



**STATE OF TEXAS**



**MITIGATION HANDBOOK**



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## Mitigation Handbook

### APPROVAL AND IMPLEMENTATION

People and property in Texas are at risk from a variety of hazards which have the potential for causing wide spread loss of lives, and damages to property, the infrastructure, and the environment.

The purpose of hazard mitigation is to implement and sustain actions that reduce vulnerability and risk from hazards, or reduce the severity of the effects of hazards on people and property. Mitigation actions are both short-term and long-term activities, which reduce the cause or occurrence of hazards; reduce exposure to hazards, or reduce effects of hazards through various means to include preparedness, response and recovery measures. Effective Mitigation actions will also reduce the adverse impact and costs of future disasters.

The *Robert T. Stafford Disaster Relief and Emergency Assistance Act* (Stafford Act) is the primary authority for providing federal disaster recovery and hazard mitigation financial assistance to states and local governments. The act was last amended in October 2000 by *Public Law (PL) 106-390 (Disaster Mitigation Act of 2000)* and incorporated as federal rules in Code of Federal Regulations (CFR) 44. Hazard mitigation related program requirements are included in 44 CFR Parts 78, 201, and 206.

This handbook provides information and guidance concerning the hazard mitigation process and mitigation program activities in Texas to include participation in state and federally funded mitigation opportunities. This handbook serves as a guide for establishing and maintaining a viable, effective mitigation program to reduce vulnerabilities, risks, and human suffering caused by hazards. As explained in the *State of Texas Hazard Analysis*, Texas is at risk from a wide variety of natural, human-caused, and technological hazards. This document and other related materials are available via the internet on the Division of Emergency Management (DEM) web-site at <http://www.txdps.state.tx.us/dem/>, and the Federal Emergency Management Agency (FEMA) web-site at <http://www.fema.gov>, or by calling the FEMA Distribution Center at 1-800-480-2520.

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Date

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## ACKNOWLEDGEMENTS

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The Texas Hazard Mitigation Team member Agencies are:

- General Land Office
- Office of Rural Community Affairs
- Railroad Commission
- Texas Department of Housing and Community Affairs
- Texas Department of Insurance
- Texas Department of Public Safety
- Texas Department of Transportation
- Texas Engineering Extension Service
- Texas Forest Service
- Texas Natural Resource Conservation Commission
- Texas Parks and Wildlife Department
- Texas Water Development Board

Information for this handbook was provided from a number of sources, but two (2) documents in particular deserve mention: “*Basics of Community Mitigation in Building a Disaster Resistant Community*” (FEMA publication SM 393.1), and “*Local Hazard Mitigation Planning Manual*” (North Carolina Division of Emergency Management, 11/23/98 draft document).

## ABOUT THIS HANDBOOK

This handbook uses the terms “community” in a broad sense to include all political subdivisions, agencies, and organizations engaged in establishing and maintaining a sustained mitigation program.

Mitigation program activities in Texas employ the coordinated and interactive use of at least three components. The organization, responsibilities, and operations of the Hazard Mitigation Team are in the “*Annex P (Hazard Mitigation)*” of a comprehensive “*Emergency Management Plan*”; current, quantifiable vulnerability and risk data, designed to facilitate the prioritization of mitigation and preparedness needs are in the “*Hazard Analysis*”; and the identification and implementation of specific vulnerability and risk reduction actions are contained within the “*Mitigation Action Plan*”. This Handbook addresses the relationships and mutually supporting interactions between these three components.



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## ATTACHMENT 1

**Mitigation Planning Resources** describes state and FEMA guidance materials designed to assist in the development, implementation and sustainability of mitigation programs and mitigation action plans. The materials still under development by FEMA are identified, but the remaining items may be ordered directly by calling 1-800-480-2520, or they can be ordered online via the FEMA web-site at <http://www.fema.gov>.

## ATTACHMENT 2

**Building Blocks to Success** outlines the steps in the mitigation process. Accomplishment of the various decisions and actions will result in reduced vulnerability and risks from hazards. The process is dynamic and requires scheduled reviews and updates based on changing population, development, and reevaluation of hazards and their potential consequences.



# INTRODUCTION

Hazards are part of the world around us. The occurrence of floods, hurricanes, tornadoes, winter storms, earthquakes, wildfires and other hazardous events are inevitable. These hazards are natural phenomena that we cannot control. These events can cause damage to the ecological environment: fire can destroy forests, coastal storms can create and fill inlets and move barrier islands, high winds and wave surge can wreak havoc in wetlands, tornadoes can uproot trees, earthquakes can alter the landscape, and floods can quickly reclaim natural floodplains. Despite their destructiveness, however these occurrences are part of the natural system. The natural environment is amazingly recuperative from the forces of wind, rain, fire and earth, and can regenerate with resiliency, restoring habitat and ecosystems in time for the next generation of plant and animal life to begin anew.

It is when the man-made environment intersects with these natural phenomena that “disasters” result. Disasters occur when human activity, such as buildings, infrastructure, agriculture, and other land uses take place in the path of the forces of nature. The man-made environment is not nearly as indestructible nor as recuperative as the natural one, and the occurrence of a natural hazard can result in damages and hardships for an entire community for many years following the event.

Unfortunately, the frequency of disasters is rising at an alarming rate, not necessarily because natural hazards have become more frequent, but because more and more people have chosen to live and work in locations that put them at risk. Many Texans have chosen to live in areas at risk from coastal storms, repeated flooding, and seismic activity, often with little or no attention to the need for sound building practices or land use policy. As a result, risk of disasters occurring in the wake of natural hazards continues to grow. For instance, approximately 26% of the state’s population live in the most hurricane-prone counties. Likewise, while floods have caused a greater loss of life and property and have disrupted more families and communities than all other natural hazards combined, however, development in flood-prone areas continues, putting more and more people and property in danger from future floods.

While we cannot prevent natural hazards, we do have some means at hand to reduce some of their adverse consequences. We have tools and techniques which, when put into effect in a timely fashion, allow us to avoid the worst-case scenario when a hazard does occur. By managing the characteristics of the existing and future human environment in a community before a hazardous event occurs, we can mitigate many of its negative impacts so that a disaster is less likely to result or will at least be of diminished magnitude.

This handbook is intended to serve as a guide to local policy makers, business leaders, planners, builders and developers, environmental and conservation groups, private citizens, and others who wish to make use of available mitigation measures to decrease the vulnerability of their community to future disasters. By following the steps outlined in this handbook, an effective plan for mitigating the impacts of the hazards that occur in an area can be developed and implemented.

As the costs of disasters continue to rise, emergency management professionals as well as the general public must find ways to reduce hazard risks to our communities and to ourselves. The efforts made to reduce hazard risks are easily made compatible with other community goals; safer communities are more attractive to employers as well as residents. As communities plan for new development and improvements to existing infrastructure, mitigation can and should be an important component of the planning effort. This means taking action to reduce or eliminate long-term vulnerability and risk from hazards and their effects.

This handbook is intended for anyone who has responsibility for or interest in reducing hazard consequences in their community. It contains information that can be used to answer questions about mitigation, to provide a rationale for proposed actions, and to initiate a mitigation program in a community.

# CHAPTER 1

## THE CASE FOR MITIGATION

### What is Hazard Mitigation?

***Mitigation*** is defined as sustained actions taken to reduce or eliminate long-term risk to people and property from hazards and their effects. The purpose of mitigation is twofold: to protect people and structures, and to minimize the costs of disaster response and recovery.

This definition highlights the long-term impact that effective mitigation can produce. While the actions involved in the four phases of a comprehensive emergency management system are related to a specific event, mitigation actions also have the potential to produce repetitive benefits over time, and concern events that may occur in the future. In fact, hazard mitigation can be viewed as the foundation of emergency management, and should be interwoven with all the other phases of your emergency management system. By developing mitigation programs that affect the impact of future disasters, planners can break the cycle of damage, reconstruction, and repeated damage.

### ***Mitigation and Emergency Management***

The many tasks and functions of comprehensive emergency management may be summarized into a cycle through which communities *prepare* for emergencies and disasters, *respond* to them when they occur, help people and institutions *recover* from them, and *mitigate* their potential effects to reduce the risk of future loss.

**Preparedness** ensures that people are ready for an emergency or disaster and respond to it effectively. Preparedness requires:

- Obtaining and maintaining emergency response capabilities, facilities, equipment, and supplies.
- Developing a plan for risk-based contingencies and for implementation of emergency actions.
- Practicing and evaluating the plan and procedures through exercises.
- Conducting training for emergency workers.

**Response** begins as soon as a hazard caused incident occurs or threatens. It involves:

- Actions to save lives.
- Actions to contain and control hazard caused consequences.
- Actions to maintain emergency response efforts and continued operation of essential services.
- Actions to determine needs and request and receive supplemental emergency assistance.
- Actions to bring damaged services and systems back on line.

**Recovery**, or rebuilding, after a disaster may take years. Recovery tasks include:

- Clearing debris and repairing roads and bridges.
- Restoring water, sewer and other essential services.
- Rebuilding homes, businesses, and public facilities.

The goal of all **mitigation** efforts is long-term risk reduction. The emphasis on *sustained* actions to reduce long-term risk differentiates mitigation from preparedness and response tasks that are required to survive a disaster and from recovery tasks which are essentially the return to pre-disaster status. Mitigation actions following a disaster focus on making the situation safer and better than before the incident occurred. Mitigation is an essential component of emergency management. Effective mitigation actions can decrease the impact, the requirements and the expense of a future hazard event.

The *State of Texas Emergency Management Plan* includes the emergency support function of mitigation in *Annex P (Hazard Mitigation)*. The state standards for local emergency management plans require that local governments have a hazard mitigation annex to their plans, which is typically also designated Annex P.

### ***Why is Mitigation Needed?***

The expense of reconstruction following a disaster continues to escalate. An alarming amount of money is spent on repairing damages and not on improvements or economic growth. A growing body of Federal, State, and local-level experience, along with technical research, has demonstrated that mitigation can reduce losses (in terms of life, property, and community resources) from hazard events. A fundamental premise of mitigation strategy is that current dollars invested in mitigation will significantly reduce the demand for future dollars by reducing the amount needed for emergency recovery, repair and reconstruction following a disaster. Mitigation also calls for conservation of natural and ecologically sensitive areas (such as wetlands, floodplains, and dunes) which enables the environment to absorb some of the impact of hazard events. In this manner, mitigation programs can help communities attain a level of sustainability, ensuring long-term economic vitality and environmental health for the community as a whole.

The tension between natural hazards and the decisions people make regarding land use and the built environment is mounting every day. We must take steps to significantly reduce the vulnerability of Texas communities to natural hazards; this can be effectively done through mitigation. Many Texas communities are growing faster than their natural surroundings can support them. Development is occurring in areas, which are inappropriate or even dangerous for human settlement. Flat, dry construction sites are long gone in many communities, yet the pressure to build more homes, stores, offices, and industrial sites continues to be steady and strong throughout the Lone Star State. Wetlands, ocean front beaches and dunes, floodplains, steep slopes, fault zones, fire-prone areas, and other wild and open spaces are now being quickly developed. Many are altered to suit the builders' needs – wetlands are drained, dunes are leveled, vegetation is planted in fire-break zones - and the natural integrity and natural processes and benefits of the area is lost. In choosing these building sites and changing the landscape, we not only lose the inherent value of these areas, but we also expose ourselves to forces beyond our control.

Future growth and prosperity require that we build safer and smarter, and regain a balance with the earth's natural systems. Hazard mitigation is one of the ways we can accomplish this, by making what we build more resilient to the impacts of natural hazards, thereby decreasing the future vulnerability of human life and property while bolstering the long-term viability of natural ecosystems and human communities. Hazard mitigation actions that reduce a community's vulnerability and risk also promote the sustained future growth and economic success of that community. Mitigation provides for a safe and sustainable future through conscientiously controlled growth and development. This sustainable development communicates a concern with *what kind* of development, rather than *how much*, and likewise encourages development that is built to standards designed to withstand likely hazard impacts and is located in areas that have minimal exposure to those impacts. Sustainable development recognizes that our economic structure and the natural environment are not in conflict, but instead are irrevocably interconnected and interdependent. Hazard mitigation can play a role in maintaining a balance between the human and the natural systems and ensuring the health of both. By investing in mitigation measures before a hazard occurs, a community can significantly reduce the need for large expenditures for emergency response, recovery, repair and reconstruction following a disaster. Mitigation can also provide a degree of socio-economic continuity in the community by reducing the social and economic disruption that often accompanies a disaster through damage to transportation and communications systems, dislocation of people, loss or interruption of jobs, and closing or disabling of businesses, schools, and social centers.

### ***Whose Job is Mitigation?***

#### **Individuals**

Mitigation must begin in the home. Individuals should:

- Take time to learn about the risks to their home and family.
- Exercise personal responsibility for their safety.
- Comply with appropriate building codes and zoning ordinances.
- Insist their community participate in the National Flood Insurance Program (NFIP) and Community Rating System (CRS) initiative.
- Make sure property and possessions are adequately covered by insurance (normal peril, flood, and windstorm).
- Not build or buy homes located in vulnerable high-risk areas, or are not constructed or retrofitted in accordance with appropriate building codes.
- Identify recurring or potential problems in their area that threaten life and property and call these to the attention of local authorities.

#### **Private Sector**

Disaster resistant communities must develop partnerships with businesses, private organizations, and individual homeowners. The whole community has much to gain by reducing their risks to hazards.

- Even if individual businesses survive and recover quickly after a disaster, their recovery is incomplete if employees cannot get to work, water and electricity are unavailable, or customers fear safety hazards.
- The whole community is affected if the businesses are unable to recover.

At a minimum, businesses, private organizations, and individual homeowners have a responsibility to:

- Purchase and maintain appropriate insurance coverage.
- Comply with applicable zoning and land-use regulations.
- Comply with applicable building codes.
- Take other measures, as necessary and possible, to reduce or eliminate damage from known hazards.

## **Local Government**

Mitigation happens locally; local government must recognize hazards and initiate mitigation actions. At a minimum, that means:

- Enacting and enforcing building codes, zoning ordinances and other measures to protect life and property.
- Making the public aware of hazards that present risks to people and property and measures they can take to reduce their risk and possible losses. This includes taking personal responsibility for making informed choices regarding risk.
- Complying with federal and state regulations that are designed to reduce disaster costs and preserve and protect natural, historic and cultural resources.

In addition, local government should:

- Limit variances and property tax reductions that subsidize vulnerability and risk.
- Develop commitment and capacity to change the way hazardous areas are managed.
- Coordinate and integrate policies to manage exposure to hazards with policies to accomplish economic, social and environmental objectives.
- Foster innovations in government and land management to better match institutional systems and tools with the problems posed by hazards.

## **State Government**

State government also plays a significant role in advancing mitigation. It too must emphasize to its constituency the importance of substantially reducing the risk of loss of life, injuries, economic costs, and destruction of natural and cultural resources that result from hazards.

The State's mitigation responsibilities include the following:

- Upholding state and federal regulations intended to reduce hazard losses.

- Taking the lead in mitigation by evaluating state owned and operated facilities and ensuring that they are designed, constructed, and/or retrofitted to reduce impacts of future hazard events.
- Providing resources to assist local jurisdictions to achieve mitigation objectives.
- Administering programs that provide assistance for mitigation initiatives.

### **Federal Government**

Federal agencies are expected to provide the example and to assist with the effort to achieve mitigation goals. Their mitigation responsibilities include the following:

- Leading by example to ensure federally owned and/or operated facilities are designed, constructed, and retrofitted to reduce the impact of future hazard events.
- Collaborating with academia, national standards and code-writing groups, and the private sector to speed the development and application of mitigation technologies.
- Supporting applied research on priority mitigation issues.
- Administering programs that are intended to support and encourage local efforts to mitigate hazard losses.

**MITIGATION IS EVERYBODY'S JOB!**

# CHAPTER 2

## PARTNERSHIPS AND ANNEX P

### *Partnerships and the Team Approach*

While it is true that the Heisman Trophy is awarded to the single best college football player each year, it is inconceivable to even imagine that the winner could have done so without the help and commitment of his team mates, or that winning the award was not a result of the team's efforts. The old adage "Two heads are better than one" is a truism and a recommended method of solving complicated problems. Using a team approach provides an excellent opportunity to insure that a wide-range of ideas, and potential solutions are discussed and that informed and appropriate decisions can be made.

Using a team approach builds successful problem solving partnerships between stakeholders so that all have a share in the decision making process, and facilitates mutual support for implementation and sustainability of solutions. Emergency management requires partnerships for solving problems, and so does hazard mitigation.

The key element in a successful mitigation program is a partnership that is active, committed, and participating in the mitigation process. An effective method used to facilitate the development and sustained operations of participating, committed, partnerships is the adoption of a Hazard Mitigation Annex to your local Emergency Management Plan. This annex (designated as Annex P in state planning guidance with planning standards and criteria included in *Checklist P*) insures that the function of hazard mitigation is incorporated into your comprehensive emergency management program. A copy of Annex P is available on the DEM web-site.

### ***Annex P***

Your Annex P is a baseline document and record of your hazard mitigation program. Your Annex P:

- Identifies the members of your Hazard Mitigation Team (HMT).
- Identifies the team leader - your Hazard Mitigation Coordinator (HMC).
- Defines the tasks and responsibilities of the HMT and HMC.
- Describes your mitigation process and procedures for pre-incident, incident response, and post-incident activities.
- Facilitates the collection and access to hazard-related resource data.

### Hazard Mitigation Team

Although a strong community leader is important to the mitigation effort, a community-based planning team is essential. A Hazard Mitigation Team:

- Ensures better solutions, because no one person in the community has all the answers.

- Gains community acceptance for the mitigation plan, since many viewpoints are represented.
- Ensures important information and assistance are not overlooked.
- Greatly expands capabilities, expertise, and resources because of multi-disciplined approach to problem identification and resolution.

Hazard Mitigation teams are composed of individuals with a variety of skills and areas of expertise. Appendix 1 of the Annex P identifies a number of functional areas that may be needed and from which to draw team membership. Additional recommended members for the community-based team includes the following.

- A member of the City Council or Commissioners Court.
- The community planner or a planning board member.
- The Floodplain Administrator
- A building official.
- The community engineer.
- The community health official.
- Public works personnel.
- The Emergency Management Coordinator.
- One or more hazard area residents.
- One or more representatives of the business community.
- Representatives of adjoining communities (problems and/or solutions are likely to extend outside community boundaries).
- Representatives of area-wide organizations (Watershed and river basin based solutions can be very effective for the entire area.)
- Representatives of natural resource conservation groups.

There are many ways to recruit these potential team members and encourage team participation. There may be planning groups already established to address hazard related issues.

- The Local Emergency Planning Committee (LEPC) that addresses hazardous materials issues
- The Community Rating System (CRS) group (that implements activities to reduce flood losses).
- The Neighborhood Associations that address environmental and public safety concerns.

The groups, mentioned above, may be a good core for a hazard mitigation team. In addition, the following methods have been successful.

- Mayors and County Judges can appoint team members.
- Publicize that a plan will be developed to solve hazard problems and ask for volunteers.
- Emphasize the importance of a diverse team in mitigation planning.
- Inform people of what the time commitment may be in terms of duration and frequency.

- Give people the option of providing input in other ways, besides being a team member, such as participating in town meetings.

## Selecting a Hazard Mitigation Coordinator

One agency or organization must be assigned primary responsibility for the emergency support function of hazard mitigation. It is highly recommended that an organization best suited with capabilities and expertise to plan for, secure and administer funding, and implement and manage mitigation projects be assigned this responsibility. Agencies/organizations like, floodplain management, public works, engineering, planning departments, flood control districts, building inspections, or the city manager's office, are all excellent candidates.

The Hazard Mitigation Coordinator (HMC) is the individual appointed from within the designated primary agency/organization that is responsible for day to day mitigation program activities and for coordinating the activities of the Hazard Mitigation Team. A floodplain administrator, city planner, engineer, grant specialist, etc. are all excellent candidates. The HMC must be prepared to commit a significantly high amount of time and energy to organize and administer an on going hazard mitigation program. A successful and effective program must be multi-disciplined and dynamic, and requires an HMC that is knowledgeable, focused, and an active participant.

## Public Input

Throughout the plan development, adoption, and maintenance process, public input will be required to ensure workable solutions to hazard problems.

- Local officials and residents will provide useful historical information on the various hazards that are likely to occur in the community.
- Input from the community is needed. It will ensure that solutions, proposed actions, ongoing implementation of the plan, and monitoring and documenting of successes are accomplished.

There are several ways the hazard mitigation planning team can ensure that public input is obtained. These methods include:

- Hosting public input workshops, which can take the form of a facilitated meeting involving a large group of community representatives, business representatives, and residents. This approach allows the public to help identify issues and ways to solve problems.
- Developing and distributing questionnaires to hazard area residents in utility bills, or posted in the local newspaper to gather information about public concerns and interest in mitigating local hazard risk.
- Disseminating information and opportunities for feedback through local access cable television. Meetings can be broadcast to the community, and can include video footage of historical or recent disaster damages, as well as phone numbers of team members who will accept comments and suggestions.

- Including hazard vulnerability and risk information as well as proposed mitigation measures on the community's website. The Internet provides a means of quickly disseminating current information to the public, and also provides a means for public feedback.

# CHAPTER 3

## *Hazard Analysis Process*

Now that you have a local Hazard Mitigation Team in place, their first job is to develop your Hazard Analysis. Understanding hazards and their consequences is the first step in any effort to reduce community risk. Hazard analysis involves identifying all of the hazards that potentially threaten a community and analyzing them individually to determine the degree of threat that is posed by each. Hazard analysis determines:

- What hazards can occur
- How often they are likely to occur
- How these hazards are likely to affect the community and how severe may be the impact
- How vulnerable the community is to the hazard
- Which hazards pose the greatest risk and require prioritized mitigation and preparedness actions

This information is used in the development of both mitigation and emergency management plans. It indicates which hazards merit special attention, what actions might be taken to reduce the impact of those hazards, and what resources are likely to be needed during response operations.

Hazard analysis requires completion of five steps:

- Create and inventory sectors
- Identify hazards
- Profile each hazard
- Determine vulnerability and associated risks
- Prioritize hazards

### *Hazard Analysis Step 1 - Create and Inventory Sectors*

*Sectoring* is dividing the community into manageable segments for defining specific types of information.

Use logic and your personal knowledge of the local area to create the sectors. They need to be clearly defined and understood. The use of sectors allows you to better define what is vulnerable in each sector and consequently help you determine level of risk in each sector. If you know specifically what is threatened and the potential severity of the impact in each sector you can better identify appropriate mitigation actions and also warning and emergency response needs within each sector. The use of sectors can also be used as a way to organize and conduct emergency response and damage assessment operations following an emergency incident or disaster.

Sector definitions should include easily identifiable boundaries and all geographic features such as topography, waterways, soil compositions, marshes, wooded areas and coastal areas, etc. Using political boundaries such as county precinct lines may be a good start – but remember that hazards and consequences do not recognize or follow political boundaries. *Inventorying* is identifying and listing what is actually located in each sector so that you can determine what is vulnerable to hazard consequences. To facilitate this process information is collected, reported, and categorized into groups as follows:

### ***People***

- How many people are in the sector, how many live in each subdivision or neighborhood?
- Where do people congregate (e.g. fairgrounds, shopping malls, sports arenas, schools, etc.) how many are at each location and do numbers shift at certain times during the day, or time of the year?
- What is the special needs population of the sector and where is it concentrated?
- If appropriate and a concern, what is the animal and livestock population and areas of concentration?

### ***Housing Units***

- How many housing units are in the sector?
- How many are in each subdivision or neighborhood, and what types of units are they (single family, multiple family, mobile or manufactured homes, condos, camp grounds, or RV parks, etc.)?
- What is general age and cost of units in each sub-division or neighborhood? How many are insured for fire, flood, and windstorm?

### ***Critical Facilities***

- What fire, rescue, police, communications, and direction and control facilities are in the sector and where are they located?

### ***Special Facilities***

- What schools, nursing homes, health care facilities, prisons, jails, or unique historical or other cultural resources are in the sector, and where are they located?

### ***Infrastructure and Lifelines***

- What are and where are utilities and mass transit systems that provide services within sector?
- Where are pipelines, railroads, highways, bridges, and navigable waterways in the sector?
- Where are flood protection and drainage works in the sector?

### ***Hazmat Facilities***

- What and where are facilities that make, use, store, or transport radioactive or hazardous materials?

### ***Commercial Facilities***

- What and where are businesses and industrial facilities in the sector? (Examples are retail centers, factories, industrial sites, tourist attractions, port facilities, and agricultural and marine centers, etc.)

You will need both maps and supporting data to complete this step and report your findings. This is a job well suited to a Geographical Information System (GIS) application which combines the use of maps and supporting databases.

### ***Hazard Analysis Step 2--Identify Hazards***

Put together a list of hazards that may occur in the community. Consider all types of hazards.

***Natural hazards*** include:

- Hurricanes
- Tropical storms
- Thunderstorms and lightning
- Tornadoes
- Windstorms
- Hailstorms
- Severe winter storms
- Extreme summer weather
- Landslides
- Land subsidence
- Floods
- Storm surges
- Coastal erosion
- Droughts
- Earthquakes
- Wildfires

***Technological hazards*** include:

- Dam failures
- Fires
- Hazardous materials events
- Nuclear accidents

***Human-Caused hazards*** include:

- Civil or political events such as rioting, or large demonstrations.
- Accidents such as aircraft crashes, train derailments, building/bridge failures, or utility system outages.
- Terrorist threats or actions.

***Cascading Potential*** identifies situations when one hazard may trigger others in a cascading fashion. For example, an earthquake or a flood that ruptured natural gas pipelines could result in fires and explosions that dramatically escalate the type and magnitude of events. This may also be referred to as “Residual or Secondary Impacts”. Sometimes hazard-induced events occur in neighboring counties that eventually cause a cascading emergency or disaster.

### ***Hazard Analysis Step 3--Profile Each Hazard***

See the attached “**Hazard Profile Worksheet**”, which provides a sample way to collect data on each hazard.

Develop a profile for each hazard identified in Step 2 and include the following information:

- Frequency of occurrence - how often it is likely to occur.
- Severity of impact - how bad it can be, and how much it can cost people and community to respond and recover.
- Areas affected – compile list of maps, studies, reports etc. that identify areas at risk.
- Duration - how long it can be expected to last.
- Seasonal pattern - the time of year during which it is more likely to occur.
- Warning Time - how fast it is likely to occur.
- Cascading Potential – what hazard impacts are possible.
- Availability of warnings - what warning system exists.

### ***Create Hazard Area Maps:***

Maps, particularly GIS maps, are very effective tools to clearly depict vulnerability and areas at risk in relation to people, facilities, and infrastructure.

### ***Hazard Analysis Step 4--Determine Vulnerability and Associated Risk***

See the attached “**Vulnerability and Risk Assessment Worksheet**” which provides a sample way to combine information from sector profiles developed in step 1 with the hazard-specific information collected during Steps 2 and 3 to quantify potential consequences of the hazard.

The costs for responding to and recovering from hazard caused emergencies and disasters continues to escalate, and the collection and incorporation of dollar losses based on existing and potential future development is essential to determination of severity of impact from each hazard and prioritization of mitigation needs. Detailed information and guidance concerning the collection and reporting of estimated hazard caused losses are provided in the document *Understanding Your Risks- Identifying Hazards and Estimating Losses* (FEMA 386-2 August 2001).

**Vulnerability** is the identification of what is capable of being affected by the consequences of a hazard. The maps and information contained in the completed sector inventory identifies what is in the sector and where it is located. This is now cross-referenced with the boundaries of the areas potentially affected by the hazards, and what is inside this area is vulnerable and is at risk. Vulnerability is determined for each group inventoried (people, housing units, key facilities, special facilities, infrastructure and lifelines, HAZMAT facilities, and commercial facilities), for each hazard in each sector.

**Risk** is the potential, or probability that an incident will occur and that a hazard will cause an adverse impact to what ever is vulnerable to that hazard—the higher the probability of occurrence, the higher the level of risk.

This step allows you to determine exactly what is capable of being damaged or destroyed by a hazard (**vulnerability**) and the probability of damages that occur (**risk**). This allows you to quantify impact based on risk, and to prioritize your mitigation and preparedness needs and actions so you can focus on the hazards that present the greatest threat to each sector and consequently to the entire jurisdiction.

### ***Hazard Analysis Step 5—Prioritize Hazards***

See the attached “**Hazard Impact and Risk Summary**” which provides a sample way to cross-reference the compiled data collected in the previous steps. It will include:

- Frequency of occurrence
- Warning Time
- Potential Severity
- Risk Level

Based on these ratings, a priority can be assigned to each hazard within each sector. Priorities may be described using quantitative ratings such as High, Medium and Low. When this is completed you can now develop a hazard summary for the entire jurisdiction and identify which hazards pose the greatest overall potential impact. It is recommended that this final hazard summary be included in Section IV (Situation and Assumptions) in your local emergency management plan.

### **Sources of Information:**

The information, maps, and data you need to complete your hazard analysis are available from a number of sources. You should start by looking at historical incident and disaster records maintained by your local Emergency Management Coordinator. You should also seek information from members of your local Hazard Mitigation Team, your LEPC, and your local planning office, Floodplain Administrator, Tax Assessor, libraries, newspapers, chamber of commerce, and your Council of Government (COG).

Information is also available in the *State of Texas Hazard Analysis*, from DEM, state agencies, flood control districts, river authorities, and also from federal agencies such as the National Weather Service, Corps of Engineers, and FEMA.

Maps, both printed and digital are also available from State Hazard Mitigation Team member agencies, and universities. Many local governments and COGs have excellent GIS capabilities.

Data is available in many forms and an ever increasing amount is available via the Internet (see the DEM web-site at <http://www.txdps.state.tx.us/dem/>). Annex P (Hazard Mitigation) of your local emergency management plan also contains a list of maps, previously completed studies, recommendations, projects, and plans that are applicable to specific hazards that pose a risk to your jurisdiction. These documents should prove very helpful to your efforts to complete your hazard analysis.

### **Using the Hazard Analysis**

Brainstorm worst-case scenarios to identify hazard-specific planning and resource requirements. Describe the hazard's development and impact on the jurisdiction and its generation of specific consequences. Include the following:

- Overall impact on the community.
- Impact and consequences on specific sectors (e.g. collapsed buildings, loss of critical services and infrastructure, death, injury, or displacement).
- Appropriate mitigation actions.
- Emergency response and disaster recovery needs.

This activity is helpful in establishing the planning assumptions used in the development of a mitigation action plan and in emergency response preparedness activities.

This process can help you develop an exercise scenario based on projected risk and hazard consequences.

### **Communicating The Risk**

Once the hazard analysis process has been completed, the risk associated with each hazard must be communicated to the public and to other community officials by explaining the following:

- What can occur?
- The likelihood that it will occur.
- The consequences if it does occur, in terms of casualties, destruction, disruption and costs.

Community leaders and other interested individuals must then decide what level of risk is acceptable, and what will be done to achieve the desired level of disaster resistance.

Communities *can* take actions that will reduce future losses due to hazards. The knowledge and the tools to reduce hazard risks exist. However, mitigation efforts will not be effective if approached in isolation. Communities must study and then select a mitigation strategy that promotes the concurrent achievement of hazard loss reduction and other community goals.

## **Review and Maintenance of Hazard Analysis**

You should review and update your hazard analysis at least annually. You should review and incorporate damage assessment and local mitigation team reports developed after each emergency and/or disaster event to insure your hazard analysis is accurate and current.

Some questions to be answered during the review process are:

- Is vulnerability and risk data current?
- Do all of the hazards included in the hazard analysis still pose a threat to the community?
- Are there hazards that are not included in the existing analysis that pose a potential threat to the community?
- Does the hazard analysis specifically consider the possibility and impact of cascading hazards?

## HAZARD PROFILE WORKSHEET

<b>HAZARD:</b>	
<b>POTENTIAL SEVERITY OF IMPACT:</b>	
Substantial	<ul style="list-style-type: none"> <li>Multiple deaths</li> <li>Complete shutdown of facilities for 30 days or more.</li> <li>More than 50 percent of property destroyed or with major damage.</li> </ul>
Major	<ul style="list-style-type: none"> <li>Injuries and/or illnesses result in permanent disability.</li> <li>Complete shutdown of critical facilities for at least 2 weeks.</li> <li>More than 25 percent of property destroyed or with major damage.</li> </ul>
Minor	<ul style="list-style-type: none"> <li>Injuries and/or illnesses do not result in permanent disability.</li> <li>Complete shutdown of critical facilities for more than 1 week.</li> <li>More than 10 percent of property destroyed or with major damage.</li> </ul>
Limited	<ul style="list-style-type: none"> <li>Injuries and/or illnesses are treatable with first aid.</li> <li>Minor quality of life lost.</li> <li>Shutdown of critical facilities and services for 24 hours or less.</li> <li>Less than 10 percent of property destroyed or with major damage.</li> </ul>
<b>FREQUENCY OF OCCURRENCE:</b>	<b>SEASONAL PATTERN:</b>
<input type="checkbox"/> Highly likely: Event probable in next year. <input type="checkbox"/> Likely: Event probable in next 3 years. <input type="checkbox"/> Occasional: Event possible in next 5 years. <input type="checkbox"/> Unlikely: Event possible in next 10 years.	
<b>LIST SOURCE DOCUMENTS, STUDIES, MAPS, ETC, THAT IDENTIFY AREAS POTENTIALLY AFFECTED:</b>	
<b>PROBABLE DURATION:</b>	
<b>WARNING TIME (Potential Speed of Onset):</b>	
<input type="checkbox"/> Minimal (or no) warning. <input type="checkbox"/> 3 to 6 hours warning. <input type="checkbox"/> 6 to 12 hours warning. <input type="checkbox"/> More than 12 hours warning.	
<b>CASCADING POTENTIAL:</b>	
<b>EXISTING WARNING SYSTEMS:</b>	

## VULNERABILITY AND RISK ASSESSMENT WORKSHEET

HAZARD: \_\_\_\_\_ SECTOR: \_\_\_\_\_ DATE: \_\_\_\_\_

Page 1 of 2

<b>Vulnerability Group</b>	<b>Very High Risk</b> People and facilities located in known risk areas (e.g. Hurricane risk area, floodway, 100-year floodplain, vulnerable zones around HAZMAT site, active fault line, etc.)	<b>High Risk</b> People and facilities located in areas that have previously experienced impacts from hazards and/or in areas where impacts from hazards are possible and probable (e.g. 500-year floodplain, fringe areas along waterways, inland areas beyond coast, "tornado alley", etc.)	<b>Limited Risk</b> People and facilities located in areas that have low frequency history of impacts from hazards and/or in areas where impact is possible but not probable.	<b>Minimal Risk</b> People and facilities located in areas with no history of occurrence of hazards and/or in areas where impact is not possible or probable.
<b>People</b>				
<b>Housing Units</b>				
<b>Critical Facilities</b>				
<b>Special Facilities</b>				

<b>Vulnerability Group</b>	<b>Very High Risk</b> People and facilities located in known risk areas (i.e. Hurricane risk area, floodway, 100-year floodplain, vulnerable zones around HAZMAT site, etc.)	<b>High Risk</b> People and facility located in areas that have previously experienced impacts from hazards and/or in areas where impacts from hazards are possible and probable (i.e. 500+ year floodplain, fringe areas along waterways, inland areas beyond coast, “tornado alley”, etc.)	<b>Limited Risk</b> People and facilities located in areas that have low frequency listing of impacts from hazards and/or in areas where impact is possible but not probable.	<b>Minimal Risk</b> People and facilities located in areas with history of occurrence of hazards and/or in areas where impact is not possible or probable.
<b>Infrastructure and Lifelines</b>				
<b>HAZMAT Facilities</b>				
<b>Commercial Facilities</b>				

**HAZARD IMPACT and RISK SUMMARY**

<i>Hazard</i>	<i>Sector</i>	<i>Frequency of Occurrence</i>	<i>Warning Time</i>	<i>Potential Severity</i>	<i>Risk Level</i>	<i>Priority*</i>
		<input type="checkbox"/> Highly Likely <input type="checkbox"/> Likely <input type="checkbox"/> Occasional <input type="checkbox"/> Unlikely	<input type="checkbox"/> Minimal or None <input type="checkbox"/> 3 to 6 hours <input type="checkbox"/> 6 to 12 hours <input type="checkbox"/> More than 12 hours	<input type="checkbox"/> Substantial <input type="checkbox"/> Major <input type="checkbox"/> Minor <input type="checkbox"/> Limited	<input type="checkbox"/> Very High <input type="checkbox"/> High <input type="checkbox"/> Limited <input type="checkbox"/> Minimal	
		<input type="checkbox"/> Highly Likely <input type="checkbox"/> Likely <input type="checkbox"/> Occasional <input type="checkbox"/> Unlikely	<input type="checkbox"/> Minimal or None <input type="checkbox"/> 3 to 6 hours <input type="checkbox"/> 6 to 12 hours <input type="checkbox"/> More than 12 hours	<input type="checkbox"/> Substantial <input type="checkbox"/> Major <input type="checkbox"/> Minor <input type="checkbox"/> Limited	<input type="checkbox"/> Very High <input type="checkbox"/> High <input type="checkbox"/> Limited <input type="checkbox"/> Minimal	
		<input type="checkbox"/> Highly Likely <input type="checkbox"/> Likely <input type="checkbox"/> Occasional <input type="checkbox"/> Unlikely	<input type="checkbox"/> Minimal or None <input type="checkbox"/> 3 to 6 hours <input type="checkbox"/> 6 to 12 hours <input type="checkbox"/> More than 12 hours	<input type="checkbox"/> Substantial <input type="checkbox"/> Major <input type="checkbox"/> Minor <input type="checkbox"/> Limited	<input type="checkbox"/> Very High <input type="checkbox"/> High <input type="checkbox"/> Limited <input type="checkbox"/> Minimal	
		<input type="checkbox"/> Highly Likely <input type="checkbox"/> Likely <input type="checkbox"/> Occasional <input type="checkbox"/> Unlikely	<input type="checkbox"/> Minimal or None <input type="checkbox"/> 3 to 6 hours <input type="checkbox"/> 6 to 12 hours <input type="checkbox"/> More than 12 hours	<input type="checkbox"/> Substantial <input type="checkbox"/> Major <input type="checkbox"/> Minor <input type="checkbox"/> Limited	<input type="checkbox"/> Very High <input type="checkbox"/> High <input type="checkbox"/> Limited <input type="checkbox"/> Minimal	
		<input type="checkbox"/> Highly Likely <input type="checkbox"/> Likely <input type="checkbox"/> Occasional <input type="checkbox"/> Unlikely	<input type="checkbox"/> Minimal or None <input type="checkbox"/> 3 to 6 hours <input type="checkbox"/> 6 to 12 hours <input type="checkbox"/> More than 12 hours	<input type="checkbox"/> Substantial <input type="checkbox"/> Major <input type="checkbox"/> Minor <input type="checkbox"/> Limited	<input type="checkbox"/> Very High <input type="checkbox"/> High <input type="checkbox"/> Limited <input type="checkbox"/> Minimal	
		<input type="checkbox"/> Highly Likely <input type="checkbox"/> Likely <input type="checkbox"/> Occasional <input type="checkbox"/> Unlikely	<input type="checkbox"/> Minimal or None <input type="checkbox"/> 3 to 6 hours <input type="checkbox"/> 6 to 12 hours <input type="checkbox"/> More than 12 hours	<input type="checkbox"/> Substantial <input type="checkbox"/> Major <input type="checkbox"/> Minor <input type="checkbox"/> Limited	<input type="checkbox"/> Very High <input type="checkbox"/> High <input type="checkbox"/> Limited <input type="checkbox"/> Minimal	
		<input type="checkbox"/> Highly Likely <input type="checkbox"/> Likely <input type="checkbox"/> Occasional <input type="checkbox"/> Unlikely	<input type="checkbox"/> Minimal or None <input type="checkbox"/> 3 to 6 hours <input type="checkbox"/> 6 to 12 hours <input type="checkbox"/> More than 12 hours	<input type="checkbox"/> Substantial <input type="checkbox"/> Major <input type="checkbox"/> Minor <input type="checkbox"/> Limited	<input type="checkbox"/> Very High <input type="checkbox"/> High <input type="checkbox"/> Limited <input type="checkbox"/> Minimal	
		<input type="checkbox"/> Highly Likely <input type="checkbox"/> Likely <input type="checkbox"/> Occasional <input type="checkbox"/> Unlikely	<input type="checkbox"/> Minimal or None <input type="checkbox"/> 3 to 6 hours <input type="checkbox"/> 6 to 12 hours <input type="checkbox"/> More than 12 hours	<input type="checkbox"/> Substantial <input type="checkbox"/> Major <input type="checkbox"/> Minor <input type="checkbox"/> Limited	<input type="checkbox"/> Very High <input type="checkbox"/> High <input type="checkbox"/> Limited <input type="checkbox"/> Minimal	

\* High, Medium, Low

# CHAPTER 4

## MITIGATION GOALS AND STRATEGIES

Building safer and smarter for the future can be achieved with committed leadership, and shared community-based goals and strategies.

### *Community Commitment*

Community leaders need to acknowledge that there are hazards and that they can and must be addressed. The availability of local staff and/or volunteers to spend time planning and carrying out activities that will reduce hazards and prevent losses depends on the level of community commitment and support from elected officials. This in turn greatly influences the quality and long-term benefits of mitigation action plans.

### *Goals*

Goals are generally broad-based and long-term in nature. The goal identifies what the community expects to accomplish through mitigation actions during a designated time frame.

Goals must be realistic and achievable. A goal of “Stopping Floods” should be changed to something like “Reducing repair costs from flood damage to infrastructure along Jones Creek by 75% within the next five years.” Goals must be consistent with state mitigation goals and closely linked to existing local plans and initiatives, particularly the Comprehensive Plan as follows:

- Goals to reduce hazard vulnerability and risk should always be coordinated with the community’s Comprehensive Plan and capital improvements program.
- The Comprehensive Plan reflects what the community would like to see happen in the future; it guides other local measures such as capital improvements, zoning and subdivision ordinances.
- The Comprehensive Plan can incorporate the mitigation strategies identified in the community’s mitigation action plan to limit new development in hazard prone areas and encourage practices that are consistent with disaster resistant community goals.

### *Mitigation Strategies and Measures*

A mitigation strategy elaborates on the methodology and the process to be used to accomplish the community’s goals. A mitigation strategy is comprised of one or more mitigation measures designed to eliminate or reduce a community’s vulnerability and risk from hazards.

Following is an explanation and discussion of seven strategies and related measures.

## ***Personal and Commercial Property Insurance***

Insurance policies do not prevent a disaster from occurring, but appropriate insurance coverage can lessen the burden of a disaster victim whether it is an individual or a whole community.

Personal property and commercial property insurance is the first line of defense for ensuring quick recovery and reduced economic loss from all forms of disasters. Coverage must be obtained in a separate multiple hazard property and casualty policy, flood policy, wind damage policy and earthquake policy to achieve total all hazard protection.

- Personal property insurance coverage for specified hazards is normally sufficient to offset recovery costs on a residence, and provides immediate temporary housing and money for temporary repairs and rapid funding for permanent repairs from storm damage and flood damage. Insurance payments are usually quickly available following an event, but federal loans or grants are restrictive as to eligibility, and are usually only available following a major disaster declaration.
- As in personal property insurance, commercial property coverage is available for all hazards in various forms.
- A community can aid citizens by participating in various insurance initiatives to reduce the costs of insurance coverage to individual property owners. Some property and casualty and flood insurance underwriters offer fire, windstorm, and flood incentive programs.
- Community Rating System (CRS) – An incentive program sponsored by the National Flood Insurance Program (NFIP) that can award up to a 45% reduction in cost of flood insurance policies to residents in participating communities.
- Increased Cost of Compliance (ICC) – an increased benefit from flood insurance policies that provides up to \$20,000.00 for costs to bring a substantially damaged structure into code compliance for a building permit. Funds may be used to elevate, relocate, or demolish residences, and may also be used for flood proofing of commercial structures.

## ***Prevention***

Communities can achieve significant progress toward hazard resistance through prevention measures. Prevention measures keep a hazard risk problem from getting worse. Using prevention measures, future development can be guided away from hazards, while maintaining other community goals such as economic development and quality of life.

Examples of prevention measures include the following:

- Planning and zoning – identifying low hazard risk areas for higher density development and guiding development away from areas of greater risk.

- Open space preservation – designating high hazard risk areas for recreational or other low-density uses and preventing the construction of residences, businesses and public buildings.
- Land development regulations – imposing construction standards on what is allowed in the hazard area. May include subdivision regulations, building codes and ordinances.
- Storm water management – planning and implementing policies that control the potentially hazardous impacts of storm water run-off.
- Dune and beach maintenance – regulating and caring for dunes and beaches to prevent erosion and maintain a barrier against coastal storms.

### ***Property Protection***

Property protection measures are used to modify existing structures subject to hazard risk, or their surroundings. A community may find these to be inexpensive measures because often they are implemented or cost-shared with property owners.

These measures directly protect people and property at risk. Some examples of property protection measures are:

- Acquisition – public procurement and management of lands that are vulnerable to damage from hazards.
- Relocation – permanent evacuation of hazard-prone areas through movement of existing hazard prone development and population to safer areas.
- Retrofitting – rebuilding or modifying structures to reduce damages, and provide more protection from future hazard events such as a tornado safe room program.
- Flood proofing – protecting a flood-prone building. *Dry flood-proofing* means sealing a building against floodwater by making all areas below the flood protection level watertight. *Wet flood-proofing* means allowing the floodwaters to enter the building to minimize pressure on the structure.
- Elevation – raising structures above the currently established base flood elevation (BFE).

Ideally, adoption and/or enforcement of building codes accompany rebuilding of damaged or hazard prone structures to minimize risk of future damage. Hazard mapping is not precise. Hazard areas particularly BFEs, change and risk increases so that current levels and standards can become obsolete and more dangerous in the future.

### ***Natural Resource Protection***

Natural resource protection measures are intended to reduce the intensity of hazard effects as well as to improve the quality of the environment and wildlife habitats. Parks, recreation, or conservation agencies or organizations usually implement these activities. Examples of natural resource protection include:

- Erosion and sediment control – Practices such as reforestation and planting other vegetation minimize erosion and capture sediment before it leaves the site. Terracing,

contour strip farming, no-till farming and impoundment (sediment basin, farm ponds, and wetlands) also slow runoff.

- Wetland protection – Wetlands must be protected because they can store large amounts of floodwater, filter water, and provide habitats for many species of fish and wildlife.
- Forest and wildland management – The management of vegetation and pruning of trees can greatly reduce the adverse impact of ice storms and fires.

## ***Structural Projects***

Structural measures directly protect people and property at risk. They are called “structural” because they involve construction of man-made structures to control hazards.

Examples of structural measure are:

- Reservoirs – control flooding by holding high flows behind dams or in storage basins.
- Levee/floodwalls – a barrier of earth or stone erected between the river and the property to be protected.
- Seawalls/bulkheads/revetments – barrier of timber, concrete, metal sheet piling or rocks (riprap) built on seashores and lakeshores to protect property.
- High flow diversions – a new channel that sends floodwater to a different location.
- Channel modifications – making a channel wider, deeper, smoother or straighter to increase the conveyance of water.
- Storm sewers – new sewers, enlarged pipes, improved streets and backflow prevention to reduce stormwater flooding.
- Debris basins – used to collect mud and debris from landslides.

Structural projects can be very expensive. Other disadvantages may include the following.

- They may require extensive environmental evaluations to ensure continued protection of floodplains, wet lands, and wildlife habitats.
- They require regular maintenance to ensure the structure continues to function as designed.
- They can foster a false sense of security because if the hazard level exceeds the design criteria, or if the structure is not adequately maintained, the community can still suffer a disaster.

## ***Public Information***

Public information activities inform and remind people about hazardous areas and the measures necessary to avoid potential damage and injury. Remember individuals and families have primary responsibility for their own safety and welfare. The public can be informed about mitigation through several avenues. Some examples include:

- Outreach projects – programs designed to encourage people to seek out more information and to take steps to reduce hazard risks.
- Real estate disclosure – advising applicants for a mortgage or other loan that the property is located in a hazard area.
- Hazard information centers – locations such as web-sites and libraries where individuals can find hazard and mitigation information.
- Technical assistance – experts provide hazard specific mitigation information.
- School age and adult education programs – formal efforts to teach children and adults about hazard effects and mitigation opportunities.

Consider the following in the design of a public information program about mitigation.

- The first barrier to mitigation is lack of knowledge of what to do. People are simply unaware of mitigation activities and need information.
- The public is much more aware of strategies for preparedness than mitigation. It may be effective to link the two concepts. For example, “prepare and mitigate”.
- Target high-risk areas. People who feel that disasters don’t happen in their area often are unlikely to “buy into” the concepts of risk or mitigation.
- Timing is important. Target the time when disaster is on the minds of the population – for example at the beginning of hurricane season or after a disaster.
- Mitigation is a “pocketbook” issue. People need to know the perceived return on investment before acting. Cost savings and cost effectiveness must be emphasized in your public information campaign.
- Barriers may drop when a related purchase is under consideration. People are more willing to spend money on mitigation if they perceived that it would save more in the long run.
- Small business owners may be useful supporters. When convinced that disasters affect their employees and their business, their self-interest can propel them into activism.

### ***Emergency Preparedness***

Even when mitigation measures have been successfully implemented, all communities must still be prepared to respond to emergencies and disasters. Mitigation will reduce many hazards caused consequences, but the remaining ones still pose a significant and dangerous threat to people, property, and the environment. Your “*Hazard Analysis*” should identify the areas at risk and provide insight concerning the type, magnitude, and duration of expected consequences. Communities must be prepared to respond to these consequences and as needed accomplish the following:

- Determine occurrence threat
- Notify, assemble, and deploy emergency responders.
- Conduct warning, evacuation, sheltering, search and rescue, and mass care operations.

- Implement continuity of government actions to insure key government operations, and direction and control capabilities continue to function during and after the emergency/disaster.
- Provide auxiliary power for key facilities.
- Conduct and report damage assessments.

### ***Criteria for Selecting Mitigation Strategies***

How will your mitigation team select the best measures to implement? Once it has been established that several proposed measures will accomplish your mitigation goals, how do community leaders decide between them?

A viable mitigation strategy must achieve goals of disaster resistance in coordination with other community goals stated in the comprehensive plan or other community standards. The following set of decision criteria can be used to select the appropriate mitigation measures for the community. Ask the following questions to evaluate potential mitigation measures.

#### **Social**

- Will this proposed action be socially acceptable to the community?
- Will it allow all segments of the population to be treated fairly?
- Will the action disrupt established neighborhoods, break up voting districts or cause the relocation of low and reduced income people?
- Is the action compatible with present and future community values?
- How many lives can be saved and human suffering reduced, by implementing the proposed mitigation action?

#### **Technical**

- It is important to determine if the proposed action is technically feasible.
- What consequences are created by this approach? Most importantly, will it solve the problem?
- In light of other community goals, is it the most useful?
- Does the proposed action make use of and employ the most current information and technology concerning vulnerability and risk?

#### **Administrative**

- Does the community have the capability to implement the action?
- Can the community provide any maintenance necessary?
- Are there enough staff, technical expertise and funding?
- Can it be accomplished in a timely manner?
- Can community resources be maximized more effectively through risk-reduction efforts or disaster response and recovery efforts?

#### **Political**

- Who are the stakeholders in this proposed action?
- Have all of the stakeholders been offered an opportunity to participate in the planning process?
- How can the mitigation goals be accomplished at the lowest cost to the stakeholders?

- Is there public support both to implement and maintain this measure?

### **Legal**

- Does the community have the authority to implement the proposed measure?
- Is there a clear legal basis for the mitigation action?
- Is enabling legislation necessary?
- What are the legal side effects?
- Will the community be liable for the actions, or lack of action?
- Is it likely to be challenged?

### **Economic**

- What are the costs and benefits of this measure?
- How will the implementation of this measure affect the fiscal capability of the community?
- What burden will be placed on the tax base or local economy?
- Does the action contribute to other community economic goals, e.g., capital improvements or sustained economic growth and development?
- What future losses and disaster costs can be prevented by implementing the proposed mitigation actions?

### **Environmental**

- How will this action affect the environment?
- Will this measure comply with local, State, and Federal environmental regulations?
- Is the action consistent with community environmental goals?

Once these questions have been addressed, the community will have a good indication of the feasibility of the measures that have been proposed. The results of this evaluation are used to finalize the development of an effective mitigation action plan.

### ***Mitigation Programs and Funding Sources***

How will your community fund its mitigation efforts? Both technical and financial resources will be needed.

### ***Local Resources***

Keeping in mind that the responsibility for mitigating hazards belongs to local government, first seek all available local resources. Consider these possibilities:

- **Capital improvement projects** can incorporate mitigation actions. (For example, locating the new municipal building in a low hazard area, and building it to whatever hazard resistant standard is applicable.) Mitigation should be a priority in all capital improvement projects, including sizing culverts, repairing roads, and renovating public buildings.
- Use **economic development funds** to improve low hazard areas and attract businesses to those areas and away from hazardous sites.

- Assign **employee staff time** to cleaning out drainage ditches that will clog and cause flooding if neglected, etc.
- Solicit **donations** of hazard prone land for recreational or open space use.
- Include funds in **school bonds** for building or renovating schools to applicable hazard resistant standards.
- **Swap** publicly owned low-hazard areas for privately owned high hazard land.
- Seek reduced **insurance** rates for mitigation efforts that reduced hazard risks.
- Seek the assistance of **volunteer organizations** for technical, financial and physical assistance in mitigating community hazard risk.
- Develop **public/private partnerships** that include business, lifeline, engineering, and government organizations and universities that work to develop and promote mitigation.
- Establish **tax increment financing districts**, as in El Paso, Houston, and Dallas to assist the private sector to abate environmental hazards and revitalize older buildings.
- Initiate **local redevelopment initiatives**, as in Dallas, Galveston, Fort Worth, and San Antonio to attract new residents and businesses into downtown areas and so reduce urban sprawl.

Each local government must first look to and use their own resources and methodologies for funding and implementing mitigation actions. State and federal programs and resources may also be used to assist local government efforts.

# CHAPTER 5

## DEVELOPING A COMPREHENSIVE MITIGATION ACTION PLAN

### *What is a Mitigation Action Plan?*

A Mitigation Action Plan (MAP) is not just another document; it is a community's dynamic record of its recognition that it is vulnerable and at risk from hazards, and its committed efforts to do something about it. The plan details the actions needed and the methods for implementing specific mitigation actions designed to reduce the community's long-term vulnerability, risk, and consequences from hazards.

To be truly effective a MAP must be based on recognition and inclusion of the following principles:

- Hazards do not recognize political boundaries – areas covered by the plan must appropriately relate to hazards – multi-jurisdictional and regional planning can be a most effective approach to reduce area-wide vulnerability problems.
- All hazards must be addressed – the primary focus is on natural hazards, but technological and human-caused hazards also pose a threat and must be covered.
- A comprehensive hazard analysis must be the basis for development of proposed mitigation actions –current, quantifiable vulnerability and risk data is essential to identification of appropriate, effective mitigation actions.
- The plan must clearly identify and explain problems and provide detailed recommended solutions – proposed mitigation actions must be technically feasible, cost-effective, provide measurable results to reduce vulnerability and risk, enjoy committed support from officials and the public, and be implemented,
- Public-private partnerships and public support are keys to success – effective problem solving requires coordinated, multi-disciplined teamwork, and public involvement and support can insure that mitigation actions are implemented.
- The reduction of vulnerability, risk, and future disasters can be achieved through implementation of a comprehensive hazard mitigation action plan – the plan must have the committed support of elected officials, and the public – it must be approved and adopted (ordinance, court order, etc.), and implemented as funding opportunities occur.

### *Why Have a Mitigation Action Plan?*

The bottom line is that when implemented, good mitigation plans save lives, reduce property damage and human suffering, and also reduce costs of future disasters. Saving lives is a pretty good reason to have a mitigation plan, but disasters cost an ever increasing amount of taxpayer dollars, and such a plan, when implemented, can also reduce the drain on the taxpayers earnings and profits. Fewer and less devastating disasters reduce hardships on people, businesses, and the whole community.

An effective mitigation action plan makes it possible for a community to actually achieve measurable vulnerability and risk reduction results. This situation can promote sustainable growth and economic vitality for the community. Once a MAP has been approved and implemented additional incentives are also provided as follows:

- Allows more funds to be spent on enhancements rather than on repairing repetitive disaster caused damages.
- Simplifies and expedites the development and approval of Hazard Mitigation Grant Program (HMGP) applications following a major disaster declaration.
- Assists and supports state actions to increase the statewide allocation of federal HMGP funds from 15% to 20% of federal disaster costs.
- Establishes eligibility for participation in HMGP and award of state and federal pre-disaster mitigation program funds.
- Enhances Community Rating System (CRS) scores that can reduce costs of National Flood Insurance Program policy premiums for property owners.

Section 201 of CFR 44 (published as interim final rule in the Feb. 26, 2002 *Federal Register* Vol. 67, No. 38) now requires that the State, as well as local governments must have FEMA approved mitigation plans in place to be eligible for the full range of federal disaster assistance payments for major disasters declared after November 1, 2003. The loss of eligibility and access to all disaster recovery assistance funds would place a horrific economic burden on our communities and is another reason why mitigation action plans are needed.

### ***What should a Mitigation Action Plan look like?***

There is no single format required for a mitigation action plan - the planning process employed and the content, currency, and accuracy of the plan are far more meaningful – it could even be incorporated into existing plans such as your comprehensive plan, as consistent with provisions of chapter 213 of the Texas Local Government Code. There are several programs available that provide either funding assistance for the development of a plan or for mitigation projects once a mitigation plan has been developed and approved. These separate programs each have different requirements concerning content and approval of mitigation plans.

All of these various requirements have been reviewed and compared, and in partnership with FEMA, a comprehensive mitigation-planning standard has been developed for use in Texas. A comprehensive mitigation action plan developed in conformance with this standard will meet all of the current separate planning requirements for the HMGP, Flood Mitigation Assistance Program (FMAP), FEMA's Pre-Disaster Mitigation Program (PDM), and CRS planning requirements.

The development of a mitigation action plan in accordance with a state comprehensive planning standard provides funding assistance opportunities from multiple funding sources, and likewise establishes eligibility for awards of project funds from multiple funding sources.

The comprehensive planning standard requires that information pertaining to the community be collected and provided concerning eight broad-based criteria. The type of information provided in the mitigation plan is consistent state-wide because of the eight criteria; however the details of the plan reflect the situation and needs of each individual community.

### ***Comprehensive Mitigation Planning Standard and Criteria***

The following is a sample format for a MAP. Items 1 and 2 are suggestions concerning a way to organize the plan. Items 3 through 10 identify the eight broad-based criteria of the mitigation-planning standard, and provides a discussion of the information that must be included for each. Detailed hazard mitigation planning standards are provided in *Checklist P* of your emergency management plan. *Checklist P* must be used to review and evaluate your MAP. A copy of the checklist is available on the DEM website at <http://www.txdps.state.tx.us/dem/>.

#### **I. Authorities**

Identifies federal, state, and local rules pertaining to the plan.

#### **II. Purpose**

Define why this plan was developed, who it is applicable to, and what is expected by its implementation.

#### **III. Demographic Profile**

Define the area of responsibility (AOR) covered by this plan. This area should coincide with, or be greater than, the area covered by your comprehensive “*Hazard Analysis*” and “*Emergency Management Plan(s)*”. Identify the political sub-divisions within the area, the river basins, watersheds, and reservoirs that affect the area. Discuss the geography, population, industries, and trends or potential for future changes to population and economic growth and vitality of the area. Identify communities within the area that have been designated by state or federal programs for special consideration because of minority or economically disadvantaged populations.

#### **IV. Vulnerability and Risk Exposure**

Provide reference to and a summary of the findings of your comprehensive “*Hazard Analysis*”. Identify the date of your current “*Hazard Analysis*” and explain the scheduled review and update process. Provide a listing of the occurrences and consequences of past emergencies and disasters and a prioritized listing of areas most vulnerable and at risk from future occurrences. Information must be quantitative and detailed enough to clearly identify the people, housing units, critical facilities, special facilities, infrastructure and lifelines, Hazmat facilities, and commercial facilities specifically at risk, and estimated dollar losses based on existing and potential future development.

## **V. Public-Private Partnerships**

Provide reference to and an overview of the composition and functions of your Hazard Mitigation Team as defined in your “*Annex P*” (*Hazard Mitigation*) of your “*Emergency Management Plan(s)*”. Also identify and discuss any on-going efforts to inform, recruit and involve local businesses, private sector and non-profit groups, civic organizations, and local and regional agencies in assisting the community in reducing the identified level of risk to hazards. Document and explain the opportunities provided and actual participation of neighboring communities, businesses, academia, and all agencies with authority to regulate growth and development within the area. Document the planning process to include how it was prepared, and who was involved in the process. As hazard impacts do not stop at political boundary lines it is an essential requirement that planning coordination and sharing of information be accomplished with neighboring jurisdictions and that this process and associated activities be documented and explained in the plan.

## **VI. Public Involvement**

Address what is being done for public out-reach in order to gain grass roots support for identified and proposed mitigation actions and public support to sustain risk reduction programs. Explain actions and methods used to inform, and educate the public and get them involved in the planning process and in support of proposed mitigation actions. Document and explain opportunities and actual participation of the public to be involved and provide comments on the plan during the drafting stage, prior to final approval, and also during the maintenance and update process.

## **VII. Assessment of Current and Completed Mitigation Activities**

This is a summary explaining the past mitigation actions taken to reduce the level of risk by the community and an evaluation of their effectiveness. Mitigation actions can be embedded in a variety of rules, regulations, ordinances, court orders, programs, policies etc. Though not clearly labeled as such, there are mitigation elements contained in master drainage plans, stormwater management plans, capital improvement and comprehensive plans, building codes, zoning requirements, floodplain management, fire codes, Hazmat regulations, septic tank rules, dam safety requirements, etc. These may be federal, state, or local initiatives, but most are in place and affect the areas covered by this plan. Discuss each appropriate rule, regulation, policy, or plan within the area and explain how it has been implemented and enforced and evaluate how effective each has been to reduce future vulnerability and risk from hazards. This section must include a listing and explanation of code variances approved, and current status concerning participation in the Community Rating System (CRS). It would be helpful to discuss whether the community has had a Building Code Effectiveness Grading Report (BCEGS) performed by the Insurance Services Office, Inc. and if so, what score they received, Make sure that projects funded through the HMGP are also evaluated as well as projects identified in existing plans, and community assistance visits. Provide a general description of land use and

development trends so that mitigation options can be used in future land use considerations.

## **VIII. Mitigation Goals and Long-term Strategy**

Identify long-term hazard mitigation goals and strategies of the area covered by this plan. Explain their relationships and conformance with state and federal goals and strategies for hazard mitigation and the National Flood Insurance Program (NFIP). Provide an explanation of the area's blueprint for reducing vulnerability and potential future losses throughout the area covered by the plan. The strategy should focus on existing authorities, policies, programs, resources, and capabilities as well as the ability to expand and enhance these existing tools.

## **IX. Prioritized Mitigation Actions and Implementation Plan**

Provide reference to and a summary of existing Hazard Mitigation Team Reports ("*Appendix 2 – Annex P (Hazard Mitigation) of Emergency Management Plan(s)*"). Provide a list of prioritized mitigation actions to be implemented. Each proposed action must be explained – to include source of recommended action, what will happen, why it is needed, what it will accomplish, who will make it happen, how much it will cost, how it will be funded, and when it will be implemented. Proposed mitigation actions must be included for all jurisdictions covered by the plan.

## **X. Commitment, Adoption, Implementation, and Maintenance**

Explain how this plan will be approved, implemented and maintained. Provide copies of ordinances, court orders, executive orders, policy letters, etc. that indicate this plan has been approved, officially adopted, and will be implemented. All jurisdictions must officially adopt and commit to implementation of the plan to be covered by the plan. Provide an explanation of the process for incorporating appropriate mitigation actions and requirements from the plan into other planning mechanisms such as comprehensive or capital improvement plans. The approved and adopted plan must also contain provisions for conducting and reporting a detailed annual review and evaluation, and for updating the plan at least every five years. Provide detailed procedures for this process in this section, and include an explanation of how continued public participation in the maintenance and update of the plan will be accomplished.

### ***Planning Assistance and Approval***

Consistent with capabilities, DEM and State Hazard Mitigation Team member agencies will provide assistance and guidance for development, implementation, annual review, and update of comprehensive mitigation action plans. The state standards for initial and annual review of the mitigation action plan are included in *Checklist P*.

The State of Texas is not the approval authority for mitigation plans. The state's role is to provide assistance during development, review the plan to determine compliance with the planning standard and criteria, and as appropriate, submission of recommendations to FEMA

for final approval. The *Mitigation Action Plan* is actually approved and adopted by the community; however, FEMA, by law, must approve the plan as a condition for award and obligation of federal funding assistance to accomplish mitigation actions. It is anticipated that the evaluation tool to be used by FEMA for final review and approval of mitigation action plans will be the FEMA document titled *State and Local Plan Interim Criteria Under the Disaster Mitigation Act of 2000*. This document is currently in draft form only, but when it becomes available, you are strongly encouraged to obtain a copy from FEMA and use it for your initial evaluation of your mitigation action plan, followed by your final evaluation using Checklist P. Your draft plan, along with a copy of both completed evaluations, must be submitted to your DEM Regional Liaison Officer (RLO) for state review and further evaluation. FEMA rules in *Section 201 of 44 CFR* require that the planning process be documented and subject to FEMA review and consideration for final approval. You must insure that your planning process is documented and detailed within the plan itself, or as a separate document that lists the on going sequence of milestones, and activities/accomplishments through out the planning process.

## *ATTACHMENT 1*

### **Mitigation Planning Resources**

#### **I State Resources**

##### *State of Texas Hazard Mitigation Plan, and State of Texas Hazard Analysis*

These state documents provide information and guidance for development, implementation and maintenance of comprehensive mitigation programs and plans. They are currently being reviewed and updated to insure compliance with Section 322 of the Stafford Act.

##### *Local Emergency Management Planning Guide (DEM-10), and Texas Disaster Recovery Manual*

These documents also provide helpful information concerning emergency preparedness and disaster recovery operations.

#### **II FEMA Resources – Pre-Disaster Mitigation Act 2000 (DMA)**

##### *Planning for Post-Disaster Recovery and Reconstruction*

An older but still very valuable resource for mitigation planners at every level of government, this document was co-published by the American Planning Association (APA) and FEMA.

- Published in December of 1998.
- The APA Planning Advisory Service Report Number is 483/484.
- It is available in the FEMA warehouse or through the APA's Planning Advisory Service.

##### *Planning for Post-Disaster Recovery and Reconstruction is not Disaster Mitigation Act 2000 (DMA) guidance.*

- It is a source of guidance for planners who are typically not taught in their university education about natural hazards and disasters. It educates planners about natural hazards and the importance of hazard mitigation in both the pre- and post-disaster environment.

- It is intended to help community leaders and planners educate their constituents on how informed decisions and choices affect the rebuilding process after a natural disaster and yield a safer, more sustainable community.
- It presents a hazard mitigation planning process, emergency and long-term mitigation measures, and other information that transfers into the pre-disaster mitigation planning effort. The document is particularly helpful in depicting the impacts of disasters on communities and illustrating the role of the planner in creating a community that is more resistant to future disasters.

*Planning for Post-Disaster Recovery and Reconstruction* provides a wealth of case studies, including

- Flooding in Arnold, Missouri
- Tornado in Plainfield, Illinois
- Hurricane Opal in the Florida Panhandle
- Wildfire in Oakland, California
- Loma Prieta Earthquake in Santa Cruz, California

***Planning for a Sustainable Future: The Link Between Hazard Mitigation and Livability (FEMA-364)***

The first of a pair of publications intended to be used to help guide community efforts toward sustainability were published by FEMA in September 2000.

The primary intent of this booklet is to show communities how the goal of disaster resilience or resistance can be a catalyst to help achieve a sustainable future. It focuses on the vision of sustainable communities. It illustrates the benefits of disaster prevention planning (mitigation) before disaster and/or planned recovery afterward.

The booklet is an ideal handout for members of a mitigation planning team and other members of the community interested in preventing community disaster.

***Rebuilding for a More Sustainable Future: An Operational Framework (FEMA-365)***

The second publication in this series was published by FEMA in November 2000. It is a booklet that develops the themes introduced in the first booklet and develops them into more detailed guidance for use during post-disaster recovery.

In addition to FEMA and State agencies, this publication is useful for local officials and citizens of communities to understand the impacts of their decisions on the sustainability of their communities.

- It defines and describes sustainability in relation to disaster resistance.
- It suggests specific sustainable practices for communities prone to:
  - Flooding
  - Earthquakes
  - Coastal storms
  - Tornadoes
  - Wildfires
  - Landslides

It contains a section that includes eighteen tools and programs for sustainability as well as appendices providing such valuable information as:

- Glossary and acronyms
- Websites
- Recommended readings
- Federal technical assistance and funding
- Quotable materials on sustainability

***Mitigation Resources for Success (FEMA-372)***

This compact disk (CD) is a compendium of FEMA resources related to mitigation practices and projects.

### **III FEMA Resources for DMA implementation**

The newest group of resources is designed specifically for use in pre-disaster mitigation planning.

- How-to Guides are designed to provide the type of information needed to initiate and maintain a planning process that will result in safer communities.
- They are applicable to States and communities of various sizes and varying ranges of financial and technical resources.
- The How-To Guides are in varying stages of completion.

#### ***Getting Started: Identifying Resources and Assuring the Success of the Hazard Mitigation Plan (FEMA-386-1)***

This How-to guide presents an overview of the entire mitigation planning process and sets the stage for implementation of a successful mitigation planning process. It includes units on:

- Preparing the community for planning.
- Establishing the planning team.
- Engaging the community.
- Getting to work.

How-to #1 is expected to be available in the summer of 2002.

#### ***Understanding Your Risks: Identifying Hazards and Estimating Losses (FEMA 386-2)***

This guide addresses the second phase of the planning process, risk assessment.

- Risk assessment provides the foundation for the rest of the mitigation planning process.
- Risk assessment information also assists emergency management personnel by identifying both potential hazards and vulnerable risks.

This How-to guide describes some methods that may be used to develop this information.

This document is already in the FEMA warehouse.

***Developing a Mitigation Plan: Identifying Mitigation Measure and Implementation Strategies (FEMA-386-3)***

The process for developing a successful hazard mitigation plan is just as important as the plan itself.

This How-to guide focuses on the third step of the mitigation planning process: developing a mitigation plan. It provides suggestions that will help to develop a mitigation plan that will be accepted by FEMA to meet the requirements of DMA 2000.

How-to #3 is expected to be available in the summer of 2002.

***Bringing the Plan to Life (FEMA-386-4)***

The fourth phase of the mitigation planning process is “Implement and Monitor”. The mitigation plan is “brought to life” when the mitigation strategy is actually undertaken. This phase also involves periodic evaluation of the mitigation strategy and identification of needed revisions. How-to #4 explains this phase.

How-to #4 is expected to be available in the fall of 2002.

***Using Benefit/Cost Analysis in Mitigation Planning (FEMA-386-5)***

Throughout the mitigation planning process there will be ongoing needs for additional information. An area of inquiry that is sure to be explored during the process is Benefit-Cost analysis.

How-to #5 covers a more comprehensive way to determine risk, and a method to compare the costs of projects intended to reduce that risk.

How-to #5 should be available in the fall of 2002.

### ***Planning for Historic Resources (FEMA-386-6)***

This booklet is useful to the community that wishes to protect historic and cultural resources by mitigating effects of natural hazards.

It identifies the differences in the mitigation planning process when historic and culturally significant resources are involved.

How-to #6 should be available in the fall of 2002.

### ***Integrating Technological and other Manmade hazard Considerations into Mitigation Planning (FEMA-386-7)***

How-to #7 is intended to guide States and localities to incorporate mitigation planning for technological and other manmade hazards.

It puts forth a method intended to supplement other mitigation planning efforts rather than replace them.

The projected date for completion of How-to #7 is the summer of 2002.

### ***State and Local Plan Interim Criteria under the Disaster Mitigation Act of 2000.***

*To further help States, and local, and tribal governments meet the new DMA planning requirements, FEMA has prepared this guidance with two major objectives in mind:*

- *To help federal and State reviewers evaluate mitigation plans from different jurisdictions in a fair and consistent manner; and*
- *To help states and local jurisdictions develop new mitigation plans or modify existing ones in accordance with the criteria of Section 322 of the Stafford Act.*

*The Plan Criteria includes references to specific language in the rule, descriptions of the relevant criteria, and sample plan text to illustrate differences between plan approaches that would and would not meet DMA criteria. This is to assist States and local governments in developing a comprehensive, multi-hazard approach to mitigation planning, and in preparing plans that will meet the new requirements.*

**IV. The following publications on flood-related subjects are available at no charge from the Federal Emergency management Agency. These publications can be ordered by calling (800) 480- 2520 and requesting a copy by mail or on-line at <http://www.fema.gov/nfip/forms.htm>.**

The first two publications taken out of the normal numbering sequence are “must have \*” references for this field: \*

**\*A Guide To FLOOD MAPS, How To Use a Flood Map To Determine Flood Risk For a Property (FEMA 258/May 1995)**

A user-friendly guide to assist in deciding whether a specific property is in danger from flooding. The Guide explains floodplain symbols and how to read a Flood Insurance Rate Map (FIRM).

**\*Answers to Questions About the National Flood Insurance Program (NFIP) (FEMA-387)**

Provides nontechnical answers to questions frequently asked about the NFIP by community officials, present and prospective policyholders, real estate agents, lenders and others.

**Design Guidelines for Flood Damage Reduction (FEMA-15)**

Provides general information about flooding and how to properly design and build in floodprone areas

**Elevated Residential Structures (FEMA-54)**

Covers proper design and construction method for elevated homes.

**Manufactured Home Installation in Flood Hazard Areas (FEMA-85)**

Contains information about how to properly site and install a manufactured home in a flood hazard area, with emphasis on design of elevated foundations.

**A Unified National Program for Floodplain Management (FEMA-100)**

Updates a 1979 report, which presents strategies fundamental to implementing a balanced approach to floodplain management.

**Floodproofing Non-Residential Structures (FEMA-102)**

Describes a variety of floodproofing strategies for commercial and industrial structures.

### **Design Manual for Retrofitting Floodprone Residential Structures (FEMA-114)**

Presents floodproofing techniques that can be used for existing residential structures.

### **Reducing Losses in High Risk Flood Hazard Areas: A Guidebook for Local Officials (FEMA-116)**

Designed to help local government improve floodplain management programs for high- risk flood hazard areas.

### **Mandatory Purchase of Flood Insurance Guidelines (FEMA-186)**

Presents an overview of the flood Disaster Protection Act of 1973 and the National Flood Insurance Reform Act of 1994, which amends the Act of 1973. Explains the applicable statues or regulations.

### **Answers to Questions About Substantially Damaged Buildings (FEMA-213)**

Provides guidance for determining whether a building has been substantially damaged.

### **Engineering Principles and Practices for Retrofitting Floodprone Residential Buildings (FEMA-259)**

Provides engineering design and economic guidance to engineers, architects, and local code officials about what constitutes technically feasible and cost-effective retrofitting measures for flood prone residential structures.

### **Managing Floodplain Development in Approximate Zone A Areas (FEMA-265)**

A guide for use by community officials, property owners, developers, surveyors, and engineers who may need to determine base (100 year) flood elevations (BFEs) in Special Flood Hazard Areas designated as approximate Zone A on Flood Insurance Rate Maps.

### **Protecting Floodplain Resources (FEMA-268)**

A guidebook for officials and citizens at the local level on protecting natural resources in floodplains. Offers suggestions for creating strategies for wisely managing floodplain natural resources.

**Increased Cost of Compliance Coverage: Interim Guidance for State and Local Officials (FEMA-301)**

Provides information on the Increased Cost of Compliance (ICC) coverage and how it relates to communities' administration of floodplain management laws or ordinances following a flooding event.

**Appeals, Revisions and Amendment to Flood Insurance Maps: A Guide for Community Officials (FIA-12)**

Details how to obtain revisions to FEMA flood risk maps.

## ***ATTACHMENT 2***

### **Building Blocks to Success**

1. Decide to commit to the effort;
2. Decide on Primary Agency and Hazard Mitigation Coordinator (HMC);
3. Decide on area to be covered by hazard analysis and Mitigation Action Plan (MAP);
4. Decide on Team Members/Partners;
5. Involve Public;
6. Develop Annex P (hazard mitigation);
7. Develop Quantitative Hazard Analysis;
8. Develop MAP;
9. Adopt MAP (court order/ordinance);
10. Implement MAP; and
11. Continue Mitigation Process (ongoing review and update of hazard vulnerability and risk data along with continuing development and implementation of mitigation actions).