

8 Hazard Mitigation Actions

8.1 Section Organization

Hazard mitigation actions are identified below. Section 8.2 contains mitigation actions that are not specific to a particular hazard. Sections 8.3 through 8.29 describe each individual hazard that has been identified. These mitigation actions have been organized around the hazards and prioritized using the results of the HIVA.

Each Hazard-specific Mitigation Action presents a description of the action; the benefit to be derived from a particular action; estimated costs, if available; the County agency or organization that will be responsible for implementing the action; an implementation schedule; the mitigation goal and objective which the action fulfills; the priority of the action, based on its effect on overall risk to life and property, ease of implementation, political and community support; and potential sources of funding to support the action.

Appendix F contains detailed information on grant funds that may be available to support implementation of these mitigation actions.

8.2 Multiple Hazard Mitigation Strategies

This Plan identifies twenty-seven specific hazards that may potentially affect the County. These hazards differ in important ways, such as in their predictability, length of warning time, speed of onset, magnitude, scope, duration of impact, and the possibility of secondary impacts. However, many of the demands they generate on the county's emergency management infrastructure arise not from their differences but from their commonalities. Those mitigation actions that address these commonalities are presented below in sections 8.2.1.1 through 8.2.1.23.

8.2.1.1 Mitigation Action MH-1:

Evaluate existing shelters to determine adequacy for current and future populations. Work with appropriate personnel from County agencies and Red Cross to close gaps identified by the evaluation process. These may include:

- Appropriate staffing levels
- Ensure adequate quantities of necessary supplies are available
- Identify informational needs to be delivered to County residents through community groups and/or publications

Estimated Costs: Investment in staff time.

Benefits: A group has been assembled and tasked to review the Emergency Operations Plan including the annex on sheltering. Adequate planning for sheltering activities will ensure that County residents have a safe location to go in the event of a hazardous incident. Establishing shelters minimizes the exposure of residents to a potential hazard, thereby reducing the risk of loss of life or serious injury.

Implementation Schedule: Ongoing activity.

Related Objectives: Objective 1.3.

Priority: High

Potential Funding Sources: General revenue.

8.2.1.2 Mitigation Action MH-2:

Develop evacuation plans, policies and procedures for the full range of contingencies and geographic areas of the County.

- Bring together experts in emergency planning, transportation planners, and traffic engineers to develop evacuation plans, policies, and procedures for the full range of contingencies that Anne Arundel County may face.
- Use closed circuit televisions of the Maryland Department of Transportation to help aid traffic flow during evacuations.
- Develop canned messages for use with the public and the media.
- Examine the need for additional legislative authority to conduct mandatory evacuations.

Estimated Cost: Substantial staff time.

Benefits: The County has an evacuation annex to its Emergency Operations Plan. This action would take evacuation planning to the next level, tailoring plans for specific events and specific neighborhoods. This action will help protect public health and safety by having plans in place to assist those people threatened by various emergency conditions evacuate to safety in a timely manner. The plans to be developed will include a determination of the conditions under which evacuation may be necessary; a clear chain of command; specific evacuation routes, plans, and procedures for different types of emergencies and geographic areas; provisions for assisting those with disabilities and those who do not speak English; and outreach to the public.

Responsible Organization: Office of Emergency Management with the Transportation, Planning, Fire, and Police Departments

Implementation Schedule: This will be an on-going activity to be started in 2005 and completed by 2008.

Related Objectives: Objectives 1.1 & 1.2

Priority: High

Potential Funding Sources: General revenues, grants

8.2.1.3 Mitigation Action MH-3:

Design and implement a comprehensive, concerted campaign of community awareness and education under the auspices of the Anne Arundel County Office of Emergency Management. A comprehensive, concerted, neighborhood-based community awareness and educational campaign is needed to give the residents of the County the knowledge and tools necessary to carry out their responsibilities to mitigate damage to their own lives and property before disaster strikes, better prepare for disasters, and know what to do to respond to an emergency situation. The campaign will be a long-term initiative, providing consistent educational opportunities to advance the community's knowledge and skills. Major components of the planned campaign are outlined below.

- Branding. Develop a "brand" that will help residents and County employees easily identify the campaign.
- Annual Events. The campaign will include three major types of events annually. These include:
 - At least five major annual campaigns such as:
 - annual safety fair
 - flood awareness week
 - wildland fire prevention
 - hurricane season
 - pre-winter storm season;
 - Additional news conferences or exhibits as needed such as cold weather safety demonstrations, during the year focusing on various hazards facing the County
 - Mini-conferences or workshops annually on high priority hazard mitigation topics

- Develop a public speaking series to include topics such as types of natural disasters and risks, how to develop a family disaster plan, how to develop a family disaster supply kit, how to develop a business continuity plan, simple types of mitigation projects for homeowners, etc. These speaking engagements will be offered to civic groups such as Rotary and Kiwanis Clubs, the Chamber of Commerce, church and interfaith groups, and others.
- Website. Continue to enhance the Office of Emergency Management website: <http://www.aacounty.org/OEM/index.cfm>.
- Publications. Publish a monthly newsletter that contains important messages and potentially life-saving information regarding personal preparedness and disaster loss prevention.
- Safety Education. Develop comprehensive resources for education about each of the identified hazards.
- Partnership Development. Reach out to existing and new sponsors to assist in the funding of campaign events and getting out the message of hazard mitigation.
- Work with the Anne Arundel County Convention and Visitors Bureau and others to alert tourists to potential natural hazard areas and what to do if a natural or man-made hazard occurs during their visit to the County. This could include brochures to be left in the visitors' center, hotels and attractions about evacuation routes, sheltering information, and other important information.
- Develop a business continuity planning display to raise the awareness level of why it is important to have such a plan, how to develop a plan, and encourage businesses to make sure that their plan fits in with the County's plan. This display will be appropriate for use at local chamber of commerce meetings and activities, civic group gatherings and other business-related gatherings.
- Direct Mailings. Develop and mail material to individuals and businesses in high hazard areas (such as within the 100-year floodplain) with messages about the risks they face, options to mitigate those risks, and funding that may be available for mitigation. Create mailings to neighborhood, community, and church groups to notify them of upcoming events and to provide information that can be used in their newsletters to reach larger audiences.
- Translation Services. Continue translating important literature into Spanish, Korean or other appropriate language to help reach all populations in the County with preparedness messages.

- Elementary and Middle School Program. Develop and implement an all-hazards program aimed at elementary and middle school students.

Estimated Cost: To be determined, but will be substantial.

Benefits: This action will result in a more informed public, aware of the risks they face from various hazards and knowledgeable about how to protect their families, homes, workplaces, communities, and livelihoods from the impact of disasters. It will also result in lasting partnerships with those partners and community members who provide support.

Responsible Organization: The Office of Emergency Management

Implementation Schedule: These activities will be conducted on an annual basis from 2004 through 2008.

Related Objectives: Objectives 1.1, 1.2, 2.1, 2.2, 2.3, 5.1, & 5.3.

Priority: High

Potential Funding Sources: General revenues, grants

8.2.1.4 Mitigation Action MH-4:

Develop a coordinated, interagency emergency debris removal plan that includes:

- A command structure
- Pre-designate staging areas and dumping sites
- Pre-qualify contractors for use in large-scale disasters
- Pre-identify specialized equipment needs and develop standby lease agreements
 - Identify partnership opportunities with local farmers who volunteer their equipment that may be useful in clearing debris
- Provide for recycling of materials
- Debris removal on both public and private properties

Estimated Cost: Minimal

Benefits: Natural and man-made disasters generate a variety of debris that includes, but is not limited to, trees and other vegetative organic matter,

building/construction material, appliances, personal property, mud, and sediment. The quantity and type of debris generated from any particular disaster will be a function of the location and kind of event experienced, as well as its magnitude, duration, and intensity.

The quantity and type of debris generated, its location, and the size of the area over which it is dispersed will have a direct impact on the type of removal and disposal methods utilized to address the debris problem, associated costs incurred and how quickly the problem can be addressed. The County may have difficulty in locating staff, equipment, and funds to devote to debris removal, in the short- as well as the long-term, following a major natural or man-made disaster.

This action will foster a unified and coordinated approach to respond to any major debris-generating disaster. The plan will ensure that efficient and effective methods are used to resolve disaster debris removal and disposal issues; implement and coordinate private sector debris removal and disposal contracts to maximize cleanup efficiency; and expedite debris response and recovery efforts to reduce the potential for injury to County residents.

Responsible Organization: Office of Emergency Management to facilitate development of the plan with other County Departments.

Implementation Schedule: This activity will be implemented by 2005.

Related Objectives: Objectives 4.1, 4.2, & 4.5

Priority: High

Potential Funding Sources: General revenues

8.2.1.5 Mitigation Action MH-5:

Conduct tabletop, functional, and full-scale disaster exercises with local law enforcement, emergency management, County officials, and other disaster response agencies/partners.

- Develop and manage disaster exercises in various areas of the County.
- Evaluate the performance of County agencies

- Types of exercises to include: Flood exercise, Weapons of Mass Destruction Exercise, Hazardous Materials Spill Exercise, High Winds, Winter Storm, and Bio-Terrorism Exercise, etc.

Estimated Costs: Substantial staff time and materials.

Benefits: Conducting exercises will allow County agencies to interact, communicate, and practice the actions that would be taken during an actual disaster. These actions allow the County to simulate actual actions and responses. An evaluation following the exercise is essential to identify the things that were done well and those areas where there were gaps in performance. Practice will allow the County to better respond to a disaster when it strikes. Better response ensures that fewer residents are at risk of loss of life or injury.

Implementation Schedule: This activity will begin in 2005.

Related Objectives: Objectives 4.1, 4.3, 4.4, & 4.5

Priority: High

Potential Funding Sources: Grants

8.2.1.6 Mitigation Action MH-6:

Identify County response agencies and what they do. Create an inventory and matrix for distribution to all response agencies.

Estimated cost: Minimal.

Benefits: Ensuring that all the response agencies in the County are aware of who the other response organizations are and their capabilities is an important activity to protect the residents of the County. While there is a great deal of institutional knowledge about what capabilities the various agencies in the County possess, the knowledge tends to be individual specific. By creating a matrix that depicts the various response agencies and their roles during an emergency, the County will be better prepared to have the appropriate agencies respond. This, in turn, will ensure that County residents will receive quicker service and minimize the potential for injury or death.

Responsible Organization: Office of Emergency Management

Implementation Schedule: This activity will occur in 2005.

Related Objectives: 4.1, 4.4, & 4.5

Priority: High

Potential Funding Sources: General revenue.

8.2.1.7 Mitigation Action MH-7:

Enhance the information base to support future hazard mitigation planning.

- Work with the Anne Arundel County Office of Information Technology to develop appropriate GIS data.
- Ensure County is taking advantage of modeling programs provided by the Federal government such as ALOHA, CAMEO, HAZUS, and others.
- Ensure County employees have appropriate training to be able to use County GIS and appropriate modeling software.

Estimated Costs: Substantial.

Benefits: GIS and other planning software are valuable tools for emergency response planning and operations. They will help estimate the location and degree of losses, establish emergency routes, and assess requirements for initial response and mass care. More prepared emergency response organizations are better able protect themselves and County residents from the harmful effects of hazards. This can prevent the loss of life or injury.

Implementation Schedule: This activity is ongoing.

Related Objectives: Objectives 1.4, 4.2, & 4.3

Priority: Medium

Potential Funding Sources: General revenues, grants

8.2.1.8 Mitigation Action MH-8:

Identify situations when sheltering-in-place is the most appropriate course of action. Evaluate the means of disseminating a message to reassure and inform

residents that the safest course of action during a disaster is to remain in their current location.

Estimated Costs: Minimal.

Benefits: A group has been assembled and tasked to review and update the Emergency Operations Plan including the annex on sheltering. As part of this review, planning team members will examine the need for a plan of action to be implemented when sheltering in place. Adequate planning for sheltering activities will ensure that County residents have received the appropriate information prior to a disaster to understand the reasoning and need for sheltering-in-place. Since there are times when sheltering-in-place may be the most appropriate course, this action minimizes the exposure of residents to a potential hazard, thereby reducing the risk of loss of life or serious injury.

Implementation Schedule: This will be an ongoing activity beginning in 2005.

Related Objectives: Objectives 1.2 & 1.3

Priority: Medium

Potential Funding Sources: General revenue.

8.2.1.9 Mitigation Action MH-9:

Implement an early warning water quality monitoring system at County water facilities and transmission and distribution mains.

Estimated cost: To be determined.

Benefits: Install an “early warning system” that continually monitors typical water quality parameters and reports to a central point. Pre-determined values could be set to automatically close valves, shut down pumps, and activate warning alarms to prompt Public Works personnel. This type of automated system will reduce the risk of illness, injury, or death to water customers from a contaminant in the drinking water.

Responsible Organization: Department of Public Works

Implementation schedule: To be determined.

Related Objectives: Objectives 1.1, 1.4, & 7.2

Priority: Medium

Potential Funding Sources: General revenues, grants

8.2.1.10 Mitigation Action MH-10:

Implement physical modifications of inactive County water and wastewater facilities.

Estimated cost: To be determined.

Benefits: Remove a point of vulnerability to County infrastructure. Due to lack of routine monitoring by Operations personnel, inactive water and wastewater facilities are very vulnerable to attack. Through document review and interviews, Public Works will create a list of inactive facilities and determine whether the facility is permanently deactivated. The department will identify specific actions to be taken to isolate the facility from the system (e.g. install valve, remove pipe). Isolating inactive facilities will reduce the risk of illness, injury, or death to County residents by making these facilities less vulnerable to the introduction of a contaminant.

Responsible Organization: Department of Public Works

Implementation schedule: To be determined.

Related Objectives: Objectives 1.1, 1.4, & 7.2

Priority: Medium

Potential Funding Sources: General revenues, grants

8.2.1.11 Mitigation Action MH-11:

Establish an all-hazard resource center to be located in the County Emergency Operations Center. The center will act as a clearinghouse for information on local hazard identification, preparedness, and mitigation strategies for use by residents, businesses, County employees, non-profits, and others. Marketing efforts will be undertaken to ensure that prospective users are aware of the

location of the information. Information will be collected and stored in hard copy as well as made available electronically on the OEM Web site.

This center will collect and disseminate information about the National Flood Insurance Program, Flood Insurance Rate Maps, books about mitigation for homeowners, FEMA guides, family disaster planning information, and other valuable information about natural and man-made hazards.

Estimated Costs: Minimal.

Benefits: This central resource will permit residents, County employees, and others to have one location where information can be easily accessed and retrieved. This action will result in a more informed public, aware of the risks they face from various hazards and knowledgeable about how to protect their families, homes, workplaces, communities, and livelihoods from the impact of disasters.

Responsible Organization: The Office of Emergency Management

Implementation Schedule: These activities will be conducted on an ongoing basis starting in 2004.

Related Objectives: Objectives 1.1, 2.1, 2.2, & 4.2.

Priority: Medium

Potential Funding Sources: General revenues, grants

8.2.1.12 Mitigation Action MH-12:

Formalize hazard mitigation as a factor in community development planning activities, including business development and long-range regional growth planning. As part of the planning process, proposed development should include:

- Potential dollar losses from all hazards
- Alternative growth scenarios

Estimated Cost: Substantial

Benefits: This action will allow the County and the public to take future disaster costs into account as they plan for the region's future growth. Development of

criteria to encourage future growth into non-hazardous areas will save substantial disaster costs over the long term. Moreover, steering business development away from hazardous areas will save businesses from the costly cycle of disaster damage and repairs and potentially save lives and injuries.

Responsible Organization: Planning and Zoning, Economic Development Corporation

Implementation Schedule: This activity will begin in 2005.

Related Objectives: Objective 3.3, 4.1, & 4.5

Priority: Medium

Potential Funding Sources: General revenues, grants

8.2.1.13 Mitigation Action MH-13:

Explore the options for offsite storage of critical County records and data. Implement a plan to ensure the integrity and safety of information stored at an offsite storage facility.

Estimated Cost: To be determined.

Benefit: In the event of a catastrophic natural or human disaster, critical County data may be destroyed. To prevent the loss of such data, offsite storage is essential to ensure that information can be retrieved and restored. Additionally, archiving the County's data is important in an age of expanding regulations and lawsuits. Backup offsite storage ensures that vital County infrastructure is safe from viruses, human error, employee sabotage, and natural disasters.

Responsible Organizations: Office of Information Technology, Office of Emergency Management

Implementation Schedule: This activity will begin in 2005.

Related Objectives: Objective 3.2

Priority: Medium

Potential Funding Sources: Grants, general revenue

8.2.1.14 Mitigation Action MH-14:

Encourage County personnel to take the CERT training course offered by the Office of Emergency Management.

- Increase the number of trained County personnel as emergency responders
- Increase the number potential trained volunteers such as volunteer firefighters, doctors, and nurses who may become first responders in an emergency event

Estimated Cost: \$20,000 per year for three years in the form of a grant from the Corporation for National and Community Service.

Benefits: Increasing the County's pool of disaster preparedness and homeland defense volunteers enhances the County's ability to manage major emergencies more effectively. The material presented provides a good basis for encouraging pre-disaster planning and mitigation.

Responsible Organization: Office of Emergency Management

Implementation Schedule: Recruitment and training will be completed by the end of 2005.

Related Objective: Objective 4.4

Priority: Medium

Potential Funding Sources: Grants

8.2.1.15 Mitigation Action MH-15:

Identify County natural environmental assets such as ponds, streams, meadows, rivers, and other environmentally significant features. Assess the ways in which the identified hazards may affect these environmental assets and determine feasible measures to redress these vulnerabilities.

Estimated Costs: To be determined.

Benefits: By ensuring that wetlands, retention ponds, and natural vegetation are identified for restoration and protection, the potential impacts of hazards such as floods, landslides, and drought may be minimized. These action will minimize or eliminate the effect of hazards upon the residents and property in the County.

Responsible Organization: Cultural and Environmental Resources

Related Objectives: Objective 7.1 & 7.2

Implementation Schedule: This activity will begin in 2005

Priority: Medium

Potential Funding Sources: Grants

8.2.1.16 Mitigation Action MH-16:

Examine current stormwater and wastewater treatment capacities to ensure that water quality parameters are being met.

Estimated Costs: To be determined.

Benefits: Ensuring that water quality measures are being met minimizes the effects of discharges upon the environment. Since many environmental resources act as mitigation measures to minimize or eliminate the effect of hazards upon the residents and property in the County, the prevention of harmful discharges ensures that wetlands, retention ponds, and natural vegetation are restored and protected. This has the benefit of minimizing the negative impacts of potential impacts of hazards such as floods, landslides, and drought on the environment and the residents.

Responsible Organization: Public Works

Related Objectives: Objective 7.1 & 7.2

Implementation Schedule: This activity will begin in 2005

Priority: Medium

Potential Funding Sources: Grants

8.2.1.17 Mitigation Action MH-17:

Promote the use of NOAA "All Hazards" radios for early warning and post-event information to critical facilities and other facilities serving County residents. Provide education and training to ensure that individuals in these facilities understand what the information means and what actions should be taken when notifications are broadcast.

Estimated Cost: Approximately \$ 55 per radio for a battery-operated unit with SAME technology.

Benefits: NOAA Weather Radio (NWR) is a nationwide network of radio stations broadcasting continuous weather information directly from nearby National Weather Service offices in Sterling, Virginia; Mount Holly, Delaware; Pittsburg, Pennsylvania. These stations broadcast National Weather Service warnings, as well as post-event information for all types of hazards, both natural and man-made. These broadcasts are generated seven days a week, 24 hours a day. Working with the Federal Communication System's Emergency Alert System, NOAA Weather Radios are a single source for the most comprehensive weather and emergency information available to the public.

These warnings can buy extra time for people to react and take preventative measures before dangerous weather or other hazard conditions reach their area. New technology allows users to pre-select the National Weather Service alerts according to local geographic areas such as a county (Specific Message Encoding or SAME). The hearing and visually impaired can also get these warnings by connecting specially designed attention-getting devices such as strobe lights, personal computers, text printers and vibrators. Early warning of dangerous conditions allows time for individuals to take appropriate action to protect lives and property.

Responsible Organization: Office of Emergency Management

Implementation Schedule: During 2002, the Anne Arundel County Office of Emergency Management provided NOAA Weather Radios to each school in the County. This initiative would provide additional NOAA Weather Radios to critical facilities, recreational centers, day care facilities, and those facilities serving special population groups. This action will continue in 2004 and beyond.

Related Objectives: Objective 1.4

Priority: Low

Potential Funding Sources: General revenues, grants

8.2.1.18 Mitigation Action MH-18:

Research and evaluate hazards and data needs to examine in greater detail for next iteration of Mitigation Plan.

Estimated Cost: \$ 2,000 staff time for research.

Benefits: Identifying vulnerabilities in the County leads to the creation of feasible mitigation strategies that will reduce or eliminate risk to residents and property.

Responsible Organization: Office of Emergency Management

Implementation Schedule: This activity to begin in 2005.

Related Objective: Objective 1.5

Priority: Low

Potential Funding Sources: Grant

8.2.1.19 Mitigation Action MH-19:

Encourage adequate and well-understood insurance coverage, including separate personal property coverage, among property owners.

- Encourage participation in the National Flood Insurance Program.
- Coordinate with the state insurance commission to conduct outreach efforts to educate realtors and insurance agents about the NFIP and its requirements.
- Educate municipal and County leaders about the NFIP and its requirements.

Estimated Cost: Minimal

Benefits: Reduce the economic exposure of residents who live in the 100 year flood plain or who build in the 100 year flood plain. After a flooding event, the

insurance can be used to rebuild a home and make it more resistant to future floods.

Responsible Organization: Office of Emergency Management

Implementation Schedule: This activity will begin in 2005.

Related Objectives: Objective 3.1

Priority: Low

Potential Funding Sources: General revenue.

8.2.1.20 Mitigation Action MH-20:

Adopt future updates to the International Building Code on a three-year cycle as it becomes available.

Estimated Cost: Substantial

Benefits: The 2003 International Building Code is part of a comprehensive, coordinated set of codes produced by the International Code Council (ICC) and has been widely adopted by states and municipalities across the country. The International Building Code represents minimum standards that must be met by the private sector construction industry to safeguard public health and safety. It incorporates resistance to natural disasters, fire protection and security of building systems into its construction codes. Future iterations of the International Building Code will continue to safeguard public health and safety by mandating that new buildings are constructed in a manner that will provide maximum protection of human life and minimize the potential for structural damage.

Responsible Organization: Inspections and Permits, Economic Development Corporation

Implementation Schedule: This activity will begin in 2006.

Related Objectives: Objective 3.3

Priority: Low

Potential Funding Sources: General revenues

8.2.1.21 Mitigation Action MH-21:

Identify County historic assets such as buildings, vessels, archeological sites, and other historically significant features. Assess the ways in which the identified hazards that may affect these historic assets and determine feasible measures to address their vulnerabilities.

Estimated Costs: To be determined.

Benefits: By inventorying the historic assets in the County, and taking measures to address their vulnerabilities, the County will be able to preserve and ensure that historically important structures, vessels, and archaeological sites will be intact for future generations.

Responsible Organization: Cultural and Environmental Resources

Related Objectives: Objective 6.1

Implementation Schedule: This activity will begin in 2004.

Priority: Low

Potential Funding Sources: Grants

8.2.1.22 Mitigation Action MH-22:

Assess the need for, and encourage the use of appropriate fire prevention measures, such as retrofitting with sprinklers, in historic buildings in the County.

Estimated Costs: To be determined.

Benefits: By installing fire prevention measures in historic assets in the County, valuable historical resources will be less vulnerable to fire, a leading cause of vulnerability in these types of structures. The County will be able to preserve and ensure that historically important structures, vessels, and archaeological sites will be intact for future generations to learn from and enjoy.

Responsible Organization: Cultural and Environmental Resources

Related Objectives: Objectives: 6.1

Implementation Schedule: This activity will begin in 2006

Priority: Low

Potential Funding Sources: Grants, private funding

8.2.1.23 Mitigation Action MH-23:

Ensure that critical area restrictions are being adequately enforced.

Estimated Costs: To be determined.

Benefits: The Chesapeake Bay and its tributaries are major assets of the County. Degradation of the Bay will adversely affect the County's environmental, social, and economic health. Therefore preserving and protecting sensitive areas such as streams, floodplains, tidal and nontidal floodplains from development is essential to ensure that the County's natural resources are not degraded. Enforcement of existing restrictions on development in identified critical areas will prevent losses to the County's environmental, social, and economic health.

Responsible Organization: Permits and Inspections, Planning and Zoning

Related Objectives: Objective 7.1

Implementation Schedule: This activity will begin in 2005.

Priority: Low

Potential Funding Sources: General revenue

8.3 Extreme Heat Mitigation Actions

8.3.1 Description of Hazard

Extreme heat waves usually come on subtly, raise summer temperatures higher than normal, and may leave casualties in their wake. Extreme heat is defined as temperatures that hover 10 degrees or more above the average high temperature for a particular region and last for an extended period of time. Humid or muggy conditions can exacerbate the effects of high heat and occur when a "dome" of high atmospheric pressure traps hazy, damp air near the ground.

Heat kills by pushing the body beyond its limits. Under normal conditions an internal thermostat produces perspiration that evaporates and cools the body. The human body dissipates heat by varying the rate and depth of blood circulation, by losing water through the skin and sweat glands, and as a last resort, by panting, when blood is heated above 98.6°F. Sweating cools the body through evaporation. However, high relative humidity retards evaporation, robbing the body of its ability to cool itself. When heat gain exceeds the level the body can remove, body temperature begins to rise, and heat related illnesses and disorders may develop.

Most heat disorders occur because the victim has been overexposed to heat or has over-exercised for his or her age and physical condition. The Heat Index (HI) is the temperature the body feels when heat and humidity are combined. Tables 8.1 and 8.2 illustrate the heat index and its potential effects on the human body.

Table 8-1. Temperature Versus Relative Humidity

Temperature (F)	Relative Humidity (%)					
	90%	80%	70%	60%	50%	40%
80	85°	84°	82°	81°	80°	79°
85	101°	96°	92°	90°	86°	84°
90	121°	113°	105°	99°	94	90°
95		133°	122°	113°	105°	98°
100			142°	129°	118°	109°
105				148°	133°	121°
110						135°

*This chart is based upon shady, light wind conditions; exposure to direct sunlight can increase the HI by up to 15°F.
 ** Due to the nature of the heat index calculation, the values in the table has an error +/- 1.3F.

Source: National Weather Service: <http://www.crh.noaa.gov/pub/heat.htm>

Table 8-2. Heat Index Versus Possible Effects

HI	Possible Heat Disorder
80°F - 90°F	Fatigue possible with prolonged exposure and physical activity.
90°F - 105°F	Sunstroke, heat cramps and heat exhaustion possible.
105°F - 130°F	Sunstroke, heat cramps, and heat exhaustion likely, and heat stroke possible.
130°F or greater	Heat stroke highly likely with continued exposure.
Source: National Weather Service: http://www.crh.noaa.gov/pub/heat.htm	

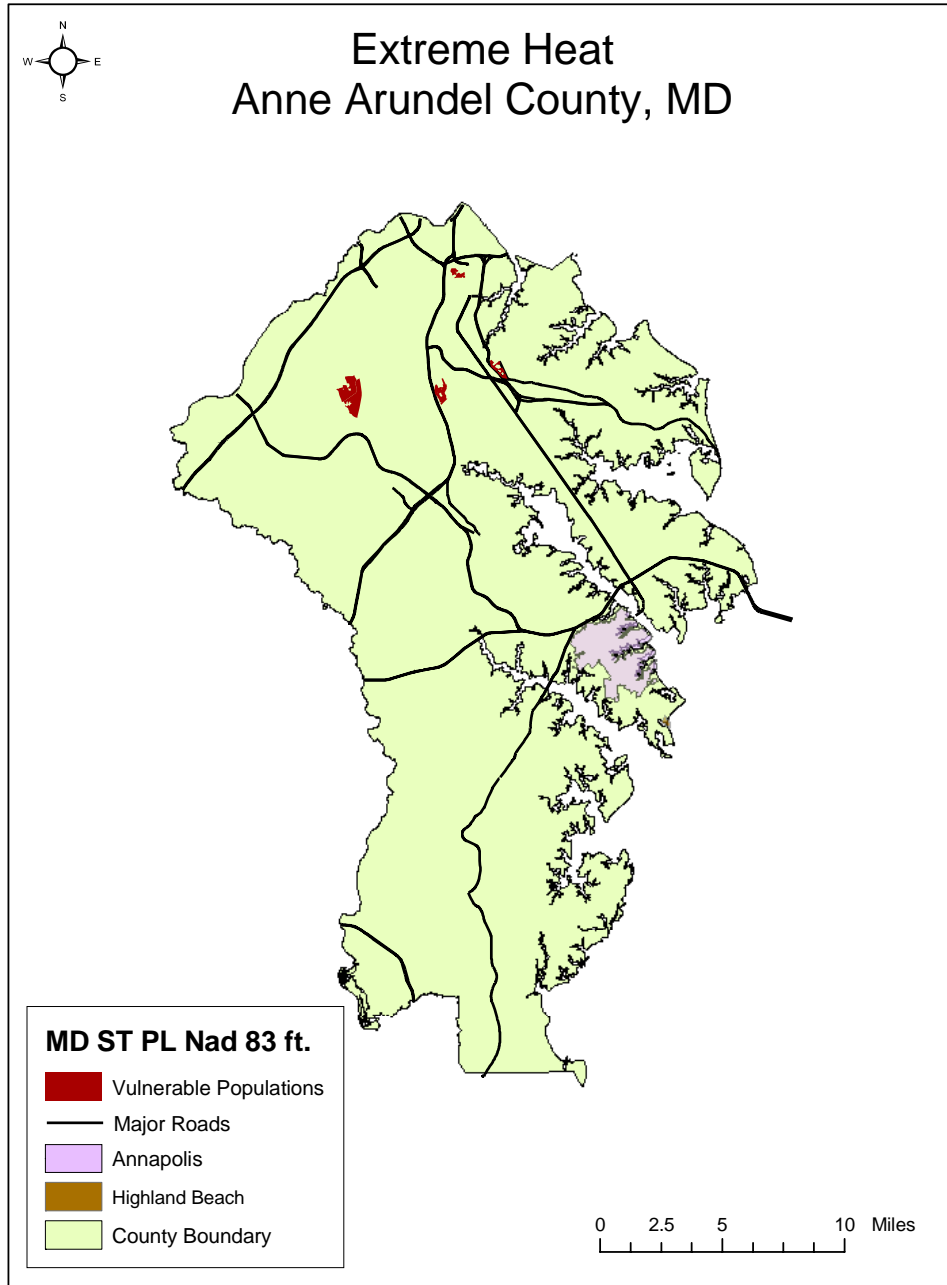
8.3.2 History

Over the past four years, Anne Arundel County has experienced seven episodes of extreme heat, according to National Weather Service data (see Appendix C for additional information).

8.3.3 Vulnerability

Excessive heat does not have particular impacts in any one geographical section of the county. The most vulnerable individuals to this hazard are the very old and the young, as well as those individuals whose socio-economic status prevents them from having access to artificial cooling methods. Figure 8-1 presents the Census Blocks in the County where the highest concentrations of vulnerable populations reside. These areas contain 2,985 people who will potentially be affected by this hazard. The economic impacts of this hazard cannot be evaluated geographically. Critical County infrastructure is unlikely to be affected by this hazard.

Figure 8-1. Extreme Heat



Taylor 8/19/04

Office of Emergency Management
C:\Mitigation GIS\Maps for Plan\Extreme Heat

All-Hazard Mitigation Plan

8.3.4 Impacts/Risk

Excessive heat can have a major impact, causing multiple deaths, but sparing property. With extreme heat, there is little physical destruction, although roads can buckle, trains derail, and livestock die. Extreme heat conditions can pose problems for those not accustomed to the climate or who are outside for prolonged periods of time. Extreme heat can create a threat even to individuals and communities that are accustomed to high temperatures. Excessive heat can also cause utility outages due to an increased demand for electricity.

Elderly residents, young children, those who are overweight, individuals who live alone, residents who lack access to transportation and air-conditioning, and people suffering from serious illnesses are especially prone to heat-related problems. According to the Federal Emergency Management Agency, between 1936 and 1975, nearly 20,000 people succumbed to the effects of heat and radiation from the sun. Extreme heat disorders include sunburn, heat cramps, heat exhaustion, and heat stroke.

People living in urban areas may be at greater risk from the effects of a prolonged heat wave than people living in rural regions. An increased health problem can occur when stagnant atmospheric conditions trap pollutants in urban areas, thus adding contaminants to excessively hot temperatures.

There are seasonal patterns to excessive heat waves, with an event most likely to occur in the summer months. Excessive heat can also cause utility outages due to an increased demand for electricity. Utility outages could severely hamper the county's ability to provide services as facilities become inoperable and must be closed due to a lack of power or water.

8.3.5 Extreme Heat Mitigation Actions

8.3.5.1 Mitigation Action EH-1:

Initiate an extreme heat public awareness and educational campaign under the County education and outreach program. Topics to be addressed include:

- Awareness of the dangers of excessive heat
- Steps to keep heat outside and cool air inside, such as closing floor heat registers, improving insulation, installing weather-stripping and temporary reflectors, and using fans to spread cool air
- Steps to take during excessive heat waves, including drinking plenty of water, limiting intake of alcoholic beverages, dressing in light, loose-

- fitting clothing, wearing hats, avoiding sunshine and extreme temperature changes, and avoiding strenuous activities
- Symptoms of heat disorders and what to do to in cases of emergency
 - Ways to reduce energy consumption during periods of excessive heat

Estimated Cost: Costs will be covered as part of the County education and outreach initiative.

Benefits: This action will help ensure that residents are aware of steps they can take to be better prepared for periods of excessive heat. These measures are intended to reduce the risk of injury or death.

Responsible Organizations: Office of Emergency Management

Related Objectives: Objectives 1.1, 2.1, & 2.2

Priority: High

Funding Sources: General revenues, grants

8.3.5.2 Mitigation Action EH-2:

Create a database to track those at high risk of death such as the elderly, the poor, those who live alone, and those who lack access to transportation and air-conditioning.

Estimated Cost: To be determined

Benefits: This action will allow the County target those individuals most at risk from extreme heat events for special treatment that will reduce their risk of injury or death.

Responsible Organization: Health department

Implementation Schedule: This activity to begin in 2005.

Related Objectives: Objective 1.2 & 1.4

Priority: Medium

Funding Sources: General revenues

8.3.5.3 Mitigation Action EH-3:

Increase tree plantings along public rights of way to reduce the Urban Heat Island effect.

Estimated cost: To be determined

Benefits: This action is intended to reduce the heat in urban areas caused by concrete, buildings, and loss of tree cover. The tree plantings along rights of way are aimed at shading streets and reducing the heat absorbed by dark pavement. It is estimated that the “urban heat island effect” causes urbanized areas to be 3 to 9 degrees hotter than surrounding rural areas, leading to increased energy bills and more dependence on fossil fuels to create electricity. This action will help reduce the urban heat island effect reduce the risk of injury of death or injury.

Responsible Organization: Planning and Zoning, Office of Environmental and Cultural Resources

Implementation Schedule: This activity will begin in 2005.

Related Objective: Objectives 1.1, 5.3, 7.1, & 7.2

Priority: Low

Funding Sources: General revenues, grants, private sources

8.3.5.4 Mitigation Action EH-4:

Create and implement a plan for providing Cooling Centers and Shelters during extreme heat situations. This includes identification of appropriate facilities and equipment such as fans and mist nozzles.

Estimated Costs: To be determined

Benefits: This action will establish plans for Cooling Centers and Shelters to be set up during times of extreme heat. These Cooling Centers and Shelters will provide residents that do not have access to air-conditioning, a place to go which will reduce or minimize the chances of serious injury or death.

Responsible Organizations: Office of Emergency Management, Health Department

Priority: Low

Funding Sources: General revenues, grants

8.3.5.5 Mitigation Action EH-5:

Increase cooperation with news outlets to make residents aware of steps they can take to be better prepared for extreme heat situations.

Estimated Cost: To be determined

Benefits: By utilizing the news outlets, residents will be made further aware of how to stay safe during excessive heat as well as what they can do to decrease the threat of serious injury or death.

Responsible Organizations: Office of Emergency Management, Public Information Office

Implementation Schedule: This activity will begin in 2005.

Related Objectives: Objective 1.1, 2.1 & 4.1

Priority: Low

Funding Sources: General revenues, grants, private sources

8.3.5.6 Mitigation Action EH-6:

Establish partnership opportunities with benevolent organizations, corporate entities, and other assistance programs to create a program to donate fans to vulnerable populations.

Estimated cost: To be determined

Benefits: There are many individuals in the County without the means to maintain a cool environment during an extreme heat event. If those individuals also happen to belong to at risk populations, such as the elderly, the poor, or those with some type of illness, the results of an extreme heat event could be quite drastic. The fans will be provided to vulnerable populations to provide them some relief in preparation for an extreme heat event. This action will reduce the likelihood of death or injury in these populations due to excessive heat.

Responsible Organization: Office of Emergency Management, Public Health
Implementation Schedule: This activity will begin in 2006.

Related Objectives: Objective 1.2 & 5.2

Priority: Low

Funding Sources: Donations, private funding

8.4 Public Health Emergency Mitigation Actions

8.4.1 Description of Hazard

Public health emergencies can take many forms—disease epidemics, large-scale incidents of food or water contamination, or extended periods without adequate water and sewer services. There can also be harmful exposure to chemical, radiological, or biological agents, and large-scale infestations of disease carrying insects or rodents. Public health emergencies can occur as primary events by themselves, or they may be secondary to another disaster or emergency, such as tornado, flood, or hazardous material incident.

The common characteristic of most public health emergencies is that they adversely impact, or have the potential to adversely impact, a large number of people. Public health emergencies can be statewide, regional, or localized in scope and magnitude.

In particular, two public health hazards have recently emerged as issues of great concern, with far reaching consequences. One pertains to the intentional release of a radiological, chemical, or biological agent, as a terrorist act of sabotage to

adversely impact a large number of people. For more information on biological terrorism see Section 10.26, Weapons of Mass Destruction Attack.

The second hazard concerns a deadly outbreak (other than one caused by an act of terrorism) that could kill or sicken thousands of people across the county or around the globe.

The following table identifies specific illnesses and diseases in which Anne Arundel County is particularly interested.

Table 8-3. Public Health Concerns

Group	Disease
AIDS/HIV	AIDS
Enterics	Amebiasis
	Campylobacter
	Cryptosporidia
	Cyclospora
	<i>E. coli</i> 0157:H7
	Salmonella
	Shigella
	Typhoid Fever
	Yersinia
Hepatitis, viral	Hepatitis A (infectious) *
	Hepatitis B (serum) - acute *
	Hepatitis B (serum) - chronic
	Hepatitis C - acute
	Hepatitis C - chronic
Influenza	Influenza A *
	Influenza B *
Meningitis & Encephalitis	Encephalitis
	Meningitis, bacterial
	Meningitis, fungal
	Meningitis, viral
	Meningitis, meningococcal **
Sexually Transmitted Diseases	Chlamydia
	Gonorrhea
	PPNG
	Syphilis: primary
	Syphilis: secondary
	Syphilis: early latent
	Syphilis: congenital
Strep Group	Strep Pneumoniae, Invasive *
	Strep Grp. A Invasive
	Strep Grp. B Invasive

	Strep Pneumonia Resist.
Tuberculosis	M. Tuberculosis
	<i>M. Marinum</i>
	Mycobacterioses, other
Vaccine preventable Diseases	H. Influenza, type b (Hib) *
	German Measles (Rubella) *
	Measles (Rubeola) *
	Mumps *
	Pertussis *
	Varicella *
Zoonoses	Animal exposures
	Post exposure treatments
	Animal rabies
	Ehrlichiosis
	Lyme Disease
	Psittacosis
	Rocky Mountain Spotted Fever
Other	Kawasaki syndrome
	Legionellosis
	Listeriosis
	Malaria
	Arboviral
NOTE: * Asterisks indicate vaccine preventable diseases.	
**A, C, Y, W135	

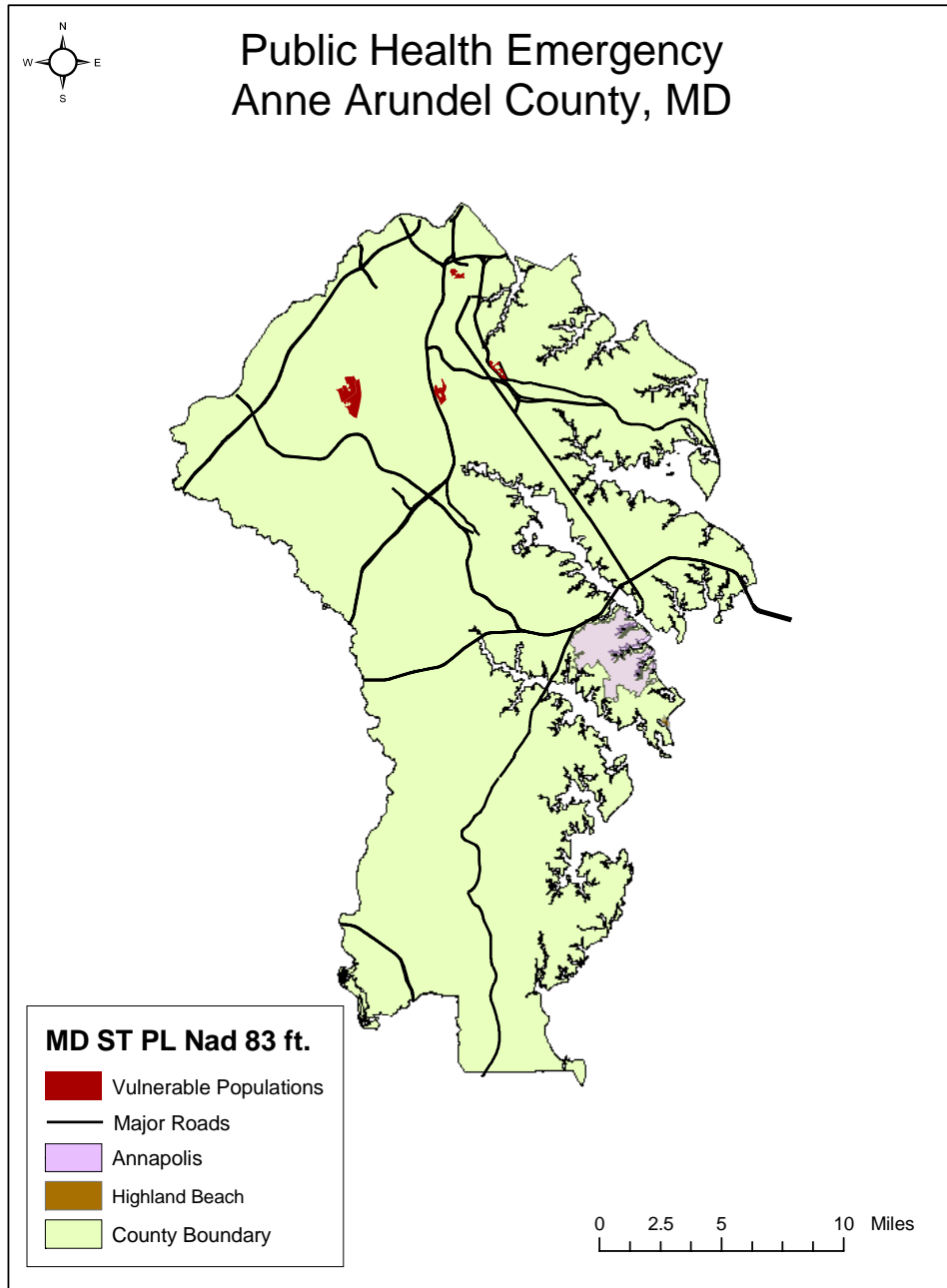
8.4.2 History

Over the past three years, Anne Arundel County has experienced 116 outbreaks according to Anne Arundel County Health Department data (see Appendix C for additional information).

8.4.3 Vulnerability

Public health emergencies do not have particular impacts in any one geographical section of the county. The most vulnerable individuals to this hazard are the very old and the young, as well as those individuals whose socio-economic status prevents them from having access to adequate health care. Figure 8-2 presents the Census Blocks in the County where the highest concentrations of vulnerable populations reside. These areas contain 2,985 people who will potentially be affected by this hazard. The economic impacts of this hazard cannot be evaluated geographically. Critical County infrastructure is unlikely to be affected by this hazard.

Figure 8-2. Public Health Emergency



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All-Hazard Mitigation Plan

8.4.4 Impacts/Risk

The major effects of an epidemic include disruption of social, economic, and family and school routines, and the personal health of the patients. In an uncontrolled epidemic, lack of adequate control measures could result in many deaths and disabilities. In some scenarios, the fatalities might number in the thousands, and recovery from the disaster could be prolonged extensively.

The large percentage of the world's population that is clustered in cities makes them ideal breeding grounds for epidemics. Health officials believe there is a high probability we will see a dangerous, rapid outbreak of some type of infectious disease. Modern transportation methods such as air travel and the automobile make it possible for such a disease to spread at a very rapid rate. The effect of a pandemic on the County would likely be relatively prolonged—weeks to months. The impact of the next pandemic could have a devastating effect on the health and well being of County residents.

8.4.5 Public Health Emergency Mitigation Actions

8.4.5.1 Mitigation Action PH-1:

Establish an internal emergency operations plan for the County Department of Health. The plan will be revised least annually, and will include the following tabs:

- Bioterrorism Agents (CDC Categories A, B, and C)
- Isolation and Quarantine plan
- Incident Command System for DOH
- Strategic National Stockpile plan (SNS) Mass clinic dispensing for 0-500,000 persons
- Business Continuity plan
- Communications plan
- Special Needs Populations
- Sheltering in Place
- Evacuation and Emergency Shut-Down of County Health Centers
- Suspicious Mail Handling
- BT and Emergency Preparedness Acronyms
- Emergency Phone Bank Protocol
- MOUs for Emergencies

Estimated Cost: To be determined.

Benefits: Creating an emergency operations plan for the Health Department allows the County to systematically plan for public health emergencies. The planning process forces County personnel to consider potential threats; it also creates written protocols to specify the appropriate responding organizations. It also stipulates the type of response required for each threat. The planning process ensures that County residents are less vulnerable to public health emergencies.

Responsible Department: Department of Health

Implementation Schedule: This activity to be completed in 2004.

Related Objectives: Objective 1.4

Priority: High

Potential Funding Sources: Grants

8.4.5.2 Mitigation Action PH-2:

Create the County Strategic National Stockpile (SNS) plan for mass dispensing of prophylaxis for all county residents in the event of a bioterrorism attack.

Estimated Cost: To be determined.

Benefits: The public health benefit resulting from mass dispensation of prophylaxis is likely to vary by disease. If a disease has a relatively wide distribution of potential onsets, early recognition provides greater opportunity to administer prophylaxis to exposed persons. A potential benefit would remain for alerting healthcare providers and informing their care of others with similar symptoms. Rapid response may prevent people from becoming ill or reduce severity the severity of those who have become ill.

Responsible Department: Health Department

Implementation Schedule: Activity to be completed 2004.

Related Objectives: Objective 4.3 & 5.2

Priority: High

Potential Funding Sources: Grants.

8.4.5.3 Mitigation Action PH-3:

Conduct a forensic epidemiological meeting where first responders such as law enforcement and public health officials can discuss their role in investigating a bioterror event.

Estimated Costs: Minimal staff time required.

Benefit: By convening this group, the County has the opportunity to exchange ideas, refine the knowledge of the involved parties, and examine the priorities of various agencies with respect to bioterrorism. The group ensures a unified, effective County response that is more effective and less costly in dollars expended and lives claimed.

Responsible Department: Health Department

Implementation Schedule: This activity to be completed in 2004.

Related Objectives: Objective

Priority: High

Potential Funding Sources: Grant, general revenue

8.5 Hurricane, Tropical Storm, or Nor'easter Mitigation Actions

8.5.1 Description of Hazard

Hurricanes, tropical storms, and typhoons are collectively known as tropical cyclones. A hurricane is a severe tropical storm that forms in the southern Atlantic Ocean, Caribbean Sea, Gulf of Mexico, or in the eastern Pacific Ocean. Hurricanes need warm tropical oceans, moisture, and light winds above them. If the right conditions last long enough, a hurricane can produce violent winds, extremely large waves, torrential rains, and floods.

Hurricanes rotate in a counterclockwise direction around an "eye" and have winds of at least 74 miles per hour. There are on average six Atlantic hurricanes each year that may strike the United States coastline from Texas to Maine.

When hurricanes move onto land, heavy rain, strong winds, and heavy waves can damage buildings, trees, and cars. The heavy waves are called a storm surge.

For a more detailed breakdown of hurricane intensity classifications see Table 8-4, which references the Saffir-Simpson Hurricane Scale.

Table 8-4. Saffir- Simpson Hurricane Scale

Category	Wind Speed (mph)	Storm Surge (ft)	Potential Damage
1	74 - 95	4 - 5	Minimal
2	96 - 110	6 - 8	Moderate
3	111 - 130	9 - 12	Extensive
4	131 - 155	13-18	Extreme
5	> 155	> 18	Catastrophic
Source: NOAA National Hurricane Center			

Tropical cyclones have sustained surface wind speed that ranges from 39 to < 74 mph. These storms can either be wind events or water events. As a result, tropical cyclones can cause extensive wind damage, storm surge damage, flooding damage, and erosion.

The vulnerability to wind and storm surge is discussed in this portion of the plan, while the vulnerability to flooding is discussed in the flooding portions of the plan.

Nor'easters have effects on the County that are similar to those of a Tropical Cyclone event. However, nor'easters are extra-tropical storms that derive their strength from horizontal gradients in temperature. These storms form as a result of a drastic drop in temperature as cold, arctic air flows south where it collides with warmer air moving northward. This tends to cause the storm to begin to revolve. Winds around the storm center carry warm, moist air from over the Gulf Stream, up and over the colder inland air. The air rises, cools, and snow begins to fall.

Winds around the nor'easter's center can become intense with wind gusts that exceed hurricane force in intensity. The wind builds large waves that batter the coastline and sometimes pile water inland causing major coastal flooding and severe beach erosion. Unlike a hurricane, which usually comes and goes within one tide cycle, the nor'easter can linger through several tides, each one piling more and more water on shore and into the bays and dragging more and more

sand away from the beaches.

Nor'easters can also create extreme winter conditions. Extreme winter weather information will be discussed in the winter storm section of this plan.

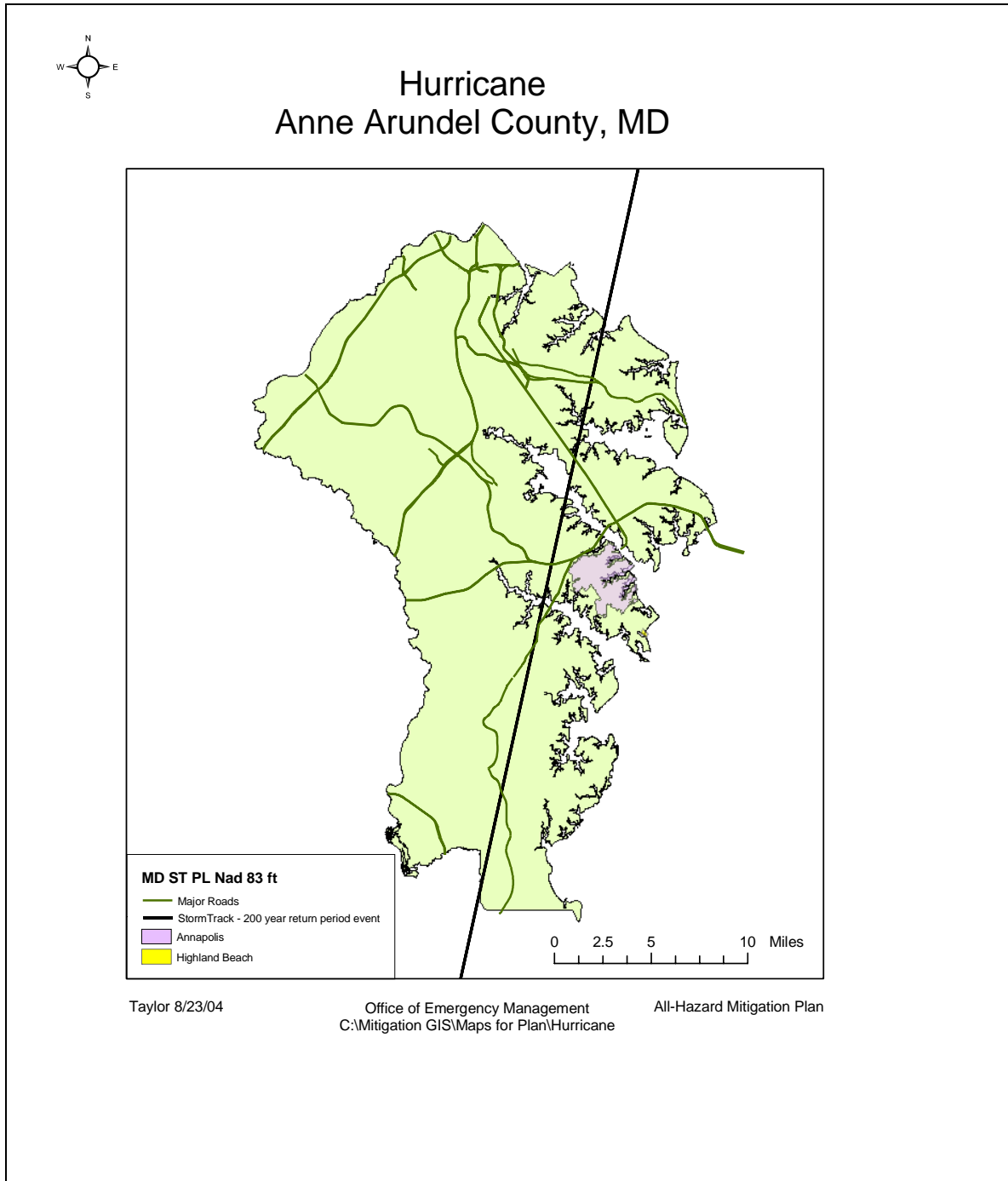
8.5.2 History

Over the past 104 years, Anne Arundel County has had twelve hurricanes, tropical storms, or nor'easters strike, according to National Weather Service data (see Appendix C for additional information).

8.5.3 Vulnerability

Hurricanes, tropical storms, and nor'easters do not have particular impacts in any one geographical section of the county. However, a 200-year storm, as illustrated in Figure 8-3, could have devastating effects on the County. A storm of this magnitude would potentially create a loss of \$472,000,000 to buildings and their contents. Such a storm could potentially put the entire population (489,656) of the County at risk. All 47 critical infrastructure buildings have the potential to be impacted by this hazard.

Figure 8-3. Hurricane



8.5.4 Impacts/Risk

These types of storms can have a tremendous impact on the County, with a high potential for loss of life and property and the capacity to greatly impact the

economy. The intensity of the tropical storm or nor'easter greatly affects the impacts to the County. Typical impacts are presented in Table 8-5 below.

Table 8-5. Hurricane Damage by Category

Category	Level	Description
1	Minimal	Damage primarily to shrubbery, trees, foliage, and unanchored homes. No real damage to other structures. Some damage to poorly constructed signs. Low-lying coastal roads inundated, minor pier damage, some small craft torn from moorings.
2	Moderate	Considerable damage to shrubbery and tree foliage; some trees blown down. Major damage to exposed mobile homes. Extensive damage to poorly constructed signs. Some damage to roofing materials of buildings; some window and door damage. No major damage to buildings. Coast roads and low-lying escape routes inland cut by rising water 2 to 4 hours before arrival of hurricane center. Considerable damage to piers. Marinas flooded. Small craft in unprotected anchorages torn from moorings. Evacuation of some shoreline residences and low-lying areas required.
3	Extensive	Foliage torn from trees; large trees blown down. Practically all poorly constructed signs blown down. Some damage to roofing materials of buildings; some wind and door damage. Some structural damage to small buildings. Mobile homes destroyed. Serious flooding at coast and many smaller structures near coast destroyed; larger structures near coast damaged by battering waves and floating debris. Low-lying escape routes inland cut by rising water 3 to 5 hours before hurricane center arrives. Flat terrain 5 feet or less above sea level flooded inland 8 miles or more. Evacuation of low-lying residences within several blocks of shoreline possibly required.
4	Extreme	Shrubs and trees blown down; all signs down. Extensive damage to roofing materials, windows and doors. Complete failures of roofs on many small residences. Complete destruction of mobile homes. Flat terrain 10 feet or less above sea level flooded inland as far as 6 miles. Major damage to lower floors of structures near shore due to flooding and battering by waves and floating debris. Low-lying escape routes inland cut by rising water 3 to 5 hours before hurricane center arrives. Major erosion of beaches. Massive evacuation of all residences within 500 yards of shore possibly required, and of single-story residences within 2 miles of shore
5	Catastrophic	Shrubs and trees blown down; considerable damage to roofs of buildings; all signs down. Very severe and extensive damage to windows and doors. Complete failure of roofs on many residences and industrial buildings. Extensive shattering of glass in windows and doors. Some complete building failures. Small buildings overturned or blown away. Complete destruction of mobile homes. Major damage to lower floors of all structures less than 15 feet above sea level within 500 yards of shore. Low-lying escape routes inland cut by rising water 3 to 5 hours before hurricane center arrives. Massive evacuation of residential areas on low ground within 5 to 10 miles of shore possibly required.
Source: National Weather Service Tropical Prediction Center, National Hurricane Center http://www.nhc.noaa.gov/aboutsshs.shtml		

8.5.5 Hurricane, Tropical Storm, or Nor'easter Mitigation Actions

8.5.5.1 Mitigation Action HU-1:

Hurricanes, tropical storms, and nor'easters cannot be prevented, but the impact of these storms can be reduced. Key to reducing the adverse impacts of these storms is preparation at both the individual and community levels.

This action will help make sure that residents understand the terminology used in hurricane alerts and are knowledgeable about measures they can take to minimize potentially life-threatening conditions. Prior to hurricane storm season, residents should be informed about:

- Proper ways to secure their homes in preparation for a hurricane. Such measures may include boarding of windows, sandbagging, and
- Restraining objects that could become floating debris
- Planning a safe evacuation route should the need arise
- Creating a family plan
- Ensuring that a kit is prepared that includes:
 - Flashlight and extra batteries
 - Portable battery-operated radio and extra batteries
 - First-aid kit
 - Emergency food and water
 - Non-electric can opener
 - Essential medicines
 - Cash and credit cards
 - Sturdy shoes and a change of clothing
 - Copies of important papers, including bank accounts, insurance and household inventory records

Estimated Cost: Costs will be covered as part of the County education and outreach initiative (see MH-8).

Benefit: Ensuring the residents are knowledgeable about ways to prepare for a hurricane will prevent secondary damage from floating debris, flying glass, and other secondary dangers. These types of measures will minimize the risk to property and eliminate potential health hazards.

Responsible Organization: Office of Emergency Management

Implementation Schedule: To begin in 2005

Related Objectives: Objectives 1.1, 2.1, & 2.2

Priority: High

Potential funding sources: General revenues, grants

8.5.5.2 Mitigation Action HU-2:

Educate residents and promote the use of tie down mechanisms for home heating oil tanks.

Estimated cost: \$100 per kit.

Benefits: The installation of a tank tie down kit will prevent home heating oil tanks from being displaced during a disaster. During Tropical Storm Isabel, hundreds of tanks in Anne Arundel County were dislodged and overturned. This caused many gallons of heating oil to spill onto the ground and into the water. By installing tie down kits, residents can eliminate a potential source of floating debris and soil and water contamination.

Responsible Organization: Office of Emergency Management, MDE

Implementation Schedule: Beginning in 2005

Related Objectives: Objectives 1.1, 2.2, 7.2

Priority: High

Potential funding source: General revenues, grants

8.5.5.3 Mitigation Action HU-3

Continue acquisition of repetitively flooded structures in the floodplain.

Activities include:

- Develop an action plan by 2005 to identify funding alternatives and to identify and prioritize structures for acquisition and removal.
- Leverage State and Federal funding sources to maximize the number of voluntary buyouts that can be accomplished.

Estimated Cost: \$250,000 per residential structure

Benefits: Buildings that suffer repetitive flood losses are typically low in elevation and near the shoreline or other flooding source. Structural alternatives to prevent flood water from damaging the building are often physically unfeasible, usually more expensive, and almost always more environmentally damaging than alternatives to acquire the property at risk and remove it from the flooded area. Acquisition of repetitively flooded structures in the floodplain has added environmental benefits of reclaiming green space along the shoreline and avoiding the expense of construction and maintenance of structural flood controls. This action will help improve buyout planning, maximize outside sources of funding, and thus increase the number of voluntary buyouts that can be accomplished and increase the number of acres of floodplain converted to green space.

These mitigation actions will also help end the cycle of continuing disaster damage. It will reduce repetitive flood losses, including those to the National Flood Insurance Program. By removing these homes from the floodplain, it will return the land to its natural state, thereby protecting the natural and beneficial functions of the floodplain.

Responsible Organization: Office of Emergency Management, Central Services Real Estate Office

Implementation Schedule: Activity to commence in 2005

Related Objectives: Objectives 1.2, 5.2, 7.1, & 7.2

Priority: Low

Potential funding sources: General revenue, grants

8.5.5.4 Mitigation Action HU-4:

Continue elevation of repetitively flooded structures in the floodplain.

Activities include:

- Develop an action plan by 2005 to identify funding alternatives and to identify and prioritize structures for elevation.
- Leverage State and Federal funding sources to maximize the number of structures that can be elevated.

Estimated Cost: \$50,000 per residential structure

Benefits: Buildings that suffer repetitive flood losses are typically low in elevation and near the shoreline or other flooding source. These mitigation actions will help end the cycle of continuing disaster damage. It will reduce repetitive flood losses, including those to the National Flood Insurance Program.

Responsible Organization: Office of Emergency Management, Inspections and Permits

Implementation Schedule: Action to commence in 2005

Related Objectives: Objectives 1.2, 5.2, 5.3, 7.1, & 7.2

Priority: Low

Potential funding sources: Grants, general revenue

8.5.5.5 Mitigation Action HU-5:

Partner with local boating organizations to disseminate targeted messages about preparing and securing boats prior to the arrival of a hurricane.

Estimated Cost: To be determined.

Benefits: During Tropical Storm Isabel, many watercraft were displaced from their slips and moorings. This created a large, floating debris hazard as well as a source of potential soil and water contamination. By working with local boating organizations, the County can ensure that boat owners are prepared for the effects of this type of storm. Preparation in this manner will ensure that a source of potential contamination or injury is eliminated.

Responsible Organization: Office of Emergency Management

Implementation Schedule: To begin in 2005.

Related Objectives: 1.2, 2.1, & 2.2

Priority: Low

Potential Funding Sources: General revenue, grants

8.6 Terrorism or Sabotage Mitigation Actions

This section has been removed for security purposes.

8.7 Weapons of Mass Destruction Attack Mitigation Actions

This section has been removed for security purposes.

8.8 Air Pollution Mitigation Actions

8.8.1 Description of Hazard

Air pollution episodes in the County are characterized by elevated levels of ozone and have historically occurred during the summer months of May through September. It is unlikely that episodic conditions characterized by elevated levels of other pollutants for which there are episode criteria (e.g.: sulfur dioxide, nitrogen dioxide, carbon monoxide and particulate matter) will occur. The probability is high that an Air Quality Index (AQI) of Red (Unhealthy) or Purple (Very Unhealthy) might be forecast which would lead to an Air Quality Action Day being issued by the Maryland Department of the Environment (MDE).

The AQI is an index for reporting daily air quality. It is a measure of how clean or polluted the air is. The AQI focuses on the health effects that residents may experience within a few hours or days after breathing polluted air. The Federal Environmental Protection Agency calculates the AQI for five major air pollutants regulated by the Clean Air Act: ground-level ozone, particle pollution (also known as particulate matter), carbon monoxide, sulfur dioxide, and nitrogen dioxide. For each of these pollutants, EPA has established national air quality standards to protect public health.

The AQI runs from 0 to 500. The higher the AQI value, the greater the level of air pollution and the greater the health concern to the residents. An AQI value of 100 generally corresponds to the national air quality standard for the pollutant, which is the level EPA has set to protect public health. AQI values below 100 are generally thought of as satisfactory. When AQI values are above 100, air quality is considered to be unhealthy—at first for certain sensitive groups of people, then for everyone as AQI values get higher (See Table 8-6).

Table 8-6. AQI Values

Air Quality Index Levels of Health Concern	Numerical Value	Meaning
Good	0-50	Air quality is considered satisfactory, and air pollution poses little or no risk.
Moderate	51-100	Air quality is acceptable; however, for some pollutants there may be a moderate health concern for a very small number of people who are unusually sensitive to air pollution.
Unhealthy for Sensitive Groups	101-150	Members of sensitive groups may experience health effects. The general public is not likely to be affected.
Unhealthy	151-200	Everyone may begin to experience health effects; members of sensitive groups may experience more serious health effects.
Very Unhealthy	201-300	Health alert: everyone may experience more serious health effects.
Hazardous	> 300	Health warnings of emergency conditions. The entire population is more likely to be affected.

Short-term exposure to air pollutants above certain levels may cause temporary health concerns such as eye irritation, throat irritation, and difficulty breathing. Exposure to air pollution may also trigger attacks of pre-existing lung conditions such as asthma. Long-term exposure to air pollution can cause or aggravate chronic health concerns, such as cancer and damage to the body's immune, neurological, reproductive and respiratory systems.

8.8.2 History

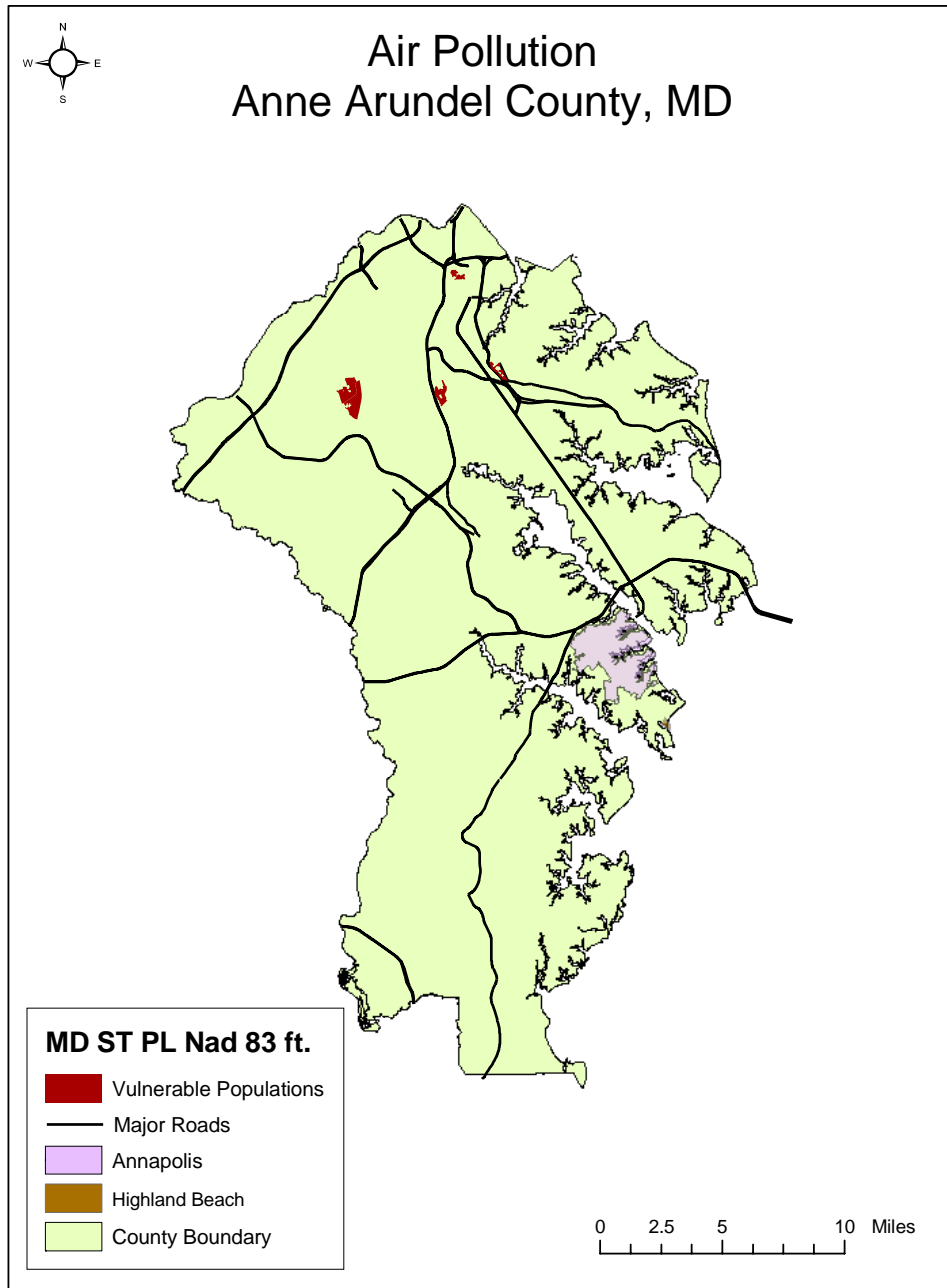
Over the past six years, there have been 30 instances when the ozone level in Anne Arundel County was either unhealthy or very unhealthy according to data from the Environmental Protection Agency (see Appendix C for additional information).

8.8.3 Vulnerability

Air pollution does not have particular impacts in any one geographical section of the county. The most vulnerable individuals to this hazard are the very old and the young. Figure 8-4 presents the Census Blocks in the County where the

highest concentrations of vulnerable populations reside. These areas contain 2,985 people who will potentially be affected by this hazard. The economic impacts of this hazard cannot be evaluated geographically. Critical County infrastructure is unlikely to be affected by this hazard.

Figure 8-4. Air Pollution



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Office of Emergency Management
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All-Hazard Mitigation Plan

8.8.4 Impacts/Risk

Air pollution occurs with some warning, but the persistent nature of the hazard can cause sickness or discomfort to residents. Environmental incidents involving air and water pollution would likely impact a more localized area; however, long-term effects on the environment in the impacted area could linger for many years.

8.8.5 Air Pollution Mitigation Actions

8.8.5.1 Mitigation Action AP-1:

Design and implement a comprehensive community awareness and educational campaign on the dangers of air pollution, targeted at areas of highest risk.

Potential Costs: Costs will be covered as part of the County education and outreach initiative (see MH-8).

Benefits: Many residents in the County may be unaware of the risk from air pollution and its severity; they do not understand how to mitigate the risk to themselves; or what they can do to reduce air pollution. A concerted educational campaign will focus on the nature of the risk, how to reduce the risk, and what to do during days of poor air quality. Components of the educational program will include actions such as:

- Reduce or eliminate open burning
- Plant deciduous trees in locations around the home to provide shade in the summer, but to allow light in the winter
- Turn thermostat down in the winter and up in the summer (this conserves energy and reduces production emissions)
- Provide outreach to encourage reduced driving, encourage transit use, and increase the use of clean alternatively-fueled vehicles

By reducing air pollution generation, County residents can reduce the likelihood of illness, particularly to at-risk populations.

Responsible Organization: Office of Emergency Management & Health Department

Implementation Schedule: Implementation is planned for 2005.

Related Objectives: Objectives 2.2

Priority: High

Potential Funding Sources: Grants, general revenue

8.9 Building, Dwelling, or Vessel Fires Mitigation Actions

8.9.1 Description of Hazard

Fire is the naturally occurring companion of energy released in the form of heat and light when oxygen combines with a combustible, or burnable, material at a suitably high temperature (about 617 degrees F, 325 degrees C for wood to burn).



Fuel, heat and oxygen are all needed in the right combination to produce fire. Combined, they're called the "fire triangle." Take away one of the sides, and the triangle collapses. The same is true of fire. Take away any of the three components of fire – fuel, heat or oxygen – the fire collapses, meaning that it can't burn.

Major urban and structural fire events are highly likely. Structural fires are a major problem that can affect any portion of the county. The County's fire departments are staffed by a mix of volunteers and career firefighters dedicated to the task of fire prevention and suppression. Whether paid or volunteer, these departments are often limited by lack of resources and financial assistance. The impact of a fire to a single-story building in a small community may be as great as that of a larger fire to a multi-story building in a larger city.

Fires impact many aspects of society in terms of economic, social, and other indirect costs. One of the most costly types of fire is one that is intentionally started by an arsonist. Fires caused by arson impact residents through higher insurance premiums, lost jobs, loss of lives, injuries, and property loss.

8.9.2 History

Over the past three years, there have been 3,827 fires involving buildings, dwellings, and vehicles in Anne Arundel County, according to data from the Anne Arundel County Fire Department (see Appendix C for additional information).

8.9.3 Vulnerability

Building, dwelling, or vessel fires do not have particular impacts in any one geographical section of the county. The locations in the County where a fire