

Appendix D – Integrating Hazard Mitigation into Community Comprehensive Planning

Appendix A provides an excellent example of a stand-alone Hazard Mitigation Plan that could be coordinated with the community’s existing Comprehensive Plan. The Appendix A sample plan is multi-hazard in orientation and provides numerous “real world” examples of recommended mitigation actions that could be easily molded to fit the needs of many communities. This is a perfectly viable planning option for developing a Hazard Mitigation Plan. If properly developed and diligently implemented, this option can result in an effective reduction in hazard vulnerability.

However, the more preferable planning option is to integrate hazard mitigation concepts and strategies into the community’s existing Comprehensive Plan structure. (Note: Comprehensive Plans are also commonly called Master Plans, General Development Plans, or other similar titles.) Integrating mitigation concepts and strategies into the Comprehensive Plan will, in the long run, result in a greater and more permanent “institutionalization” of hazard mitigation into the community’s development processes, practices, and pattern. Comprehensive Plans address many aspects of the community’s physical, social and economic environment. As a result, the opportunities for effectuating desirable change and improvement to the community’s development pattern and community support systems is greatly enhanced. Under this planning option, mitigation can influence every future decision made in these important areas. In addition, since development control and guidance mechanisms such as zoning and capital improvements planning are predicated, to some degree, by the community’s intended or desired development pattern (as articulated in the Comprehensive Plan), mitigation strategies, concepts and initiatives stand a much greater chance of being considered for implementation if they are part of the larger community Comprehensive Plan. For that reason, it is recommended that hazard mitigation planning be undertaken as an integral component of the community’s overall comprehensive planning efforts.

Two basic methods can be utilized to integrate hazard mitigation into the community’s Comprehensive Plan:

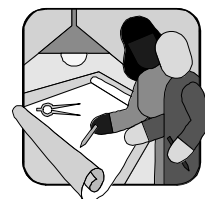
METHOD 1:

A Hazard Mitigation Element is developed and integrated into the plan.

METHOD 2:

Hazard mitigation concepts and strategies are integrated directly into existing elements in the plan.

Note: Excellent guidance on integration of hazard mitigation into the community comprehensive planning process can also be found in the publication Comprehensive Plan / Hazard Mitigation Interface, produced by the Livingston County Department of Planning. Single copies of this document may be obtained by contacting the Livingston County Department of Planning at 517/546-7555. The Livingston County guidance document is used in a training course (of the same name) delivered by the Emergency Management Division, Michigan Department of State Police as part of its emergency management training program. (Information on this and other EMD/MSP training courses can be obtained at www.mspemd.org, or by calling 517/333-5034.) Several of the ideas and principles outlined in this Appendix were derived from that Livingston County guidance document.



REMINDER: KEY DEFINITIONS USED IN THIS APPENDIX

Exposure: The number of persons and the types, qualities, and monetary values of various types of property or infrastructure that may be subject to an undesirable or injurious hazard event. (Those things in harm's way – people, buildings, infrastructure, etc.)

Risk: The predicted impacts that a hazard would have on people, services, and specific facilities and structures. (What could happen – given the worst case scenario.)

Vulnerability: The quantification of a community's risk to determine which hazards present the greatest threat to people, property, and essential services. (What will be affected and how bad will it be, after considering existing mitigation and preparedness in the community. The "net effect" the hazard will have on the community.)

INTEGRATION INTO COMPREHENSIVE PLANS: THE OPTIONS

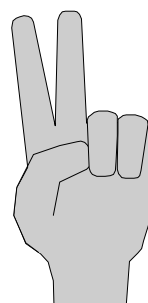
METHOD 1: Hazard Mitigation Element integrated into the community's Comprehensive Plan.

Appendix A, in addition to being an excellent example of a stand-alone Hazard Mitigation Plan, could also serve as a Hazard Mitigation Element within the community's Comprehensive Plan. It may have to be edited somewhat to fit the overall style of the plan, but its multi-hazard orientation and numerous "real world" examples of recommended mitigation actions can easily be molded to fit the needs of many communities.

METHOD 2: Hazard mitigation concepts, strategies and policies integrated into existing elements in the community's Comprehensive Plan.

Probably the most effective method for fostering and promoting the implementation of hazard mitigation concepts, strategies and policies within the community is to completely integrate them into existing elements in the community's Comprehensive Plan. Under this scenario, there would not be a separate Hazard Mitigation Element within the plan. Rather, mitigation concepts, strategies and policies would appear in appropriate places throughout the plan. For example, those mitigation concepts, strategies and policies that affect land use issues would appear in the Land Use Element; those that affect transportation facilities would appear in the Transportation Element and/or the Public Facilities Element; etc. In addition, the community's Hazard Analysis – the foundation for the hazard mitigation strategies and policies – should be included because hazard risk and vulnerability affect every other functional element within the plan.

This method recognizes that hazard mitigation is not a separate, optional activity, but rather a **necessary activity** that must be addressed under each functional element in the plan. Although the focus on hazard mitigation may be somewhat more diluted, the potential for greater attention to mitigation concepts and implementation and effectiveness of mitigation strategies and policies makes this a highly favorable approach for many communities.

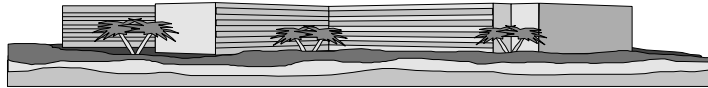


Note: Methods 1 and 2 are consistent with the American Planning Association’s “Growing Smart” initiative, as outlined in the “Growing Smart Legislative Guidebook” (Chapter 7, Local Comprehensive Plans) and Planning Advisory Service (PAS) Report Number 483/484, “Planning for Post-Disaster Recovery and Reconstruction” (Appendix E, Model Natural Hazards Element). Methods 1 and 2 are also consistent with the Institute for Business and Home Safety (IBHS) “Community Land Use Evaluation (CLUE)” for Natural Hazards initiative – the focus of which is a survey tool that local planners can use to assess how well their community addresses natural hazards mitigation in its comprehensive or general plans.

COMMUNITY DEVELOPMENT AND THE MITIGATION OF HAZARDS

FACTORS CONTRIBUTING TO THE GROWING RISK OF DISASTERS IN MICHIGAN AND ACROSS THE UNITED STATES

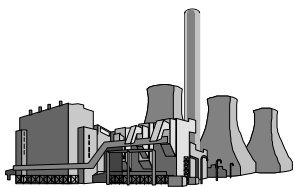
- Concentrated population in urban areas.
- Development in hazardous areas – especially coastal areas and floodplains.



- Surges in holiday, weekend, and seasonal populations in coastal and heavily wooded resort areas (problematic for evacuations during disasters and preventing wildfires).
- Deforestation – more people living in forested areas, which results in wildfires and more forests being damaged or destroyed for land development.



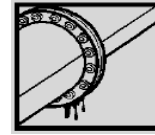
- Human actions – such as building dams and dikes (many of which are now in need of maintenance and may be unsafe), filling in wetlands, and paving large areas of land.



- Unsafe buildings due to lax enforcement of building codes, and older buildings that have not been retrofitted to newer, more stringent building standards.
- Increase in the manufacture, storage, transport, and use of hazardous materials.

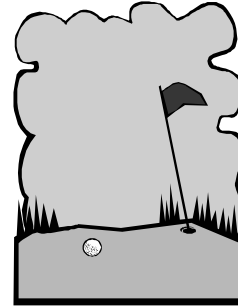
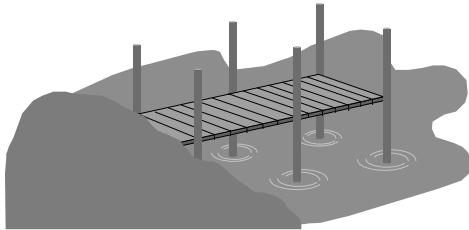


- Old infrastructure that was not built to withstand the excessive forces of nature.



HAZARD MITIGATION: KEY LAND USE ISSUES FOR COMMUNITIES TO CONSIDER

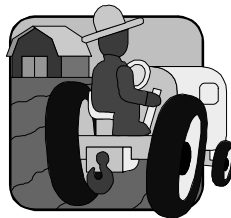
1. **Safe, beneficial use for hazard prone areas:** i.e., floodplains, subsidence areas, steep slopes, high risk erosion areas, unstable soil areas, etc.



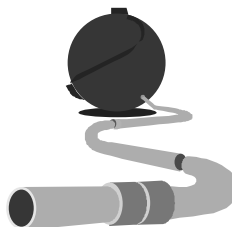
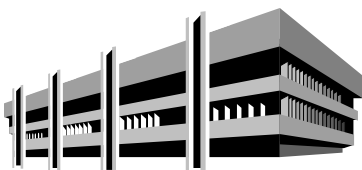
2. **Concentration issues:** i.e., of population, utility infrastructure, critical public facilities, etc. The greater the concentration of people and structures, the greater the risk.



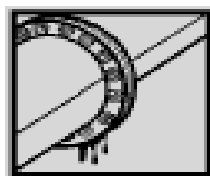
3. **Proximity issues:** The spatial relationship between hazardous areas and surrounding land uses (what is immediately adjacent to hazardous areas). The greater the concentration of people and structures, the greater the risk. For example, intense development in close proximity to sites that manufacture, store, use or transport hazardous materials can lead to more serious incidents when a spill or discharge occurs. The greater the concentration of people and structures, the greater the likelihood of injury, death and property damage. This, in turn, creates even greater problems for the responders, because they have increased population and property protection concerns to address (over and above the actual handling of the hazardous material itself).



4. **Location of public facilities and infrastructure:** Does the placement of public facilities and infrastructure promote growth and development in hazardous or undesirable areas? Are critical community facilities and infrastructure located in harm's way? If so, what is being done to protect them?



5. **Development standards for public facilities and infrastructure:** How strong and functionally adequate are the facilities and infrastructure in the community? For example, is the storm drain system built to handle a 10-year storm, a 25-year storm, or a 100-year storm? Are roads and bridges built to withstand expected flooding? Do water and sewer lines have sufficient structural integrity and are they buried deep enough to prevent freeze-ups and breaks during extended severe cold spells? What fill material is used around the pipes? Are public facilities put in harm's way, such as in a floodplain? If so, what steps have been taken to protect the structures from damage?



6. **Effect of accumulated development on community systems and facilities:** For example, what effect does accumulated development upstream have on storm water management and flooding potential downstream? Unless the hazard vulnerability implications of land development are considered on a regional (or watershed) basis, downstream communities are always going to feel the ill effects of intensive development upstream. This can adversely impact both private and public properties.



REDUCING COMMUNITY EXPOSURE, RISK, AND VULNERABILITY TO NATURAL AND TECHNOLOGICAL HAZARDS THROUGH THE APPLICATION OF LAND USE / DEVELOPMENT MEASURES

The relationship between wise land use planning and the reduction of a community's exposure, risk, and vulnerability to hazards is clear. Experience has shown that those communities that carefully plan the location, type, and structural requirements of development to avoid (to the extent possible) hazard areas and vulnerable structures suffer much less disaster-related damage and impact than do communities that don't carefully plan for development. The benefits of wise land use and development planning, from a disaster recovery standpoint, include:

- less disruption to a community's economic, social, and physical structure;
- less impact on the community's tax base;
- less impact on the provision of essential services; and
- less financial impact in terms of local participation in disaster program cost-sharing.

In addition, communities that are more prone to disaster damage may be looked upon less favorably by potential business enterprises as a safe, secure place in which to conduct business. Clearly, wise land use planning has very practical benefits for all communities.

Prevention is the Key

Preventing land use or development related problems in the first place (**preventive mitigation**) is much more prudent and desirable than attempting to go back and correct the problems (**corrective mitigation**) at a later time. The old adage "an ounce of prevention is worth a pound of cure" is certainly true when it comes to land use planning and community development. Buildings, homes, businesses, and public infrastructure that are

vulnerable by location, design, or construction are doomed to eventual failure. It might not occur overnight, but experience has shown that eventually it will occur. The unfortunate part is that the community is left with the job of picking up the pieces in the aftermath of an emergency or disaster.

Hazard Mitigation is Primarily a Local Function

Fortunately, local governments have many tools available to guide the type, location and structural requirements of development. For that reason, and since development occurs at the local level, hazard mitigation is inherently a local government function. State government has an important role to play in that laws and processes governing the use of land and development of property originate at the state level. In addition, state agencies administer a wide variety of programs that affect – either directly or indirectly – the development and use of land. Therefore, successful implementation of a program to reduce hazard vulnerability must, out of necessity, be a joint cooperative effort between the State and local governments. State government provides the means (i.e., enabling laws) for regulating land development, and local governments put that means to use and actually make land use / development decisions.

For land use / development decision making to be effective in limiting or eliminating hazard exposure, risk and vulnerability, local and state actions must be carefully coordinated. The State must ensure, through appropriate legislation and rules / regulations, that local governments have the necessary means to effectively guide and manage land use change and development. In addition, the State must ensure that its development related actions do not contribute to an increase in hazard exposure, risk and vulnerability.

Local governments, in turn, must make good land use decisions and exercise prudent stewardship of the land development process within their communities. Adequate guidance, oversight, and enforcement at the local level are critically important to successfully mitigating hazards.

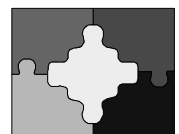
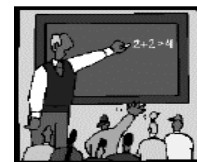
Successful implementation of this process will help ensure that Michigan’s land use / development pattern lends itself to a reduction in the exposure, risk, and vulnerability to natural and technological hazards.

LAND USE / DEVELOPMENT GUIDANCE AND REGULATORY MEASURES IN MICHIGAN

Local governments in Michigan can utilize the following measures to effectively guide and regulate land use and development:

- comprehensive planning
- zoning ordinances
- building codes
- subdivision regulations
- special area, use and design regulations
- capital improvements planning
- financial incentives
- disclosure requirements
- transfer of development rights
- public acquisition and management of lands
- public education

Etc. (This list is certainly not all inclusive.)



FOLLOWING IS AN OUTLINE OF WHAT COULD BE CONSIDERED A “TYPICAL” COMMUNITY COMPREHENSIVE PLAN IN MICHIGAN IN WHICH SUGGESTIONS HAVE BEEN MADE FOR INTEGRATING MITIGATION CONCEPTS, STRATEGIES AND POLICIES INTO APPROPRIATE PLAN ELEMENTS:

(NAME OF COMMUNITY) COMPREHENSIVE PLAN

(The planning elements in **boxes below** are suggested locations within a Comprehensive Plan that hazard mitigation concepts, strategies and policies can be addressed. Notes pertaining to the suggestion are provided in **bold type** at the end of each plan section. Since there is no uniform, standard format or required planning elements for a Comprehensive Plan in Michigan, the sample individual elements listed may not mesh exactly with a community’s existing Comprehensive Plan. Adjustments may have to be made to fit the local situation and planning priorities.)

INTRODUCTION

- History of Planning in (name of community)
- Purpose and Role of the Plan
- Creation of this Plan
 - Citizen Participation

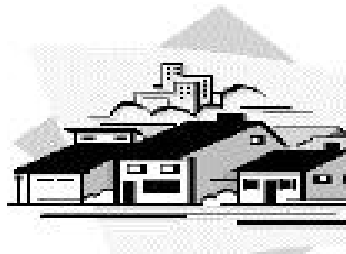
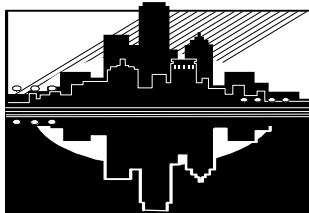


Planning Documents and Technical Studies*

***Note: In this introductory section, the community’s Hazard Analysis and Hazard Mitigation Strategies can be discussed and given special note as having provided an informational foundation for the creation of the Comprehensive Plan. It may be appropriate to include the Hazard Analysis or Hazard Analysis Summary as an attachment or appendix to the plan.**

Overarching Principles

Sustainability*

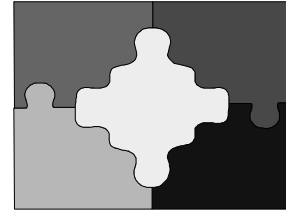


***Note: The philosophy of “sustainability” is well founded in professional urban planning practice. Creating and fostering a sustainable development pattern within the community will, by its very nature, address hazard risk and vulnerability reduction activities. Specific elements of a sustainable community include:**

- **Ecological integrity**
- **Economic security**
- **Empowerment and responsibility**
- **Social well-being**



All of these elements have at their very roots the idea that the community and its facilities and services will be reasonably protected from hazards – be they human-induced, such as crime, or natural and technological in nature, such as floods, tornadoes, thunderstorms, hazardous material accidents, or fire.



LAND USE ELEMENT

Vision Statement*

***Note:** The Vision Statement can articulate a “vision” of a community land use pattern that minimizes (or, if possible eliminates) the long term risk and vulnerability to people, property, and the environment from human-induced, natural, and technological hazards. Such a vision is consistent with the generally accepted desire to foster and create a “sustainable” development pattern that provides current and future generations with a full range of choices and opportunities in creating and maintaining a community that is 1) ecologically responsible; 2) physically, economically, and socially strong; and 3) perceived as a desirable and safe place in which to live, work, and conduct business.

Land Use Policy and Action Plan*

***Note:** In this section, specific background information can be provided regarding known hazard areas within the community. Possible acceptable land uses and necessary public safety / development standards for those areas can be discussed. Areas to address might include:

- floodplains
- high-risk Great Lakes shoreline flooding / erosion areas
- areas of steep slopes subject to landslide
- areas of expansive / unstable soils
- subsidence areas
- seismic hazard areas
- high wind areas
- urban / wildland intermix areas
- environmentally contaminated areas
- areas within the determined vulnerability zone of a SARA Title III / Section 302 site
- areas within the determined vulnerability zone (10-mile Emergency Planning Zone) of a commercial nuclear power plant
- areas within the identified inundation zone (hydraulic “shadow”) of a “high” or “significant” hazard dam
- areas contiguous to oil / gas wells, pipeline terminals, storage facilities, production facilities, or compressor stations
- areas contiguous to railroads, highways, or waterways that regularly carry significant quantities of hazardous materials
- areas contiguous to high-volume commercial passenger airports and other passenger transportation terminals and facilities



This section should also discuss the impacts of these hazard areas on the community's overall land use pattern. (For example, proposed developments within the floodplain will have to meet more stringent elevation standards that may alter the character and/or appearance of the structures. High concentrations of SARA Title III / Section 302 sites in certain areas may make surrounding areas inappropriate for high density residential development unless strict public safety measures can be implemented and/or buffer zones are established. Etc.)

NATURAL ENVIRONMENT ELEMENT

Vision Statement

Fragile Ecosystems*



***Note:** In this section, specific background information can be provided on those hazard areas that are also part of fragile ecosystems, such as:

- floodplains
- high-risk Great Lakes shoreline flooding / erosion areas
- areas of steep slopes subject to landslide
- urban / wildland intermix areas
- areas of expansive / unstable soils

These hazard areas, because of their fragile nature, either should not be developed, or development should occur in such a way that stringent public safety / development standards are implemented to ensure that no injuries or loss of life occurs and structural / ecological damage is kept to a minimum.

Natural Environment Policy and Action Plan*

***Note:** In this section, specific background information can be provided regarding known hazard areas within fragile ecosystems (as per the Fragile Ecosystems section above), and possible acceptable land uses and necessary public safety / development standards for those areas can be discussed. In addition, the benefits of not developing these areas, or developing them at very low density (to reduce hazard vulnerability and preserve the environment) should be discussed. (For example, undeveloped or lightly developed floodplains provide enhanced natural storage areas for surface runoff and snowmelt. Undisturbed steep slopes are less likely to collapse and slide in heavy rainfall, thus reducing the likelihood of injury or damage to persons and structures down slope. Undeveloped dunes and shoreline habitat along the Great Lakes serve as natural buffers to flooding, high winds, and heavy wave action from the frequent storms that strike the Great Lakes. Undeveloped or lightly developed wildland fringe provides a natural buffer against destructive wildfires. Etc.)

HOUSING / BUILT ENVIRONMENT ELEMENT

Vision Statement*



***Note:** The Vision Statement can articulate a “vision” of the community's built environment that minimizes (or, if possible eliminates) the long term risk and vulnerability to people, property, and the environment from human-induced, natural, and technological hazards. Such a vision is consistent with the generally accepted desire to foster and create a “sustainable” development pattern within the community.

Housing / Built Environment Policy and Action Plan*

***Note:** In this section, specific background information can be provided on ways in which the community's housing stock and other built environment elements can be made as resistant to human-induced, natural, and technological hazards (i.e., "sustainable") as possible. Discussion can center on ways to make homes and businesses less vulnerable to crime, wind, water, hail, lightning, fire, extreme temperatures, and ground shift / collapse. Such vulnerability reduction is primarily achieved by guiding and regulating the location, size, design, type, construction methods, and materials used in structures. Much of the discussion should highlight existing codes, standards, and design / construction review practices and processes currently in use in the community (or that need to be instituted). If appropriate, discussion could also focus on the need for protecting vulnerable historically significant structures and methods that could be employed to preserve their historic character and appearance while at the same time protecting them from damage from hazard related damage.

(Public structures can also be addressed here, although it may be more desirable to present the bulk of that discussion in the Public Facilities and Infrastructure section of the plan that follows.)

TRANSPORTATION ELEMENT



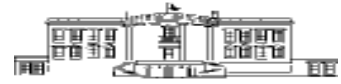
Vision Statement*

***Note:** Because the land use and transportation policies of the Plan are necessarily linked, transportation alternatives must reflect the land use pattern put in place to foster and promote "sustainability" and the reduction or elimination of vulnerability to human-induced, natural, and technological hazards. The Vision Statement for Transportation must address that reality. In addition, the Vision Statement should articulate the desire to create a transportation system that, in and of itself, does not impede evacuations or increase community vulnerability to transportation accidents or hazardous material incidents.

Transportation Policy and Action Plan*

***Note:** In this section, specific background information can be provided on ways in which the community's transportation system can be developed and/or enhanced to foster, promote, and meet the needs of the community land use pattern that seeks to reduce or eliminate vulnerability to human-induced, natural, and technological hazards. For example, if the community is seeking to prevent development in the floodplain, then public transit stations / lines and highways should not be built in or in close proximity to those areas. Specific routes can be designated for shipments of hazardous materials – routes that balance the needs of business and industry with those of public safety and protection. Rail crossings can be designed in such a way to minimize the likelihood of car-train crashes – a major cause of rail transportation accidents. Highways and local streets can be designed with community-wide evacuations in mind. Transportation facilities can be designed and constructed to withstand the excessive forces of nature – thus ensuring safe and reliable transportation in the periods immediately following a disaster.

PUBLIC FACILITIES AND INFRASTRUCTURE ELEMENT



Vision Statement*

***Note:** As per the Housing / Built Environment Vision Statement, the Vision Statement for the Public Facilities and Infrastructure section should articulate a “vision” of the community’s public built environment that minimizes (or, if possible eliminates) the long term exposure, risk and vulnerability to human-induced, natural, and technological hazards. Such a vision is consistent with the generally accepted desire to foster and create a “sustainable” development pattern within the community. If a community is actively fostering and promoting sustainable private development, then it must lead by example by ensuring that public facilities and infrastructure are as disaster resistant as possible. The Public Facilities and Infrastructure Vision Statement should emphatically state the desire to create the highest level of protection possible against disaster damage through prudent facility location, design, construction, and maintenance. In addition, the Vision Statement should indicate that every attempt will be made to ensure that current and future public facilities and infrastructure do not contribute to an increase in the community’s exposure, risk and vulnerability to hazards.

Public Facilities and Infrastructure Policy and Action Plan*

***Note:** In this section, specific background information can be provided on ways in which the community’s public built environment can be developed and maintained to ensure that it is 1) as disaster resistant as possible, and 2) does not directly or indirectly contribute to an increase in the community’s exposure, risk and vulnerability to human-induced, natural, and technological hazards. For example, if the community is seeking to prevent development in the floodplain, then public facilities and infrastructure should not be built in or service those areas. Public facilities and infrastructure should be located out of harm’s way and built to the highest engineering / structural and public safety standards economically possible to prevent damage from natural forces and potential loss of human life. Whenever possible, deconcentration of public facilities providing essential public services should be a desired goal, since services provided by one central facility are always more at risk than those provided by several smaller facilities. The principle of deconcentration also should be applied to the design of service networks – roads, pipelines, cables, etc. – to reduce risk of failure and loss of service. (Long lengths of supply lines are at risk if they are damaged at any point. Networks that interconnect and allow more than one route to any point are less vulnerable to local failures, providing that individual sections can be isolated when necessary. The same holds true for roads.)

ECONOMIC DEVELOPMENT ELEMENT



Vision Statement*

***Note:** The Vision Statement can articulate the importance that the community’s built environment minimize (or, if possible eliminate) the long term risk and vulnerability to human-induced, natural, and technological hazards. Such a vision fosters and promotes a “sustainable” development pattern within the community, which has at its very roots the idea of protecting the community’s economic base from undue harm and disruption. Simply put, a community that is not disaster resistant cannot be “sustainable” economically.

Economic Development Policy and Action Plan*

***Note:** Policies relating to a “sustainable” community development pattern should be addressed in the preceding sections. However, it may be desirable to discuss the community’s most strategic locations for development – away from known hazard areas. By promoting those strategic locations, private investment can be guided into those areas of the community that are not in harm’s way. It may also be desirable to discuss the importance of the development of recreation opportunities and facilities within the community – especially if they would utilize land that is otherwise unsuitable for intense development. For example, if recreational areas are developed in the floodplain, that land is taken out of the development cycle – thus lowering the community’s risk and vulnerability to flooding. However, the new riverfront recreational areas, if properly marketed, could serve as magnets for attracting local and regional tourists to the community – thus putting the community in a “win-win” situation. (A well advertised canoe livery, bike path, or ski trail, for example, can provide much needed economic benefit to the community from otherwise hazard prone land.) Beachfront property offers the same example. Beachfront property used for private residences is beachfront property that will not attract tourist dollars to the community. The little property tax money that is generated from these properties would, in all likelihood, be more than offset by increased tourism revenue if the land were open and available to community residents and the traveling public.

ENERGY ELEMENT



Vision Statement*

***Note:** Energy and hazard mitigation are necessarily intertwined, as reliable, uninterrupted energy supplies are vital to a “sustainable” community. Severe storms, high winds, flooding, snow and ice, freezing temperatures, ground collapse, and fire can all wreak havoc on electrical and gas transmission lines and related infrastructure. When that occurs, energy supplies are disrupted – sometimes for days or even a week or more at a time. Those disruptions are especially problematic (sometimes even life threatening) when critical facilities are involved – water and wastewater treatment plants, hospitals, police and fire stations, emergency medical services, and nursing homes, to name just a few. Therefore, it is critically important that a community take whatever steps are practical and appropriate to ensure a reliable, uninterrupted supply of energy for critical facilities, business establishments, and private residences. The Vision Statement for Energy should articulate that need and make it a priority in the community’s overall energy plan and strategies. A community that is not secure in its energy supply cannot be considered a “sustainable” community.

Energy Policy and Action Plan*

***Note:** Policies relating to energy should focus on maintaining a reliable, uninterrupted energy supply for the community. Emphasis should be placed on strengthening electrical lines and infrastructure to make them more resistant to harmful natural forces such as wind, water, lightning, snow, and ice, as well as human-induced hazards such as sabotage. If a community has a public power utility, that responsibility falls on the community. If a private utility serves the community, the community must ensure that it works closely (and continuously) with the utility to see that appropriate mitigative actions are taken. In either case, the most probable and effective actions include: 1) regular line and equipment maintenance and replacement programs; 2) underground burial of critical lines and strengthening of critical equipment; 3) regular tree trimming around overhead lines; 4) lightning protection for critical system links and nodes; 5) installation of emergency generators at critical public facilities; and 6) public education regarding home landscaping around power lines.

IMPLEMENTATION PLAN*

***Note: Implementation of a Comprehensive Plan with integrated hazard mitigation policies and strategies is necessarily accomplished via a wide variety of methods, including:**

- **Regional Cooperation**
- **Public / Private Partnerships**
- **Inter-Departmental / Agency Collaboration**
- **Technical Studies / Sector Plans**
- **Zoning Ordinance**
- **Subdivision Regulations**
- **Capital Improvements Program**
- **Building Codes**
- **Special Program and Project Implementation**



Following are examples of the ways in which hazard mitigation policies and strategies can be implemented using the aforementioned methods:

Regional Cooperation

Cooperation between the State, the federal government, neighboring municipalities, regional entities, and the private sector is essential for successful plan implementation. Pooling resources makes regional solutions more cost efficient and effective. For example, solutions to flooding are often best addressed at the regional (watershed) level – although in some cases that may not be possible. Likewise, mitigation issues pertaining to wildfires, hazardous materials, dam failure, and other hazards require, by their very nature, regional coordination and cooperation in policy / strategy development and implementation.

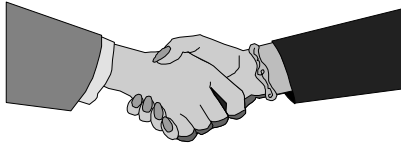
Regional entities that may provide assistance with hazard mitigation include:

- Regional Planning Commissions
- Fire Associations
- Watershed Councils
- Parks and Recreation Districts / Authorities
- Local Emergency Planning Committees (LEPCs)
- Forest Management Districts
- Soil Conservation Districts
- Drainage Districts
- Etc.



Public / Private Partnerships

Combined efforts of public and private partners is another way to implement the mitigation policies / strategies in this Plan. Public / private partnerships are the hallmark of the Federal Emergency Management Agency's "Project Impact" initiative, which seeks to develop disaster resistant communities by encouraging communities to develop public / private partnerships for hazard identification and risk / vulnerability reduction purposes. Community based public / private partnerships work best, since the private sector entity has a vested interest in the future sustainability of the community. In Michigan, many communities have worked successfully with local financial institutions, private non-profit organizations, business and industry, and philanthropic foundations to reduce or eliminate their vulnerability to hazards through implementation of hazard mitigation policies and strategies. If the desired partners are involved in the development of the mitigation policies and strategies outlined in the Comprehensive Plan, they will, in all likelihood, be much more willing to enter into implementation partnerships that involve the commitment of time, personnel resources, and money.



Inter-Departmental / Agency Collaboration

Coordination and partnerships must extend to local governmental departments / agencies as well. Collaboration is a hallmark of successful implementation of mitigation policies, strategies, and projects. Rarely are mitigation projects implemented by one single agency; rather, collaborative efforts are the rule rather than the exception. One of the best ways to foster and promote collaboration is to form a local or regional Hazard Mitigation Coordinating Council, similar in composition and function to the Michigan Hazard Mitigation Coordinating Council. Such a body could be a subcommittee of the local Planning Commission, or it could be an independent entity that makes specific recommendations on mitigation policy, strategy, and project implementation to the Planning Commission. Ideally, all local agencies and community organizations that will be involved in mitigation activities would be represented, although that may not always be logistically possible. The Policy / Action Plans at the end of each plan section also foster and promote a collaborative implementation “culture”, as most policies, strategies, and projects require the involvement of more than one department, agency, or community organization.

Technical Studies / Sector Plans



The mitigation policies, strategies, projects, and actions recommended in each of the plan sections originated from public input, past experiences, technical information, and thorough analysis of relevant data. The local Hazard Analysis, which identifies and quantifies all hazards pertinent to the community, provides the foundation for the community’s mitigation efforts. Ideally, the Hazard Analysis or Hazard Analysis Summary will be included as an attachment to the Comprehensive Plan. Completion of the local Hazard Analysis is the first step in the hazard mitigation planning process. Relevant mitigation policies, strategies, and projects cannot be formulated until that vital document is completed.

Other technical studies or sector plans may be of help in the community’s mitigation efforts. For example, inventories / surveys of all public buildings and their condition could be used to determine the need for application of specific mitigation measures on those buildings. Historic preservation surveys / studies can help determine what structures are at risk from damage, and the “acceptable limits” for any mitigation measures being considered (i.e., so as to not alter the historic characteristics of the structure). Downtown or neighborhood development plans might pinpoint recurring problems related to specific hazards and recommend specific mitigation measures to reduce or eliminate those problems. Watershed studies and river management plans may identify problems relating to flooding and propose solutions. Response plans developed by the Local Emergency Planning Committee (LEPC) help identify the vulnerability zones around each SARA Title III / Section 302 site in the community, enabling the community to devise appropriate mitigative measures to reduce potential impacts on nearby residents. Etc.

Zoning Ordinance



A Zoning Ordinance is probably the most effective measure a community has for guiding and regulating development and the land use pattern, and it can be very effective in mitigating hazard exposure, risk, and vulnerability. The Zoning Ordinance provides a mechanism for implementing the policy decisions articulated in the Comprehensive Plan concerning the desired locations of

various land uses and public facilities. The Zoning Ordinance is based on the Comprehensive Plan and therefore is developed and adopted after formal adoption by the community of the Comprehensive Plan. One major difference between the two mechanisms is the timeframe upon which they are based. Generally, the Comprehensive Plan is designed to guide development for the next 15-20 years or more, whereas the Zoning Ordinance will typically be adopted on the basis of a 7-10 year land use development need projection.

A Zoning Ordinance typically addresses 3 primary areas: 1) the use of land and structures and the height and bulk of structures; 2) the density of population and intensity of land and structural use; and 3) the provision for space around structures (i.e., requirements for side yards, rear yards, open space, building setback lines, etc.)

Some Zoning Ordinances may specifically address potential hazards to life and property, although there is not a strict requirement to do this. The ordinance itself consists of a map or maps delineating the zoning districts in the community where various land uses will be allowed, and an accompanying set of administrative procedures, standards and methods for enforcing the zoning regulations. Zoning districts typically include various types of industrial, commercial, residential, agricultural, and public facility uses. Specific zoning districts are tailored to the particular needs of the community. For example, communities that have a significant amount of lakefront properties may have a special zoning district for residential development around lakes.

Although there are a variety of standard zoning districts, there are no formal legal requirements regarding the specific types of districts that must be included in a Zoning Ordinance. Obviously, the ordinance must allow sufficient uses to be legally defensible if challenged in court. Each Planning Commission must determine the type of zoning districts that are appropriate for the community, based on its unique characteristics. For hazard mitigation purposes, establishing special zones for such hazardous areas as floodplains, urban / wildland intermix areas, high risk Great Lakes shoreline flooding / erosion areas, steep / fragile slope areas, areas within the identified hydraulic “shadow” of a high or significant hazard dam, areas prone to subsidence, etc. may be necessary and desirable to ensure the public health, safety and welfare is adequately protected. Such zones would not necessarily preclude development in these areas, but would require that specific standards are met for structures and land uses within the zones.

Subdivision Regulations



Subdivision regulations are the legally established standards of design and construction for dividing a land parcel into smaller ones for the purpose of selling or leasing the property. The Land Division Act (288 PA 1967, as amended by 591 PA 1996 and 87 PA 1997) governs the subdivision of land in Michigan. The Act requires that the land being subdivided be suitable for building sites and public improvements, that there be adequate drainage and proper ingress and egress to lots, and that reviews be conducted at the local, county and state levels to ensure that the land being subdivided is suitable for development. The Act also requires conformance with all local planning codes. From a hazard mitigation standpoint, that point is important because it gives the local Planning Commission the authority to approve subdivision development in accordance with the local Comprehensive Plan and regulatory standards.

Subdivision regulations can be an effective tool in reducing exposure, risk and vulnerability to certain hazards, such as flooding and wildfires, if mitigation factors are incorporated into the subdivision process through mechanisms such as local planning codes. For example, a community may allow a subdivision to be placed in a heavily wooded area susceptible to wildfire if proper engineering measures are taken regarding lot size and ingress and egress, thereby providing an adequate level of protection to developed home sites and the residents occupying those home sites.



Capital Improvements Planning



The value of public land, buildings, and infrastructure in a community of moderate size typically is worth tens to hundreds of millions of dollars. To protect those assets and assure the continuation of essential services, the community must maintain its existing facilities, upgrade them to meet community interests and needs, and expand them as the community grows.

A Capital Improvements Plan (CIP) is the mechanism through which a community identifies, prioritizes, and establishes financing methods for needed public improvements such as new or improved public buildings, roads, bridges, treatment plants, water and sewer infrastructure, etc. Planning Commissions are required by statute to annually prepare and adopt a CIP and recommend it to the legislative body for their use in considering public works projects. Generally, public improvements included in the CIP are those that require a substantial expenditure of public funds. (Each jurisdiction must decide what constitutes a substantial expenditure.) The CIP can be an effective implementing mechanism for the community's Comprehensive Plan and Zoning Ordinance because it dictates the nature and timing of public facility expenditures. Normally, the CIP is established for a six-year period. The first year of the CIP becomes the year's capital budget and is the basis for making appropriations for capital improvements. As a result, the annually approved items are the highest priority public improvements to be built in planned areas.

For the CIP to be an effective mechanism for implementing the Comprehensive Plan and Zoning Ordinance, public improvements must be targeted for those areas of the community where growth or certain types of land uses are desirable. Public improvements should not be put in those areas where growth or development is not desired. In that sense, the CIP should mirror the Comprehensive Plan and Zoning Ordinance (otherwise, the three mechanisms may work at cross purposes – i.e., public expenditures in a non-desirable area may spur unwanted development). On the other hand, if desirable private development occurs or is proposed, the CIP may have to be adjusted somewhat to coordinate public investment with the desired private development.

Each year, the Planning Commission must extend the CIP one more year through the established local planning process. As part of that process, the Commission will reevaluate project proposals in light of any developmental changes that might necessitate revision in public improvement priorities. Each year becomes the beginning of a new CIP.

From a hazard mitigation perspective, the CIP, if coordinated with the community's Comprehensive Plan and Zoning Ordinance, can be an effective mechanism for creating a desirable, less vulnerable land use and development pattern. Planning Commissions, because they create and adopt each of the three mechanisms, are instrumental in ensuring that public investment is done in such a way that it helps reduce or eliminate community exposure, risk, and vulnerability to hazards.



Building Codes

Building Codes are designed to ensure that a building or other structure will be constructed in such a manner as to be safe for occupancy and use. These codes also regulate health and sanitation requirements for water, ventilation, plumbing, electricity, mechanical equipment, heating and air conditioning, and they contain minimum construction standards for natural hazard resistance.

All communities in Michigan must have a Building Code. Local Building Codes must conform to the State Construction Code (230 PA 1972, adopted November 5, 1974 and recently amended by 245 PA

1999), which establishes general minimum construction standards for buildings and structures in all Michigan municipalities.

(Background Note: Under 230 PA 1972, communities had the option of adopting the State Construction Code – the National Building Officials and Code Administrators (BOCA) Code with State amendments – or they could adopt any other nationally recognized Building Code such as the Uniform Building Code (UBC) or the Council of American Building Officials (CABO) Code for one and two family dwellings. Approximately 40% of Michigan communities adopted the State Construction Code and 50% followed the National BOCA Code. The remaining 10% adopted the UBC.)

Under 245 PA 1999, all Michigan communities will now be subject to the State Construction Code, which is a compilation of the International Residential Code, the International Building Code, the International Mechanical Code, and the International Plumbing Code published by the International Code Council, the National Electrical Code published by the National Fire Prevention Association, and the Michigan Uniform Energy Code with amendments, additions, or deletions as the Michigan Department of Consumer and Industry Services determines appropriate. Michigan is currently embarking on adoption of the Code with the desired goal of implementation during 2001. The new State Construction Code will provide for statewide uniformity of application and implementation of rules governing the construction, use, and occupancy of buildings and structures.

Provisions of the State Construction Code and other Building Codes are enforced through authorized local building inspection agencies and state inspectors. In Michigan, there are 2,600 registered local inspectors and 80 state inspectors. In communities where comprehensive planning is not done, the Building Code is often the only land use regulatory measure available.

Building Codes, used in concert with other available land use / development guidance measures (and if properly enforced), can be effective in reducing or eliminating damage caused by several types of hazards. For example, proper adherence to wind load requirements for roof systems can substantially reduce damage to structures from straight-line and tornadic winds. (Also, by securing the “envelope” of a structure, water-related damage from rainfall can also be greatly reduced. Many times, that makes the difference between a home that suffers minimal or no damage and one that suffers major damage or is a total loss.) Enforcement of basic Building Code provisions can also reduce damage caused by fire and flooding.

(Background Note: The new State Construction Code, if promulgated with the 1-foot “freeboard” provisions from the current version of the State Construction Code, will be more stringent in addressing new construction in floodprone areas. As an example, the BOCA National Code/1996 required that all new residential buildings or structures erected in a flood hazard zone be elevated so that the lowest floor is located at or above the 100-year (base) flood elevation. All basement floors had to be located at or above the base flood elevation. The UBC also had similar requirements. The new State Construction Code is more stringent than BOCA, as it requires that all residential buildings in the flood hazard zone have the lowest portion of all horizontal structural members supporting floors (such as floor joists) be located at or above the 100-year flood elevation. Thus, under the new State Construction Code, the lowest floor surface would be about 12 inches (the thickness of the floor joist and flooring) higher than was required under BOCA and UBC. The Code also requires that utilities and mechanical equipment be elevated above the 100-year flood elevation or protected so as to prevent water from entering or accumulating within the components during the occurrence of a 100-year flood. Non-residential structures may be elevated or watertight floodproofed. Non-residential buildings using the watertight floodproofing option must be designed and certified by a registered architect or professional engineer.)

By properly enforcing the flood resistant construction provisions of the State Construction Code, inspectors will help ensure that new construction within floodprone areas will be built in such a manner as to minimize future flood losses.

Special Program and Project Implementation

Many of the hazard mitigation strategies specified in the Comprehensive Plan require action of the community's various departments and agencies in the continuous implementation and administration of special programs and projects. Typically, these programs and projects are aimed at protecting the environmentally sensitive or other special use areas, regulating the appearance of the community, or ensuring the structural and operational integrity of public facilities and infrastructure through proper application of engineering standards and "best practices". Examples of special area, use and design regulations that might be pertinent to the implementation of mitigation strategies within Michigan communities include:

- local floodplain management ordinances
 - coastal zone management regulations
 - watershed management regulations
 - special infrastructure design standards and regulations
 - drainage regulations
 - housing regulations
 - urban forestry programs
 - wetland protection regulations
 - natural rivers protection regulations
 - farmland and open space protection regulations
 - endangered species / habitat regulations
 - urban design regulations
 - historic preservation regulations
- Etc. (This list is certainly not all inclusive.)



These regulations and standards are typically administered by or fall under the oversight of a state or federal agency and are carried out by local officials. Most are designed to regulate a certain aspect of the natural or built environment to ensure protection of the public health, safety and welfare, and/or the environment. They can be mechanisms for achieving hazard mitigation, in addition to their intended basic purpose.

The major provisions of these regulations, where pertinent, should be included or addressed in the Comprehensive Plan and primary implementing mechanisms such as the Zoning Ordinance, Capital Improvements Plan, etc.

PLAN EVALUATION / MAINTENANCE*



***Note:** The hazard mitigation strategies and policies specified in the plan should be evaluated on a continuous basis, along with the other plan elements. Ideally, plan evaluation will be done by a Hazard Mitigation Coordinating Council or similar appointed body – serving either as a subcommittee of the Planning Commission or acting as an independent entity apart from but coordinating with the Planning Commission and community's professional planning staff. This continuous evaluation is important because the community's hazard base and hazard exposure, risk, and vulnerability are constantly changing due to development, changing weather patterns, industrial activity, technological advances, and changes in local, state, national, and world conditions. The revised local Hazard Analysis should serve as the primary basis for re-evaluation and modification of community hazard mitigation strategies and policies within the Comprehensive Plan. Other factors to consider in the evaluation process include recent disaster experiences, fiscal constraints, public input, technology changes, and changes in federal, state, or local policy affecting an aspect of the natural or built environment that impacts hazard vulnerability reduction efforts.

ONGOING COMMUNITY PARTICIPATION*



***Note:** A portion of the mitigation strategies and policies specified in the Comprehensive Plan undoubtedly were shaped by the concerns of the community's citizens and business community. That public participation process does not end with the development of the Comprehensive Plan. The community must continue to seek advice from the public and monitor public opinion through whatever methods will ultimately prove to be most successful in obtaining meaningful feedback on the community's mitigation strategies and policies. Community participation ideally will be tied into a community hazard education effort that could include such activities as:

- a community hazards module in local elementary, middle school, and high school curriculums;
- local hazard awareness campaigns that coincide with the State's hazard awareness campaigns;
- public education / input sessions at Hazard Mitigation Coordinating Council and/or Planning Commission meetings;
- written survey questionnaires that inform the public about community hazards and solicit public opinion on a variety of mitigation issues;
- newspaper articles that discuss pertinent mitigation topics and suggest ways for the public to provide input on the hazard matter in question; and
- local television coverage that focuses on hazard issues, with opportunity for public feedback.

RELATIONSHIP TO OTHER PLANS / PROCESSES*



***Note:** Community growth and development and its associated impacts – both positive and negative – does not always neatly follow jurisdictional boundaries. Actions and impacts from Community A will eventually affect Community B, and vice versa. For that reason, it is incumbent on every community to look beyond its borders when developing and revising its Comprehensive Plan. This is especially true when it comes to instituting hazard mitigation strategies and policies within the plan, as hazards also do not recognize community borders in inflicting their negative impacts. So, for example, if Community A is proposing open space land use in the floodplain on one side of the border, and Community B upstream is proposing intensive residential and commercial development in that same floodplain, the negative impacts from that increased development concentration will clearly fall more heavily on the shoulders of Community A. Similarly, if Community A is proposing high density residential land use on one boundary with Community B, while just over the border Community B is proposing heavy industrial land use, the potential negative impacts from that industrial activity will affect the residents of Community A. Although these issues of incompatible land uses are often the result of historical growth and land use patterns and cannot always be resolved to everyone's satisfaction, the potential negative impacts can at least be anticipated and hopefully addressed through appropriate mitigation strategies and policies in appropriate places within the Comprehensive Plan.

A border analysis, then, should be a standard comparative tool used in the development of the Comprehensive Plan. Major transportation arteries and systems should also be analyzed for their potential impacts in terms of hazardous material transport within the community, and the potential for catastrophic passenger transportation accidents. Neighboring and regional economic development activities, such as major commercial centers or the development / growth of certain industries, can also directly impact a community's exposure, risk, and vulnerability to hazards and

the quality of the environment. These and many other similar issues must be continuously examined as part of the Comprehensive Planning process.

SUGGESTED HAZARD MITIGATION ATTACHMENTS*

Community Hazard Analysis (or Hazard Analysis Summary)