINCIPLES INTO COMPREHENSIVE, GENERAL, AND MASTER PLANS

Introduction

Integrating the Hazard Mitigation Plan into the Comprehensive Plan promotes collaboration between planners and emergency managers by ensuring that hazard assessment information is incorporated into future land use and other elements.

Source: FEMA's *Integrating the Natural Hazard Mitigation Plan into a Community's Comprehensive Plan – A Guidebook for Local Governments* May 2013.

Part 2 provides examples of integrating hazard mitigation principles into various elements of the Comprehensive Plan (land use, transportation, housing, disaster preparedness and safety, environmental management, open space and recreation, urban design and retrofit, etc.). Examples of goals and corresponding actions and policies are included. For each plan element, develop goals and policies (less specific) or actions (more specific) to incorporate hazard mitigation principles.

Hazard mitigation principles can be integrated into the Comprehensive Plan through the incorporation of information: 1) into each plan element, 2) as a separate standalone element, or 3) as an annex or appendix to the Comprehensive Plan. Refer to the language below and modify as necessary.

Step 1: Collect Documents

Download and review your community's Comprehensive Plan.

Product: Comprehensive Plan

Step 2: Review Guide Questions

Refer to your plan and review and answer relevant questions from Appendix A. The questions, which are ordered by category, will help you identify what to look for in the various elements of the Comprehensive/Master Plan. Each department should answer the set of questions that are pertinent to them. If the answer is yes, then you are currently integrating. Identify where it is addressed, and document the page number and section. Also identify any inconsistencies between plans. If the answer is no, you have identified a gap. Make a recommendation to address the gap using the examples listed in Step 3.

In your Comprehensive Plan, identify the future land use map, which shows growth areas in natural high-hazard areas, or land use policies that discourage development or redevelopment within natural hazard areas.

Product: List of inconsistencies, gaps, and recommendations

Step 3: Review Examples/Best Practices

Review the best practices examples provided below for language, format, and terminology. This exercise will help you in drafting the recommendations. Included below are a few selected Plan elements; the list includes only suggestions for consideration and is not intended to be comprehensive. Some hazards are experienced nationwide, while others are location specific. Use the Guide as a starting point, tailor it to the hazards in your area, and modify the language as appropriate.

Product: List of actions/recommendations

For each document that you review, develop the following sections:

- An overview (3–5 sentences), rather than including a complete recap section by section.
- Plan strengths
- Elements that address hazard mitigation principles and options for their inclusion

You may or may not include each element shown below but rather use them as a guide to develop language for your community's plans.

Examples

Land Use

- Goal: Create a disaster-resistant community that can prepare for hazard impacts, and thrive after a hazard event.
- Action: When evaluating development proposals or changes to zoning consider Comprehensive Plan policies, Zoning and Subdivision Ordinance standards, existing land uses, environmental impacts, and, social, economic, and community concerns.
- Action: Identify potential problems that may arise from various densities of development in hazard-prone areas, determine what densities are appropriate, and establish standards to direct development away from high-hazard areas.

Transportation

- Goal: Develop transportation policies to guide growth to safe locations and limit access to natural hazard areas.
- Action: Continue to work with the City, the Regional Transportation Agency), and Transit Agency to on a regular basis to develop a recovery element following a significant hazard event.
- Action: Restrict tank vehicles with potentially hazardous materials in residential and other areas such as the Hazardous Fire Area.
- Action: Provide for emergency access to all parts of the city and safe evacuation routes.
- Action: Develop an Emergency Access and Evacuation Network map that identifies the roadways in the city that must be maintained for emergency access and emergency evacuation in case of a major hazard event such as a fire, flood, or hazardous materials release. Identify roadways for evacuation that are likely to avoid hazard areas like floodplains.
- Action: Use transportation projects to determine the location and density patterns of future growth (projects most likely to be involved directly with capital improvements planning).

Housing

- Goal: Existing housing shall be maintained and improved. Improvements that will prepare buildings for a major seismic event should be encouraged.
- Policy: Maintain housing supply and reduce the loss of life and property caused by earthquakes by requiring structural strengthening and hazard mitigation in housing.
- Policy: Encourage and facilitate addition of second and small “in-law” units on properties with single-family homes, but not in areas with limited parking and vehicular access or that are especially vulnerable to natural disaster.
- Action: Identify zoning districts where emergency shelters are permittable, including a year-round emergency shelter
- Policy: Address issues of how housing demand is influenced by the desire to locate near natural amenities such as rivers or wooded areas, which can significantly increase risk.
- Action: Retrofit or replace public and publicly subsidized affordable housing to reduce vulnerability during a natural disaster.

Disaster Preparedness and Safety

- Goal: Improve disaster resiliency and reduce the potential for loss of life, injury, and economic damage resulting from earthquakes, urban and wildland fire, and floods.
- Policy: Establish and maintain an effective emergency response program that anticipates the potential for disasters, maintains continuity of life-support functions during an emergency, and institutes community-based disaster response planning, involving businesses, non-governmental organizations, and neighborhoods.
- Policy: Develop mitigation programs to reduce risks to people and property from natural and man-made hazards to socially and economically acceptable levels.
- Policy: Plan for and regulate the uses of land to minimize exposure to hazards from either natural or human-related causes and to contribute to a “disaster-resistant” community.

Open Space and Recreation

- Goal: Preserve high hazard areas as open spaces or places for passive recreation.
- Policy: Implement the Waterfront Plan policies to establish the waterfront as an area primarily for recreational, open space, and environmental uses, with preservation and enhancement of beaches, marshes, and other natural habitats.
- Policy: Convert vulnerable floodplain land, steep slopes, and areas vulnerable to wildfire or other hazards into open space or recreational areas to help avert or minimize disasters.

Environmental Management

- Goal: Protect and restore natural vegetation and other natural resources that provide floodplain protection, minimize erosion, stabilize slopes, or provide other eco- system services.
- Policy: Ensure that new development pays its fair share of improvements to the storm sewerage system necessary to accommodate increased flows from the development.
- Policy: Encourage drought-resistant, rodent-resistant, and fire-resistant plants to reduce water use, prevent erosion of soils, improve habitat, lessen fire danger, and minimize degradation of resources.
- Policy: Preserve natural vegetation and woodlands on steep slopes to reduce the likelihood of landslides.
- Policy: Conserve natural woodlands and minimize buildings and structures in woodlands to reduce exposure to wildfires.
- Policy: Work with owners of vulnerable structures and sites containing significant quantities of hazardous material to mitigate potential risks.

- Policy: Establish ways to warn residents of a release of toxic material or other health hazard, such as sirens and/or radio broadcasts.

Urban Design and Retrofit

- Goal: Encourage and support the long-term protection of historically or architecturally significant buildings to preserve neighborhood and community character.
- Policy: Encourage, and where appropriate, require owners of historically or architecturally valuable buildings to incorporate disaster-resistance measures to enable them to be feasibly repaired after a major earthquake or other disaster.
- Policy: Develop incentives for owners of historic or architecturally significant structures to undertake mitigation to levels that will minimize the likelihood of demolition and maximize the ability to repair or avoid damage in the event of a natural disaster.
- Action: In preparing for the period after the next big earthquake, firestorm, or other major disaster, establish preservation-sensitive measures including requirements for temporary shoring or stabilization where needed; arrangements for consulting with preservationists; expedited permit procedures for suitable repair or rebuilding of historically or architecturally valuable structures; and, where appropriate, provisions for replanting. Encourage use of FEMA funds for rehabilitation of such structures wherever possible.
- Action: Consider providing new or expanded sources of financial assistance for unreinforced-masonry and other structures, including historically or culturally significant ones that need seismic retrofit.

Table 2.1 is an example from the City of Berkeley's Local Hazard Mitigation Plan that compares actions from the Mitigation Plan with policies and actions from the Comprehensive Plan (also known as General Plan).

Develop a similar table to help understand where they complement one another and where they may contradict with one another.

Table 2.1: Mitigation Action Comparison to the Comprehensive/General Plan

Mitigation Action No. if applicable	Mitigation Action	Comparison to General Plan Action/Policy
A-1	Strengthen or replace important city-owned and used buildings that are known to have structural weaknesses	Derived from General Plan Action. The action in the Mitigation Plan is very similar to the policy in the General Plan. The General Plan proposes more detailed steps for implementation.
	Complete the ongoing program to retrofit all remaining non-compliant unreinforced masonry buildings	Derived from General Plan Action. The action in the Mitigation Plan is very similar to that the policy in the General Plan.

2004 City of Berkeley, CA Disaster Mitigation Plan
http://hazardmitigation.calema.ca.gov/docs/lhmp/Berkeley_City_of_LHMP.pdf

Table 2.2 below helps determine where mitigation principles are identified and integrated into various elements of your jurisdiction's Comprehensive Plan. For elements that are integrated, indicate "Y." For elements that are not integrated, indicate "N." This will clearly show where you need to focus your future efforts.

Table 2.2: Integrating Hazard Mitigation Principles into Local Comprehensive Planning Elements

Element	Hazard Mitigation Principles
Land Use	Y
Transportation	N
Housing	N
Community Facilities	Y
Economic Development	N
Historic Preservation	Y
Urban Design	N
Sensitive Areas	N
Water Resources	N
Plan Implementation	N
Other	
Other	

Conclusion

Both the Hazard Mitigation Plan and Comprehensive Plan are key documents in a community but are often developed separately with little coordination, much less integration, between the two planning processes. Awareness and identification of hazards in the Comprehensive Plan can help the community avoiding developing in areas where infrastructure and buildings would be put into harm's way. Coordinating with the Comprehensive Plan can provide a mechanism for implementing the mitigation goals, objectives, policies, and actions in the Hazard Mitigation Plan beyond Federal mitigation grants and recovery operations. These are just two examples of how coordination and integration between these two planning processes can strengthen each process and lead to a more resilient community.

This concludes Part 2. At this milestone, you should have developed goals and policies for various elements of the Comprehensive Plan.

PART 3 – INTEGRATION ACROSS AGENCIES/DEPARTMENTS

Interagency coordination is key for any planning process to be successful. Involving agencies or departments throughout the process, considering their viewpoints, and valuing their expertise is important so they feel more vested in the process and become more involved in implementation. Table 3.1 helps identify which departments/agencies currently do or do not coordinate with one another.

Develop a similar table to determine where there are links or gaps between agencies. Identify strategies to improve coordination between agencies and integrate across departments for various projects and processes.

For agencies that coordinate with one another, indicate "Y." For agencies that do not coordinate with one another, indicate "N." This will clearly show where you need to focus your future efforts.

Note: Including an action in the mitigation strategy of your Hazard Mitigation Plan to review and update this table annually is also beneficial.

Table 3.1: Integration across Agencies/Departments

Jurisdiction	Planning & Zoning	Community Development	Transportation	Public Works	Emergency Management	Budgeting	GIS	Housing	Parks and Recreation	Permits and Inspections	Other	Other	Other
Planning and Zoning													
Community Development													
Transportation													
Public Works													
Emergency Management													
Budgeting													
GIS													
Housing													
Parks and Recreation													
Permits and Inspections													
Other													
Other													
Other													
Other													
Other													

Step 1: List Agencies/Departments

Make a list of all relevant agencies for Plan Integration purposes.

Product: Bulleted list of all agencies/departments

A list of agencies/departments is included below. This list is not comprehensive, so others should be added as necessary:

- Planning and Zoning
- Community Development
- Transportation
- Public Works
- Emergency Management
- Budgeting
- Geographic Information Systems (GIS)

Step 2: Review Guide Questions

Refer to the Guide questions in Appendix A of this document. The questions will help you identify the agency/department that would answer the specific set of Guide questions that are relevant to their agency/department.

Step 3: Review Examples/Best Practices

Review the best practices examples provided below for language, format, terminology, etc. This exercise will help you in drafting the recommendations and suggestions for Plan Integration. The selected examples are not intended to be a comprehensive list of issues for coordination. Use them as a foundation and tailor a list for your community.

Product: List of actions/recommendations

Examples

Below are examples of issues and recommended actions for coordination with various State, county, and local agencies and departments.

- Issue: Growth areas were designated a long time ago and seem to be locked in against change without help from the State Planning Office.
- Action: Cecil County planning staff should consider working closely with the State Planning Office on the State's growth strategy for Cecil County. For example, the Department of Natural Resources Coastal Program's climate change mapper is a step towards buy-in at the State level. The mapper looks at environmental vulnerability factors (with a coastal focus).
- Issue: Sometimes, hazard mitigation goals conflict with those of Smart Growth.
- Action: Planners and emergency managers should work together to collectively benefit the community.
- Issue: Maryland's policy is to convene at Emergency Operations Centers and contact critical facilities during a disaster. However, it is not a requirement, and often, facilities

are unable to be reached in an emergency, because they lack power supply or phone lines are down.

- Action: Implement a strategy at the State level through the Department of Health & Hygiene to address this.
- Action: Conduct an exercise with the appropriate agencies on what to do in an emergency.
- Issue: Small municipalities are often run by volunteers and the lack of coordination is a concern. There is a need for improved GIS for incorporated municipalities.
- Issue: At the County level, there is a lack of cooperation between agencies on data that would help other departments. For example, databases used in other departments/agencies are not integrated and municipalities are not benefitting from the available GIS data.
- Action: Develop a data repository for standardization and update the data regularly.

Conclusion

Plan Integration ensures collaboration and fosters interdisciplinary idea-sharing between agencies/departments. It considers various perspectives for reducing risk and promotes leveraging opportunities and partnerships to maximize resources are and avoid duplication of efforts.

This concludes Part 3. At this milestone, you should have identified links and gaps between agencies/departments at various levels of government.

PART 4 – CASE STUDY OVERVIEWS

Purpose

Two real-world case studies are provided to show how communities have embarked on the process of hazard mitigation integration. Each case study illustrates how a community has or could incorporate hazard mitigation into plans, policies, and procedures, as well as encourage inter-departmental and/or inter-jurisdictional collaboration. Refer to Appendix E.

Background

The two case studies—Cecil County, MD, and Broward County, FL—demonstrate integration efforts in jurisdictions with vastly different geographic locations, demographics, hazards, risk reduction priorities, and technical capabilities and capacities. These two jurisdictions, while contrasting in size and location, are provided as case studies because they have both approached integration in similar ways:

- Cecil County recently embarked on the Plan Integration process by identifying ways to include mitigation principles in various plans and ordinances.
- Broward County integrated hazard mitigation in a wide range of community-wide planning initiatives.

Cecil County, MD, is in the northeastern part of the State of Maryland, in the Delmarva (Delaware-Maryland-Virginia) Peninsula. As of 2010, the County population was slightly more than 101,000. The County has eight municipalities. Cecil County has over 417 square miles. Cecil County is primarily rural, but has denser development around Elkton, the county seat. The population density is 290 per square mile. The County is bound by the Mason-Dixon line to the north and east, and the Sassafras River and Kent County, MD, to the south. The western border lies along the lower reaches of the Susquehanna River.

Plan Integration Status: FEMA selected Cecil County to perform Plan Integration as part of a pilot process (October 2013 to March 2014). The Cecil County case study includes a wide range of recommendations for integration. It provides sample language modifications for both local planning mechanisms as well as comprehensive plan elements.

Broward County, FL, is a part of the Miami metropolitan area in the southeastern part of the State. Broward County is the 18th most populous county in the United States, with 31 municipalities. As of 2010, the county population was nearly 1.8 million. Broward County comprises 1,319 square miles, of which 1,205 are land and 114 are water. The majority of the County is developed, and within the developable land, the population density is 3,740 per square mile. The urban area is bordered by the Atlantic Ocean to the east and by the Everglades National Park to the west.

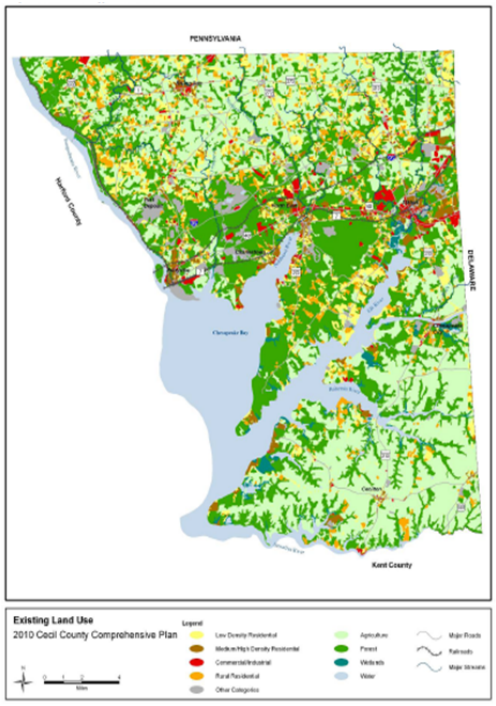
Plan Integration Status: The Broward County case study provides general and conceptual recommendations for local planning mechanisms, Comprehensive Plans, and interdepartmental coordination. It includes examples of how mitigation has been featured in local plans, as well as Comprehensive Plan elements (i.e., goals, policies, and objectives) (December 2010 to May 2012).

Applicability to Users

The case studies provide examples that can be applicable to any community. However, the vast majority of communities may be similar to Cecil County, with a high interest in integration but perhaps limited exposure or experience with the concepts of Plan Integration.

Case Study – Cecil County, MD

In January 2014, FEMA Region III selected Cecil County, MD, as a pilot community for Plan Integration. The Plan Integration Guide was used to assist local officials with the Plan Integration process. Cecil County performed Plan Integration with the goal of making the County more resilient to disasters. FEMA Region III staff and the contractor reviewed a number of local plans and ordinances and identified areas for Plan Integration for discussion with the local officials. A full-day workshop was held in Elkton, MD, on 22 February 2014, for Cecil County departments and municipalities to engage in and embark on Plan Integration. Cecil County departments and municipalities worked closely to ensure each agency had a say in how and where their plans and ordinances should be integrated. The following is a list of plans and ordinances that were integrated. Appendix E shows how and where hazard mitigation principles were integrated into each plan/ordinance.



Source: Maryland Dept. of Planning 2007 Land Use Land Cover dataset

County Plans and Ordinances

- 2010 Cecil County Comprehensive Plan
- 2011 Cecil County Zoning Ordinance
- 2011 Cecil County Subdivision Regulations

Municipal Plans and Ordinances

- 2003 Elkton Downtown Master Plan
- 2013 Elkton Floodplain Ordinance – Title 15 – Ordinance 5
- 2013 Port Deposit Floodplain Management Ordinance
- 2009 Port Deposit Comprehensive Plan Water Resource Element
- Charlestown Zoning Ordinance
- Charlestown Subdivision Ordinance
- 2008 Charlestown Comprehensive Plan
- 2013 Perryville Zoning Ordinance Forest Conservation Chapter 48
- 2013 Perryville Zoning Ordinance Floodplain Management Chapter 46
- 2009 Chesapeake City Comprehensive Plan: A Plan for 2030

Inter-departmental coordination opportunities were identified and captured during a workshop conducted in November 2013. The workshop included a group discussion, which began role identification in the development process. The participants reviewed the guide questions to help

develop a list of issues, goals, and actions. Municipal officials, county departments, and State agencies participated in the workshop.

Case Study – Broward County, FL

Broward County identified hazard mitigation integration opportunities and existing examples as part of a Federal and State grant-funded process to establish a road map for Broward County stakeholders to make realistic incremental improvements toward making the County a model resilient, disaster resistant, and sustainable community. Plan Integration was accomplished during an 18-month planning process, in part, through the preparation of the 2011 Enhanced Local Mitigation Strategy (ELMS) (also known as the local Hazard Mitigation Plan) and creation of their Long-Term Recovery and Redevelopment Strategy (LTRRS) (also known as the Post-Disaster Redevelopment Plan). A consultant was hired to facilitate both planning initiatives.

A Hazard Mitigation Integration report was prepared and included in the ELMS. The recommendations and observations were reviewed and approved by county staff. Several meetings were held with stakeholders to help them better understand how and when to include mitigation in particular processes. For example, to include mitigation measures into a construction project (maintenance or new construction), the mitigation measures would have to be included at the conceptual design phase 7 years before the project could be included (and funded) as a capital improvement project.

Inter-departmental coordination opportunities and existing examples were identified and captured in the LTRRS. This process involved facilitated workshops for nine function-based Technical Assistance Committees to develop post-disaster recovery and redevelopment Action Plans based on the National Disaster Recovery Framework.

Broward County has an advanced level of hazard mitigation integration in their plans, policies, and procedures. County staff has worked with a wide range of local, regional, State, and Federal stakeholders and partners to ensure that hazard mitigation is reflected in daily activities. Each of the 31 municipalities has participated in plan development and exercises that focus on inter-disciplinary collaborative efforts between departments and organizations for hazard risk reduction.

One of the resounding lessons learned during the 18-month planning process was hazard mitigation principles are most effectively and realistically integrated on a daily basis. Integration can be institutionalized in a community by embracing a mitigation mindset. A community does not need to wait several years to update their local Hazard Mitigation Plan, before considering integration. Appendix E shows how and where hazard mitigation principles were integrated into various plans/ordinances.

PART 5 – SUMMARY

What is Next after the Plan Integration Document is Developed

Develop the Plan Integration document and include it in the next plan update or as an appendix to the currently approved plan, at the end of the capabilities section.

Be sure to include each of the three parts of the Guide (with matrices) identified below and a conclusion that identifies gaps or deficiencies.

- Part 1 – Integration of Hazard Mitigation Principles into Other Local Planning Mechanisms
- Part 2 – Integration of Hazard Mitigation Principles into Comprehensive Plan Elements
- Part 3 – Integration Across Agencies

Key Takeaways

Use the Hazard Mitigation Plan as a driver and platform to perform successful Plan Integration at the State and local levels.

Identify where gaps exist between local planning mechanisms and develop a strategy to address them.

Identify where deficiencies exist between departments and develop a strategy to integrate efforts and make connections.

Use the final Plan Integration Checklist to ensure all steps have been completed.

Table 5.1 includes a final checklist.

Complete this checklist to ensure that each step of the Plan Integration process is completed, including the review of specific plans and ordinances and documentation of coordination between agencies.

Table 5.1: Plan Integration Checklist

STEPS	COMPLETE/NOT COMPLETE
Part 1 – Integration of Hazard Mitigation Principles into other Local Planning Mechanisms	
Step 1: Collect Documents	
Master Plan/Comprehensive Plan	
Design Facilities Manual	
Stormwater Regulations	
Transportation Plan	
Emergency Operations Plan	
Capital Improvements Program	
State Hazard Mitigation Plan	

STEPS	COMPLETE/NOT COMPLETE
Parks, Open Space, and Recreation Plan	
Zoning Ordinance	
Subdivision Regulations	
Building Code	
Post Disaster Recovery Plan	
Economic Development Plan	
Revitalization Plan	
Other Plan or Ordinance	
Other Plan or Ordinance	
Step 2: Review Guide Questions	
Land Use	
Transportation and Infrastructure	
Emergency Management	
Environment and Open Space	
Plan Implementation	
Step 3: Review Best Practices/Examples	
Part 2 – Integration of Hazard Mitigation Principles into Comprehensive Plan Elements	
Step 1: Collect Documents	
Comprehensive Plan	
Step 2: Review Guide Questions	
Land Use	
Transportation and Infrastructure	
Emergency Management	
Environment and Open Space	
Plan Implementation	
Step 3: Review Best Practices/Examples	
Transportation	
Housing	
Disaster Preparedness and Safety	
Open Space and Recreation	
Environmental Management	
Urban Design and Retrofit	
Other	
Other	

STEPS	COMPLETE/NOT COMPLETE
Part 3 – Integration Across Agencies	
Step 1: List Agencies/Departments	
Planning and Zoning	
Community Development	
Transportation	
Public Works	
Emergency Management	
Budgeting	
GIS	
Housing	
Parks and Recreation	
Permits and Inspections	
Other	
Other	
Step 2: Review Guide Questions	
Land Use	
Transportation and Infrastructure	
Emergency Management	
Environment and Open Space	
Plan Implementation	
Step 3: Review Best Practices/Examples	

PART 6 – RESOURCES

Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards. http://www.fema.gov/media-library/assets/documents/30627

Integrating Hazard Mitigation Into Local Planning: Case Studies and Tools for Community Officials. http://www.fema.gov/media-library/assets/documents/31372?id=7130

Mitigation Planning Resources. http://www.fema.gov/hazard-mitigation-planning-resources

APPENDIX A – GUIDE QUESTIONS

The following guide questions will help you identify inconsistencies, gaps, and recommendations in each of the following five categories:

- Land Use
- Transportation and Infrastructure
- Emergency Management
- Environment and Open Space
- Plan Implementation

Guide Questions – Land Use

These questions may be used as a guide to develop the land use section of the Plan Integration document. Please refer to your community's Comprehensive Plan, Land Use Plan, or your long-range Master Plan while completing this form.

If you answer "yes" to any question, please elaborate on the information, policy, or objective from the relevant plan, study, or ordinance.

1. In general, do you consider your community resilient to natural hazards? If yes, why?

2. In delineating future growth areas, does your community's future land use map take into account natural or human caused high-hazard areas such as:

   Natural high-hazard areas

   - Steep slopes subject to landslides
   - Steep slopes and wooded areas subject to wildfire
   - Urban/wildland intermix areas
   - 100-year floodplain
   - 500-year floodplain
   - Coastal flood zones
   - Hurricane-prone areas
   - Erosion areas
   - Seismic hazard zones
   - Areas of expansive/unstable soils, subsidence areas
   - Coastal construction line
   - Wind speed zone over 100 miles per hour or special wind regions
   - Sinkhole areas

   Human caused high-hazard areas

   - Areas within the identified inundation zone of a "high" or "significant" hazard dam
   - Areas within the determined vulnerability zone (10-mile emergency planning zone) of a nuclear power plant
   - Areas contiguous to railroads, highways, or waterways that regularly carry significant quantities of hazardous materials
   - Areas contiguous to oil/gas wells, pipeline terminals, storage facilities, production facilities, or compressor stations
   - Areas contiguous to high-volume commercial passenger airports and other passenger transportation terminals and facilities

3. Does the future Land Use Plan take into account high-hazard areas and identify adequate space for projected future growth outside of these high-hazard areas? If yes, which hazard areas does it address?

4. Does the plan include policies to restrict the density of new development in high-hazard areas or guide new development away from high-hazard areas? Does the plan include policies to relocate vulnerable existing development to safer/less vulnerable areas?

5. Do the land use policies discourage development or redevelopment within natural hazard areas?

6. Does your plan include policies for existing structures and facilities to be strengthened, elevated, or relocated during the redevelopment process?

7. Does your plan include policies to strengthen stormwater management retention (e.g., retain more stormwater on site) during the redevelopment process?

8. Are there any areas identified in the Land Use Plan where a proposed rezoning would put more people at risk (for example, by allowing higher-density development in the 100-year floodplain)?

9. Does your Comprehensive Plan include goals and objectives aimed at safe growth? For example, if your community is located in a high-hazard area, does your community have a provision wherein allowable densities for undeveloped areas in coastal high-hazard zones will be considered for reduction or new development on barrier islands will be limited to densities that meet required evacuation standards?

10. Are the goals and policies of the Comprehensive Plan compatible with those of the FEMA Local Hazard Mitigation Plan? Do any goals and policies conflict with the FEMA Local Hazard Mitigation Plan?

11. Is safety explicitly included in the plan's growth and development policies?

12. Does the monitoring and implementation section of the Land Use Plan cover safe growth objectives?

13. Does your future Land Use Plan contain growth management techniques, such as land conservation, buffering, and clustering of development to protect and conserve natural resources?

14. Does your plan include other techniques, such as crime prevention through environmental design (CPTED), planned unit developments, or cluster developments?

Inconsistencies, Gaps, and Recommendations

Guide Questions – Transportation and Infrastructure

These questions may be used as a guide to develop the transportation and infrastructure section of the Plan Integration document. Please refer to your Transportation Plan while completing this form.

If you answer "yes" to any question, please elaborate on the information, policy, or objective from the relevant plan, study, or ordinance.

1. Does the long-range Transportation Plan address hazards that can occur and affect the transportation system assets? For example, does it identify hazards and their likely effects on the various modes of the transportation system, vulnerable assets, and other risks in the system? Does it include a plan to monitor hazardous material transportation?

2. Does the Transportation Improvement Program (TIP) have projects that address hazard mitigation and/or emergency management (e.g., Intelligent Transportation Systems [ITS] investments to coordinate local traffic management centers for evacuation)?

3. Is the transportation network developed in a manner that provides redundancy (i.e., alternate routes) if certain key nodes or routes are affected by disaster?

4. Is the transportation system designed to function under disaster conditions and does it adequately address evacuation? Is there a Memorandum of Understanding between agencies for sharing data and information before, during, and after a disaster? Are communication systems interoperable (e.g., for communication between transportation entities and first responders)?

5. Are policies in place to protect transportation facilities, such as airports, from hazard events and to locate them outside of high-hazard areas?

6. Are policies in place for design and siting of water and sewer systems, roads and bridges, hospitals and medical facilities, power plants, and public safety facilities to protect these facilities during hazard events and for their continued operation after a disaster event?

7. How does your State law address the siting of new critical facilities in high-hazard coastal zones? Does it prohibit them or allow them with stipulations?

8. Are there any public transit stations/lines and highways in close proximity to flood-prone areas?

9. Are there specific designated routes for the conveyance of hazardous materials so that public safety is not compromised?

10. Are rail crossings designed in a manner that minimizes the likelihood of car-train crashes—a major cause of rail transportation accidents?

11. Are highways and local streets designed with capacity to accommodate community-wide evacuations?

12. Are any transportation facilities designed and constructed (hardened) to withstand the excessive forces of nature to ensure continuity of operations immediately after a disaster?

13. Is there a de-concentration of public facilities that provide essential public services within your community?

14. Is there a de-concentration in the design of service networks (roads, pipelines, cables, etc.) to reduce the risk of failure and loss of service after a hazard event?

15. Are evacuation route capacity and clearance times addressed through land development regulations, a schedule of evacuation route improvements, or any mechanism to reach the level of service?

Inconsistencies, Gaps, and Recommendations

Guide Questions – Emergency Management

These questions may be used as a guide to develop the emergency management section of the Plan Integration document Please refer to your community's Emergency Operations Plan while completing this form.

If you answer "yes" to any question, please elaborate on the information, policy, or objective from the relevant plan, study, or ordinance.

1. Has your community adopted an Evacuation and Shelter Plan to deal with emergencies from natural hazards?

2. Does your Emergency Operations Plan (EOP) contain information on maintaining or reducing hurricane evacuation times?

3. Does your EOP show which major evacuation routes are prone to flooding?

4. Has your community prepared a Post-Disaster Redevelopment Plan that includes policies to reduce or eliminate the exposure of human life and public and private property to natural hazards after a disaster?

5. If yes, does post-disaster redevelopment include policies to address short-term repair and cleanup actions needed to protect public health and safety and long-term repair and redevelopment activities; address the removal, relocation, or structural retrofitting of damaged infrastructure; and limit redevelopment in areas of repeated damage?

6. Does your Post-Disaster Redevelopment Plan include actions or policies on incorporating hazard mitigation into the short- and long-term recovery process (e.g., Public Assistance 406 Mitigation in short-term recovery)?

7. Is there a policy to meet existing and future shelter demand to ensure the safety of residents in the event of a disaster?

8. Are there enough shelters to support population growth and special needs populations?

9. Does your community's Hazard Mitigation Plan reference the EOP and which departments would be involved for specific functions, such as shelter operations, damage assessment, and flood control for various hazards, to ensure that the two plans are well integrated? For example, does your EOP include actions to collect valuable data (e.g., high water marks) after a recent hazard event? This type of information can be essential to preparing hazard mitigation project applications for FEMA funding.

10. Do your Continuity of Operations (COOP) / Continuity of Government (COG) Plans identify mitigation opportunities for key government facilities at higher risk?

11. Is there joint participation of community staff in plan exercises (e.g., COOP, Comprehensive Emergency Management Plan [CEMP], emergency operations center [EOC], shelter, evacuation, housing, mitigation, recovery, comprehensive planning charettes)?

Inconsistencies, Gaps, and Recommendations

Guide Questions – Environment and Open Space

These questions may be used as a guide to develop the environment and open space section of the Plan Integration document. Please refer to your community's Open Space Plan, stormwater management regulations, and Sediment and Erosion Control Plan while completing this form.

If you answer "yes" to any question, please elaborate on the information, policy, or objective from the relevant plan, study, or ordinance.

1. Is there a policy to utilize land that is otherwise unsuitable for development (such as floodplains, steep slopes) for recreational purposes, thereby lowering the community's risk?

2. Are there policies to encourage the development of waterfront areas for recreational purposes, to serve as tourist attractions, and to provide an economic benefit to the community from land that is otherwise prone to hazards?

3. Are your wetlands identified and mapped?

4. Are your wetlands maintained and conserved so as to be able to mitigate hazard damage?

5. Do environmental policies maintain and restore protective ecosystems?

6. Do environmental policies provide incentives to encourage development outside protective ecosystems?

7. Are the hazard vulnerability implications of land development considered on a regional (or watershed) basis?

8. If applicable, do your community's environmental policies address the effect that upstream development has on stormwater management and flooding potential downstream?

9. Are policies in place for the protection and conservation of the natural functions of existing soils, rivers, lakes, floodplains, and beaches and shores?

10. Does your community's Stormwater Management Plan address low-impact development (LID) techniques to manage stormwater, such as bio-retention areas, dry wells, infiltration trenches, filter/buffer strips, vegetated swales, rain barrels, and cisterns?

11. Are any other best management practices (BMPs) in place to reduce stormwater runoff?

12. Is a policy or program in place for sediment and erosion control?

Inconsistencies, Gaps, and Recommendations

Guide Questions – Plan Implementation

The following questions may be used as a guide to develop the plan implementation section of the Plan Integration document Please refer to your community's building code, zoning ordinance, and subdivision regulations while completing this form.

If you answer "yes" to any question, please elaborate on the information, policy, or objective from the relevant plan, study, or ordinance.

Building Code

1. What building codes, standards, and design/construction review practices does your community currently use? (e.g., type of code/date of adoption)?

2. Does the building code contain hazard reduction provisions (e.g., strengthen construction to withstand wind forces)?

3. Are policies in place to reduce vulnerability to wind, water, hail, lightning, fire, extreme temperatures, and ground shift/collapse through regulating the location, size, design, type, construction methods, and materials used in structures?

4. Does your building code contain sections on hurricane preparedness, flood hazard reduction (over and above minimum National Flood Insurance Program [NFIP] requirements), environment and natural resources? Does your plan include a wind speed map showing areas subject to 100-, 110-, 120-, and 130-mile-per-hour winds?

5. Are there measures for protecting vulnerable historically significant structures to preserve their historic character and appearance as well as protect them from damage from hazard events?

Inconsistencies, Gaps, and Recommendations

Zoning Ordinance

6. Does the zoning ordinance conform to the Comprehensive Plan in terms of discouraging development or redevelopment within natural hazard areas?

7. Does the ordinance contain natural hazard overlay zones that set conditions for land use within such zones?

8. Do rezoning procedures recognize natural hazard areas that allow greater intensity or density of use?

9. Does the ordinance prohibit development within, or filling of, wetlands, floodways, and floodplains over and above minimum NFIP requirements?

Inconsistencies, Gaps, and Recommendations

Subdivision Regulations

10. Do the subdivision regulations restrict the subdivision of land within or adjacent to natural hazard areas?

11. Do the regulations permit conservation subdivisions or cluster subdivisions that conserve environmental resources by setting aside land for protection of natural resources?

12. Do the regulations allow density transfers or transfer of development rights where hazard areas exist?

13. Are there any additional mitigating measures, such as additional setbacks in critical erosion areas, conservation of dunes and vegetation, floodproofing of utilities, and structural wind resistance and floodplain management?

14. How do your zoning administrators, building inspectors, and utility officials implement development review approvals?

Inconsistencies, Gaps, and Recommendations

Capital Improvement Program and Infrastructure Policies

15. Does the capital improvement program provide funding for hazard mitigation projects identified in the Hazard Mitigation Plan or include mitigation as a component to a redevelopment, renovation, or development project (e.g., replacing a courthouse roof, elevating a water treatment plant)?

16. Does the Capital Improvement Plan limit or prohibit expenditures on projects that would encourage new development or additional development in areas vulnerable to natural hazards?

17. Does your community have infrastructure policies that limit extension of existing infrastructure, facilities, and/or services that would encourage development in areas vulnerable to natural hazards?

18. Do your community policies limit public expenditures in Coastal High Hazard Areas (e.g., limit expenditures to necessary repairs to maintain in current condition public safety needs, services to existing residents, recreation, and open space uses)?

Inconsistencies, Gaps, and Recommendations

Other

19. If you have them, do your community's Small Area Plans / Corridor Plans recognize the need to avoid or mitigate natural hazards?

20. Do your community's economic development or redevelopment strategies include provisions for mitigating natural hazards?

Inconsistencies, Gaps, and Recommendations

APPENDIX B – EXAMPLE OF INTEGRATION OF PLAN AND ORDINANCES

Appendix B provides a real-life example of mitigation integrated into planning best practices in a variety of arenas, including universities and local jurisdictions. This example also shows how two separate entities, a university and a county, can coordinate planning efforts. The excerpts from the *2009 University of Maryland Eastern Shore Hazard Mitigation Plan* provided in this appendix are intended to provide planners with examples and language to include in plans and ordinances in their communities.

Community: University of Maryland Eastern Shore
Plan Name: 2009 University of Maryland Eastern Shore Hazard Mitigation Plan
Example Type: Hazard Mitigation Plan
Weblink: http://umes.edu/WorkArea/DownloadAsset.aspx?id=38436

Chapter III – PLANNING PROCESS – Review and Incorporation of Relevant Plans and Studies

This section comprises a review and summary of various documents at the University, Town, County, and State levels as they relate to land use, building construction, and floodplain management in and around the UMES campus. Each subsection includes a summary of the document and potential options for including hazard mitigation principles and practices in these documents, as the case might be. The purpose of these recommendations is to provide facility planners with ideas on how to better integrate hazard mitigation into future plans and activities.

UMES Master Plan (2008–2012)

The main purpose of the Master Plan is to determine where and how all planned and anticipated construction can be accommodated within a well-defined urban design and open space network and to guide the prioritization of individual projects by suggesting their most appropriate location. The Plan's objective is to determine how much future development can be accommodated through the campus and to establish who and where this growth should be sited. Therefore, this Plan provides an excellent avenue to incorporate general hazard mitigation principles.

Recommendations for Incorporating Hazard Mitigation Principles into the Master Plan

- In the Purpose of the Plan section (1.1), include a sentence (6) under 'interrelated factors that need to be examined concurrently' that states "Location in proximity to forested areas and the floodplain."
- Incorporate into the Planning and Design Issues section (1.7): "High-hazard areas."
- In Section 1.8 – Facility Master Plan Concept, expand the 1st point to include "The nature of the buildings and open spaces should reflect the existing patterns and work around natural barriers and topography and consider the potential effects of natural hazards such as wildfires and floods."
- Include a reference to the DCFS, indicating that the location of future structures on campus will conform to DCFS guidelines and be located away from high-hazard areas and/or those that are vulnerable to the effects of wind and water.
- Incorporate into the Mission Statement, given that the University is bordered by branches of the Manokin River—the Loretto Branch to the north and the Manokin Branch to the south, the campus is at increased risk from damage related to flooding, and will look for opportunities to better protect itself from these events and their effects.

Design Criteria/Facility Standards Manual (DCFS, 2005)

The UM Design Criteria/Facility Standards (DCFS) Manual is the document that is used by all campuses of the University of Maryland system, including the UMES uses to guide development at the various campus locations throughout the State. The DCFS include specific guidance and references to many other documents. These Standards and Guidelines are intended to serve as a guide for renovation and new construction projects at the University.

All buildings, including the University, are required to apply the standards in the State's Model Performance Code (COMAR 05.02.07) and the Maryland State Fire Prevention Code (COMAR 29.06.01) for any construction, alteration, remodeling or renovation. The Model Performance Code One includes the BOCA Building Mechanical and Energy Conservation Codes and the State Fire Prevention Code includes the NFPA 101 and the BOCA Fire Prevention Code.

A goal identified in the Manual is to create facilities that will last 50-100 years, which should take into consideration, adequate hazard mitigation measures. Therefore, this Manual may serve as a good platform to incorporate mitigation measures and practices into the University's long-term development process.

Note: A few of these principles have been extracted from options to incorporate hazard mitigation principles form the UM College Park Hazard Mitigation Plan as they follow the same Manual.

Options for Incorporating Hazard Mitigation Principles into the DCFS

- In Section 1.01 (Building Goals and Design Principles), include hazard mitigation as a design principle.
- In Section 1.03 (Codes), include references to FEMA engineering guidelines for shelters.
- Review and update Section 1.07 E1 (Exterior Cladding) to specify wind resistance standards, especially regarding window construction and details.
- In the Mechanical and Electrical Equipment subsection (1.07 F 2), as appropriate, include language specifying standards for attaching mechanical and electrical equipment to roofs and exteriors.
- Section 2.16 – The University follows the 1994 Maryland Standards and Specifications for Soil Erosion and Sediment Control. Continue to enforce the requirement of sediment and erosion control approval to be obtained from the Maryland Department of the Environment if more than 5,000 square feet of surface area or more than 100 cubic yards is disturbed to reduce flooding problems related to runoff.
- Section 2.19 – Continue to design and construct stormwater drainage systems to convey the 10-year storm in accordance with the Maryland State Highway standards.
- Section 2.20 discusses wetlands and the floodplain, which are regulated in accordance with the Maryland Department of the Environment and the U.S. Army Corps of Engineers. This section does not provide specific guidelines. Consider updating this section to include a list of guidelines and regulations related to development in and around floodplains and wetlands, for reference.
- Modify Section 8.01 (Doors and Frames) to include requirements for wind-resistant construction practices.
- Modify Section 8.02 (Glass and Glazing) to include requirements for wind-resistant construction practices.
- Modify Section 8.04 (Windows) to include requirements for wind-resistant construction practices and specifications.
- Modify Section 15.02 (HVAC) to include requirements to properly secure and raise HVAC systems.

- Add a section to the Manual that discusses sheltering-in-place. The section should identify locations and specifications for shelters on campus.

Maryland Stormwater Management Guidelines

The University's stormwater regulations and permit procedures are similar to that of the State and are based on the State's Stormwater Management Guidelines. For all redevelopment projects, the existing impervious area impacted within project limits is at least 20 percent.

- UMES may want to consider developing a stormwater master plan that would consider low impact development techniques to manage storm water by incorporating techniques such as bio-retention areas, dry wells, infiltration trenches, filter/buffer strips, vegetated swales, rain barrels, and cisterns. This will reduce the impact of flooding on campus.
- Additionally, UMES may consider clarifying and formalizing the stormwater impact review processes that are currently employed. This could include establishment of a review committee comprising staff from the Maryland Department of the Environment, Somerset County, and the Town of Princess Anne.

University of Maryland Eastern Shore Emergency Resources Guide

The UMES Emergency Resources Guide provides procedures for responding to various agencies. The guide also includes general procedures to evacuate buildings during the time of an emergency. The guide also offers recommendations for medical emergencies related to hazards such as heat exhaustion, hypothermia and a brief section on sheltering-in-place. Options for Coordination between the UM and State Hazard Mitigation Plans.

University of Maryland Eastern Shore Crisis Management Plan

The UMES Crisis Management Plan mentions tornadoes, hurricanes, winter storms and earthquakes as natural and manmade emergencies that my impact the campus and details the response procedures that campus officials should follow during an emergency. Options for Incorporating Hazard Mitigation Principles into the Crisis Management Plan:

- The University EOP highlights tornadoes, winter storms hurricanes, and earthquakes as natural hazards and outlines protection measures that should be taken in case such an event threatens the campus. This list should be extended to include other natural hazards such as floods and wildfires to which the University is vulnerable, based on the analysis in the Hazard Mitigation Plan.

UMES Emergency Preparedness Audit

In May 2009, a review of the Emergency Preparedness Plan was conducted to determine whether UMES' Plan complied with University System of Maryland's Policy on Campus Emergency Planning, Preparedness, and Response. A number of areas were noted for review and improvement. Of those, items that are relevant to the Hazard Mitigation Plan are listed below:

- The Crisis Management Plan should be updated to include the hazards/risks and appropriate mitigation actions.
- The evacuation planning section in the Emergency Evacuation and Operations Plan should be updated annually.
- Town Hall meetings facilitated by the Department of Public Safety should include question and answer segments on various topics such as preparedness, evacuation, and response, and feedback forms should be made on the Public Safety website.
- The range of hazards and the campus' vulnerability to these hazards should be assessed annually.

UMES Emergency Evacuation and Operations Plan

The Environmental Health and Safety Department has developed a model Emergency Evacuation and Operation Plan (EEOP) to assist departments in low-rise buildings prepare for emergencies. The EEOP model plan correlates with the UMES EOP that was developed for campus operations during large scale or campus-wide emergencies.

The document discusses coordination with the UMES Emergency Operations Plan and other Departmental Emergency Operations Plans as well as coordination with Departmental Health and Safety Plans. University emergency resources and contacts from various departments are listed as well as expectation for departments and staff. The Plan's appendix includes detailed evacuation procedures for persons with disabilities and procedures for conducting, critiquing, recording, and reporting fire drills.

The University has as many as 38 Emergency Building Evacuation Plans for emergency coordination and response by buildings. A listing of these can be found at http://www.umes.edu/EHS/Default.aspx?id=20930. Each building's evacuation plan identifies: assembly points, emergency management coordinators, and contact information. An individual (Building Manager) is assigned for each building, who is responsible for the health and safety of the building.

Options for Incorporating Hazard Mitigation Principles into the Crisis Management Plan:

- The EEOP outlines emergency procedures for fire, bomb threats, chemical spills or release and earthquakes. Emergency procedures for floods should be included in this section since the campus is particularly vulnerable to flooding. Procedures would include: moving items of value to a higher level; shutting off all ignition, heat, and gas sources, etc.

University System of Maryland (USM) Report on Campus Safety and Security (2008)

The goals of this project were to: identify "best practices" that can be implemented at USM institutions to enhance of safety and security of all campuses; ensure that steps taken did not diminish the atmosphere of the campus atmosphere; and to establish an official, ongoing mechanism to support, monitor, coordinate, and update campus safety and security initiatives. A recommended policy was developed for campus safety and security and emergency planning, prevention, preparation, and response that identified key areas in campus response plans.

Three sub-groups were formed for the project:

Subgroup 1: Risk assessment and planning – identification of potential hazards and threats, assessment of vulnerability and planning and prioritization of actions to address potential threats.

Subgroup 2: Emergency preparedness and prevention – actions to be taken prior to an emergency event and on mitigating the impact of the event;

Subgroup 3: Response and recovery – response to significant events in the intermediate and longer term and restoration of normal operations to the institution.

Options for Coordination between the UMES Mitigation and Campus Safety and Security Plan

- This plan identifies the need for the inclusion of appropriate mitigation activities targeted to specific threats, in the Emergency Preparedness Plan. The need for this integration should be reinforced and specific section from the Hazard Mitigation Plan can be cited in the Safety and Security Plan.
- The plan recommends that local and State emergency responders are included in the preparation of various campus plans and that the institutions should establish close

working relationships with these entities. This has been emphasized in the Hazard Mitigation Plan as well and should continue to be a priority.

University of Maryland Eastern Shore System Disaster Recovery Plan (DRP)

The DRP is designed to mitigate the risk of system and service unavailability by providing solutions for the prompt and effective continuation or resumption of mission-critical services in the event of a disaster. The Plan identifies mission-critical infrastructure components and offers measures to protect them.

The DRP consists of the following phases: Notification and activation, assessment and conditions evaluations and reporting, continuity of Information Technology services and initial recovery; and full recovery and reconstitution of normal operations – reestablishing IT operations at the permanent location, returning platforms to operations, restoring network continuity and that of computer operations. In the event of a catastrophic scenario that renders the system facility located in Waters Hall Server Room 2107 as inoperable, it would require the availability of information technology resources needed to restore IT services at an alternate site.

The Plan also includes a DRP form. The purpose of this report is to capture information on problems encountered during execution of the system DRP, and to identify necessary changes in DRP policies, processes and procedures to prevent reoccurrence. It includes a Disaster Log form, a facility/site evaluation checklist, a platform damage and operability checklist, applications status checklist, network evaluation checklist, and a security operations checklist.

Options for Coordination between the UMES Mitigation Plan and DRP

Add recommendation to coordinate HMP survey data with facility evaluation checklist?

University of Maryland Eastern Shore Capital Improvement Plan

The UMES Master Plan draft identifies 17 capital projects and 11 system funded projects that are slated for construction between 2008 and 2018.The major portion of funding for these projects is from State funds (general obligation bonds).

Options for Coordination between the UMES Hazard Mitigation Plan and Capital Improvement Plans

- Work to ensure that hazard mitigation principles are introduced into the capital improvements planning process and on new construction and reconstruction projects, UMES should emphasize those projects that mitigate the impact of natural hazards and consider them high priority projects.
- Consider a more unified approach to better integrate efforts between the Master Plan, Hazard Mitigation Plan, DCFS manual and CIP by including a staff member who is knowledgeable about hazard mitigation, to be involved in the CIP.
- On the renovation/new addition projects in the proposed CIP, identify opportunities to incorporate hazard mitigation principles, i.e., improving resistance to wind or flood.

Somerset County Hazard Mitigation Plan (2005)

The Somerset County Hazard Mitigation Plan was prepared and adopted in 2005 for Somerset County and the municipalities of Crisfield and Princess Anne. The Plan provides information on the various hazards to which the County is prone. Hurricanes, storm surge, winter storms, high winds, and floods rank high among other hazards. While the County Plan ranks the top two hazards as hurricanes and storm surge, the UMES Hazard Mitigation Plan ranks the top three hazards as flood (including storm surge), wind (including hurricanes and tropical storms), and lightning.

Options for Coordination between UMES and Somerset County Hazard Mitigation Plans:

- One goal of the County Hazard Mitigation Plan is to improve coordination and communication with other relevant organizations and establish lasting partnerships. The goal does not list UMES in particular. As part of the 2010 update to Somerset Count's Hazard Mitigation Plan, the planning process should allow for facility planners from UMES to be present on the Committee so they can jointly identify areas of cross reference between the County Plan and the University Plan and ensure they are in harmony with one another.
- One objective in the County Plan is to increase the number of critical facilities that have carried out mitigation measures to ensure their functionality in a 100-year flood event. This goal includes facilities at the UMES campus, which are identified by the University as being in the floodplain or storm surge area. This goal to protect critical facilities on campus should continue to be achieved jointly by the University and the County.
- One mitigation action in the County plan discusses the identification of structures for retrofit projects, particularly at UMES, for which the University would be the applicant. This should be made a priority and UMES and the county should work closely to develop project applications.
- The 2005 County HMP recognizes that the campus could grow to more than 5,000 students by the year 2008 and that new student housing would be constructed adjacent to the campus within the growth corridor. The City of Princess Anne and the University should work together in identifying suitable locations for off-campus student housing and identify properties that are not in high-hazard areas such as in or near the floodplain.

Somerset County Comprehensive Plan (2002)

The Somerset County Comprehensive Plan serves as a general long-term guide for growth and development in the County and its municipalities. The Plan includes an important special activities goal: To establish a Joint Consultative Committee between the County, Town of Princess Anne, and UMES to coordinate expansion programs, annexation issues and areas of mutual interest, including provision of off-campus amenities and recreation opportunities for students. This goal is vital to improve the relations with UMES. The University, City, and County should regularly communicate and cooperate on issues and work together to coordinate decision-making and share resources.

Under the Environmental Goals, the Plan discusses the need for respecting sensitive areas such as floodplains and wetlands, and discouraging new development in areas in areas with steep slopes, unstable soils, or has the potential for flooding or erosion, and promotes cluster development. These goals closely mirror hazard mitigation planning principles:

The Plan designates the area to the northeast of UMES as one of three growth nodes for the county, which will be primarily residential in nature. It discusses that stronger ties should be developed between UMES and the Town of Princess Anne, particularly in providing services and entertainment needs for the students. It also recommends that the Town work closely with the University and take student needs into consideration while developing a commercial area revitalization program.

Options for Coordination between the UMES and Somerset County Comprehensive Plan

- The County, City and University should collaborate in preparing grant applications and work closely with the State to understand the mitigation program and allocation of mitigation dollars from the State for project development, particularly where the project is of interest to the local jurisdiction (City or County) as well.
- The City and University should collaborate on applying for joint funding for emergency management equipment.

Somerset County Emergency Operations Plan

Somerset County is currently in the process of completing their new Emergency Operations Plan, using the Emergency Support Functions (ESFs). The Plan is expected to be completed this spring. Currently there are no memorandums of agreements between the County and UMES although the University plays a large role in the County's Sheltering Plan. UMES representatives are invited to the County EOC meetings to stay in the loop on any emergency situations and means of response.

Options for Coordination between the UMES and Somerset County Emergency Operations Plan

- Involve the University in reviewing the draft EOP when completed.
- Continue to have discussions with the University in areas where there can be mutual aid to one another and consider a memorandum of agreement, if appropriate.

Maryland Hazard Assessment (2005)

Part V of the Maryland Hazard Assessment comprises jurisdictional profiles that have risks summarized for weather related- and other natural hazards and technological risks for each county in the State. The State Risk Assessment considered the following for each of its jurisdictions: the hazards for which numerous Maryland jurisdictions share significant risk; jurisdictions that face the largest number of hazards with significant risks; and jurisdictions that appear to be most vulnerable to specific types of hazards. The State assessment ranks Somerset County as high risk for hurricane/tropical storm and storm surge and wildfires and as medium-high risk for ice and medium risk for hail and tidal/coastal flooding.

- Future updates to the UMES Hazard Mitigation Plan should continue to take into account the State Risk Assessment data for Somerset County to ensure that the hazards identified as high priority continue to be aligned with those identified by the State.

Maryland State Hazard Mitigation Plan (2005)

The Maryland State Hazard Mitigation Plan addresses risks, mitigation capabilities, strategies and actions on a State level. There are a few areas of the State plan that suggest possible actions on the part of both the State and UMES that would help to align their mitigation goals and strategies, and would foster cooperation between the groups to advance mitigation efforts.

Options for Coordination between the UM and State Hazard Mitigation Plans:

Section 7.1.3 of the State Plan states an objective to "identify and explore the implementation of mitigation activities for State-owned facilities that are most at-risk to multiple hazards and most valuable in terms of use and cost." The Plan states that the State should "begin the development of facility specific mitigation actions with the facilities that are at risk from one or more hazards. The strategy related to this objective is for the State to approach the agencies with responsibility for the facilities in order that potential mitigation projects can be included in the 2007 State plan update. The numbers in parentheses after the goals refer to sections in the Maryland State plan.

- One of the goals in the State Plan is to have the State Mitigation Planner serve on other boards and committees. UMES should continue to invite State mitigation representative to participate in their annual hazard mitigation project update meeting. This would improve understanding of mitigation principles and may improve UMES' opportunities for securing FEMA mitigation grants.
- Expand mitigation education and outreach efforts (7.1.6).
- Undertake and sustain efforts to identify and analyze projects that reduce wind risk to UMES' assets and operations (7.5.1).
- Continue efforts to ensure that building codes are enforced with regard to wind resistance (7.5.3).

- Explore mitigation options for mitigating the effects of “criminal actions” (presumed to mean acts of terrorism, sabotage or vandalism) in combination with natural hazard mitigation efforts. (7.12.1).

APPENDIX C – BEST PRACTICE EXAMPLES FROM VARIOUS STATES

Appendix C provides excerpts from current local plan and ordinances wherein natural hazard mitigation concepts and safety principles are integrated. The intent of these excerpts is to provide planners with examples and language used to include in plans and ordinances in their communities. Table C-1 list plans that can be referenced for best practice examples. The plans shown as **bold** and shaded are those excerpted in Appendix C.

Table C-1. List of Best Practice Examples from Various States

Location	Plan Name
Arizona	City of Yuma 2012 General Plan
California	**City of Berkeley General Plan**
	City of Gilroy, CA General Plan (June 2002)
	2035 Kings County General Plan
	City of Roseville General Plan
Colorado	Adams County, Colorado Transportation Plan, December 2012
Delaware	City of Lewes Integrated Hazard Mitigation and Climate Adaptation Action Plan
Georgia	Savannah Flood Mitigation Plan
Idaho	**Twin Falls County Comprehensive Plan**
Illinois	Evansville-Vanderburgh County Area Plan Commission Comprehensive Plan
	2009 City of Oglesby Comprehensive Plan
Kansas	**Greensburg Sustainable Comprehensive Master Plan**
Louisiana	New Orleans 2030 Master Plan
Maine	Town of Bourne, Maine, Local Comprehensive Plan
	The Town of Pepperell's Comprehensive Plan Update 2007-2016
Maryland	2008 Disaster Resistant University Plan for University of Maryland Eastern Shore
Michigan	2012 Park, Recreation, Open Space & Greenways Plan
Minnesota	**2011 Roseau Comprehensive Plan**
Mississippi	2008 Comprehensive Plan for Lamar County, MS
New Hampshire	**The Town of Tamworth Master Plan**
New Jersey	Franklin Township Flood Mitigation Plan
New York	City of New York Waterfront Revitalization Program
Nevada	Capital Improvement Program – Douglas County, Nevada FY 2012-2016
Oklahoma	City of Tulsa Multi- Hazard Mitigation Plan (2009) Plan
Oregon	**State of Oregon – Systemic Plan Integration in Oregon: A Statewide Example of Reducing Risk Through Planning**
	City of Portland: Economic Development Strategy: A Five-Year Plan for Promoting Job Creation and Economic Growth

Location	Plan Name
Pennsylvania	2010 Lycoming County Hazard Mitigation Plan
	2013 Schuylkill County, PA Multi-jurisdictional Hazard Mitigation Plan Update
	2013 Wyoming County, PA, Hazard Mitigation Plan Update
Rhode Island	City of Providence Comprehensive Plan
South Carolina	Horry County Hazard Mitigation Plan
Virginia	Fredericksburg, VA Unified Development Ordinance
	Fairfax County: Commonwealth of Virginia 2009 Construction Code
Washington	Yakima County 2015 Comprehensive Plan
Wisconsin	State of Wisconsin: A Guide and Model for Preparing a Local Government and Tribal Organization All Hazards Mitigation Plan
Wisconsin	2005 Dane County, WI, Water Quality Plan
Wyoming	Laramie County Comprehensive Plan

[A] City of Berkeley General Plan (2013)

Community: California
Plan Name: City of Berkeley
Example Type: City of Berkeley General Plan
Weblink: http://www.fema.gov/media-library-data/20130726-1908-25045-0016/integrating_hazmit.pdf

The City of Berkeley, California, successfully integrated hazard mitigation content throughout nearly all elements of its General Plan, which is also formally linked to the City's local hazard mitigation plan. This is an example of how hazard mitigation may be integrated into the various elements of a local comprehensive plan. Both examples highlight the relationship between each element and Federal requirements for local hazard mitigation plans

The table shown on the following pages is intended to illustrate how hazard mitigation may be integrated into a local comprehensive plan. It provides relevant excerpts ("Hazard Mitigation Content") as taken from each element of the City of Berkeley's General Plan. This includes the following elements: § Introduction §Land Use § Transportation § Housing §Disaster Preparedness and Safety §Open Space and Recreation §Environmental Management §Economic Development and Employment §Urban Design and Preservation §Citizen Participation § Implementation. A third column, "Potential Hazard Mitigation Elements," has been added to the table to highlight the relationship between the hazard mitigation content included in each element of the Berkeley General Plan (or perhaps where additional content could be included), and Federal requirements for local hazard mitigation plans (Title 44 Code of Federal Regulations §201.6).

As can be seen in this example the City of Berkeley integrated hazard mitigation goals, policies and actions throughout nearly all elements of its General Plan. The City also maintains a separate Disaster Mitigation Plan as an appendix to the General Plan, which was prepared specifically to meet the Federal requirements for local hazard mitigation plans. Most of the actions in the Disaster Mitigation Plan are directly taken from the General Plan's Disaster Preparedness and

Safety Element, and the Disaster Mitigation Plan also includes an appendix with a matrix comparing Mitigation Plan Actions with General Plan Policies and Actions.

Land Use

The Introduction identifies seven major goals for the Plan, including the following goal statement that is focused on hazard mitigation:

Goal: Make Berkeley a disaster-resistant community that can survive, recover from, and thrive after a disaster.

The Land Use Element integrates several policies and actions related to hazard mitigation:
Policy-Action: When evaluating development proposals or changes to zoning consider General Plan and Area Plan policies, Zoning and Subdivision Ordinance standards, existing land uses, environmental impacts, safety and seismic concerns, social and economic consequences, and resident, merchant, and property owner concerns.

Policy: Ensure that all residential areas are safe and attractive places to live.
Policy-Action: Carefully review and regulate proposals for additional residential development in the Hill Fire Hazard Area and the tsunami, seismic and landslide hazard areas.

Transportation

The Transportation Element integrates several policies and actions related to hazard mitigation:

Policy: Continue to evaluate the possibility of working with the City of Albany, the racetrack owners, regional transportation agencies, and AC Transit to establish a ferry terminal and regular San Francisco ferry service from Berkeley at the foot of Gilman Street or at the foot of University Avenue as an alternative to the Bay Bridge and as an essential recovery element following a significant seismic event.

Policy-Action: Restrict tank vehicles with potentially hazardous materials in residential and other areas such as the Hazardous Fire Area.

Policy: Provide for emergency access to all parts of the city and safe evacuation routes.
The Emergency Access and Evacuation Network map identifies the roadways in the city that must be maintained for emergency access and emergency evacuation in case of a major disaster, such as fires, earthquakes, floods, reservoir rupture, or hazardous materials release.

Housing

The Housing Element integrates an objective and several policies and actions related to hazard mitigation:

Objective: Existing housing should be maintained and improved. Improvements that will prepare buildings for a major seismic event should be encouraged.

- *Policy*: Maintain housing supply and reduce the loss of life and property caused by earthquakes by requiring structural strengthening and hazard mitigation in Berkeley housing.
- *Policy*: Encourage and facilitate addition of second and small “in-law” units on properties with single-family homes, but not in areas with limited parking and vehicular access or that are especially vulnerable to natural disaster.
- *Policy*-Action: Identify zoning districts where emergency shelters shall be allowed as of right, including a year-round emergency shelter.

Disaster Preparedness and Safety

The Disaster Preparedness and Safety Element includes six objectives:

1. Establish and maintain an effective emergency response program that anticipates the potential for disasters, maintains continuity of life-support functions during an emergency, and institutes community-based disaster response planning, involving businesses, non-governmental organizations, and neighborhoods.
2. Improve and develop City mitigation programs to reduce risks to people and property from natural and manmade hazards to socially and economically acceptable levels.
3. Plan for and regulate the uses of land to minimize exposure to hazards from either natural or human-related causes and to contribute to a "disaster-resistant" community.
4. Reduce the potential for loss of life, injury, and economic damage resulting from earthquakes and associated hazards.
5. Reduce the potential for loss of life, injury, and economic damage resulting from urban and wildland fire.
6. Reduce the potential for loss of life and property damage in areas subject to flooding.

Open Space and Recreation

The Open Space and Recreation Element integrates a policy and several actions related to hazard mitigation:

Policy: Implement the 1986 Waterfront Plan policies to establish the waterfront as an area primarily for recreational, open space, and environmental uses, with preservation and enhancement of beaches, marshes, and other natural habitats.

Environmental Management

The Environmental Management Element integrates several policies and actions related to hazard mitigation:

Policy: Work with owners of vulnerable structures with significant quantities of hazardous material to mitigate potential risks.

Policy: Establish a way to warn residents of a release of toxic material or other health hazard, such as sirens and/or radio broadcasts.

Policy -Action: Ensure that new development pays its fair share of improvements to the storm sewerage system necessary to accommodate increased flows from the development.

Policy: Encourage drought-resistant, rodent-resistant, and fire-resistant plants to reduce water use, prevent erosion of soils, improve habitat, lessen fire danger, and minimize degradation of resources.

Urban Design and Retrofit

Policy: Encourage and support the long-term protection of historically or architecturally significant buildings to preserve neighborhood and community character.

Action: Encourage, and where appropriate require, owners of historically or architecturally valuable buildings to incorporate disaster-resistance measures to enable them to be feasibly repaired after a major earthquake or other disaster.

Action: Create incentives for owners of historic or architecturally significant structures to undertake mitigation to levels that will minimize the likelihood of demolition and maximize the ability to repair or avoid damage in the event of a natural disaster.

Action: In preparing for the period after the next big earthquake, firestorm, or other major disaster, establish preservation-sensitive measures including requirements for temporary shoring

or stabilization where needed; arrangements for consulting with preservationists; expedited permit procedures for suitable repair or rebuilding of historically or architecturally valuable structures; and, where appropriate, provisions for replanting. Encourage use of FEMA funds for rehabilitation of such structures wherever possible.

Policy-Action: Consider providing new or expanded sources of financial assistance for unreinforced-masonry and other structures, including historically or culturally significant ones that need seismic retrofit.

[B] City of Roseville General Plan (2025)

State: California
Community: City of Roseville
Plan Name: City of Roseville General Plan
Example Type: Comprehensive Plan
Weblink:
http://www.roseville.ca.us/planning/general_plan_n_development_guidelines.asp
http://www.roseville.ca.us/fire/preparedness/hazard_mitigation_plan.asp

Established direct linkages through content reference and mutual update triggers between the General Plan and Hazard Mitigation Plan. The Hazard Mitigation Plan has also been incorporated by reference into the Safety Element of the General Plan, as it includes greater detail and more robust risk analysis than Safety Element requirements.

Section VIII – Safety

The citizens of Roseville rely on the City for many of their safety needs, such as fire and crime prevention. They count on the City to plan for, and protect them from, natural hazards such as flooding, earthquakes, and other potentially dangerous situations. The Safety Element addresses safety concerns of the community and sets forth the goals and policies essential for their resolution. The Safety Element is comprised of the following components:

Seismic and geologic hazards include goals and policies to protect the City's residents from danger associated with active faults, liquefaction, ground failure (landslides), and steep slopes. While the potential for seismic and geologic hazard occurrences in Roseville is not high, the soil and geologic characteristics of the City continue to play an important role in determining safety procedures.

Flood control underscores the need for development standards along the City's floodways. Since the floods of 1986, the City's flood-prone areas have been redefined and, in some cases, regulations pertaining to development in these areas are more restrictive to protect life and property.

Police services addresses protection of persons and property within the City by application of the crime prevention unit, building security ordinance, department training program, and streets patrol.

Fire protection includes goals and policies to prevent and protect against catastrophic fires and minimize the loss of life and damage to property and the environment. Policies are established to achieve a four-minute response time and an ISO rating of 3 or better.

Hazardous materials addresses the need for the safe and efficient handling of hazardous materials and implementation of programs that will comply with State law. This includes requirements for the submittal of a Hazardous Materials Management Plan (HMMP) and emergency response procedures for hazardous spills.

Health services includes the existing status of health services within the City of Roseville and provides policies that ensure that medical needs are met. Trauma center services and health care for indigents are addressed.

Electromagnetic fields include the Electric Department's policy of "prudent action" with regard to electromagnetic fields (EMF).

Seismic and Geologic Hazards

Goal 1: Minimize injury and property damage due to seismic activity and geologic hazards.

Flood Hazard

Goal 1: Minimize the potential for loss of life and property due to flooding.

Goal 2: Pursue flood control solutions that are cost-effective and minimize environmental impacts.

Hazardous Materials

Table C-2. Implementation Measures for Various Hazards

Seismic and Geologic Hazards	Implementation Measures
1. Continue to monitor seismic activity in the region and take appropriate action if significant seismic hazards, including potentially active faults, are discovered in the planning area.	California Division of Mines and Geology Studies Emergency Operations Plan
2. Continue to mitigate the potential impacts of geologic hazards through building plan review.	California Building Code
3. Minimize soil erosion and sedimentation by maintaining compatible land uses, suitable building designs, and appropriate construction techniques.	Development Review Process – Grading and Erosion Control Ordinance Specific Plans
4. Comply with State seismic and building standards in the design and siting of critical facilities including police and fire stations, school facilities, hospitals, hazardous material manufacture and storage facilities, bridges, and large public assembly halls.	Land Use Designation California Division of Mines and Geology Studies California Building Code
5. Create and adopt slope development standards prior to or as part of the planning process for any area identified as having significant slope.	Development Review Process Specific Plans
6. Require contour grading, where feasible, and re-vegetation to mitigate the appearance of engineered slopes and to control erosion.	Development Review Process Grading and Erosion Control Ordinance
Flood Protection	**Implementation Measures**
1. Continue to regulate, through land use, zoning, and other restrictions, all uses and development in areas subject to potential flooding and require new development to comply with the State Plan of Flood Control.	Land Use Designation Ordinance Modification Development Review Process Multi-Hazard Mitigation Plan
2. Monitor and regularly update City flood studies, modeling and associated land use, zoning, and other development regulations.	Flood Information Update National Flood Insurance Program
3. Continue to pursue a regional approach to flood issues.	
4. Provide flood warning and forecasting information to community residents to reduce impacts to	Placer County Flood Control District

personal property. 5. Minimize the potential for flood damage to public and emergency facilities, utilities, roadways, and other infrastructure. 6. Require new developments to provide mitigation to insure that the cumulative rate of peak run-off is maintained at pre-development levels. 7. Continue to implement the Storm Maintenance Program to keep creeks and storm drain systems free of debris. 8. Establish flood control assessment districts or consider other funding mechanisms to mitigate flooding impacts. 9. Where feasible, maintain natural stream courses and adjacent habitat and combine flood control, recreation, water quality, and open space functions.	Interagency Coordination Flood Alert and Early Warning Systems Ordinance Modification Development Review Process Specific Plans Master Drainage Plan Storm Maintenance Program Financing Mechanisms Specific Plans Financing Mechanisms Land Use Designation Ordinance Modification Specific Plans
Hazardous Materials	**Implementation Measures**
1. Require the disclosure of the use and storage of hazardous materials in existing and proposed industrial and commercial activities and siting of hazardous waste disposal facilities in accordance with Placer County guidelines and State law. 2. Work with Placer County and other public agencies to inform consumers about household use and disposal of hazardous materials. 3. Cooperate fully with both public and private agencies, as defined in the City of Roseville Hazardous Materials Emergency Response Plan in the event of a hazardous material emergency. 4. Develop a hazardous materials truck route through the City of Roseville and limit pickup and delivery of hazardous materials during peak traffic hours.	Hazardous Materials Listing Development Review Process Hazardous Waste Management Plan Inter-governmental Coordination Hazardous Waste Pickup Hazardous Materials Data Base Interagency Cooperation Hazardous Materials Truck Route

[C] Town of Tamworth Master Plan (2008)

State: New Hampshire
Community: Town of Tamworth
Plan Name: The Town of Tamworth Master Plan
Example Type: Comprehensive Plan
Weblink: http://www.tamworthnh.org/mps.html

Chapter 9 of the Tamworth Master Plan includes a Natural Hazards element that examines and profiles the potential natural hazards to Tamworth, considers elements of the built environment,

which are at risk from natural hazards, and identifies the following goals and recommendations to address natural hazards.

Hazard Vulnerability

It is important to know what risks Tamworth residents face from natural hazards. The Town of Tamworth Hazards Mitigation Plan of August 2004, compiled by Lakes Region Planning Commission, examines these risks.

Table C-3. Hazard Ranking

High	Medium +	Medium	Low
Flood	Earthquake	Drought	Extreme Heat Tsunami
Wildfire		High winds	Subsidence
Radon		Thunderstorms	Landslide
Nor'easter		Hurricanes	Avalanche
Heavy Snow		Downburst	
		Lightning	
		Hail	

Hazard Mitigation Goals

In 1995, Tamworth's Master Plan listed the following hazard mitigation goals:

- To raise the standard of municipal facilities, services, and infrastructure to meet the needs of Tamworth's current and future population.
- To participate actively with regional and State highway planners to assure that major route construction or reconstruction will serve the interests of the town.
- To provide for safe and efficient traffic flow along all local roads and State highways in Tamworth.
- To provide safe housing for all residents.
- To guide quality commercial and environmentally sensitive and low impact industrial development to appropriate locations.

In 2004, the Tamworth Hazard Mitigation Plan outlined the following hazard mitigation goals (as adapted from the NH State goals; http://www.nhoem.state.nh.us/mitigation/):

- To reduce the potential impact of natural and manmade disasters on the town's critical support services, facilities and infrastructure.
- To improve emergency preparedness.
- To reduce the potential impact of natural and manmade disasters on private property, the town's economy, and Tamworth's natural environment.
- To reduce Tamworth's liability with respect to natural and manmade hazards generally.
- To reduce the potential impact of natural and manmade disasters on the town's specific historic treasures and interests, as well as other tangible and intangible characteristics which add to the quality of life of the citizens and guests of Tamworth.
- 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 and acceptance of hazard mitigation generally.

This 2008 (also included in Chapter 3, Implementation) Master Plan makes the following recommendations concerning natural hazards

A. The Emergency Management Director should publish and otherwise make Tamworth residents and business owners aware of the Tamworth Emergency Management Plan.
B. The Planning Board should require that development meet the Hazard Mitigation Goals described in the Town of Tamworth Hazards Mitigation Plan.
C. The Planning Board, Fire Chief and the Board of Selectmen should require that developments and general construction of buildings and infrastructure conform to all safety codes.
D. The Planning Board should present to the voters for adoption a Building Code and Fire Safety Code (RSA 155-1, RSA 153-5).
E. The Planning Board should prohibit development in areas subject to flooding or wildfire.
F. The Board of Selectmen with the Emergency Management Director should provide for the frequent inspection of roads, dams, culverts and bridges to verify that they are safe and take the appropriate action if they are not.

[D] Twin Falls County Comprehensive Plan (2008)

State: Idaho
Community: Twin Falls County
Plan Name: Twin Falls County Comprehensive Plan
Example Type: Comprehensive Plan
Weblink:
http://www.twinfallscounty.org/files/planning_zoning/Final_comp_plan_with_map.pdf

The Comprehensive Plan's overall "Statement of Purpose" includes 12 specific objectives, including to protect life and property in areas subject to natural hazards and disasters. The Plan contains a chapter on Hazardous Areas, which assesses the natural and manmade hazards, categorizes, priorities, and maps the hazard areas.

Chapter 8 – Hazardous Areas

GOAL: OBJECTIVES:

1. Preserve the environment for future generations by ensuring that the highest level of safety and security for County residents that is reasonably possible by means of thorough and accurate identification and elimination of potential hazards of property and life.

   Ensure that new structures and development sites are designed to minimize likelihood of damage resulting from geologic and seismic hazards.

2. Ensure the flood prevention and flood prevention and floodplain standards minimize financial loss and maximize protection of property in the event of flooding.

3. Control sources of pollutants from entering water resources.

4. Identify transportation routes for the transportation of hazardous materials.

5. Maintain healthy air quality

6. Protect Twin Falls County's aquifer.

POLICIES:

1. Enhance emergency preparedness through public education, training, drills and exercises and develop a contingency plan.

2. Join with cities and State disaster services to maintain and improve an adequate emergency plan.
3. Ensure that Twin Falls County's flood prevention and floodplain development standards and practices provide satisfactory safeguards and public and private development.
4. Provide information and training regarding environmental problems or hazard areas to citizens.
5. Develop policies and ordinances that encourage wise disposal of hazardous materials (e.g., household chemicals, medicines, electronic products (computers, cell phone batteries and others.)
6. Adopt the appropriate fire codes regarding storage of chemicals.
7. Mini-storage units should be limited to the type of materials that can be stored in them. Identify areas of unstable slopes in Snake River, Salmon Falls Creek and Rock Creek. Develop partnerships with property owners to clean up identified Brownfields.

[E] Greensburg Sustainable Comprehensive Master Plan (2008)

State: Kansas
Community: City of Greensburg
Plan Name: Greensburg Sustainable Comprehensive Master Plan
Example Type: Comprehensive Plan
Weblink: http://www.greensburgks.org/residents/recovery-planning/sustainable-comprehensive-master-plan/view

This example is from FEMA's Integrating Hazard Mitigation into Local Planning – Case Studies and Tools for Community Officials, March 2013

On May 4, 2007, an EF-5 tornado struck the City of Greensburg, Kansas, destroying more than 90 percent of its building stock. In the wake of the disaster, the community set forth to rebuild and become a model sustainable rural community. The city adopted a Long-Term Community Recovery Plan in 2007, prepared through FEMA's Long- Term Community Recovery (LTCR) program. The LTCR program helped launch the preparation of a sustainable comprehensive plan to act as the blueprint for all new development in the city, providing direction and strategy for rebuilding. The Greensburg Sustainable Comprehensive Master Plan devotes an entire section to hazard mitigation, focusing on tornado, thunderstorm, and other high windstorm hazards.

Integration Highlights

- Integrating hazard mitigation into the recovery plan or land development code by requiring that power lines be buried to reduce damage and decrease the frequency of power outages.
- Require back-up generators for critical facilities and test them regularly. This can be accomplished by integrating hazard mitigation into the local zoning ordinance and defining critical facility.
- Requiring or recommending the use of native species in the local land development code or tree ordinance. Using native plants and trees for ornamental plantings decreases vegetation damage, as they are typically more wind tolerant.
- Strengthening the local building code to reduce wind related damages.

- Building safe rooms using FEMA guidelines and seeking FEMA funding for such structures.
- Integrating hazard mitigation into the local emergency preparedness plan by committing to become a StormReady community.

[F] 2011 Roseau Comprehensive Plan

State: Minnesota
Community: City of Roseau
Plan Name: 2011 Roseau Comprehensive Plan
Example Type: Comprehensive Plan
Weblink: http://www.city.roseau.mn.us/vertical/sites/%7B8FB1D8F3-5043-4518-90E7-60C266949462%7D/uploads/Roseau_Master_Plan.pdf

The City's Comprehensive Plan includes a "Hazard Mitigation" section. This section attempts to develop a framework for responding to all types of hazards as well as proposing mitigation steps for hazards that have repetitively struck the city, mainly flooding.

SECTION 12: HAZARD MITIGATION

12.1 Introduction

The Hazard Mitigation Section of the Comprehensive Plan addresses the City's response to the many potential hazards that threaten it. While it is not realistic to believe that the City can mitigate all potential hazards facing the community. This section attempts to develop a framework for responding to all types of hazards as well as proposing mitigation steps for hazards that have repetitively struck the city, mainly flooding.

12.2 Planning Context

The City of Roseau is particularly susceptible to a number of natural disasters such as severe storms, tornadoes, flash flooding, spring runoff flooding, blizzards, drought and other weather related hazards. Roseau regularly experiences spring runoff flooding and flash floods. In the past 10 years Roseau has experienced approximately 10 flood events requiring some type of protective response from the community. Flooding has resulted in the most damages to the City of Roseau with major floods inundating the city in the early 1900's, the 1960's and most recently the late 1990's and early 2000's. In 2002 the City of Roseau experienced its flood of record when a June rain event flooded approximately 75% of the built-up areas of the city causing over $100 million in public and private property damages.

12.3 Goals, Policies & Programs

Adequate Permanent 100-year Flood Protection for the Entire Roseau Community—

Nearly 75% of the total developed area of the City of Roseau and over 95% of the commercial development lie within the 100-year floodplain. This situation results in numerous negative impacts to the community. First and foremost the flood risk to these properties is very real and potentially devastating, as was witnessed in the 2002 flood.

Second, development of effective flood prevention structures and planning are of the utmost priority for the city's long-term social and economic viability.

City leaders and administrative staff need to require strict adherence to established floodplain ordinances, rules and regulations and continue to maintain and update as necessary the FIRM and 100-year floodplain mapping in the local floodplain ordinance

- Continue to strictly enforce the 100-year floodplain and regulations for new and existing developments
- Implement and/or support the implementation of Short– and Long-Range Flood Mitigations projects throughout the Watershed.
- Complete the construction the Roseau River East Diversion Flood Mitigation Project which removes the City of Roseau from the 100-year floodplain and provides flood fighting capacity up to the 500+ year event
- Support the completion of the Norland Impoundment Project
- Support the development of the Malung Impoundment Project upstream of Roseau
- Support the development of the Stafford Impoundment Project upstream of Roseau
- Support efforts of the Roseau River Watershed District to control water flow upstream and downstream of the City of Roseau through various projects and initiatives.
- Maintain a current comprehensive Hazard Mitigation Plan and Emergency Operations Plan and continually assess our readiness to respond to various emergency situation so that damages and loss of life can be mitigated.
- Continue to assess and update the All Hazard Mitigation Plan and Emergency Operations Plan to keep them current
- Work with FEMA, State of Minnesota and Roseau County to address major weaknesses in our preparedness for any specific hazards and update the City's Emergency Operations Plan regularly to assess the city's readiness for emergency response and necessary training of critical staff.
- Maintain the City's Emergency Operations Flow Chart and make sure all parties are properly trained for their roles according to the established NIMS policy.

[G] Systemic Plan Integration in Oregon: A Statewide Example of Reducing Risk Through Planning

Community: State of Oregon
Plan Name: Systemic Plan Integration in Oregon: A Statewide Example of Reducing Risk Through Planning
Example Type: Statewide Planning
Weblink: http://www.fema.gov/media-library-data/20130726-1908-25045-0016/integrating_hazmit.pdf

This example is from FEMA's Integrating Hazard Mitigation into Local Planning – Case Studies and Tools for Community Officials, March 2013

The State maintains a set of 19 Statewide Planning Goals on land use, citizen involvement in planning processes, housing, and natural resources. While all of these goals holistically address land use and development at the local level, three directly integrate natural hazard mitigation planning into land use planning. These include statewide planning goals that require communities to develop a factual basis for their comprehensive plans, including the development of inventories of hazard risk areas, which may also be used during the hazard mitigation planning process.

Statewide Planning Goal 7 states that developments may not be planned in areas of known natural hazard risk without appropriate safeguards. The Goal also states that local governments must adopt comprehensive land use policies that reduce risk to floods, landslides, earthquakes, tsunamis, coastal erosion, and wildfires. Goal 7 also standardizes a procedure for the sharing of new information on hazard risk with local governments. Planning Goals 17 and 18 incorporate hazard mitigation planning activities that are specific to coastal areas. Goal 17 focuses on

reducing hazards associated with coastal shorelands, and Goal 18 seeks to protect life and property through proper beach and dune conservation.

Oregon's land use planning and hazard mitigation efforts are well connected. Back-to-back winters with severe storms and flooding in 1996 and 1997 spurred the State to create the Governor's Interagency Hazard Mitigation Team, which guides State hazard mitigation planning efforts. This team of approximately 20 State agencies provides expertise, implementation support, and overall coordination for the State of Oregon Natural Hazards Mitigation Plan. The natural hazards identified in the State mitigation plan are consistent with those listed in Goal 7, which also builds in provisions for local communities to incorporate more localized hazard information into their comprehensive plans. Oregon's Department of Land Conservation and Development (DLCD) manages the State Natural Hazards Program, while working closely with emergency management staff to reduce losses.

The Oregon DLCD encourages local governments to participate in both the National Flood Insurance Program (NFIP) and the Community Rating System (CRS). The requirements of the NFIP and CRS are considered intrinsic land use tools to both the State and local communities.

Oregon's building code also incorporates hazard mitigation principles, regulating building construction with respect to earthquake risk, wind loads, wildfire risk, and flood hazards, while working hand-in-hand with the State's NFIP model ordinance. The building design standards, while optional, include best practices for design and construction in flood hazard areas. Beyond everyday building requirements, Oregon law requires new critical facilities undergo hazard-specific site analysis to create resilient critical and essential facilities; it also prevents placing critical facilities in tsunami hazard zones.

In order to effectively protect from floods and other hazards, Oregon communities use three key local land controls: overlay zoning, subdivision regulations, and transfer of development rights (TDR) programs. Overlay zoning specifies more stringent requirements to protect identified hazard-prone areas. For example, the City of Talent uses a combination floodplain, parks, and greenway overlay to protect the floodplain and ensure it can properly convey flood waters.

Subdivision regulations work to create safer future development, exemplified in Polk County, which prohibits subdivisions in the floodplain, and the State encourages other communities to use cluster development and performance bonds to encourage subdivisions in areas of the community that are deemed safe. TDR programs are used particularly for areas of known landslide hazard; TDRs transfer existing development rights from hazard-prone areas to safer areas. For example, Deschutes County requires developers to transfer the former right to development in landslide-prone areas to another parcel in a designated safe "receiving site."

Integration Highlights

- Setting a State or countywide planning agenda that clearly links local planning with preventing loss of life and property.
- Convening interagency experts to improve overall hazard mitigation integration.
- Standardizing risk information dissemination to empower local communities to make land use and development decisions based on the best possible information.
- Using overlay zoning and hazard-specific subdivision requirements to protect new and future development from hazards identified in hazard mitigation plans.
- Considering implementing TDR programs to move the right to development from unsafe to safe areas.
- Encouraging CRS participation at the statewide level to support local efforts.

Table C-4. Role in Plan Integration

Planning Mechanisms	Role in Plan Integration
Land Use Planning Goal 7	Natural hazards defined in Planning Goals are the same as those identified in the State hazard mitigation plan for a seamless connection across the planning and emergency management communities.
Interagency Hazard Mitigation Team	Recognizes the interdisciplinary nature of both land use and hazard mitigation, and strengthens connections and information sharing statewide.
Oregon State Building Code	Uses criteria specific to hazards identified in the State hazard mitigation plan and Goal 7 to promote safer building design and construction.
NFIP and CRS	Provides the framework for overlay zoning, subdivision regulations, and other land use controls to assist in hazard mitigation planning

APPENDIX D – MAP OF FEMA REGIONS

If you need assistance, contact your FEMA Region office.

APPENDIX E – CASE STUDY DETAILS

Appendix E includes the results of the Cecil County, MD Plan Integration Pilot case study (conducted by FEMA) as well as an example of Plan Integration that was done in Broward County, FL over the last two years. These case studies are described in Part 4 of this guidance document.

Case Study #1 – Cecil County, MD

The following information presents the recommendations for Plan Integration developed by Cecil County and its municipalities..

Review of Plans and Ordinances

This section below includes a review of the following county and municipal plans and ordinances as well as a list of suggestions to modify these plans and integrate hazard mitigation principles.

County Plans and Ordinances

- 2010 Cecil County Comprehensive Plan
- 2011 Cecil County Zoning Ordinance
- 2011 Cecil County Subdivision Regulations

Municipal Plans and Ordinances

- 2003 Elkton Downtown Master Plan
- 2013 Elkton Floodplain Ordinance – Title 15 – Ordinance 5
- 2013 Port Deposit Floodplain Management Ordinance
- 2009 Port Deposit Comprehensive Plan Water Resource Element
- Charlestown Zoning Ordinance
- Charlestown Subdivision Ordinance
- 2008 Charlestown Comprehensive Plan
- 2013 Perryville Zoning Ordinance Forest Conversation Chapter 48
- 2013 Perryville Zoning Ordinance Floodplain Management Chapter 46
- 2009 Chesapeake City Comprehensive Plan: A Plan for 2030

2010 Cecil County Comprehensive Plan

Add goal – *"Encourage Cecil County to become a disaster resistant community that can be prepared for and thrive after a hazard event."*

Add Objective: *Ensure that all new development is resistant to current and future hazards*

Page 3-29 3. *Add 'land use policies require development or redevelopment according to existing codes to reduce impact from hazards that discourage development or redevelopment within natural hazard areas – steep slopes, coastal areas, 100-year floodplain, wind speed zones over 100mph.*

4-1 Economic development
Page 4-21 – policies and actions
No. 4 – *Provide infrastructure including water sewer and roads to designated employment and mixed use areas with consideration of hazard areas.*

5-1 Transportation
Add goal on page 5-1 – *Develop transportation policies with consideration of hazard areas.*
Include on page 5-22 – other policies

Develop an emergency access and evacuation network map that identifies the roadways in the county that must be maintained for emergency access and emergency evacuation in case of a major hazard event –
Page 19. *While adopting the Airport Overlay district, ensure that the placement of the facilities (hangers, fuel storage) is planned with consideration of hazard areas.*

6-1 Water resources
6. *Consider hazards and safety while designing and siting of water and sewer systems to protect these facilities during hazard events and for their continued operation after a hazard event.*

6.8 No. 1 Action: *Aggressively pursue development of water resources infrastructure in the growth corridor with consideration of hazard areas. Develop policies for the proper design and siting of to protect these facilities during hazard events and for their continued operation after a hazard event.*

7. Sensitive Areas
Add *coastal zones* to bullets

Page 7-17 Other – *Consider policies to utilize land that is otherwise unsuitable for development for recreational purposes thereby lowering the county's risk.*

8 Community Facilities
Page 8-1 Site new facilities in or convenient to existing population centers and growth areas with consideration of hazard areas pursuant to the adopted code.

Section 8.12 Policies and actions – page 8-17 – *Site community facilities (public safety,, health and educational, and others) with consideration of hazard areas pursuant to the adopted code.*

Chapter 9 – Housing
Page 9-1 – *Accommodate residential growth by providing for and encouraging the development of a mix of housing types and densities in the Growth Corridor with consideration of hazard areas.*

Chapter 11
11.1 – Goals – *Establish funding and growth management mechanisms to ensure infrastructure and community facilities are provided concurrent with growth, demand, and consideration of hazard areas.*

Page 11-8

1. *Include hazard mitigation projects identified in the Hazard Mitigation Plan in the Capital Improvements Program.*
2. *Limit or prohibit expenditures on projects in the CIP that would encourage new development or additional development in areas vulnerable to natural hazards (Cordell from DPW to craft language).*

2011 Cecil County Zoning Ordinance

Part IV – Historic District page 333
Add new e
The historic structures of the County should be assessed for hazard vulnerability and potential risks should be identified during the application process.

Add purpose: add f to end of sentence
Preserve the integrity of the County's historic landmarks, sites, structures or districts while minimizing loss and damage from hazard events.
Integrate historic and cultural resource considerations into hazard mitigation planning.

Page 333 – Add section on historic preservation to comp plan – *Inventory and assess historic properties for hazard vulnerability and develop actions to address these risks.*
Refer FEMA 386-6 (How-to Guide) *Integrate Historic and Cultural Resource Considerations into Hazard Mitigation Planning.*
http://www.fema.gov/media-library-data/20130726-1522-20490-2886/howto6.pdf

2011 Cecil County Subdivision Ordinance

None

2008 Charlestown Comprehensive Plan
(Available at: http://www.charlestownmd.org/documents/2008ComprehensivePlan.pdf*)*

Chapter 3 Page 1 Goal: *Ensure development is consistent with the overall growth goals and objectives of the 2008 Charlestown Comprehensive Plan while paying attention to high hazard areas.*

Page 1 – Land Use
Objective – *Encourage Charlestown to become a disaster resistant community that can prepare for and thrive after a hazard.*

Page 2 – Resource Conservation
Require development design be done in a manner that will preserve significant natural features and other resources.

Page 2 Transportation
Develop transportation policies to guide growth to safe locations with consideration of hazard areas.

Page 3 Community Facilities
Develop community facilities in safe locations with consideration of hazard areas.

Page 3 Housing
Retrofit or replace public and publicly subsidized housing to reduce vulnerability during a disaster.

Community Design
Design new neighborhoods and appropriate infill and redevelopment based on sound place-making principles for hazard vulnerability and site vulnerability.

Page 8
Last paragraph – 1st sentence add *'incompatible uses as well as hazards.*

Page 9
End of 2nd paragraph add: *while addressing hazard vulnerability and structural integrity.*

Page 21
After *for water* add *Consider hazards when siting these new facilities.*

Charlestown Subdivision Ordinance

Page 15003

4. Further the orderly development of land while considering hazards.

6. Facilitate adequate provision for transportation, water, sewage, schools parks and other public facilities while considering hazard areas.

13…. Add floodplains to list.
14 ….Add *develop in a safe manner to save property and reduce injury and loss of life.*

Page 15009
150-16 – general requirements – Add D – *Consider cluster development/subdivisions by setting aside land that is subject to hazards and developing on the less vulnerable part of the property.*
Add e. *Research the concept of transfer of development rights and density transfers from hazard areas to less vulnerable areas*.

Page 15017 – at end of paragraph
Address floodproofing of utilities (raising electrical equipment, etc.) where applicable.

Charlestown Zoning Ordinance

Page 17528 Section 175-22 Floodplain District needs to be rewritten based on the 2013 Charlestown Floodplain Ordinance. Also consider the Maryland Model Floodplain Ordinance.

2003 Elkton Downtown Master Plan

Page 9 – Recommendation – review the local and County Hazard Mitigation Plan during the next update of the Master Plan.

Page 23
For discussion – acquiring sensitive areas as a priority of preserving open space

Page 33
Hazards and safe development should be considered for any type of use for open space areas (restroom facilities).

Page 45
Develop with hazards in mind

Page 61
Ensure new development is done with hazards in mind

Page 63
Hazards and safety measures need to be considered when planning for open space.

Develop a section on Safety in the Master Plan in 6.9 Implementing the Master Plan to contain the following:

- Road systems adequate for evacuation, notification
- Maintenance of bridges into downtown
- Historic sites within floodplain – Elk Landing
- Union Hospital
- Flooding of Elk Creek
- Proper siting and design requirements with hazards in mind for redevelopment sites
- Development of infrastructure – roads, bridges, open spaces and new development with safety in mind

2013 Perryville Floodplain Management Ordinance Chapter 46
Section 46-28 Gas or Liquid Storage Tanks should be elevated to Base Flood Elevation + 2 feet – page 46-25

2009 Port Deposit Comprehensive Plan

Go through a thorough review process and update with a Safety Element and relevant recommendations

Page 14 – Goals – Add Safety from Natural Hazards section – *To reduce the town's vulnerability to hazards.*

Page 20 add as section 3.3-11 Safety from Natural Hazards

- *To take hazards into consideration for any type of development.*
- *To reduce the potential impact of disasters on the town to protect the quality of life.*
- *To ensure the structural integrity of municipal facilities, services, and infrastructure to meet the needs of the Town's current and future population.*

Page 32 – Chapter 5 – Transportation 5.2.1
Add – *The Town shall address evacuation issues per the Regional Transportation Plan.*

Page 43 – Chapter 6 – Natural Resources and Sensitive Areas
Last bullet – *Ensure any development or redevelopment in the RCA is done with the consideration of hazard areas.*

Page 51 6.2.6 Stormwater Management
Add – *The Town follows the Cecil County Stormwater Management Ordinance*.

Water Resources Page 89
Section 11.6 – Section needs to be rewritten and updated to reflect that the agreement with a contractor (leave term 'contractor' generic) to provide the community's water supply

2013 Port Deposit Floodplain Ordinance
No comments

2009 Chesapeake City Comprehensive Plan: A Plan for 2030

Page 2: add
Quality of Life and Sustainability: A high quality of life is achieved through universal stewardship of the land, water, and air resulting in sustainable and *disaster resilient communities* and protection of the environment.

Page 3 – The comprehensive plan principles address flooding. We support this idea

Page 20 – reword objective 1 and add….
Development in the Chesapeake City's growth areas occurs in an ecologically sustainable way *with consideration of hazard areas*.

Page 21 – add

Existing facilities and services are maintained, improved, and optimized as the Town grows. The town and outside agencies work together *to consider hazards such as flooding* during facility upgrades to ensure they occur at appropriate stages and that quality service is maintained

Page 22 – Under land use goals, add a last goal
Any development within the Town should consider hazards.

Page 26 – add

To reduce the ecological impact of future development and to the extent possible, restore and protect natural areas *such as critical habitat areas, floodplain, wetlands, and steep slopes.*

Page 36 – plan for environment resources and sensitive areas

Growth areas A and B have substantial land area within the Critical Area. The plan for development for areas A and B includes much of the preservation of much of the RCA in the

critical area. Development of residential and commercial areas with associated infrastructure will largely occur outside the critical area.

There is some discrepancy between low impact development (page 36) and low density residential (page 24) needs to be flushed out.

Page 36 – Town's policy should be referenced page 37-20

Town's policy to establish river, wetlands, and floodplain buffers. This plan recommends establishing buffer zones along the Town's water resources. Buffers should be established as follows"
Streams: 300 feet, canal: 200 feet; floodplains: 50 feet; wetlands 50 feet.
Page 36: Prior to location and design of public facilities or the approval of private development that may be impacted by sea level rise because of their location the planning commission of the anticipated extent of sea level rise such as mapping becomes available and is refined for its use.

Page 37 – action to update the zoning ordinance to require buffers around streams, floodplains, and wetlands. Buffers should be:
Streams: 300 feet, canal: 200 feet, floodplains: 100 feet, wetlands: 50 feet

The floodplain buffer is doubled from 50 feet to 100 feet. This is good.

Inconsistent with other verbiage in document

- Page 38 – 2nd bullet – sewer facilities area adequate to serve the town.
- Page 10 – In this regard this comprehensive plan recognizes that there is presently insufficient water and sewer capacity to serve the approved housing units in the town.
- Page 38 – 1st bullet – there is adequate drinking water to serve residents.

Page 46 – good references to mitigation principles

- Objective – The most ecologically sound practices of stormwater management are incorporated into development planning.
- Require forested buffers in growth areas to ensure that stormwater does not enter streams, creeks, or the canal directly.
- Update Zoning Ordinance to make low impact development the standard for all new development.
- Update the Zoning Ordinance to require on-site stormwater management. The Zoning Ordinance should also allow for shared stormwater management systems in dense commercial areas. Buffers are established around streams, wetlands, and floodplains.

Page 47 – revise goal
Keep MD 213 open for safe efficient regional traffic flow and evacuation while protecting the circulation needs of the Town's residents.

2010 Town of Elkton Comprehensive Plan

Page 2.3 – include Cecil County and Elkton Hazard Mitigation Plan Updates to bullets.

Page 2.4 – as last bullet add – *how to make the community more resistant to disasters.*

4.1 add as last bullet – develop Elkton in a manner that is less vulnerable from hazards.

Page 5. 1. Add
Consider hazards and safety while designing and siting of water and sewer systems to protect these facilities during hazards events and for their continued operation after a disaster.

Page 5-15 extend sentence –

A major goal of the Water Resources chapter is to more closely link land use and development to water quality *and to ensure the safety of water resources infrastructure.*

Page 5-16 Add as bullet 18
Develop water resources infrastructure in the Town with the consideration of hazard areas. Develop policies for the proper design and siting to protect these facilities during hazard events and for their continued operation after a disaster event.

Page 6-1 add *floodplain* to 2nd bullet under Goals and Objectives.

Page 6-1 add last bullet
Continue to preserve sensitive areas to mitigate impact from disasters.

Page 7-1 add bullet
Develop transportation networks with consideration of hazard areas.

Page 7-8 add – bullet 3 under Future Traffic
Preserving US 40 as a free flowing highway though Elkton. If US 40 is to continue to function as the center of commercial activity, not only in Elkton, but for the county as a whole, travel along the road must be efficient*, address evacuation issues, and make destinations accessible.*

Page 7-19 add 18
Design and build transportation systems that lessen impacts from hazards.

Page 8-14 5a – extend sentence
Continue to implement provisions in the Town's development ordinances to preserve floodplains, wetlands, and other ecologically significant areas*, which could also reduce vulnerability to hazards.*

Page 9-1 add bullet
Build housing by providing for and encouraging development with consideration of hazard areas.

Page 10-1 extend sentence
Provide adequate and suitable land areas zoned for economic expansion and provide public facilities to support these sites. *Suitable land areas should include consideration of hazard areas.*

Page 10-11 add
Protect all commercial and industrial development in the Town of Elkton by ensuring that existing and new development is resistant to hazards.

Page 11-1 extend 3rd bullet
Support the revitalization of neighborhoods through the renovation and adaptive reuse of older structures *while considering hazards.*

Page 12-2 – add
Integrate policies and actions of the Town's Hazard Mitigation Plan and the County's Hazard Mitigation Plan with respect to hazards.

Case Study #2 – Broward County, FL

This case study completed for Broward County, FL, described in Part 4 of this guidance, comprises the following three sections:

- Part 1 – Integration of Hazard Mitigation Principles into other Local Planning Mechanisms
- Part 2 – Integration of Hazard Mitigation Principles into Comprehensive Plan Elements

Broward County, FL, and its jurisdictions have measures in place to leverage planning, coordination, and resources among county and municipal departments, businesses, non-governmental organizations, and regional partners to integrate hazard mitigation planning before and after disasters to enhance the communities' disaster resiliency. There are also additional opportunities for further integration. These measures and opportunities are featured in this case study.

Part 1 – Integration of Hazard Mitigation Principles into Other Local Planning Mechanisms

Step 1. Collect Documents: The following local plans were collected for review:

(1) *Enhanced Local Mitigation Strategy* (ELMS)
(2) *Comprehensive Emergency Management Plan* (CEMP)
(3) *Countywide Recovery Process* (CRP) (2011)
(4) *Broward County Continuity of Operations Plan* (COOP)
(5) *Climate Change Action Plan* (CCAP)
(6) *Long Range Transportation Plan* (LRTP)
(7) *VisionBROWARD*: A Community Economic Development Partnership
(8) *Long Term Recovery and Redevelopment Strategy* (LTRRS)

Step 2. Review Guide Questions: The review guide questions were used to support the plan review.

Step 3. Review Best Practices/Examples: A review was conducted to identify the plan strengths as well as opportunities for further hazard mitigation integration into each plan.

The following section presents the results of the review for if and how hazard mitigation principles were included in each of the seven documents. The document review comprises an overview, a description of the plan strengths, and a discussion of options for additional integration of hazard mitigation principles into each plan:

(1) *Enhanced Local Mitigation Strategy* (ELMS) (2012)

Overview: The ELMS is the community's blueprint for how it intends to reduce the impact of natural and human-caused hazards on people and the built environment. The ELMS is also known as the Hazard Mitigation Plan. Essential elements of an ELMS include a risk assessment, capability assessment, mitigation strategy, and the mitigation projects list. These and other elements of the ELMS are designed to also support community planning and any future long-term recovery processes.

Plan Strengths:

- Detailed integration of mitigation into other plans is capture in the "Incorporation into Existing Planning Mechanisms" subsection (pp. 315- 323). This subsection includes descriptions of integration into key County on-going planning process including the

Comprehensive Plan and the Capital Improvement Plan. A description of the Mitigation Assessment Team (MAT) process (pp. 322-323) outlines a process that "can identify opportunities for proactive mitigation measures to be identified year round."

- The ELMS includes a sea level rise/climate change hazard profile and vulnerability assessment (pp. 138-146), hazard vulnerability profile for existing and future land uses (pp. 53-58), a flood analysis mixed with the wind analysis for hurricanes (pp. 86-104), Hazus-MH flood analysis results for typical Category 3 storm surge (pp. 103-104) and Zone A – Coastal/Riverine (pp. 113-132). Various data sources were used to determine the acres of land by land use classification in the 100-year floodplain, the Coastal High Hazard Area and the Hurricane Vulnerability Zone Table 4-3 (pp. 43-45 and potential building losses for 10-, 50- 100- and 500-year flood events (pp. 118-121).
- Also includes an Economic Vulnerability Chapter (pp.172-268).
- Use of Hazus to more specifically estimate potential damages
- The ELMS describes that, "Prior to hurricane season each year, the guiding principles, hazard identification and vulnerability assessment and the mitigation initiatives shall be incorporated into county and State exercises. The local exercise shall involve the activation of the Emergency Operations Center with municipal representation and all 18 Emergency Support Functions." (p. 38). Mitigation staff participated in the Florida Catastrophic Planning Workshop where a Cat 5 coming into Broward was simulated. (p.114). One objective (3.1) is to include education and exercise curricula for public and private officials in hazard mitigation and emergency management. (p.279)
- Oakland Park is a good example of a city that is coordinating floodplain management with land development regulations (p. 300).

Options for Additional Integration of Hazard Mitigation Principles into the ELMS:

- Follow-up actions on the Economic Vulnerability section. This information could be presented to businesses to communicate the risk in the key commercial areas.
- Follow-up on private sector efforts to further incorporate mitigation. Have a demonstration of mitigation efforts by different companies during each ELMS Private Sector Committee meeting.
- Provide follow-up specific examples of how the County has incorporated mitigation into Capital Improvement Process. Provide demonstration of this to municipalities so they can follow the lead.
- Follow-up on efforts started in ELMS to help municipalities incorporate mitigation into their comprehensive plans.
- Include specific data that is useful for developing hazard mitigation strategies, such as detailed analyses using GIS, SLOSH, and Hazus hot spots, and include close-up maps of the 10-year flood hazard areas.
- Include a map of wind zones to complement Table 4-20, pp. 99-100).
- Make an actionable section of the LMS that has a checklist to help re-assess projects after a disaster based on actual damages and available funding.
- Include the Capital Improvement project list by reference in the ELMS, for those projects that include hazard mitigation measures. Specify which projects are already underway.
- Prepare and conduct an exercise focused on how mitigation can better be incorporated into the short-term and long-term recovery process. Invite staff that is involved with other planning processes that do or could involve hazard mitigation (e.g., Capital Improvement project and long range transportation project development and implementation).

(2) *Comprehensive Emergency Management Plan* (CEMP) (2009)

Overview: In Florida, a CEMP is the all hazards Emergency Operations Plan. The CEMP establishes a framework through which the governments and agencies of Broward County will prepare for, respond to, recover from, and mitigate the impacts of a major or catastrophic emergency, which would adversely affect the health, safety, and general welfare of its residents. The CEMP includes components that are strategically and procedurally oriented. The CEMP describes the basic strategies, assumptions, and mechanisms through which the local and county governments and agencies will mobilize resources and conduct activities to guide and support efforts for emergency operations. The CEMP promotes hazards vulnerability reduction and expedient onset of disaster recovery.

Plan Strengths:

- The CEMP includes a description of the hazards vulnerability for flood (pp. 22 and 27) and for wind (pp. 19-21), as excerpted from the LMS.
- The CEMP explains that mitigation is integrated through the post-disaster damage assessment process (pp. 94-95). Post-disaster mitigation assessment is performed by a multi-agency Mitigation Assessment Team to identify needs and strategies for future mitigation initiatives. The team evaluates building and infrastructure damage and assists the LMS Executive Committee reevaluate and update mitigation strategies and projects.

Options for Integration of Hazard Mitigation Principles into the CEMP:

- Include a reference to the more detailed flood and wind vulnerability analyses in the LMS. Note that the Broward County official Risk and Vulnerability Analysis is presented in the LMS, Chapter 4.
- Include a process and organizational structure for the ESFs to transition into short and long term recovery functions to coordinate response, and short and long term disaster recovery decision making, including the identification for mitigation opportunities.

(3) *Countywide Recovery Process* (CRP) (2011)

Overview: The CRP provides guidance and a coordinated system for County and municipal agencies regarding operations and actions to be implemented during “blue skies” and in the aftermath of a major or catastrophic disaster that impacts the County. It delineates operational concepts relating to pre-disaster mitigation/recovery planning and post-disaster recovery; identifies components of the recovery organization; and describes the overall responsibilities intended to expedite public and private recovery. The basic premise of the CRP is that planning done in advance of a disaster can accelerate a post-disaster return to normalcy and take advantage of mitigation opportunities.

Plan Strengths:

- The CRP was developed in concert with and in support of the LMS and CEMP (pp. 7-9).
- Both pre- and post-disaster mitigation procedures are included throughout the CRP (p. 9), planning assumptions (pp. 11-12), staff organization (pp. 26-29)].
- During the Transition Phase, the LMS team will meet as soon as possible after a disaster to reinforce the potential for including mitigation in all appropriate repairs (pp. 33 and 58-59).
- During the Short-Term Recovery Phase, it is noted that this is the time when mitigation opportunities could be missed (p. 34), and post-impact mitigation assessment teams are deployed to assess and document potential mitigation opportunities (p. 60).
- During Long-Term Recovery, the Hazard Mitigation Coordinator will coordinate post-incident mitigation programs and evaluations, and update the LMS (p. 37, 61, and 66-67).

- Mitigation coordination is explained with regard to programs, purpose, and process (pp. 53-54). Mitigation information is provided to the private sector (p. 54).
- During the Activation Phase, mitigation implications will be communicated and coordinated with Sections of the Emergency Operations Center organization (p. 56). Also, the Incident Command will be advised through the Planning Section of response actions that will avoid or minimize adverse effects on short-and long-term recovery and mitigation operations (p. 57).
- Mitigation information will be disseminated at Disaster Recovery Centers (p. 79).
- A Mitigation Operations Annex is also included, which explains hazard mitigation projects, costs, coordination, the process for identifying mitigation opportunities, and managing mitigation assistance funds, damage assessment, disaster permitting, and mitigation personnel training procedures (pp. 89-95).

Options for Integration of Hazard Mitigation Principles into the CRP:

- Include a timeline for when the various phases occur, and definitions for short- and long-term recovery.
- Identify what can realistically be accomplished during the timeframe for various phases and key decision points.
- Include specific references to the LMS for pre- and post-disaster mitigation goals and objectives, and project list.
- Refer to the Capital Improvement list for those projects that involve mitigation for coordinated disaster recovery efforts.
- Develop Standard Operating Guidelines that identify stakeholders, the organizational structure, recovery guidelines, etc.
- Identify what funding sources might be required for projects that involve mitigation and identify the estimated timeline for receipt of funding. Some funding sources may be received sooner (e.g., Public Assistance 406 Hazard Mitigation) than others (e.g., Hazard Mitigation Grant Program). The timeline will help to coordinate project repair schedules.
- Identify what needs to be documented for recovery projects that may be eligible for hazard mitigation funding (e.g., past non-declared disaster damages can be included in determining the benefit cost ratio, and some temporary repair measures can be included in repair v. replacement assessments). Refer to existing documents, as needed (e.g., Damage Assessment SOP).

(4) *Broward County Continuity of Operations Plan* (COOP) (2011)

Overview: The COOP is a plan for reestablishing the functionality of a department/building immediately after an incident occurs that prevents use of parts or all of the building. The COOP establishes mission essential functions and resources, chain of command, line of succession, vital records, and plans for backup or alternate emergency facilities in case of an extreme emergency or disaster event.

Plan Strengths:

- The COOP does not include mitigation and recovery measures, as it is developed for resuming mission essential functions immediately after a disaster. However, there are opportunities to integrate mitigation from the perspective of evaluating the vulnerability of facilities that are used for COOP activations, which may need to be mitigated (e.g., retrofitted).

Options for Integration of Hazard Mitigation Principles into the COOP:

- Identify the most critical facilities/functions, based on hazards vulnerabilities, for potential hazard mitigation measures. Include these on the LMS and/or Capital Improvements project lists, and identify whether these are on multiple lists.
- Identify funding sources (e.g., capital improvements and grant opportunities).
- Identify critical lifelines [supervisory control and data acquisition (SCADA)] and IT issues.
- Evaluate alternate relocation facilities for potential mitigation options.
- Identify which primary and alternate facilities have been mitigated.
- Integrate damage assessment processes from (CEMP and Damage Assessment SOP) that are probably more sensitive to disaster mitigation funding to make sure the damage assessment for COOP takes these into consideration.
- Identify what kinds of temporary repairs can be made without jeopardizing hazard mitigation funding. If permanent repairs start before mitigation funding (e.g., Public Assistance 406 mitigation funds or Hazard Mitigation Grant Program) is approved, the funds cannot be accessed.
- Compose narratives documenting support for mitigation projects based on the need to protect facilities and functions.
- For buildings that house multiple departments, have them coordinate to help make the case for mitigating the building.
- Add the benefit cost analysis (BCA) component to show the loss of income/financial impact to services to help make argument for mitigation funding
- Identify assumptions/weak spots and ideas for mitigation (communications/electricity).
- Identify opportunities to submit mitigation grant requests that may need to be submitted in a bundled fashion (e.g., generators alone may not be selected for mitigation, but when combined with other items can be more likely to be selected).

(5) *Climate Change Action Plan* (CCAP) (April 2011 draft)

Overview: The CCAP prepared by the Broward County Climate Change Task Force, along with the *Analysis of the Vulnerability of Southeast Florida to Sea Level* Rise by the Southeast Florida Climate Change Regional Compact and *Past and Projected Trends in Climate and Sea Level for South Florida* by the South Florida Water Management District (SFWMD) (an External Review Draft), are plans and documents that detail the projected impacts of Climate Change and Sea Level Rise on Broward County and some of its key infrastructure and facilities, and recommendations for a countywide climate program to mitigate the causes, and adapt to the consequences of climate change and its accompanying impacts. For the purposes of the review below, Document 1 is the CCAP, Document 2 is the Southeast Florida Climate Change Regional Compact draft document referenced above and Document 3 is the SFWMD document referenced above.

Plan Strengths:

- The Plan includes details on potential flood impacts from climate change and sea level rise (SLR), including areas inundated by SLR, increased storm surge, and increased precipitation that leads to inland flooding (p. xviii of Document 3).
- The documents reviewed detail future impacts on storm surge and rainfall (p. 18 of Document 3) by climate change. The documents also project future tidal flooding of structures east of salinity barriers, which is east of the approximate halfway point between I-95 and the Florida Turnpike for most of the County (p. 4 and 14 of Document 1).

- The Plan mostly describes the future impact of climate change on wind speeds caused by rising sea temperature, estimated to cause a 5 to 10 % increase in hurricane wind speed (B-1 of Document 1). The Plan suggests that wind studies should be conducted on existing buildings, but this is more related to harnessing wind power (D-3 and E-9 of Document 1); P. 18 of 3 says increased wind speeds from 2-11%.
- Although the Plan does not include flood and wind risk assessment results other than projected future scenarios from wind and sea level rise, it does provide good data to estimate future risks based on climate change.

Options for Integration of Hazard Mitigation Principles into the CCAP:

- Include a representative of the Broward County Climate Change Task Force in the review of the LMS vulnerability assessment for flood and wind risks based on climate change to ensure consistency. Have the Task Force comment on the listed mitigation actions in the LMS for consistency with the Task Force's efforts.
- Reference the CCAP in the LMS, along with two additional reports: Southeast Florida Regional Compact Climate Change Plan, which provides updated scenarios and impacts on critical facilities, and the SFWMD external report on projected Climate and Sea Level Trends, which has updated projection data.
- The SFWMD and the Southeast Florida Regional Climate Change Compact should participate in mitigation and preparedness exercises to discuss future risk scenarios.
- Discuss with the Climate Change Action Task Force how sustainability/climate change adaptation actions are considered, identified, prioritized, and funded. Have the Task Force consider adding multi-hazard mitigation considerations to this process (e.g., if the airport terminal roof is being renovated, make it more energy efficient, and consider making it more wind resistant also).

(6) *Long Range Transportation Plan (*LRTP) (2035)

Overview: Per the mission statement of the plan, "the Broward County LRTP promotes the safe, secure, and efficient movement of people and goods by providing balanced transportation choices that support superior mobility through improvements in all modes with a focus on mass transit and transit-supportive land use in key corridors and mobility hubs." The LRTP sets the framework for a balanced and forward thinking system with investments toward alternative modes such as mass transit, bicycle, pedestrian, and smart growth policies. Through the year-long process, a full portfolio of transportation improvements was identified to meet existing deficiencies and future needs for all travel modes.

Plan Strengths:

- The LRTP includes wind vulnerability analysis was included (p. 33).
- The LRTP includes roadway improvements to increase emergency evacuation capacity and response times on designated hurricane evacuation routes (p. 45).
- The 2035 LRTP includes roadway and transit improvements that will decrease the hurricane evacuation clearance time for Broward County evacuees. The following list of roadway improvements, recommended in the 2035 LRTP (see Exhibit 28, page 59) will enhance the county's hurricane evacuation plan.

Options for Integration of Hazard Mitigation Principles into the LRTP:

- Develop a process to explore potential mitigation opportunities whenever there is new construction, renovation, and repairs.
- Include the project list by reference in the LMS, for those projects that include hazard mitigation measures. Specify which projects are already underway.

- Develop a committee to review projects for hazard mitigation opportunities and have them coordinate with the existing transportation project review committee.
- Participate in BC EMD exercises focused on how mitigation can better be incorporated into the short-term and long-term recovery process.
- Include reference to the LMS and note that the official *Broward County Risk Assessment* is located in chapter 4 of the LMS.

(7) *VisionBROWARD: A Community Economic Development Partnership*

Overview: *VisionBROWARD*'s strategic vision is that, although South Florida has many collective assets that are shared with its neighboring counties, the most advantageous progress that could be realized from this point forward depends on thinking regionally. The regional mindset needs to be incorporated into an action plan to include regional marketing and identity with a South Florida brand. It speaks to the need for a regional economic foundation that would be a public/private leadership forum, and an umbrella organization that would promote direction to more localized metropolitan planning organizations, transit authorities, planning councils, sports authorities, arts groups, cultural consortia, tourist bureaus, and planning councils.

Plan Strengths: Hazard mitigation was not incorporated into this plan.

Options for Integration of Hazard Mitigation Principles into VisionBROWARD:

- Develop a process to explore potential mitigation opportunities for economic development projects.
- Have the members of the public private partnership participate in BC EMD exercises focused on how mitigation can better be incorporated into the short-term and long-term recovery process.
- Include reference in future economic development plans and note that the official Broward County Risk Assessment is located in chapter 4 of the LMS, which includes an economic vulnerability analysis.

(8) *Long Term Recovery and Redevelopment Strategy* (LTRRS)

Overview: The LTTRS is similar to a Post-Disaster Redevelopment Plan. The LTRRS is a countywide strategy to guide decision making for recovery and redevelopment. It was collaboratively developed by county and municipal governments, businesses, and non-governmental organizations for collaborative disaster preparedness, mitigation, response, recovery, and redevelopment. It is comprised of elements, which were developed by local Technical Assistance Committees (TAC), based on the *National Disaster Recovery Framework*, as follows:

- Land Use and Community Redevelopment
- Infrastructure and Public Facilities
- Health and Social Services
- Environmental Preservation/Climate Change Adaptation and Historic Preservation & Cultural Affairs and Community Visioning
- Governmental Operations
- Economic Redevelopment
- Business Emergency Preparedness Network
- Disaster Housing

Plan Strengths:

- Each TAC developed an Action Plan with an implementation timeline and assigned each action item to responsible and support entities.

- The following TACs included pre- and post-disaster hazard mitigation measures into their action items:

a. Land Use and Community Redevelopment

- Map areas with non-conforming structures, non-conforming land-use, and non-conforming densities.
- Identify areas in the Special Flood Hazard Area, for which post-disaster redevelopment may differ from existing development for flood risk reduction based on community input.
- Identify public service facilities/systems (e.g., public works, utilities, electric) that are in hazard-vulnerable locations, and identify potential relocation sites that should be pursued before or after a disaster.
- Review new flood maps and historic flood prone areas. Compare current grandfathered use, current zoning, and future land use. Identify anticipated problem areas.

b. Infrastructure and Public Facilities

- Change traffic signals on wires to mast arms.
- Explore opportunities for signs that will stand up to hurricanes.
- Consider if infrastructure should be move if destroyed post-disaster.
- Consider moving parts of the electric systems underground.
- Research Broward County Transit facilities, and consider alternate locations outside flood prone areas for post-disaster redevelopment options.
- Re-assess critical facility and essential governmental building inventory for location in hazard zones and wind rating. Identify potential hazard mitigation project opportunities to include in the ELMS. Include alternate locations for COOPs in this process.
- Identify projects that include both hurricane mitigation and LEED opportunities.
- Assess current codes and revise as necessary.
- Consider location of critical facilities and how they may be affected by disasters or long-term environmental concerns.

c. Health and Social Services

- Research the resiliency of dialysis centers and their COOP plans (e.g., electricity, sanitary water).

d. Environmental Preservation/Climate Change Adaptation and Historic Preservation & Cultural Affairs and Community Visioning

- Work with municipalities to create GIS coverage of National Register of Historic Places (NRHP) and county historically designated properties. Establish a baseline county-wide historic resource survey.
- Establish guidelines for historic property owners on how to mitigate against flood, wind, and other hazards while retaining historic characteristics of building and site.
- Provide reconstruction guidelines for historic buildings to property owners: *Disaster Mitigation of Historic Structures* and *Disaster Planning for Florida's Historic Resources (*1,000 Friends of Florida, August 2008).
- Amend the *Historic Preservation Element of the County Comprehensive Plan* to incorporate language, which supports hazard mitigation for historic resources.
- Include a History Center representative on the LMS Committee to attend meetings and add narrative, goals, and policies for historic resources in the LMS.

- Conduct a mitigation assessment of the top ten most historically significant and publicly owned structures.
- Work with municipalities to conduct historic structures mitigation assessments.
- Develop mitigation projects for at least 10 publicly owned historic structures and include them in the LMS Project Prioritization Database.
- Expand the LMS risk assessment to include privately owned historic structures.
- Identify mitigation priorities for historic properties based on risk assessments.
- Conduct outreach on historic property hazard mitigation techniques for private historic property owners (education sessions, pre-hurricane workshops, presentation/brochure for municipalities).
- Identify funding sources for historic preservation related hazard mitigation.

Options for Integration of Hazard Mitigation Principles into the LTRRS: Options for integrating hazard mitigation principles have already been included in the LTRRS.

- The strengths listed above include options for integrating hazard mitigation into the LTRRS, as well as other local planning mechanisms and Comprehensive Plan.
- Institutionalizing hazard mitigation into the community culture for daily planning and governmental operations, supports maximum hazard mitigation integration.

Table D.1 includes Broward County's plans (column A) and the sections from these plans that are included in the Enhanced Local Mitigation Strategy (ELMS) (column B). This provides a snapshot of how hazard mitigation has been integrated between the ELMS and other local planning mechanisms.

Table D.1: Local Plans Incorporated into the Enhanced Local Mitigation Strategy

Plan Name	How Local Plan has been Incorporated into the Enhanced Local Mitigation Strategy
Comprehensive Emergency Management Plan	• References Emergency Support Function (ESF) process, organizational procedures, and coordination for identifying mitigation opportunities during response. • Recommends including process and organizational structure for ESFs to transition from response to short- and long-term recovery for decision making for ongoing mitigation opportunity identification
Broward County Continuity of Operations Plan (COOP)	Recommends: • Including relevant parts of the ELMS vulnerability assessment into the COOP • Integrating damage assessment and mitigation opportunities/grant identification/benefit cost analysis for primary and alternate facilities from the CEMP and Damage Assessment Standard Operating Procedures
Climate Change Action Plan (CCAP)	Recommends: • Including a Broward County Climate Change Task Force (BCCCTF) representative in the review of the ELMS vulnerability assessment for flood and wind risks based on climate change and provide review comments on listed mitigation actions to ensure consistency between the two plans • South Florida Water Management District and Southeast Florida Regional Climate Change Compact members participation in mitigation and preparedness exercises • Having BCCCTF consider using a multi-hazard mitigation approach for identifying sustainability and climate change adaptation actions
Long Range Transportation Plan	Recommends: • Developing a process to explore mitigation opportunities for new

Plan Name	How Local Plan has been Incorporated into the Enhanced Local Mitigation Strategy
	construction, renovation, and repairs • Including a project list in the ELMS for those with mitigation measures
Long Term Recovery and Redevelopment Strategy	Recommends: • Various hazard mitigation measures to be implemented by the TACS.

Table D.2 identifies which plans are or are not concurrent with one another.

Table D.2: Integrating Hazard Mitigation Principles into Local Planning Mechanisms

Plan/Ordinances	Hazard Mitigation Principles
Comprehensive Emergency Management Plan (CEMP)	Yes
Broward County Continuity of Operations Plan (COOP)	No
Climate Change Action Plan (CCAP)	Yes
Long Range Transportation Plan (LRTP)	Yes
VisionBROWARD: A Community Economic Development Partnership	No
Long Term Recovery and Redevelopment Strategy (LTRRS)	Yes

Part 2 – Integration of Hazard Mitigation Principles into Comprehensive Plan Elements

Step 1. Collect Documents: The following *Comprehensive Plan Elements* (2009) were collected for review:

(Element 2) Future Unincorporated Land Use Element
(Element 7) Drainage and Natural Aquifer Groundwater Recharge Element
(Element 8) Housing Element
(Element 9) Recreation and Open Space Element
(Element 10) Coastal Management Element
(Element 11) Natural Disaster Component
(Element 13) Conservation Element
(Element 14) Capital Improvement Element
(Element 18) Urban Design Element

Step 2. Review Guide Questions: The review guide questions were used to support the plan review.

Step 3. Review Best Practices/Examples: A review was conducted to identify the plan strengths as well as opportunities for further hazard mitigation integration into each Comprehensive Plan Element.

The following presents an overview of how hazard mitigation principles were integrated into nine elements of the Comprehensive Plan.

Overview: The Comprehensive Plan establishes the goals and objectives that govern the community's growth and development and policies for daily land use and development decision making. The Comprehensive Plan serves as the foundation for land development regulations, zoning, major capital expenditures, and other initiatives to accomplish the community's overall vision. The Comprehensive Plan includes recovery and mitigation measures pertaining to future land use, coastal management, housing, infrastructure, post-disaster redevelopment, repeated

damage, stormwater management, conservation, recreation and open space, intergovernmental coordination, and capital improvements. Given the broad nature of the plan and its regulatory standing, the integration of post-disaster redevelopment policies into the Comprehensive Plan can enhance the likelihood of implementing a successful post-disaster redevelopment strategy following a disaster.

(Element 2) *Future Unincorporated Land Use*

Strengths:

Policy 2.2.5. Broward County shall continue to utilize the development review process of the Land Development Code to implement its standards and criteria for construction and operation of water management works to provide for drainage and stormwater management and to control seasonal and/or periodic flooding in the Unincorporated Area.

Policy 2.2.6. Broward County shall continue to implement the floodplain management provisions of the Broward County Code of Ordinances, which establish flood hazard standards for the Unincorporated Area.

Policy 2.2.7. Broward County shall continue to maintain a comprehensive water resources management plan which addresses drainage and stormwater management in the Unincorporated Area not included within an independent special or water control district.

Policy 2.4.1. Broward County shall continue to implement the zoning code as it relates to nonconforming uses and structures.

Policy 2.4.2. The Planning and Redevelopment Division (PRD) shall continue to recommend against proposed land use plan amendments for the purpose of recognizing nonconforming uses which are incompatible with the surrounding land uses.

Policy 2.4.3. The PRD shall continue to recommend against proposed land use plan amendments which are incompatible with adjacent land use designations.

Policy 2.5.6. The Development and Environmental Regulation Division (DERD) shall, in order to conserve native vegetative cover, continue to implement code requirements relating to the clearance of lands designated as Natural Resource Areas.

Policy 2.5.7. The DERD shall, in order to conserve native vegetative cover, continue to implement code requirements, as such relates to natural resource areas contained within site plans in the Unincorporated Area.

Policy 2.5.8. The DERD should continue to recommend the designation of land as a Local Area of Particular Concern (LAPC) in the categories of Cultural Resources, Marine Resources, Native Vegetation, Natural Landforms, and Wildlife Areas.

Policy 2.5.9. The DERD shall continue to utilize the development review process to consider the impact of proposed land use plan amendments on environmentally sensitive lands such as Urban Wilderness Areas.

Policy 2.5.12. The DERD shall continue to implement code requirements concerning any land designated as an archaeological site in the Broward County Land Use Plan Map Series, the Florida Master Site File or the National Register of Historic Places.

Policy 2.5.14. The PRD shall request the Broward County Historical Commission to identify historically significant structures and archaeological sites in the Unincorporated Area, which may be eligible for inclusion on the Florida Master Site File or National Register of Historic Places.

Policy 2.5.17. Broward County shall continue to make land use decisions which are consistent with the Federal Water Resources Development Act of 2000 and the Florida Everglades Forever

Act with regard to maintaining and/or improving the water quality, quantity, distribution and timing of flows in the water conservation areas.

Objective 2.6. Coordinate land use planning activities and coastal area population densities with the Broward County Hurricane Evacuation Plan.

Objective 2.7. The PRD shall coordinate future land uses by encouraging the reduction or elimination of uses that are inconsistent with interagency hazard mitigation reports.

Policy 2.7.1. The PRD shall work with municipalities to coordinate the preparation of post-disaster redevelopment and mitigation plans for the coastal area.

Objective 2.9**.** Broward County will to the maximum extent feasible, promote "Smart Growth" and energy efficient development and land use patterns which also account for existing and future electrical power generation and transmission systems in an effort to discourage urban sprawl and reduce greenhouse gasses.

Policy 2.9.1**.** Broward County's development within the Unincorporated Area shall emphasize re-development and infill, which concentrates the growth and intensifies the land uses consistent with the availability of existing urban services and infrastructure in order to conserve natural and man-made resources.

Policy 2.9.2**.** Broward County will encourage and implement to the maximum extent feasible for those (re)development projects within the Unincorporated Area the use of compact building design principles which preserve more open space, contain mixed use, support multi-modal transportation options, make public transportation viable, reduce infrastructure costs and take advantage of recycled building materials.

Policy 2.9.3. Broward County will encourage and implement to the maximum extent feasible for those (re)development projects within the Unincorporated Area energy conservation and the reduction of greenhouse gasses by encouraging land developers and builders to implement the Florida Green Building Coalition, US Green Building Council Leadership in Energy and Environmental Design (LEED).

Policy 2.10.4**.** The Broward County Comprehensive Plan Map Series shall also include the following maps which shall be maintained by the agency indicated: 6. Floodplains – Broward County Planning Council… 9. Coastal High Hazard Areas – Emergency Management Agency.

Options for Integration of Hazard Mitigation Principles into the Future Unincorporated Land Use Element:

- Encourage the DERD to utilize the development review process to consider the impact of proposed land use plan amendments in flood hazard areas
- Encourage a meeting between the County Commissioners, PRD, and Emergency Management to discuss how to better ensure that Comprehensive Plan policies designed to minimize risk are effectively implemented and that the actual results are reaping the intended benefits. If not, outline corrective actions.
- Include an inventory of historic structures and archeological sites in the LMS vulnerability assessment, and the various components of the Recovery Framework and update it as structures are added to the Florida Master Site File or National Register of Historic Places.
- Encourage the clustering of new development or redevelopment away from flood hazard areas.

(Element 7) *Drainage and Natural Aquifer Groundwater Recharge*

Strengths:

Goal 7.0. To optimize the utilization of water resources through provision of stormwater management for Broward County which reduces damage and inconvenience from flooding, promotes recharge to the Biscayne Aquifer, improves and protects water quality in surface and ground waters, and protects the functions of wetlands in urban areas.

Objective 7.1**.** Broward County shall implement drainage improvements to remove existing Group One deficiencies by 2010, and South County (SC) and Central County (CC) deficiencies by 2015.

Policy 7.1.1. Broward County shall continue to include Group One capital improvements needs in the Broward County Capital Program.

Policy 7.1.2**.** Broward County shall continue to include SC capital improvements needs in the Broward County Capital Plan.

Policy 7.1.3**.** Broward County shall include CC capital improvements needs in the Broward County Capital Plan.

Objective 7.2**.** Stormwater management facilities shall be provided to meet the County's short-term and long-term future surface water management needs.

Policy 7.2.1. Broward County and other appropriate drainage districts shall continue to implement land development regulations which implement the minimum design criteria for stormwater management identified in Table 7-A as the level of service standard to assess adequacy of service and concurrency during the development review process where jurisdictionally appropriate. Table 7-A states that buildings are to have the lowest floor elevation no lower than the 100-year flood elevation or FEMA Base Flood Elevation, whichever is higher.

Policy 7.2.12**.** Broward County shall participate and implement the Community Rating System (CRS) as per Federal Emergency Management Agency (FEMA) requirements through 2010.

Objective 7.4. Stormwater management facilities shall be designed, constructed and operated in a manner that conserves and enhances potable water resources.

Policy 7.4.1. Broward County shall work with the South Florida Water Management District and the independent drainage districts to implement applicable portions of the Lower East Coast Water Supply Plan 2005-2006 Update intended to reduce losses of excess stormwater to tide, recharge the surficial aquifer and provide additional storage of surface waters.

Policy 7.4.2. Broward County shall address stormwater management issues on a watershed (basin) basis as a means of providing cost effective water quality and water quantity solutions to specific watershed problems.

Policy 7.4.3. Broward County shall develop a County-wide Water Management Master Plan that optimizes flood protection, water quality treatment and protection, stormwater storage, wetlands sustainability, and ground water recharge functions. The Master Plan shall be developed as part of the County's efforts to meet water supply needs and water resource goals through 2025 with the application of the County's integrated surface water and groundwater model that incorporates the existing surface water management system, well field characteristics, water demands, ground water levels, flows and canal stages.

Policy 7.4.4. Broward County will work with the independent drainage districts, municipalities, and the SFWMD, to investigate implementation of the proposed County-wide Water Management Master Plan.

Policy 7.5.11**.** Broward County shall utilize, preserve, restore, and enhance natural water bodies and functions by encouraging non-structural and structural erosion control devices and discourage the channelization, installation of seawalls or other alteration of natural rivers, streams and lakes.

Policy 7.5.12. Protect the water storage and water quality enhancement functions of wetlands, floodplains, and aquifer recharge areas through acquisition, enforcement of rules, and the application of land and water management practices which provide for compatible uses.

Options for Integration of Hazard Mitigation Principles into the Drainage and Natural Aquifer Groundwater Recharge Element:

- Consider the use of freeboard to elevate hazard prone structures above the 100-year flood level or base flood elevation to prepare for future risk from sea level rise and potential higher rainfall caused by climate change.

(Element 8) ***Housing***

Strengths:

Policy 8.7.5. Broward County shall encourage developers to comply with green certification standards found within Florida Green Building Coalition, US Green Building Council Leadership in Energy and Environmental Design (LEED) or other acceptable environmental and commercial building standards…

Options for Integration of Hazard Mitigation Principles into the Housing Element:

- Provide outreach and education to encourage developers to include hazard mitigation measures for new construction and redevelopment. This would include: latest building codes, floodplain ordinances, and IBHS.
- Promote the acquisition or elevation of repetitive flood loss structures.
- Continue CRS participation, and encourage all jurisdictions to participate.

(Element 9) ***Recreation and Open Space***

Strengths:

Policy 9.5.2**.** Broward County shall continue to utilize the development review process of the Land Development Code to ensure the provision of pervious areas and greenspace by requiring developers to meet open space requirements of Chapter 5, Article IX, Section 5-192(a)(11), Pervious Areas and Greenspace, "Broward County Code of Ordinances.

Policy 9.5.3**.** Broward County shall continue to utilize the Conservation land use category on the Future Unincorporated Area Land Use Element Map Series to designate natural reservations such as the Water Conservation Area, regional parks, and other appropriate publicly owned lands in the Unincorporated Area.

Options for Integration of Hazard Mitigation Principles into the Recreation and Open Space Element:

- Include the benefits of pervious surface and open space to mitigate flood hazard vulnerability.
- Include a policy to review flood hazard areas included in the Land Use Element Map Series for LMS project identification and post-disaster redevelopment. Cross reference these maps in the LMS vulnerability assessment.

(Element 10) *Coastal Management Element*

Strengths:

Objective 10.1**.** Protect and conserve remaining wetlands, living marine resources, coastal barriers, and wildlife habitat, as applicable in the coastal area.

Policy 10.1.1**.** The County shall limit the specific and cumulative impacts of development or redevelopment upon wetlands, water quality, water quantity, wildlife habitat, living marine resources and the beach dune system through the review of developments by Broward County.

Objective 10.2. Protect and enhance dunes and coastal biological communities, monitor State-mandated construction standards which minimize the impacts of man-made structures on dunes, and restore altered dunes.

Policy 10.2.1. Assist State agencies in the enforcement and monitoring of compliance with the DEP Coastal Construction Control Line regulations.

Policy 10.2.2. Monitor development in the coastal areas to ensure proper compliance with State and local regulations.

Policy 10.2.3**.** Development and redevelopment in the coastal area shall not degrade or destroy existing natural beaches or berm areas.

Options for Integration of Hazard Mitigation Principles into the Coastal Management Element:

- Establish a new definition for coastal evacuation areas that is consistent with storm surge evacuation vulnerability along the barrier islands.
- Establish policy to limit development that will increase evacuation clearance times in the coastal evacuation areas.
- Restore natural coastal vegetation at the Hillsboro Inlet Lighthouse.

(Element 11) ***Natural Disaster Component***

Strengths:

Goal 11.0**.** Protect human life and limit public expenditures in the Coastal Area subject to destruction by natural disaster.

Objective 11.1**.** Limit public expenditures that subsidize development and establish criteria for prioritizing capital improvements.

Policy 11.1.1. Public expenditures should focus on projects, which restore or enhance natural resources such as beach nourishment.

Policy 11.1.2. The County shall not utilize public funds for infrastructure expansion or improvements in coastal high-hazard areas unless such funds are necessary to provide services to the existing development and to provide adequate evacuation in the event of an emergency.

Objective 11.2. Direct population concentrations away from known or predicted coastal high-hazard areas.

Policy 11.2.1**.** The Broward County Planning Council shall maintain a Broward County coastal high-hazard area map with information received from the Emergency Management Agency as part of the Natural Resource Map Series of the Broward County Land Use Plan.

Objective 11.4**.** Broward County shall develop a countywide post-disaster redevelopment and mitigation plan, which reduces exposure of life and property to natural hazards.

Policy 11.4.1. Post-disaster redevelopment should distinguish between immediate repair and cleanup actions needed to protect public health and safety and long-term repair and redevelopment activities.

Policy 11.4.2. Post-disaster redevelopment should address the removal, relocation, or structural modification of damaged infrastructure as determined appropriate by Broward County but consistent with Federal funding provisions and unsafe structures.

Policy 11.4.3. Broward County shall incorporate the recommendations of interagency hazard mitigation reports into the Broward County Comprehensive Plan.

Policy 11.4.4. All new construction along the beachfront should be consistent with design criteria established pursuant to the designation of the Coastal Construction Control Line (CCCL).

Policy 11.4.5. Regulations contained within the Florida Building Code should be enforced to reduce exposure of life and property to the damaging effects of a hurricane.

Policy 11.4.6. Broward County disaster specific mitigation plan addendum recommendations should be incorporated into the post-disaster redevelopment plan for the countywide post-disaster redevelopment and mitigation plan.

Policy 11.4.7. Broward County shall limit post-disaster redevelopment in areas of repeated damage, where legal and financially feasible.

Options for Integration of Hazard Mitigation Principles into the Natural Disaster Component:

- Replace CHHA with coastal evacuation areas in Policies 11.1.2; 11.2 and 11.21.
- Review recommendations for including the CCAP referenced Adaptation Action Areas to reduce hazards vulnerability along the coast.

(Element 13) ***Conservation***

Strengths:

Policy 13.1.16**.** Broward County shall develop a countywide Climate Change Program to mitigate and adapt to the consequences of climate change in coordination with other local governments, private businesses, other governmental agencies and the State of Florida. This program will focus on mitigating the causes and consequences of greenhouse gas emissions in a cost-effective and efficient manner that preserves the County's economic competitiveness.

Policy 13.2.7. Broward County shall maintain an emergency response program with the capacity to rapidly respond to discharges of hazardous materials or solid waste and to investigate environmental complaints Broward County shall also maintain a response network for hurricane emergencies or other declared emergency situations under Broward County Emergency Support Functions 8 and 10.

Policy 13.2.9. Broward County shall continue to encourage the South Florida Water Management District's and other governmental entity's efforts to acquire private property and mineral rights in the water conservation areas as defined in the Future Unincorporated Area Land Use Element.

Policy 13.2.10**.** No new solid-fill transportation facilities or similar structures, which contradict the efforts of the Federal Water Resources Development Act of 2000 and the Florida Everglades Forever Act, shall be permitted within Broward County's water conservation areas, as defined in

the Future Unincorporated Area Land Use Element, without provisions for maintaining the freshwater sheet flow.

Objective 13.5. Broward County shall conserve and protect its soils resources by maintaining land development regulations governing soil erosion and shall appropriately use its soils by enforcing existing land development regulations limiting the use of septic tanks to those soil associations suitable for such usage.

Policy 13.5.1. To minimize soil erosion on new construction sites, land development regulations shall be maintained which require measures consistent with Chapter 27, Broward County Natural Resource Protection Code and the Best Management Practices of the United States Natural Resources Conservation Service.

Policy 13.5.2. Plans for the construction or expansion of arterial and collector roadways with steep embankments shall include appropriate landscaping and design to minimize soil erosion.

Policy 13.5.3. Broward County will continue to maintain and implement programs concerning the conservation and protection of beach resources. These programs shall ensure that activities along the coast do not promote beach erosion.

Policy 13.6.3**.** Broward County shall continue to implement the Broward County Land Development Code, Greenspace, as it relates to review of site plans in the Unincorporated Area.

Policy 13.6.6**.** Broward County shall make information from the map of County Commission designated properties of ecological concern of native vegetative communities available to municipalities and other interested parties in order to coordinate natural resource planning and management activities.

Policy 13.6.19. The County shall pursue opportunities for the restoration and/or enhancement of degraded natural areas, including but not limited to, reforestation, restoration of shorelines or dunes, restoration of natural hydrology, or removal of non-native vegetation.

Objective 13.8. Increase the quality and connectivity of regionally significant wetland resources.

Policy 13.8.1**.** Optimize siting of mitigation projects to enhance their relationships with other wetlands.

Policy 13.8.2. Integrate wetlands into regional stormwater drainage/water management practices to provide necessary hydrology.

Policy 13.8.3. Participate in land acquisition/greenway programs to improve connectivity of effective size of wetland/upland systems.

Policy 13.8.6. When feasible, lands where activities could impact areas essential to Everglades restoration, as identified by the SFWMD, shall not be designated in future land use categories that would increase density or intensity.

Objective 13.9. Ensure through effective management, the long-term functions of wetlands.

Policy 13.9.1. Provide for adequate hydrology for protected wetlands by establishing minimum water flows and levels for protected wetlands during license application review.

Policy 13.9.2. In cooperation with the SFWMD, FDEP, and the Broward County Parks and Recreation Division shall continue to develop government-sponsored mitigation banks or similar mechanisms to provide publicly owned repositories for required mitigation by 2010.

Policy 13.9.3. When feasible the future land use designation for wetlands that are to be preserved should be changed to Conservation, Park, or Open Space.

Policy 13.9.4. Develop, adopt, and fund long-term management plans for publicly owned or protected wetlands.

Objective 13.10. Create/acquire additional wetlands in Broward County.

Policy 13.10.1. Participate in land acquisition initiatives, greenway programs, park expansions, and other programs for increasing acreage of wetlands.

Policy 13.10.2. Develop and implement programs for protecting and expanding existing wetland areas such as Transfer of Development Rights, conservation easements, restrictive covenants, and tax incentives.

Policy 13.10.3. Prepare a basin study for Indian Trace Basin 2 to evaluate future land use designations and develop an implementation plan that will contribute to the success of the Water Preserve Areas in western Broward County.

Policy 13.10.4. Maintain a *Wetland Resource Plan* that will ensure flexibility over time as to the approaches to wetland protection, enhancement, and creation.

Options for Integration of Hazard Mitigation Principles into the Conservation Element:

- Include language in various policies to recognize the benefits of using conservation for hazard mitigation (e.g., flood).

(Element 14) *Capital Improvement*

Strengths:

Policy 14.1.1. Capital projects will be evaluated using the following criteria: 1. Preservation of health and ensuring the safety of the public by eliminating public hazards,

Policy 14.1.4. Continue to implement plans for drainage, and parks improvements by the end of the planning period.

Objective 14.2. The County shall limit public expenditures within coastal high-hazard areas to maintenance of existing infrastructure.

Policy 14.2.1. Appropriations for infrastructure shall be made only to maintain existing infrastructure within coastal high hazard areas unless level of service standards are not being met.

Policy 14.1.9. Funds will continue to be allocated for the replacement and renewal of infrastructure in an amount, which will minimize the operating costs of infrastructure, and to maximize the life of the infrastructure.

Options for Integration of Hazard Mitigation Principles into the Capital Improvements Element:

- Include a map of Capital Improvement projects that has hazard overlays to determine if they are in hazard zones and could include hazard mitigation measures.
- Conduct a hazards analysis for Capital Improvement projects in hazard zones.
- Include the Capital Improvement project list by reference in the LMS, for those projects that include hazard mitigation measures. Specify which projects are already underway.
- Analyze the Capital Improvement projects with the newly developed Loss Estimation tool.
- Develop a committee to review projects for hazard mitigation opportunities and have them coordinate with the existing Capital Improvement project review committee.
- Expand the criteria that are used for prioritizing Capital Improvement projects to include hazard mitigation considerations for each investment.

- Participate in BC EMD exercises focused on how mitigation can better be incorporated into the short-term and long-term recovery process.
- Eliminate or modify Policy 14.2.1 regarding provision of infrastructure in CHHA.

(Element 18) ***Urban Design***

Strengths:

Objective 18.2. Encourage architectural design that reflects the character, history and climate of Broward County, seamlessly incorporating functional public space, innovative styles, quality building materials, and energy efficient, green construction methods that reduce greenhouse gas emissions.

Policy 18.2.1. Broward County shall require that all new County-owned and operated building construction achieve a minimum LEED (Leadership in Energy and Environmental Design) rating of "LEED Certified" in accordance with County resolution 2008-856.

Options for Integration of Hazard Mitigation Principles into the Urban Design Element:

- Encourage including hazard mitigation measures in architectural design for new structures and in redevelopment scenarios.
- Expedite permitting for mitigation projects, as is done for green projects.

Table D.3 includes Broward County's Comprehensive Plan Elements (column A) and a summary of how these elements are incorporated into the Enhanced Local Mitigation Strategy (column B). This provides a snapshot of how hazard mitigation has been integrated between the ELMS, other local planning mechanisms and the Comprehensive Plan.

Table D.3: Comprehensive Plan Element Incorporated into the Local Mitigation Strategy

Comprehensive Plan Element	Element Incorporated into the Enhanced Local Mitigation Strategy
Future Unincorporated Land Use	Chapter 6 references the Broward County Land Use Plan which addresses land use
Drainage and Natural Aquifer Groundwater Recharge	Drainage addressed by County and individual municipalities in Chapter 6
Housing	Housing Vulnerability – Appendix J
Recreation and Open Space	Open space addressed by County and individual municipalities in Chapter 6
Coastal Management	Chapter 7 – Plan Integration Efforts (County Comprehensive Plan)
Natural Disaster Component	ELMS and Long-Term Recovery and Redevelopment Strategy (LTRRS) plan
Conservation	
Capital Improvement	Chapter 7 – Plan Integration Efforts
Urban Design	Chapter 6 references the Broward County Land Use Plan which addresses appropriate densities

Lessons Learned

During the planning process for the local hazard mitigation plan and recovery plans, several lessons were learned. Broward County is nearly built-out, so in addition to land use mitigation concepts, the County has also sought to identify other ways to reduce risk through: outreach, using mitigation principles in new construction and maintenance projects, intergovernmental coordination, and other programs. Below is a summary of lessons learned from Broward County's plan integration activities, which may help other communities overcome challenges they may face while performing plan integration:

- Use local hazard mitigation planning meetings as a forum to share best practices to increase mitigation knowledge throughout the community.
- Use technology including Facebook and Twitter to share information with the general public and private sector.
- Explore ways to make hazard mitigation cost effective and a part of daily community business procedures and decisions:
    - Work with local groups that are interested in or are already implementing hazard mitigation.
    - Identify how and when to use capital improvement funds for mitigation projects. For example, Broward County identified that they would need to work with their local insurer to include mitigation measures during the conceptual phase of a project for new construction to be considered for capital improvement funding. Consider mitigation for all major investments in new construction, redevelopment, repair and renovation.
    - Work with contiguous municipalities or water management/watershed districts to develop and fund multi-jurisdictional hazard mitigation projects to share the workload, increase funding potential, and enhance risk reduction results.
    - Apply for funding from various grant sources such as HUD's CDBG funds, PA 406 dollars, NOAA's SeaGrant rather than just the typical FEMA mitigation funding sources.
- Look for opportunities to maximize National Flood Insurance Program (NFIP) Community Rating System (CRS) credits to reduce flood hazard vulnerability and reduce flood insurance costs. During the local mitigation planning update process, Broward County identified and received over 100 CRS points that could result in a $1.4 million annual savings on flood insurance policy premiums. Points were awarded for ongoing activities.
- Consider expediting permits for projects that include hazard mitigation, similar to what is done for Leadership in Energy and Environmental Design (LEED) projects. Broward County has a policy in the comprehensive plan to expedite LEED projects.
- Include a wide range of local stakeholders in exercises and planning projects, such as:
    - Local hazard mitigation planning
    - Emergency management / disaster recovery exercises
    - Interested private sector companies and organizations
    - Non-profits
- Communicate to departments with Continuity of Operations Plans that they should identify whether their primary and alternate facilities are at structural and/or operation risk to common hazards faced by the community. If so, there facilities could be retrofitted using capital improvement funds, be placed on the local mitigation plan project list, or other alternate facility sites could be investigated for use.

- Eliminate stove-piping of information and encourage interdepartmental and inter-community coordination to share information and implement hazard mitigation in daily practice, for example:
    - Share hazard risk and vulnerability assessments within the community and encourage the data to be used in multiple plans (e.g., hazard mitigation plan, recovery plan, local comprehensive plan, comprehensive emergency management plan, economic development plan, transportation plan, etc.).
    - Track and share mitigation successes and challenges among departments, municipalities, and regional entities.
- Communicate vulnerability and loss reduction savings to local political and executive leadership and the general public to demonstrate the benefits of hazard mitigation integration.

APPENDIX F – GLOSSARY

Built environment – A manmade setting built for human activity, including buildings, parks, and infrastructure (water and sewer supply and energy networks).

Hazard vulnerability – The susceptibility of people and buildings that occupy the space and time of exposure to a hazard event.

Hazard mitigation – Any sustained action taken to reduce or eliminate the long-term risk to life and property from hazard events. It is an on-going process that occurs before, during, and after a disaster and serves to break the cycle of damage and repair in hazard-prone areas.

Inter-agency coordination – A working relationship between various agencies of government—Metropolitan Transportation Agency, Watershed Management Agency, Regional Planning Agency, etc.

Key community officials – Decision-makers in a community—Mayors, City Managers, City Attorneys, Borough Managers, Town Councilmen, etc.

Key staff – Personnel in various departments—secretaries, information technology specialists, planners, emergency managers, engineers, GIS specialists, economic development specialists, fire and rescue personnel, etc.

Natural hazard – A naturally occurring event (one caused by the force of nature) that can have a negative effect on people or the environment. Natural hazards include floods, earthquakes, tsunamis, wildfires, hurricanes, droughts, etc.

Stakeholders – A person or group that has an interest or concern in an organization or cause and who may also serve as a resource. Stakeholders can affect or be affected by actions, objectives, and policies. Examples of key stakeholders include businesses, universities, quasi-public agencies, cooperatives, and non-government organizations.

Risk reduction – The process of making a community more resilient and less vulnerable to hazard events and disasters.

Inter-departmental coordination – The interaction between various departments of government—Economic Development, Emergency Management, Planning and Zoning, Transportation, Public Works, etc.

Local Mitigation Plan Review Tool – This Tool replaces the Local Mitigation Planning Crosswalk. It is used by plan reviewers and demonstrates how the 44 CFR§201.6 regulations are met and consists of the following components: 1) Regulation Checklist (required review for compliance with 44 CFR §201.6); 2) Plan Assessment (qualitative review); and 3) Multi-jurisdiction Summary Sheet.