VIII. Inventory of Hazard Mitigation Actions

Potential mitigation actions were proposed and discussed during multiple meetings of the Hazard Mitigation Plan Steering Committee. Committee members received preliminary drafts of the hazard analysis and vulnerability assessment, as well as preliminary drafts of actions to mitigate hazard events. The public also had the opportunity to review and suggest potential mitigation actions during the four public open house events that took place in locations throughout the county.

The following mitigation actions, coupled with the goals and objectives highlighted in the previous chapter, reiterate the necessity of intergovernmental cooperation among all local jurisdictions. In order for these actions to be successfully implemented, the county and all the entities within the county must employ a teamwork approach to hazard planning. There must be local "buy-in" to this hazard mitigation plan by St. Clair County municipalities and residents to reduce the loss of life and protect critical infrastructures in the event a hazard should occur. The most effective way this "buy-in" can be achieved is by incorporating the goals, objectives, and actions put forth in this plan into other existing and future community plans, regulations, programs and projects.

The following list of possible hazard mitigation actions for St. Clair County does not preclude other ideas for activities to save lives and prevent or reduce damages in the future. Many of the ideas are developed in various FEMA publications, including www.fema.gov, as well as in publications of other federal, state, and local agencies.

Planning for Hazards

Hazard mitigation planning is most successful when approached from a multi-hazard perspective. Some mitigation ideas fit easily into many or all hazard types. A selected mitigation action for one hazard may reduce the level of risk in other hazards as well. At the same time, a mitigation action that reduces the level of risk for one hazard may increase the risk of damage from another hazard.

Terrorism/Sabotage

Mitigation Actions: Actions to mitigate acts of terrorism and/or sabotage include:

- **Continued support of the St. Clair County Local Emergency Planning Committee (LEPC).** In 1986, Congress enacted the Emergency Planning and Community Right-

to-Know Act (EPCRA), also known as Title III or the Superfund Amendments and Reauthorization Act (SARA). The Act has had a far-reaching influence on issues relating to hazardous materials. EPCRA contains five sections that cover issues associated with the manufacture, use, exposure, transportation, and public education of hazardous materials.

- **Continued support of the St. Clair County Hazardous Operations Team.** The St. Clair County Board of Commissioner's and every community within the county have partnered to fund a hazardous materials response team, which became operational in 1999. The structure of the team is completely volunteer, with approximately 40 members from all different fields of expertise. Each team member has received over 80 hours of advanced hazardous materials training which additional monthly team training supports. In addition, members attend special training both within the state and out of state to enhance their response abilities.
- **Inter- and intra-agency coordination on potential terrorist activity.** All law enforcement and intelligence agencies should work with the highest degree of communication, coordination, and cooperation. This can be done through training exercises, compatible communication equipment, and networked information systems.
- **Enforce all Homeland Security initiatives.** The Department of Homeland Security strives to safeguard people and their freedoms, critical infrastructure, property and the economy of the nation as a whole from acts of terrorism, natural disasters, or other emergencies.
- **Continued to support the Michigan Army National Guard and Michigan Air National Guard where appropriate.** The National Guard postures readiness to mobilize combat ready units and equipment in support of the national military strategy acting as a deterrent to war. The Guard will effectively provide units and equipment to protect life and property, preserve peace, order and public safety of its citizens under the orders of the Governor and participate in local, state, and national programs that constantly improve and add solid value to Michigan and America while serving as the embodiment of the citizen soldier.
- **Encourage utility companies to prepare vulnerability studies for utilities.** Vulnerability studies will aid in short and long term planning endeavors and will provide an up-to-date measure of potential threats or problems.
- **Train and equip police officers.** Through training, law enforcement personnel should develop the competencies to understand what terrorism is and the risks associated with such

an incident, to understand the potential outcomes associated with a terrorist event, and the ability to recognize the presence of, and identify, criminal activity or terrorism in an emergency. Training should also include information on weapons of mass destruction and chemical, biological, and nuclear hazards

- **Increase security at public facilities.** The federal government has begun a systematic effort to define, prioritize, and develop effective strategies for protecting the Nation's critical infrastructure. Local governments are an integral part of the effort with regard to critical local services, such as water, electricity, telephones, roads and bridges. Critical Infrastructure Protection (CIP) should be a prominent part of community risk and threat assessment.
- **Map out potential terrorist targets within the county, as well as in Lambton County in Ontario.** Potential terrorist or sabotage targets should be known at all times and should be mapped utilizing geographic information systems to aid in planning and mitigation actions.
- **Enhance computer safety.** Every person and institution with computers that interface with other computers should consistently use computer data back-up systems and anti-virus software.
- **Develop local response procedures for suspicious packages and mail.** This will ensure the safety of package delivery employees, as well as the general public.
- **Prohibit parking within and underneath buildings.** Parking lots see many different vehicles and people in the course of a day. In many cases, it is difficult to keep track of people, places, and things. This type of instability should not be located at the foundation of a building or structure and poses a risk to the building's occupants.

Infrastructure/Utility Failure

Mitigation Actions: Mitigation actions for infrastructure and utility failures include:

- **Bury utility lines.** Encourage municipalities within the county to require that utility lines and mains be installed underground. Buried power lines offer the security of uninterrupted power during and after storms. However, consideration needs to be made for maintenance and repair, particularly in cold climates where soil freezes more readily.
- **Insulate** water mains, sewer mains, and other infrastructure.
- **Install plumbing devices** to prevent sewer backup.

- **All critical facilities should have access to an auxiliary power supply.** This project would further guarantee that facilities that serve the county in a critical function have a continual supply of power to carry out required duties even when the primary power source is unavailable. A countywide survey should be conducted to identify those critical facilities that currently do not have an auxiliary power supply.
- **Forestry Improvements.** This project provides for removal of dead trees, shrubbery, and stumps and evaluation, treatment, and trimming of trees in area parks, cemeteries, golf courses, and other park properties. Urban forests can be the most valuable infrastructure in a community's system of parks. Healthy trees stand a much higher chance of surviving the extreme loading that is associated with heavy snow and/or ice. Often, trees and/or tree branches fall onto overhead power lines and disrupt power to homes and businesses. New plantings should be of a hardy variety that stands up well to heavy loading and strong winds.
- **Public Education.** County organizations and utility providers can provide residents with information on how to respond when critical infrastructures fail.
- **Improve sensitive population management.** Communities can develop programs/networks for contacting and assisting elderly or homebound persons during periods of infrastructure failure.
- **Increasing public awareness and widespread use of the "MISS DIG" utility damage prevention service** (1-800-482-7171). Residents need to be aware of this very important utility damage prevention hotline. Utilizing the hotline will safeguard utility infrastructure and save residents time and money.

Hazardous Materials Transportation Incident

Mitigation Actions: Mitigation actions for hazardous materials transportation incidents include:

- **All fire department personnel within the county be trained and certified to the Hazardous Materials Operations level.** Training to this level will better ensure the safety of the responding personnel as well as the safety of the general public.
- **Continued support of the St. Clair County Hazardous Operations Team.** The St. Clair County Board of Commissioner's and every community within the county have partnered to fund a hazardous materials response team, which

became operational in 1999. The structure of the team is completely volunteer, with approximately 40 members from all different fields of expertise. Each team member has received over 80 hours of advanced hazardous materials training which additional monthly team training supports. In addition, members attend special training both within the state and out of state to enhance their response abilities.

- **Continued support and utilization of placarding system.** The U.S. Department of Transportation (USDOT) administers a labeling and placarding system for identifying the types of hazardous materials that are transported along the nation's highways, railways, and waterways. This system enables local emergency officials to identify the nature and potential health threat of chemicals being transported. If an accident were to occur, local emergency officials would be able to determine the proper emergency response procedures for the situation.
- **Improved design, routing, and traffic control at problem roadway areas.** The purpose of a traffic signal is to assign right-of-way to opposing movements of traffic at an intersection. As such, it may be necessary to install a traffic signal if the traffic volume increases and four-way stop signs do not lessen problems. However, improperly placed traffic signals can cause an increase in traffic accidents, particularly rear end collisions. Moreover, pedestrians can gain a false sense of security from crosswalks and red lights, which may result in an increase in pedestrian accidents.
- **Railroad inspections and improved designs at problem railway/roadway intersections** (at grade crossings, rural signs/signals for RR crossing). Railway/roadway intersections should be outfitted with four-quadrant gates blocking all lanes of traffic and longer arm gates. As the amount of freight trains, passenger trains, and highway traffic grows, the need for such improvements will become increasingly critical.
- **Enforcement of weight and travel restrictions for truck traffic.** Weight and travel restrictions for truck traffic are designed to ensure that traffic is routed to the roads and other transportation structures that have the capacity to handle heavier loads. When loads exceed weight limits, concrete begins to crumble and bridge spans can weaken, thus creating the potential for a hazardous materials accident to occur.
- **Increased coverage and use of NOAA Weather Radio** (which can provide notification to the community during any period of emergency, including large scale hazardous material incidents). NOAA Weather Radio continuously broadcasts National Weather Service forecasts, warnings and other crucial weather information. NOAA Weather Radio also provides direct warnings to the public for natural, man-made, or tech-

nological hazards.

- **Locating schools, nursing homes, and other special facilities away from major hazardous material transportation routes.** These types of facilities often house large groups of sensitive populations, including children, the elderly and disabled persons.
- **Road closures and traffic control in accident areas.** Road closures and traffic control may be necessary to allow emergency responders to access an accident.
- **Prohibit the parking of trucks with hazardous materials in residential areas.** Local jurisdictions within St. Clair County should adopt and enforce ordinances that protect residential areas from being susceptible from parked trucks carrying hazardous materials.

Hazardous Materials Facility Incident

Mitigation Actions: Mitigation actions for fixed site hazardous materials incidents include:

- **Any business or operation storing, using, or manufacturing hazardous materials should comply with Occupational Safety and Health Administration regulations outlined in 29 CFR 1910.120 hazardous waste operations and emergency response.** Employers shall develop and implement a written safety and health program for their employees involved in hazardous waste operations. The program shall be designed to identify, evaluate, and control safety and health hazards, and provide for emergency response for hazardous waste operations.
- **All fire department personnel within the county be trained and certified to the Hazardous Materials Operations level.** Training to this level will better ensure the safety of the responding personnel as well as the safety of the general public.
- **Continued support of the St. Clair County Hazardous Operations Team.** The St. Clair County Board of Commissioner's and every community within the county have partnered to fund a hazardous materials response team, which became operational in 1999. The structure of the team is completely volunteer, with approximately 40 members from all different fields of expertise. Each team member has received over 80 hours of advanced hazardous materials training which additional monthly team training supports. In addition, members attend special training both within the state and out of

state to enhance their response abilities.

- **Continued support of the St. Clair River water-quality monitoring system.** In November 2004, the federal government approved funding for a long-awaited water-quality monitoring system for St. Clair and Macomb counties. The system will allow the counties to monitor the river for chemical spills that originate on either side of the international border.
- **Maintaining an active and viable Local Emergency Planning Committee (LEPC).** To address the possibility of hazardous material incidents, communities are required under Federal law (SARA Title III) to maintain an active and viable LEPC to develop an emergency plan for preparing for and responding to chemical emergencies, such as spills, leaks, explosions, or other releases. The LEPC is required to review, test, and update the plan each year.
- **Elimination of clandestine methamphetamine laboratories through law enforcement and public education.** Methamphetamine is a stimulant that was used for the treatment of narcolepsy in the late 1930's. The drug is now produced in clandestine laboratories using chemicals that are highly volatile, toxic and dangerous. The Centers for Disease Control reported 59 events associated with methamphetamine labs where emergency services personnel were injured during the investigation between 1996 and 1999. The number of injured responders was 155 with most reporting respiratory irritation.
- **Brownfield cleanup activities.** Pollution concerns have led developers to pass up opportunities in urban centers for ones in rural and suburban areas. Contaminated properties pose an immediate threat to the county's populace and its natural resources. Local governments should seek out partnerships to overcome the barriers to Brownfield reuse, develop a cleanup plan, and leverage funds to do the cleanup.
- **Proper separation and buffering between industrial areas and other land uses.** Buffer zones can be set up to prevent violence, protect the environment, and protect residential and commercial zones from industrial accidents or natural disasters. Buffers can include landscaped berms, utility easements, or appropriate transitional land uses.
- **Road closures and traffic control in accident areas.** Road closures and traffic control may be necessary to allow emergency responders to access an accident or to allow HazMat teams to execute cleanup efforts.
- **Increased coverage and use of NOAA Weather Radio** (which can provide notification to the community during any period of emergency, including large scale hazardous mate-

rial incidents). NOAA Weather Radio continuously broadcasts National Weather Service forecasts, warnings and other crucial weather information. NOAA Weather Radio also provides direct warnings to the public for natural, man-made, or technological hazards.

- ➔ **Encourage cooperative agreements between agencies and localities.** Cooperative agreements are useful tools that may be used in a variety of situations among an array of organizations. The underlying basis of a cooperative agreement is that one agency agrees to provide some service for another agency, and vice versa.

Radiological Accident

Mitigation Actions: Mitigation actions for radiological accidents include:

- ➔ **Emergency planning along transportation routes.** Communities located along major transportation routes should develop and practice an emergency plan for handling transportation accidents involving radiological materials.
- ➔ **Shelters and warning systems.** The county can create and promote awareness of designated fallout shelters and accident warning systems. They also may develop and promote workable population protection plans, i.e., evacuation and in-place sheltering plans.
- ➔ **Work with communities on the three main ways to minimize exposure.** Communities within the county can promote the following three ways to minimize radiation exposure: 1) distance; 2) shielding; and 3) time.

Public Health Emergency

Mitigation Actions: Strategies to mitigate public health emergencies include:

- ➔ **Continued support where appropriate to the St. Clair County Health Department.** The Health Department provides a broad spectrum of clinical services and programs to prevent and limit the spread of communicable diseases through immunization and testing. Programs designed to maintain and enhance personal and family health are managed and provided by this department and include services to high risk mothers and infants, home health care, and a variety of health promotion screenings. The St. Clair County Health Department's role in the community includes the following: prevention of epidemics and the spread of disease, protection against environmental hazards, prevention of injuries, promotion and encouragement

of healthy behaviors and mental health, responding to disasters and assisting communities in recovery, and assuring the quality and accessibility of health services.

- **Working with local communities to encourage efficient building ventilation.** The spread of communicable diseases can be thwarted by compartmentalizing ventilation systems in areas/facilities prone to crowding, or areas that may involve exposure to contagions or noxious atmospheres.
- **Public awareness campaigns.** Communities can increase public awareness of radon dangers and the prevention efforts that can be taken to reduce concentrations of radon in homes and buildings. Public awareness campaigns can also emphasize the causes, symptoms, and protective actions for disease outbreaks or other potential public health emergencies.
- **Effective waste disposal.** Local communities need to address pollution control, enforcement, and cleanup. Particular procedures need to be followed for disposing of chemicals, including hazardous waste and scrap materials.
- **Ensure proper septic maintenance.** Septic tanks need to be properly located, installed, cleaned, monitored, and maintained.
- **Eradication of vacant structures.** Demolition and clearance of vacant condemned structures can prevent rodent infestations.
- **Continue to support the St. Clair County Public Health Emergency Preparedness and Response Division and its MEMS concept.** The Modular Emergency Medical System (MEMS) approach to disaster medical response, intended to assist emergency planners and health care providers in planning and coordinating an effective medical response following a large-scale bioterrorism incident within the community.
- **Develop an inventory of where water is readily available.** An auxiliary water supply should be created for contingency use in an emergency situation.

Mass Casualty

Mitigation Actions: Actions to mitigate mass casualty incidents include:

- **Continue to support the St. Clair County Public Health Emergency Preparedness and Response Division and its MEMS concept.** The Modular Emergency Medical System (MEMS) approach to disaster medical response, intended to assist emergency planners and health care providers in planning and coordinating an effective medical response following

a large-scale bioterrorism incident within the community.

- **Develop an efficient evacuation procedure**. An efficient evacuation procedure will facilitate the movement of residents from a disaster scene in the quickest and safest manner.
- **All fire department personnel within the county be trained and certified to the Hazardous Materials Operations level**. Training to this level will better ensure the safety of the responding personnel as well as the safety of the general public.
- **Continued support of the St. Clair County Hazardous Operations Team.** The St. Clair County Board of Commissioner's and every community within the county have partnered to fund a hazardous materials response team, which became operational in 1999. The structure of the team is completely volunteer, with approximately 40 members from all different fields of expertise. Each team member has received over 80 hours of advanced hazardous materials training which additional monthly team training supports. In addition, members attend special training both within the state and out of state to enhance their response abilities.
- **Inventory potential beds in surgery centers, ambulatory care centers, and long term care centers.** Other facilities that could potentially be used as neighborhood emergency help centers (NEHC) and acute (alternative) care centers (ACC) should also be identified and prepared to be operational if needed in an emergency.
- **Work in concert with the American Red Cross.** In the case of any mass casualty incident there are those that could be displaced from their homes and require temporary placement. One of the functions of the American Red Cross is to provide temporary shelter either in a mass shelter setting or by individual placements.
- **Work in concert with the Salvation Army.** The Salvation Army provides a canteen service to incident scenes that remain active for long periods of time. Their mission is to provide food and drink to emergency workers who are required to work at a mass casualty scene for long periods of time.
- **Utilize amateur radio.** In the event that a mass casualty incident requires that victims be transported to numerous hospitals, both in and outside of St. Clair County, and that Red Cross shelters need to be established, amateur radio groups can assist in the information coordination process.
- **Develop a system for caring for injured household pets or pets that have been separated from their homes.** It is important that emergency responders have clear direction on how to deal with pets. Communities should work with local

veterinarians and pertinent county agencies to develop an efficient pet management plan in the event of a mass casualty incident.

Tornado

Mitigation Actions: Mitigation actions for tornadoes include:

- **Construct storm shelters in public buildings and mobile home parks.** Risk to lives can be improved through construction and use of concrete safe rooms in homes and shelter areas of mobile home parks, fairgrounds, shopping malls, or other vulnerable public areas.
- **Mobile home park tie-downs.** Damage and injury can be prevented by anchoring mobile homes and exterior attachments such as carports and porches. The risk of damage can be reduced by using tie-downs with anchors and ground anchors appropriate for the soil type.
- **Wind bracing for microwave/radio towers.** Engineered construction can accommodate foundation design, braced elevated platforms, and the ability of a structure to withstand the lateral forces of winds and waves.
- **Upgrade warning sirens**. The current siren system does not support voice announcements. A shortcoming of a siren system is that it does not provide the nature of the emergency or describe steps to be taken to provide safety during the alert.
- **Refuge area evaluation.** Use of this scoring tool allows a school district to identify which building(s) will perform best under natural hazard conditions in the least subjective manner possible. The evaluation checklist has three sections that are applicable. Evaluations on the general building structure, selecting a refuge area in the building, and a wind hazard checklist. All school facilities should utilize this scoring tool to select the best areas within the school building to refuge the students, faculty, and staff. This tool can be used to evaluate other facilities where groups of people gather such as nursing homes, day care centers, community buildings, etc.
- **Backup power systems.** Backup power resources can enable critical facilities to continue basic services and can be used by businesses to ensure security and protect refrigerated goods. Public facilities and critical infrastructures should have the ability to function on a variety of fuel with a universal plug-in or adapter.
- **Tree management.** Tree pruning near power lines can reduce the potential for trees falling on and breaking power lines.

Extreme Temperatures

Mitigation Actions: Actions to mitigate periods of extreme temperatures include:

- **Organizing outreach to vulnerable populations during periods of extreme temperatures**, including establishing and building awareness of accessible heating and/or cooling centers in the community, and other public information campaigns about this hazard.
- **Increased coverage and use of NOAA Weather Radio** (which can provide notification to the community during any period of emergency, including large scale hazardous material incidents). NOAA Weather Radio continuously broadcasts National Weather Service forecasts, warnings and other crucial weather information. NOAA Weather Radio also provides direct warnings to the public for natural, man-made, or technological hazards.
- **Backup power systems.** Backup power resources can enable critical facilities to continue basic services and can be used by businesses to ensure security and protect refrigerated goods. Public facilities and critical infrastructures should have the ability to function on a variety of fuel with a universal plug-in or adapter.
- **Public emergency shelters.** Identify appropriate shelters for people who may need to evacuate due to loss of electricity, heat or coastal flooding due to storm surge. Communities can establish heating centers or shelters for vulnerable populations, not only for residents, but also for stranded motorists/travelers.
- **Burying power lines.** Burying or otherwise protecting electric and other utility lines can prevent utility disruption by protecting lines from ice, wind or snow damage. However, lines buried in frozen soil may be difficult to reach if repair is needed.
- **National Weather Service monitoring and advisories.** The National Weather Service has developed effective weather advisories which are promptly and widely distributed. Radio and television provide the most immediate means to do this. Accurate public information, including recommended actions to prepare for adverse weather conditions continue to be most effective in preventing loss of life and minimizing property damages.
- **Farmer preparedness to address livestock needs/problems.** In severe winter weather, livestock may be unable to forage for vegetation that is frozen under snow and ice, caus-

ing them to starve and freeze to death. Roads can be blocked, preventing or slowing distribution of fodder and food aid.

Transportation Disruption/Accidents

Mitigation Actions: Mitigation actions for transportation disruptions/accidents include:

- **Enhance driver education programs.** The risk of transportation accidents can be reduced through improvements in driver education, traffic law enforcement, and transportation planning that balances needs of public transportation conveyers with safety of the general public. Commercial operators also need training and skill enhancement programs.
- **Continually improve road design.** Improved design, routing, and traffic control at problem roadway areas can reduce risk of transportation accidents. Designated truck routes, as well as enforcement of weight and truck travel restrictions, can help. In long-term planning, communities can consider establishing more connector roads to reduce congestion on arterial roads.
- **Continually improve traffic control.** Road closures and traffic control in accident areas becomes especially critical during a hazardous material incident response.
- **Use of ITS (intelligent transportation systems) technology.** Intelligent transportation systems (ITS) encompass a broad range of wireless and wireline communications-based information, control and electronics technologies. When integrated into the transportation system infrastructure, and in vehicles themselves, these technologies help monitor and control traffic flow, reduce congestion, provide alternate routes to travelers, and save lives, time and money.
- **Support where appropriate the National Highway Safety Plan.** NHTSA is responsible for reducing deaths, injuries and economic losses resulting from motor vehicle crashes. This is accomplished by setting and enforcing safety performance standards for motor vehicles and motor vehicle equipment, and through grants to state and local governments to enable them to conduct effective local highway safety programs. NHTSA investigates safety defects in motor vehicles, sets and enforces fuel economy standards, helps states and local communities reduce the threat of drunk drivers, promotes the use of safety belts, child safety seats and air bags, investigates odometer fraud, establishes and enforces vehicle anti-theft regulations and provides consumer information on motor vehicle safety topics.
- **Boater education programs.** Accident risk can be reduced

through programs that address marine safety and general boater awareness.

- **Increased airport security and maintenance.** Airport maintenance, security, and safety programs are essential for reducing accident risk.
- **Enforcement of weight and travel restrictions.** Local officials have a responsibility to preserve our investment in roads by protecting them from excess damage caused by trucks carrying heavy loads. According to a national study by the Federal Highway Administration (FHWA), reducing truck weights by just 20% between late February and early May can increase the life of vulnerable pavements by 62%. Cutting weights in half increases pavement life by 95%. The amount of damage a road sustains is directly related to the weight of the load and how often it is applied, according to tests by AASHTO (the American Association of State Highway and Transportation Officials).
- **Training, planning, and preparedness for mass-casualty incidents involving all modes of public transportation.** Creating partnerships with school districts and public transit operators for use of school buses and other vehicles to transport patients or victims in a mass casualty incident.

Flooding

Mitigation Actions: Mitigation actions for flooding include:

- **Increase National Flood Insurance Program (NFIP) participation.** Participation in FEMA's National Flood Insurance Program provides mapping of floodplain levels in a community and flood insurance policies for floodplain property owners. Although this program does not prevent a flood from occurring, it does mitigate a property owner's financial exposure to loss from flood damage and provides a community information regarding location of hazardous floodplain areas.
- **Maintain updated floodplain mapping.** By taking the initiative locally to more accurately map problem areas with information not already on FEMA maps, a community can warn residents about potential risks that may not have been anticipated. Upgrading maps provides a truer measure of risks to a community.
- **Implement land use planning regulations in floodplain and coastal zone areas.** Land use planning regulations can alleviate exposure and risk of damage in hazardous floodplain and coastal zone areas. Floodplain and coastal zone management should be included in comprehensive planning and zoning ordinances. Examples of zoning methods that local units

of government should employ for flood hazard mitigation include:

- Adopting ordinances that limit development in the floodplain;
- Limiting the density of developments in the floodplain;
- Requiring that floodplains be kept as open space.

➔ **Alleviate repetitive loss** within floodplain areas by utilizing such strategies as:

- **Wet floodproofing of structures.** Wet flood proofing allows a controlled flooding of a structure to balance water forces and discourage structural collapse during floods. The structure contents and building systems are protected while floodwaters are allowed into the building.
- **Dry floodproofing structures.** Dry flood proofing is the sealing of a building so that water does not enter. Dry flood proofing can be done to an existing building by strengthening walls, sealing openings, use of water proof compounds or plastic sheeting on walls, and applying a long-lasting waterproof sealant coating or membrane over the exterior sheathing, siding, or brick veneer.
- **Acquisition of repetitive loss properties**. Land with structures may be purchased by and titled in the name of a local governing body that can remove structures and enforce permanent restrictions on development.
- **Purchase or transfer of development rights.** Local governments can acquire lands in high hazard areas through conservation easements, purchase of development rights, or outright purchase of property.
- **Conservation easements.** Conservation easements may be used to protect environmentally significant portions of parcels from development. They do not restrict all use of the land. Rather, they direct development to areas of land that are not environmentally significant.

➔ **Implement effective stormwater management.** Effective stormwater management includes a mechanism to address increased stormwater flows and decreased stormwater absorption due to new development. Stormwater ordinances can provide this means and mitigate flooding hazards. Examples of regulations that can be included in a stormwater ordinance are:

- **Uniform design standards.** Design standards for new development should be uniform across the County and should preserve pre-development stormwater discharges

and protect floodplains. The collection of elevation data should be required during the platting process so that local decision makers can ensure that approved lots have buildable space above the base flood elevation. These standards should also include a funding mechanism to maintain proper review of all new developments by professional engineers.

- **Soil Erosion and Sedimentation Control (SESC) Program.** The St. Clair County Public Works Office currently implements the SESC program for the entire county. Its goal is to reduce erosion and the effects of increased sedimentation on local waterways. Increased erosion and sedimentation cause blockages of waterways, among other negative environmental effects, which can lead to blockages of drains and waterways and an increase of flooding events. Stormwater ordinances can strengthen SESC programs by increasing enforcement capabilities. Examples of increasing enforcement capabilities include the increase of SESC permit fees to fund further enforcement capabilities, and the increase of permit coverage to address areas where erosion and sedimentation are not covered by current permit coverage.
- **Enhance stream bank stabilization.** Stream bank stabilization prevents erosion and sedimentation and thus mitigates flooding events. Techniques along riparian corridors such as proper sloping or grading techniques, planting of deep rooted vegetation, terracing hillsides, or installing rip rap boulders or geotextile fabric should be required for riparian corridors along drains and natural waterways.
- **Protection of wetlands.** Wetlands serve as natural collection basins for stormwater and thus mitigate potential flood hazards. Their unique soils and hydrology allow them to act like sponges and collect, filter and slowly release water into drains and natural waterways. Stormwater ordinances and/or wetland ordinances should establish a means to identify critical wetlands for preservation, fund acquisition or establishment of conservation easements for these critical wetlands, and a means to enforce the protection of these critical wetlands.
- **Protection of riparian corridors.** Riparian corridors often contain floodplains and areas that frequently flood but are not considered floodplain. Protection of riparian corridors can include protection from compaction and removal of deep-rooted vegetation, which help prevent erosion and increase storm water absorption.

- **Improve roads for flood mitigation**. Roads can be improved and designed in ways that help mitigate various types of flooding. Examples include:
  - **Upgrading bridges for greater flows.** The best designs for accomplishing this involve open bottom structures or bridges that not only span the river/stream channel, but also span one or both of the banks allowing dry passage for wildlife that move along the watercourse.
  - **Construction of alternative, elevated, or flood resistant roads.** Construction of alternative or elevated roads can lower risk of flooding to roads. Flood resistant roads have better drainage and/or stabilization/armoring of vulnerable shoulders and embankments.
- **Installation and maintenance of stormwater and sanitary infrastructure.** Such infrastructure includes:
  - **Back-up generators for pumping and lift stations in sanitary sewer systems, and other measures (alarms, meters, remote controls, switchgear upgrades) to ensure that drainage infrastructure is not impeded.** Emergency power supplies will allow utility systems to continue operating during an interruption to the power supply.
  - **Use of check valves, sump pumps and backflow preventers in homes and buildings.** The basic function of a sump pump is to keep the level of surface water lower than the basement floor. In some cases sump pumps also are used to control the amount of water brought into the basement from the sewer backup. A check valve keeps water from returning to a sump pit or crawl space after the sump pump shuts off. The basic mechanism for preventing backflow is a mechanical backflow preventer, which provides a physical barrier to backflow. Backflow is the undesirable reversal of flow of nonpotable water or other substances through a cross-connection and into the piping of a public water system or consumer's potable water system.
  - **Separation of sanitary and storm sewers.** Separation of sanitary and storm sewers helps mitigate flooding in streets, in basements and sewage overflows into natural waterways when capacity is overloaded during heavy storms. Currently Port Huron is undergoing separation of their combined storm and sanitary sewer systems. There are several small rural communities in St. Clair County that still need to identify sanitary disposal problems and initiate sanitary and storm sewer separation. Identifica-

tion of these problem areas is needed, as is funding, to properly separate these systems in areas where populations are unable to afford such a large-scale project.

➔ **Educate residents and local officials regarding flood mitigation tools and techniques.** Public awareness and education is critical to any effort that strives to mitigate flooding and promote more sustainable, disaster-resistant development. Opportunities for education and outreach include:

- **Inclusion of safety strategies** for flooded areas in driver education classes and materials.
- **Encourage residents to develop a Family Disaster Plan which includes the preparation of a Disaster Supplies Kit.** Families can cope with disaster by preparing in advance and working together as a team. Knowing what to do is the best protection for families during a hazard event.
- **Educate residents** regarding stormwater, the hazards of increased flows, erosion and sedimentation in relation to flood risks, and the methods used to prevent increases of stormwater flows, erosion and sedimentation.
- **Increased coverage and use of NOAA Weather Radio** (which can provide notification to the community during any period of emergency, including large scale hazardous material incidents). NOAA Weather Radio continuously broadcasts National Weather Service forecasts, warnings and other crucial weather information. NOAA Weather Radio also provides direct warnings to the public for natural, man-made, or technological hazards.
- **Training for local officials on flood fighting, floodplain management, floodproofing, etc.** Local officials should be well-versed in dealing with flood events and how risks can be reduced.
- **Work with local units of government to adopt zoning that promotes flood hazard mitigation.** Examples of zoning methods that affect flood hazard mitigation include: 1) adopting ordinances that limit development in the floodplain; 2) limiting the density of developments in the floodplain; and 3) requiring that floodplains be kept as open space.
- **Work with local units of government to adopt elevation requirements in subdivision regulations.** Subdivision design standards can require elevation data collection during the platting process. Lots may be required to have buildable space above the base flood elevation.

- **Dredging and clearance of sediment and debris from drainage channels.** Dredging drainage channels would enable a greater volume of floodwater to escape more rapidly during a major flood.
- **Create and/or improve partnerships** with local environmental groups, the United State Coast Guard, neighboring counties and local governments, and other pertinent agencies. Only by working together, at a regional level, can we implement better planning for our watersheds and promote development that is resistant to flooding and other disasters.

Transportation Structure Failure

Mitigation Actions: Mitigation actions for transportation structure failure include:

- **Regularly inspect overwater bridge sites for scour and instability.** Scour is the hole left behind when sediment (sand and rocks) is washed away from the bottom of a river. Although scour may occur at any time, scour action is especially strong during floods. Swiftly flowing water has more energy than calm water to lift and carry sediment down river. If sediment or rock on which bridge supports rest is scoured by a river, the bridge could become unsafe for travel.
- **Inventory and map old mining areas or land that may be susceptible to subsidence.** Old mining areas or geologically unstable terrain should be identified and mapped so that development can be prevented or limited.
- **Bridge strengthening.** The SCCRC and local road authorities should review construction plans for all bridges to determine their susceptibility to collapse. Problem bridges should be retrofitted.
- **Utilize electronic message boards** to divert traffic away from a transportation disruption or structure failure.
- **Use of ITS (intelligent transportation systems) technology.** Intelligent transportation systems (ITS) encompass a broad range of wireless and wireline communications-based information, control and electronics technologies. When integrated into the transportation system infrastructure, and in vehicles themselves, these technologies help monitor and control traffic flow, reduce congestion, provide alternate routes to travelers, and save lives, time and money.
- **Continually improve traffic control.** Road closures and traffic control in accident areas becomes especially critical during a hazardous material incident response.
- **Enforcement of weight and travel restrictions.** Local

officials have a responsibility to preserve our investment in roads by protecting them from excess damage caused by trucks carrying heavy loads. According to a national study by the Federal Highway Administration (FHWA), reducing truck weights by just 20% between late February and early May can increase the life of vulnerable pavements by 62%. Cutting weights in half increases pavement life by 95%. The amount of damage a road sustains is directly related to the weight of the load and how often it is applied, according to tests by AASHTO (the American Association of State Highway and Transportation Officials).

Ice Storm

Mitigation Actions: Proper preparation can decrease the risks of injury that can occur during cold weather, snowstorms and ice storms in particular. Mitigation strategies include:

- **Family and traveler preparedness information.** The county can produce and distribute family and traveler emergency preparedness information relating to severe winter weather hazards.
- **Burying power lines.** Burying or otherwise protecting electric and other utility lines can prevent utility disruption by protecting lines from ice, wind or snow damage. However, lines buried in frozen soil may be difficult to reach if repair is needed.
- **Emergency warming shelters.** The county can establish heating centers or shelters for vulnerable populations, not only for residents, but also for stranded motorists/travelers.
- **Outreach program.** The county can work with local governments and other agencies to systematically contact isolated, vulnerable, or special-needs populations.
- **Home and public building maintenance** to prevent roof and wall damage from "ice dams."
- **Pre-planning for debris management staging and storage areas.** Debris is usually the sleet and ice itself being cleared from roads and roofs, or vegetation such as tree branches that have fallen under the impact of winds or the weight of ice. Broken power or phone lines that had frozen or been weighted down by ice or fallen branches could be part of the problem. In some cases, roofs may collapse under the weight of ice and snow.
- **Utilization of prewetting systems and deicing units on roadways.** Prewetting involves the application of a liquid deicing solution to granular material as it is spread on the roadway. Prewetted material adheres better to the roadway. It also

speeds up the melting action by supplying enough moisture to sodium chloride, the most common deicing material, so that the melting begins immediately.

- **Anti-icing of roadways.** Anti-icing is a process where liquid deicing materials are applied to a roadway immediately before a storm. The deicing chemical prevents or weakens the bonding of ice to the pavement, causing the road to be slushy instead of icy. For anti-icing to work, deicing chemicals have to be applied at the right time and under the proper conditions. In the end, anti-icing can save road crews time and money and can prevent wear and tear on equipment.

Civil Unrest

Mitigation Actions: Mitigation strategies for civil unrest include:

- **Ensuring Standard Operating Procedures for building security are current.**
- **Ensuring that supplies and equipment are readily available for traffic and pedestrian control.**
- **Train and educate police officers** in civil disturbance response procedures.
- **Planning and documentation of events.** Local governments or other organizations can anticipate and plan for incidents. When a civil disturbance occurs, it may be a good idea to record the event on videotape for later study and use in prosecutions.
- **Encourage community involvement and leadership from a variety of ethnic backgrounds.** This will allow a diverse array of perspectives and ideas to be shared and discussed, leading to more understanding. Community leaders should hold open forums to discuss ethnic issues.
- **Provide a police presence to discourage conflicts** and provide safety for opposing groups if a controversial event will likely attract counter demonstrations,
- **Provide for signage and marking** to direct the movement of large groups through urban areas.
- **Segregate special event crowds to specified festival areas** if large crowds are disruptive to business as usual, or if they threaten sensitive sites.
- **As appropriate, restrict open alcohol sales in large crowd settings**, to reduce the potential for disorder.
- **Provide for a visible security presence** to discourage the criminal element in large crowds.

Structure Fire

Mitigation Actions: Potential mitigation strategies for structure fires include:

- **Continued support of local fire departments.** Fire departments should be deployed, equipped, and trained per NFPA standards and ISO recommendations.
- **Working with local units to ensure strong code enforcement.** Building codes and enforcement are the first measure for preventing structure fires.
- **Public Education.** Local communities can encourage public education and school programs, especially regarding stoves, heaters, fireworks, matches/lighters, smoke detectors, and evacuation. Public education can particularly focus on safe handling and disposal of cigarettes, cigars, pipes, and matches, as careless smoking and children playing with matches and lighters are significant hazards in some neighborhoods. Alcohol and other drug use can exacerbate the risks. In addition, fire extinguisher usage classes should be taught as often as possible.
- **Be proactive in preventing arson.** Structure fires can be prevented by clean up activities in areas of abandoned or collapsed structures, accumulated junk or debris, and in areas that have a history of storing flammable materials where spills or dumping may have occurred. Older communities in particular should consider establishing a quick process to secure and/or demolish abandoned structures.
- **Ensure proper maintenance of power lines.** Local power companies can help prevent or alleviate fires by proper maintenance and separation of power lines, as well as efficient response to fallen power lines.
- **Employ smart transportation planning**. Transportation planning is important for assessing roads, overpasses, etc., in order to maximize access and improve emergency response times to all inhabited or developed areas of a community. Subdivisions should include more than one entrance to allow access if one of the entrances becomes blocked.
- **Investigate the feasibility of creating fire districts within the county.** Fire districting can save jurisdictions money and benefit smaller towns that may not be able to provide adequate fire protection services.
- **Encourage local governments to incorporate sprinkler requirements into local ordinances.** The most convenient and least costly time to install home fire sprinklers is during new home construction. However, they can also be retrofitted into existing homes. Combined with smoke alarms, residential

fire sprinklers cut the risk of dying in a house fire by 82 percent, according to the National Fire Protection Association

- ➔ Firewise Communities-. Define the Wildanf-Urban Interface and adequately buffer development. Incorporate Firewise principles into site development and landscaping ordinances. Prodive materials and outreach opportunities for ongoing education and integration. (Schwab anf Meck, 2004)

Snow Storm

Mitigation Actions: Potential strategies for mitigating snow storms include:

- ➔ **Utilization of snow fences.** Using snow fences or "living snow fences" (rows of trees or other vegetation) can limit blowing and drifting of snow over critical roadway segments.
- ➔ **Burying power lines.** Burying or otherwise protecting electric and other utility lines can prevent utility disruption by protecting lines from ice, wind or snow damage. However, lines buried in frozen soil may be difficult to reach if repair is needed.
- ➔ **All critical facilities should have access to an auxiliary power supply.** This project would further guarantee that facilities that serve local communities within St. Clair County in a critical function have a continual supply of power to carry out required duties even when the primary power source is unavailable. A countywide survey should be conducted to identify those critical facilities that currently do not have an auxiliary power supply.
- ➔ **National Weather Service monitoring and advisories.** The National Weather Service has developed effective weather advisories which are promptly and widely distributed. Radio and television provide the most immediate means to do this. Accurate public information, including recommended actions to prepare for adverse weather conditions continue to be most effective in preventing loss of life and minimizing property damages.
- ➔ **Clearing and salting of roadways.** The St. Clair County Road Commission (SCCRC) is responsible for the clearing and salting of all township roads. In cities and villages, the local Public Works department is entirely responsible for plowing and salting roads. In addition, the SCCRC has a maintenance contract with MDOT to maintain all state facilities within the county. Clearing streets and roads of snow assures the passage of public safety vehicles and general traffic.
- ➔ **Maintain snow removal equipment so that it is ready to be deployed**. Local public works departments and the

SCCRC need to always plan for and maintain adequate road and debris clearing capabilities.

- **Utilization of prewetting systems and deicing units on roadways.** Prewetting involves the application of a liquid deicing solution to granular material as it is spread on the roadway. Prewetted material adheres better to the roadway. It also speeds up the melting action by supplying enough moisture to sodium chloride, the most common deicing material, so that the melting begins immediately.
- **Anti-icing of roadways.** Anti-icing is a process where liquid deicing materials are applied to a roadway immediately before a storm. The deicing chemical prevents or weakens the bonding of ice to the pavement, causing the road to be slushy instead of icy. For anti-icing to work, deicing chemicals have to be applied at the right time and under the proper conditions. In the end, anti-icing can save road crews time and money and can prevent wear and tear on equipment.
- **Building code development and enforcement of snow loads.** A single snow load weight capacity standard may not be adequate for all areas within a community. Local building departments should determine the snow load limits for their communities based on local data. A community's building code can include snow load limits or weight capacity standards in an appendix.
- **Assure that critical facilities such as police and fire stations and schools are accessible and equipped.**
- **Public emergency shelters.** Identify appropriate shelters for people who may need to evacuate due to loss of electricity, heat or coastal flooding due to storm surge. Communities can establish heating centers or shelters for vulnerable populations, not only for residents, but also for stranded motorists/travelers.
- **Farmer preparedness to address livestock needs/problems.** In severe winter weather, livestock may be unable to forage for vegetation that is frozen under snow and ice, causing them to starve and freeze to death. Roads can be blocked, preventing or slowing distribution of fodder and food aid.

Thunderstorm

Mitigation Actions: Damage from thunderstorms and lightning is often underestimated. Everyone should have an appreciation for the dangers of lightning. Although not entirely preventable, damage and life safety risk from these events can be minimized. Mitigation strategies for thunderstorms include:

- **Burying power lines.** Buried power lines offer the security

of uninterrupted power during and after storms. However, consideration needs to be made for maintenance and repair, particularly in cold climates where soil freezes more readily.

- **Continued upgrade of emergency notification technologies.** The use of cable television's emergency broadcast system, the county siren system, fiber optic networks, and other existing technologies should be utilized and continually enhanced.
- **Purchase and distribute NOAA radios.** A sound communication strategy will aid in storm warnings as well as flood warning systems. NOAA Weather Radio continuously broadcasts National Weather Service forecasts, warnings and other crucial weather information. NOAA Weather Radio also provides direct warnings to the public for natural, man-made, or technological hazards.
- **Community outreach and public education.** Communities may use outreach programs to promote awareness of thunderstorm dangers. Driver safety strategies for severe weather events can be addressed by driver safety/ education classes and by the media.
- **Using structural bracing, window shutters, laminated glass in window panes, and hail-resistant roof shingles** to minimize damage to public and private structures.
- **Training and increased use of weather spotters.** Working with their local communities and with the local National Weather Service office, spotters provide invaluable assistance and critical information to decision makers when hazardous weather threatens. Many lives are saved because of the partnership between volunteer storm spotters, emergency management officials and the National Weather Service.
- **Using surge protectors on critical electronic equipment.** The main job of a surge protector system is to protect electronic devices from "surges." A power surge is an increase in voltage significantly above the designated level in a flow of electricity.
- **Installing lightning protection devices on the community's communications infrastructure.** Protection devices should be physically located as close as possible to the equipment. Common locations in wireless infrastructures are at the top of the mast where the transmission line exists, the antenna, and at the entrance or inside of the cabinet where the transmission line enters the base station electronics.

Wildfire

Mitigation Actions: Although preventing or controlling wildfires is

preferable, there are many mitigation efforts we can take to prevent or alleviate damage to our homes and communities when fires inevitably occur. Mitigation strategies include:

- **Public education.** Outreach efforts can promote such items as non-combustible roof covering, fire safe construction, and the importance of clearing brush and grass away from buildings. It is important to promote public education on smoking hazards and the risks of recreational fires.
- **Continued support of and use of Geographic Information Systems (GIS).** GIS mapping of vegetative coverage can facilitate analysis and planning decisions through comparison with topography, zoning, developments, infrastructure, or other markers.
- **Fireplace and chimney maintenance.** Residents should be encouraged to inspect chimneys at least twice a year and clean them at least once a year.
- **Ensure proper waste disposal.** Wildfire risk can be reduced by safe disposal of yard and household waste rather than through open burning.
- **Proactive arson prevention.** Wildfires can be prevented by arson prevention clean up activities in areas of abandoned or collapsed structures, accumulated junk or debris, and in areas with a history of storing flammable materials where spills or dumping may have occurred.
- **Work with local governments to ensure road and driveway clearance.** Roads and driveways should be kept accessible to emergency vehicles and fire equipment. Driveways should be relatively straight and flat, with at least some open spaces to turn. Bridges should be strong enough to support emergency vehicles, with clearance wide and high enough for two-way traffic and emergency vehicle access.
- **Organizing neighborhood wildfire safety coalitions** to plan how the neighborhood could work together to prevent a wildfire.
- **Forestry Improvements.** This project provides for removal of dead trees, shrubbery, and stumps and evaluation, treatment, and trimming of trees in area parks, cemeteries, golf courses, and other park properties. Urban forests can be the most valuable infrastructure in a community's system of parks. Healthy trees stand a much higher chance of surviving the extreme loading that is associated with heavy snow and/or ice. Often, trees and/or tree branches fall onto overhead power lines and disrupt power to homes and businesses. New plantings should be of a hardy variety that stands up well to heavy loading and strong winds.

- **Prescribed burns and fuel management.** The thinning of flammable vegetation, possibly including selective logging to thin out some areas. Fuels cleared can be given away as firewood or chipped into wood chips for distribution.
- **Avoid building structures on hilltop locations, where they will be at greater risk from wildfires**. In addition, hillsides facing south or west are more vulnerable to increased dryness and heat from sun exposure. Communities should also enforce proper setbacks from slopes.

Scrap Tire Fire

Mitigation Actions: Mitigation strategies for scrap tire fires include:

- **Implement tire disposal policies**. A sample of policies for regulating safe disposal and management of scrap tires includes the following: separation of stored scrap tires from other materials; limits on the size of each pile; minimum distances between piles and property lines; covering, chemically treating, or shredding tires to limit mosquito breeding; providing for fire vehicle access to scrap tire piles; training employees in emergency response operations; installation of earthen berms around storage areas; prevention of pools of standing water in the area; control of nearby vegetation; an emergency plan posted on the property; and storing only the permitted volume of tires authorized for a particular site.
- **Alternate use/recycling program.** Promoting technologies that recycle tires can be an asset. Examples include using whole tires in roadbeds, for culvert wingwalls, or as slope protection, or using shredded tires for a playground surface. Communities should encourage recycling rather than storage.
- **Pest management.** Pest-control measures for mosquitoes and other nuisances around scrap tire yards will not prevent fires, but controlling pests can decrease the risk of disease to people in the vicinity.
- **Proper siting of tire storage and processing facilities.** Communities must employ land use planning that recognizes scrap tire sites as a real hazard and environmental threat.
- **Law enforcement to prevent illegal dumping** of tires at the site.

Drought

Mitigation Actions: Strategies to mitigate droughts include:

- **Continue working closely with Michigan State University Extension regarding agriculture drought pre-**

dictions. MSUE conducts research, outreach programs, and performs studies related to agricultural droughts and their effects.

- **Institute water conservation practices as necessary.** The importance of water conservation and water loss reduction should always be an integral part of any planning endeavor and associated implementation actions. As appropriate, consumers should be encouraged to employ water-saving measures in their daily lives. Communities should utilize measures or ordinances to prioritize or control water use, especially when needed for firefighting.
- **Maintain contact with the USGS regarding real time drought conditions and drought forecasts.** The USGS monitors and measures the flows of rivers and streams, as well as impacts on surface and ground water sources.
- **Preparation of a drought contingency plan.** Local communities should prepare a drought contingency plan to guide response efforts in the event of a drought. A good contingency plan identifies drought risks and liabilities, determines actions that can be taken to address those risks and liabilities, addresses funding shortfalls that could result from drought response efforts, and plan for ways to coordinate programming among local governments and other organizations to ensure an efficient response to the drought.

Agricultural Pests/Invasive Species

Mitigation Actions: Mitigation strategies for agricultural pests and invasive species include:

- **Public education.** Educating landowners on what they can do to protect forests and woodlands as well as the steps they can take to report unusual mortality or declines in their trees will go a long way toward managing these pests.
- **Work in concert with the St. Clair Conservation District to mitigate invasive species, infestations, and natural diseases.** The conservation district employs foresters and resource specialists and provides information to concerned citizens and holds educational workshops regarding forest health issues. Moreover, the Conservation District will also conduct on-site visits to assess trees.
- **Support research to understand the life cycle of invasive species** in order to determine ways to prevent their spread.
- **Use caution with any Ash Tree related material** and be aware of the current infestation situation.