

**STATE OF MARYLAND**



# **2016 HAZARD MITIGATION PLAN**

**AUGUST 2016**

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STATE OF MARYLAND  
OFFICE OF THE GOVERNOR

LARRY HOGAN  
GOVERNOR

August 9, 2016

Mary Ann Tierney  
Regional Administrator  
FEMA Region III  
One Independence Mall, 6th Floor  
615 Chestnut Street  
Philadelphia, PA 19106-4404

Dear Ms. Tierney:

In accordance with the authority vested in me by the *Annotated Code of Maryland*, Public Safety, Article 14 Sections 106(b)(2) and (b)(4), I hereby approve and declare adopted the *State of Maryland 2016 Hazard Mitigation Plan*. This plan update shall be effective as of August 26, 2016.

The *State of Maryland 2016 Hazard Mitigation Plan* has been developed in conformity with Section 322 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act and 44 CFR, Part §201 Mitigation Planning.

The efforts of many State and local departments and agencies were coordinated for the development and update of this plan. In the interest of all citizens and businesses in Maryland, let this *State of Maryland 2016 Hazard Mitigation Plan* continue to serve as an impetus for improved mitigation and recovery from disasters in the State of Maryland.

Sincerely,

A handwritten signature in black ink, appearing to read "Larry Hogan".

Larry Hogan  
Governor

cc: Russell Strickland, Director, Maryland Emergency Management Agency





# MARYLAND EMERGENCY MANAGEMENT AGENCY



LARRY HOGAN  
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EXECUTIVE DIRECTOR

August 11, 2016

Ms. Mary Ann Tierney  
Regional Administrator  
FEMA Region III  
One Independence Mall, Sixth Floor  
615 Chestnut Street  
Philadelphia, PA 19106-4404

Dear Ms. Tierney,

It is the Maryland Emergency Management Agency pleasure to formally submit for final FEMA approval the *State of Maryland 2016 Hazard Mitigation Plan* for final FEMA approval. On August 9, 2016 Governor Martin O'Malley signed the resolution and adopted the Plan. The Plan is complete and meets all the requirements outlined in 44 CFR part §201.4.

Enclosed is a copy of the 2016 Hazard Mitigation Plan and Appendices. Please note that some of the Appendices are digital only as they are large databases. Thank you for your consistent support of Maryland's Hazard Mitigation program. Should you have any questions regarding this submission, please do not hesitate to contact the State Hazard Mitigation Officer, Mark James (410)-802-9990.

Sincerely,

Russell Strickland  
Executive Director

Cc. Nancy Carpenter, FEMA  
Mari Radford, FEMA





## FOREWORD

The *2016 State of Maryland Hazard Mitigation Plan* was developed in collaboration with mitigation and resiliency stakeholders. The Maryland Resiliency Partnership Group and the Mitigation Advisory Council assisted in the development and review of the *2016 State of Maryland Hazard Mitigation Plan*. These two groups both shaped and informed the plan thereby resulting in a complete 2016 Plan rewrite rather than an update. The plan rewrite culminated into a streamlined document that focuses on new data, mapping, analysis, and opportunities.

Overarching themes of the *2016 State of Maryland Hazard Mitigation Plan* include:

- Integration with other planning initiatives at the Local, State and Federal government levels;
- Creation of a common data platform and Maryland centric guidance and technical assistance;
- Verification of critical facilities and state assets data;
- Generation of depth grids and preliminary data for Enhanced Hazus Coastal model;
- Emphasis on natural hazards that are most likely to impact Maryland now and in the future, providing an opportunity for a focused risk analysis and prioritization of mitigation strategies and resiliency efforts; and,
- Intense effort between all stakeholders to maximize opportunities for collaboration and excitement over future hazard mitigation opportunities to ensure the safety of Maryland's citizens, protection of property, environmental sustainability, community resiliency, and the preservation of Maryland's cultural and historic resources for future generations.

### Organization of the Plan

Each Plan section contains the associated element and requirement within a table format from the FEMA publication, *State Mitigation Review Guide released March 2015*. The *Guide* is intended to facilitate consistent evaluation and approval of state mitigation plans, as well as to facilitate state compliance with the mitigation planning requirements when updating plans. Noting the elements and requirements for each Plan section provides readers an opportunity to review these requirements in association with Maryland's commitment to meet all of the requirements through the presentation of data analysis, maps and figures, activities, capabilities, and ideas for the future, which are presented throughout the document. Plan sections are presented in the following order:

- Section I: Plan Development Process;
- Section II: Hazard Identification & Risk Assessment;
- Section III: Vulnerability Assessment;
- Section IV: Maryland Land Development & Population;
- Section V: 2016 Mitigation Strategies;
- Section VI: 2011-2015 Mitigation Implementation Status Report;
- Section VII: Management & Local Hazard Mitigation Plans; and,
- Section VIII: Repetitive Loss Strategy.



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## SECTION I: PLAN DEVELOPMENT PROCESS

### STATE MITIGATION PLAN REVIEW GUIDE

Released March 2015 FP 302-094-2

This *State Mitigation Plan Review Guide* is FEMA’s official policy on and interpretation of the natural hazard mitigation planning requirements. The intended use of the *Guide* is to facilitate consistent evaluation and approval of state mitigation plans, as well as to facilitate state compliance with the mitigation planning requirements when updating plans.

Figure 1.1—State Mitigation Review Guide S1 & S2

Element	Requirement
<p>S1. Does the plan describe the process used to update develop the plan? [44 CFR §201.4(b) and (c) (1)]</p> <p><i>Intent:</i> To demonstrate a deliberate approach to plan development.</p>	<p>The plan must describe the current process used to update the plan, including how the plan was prepared, the schedule or timeframe, specific milestones and activities, the agencies and stakeholders who were involved in the process, and if the mitigation planning process was integrated to the extent the possible in other state planning efforts.</p>
<p>S2. Does the plan describe how the state coordinated with other agencies and stakeholders? [44 CFR §201.4(b) and (c) (1)]</p> <p><i>Intent:</i> To actively involve stakeholders with the data an expertise to develop the plan, but also with the responsibility or authority to implement mitigation actions and reduce risk state-wide.</p>	<p>The plan must describe how other state and Federal agencies and other stakeholders were involved in the process. At a minimum, the plan must describe how the state coordinated with other agencies with other agencies and stakeholders responsible for the following sectors:</p> <ul style="list-style-type: none"> <li>a. Emergency management;</li> <li>b. Economic development;</li> <li>c. Land use and development;</li> <li>d. Housing;</li> <li>e. Health and social services;</li> <li>f. Infrastructure; and</li> <li>g. Natural and cultural resources.</li> </ul>

### 1. Planning Process & Plan Development Outreach Initiatives

The current planning process used to update the Maryland State Hazard Mitigation Plan entailed the development of individual scopes of work to complete plan elements. These scopes of work included tasks with associated timeframe and milestones. Using a plan development process focused on individual plan elements ensured that the greatest opportunities for collaboration was made available to federal, state, local and non-governmental partners. Rather than approaching all partners with an entire plan, using individual plan elements allowed for focused initiatives that were of particular interest to those involved.

Outreach and coordination initiatives occurred continuously throughout the plan development process. These initiatives ranged from the development and dissemination of Maryland Local Hazard Mitigation Plan Guidance, to the strengthening and expansion of State partnerships resulting in collaborative and meaningful mitigations strategies.

**FEMA supports hazard mitigation planning as a means to:**

- Fosters partnerships for natural hazard mitigation;
- Promote more resilient and sustainable states and communities; and
- Reduce the costs associated with disaster response and recovery.

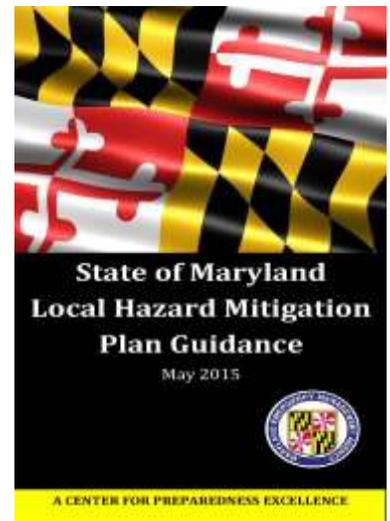
## 2. Maryland Local Hazard Mitigation Plan Guidance

The Maryland Emergency Management Agency (MEMA) developed local hazard mitigation plan guidance in May of 2015 to advise local jurisdictions of available resources, coordination activities, and minimum elements that should be included within their next local hazard mitigation plan updates. Maryland specific recommendations were presented as well as the introductions of ideas for plan integration, resiliency and climate change. Minimum elements and recommendations included:

- Top Five Hazards that Impact Maryland and should be included in all local hazard mitigation plans-Flood, Coastal Hazards, Tornado, High Wind, and Severe Winter Weather;
- Essential Facilities definition and facility types that should be included in all local hazard mitigation plans-Police Stations, Fire/Rescue Stations, Emergency Operations Centers, Hospitals and Medical Clinics, and Schools (Maryland Essential Facility Database);
- Floodplain Management-recommendations and available resources;
- Resiliency-Community Preparedness and Resiliency;
- Cultural Resources; and
- Plan Integration- Safe Growth Audit questionnaire.

In addition, Enhanced Hazus data created during the State’s plan development process was distributed to local jurisdictions, as available. Distribution of Enhanced Hazus data to local jurisdictions will continue over the next several years. Previous Hazus data developed for the State included default data within the Hazus program itself, however, the new Hazus data utilized user defined data, resulting in Enhanced Hazus analysis data and results. Local jurisdictions will incorporate Enhanced Hazus data provided by the State into their Local Hazard Mitigation Plan updates. Information sharing and distribution will result in refined risk and vulnerability assessments within local plans, thereby resulting in more robust and specific local mitigation strategies.

*Figure 1.2–Maryland Local Hazard Mitigation Plan Guidance*



*Source: Smith Planning and Design*

### 3. Maryland Emergency Management Association Conference

During the May 2015 Maryland Emergency Management Association Conference a Mitigation Workshop was offered to all conference attendees. This three hour Mitigation Workshop was held to inform participants of the new *Maryland Local Hazard Mitigation Plan Guidance* published in May 2015. In addition, preliminary results of the Statewide Critical Facility Database were presented. Each jurisdiction was provided with their individual results and any missing data was highlighted and requested. Finally, information on new mapping products and data, as well as, a plan integration session was presented.

*Figure 1.3–2015 MEMA Conference, Ocean City, MD*



*Source: Smith Planning and Design, 2015 MEMA Conference, Ocean City, MD*

### 4. Maryland Association of Floodplain & Stormwater Managers

During the 11<sup>th</sup> Annual Maryland Association of Floodplain & Stormwater Conference held in October of 2015, State hazard mitigation partners participated in an interagency panel discussion. Panel participants included agency representatives from Maryland Emergency Management Agency (MEMA), Maryland Department of Environment (MDE), Department of Natural Resources (DNR), Maryland Historical Trust (MHT) and State Highway Administration (SHA). Panel participants responded to various questions and topics displaying their collaborative and comprehensive approach to seemingly different, yet interrelated topics. Panel discussion topics included:

- Resiliency;
- New Maryland State Hazard Mitigation Plan;
- Mapping Products;
- Floodplain Management;
- Coastal Risk Map Products; and
- Enhanced Hazus.

### 5. MEMA GIS Workshop

The Maryland Emergency Management Agency hosted a GIS (Geographic Information System) Workshop on June 2, 2016. Attendees included both emergency management and GIS personnel from local jurisdictions across the State. The purpose of the workshop was to share and discuss State-wide hazard mitigation planning efforts and state and local standards for Hazus. Agenda topics included:

- Local Jurisdiction Updates;
- 2016 State of Maryland Hazard Mitigation Plan-Critical Facility Master Database Update;
- Benefits of Enhanced Hazus & Local Uses; and
- New updates to Maryland Website- mdfloodmaps.

## 6. Regional Outreach Meetings

A series of six (6) regional meetings were held throughout the State. The regional outreach meetings provided participants information on the availability of new data, risk products, and technical assistance opportunities. Regional outreach meeting presenters included personnel from Maryland State Highway Administration, Maryland Historical Trust, Maryland Department of the Environment, Maryland Department of Natural Resources, Maryland Emergency Management Agency, and the Federal Emergency Management Agency.

*Table 1.1 - Regional Outreach Meeting Schedule & Topics*

<b>BEYOND THE MAP: A PATH TOWARDS RESILIENCE, A MULTI-HAZARD APPROACH AGENDA</b>	
Southern Region- January 13, 2016	Central Region- March 11, 2016
Lower Eastern Shore Region- January 21, 2016	National Capital Region- March 14, 2016
Upper Eastern Shore Region- January 19, 2016	Western Region- April 7, 2016
<b>Agenda Items</b>	
<ul style="list-style-type: none"> <li>• FEMA- Risk Map Tools for Local Governments</li> <li>• MDE-MD Floodmaps: Advance in Floodplain Management and the NFIP</li> <li>• DNR- Coastsmart Communities: Resiliency Study Economic and Cultural Impact Study</li> <li>• SHA-Hazard Vulnerability Index</li> <li>• MHT-Historic and Cultural Resource: A New Approach for Hazard Mitigation</li> <li>• MEMA Preliminary Damage Assessment Tablet Tool Workshop</li> <li>• MEMA-Debris Management Planning</li> <li>• MEMA-State Mitigation Objectives &amp; Local Hazard Mitigation Standards</li> <li>• MEMA-Plan Integration-Why it is Important to Know and Understand Your Plans</li> <li>• MEMA-State Risk Assessments Results</li> <li>• MEMA-Regional Perspective-Past &amp; Present: Questionnaire</li> <li>• MEMA-Local Plan Review &amp; Update Opportunities</li> </ul>	

At each of the six (6) Regional Outreach Meetings a Regional Perspective Questionnaire was distributed for participant completion. The questionnaire provided participants with the opportunity to provide feedback to the State and indicate specific information that may be unique to their region and/or jurisdiction.

In an effort to further encourage discussion between local, State, and Federal partners, each of the Local Jurisdiction's most current Hazard Mitigation Plans were reviewed for potential update opportunities. Maryland's approach to defining and creating resilient communities has resulted in various data resources and tools. Sharing and collaboration between all levels of government was the primary intent of the outreach meetings. These documents are illustrated in Figure 1.4-Regional Outreach Handouts.

Figure 1.4–Regional Outreach Handouts

**Regional Outreach  
2011 – 2016 Plan Update** QUESTIONNAIRE

2016 State of Maryland Hazard Mitigation Plan Update

Name: \_\_\_\_\_ Title: \_\_\_\_\_  
Agency/Organization: \_\_\_\_\_ Installation: \_\_\_\_\_

**Section I: Hazard Identification & Risk**

1. How concerned are you about the following hazards affecting your community?  
(Place an 'X' in the corresponding column for each hazard)

Hazard Type	Extremely Concerned	Very Concerned	Concerned	Somewhat Concerned	Not Concerned
1. Flood					
2. Coastal Hazards					
3. Winter Storms					
4. Tornado					
5. Wind					
<b>All of them, the five hazards listed above should be included in local hazard mitigation plans, as per 2015 State of Maryland Local Hazard Mitigation Plan Guidance</b>					
6. Severe Thunderstorms					
7. Wildfire					
8. Drought					
9. Earthquake					
<b>Hazards #1-5, listed above, have been included in the 2016 State of Maryland Risk Assessment and Mapping Products</b>					
Other:					
Other:					
Other:					

Beyond the Map: A Path Towards Resilience, A Multi-Hazard Approach  
Lower Eastern Shore Region-January 21, 2016

**Somerset County**  
In an effort to encourage discussion between local, State, and Federal Partners, the 2012 Somerset County Hazard Mitigation Plan, was timely reviewed for potential update opportunities. Maryland's approach to defining and creating resilient communities has resulted in various data resources and tools. Sharing and collaboration between all levels of government is the primary intent of the Regional Outreach Meetings.

LOCATION	PLAN ELEMENT	UPDATE OPPORTUNITY
Page 38	Wind Hazard Risk Assessed in 2011 Plan	Continue to Identify & Assess Wind Hazard-2016 MD HIRA
Pages 60-64	Vulnerability Assessment-Critical & Public Facilities in Coastal Flood, Riverine Flood & Shoreline Erosion Risk Areas	2016 Essential Facility Database 2016 Somerset County Coastal Flood Risk Report Pending
Pages 66-67	Loss Estimation -Urban, Rural and Riverine Flood	New FEMA DIRM 2015 Riverine HAZUS-Pending
Pages 21-22	Respective Loss Data Flood Insurance Report	Updated RI Data MDE-MD Floodmap FEMA-MDE
Pages 32-39	Shoreline Erosion Sea Level Rise	DRR CoastSmart Committee/ Resilience Study Economic and Cultural Coastal Impact study Climate Tools & Resources-CC's online data viewing platform-The Coastal Atlas
Pages 77-81 Appendix C	Community Capability Capability Matrix	FEMA Plan Integration Guidance
Pages 109-112 Page 121	Flooding Issues-Project F Mitigating Roadway Flooding	SEA Hazard Vulnerability Index
Pages 118-121	Prioritized Mitigation Projects	Review listing for status potential ideas/resources available from State & Local Partners

Note: Pages referenced within the Table are attached.

Source: Smith Plannina and Desian

**a. Southern Region - January 13, 2016**

Attendees included representatives from the following agencies and organizations: Resilience Action Partners, Natural Resources Defense Council, Exelon Corp., County Public Works Departments, County Planning and Zoning Departments, County Historic Preservation, County GIS, MD Department of Information Technology, MD State Highway Administration, FEMA, MEMA, and Maryland Historical Trust.

• **Southern Region - Questionnaire Results**

Participants indicated that Coastal Hazards, Flood, and Severe Thunderstorms were the three (3) hazards of most concern. Additionally, erosion (bayside coastal cliff erosion), nuclear incident, and rising ground water were noted as concerning by meeting participants. Rising water, particularly groundwater is affecting archaeological sites and historically significant structures. Mitigation strategies suggested for inclusion in hazard mitigation plan updates included updated survey and inventory of vulnerable structures including identification of vulnerable historic structures and cultural resources.

**b. Upper Eastern Shore Region - January 19, 2016**

Attendees included representatives from the following agencies and organizations: Town of Oxford, Town of Denton, Town of Centreville, Resilience Action Partners, Emergency Services, MD Department of Health and Mental Hygiene, Queen Anne's County Community Affairs, County Public Works Departments, County Planning and Zoning Departments, County GIS, MD State Highway Administration, FEMA, MEMA, and Maryland Historical Trust.

- **Upper Eastern Shore Region - Questionnaire Results**

Participants indicated that Flood, Coastal Hazards, and Winter Storm were the three hazard of most concern. Mitigation strategies that have worked well were listed as follows: New Floodplain Ordinance that increased freeboard requirement to two feet above base flood elevation and infrastructure improvements.

**c. Lower Eastern Shore Region - January 21, 2016**

Attendees included representatives from the following agencies and organizations: Town of Snow Hill, Town of Princess Anne, Town of Berlin, Town of Cambridge, Pocomoke City, City of Salisbury, Ocean City, City of Crisfield, Chesapeake Utility, Delmarva Power, Atlantic General Hospital, Worcester Sheriff's Office, Somerset Sheriff's Office, Salisbury Police Department, Worcester Risk Management, Worcester Volunteer Services, County Emergency Services, County Public Works Departments, County Health Departments, County Planning and Zoning Departments, Resilience Action Partners, Holly Center, Lower Shore Land Trust, American Red Cross, MD State Highway Administration, FEMA, MEMA, MD Department of Natural Resources, and Maryland Historical Trust.

- **Lower Eastern Shore Region - Questionnaire Results**

Participants indicated that Coastal Hazards, Flood, Wind were the three (3) hazards of most concern. Additionally, many participants noted Winter Storms, Sea Level Rise, and High Hazard Dam Failure as very concerning. Mitigation strategies that have worked well and should be continued were listed as follows: Funding and Maintenance of Tidal Gauges and relocation of people and structures from high hazard areas to non-hazard areas within the locality.

**d. Central Region - March 11, 2016**

Attendees included representatives from the following agencies and organizations: County Public Works Departments, County Planning Departments, County Emergency Services, Anne Arundel Cultural Resources, Maryland Transit Administration, MD Humanities Council, MD Department of Human Resources, MD State Highway Administration, FEMA, MEMA, MD Department of Natural Resources, and Maryland Historical Trust.

- **Central Region - Questionnaire Results**

Participants indicated that Flood, Coastal Hazards, and Winter Storms were the three (3) hazards of most concern. Additionally, participants noted climate change, sea level rise, air pollution, and extreme heat as concerning. Mitigation strategies that have worked well include acquisition of floodprone properties, backflow prevention devices, community education, and improved floodplain regulations.

**e. National Capital Region - March 14, 2016**

Attendees included representatives from the following agencies and organizations: City of Laurel, County Emergency Services, County Public Works Departments, County Planning and Zoning Departments, MD State Highway Administration, Maryland Department of Natural Resources, FEMA, MEMA, and Maryland Historical Trust.

- **National Capital Region - Questionnaire Results**

Participants indicated that Flood, Winter Storms and Wind were the three (3) hazards of most concern. Additionally, participants noted climate change and associated extreme heat as concerning. Mitigation strategies that have worked

well include acquisition of floodprone properties, participation in the Community Rating System, and improved floodplain regulations.

**f. Western Region - April 7, 2016**

Attendees included representatives from the following agencies and organizations: First Energy, County Planning and Zoning, County Emergency Services, City of Cumberland, City of Frostburg, Garrett County Department of Social Services, Maryland Department of the Environment, Frostburg State University and the Maryland Historical Trust.

- **Western Region - Questionnaire Results**

Participants indicated that Flood, Winter Storm and Wind were the three (3) hazards of most concern. Additionally, participants noted that severe thunderstorm, wildfire, and mine related issues as concerning.

## 7. Information Distribution

In an effort to distribute and share state hazard mitigation plan development information easily and across devices, the *MEMA 2016 Hazard Mitigation Plan (HMP) Dropbox* was established. The Dropbox was organized into the six (6) MEMA region folders. Dropbox folder information included:

- 2016 Maryland HMP Risk Assessment Data and Mapping;
- MDE Advances in Floodplain Mapping and Community Rating System;
- FEMA Risk Map and Resiliency in Maryland;
- SHA Adaption and Vulnerability Assessment;
- MHT Architectural Surveys as Hazard Mitigation; and
- DNR CoastSmart Program.

A link to the Dropbox was shared with all regional outreach participants and other interested parties, as requested. All users were able to share the link with other interested parties. The method of information distribution chosen for the 2016 State HMP update process ensured ease and flexibility for all users.

## 8. Local Hazard Mitigation Plan Review

In an effort to encourage discussion between local, State, and Federal Partners, local mitigation plans were briefly reviewed for potential update opportunities prior to each of the six (6) regional outreach meetings. Maryland’s approach to defining and creating resilient communities has resulted in various data resources and tools. Sharing resources and tools was the primary intent of the regional outreach meetings. To that end, each jurisdiction was provided with a review table that included three (3) columns: location, plan element, and update opportunity. The pages referred to in the location column of the review table were printed and attached. Attaching the local plan pages provided meeting participants with information from their current plan that could be updated using the new resources and tools presented during the regional outreach meetings. These plan review tables are distributed and reviewed during local plan kickoff meeting by MEMA mitigation staff.

## 9. Integration with Other State and Federal Planning Efforts

The Maryland Emergency Management Agency (MEMA) coordinated the State Hazard Mitigation Plan update with other state and federal agencies and other stakeholders including, but not limited to, the following:

- CoastSmart Council;
- Maryland Commission on Climate Change;
- Maryland’s “Climate Change and CoastSmart Construction Executive Order”;
- Maryland Silver Jackets;

- Natural Resources Defense Council;
- Maryland Historical Trust-Cultural Resources Hazard Mitigation Planning Program;
- Maryland Department of the Environment;
- IMAP, Maryland’s Mapping & GIS Data Portal;
- FEMA Coast Risk Products and Outreach Team;
- Maryland State Highway Administration Climate Change Program: Hazard Vulnerability Assessment;
- Mitigation Operations Plan; and
- MEMA: Other Mitigation Related Initiatives in Maryland.

**a. CoastSmart Council**

Provides financial and technical support to municipal and county governments to incorporate coastal hazard and climate change resiliency into local planning and policies. Since the initiative first began in 2008, the Maryland Coastal Management Program has awarded over \$500,000 to support projects in over 9 of its 114 coastal communities.

- Often allows a community to address required planning activities while incorporating coastal hazard considerations
- Can help increase the resilience of a community and reduce the long-term exposure to coastal hazard risks

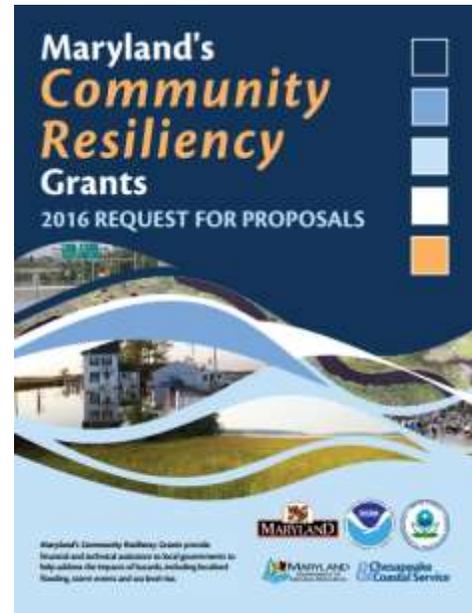
**Potential Eligible Projects:**

- Update flood ordinances, building codes
- Update hazard mitigation, comprehensive & Critical Areas
- Update Capital Improvement Project plans
- Apply to Community Rating System
- Adopt a Sea Level Rise Overlay District

**Funded Projects:**

- Talbot County: Creating Flood Resilience in Talbot County (Started 9/10/10) - Update and adopt new Floodplain regulations and adopted new FEMA Floodplain Maps - Conduct public outreach to pursue adoption of county hazard mitigation plan - Apply to FEMA’s Community Rating System (CRS) Program
- Queen Anne’s County: Queen Anne’s Coastal Resources and Floodplain Management (Started 10/1/12) - Develop and adopt a new Chapter 14:3 Floodplain Ordinance - Identify repetitive loss properties and create mitigation strategies to reduce the exposure of coastal infrastructure in high hazard areas - Establish a community dialogue via public meeting(s).
- Baltimore City: Creating a Ready and Resilient Baltimore City (Started 11/15/12) - Develop and implement an integrated All-Hazards Mitigation Plan, floodplain mapping, and Adaptation Plan program - Complete a Climate Adaption Plan (CAP) to be adopted by the Planning Commission as an official Appendix to the AHMP
- Calvert County: Enhancing Coastal Protection in Calvert County (Started 1/1/13) - Develop and adopt a special area flood management plan for the Cove Point Community - Adopt Zoning Ordinance amendments (developed during a previous

*Figure 1.5–Maryland’s Community Resiliency Grants*



project period) - Adopt the County's Shoreline Development and Protection Plan - Apply FEMA's CRS program.

**b. Maryland Commission on Climate Change**

Maryland's Commission on Climate Change is charged with advising the Governor and General Assembly on ways to mitigate the causes of, prepare for, and adapt to the consequences of climate change and maintaining and strengthening the State's existing Greenhouse Gas Reduction Plan. Commission priorities include building broader partnerships with federal, State and local governments and the private sector to reduce greenhouse gas emissions and prepare for the likely impacts of climate change in Maryland, better communicating with and educating Marylanders about the urgency of the challenge and options to address it, and establishing action plan goals and timetables for implementation.

Maryland has documented a sea level rise of more than one (1) foot in the last century, increasing water temperatures in the Chesapeake Bay, more rain and flooding in the winter and spring and more arid summers. Maryland's people and their property, natural environment and public investments are extremely vulnerable to climate change impacts.

The Commission, originally created by a 2007 Executive Order, was strengthened by a 2014 Executive Order and 2015 legislation with requirements to expand the Commission membership and maintain a comprehensive action plan, with 5-year benchmarks, to achieve science-based reductions in Maryland's greenhouse gas emissions. The Commission is supported by a Steering Committee and four (4) working groups. These working groups represent diverse stakeholder interests and bring broad perspective and expertise to the Commission's work.

**c. Maryland's "Climate Change and CoastSmart Construction Executive Order"**

On Dec. 28, 2012, Governor Martin O'Malley signed the "Climate Change and Coast Smart Construction Executive Order" to increase Maryland's long-term resiliency to flooding and sea level rise. The order directed that all new and reconstructed state structures and other infrastructure improvements in Maryland be planned and constructed to avoid or minimize future flood damage.

"As storms such as Hurricane Sandy have shown, it is vital that we commit our resources and expertise to create a ready and resilient Maryland, by taking the necessary steps to adapt to the rising sea and unpredictable weather," said Governor O'Malley. "In studying and planning for storms and climate change, we can ensure that our land, infrastructure, and most importantly our citizens are safe and prepared."

The Executive Order enacted a number of policy directives, including directing all State agencies to consider the risk of coastal flooding and sea level rise when they design capital budget projects and charging the Department of General Services with updating its architecture and engineering guidelines to require new and rebuilt State structures to be elevated two (2) or more feet above the 100-year base flood level.

Furthermore, the Executive Order charged the Maryland Department of Natural Resources to work with the Maryland Commission on Climate Change, local governments and other parties as appropriate, to develop additional Coast Smart Guidelines.

**d. Maryland Silver Jackets**

The Maryland Silver Jackets Team first convened in 2010. Its outreach activities include educating residents on the difference between storm surge inundation maps that are part of hurricane evacuation studies and flood insurance rate maps developed for the National Flood Insurance Program. In addition, the team is focused on data sharing, and the Maryland Hazard Mitigation Grant program.

- The Maryland Silver Jackets team, working in partnership with the USACE (US Army Corps of Engineers), FEMA, and NOAA (National Oceanic Atmosphere Administration), developed a short paper for local community officials and residents on the key differences and appropriate uses of Storm Surge Inundation Maps (SSIMs) created as part of a Hurricane Evacuation Study (HES) and Flood Insurance Rate Maps (FIRMs) developed for the National Flood Insurance Program.
- The interagency Maryland Silver Jackets team was able to get a first-of-its-kind workshop funded that brought together state, county, and city floodplain managers; emergency managers; planners; and regulatory specialists to talk about storm surge and coastal flood risk for this Mid-Atlantic state. More than 70 attendees from various agencies participated in this two-day Maryland Coastal Flood Workshop, held March 11 - 12, 2015, in the small Eastern Shore town of Chester.
- Maryland developed an outreach brochure for the Cumberland-Ridgeley levee systems in Maryland and West Virginia, respectively, to distribute to homeowners, business owners and other stakeholders to communicate the associated benefits and risks of the project. Partners include the USACE, FEMA, National Weather Service, Maryland Department of the Environment and the City of Cumberland. This Corps of Engineers project consists of about 1.6 miles of channel improvements along Wills Creek; 1.7 miles of channel improvement along the North Branch Potomac River; levees and floodwalls on the left and right banks of the North Branch Potomac River; three (3) pumping stations; eight (8) pressure conduits; an industrial water-supply dam; reconstruction of a railroad bridge; track relocations; and reconstruction of piers and abutments for three highway bridges.

**e. Natural Resources Defense Council**

NRDC (Natural Resources Defense Council) advocates for state and federal policies that account for increased floods risks and impacts on our water resources. NRDC successfully petitioned FEMA to require states to account for the risks of climate change in their State Hazard Mitigation Plans. NRDC has been involved in all aspects of plan development, in particular recommending ways to address climate change and sea level rise in Maryland. NRDC representatives participated in all Mitigation Advisory Committee meetings, regional outreach meetings and were involved in the development of plan strategies and action.

**f. Maryland Historical Trust-Cultural Resources Hazard Mitigation Planning Program**

The Cultural Resources Hazard Mitigation Program is aimed at protecting historic places, archeological sites, and cultural landscapes from the effects of natural hazards, such as flooding, wind and coastal erosion. The impacts of Hurricane Sandy in Maryland and to historic communities along the East Coast highlighted the need to protect the many landmarks, districts and sites that contribute so much to our economy and quality of life.

Through the two-year Program, MHT developed trainings, model guidance and educational materials to assist local governments in creating hazard mitigation plans for their cultural resources. MHT promotes a planning framework based on FEMA's

Integrating Historic Property and Cultural Resources into Hazard Mitigation Planning, which is currently being utilized in Annapolis. MHT also offers one-on-one technical assistance to aid local governments in plan development and mitigation projects involving cultural resources.

The Program provides funding in support of non-capital activities that will assist eligible applicants in preparing for and reducing impacts from natural hazards (e.g. flood, wind, earthquake, coastal erosion) to cultural resources. Cultural resources include, but are not limited to: historic buildings, structures (e.g., lighthouses, roads, and canals), objects (e.g., memorials, statues) or sites; museums, archives and other repositories of artifacts or historic records; archeological sites; traditional cultural properties and cultural landscapes.

**g. Maryland Department of the Environment**

The State of Maryland in conjunction with the Federal Emergency Management Agency (FEMA) has been systematically updating Flood Insurance Rate Maps (FIRMs) for communities over the past several years. This site is designed to guide homeowners/renters as well as communities through the process of determining their current flood risk as well as future flood risk based on the preliminary Digital Flood Insurance Rate Maps (DFIRMs).

The DFIRMs are digitally converted flood insurance rates maps that will be compatible with GIS (Geographic Information Systems). The improvements in spatial accuracy provided by the new base map, and the availability of electronic floodplain information should greatly enhance the ability to use the maps for planning, permitting, and insurance applications.

*Figure 1.6—MDE's Website: Flood Risk Application*



Maryland's Flood Map resources allows users to select their location on the map, the Flood Risk Application aids in determining their current flood risk based on Digital FIRMs (DFIRMs). The application also prompts users to launch a Flood Risk Guide, which helps users determine whether flood insurance is required or recommended for their property. Additionally, information on how to obtain and the benefits of having flood insurance is highlighted.

The Maryland Department of the Environment offers floodplain management technical assistance to local jurisdictions and encourages local participation in the Community Rating System (CRS). There are currently fourteen (14) CRS communities within the State.

**Community Rating System**

The National Flood Insurance Program’s (NFIP) Community Rating System (CRS) is a voluntary incentive program that recognizes and encourages community floodplain management activities that exceed the minimum NFIP requirements.

<https://www.fema.gov/national-flood-insurance-program-community-rating-system>

NFIP #	Community	CRS CLASS
240087	BALTIMORE, CITY OF	5
240042	BEL AIR, TOWN OF	7
240011	CALVERT COUNTY	8
240130	CAROLINE COUNTY	9
240015	CARROLL COUNTY	8
240019	CECIL COUNTY	8
240026	DORCHESTER COUNTY	8
240030	FREDERICK, CITY OF	7
240040	HARFORD COUNTY	7
240043	HAVRE DE GRACE, CITY OF	8
240044	HOWARD COUNTY	7
245207	OCEAN CITY, TOWN OF	7
245208	PRINCE GEORGES COUNTY	5
240066	TALBOT COUNTY	8

Finally, the *Maryland Model Floodplain Management Ordinance* (May, 2014) was prepared by the Maryland Department of the Environment (MDE) in response to the requirement that local jurisdictions adopt regulations that are fully comply with the requirements of the National Flood Insurance Program (NFIP). For most communities, the requirement to update regulations is triggered by revisions to the Flood Insurance Rate Maps (FIRMs) and associated Flood Insurance Study (FIS).

There are two (2) other documents that supplement this Model Ordinance: the Model Resource version and the Model Notes version. The Model Resource version of this Model Ordinance identifies the location where the specific NFIP regulation or Maryland regulation for pertinent provisions can be found, and also notes if a provision has a comparable requirement in the building code or ASCE 24. The Model Resource version also identifies what provisions might qualify for additional points through the Community Rating System (CRS).

In addition, the Model Resource version is cross-referenced to explanatory Model Notes that identify if a provision exceeds the NFIP minimum requirements. The Model Notes also provide explanations for some provisions.

**h. MD iMAP, Maryland’s Mapping & GIS Data Portal**

MD iMAP data portal provides data that supports community planning. Statewide GIS initiatives represent collaboration between federal, state, and local entities for the purpose of improved data consistency and access. Many of these initiatives have collected similar, but disparate sets of information to produce standardized and seamless datasets. These datasets are leveraged for numerous useful applications that ultimately benefit the citizens of Maryland.

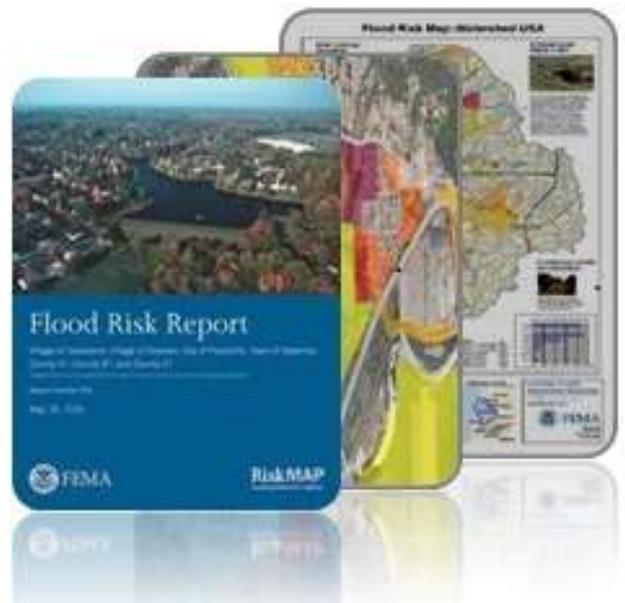
- MD IMMAP 2.0-MD iMAP is Maryland's Enterprise GIS. This platform includes a robust and reliable core infrastructure, access to GIS software and delivery of authoritative data and services to support the GIS community.
- The Maryland Statewide Address Initiative (MSAI) is a two-phase project aimed at collecting local data for the primary purpose of locating features within Maryland.
- Aerial imagery is essential for giving 9-1-1 dispatchers the proper context in the event of an emergency call. Publicly accessible aerial imagery for the entire state is available and updated regularly.
- The focus of the LiDAR Initiative is to improve public access to Maryland elevation data. The Topography Viewer and the Topography Server provide citizens with multiple options for viewing and interacting with both county and statewide elevation data products.
- With advances in communications technology, Next Generation 9-1-1 (NG9-1-1) systems have adapted to be based on Internet Protocols (IP) Standards. GIS data will play an important role in NG9-1-1 systems for a variety of functions.
- Operational and Situational Preparedness for Responding to an Emergency (OSPREY) is a suite of tools to provide Marylanders many sources of real-time data, such as traffic cameras, weather and power outages. Data supplied to OSPREY comes from MD iMAP, as well as additional state, location and federal data sources.

**i. FEMA Coast Risk Products and Outreach Team**

Risk MAP provides high quality flood maps and information, tools to better assess risk from flooding, and planning and outreach support to communities to help them take action to reduce flood risk. Coastal Risk Map Products completed for Maryland jurisdictions include:

- Anne Arundel County;
- Baltimore City;
- Baltimore County;
- Calvert County;
- Caroline County;
- Cecil County;
- Charles County;
- Dorchester County;
- Queen Anne’s County;
- Somerset County;
- Wicomico County; and
- Worcester County.

*Figure 1.7—FEMA Coast Risk Products*



Coastal Risk Map Products will be used and incorporated into both the 2016 State of Maryland Hazard Mitigation Plan and local hazard mitigation plan updates, as well. Regional outreach meetings incorporated a FEMA Risk Map presentation to inform participants of the exciting new products available for this plan cycle.

**j. Maryland Transportation Authority Climate Change Vulnerability Assessment**

The Maryland Transportation Authority (MDTA) Climate Change Vulnerability Assessment has been developed in response to Maryland’s Climate Action Plan (2008),

produced by the Maryland Climate Change Commission, and to the Climate Change and Coast Smart Construction Executive Order (2012) as well as MTA's Climate Change Policy. The purpose of the study is to identify MTA sensitive locations and assets that are vulnerable to three expected results of global climate change:

1. Sea level rise
2. Increased hurricane storm surge; and
3. Flooding due to major rain events.

The information contained in this report will be used to inform planning decisions when determining which sites and sensitive locations and assets may require investment to reduce the likelihood or consequence of potential inundation and which would impair the provision of transit services. The Global Information Systems (GIS) layers developed for this study will assist in site selection of future planning projects by identifying if a proposed site is located within an area likely to be inundated under one of the three scenarios.

**k. Maryland State Highway Administration Climate Change Program: Hazard Vulnerability Assessment**

With the support from state and federal agencies and from academic and private partners the team worked to develop a methodical approach that could identify vulnerabilities of the state's roadways and bridges.

Salisbury University Eastern Shore Regional GIS Cooperative provided state-of-the-art data products incorporating Light Detection and Ranging (LiDAR) information and projection models from the Federal Emergency Management Administration's HAZUS program. The U.S. Department of Transportation Federal Highway Administration provided the Vulnerability Assessment Scoring Tool (VAST). The team then integrated the range of data from all the tools with an updated range of sea level projections based on U.S. Army Corps of Engineers' methodology and storm surge models—information embedded within the Sea Level Change Curve Calculator tool. The resulting maps and report provided SHA with the information they needed to identify and prioritize vulnerable roadway segments and bridges in Anne Arundel and Somerset Counties.

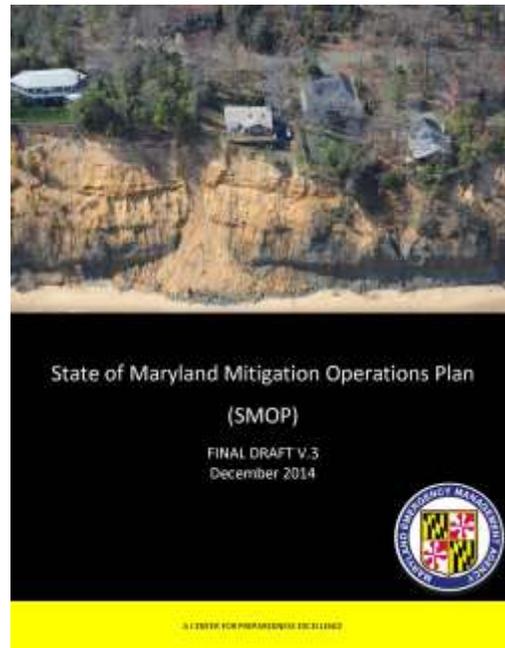
SHA can also use the technical analysis to evaluate other opportunities for improving resilience. For instance, by integrating information from the analysis with watershed boundaries and hydrologic data, they can perform site-specific vulnerability assessments for elements of transportation infrastructure. SHA can also build on this approach, replicating it in other Maryland counties to help decision makers recognize their climate vulnerabilities and consider how and when to address them.

### I. Mitigation Operations Plan

The State of Maryland Mitigation Operations Plan (SMOP) was finalized in December 2014. The SMOP is the State Mitigation Mission Area Operations Plan within the Maryland Emergency Preparedness Program (MEPP). The SMOP outlines the ongoing state-level hazard mitigation efforts that occur prior to, during, and following an incident, or disaster. The magnitude to which the Mitigation Mission Area is executed is dependent upon regulatory activity and funding each year. The identified actions and activities in this Plan are based on existing State agency statutory authorities. The goals to be met throughout the execution of the SMOP are as follows:

- Reduce risk by prioritizing investments.  
Assessing the impacts of naturally occurring and human-caused hazards on communities enables strategic prioritization of mitigation projects, and enhances the State’s ability to reduce or eliminate long-term risks through the effective allocation of resources and the dissemination of information.
- Support local jurisdictions’ involvement in hazard mitigation planning.  
All disasters are locally driven, and it is the State of Maryland’s role to provide assistance to the local jurisdictions in the form of personnel, resources, and operational coordination, at their request, when their resources are exceeded.
- Integrate risk-reduction programs across State government, and with local governments and the private sector.  
Use existing or new regulations, local ordinances, land use and building practices, and mitigation projects to reduce the risk of all hazards on life, property, and the environment. The primary tools to accomplish the consolidation and execution of risk-reduction programs and strategies are the Maryland State HMP, and the local HMPs.
- Encourage and promote the value of mitigation statewide.  
Encourage more participation from various departments and agencies across both the State and local governments to foster stronger intergovernmental coordination for risk reduction. .

Figure 1.8—Maryland Mitigation Operations Plan



### m. MEMA: Mitigation Related Initiatives in Maryland

The following information details Maryland mitigation related initiatives by state agency.

- **Maryland Department of Housing and Community Development**
  - Housing and Building Energy Unit Initiatives
- **Maryland Department of Natural Resources**
  - Forest Mitigation
  - Climate Change Adaption Strategy, Phase 1 & 2
- **Maryland Department of Planning**
  - Plan Maryland
  - Smart Growth

- **Maryland Department of Environment**
  - Maryland’s Greenhouse Gas Reduction Plan Regional Gas Initiative
  - Chesapeake Bay Maryland Clean Cars Program
  - Watershed Implementation Plan
- **Maryland Energy Administration**
  - Maryland Energy Assurance Plan
  - EmPower Maryland
  - Renewable Portfolio Standard
  - Fuel Up Maryland
  - Maryland Smart Energy Communities
  - Project Sunburst
- **Maryland Department of Transportation**
  - Transit Oriented Development

## 10. Resiliency Partnership Strategy Session

Mitigation strategies were developed throughout the plan update process. These strategies were documented as part of an ongoing planning effort. A concerted effort to flush out existing mitigation strategy ideas and insure further opportunities for new ideas, a “strategy session” was held in May, 2016. Session participants included: Maryland Emergency Management Agency (MEMA), Maryland Department of Environment (MDE), Department of Natural Resources (DNR), Maryland Historical Trust (MHT), State Highway Administration (SHA), Natural Resources Defense Council, University of Maryland, Maryland Department of Information Technology, Maryland Environmental Services, Maryland Transit Administration (MTA), AMEC Foster Wheeler, and Smith Planning and Design.

As a result of the “strategy session,” new mitigation strategies were developed for the 2016 Maryland HMP. The 2016 mitigation strategies were documented and organized for review by the Maryland Mitigation Advisory Council (MAC). The MAC prioritized 2016 mitigation strategies during the July 5<sup>th</sup> and July 18<sup>th</sup> meetings.

## 11. Mitigation Advisory Committee

The Mitigation Advisory Committee (MAC) serves as the leadership group for the Mitigation Mission Area at the state level. The State departments and agencies engaged in mitigation operate according to their statutory authorities in a roundtable, group approach to making decisions. MEMA serves as the lead for the Mitigation Mission Area and the SHMO serves as chair of the MAC. The MAC helps to identify Maryland’s threats and hazards, and conducts assessments to prioritize threats and hazards according to risk. Additionally, the MAC is responsible for the review and prioritization of HMA-related projects that are recommended and forwarded to FEMA for funding. The final authority to submit projects to FEMA for funding rests with the Executive Director of MEMA. The MAC is also responsible for the maintenance and revisions of this Plan.

The MAC evaluates and prioritizes all eligible mitigation project applications using the following Project Ranking System (Note: The percentages and priorities noted below are based on the most recent FEMA mitigation grant guidance when this plan was most recently updated. The federal guidance and the total funds available may change each fiscal year.):

- **Priority 1 - Hazard Mitigation Plan updates:** Valid, adopted HMPs are a pre-requisite for project eligibility in a local jurisdiction. HMP updates are the first priority for all HMA programs. Funds may be allocated to these projects within applicable limits. For example, up to 7% of Hazard Mitigation Grant Program (HMGP) funds available may be allocated to the preparation of local HMPs and the State HMP.

- Priority 2 - 5% Initiative (HMGP Only): Up to 5% of HMGP funds available may be allocated for projects that do not meet normal benefit cost analysis, but contribute to hazard mitigation goals. Typically, these are public information, and alert and warning projects.
- Priority 3 - Hazard Mitigation Projects (excluding generators): The balance of funding after allocation above is available for standard mitigation projects, such as those listed below (items below are in no particular order):
  - Structure Elevations (both residential and non-residential)
  - Structure Acquisition/Demolition (both residential and non-residential)
  - Flood proofing (non-residential structures only)
  - Public Infrastructure Retrofit

Note: Standard Hazard Mitigation projects, including elevations and acquisitions that exceed FEMA cost caps must complete a Benefit Cost Analysis (BCA).
- Priority 4 - Generators for Critical Facilities: The balance of funds available after all other priorities have been met will be applied to generators using a three-step process.

The MAC is staffed from, but not limited to, the following departments, agencies, and associations:

- Maryland Emergency Management Agency (MEMA)
- Maryland Emergency Management Association (Local EMA's)
- Maryland Department of Business and Economic Development (DBED)
- Maryland Department of Housing and Community Development (DHCD)
- Maryland Department of Human Resources (DHR)
- Maryland Department of Natural Resources (DNR)
- Maryland Department of Planning (MDP)
- Maryland Department of the Environment (MDE)
- Maryland Department of Transportation (MDOT)
- Maryland Department of General Services (DGS)
- Maryland Insurance Administration (MIA)
- Maryland State Treasurer's Office
- Maryland Energy Administration (MEA)

The MAC met periodically throughout the State Hazard Mitigation Plan update process.

- June 25, 2015-State Hazard Mitigation Plan Update and local HMP Update Guidelines
- August 25, 2015-State Hazard Mitigation Plan Update Status
- July 5 & 18, 2016-State Hazard Mitigation Plan Mitigation Strategies Prioritization



## SECTION II: HAZARD IDENTIFICATION & RISK ASSESSMENT

### STATE MITIGATION PLAN REVIEW GUIDE

Released March 2015 FP 302-094-2

This *State Mitigation Plan Review Guide* is FEMA’s official policy on and interpretation of the natural hazard mitigation planning requirements. The intended use of the *Guide* is to facilitate consistent evaluation and approval of state mitigation plans, as well as to facilitate state compliance with the mitigation planning requirements when updating plans.

Figure 2.1—State Mitigation Review Guide S3

Element	Requirement
<p>S3. Does the risk assessment include an overview of the type and location of all natural hazards that can affect the state? [44 CFR §201.4(c)(2)(i)]</p> <p><i>Intent:</i> To understand natural hazards across the state in order to identify which hazard risks have been or may be the most significant and the locations that have been adversely affected.</p>	<p>a. The plan must include a current summary of natural hazard that can affect the state. The summary must include information on location, extent, and previous occurrences for each natural hazard, using maps where appropriate.</p> <p>b. If any commonly recognized natural hazards are omitted, the plan must provide an explanation.</p>

### 1. Hazard Identification

Since the year 2010, Maryland has been declared for four (4) severe winter storm events. The most recent federally declared event to have occurred was Severe Winter Storm Jonas in January 2016. Three (3) Hurricane events including Irene in 2011, Remnants of Tropical Storm Lee in 2011, and Hurricane Sandy in 2012 have impacted Maryland since 2010. Finally, the State experienced widespread impacts from Severe Storms and Straight-Line Winds in 2012.

From the years 2000 to 2009, six (6) Federally Declared Disasters occurred in Maryland. These disaster declarations resulted from two (2) severe snowstorms, one (1) tornado, two (2) hurricanes, and one (1) event that included severe storms, flooding, and tornadoes. In total, Maryland has had thirty-one (31) major disaster declarations, starting with the 1962 severe storms and tidal flooding disaster event, ending with the most recent, severe winter storm event in 2016.

Natural hazards that impact the State of Maryland were identified using Federal Disaster Declarations. Five (5) hazards consistently resulted in widespread impacts across the State and include:

- Coastal Hazards;
- Flood;
- Winter Storm;
- Tornado; and,
- Wind.

Following review and discussion, the Mitigation Advisory Council (MAC) recommended that these five (5) most common hazards be included in the *2016 State Hazard Mitigation Plan*. In addition, these five (5) hazards were recommended as a minimum standard for inclusion in all local hazard mitigation plans within the *State of Maryland Local Hazard Mitigation Plan Guidance, May 2015*.

Upon further review of previous hazard occurrences, locations, and extent, the identification of three (3) additional hazards resulted, and include:

- Thunderstorm;
- Wildfire; and,
- Drought.

The standardized method used for assessing and prioritizing the eight (8) identified hazards was based on a blend of quantitative factors extracted from the National Climatic Data Center (NCDC) and other available sources. These include:

- Historical occurrences;
- Vulnerability of population in hazard area(s);
- Historical impacts, such as human lives, injuries, property and crop damages; and
- Local hazard mitigation plan hazard risk rankings.

***Note:** A complete Risk Assessment Methodology and Risk Assessment Datasets, providing detailed information on the nine (9) ranking parameters, task items, and associated data compilation tables are presented in the latter portion of this section (see pages 2-63 to 2-69.*

## 2. Risk Assessment

### a. Coastal Hazards

Coastal Hazards in Maryland take many forms ranging from storm systems such as tropical storms, hurricanes, and Nor'easters, that may cause storm surge inundation, heavy precipitation, that may lead to flash flooding and exacerbation of shoreline erosion to longer term hazards such as sea level rise. Therefore, for the purposes of this plan, coastal hazards include: tropical storms, hurricanes, Nor'easters, sea level rise and shoreline erosion.

The coastal hazards risk assessment results indicate that local jurisdictions with the highest risk to coastal hazards include: Anne Arundel, Baltimore, Calvert, Charles, Dorchester, Kent, Queen Anne's, St. Mary's, Somerset, and Worcester counties, as well as, the City of Baltimore. The majority of local jurisdictions rated as having a "high risk" to coastal hazards in the State's Risk Assessment also rated coastal hazards as a high risk within their local plans. The three (3) exceptions were Charles, Queen Anne's, and the City of Baltimore; all three (3) rated coastal hazards as "medium-high risk" within their local hazard mitigation plans.

The review of collected data used in the State's Risk Assessment yielded several notable items, including:

- Local jurisdictions containing the largest percentage of coastal land area according to the FEMA Coastal Flood Risk Reports included Calvert, Dorchester, Kent, and St. Mary's counties.
- Deaths attributed to the coastal hazard within the NCDC dataset occurred in Anne Arundel, Baltimore, Calvert, Charles, Harford, Prince George's, Queen Anne's, St. Mary's counties, as well as, the City of Baltimore.
- Impacts from coastal hazards were experienced by Somerset County during Hurricane Sandy in 2012. The Town of Crisfield is surrounded by water on three (3) sides. Hundreds of businesses and homes were flooded and many of those homeowners were displaced.

It is important to note that while the updated mitigation risk assessment was under

development, so too was Maryland's Coastal Resiliency Risk Assessment. The *Maryland Coastal Resiliency Risk Assessment* was completed and reviewed by a steering committee and was facilitated by the Maryland Department of Natural Resources (DNR). In order to assist with plan integration and inform both the hazard mitigation plan development and the DNR coastal resiliency risk assessment, members of both planning committees included many of the same people. Rather than view these efforts as separate, State staff and their partners viewed the development process of both efforts as fortuitous, and successfully enhanced both planning documents through this concurrent and inclusive process.

Maryland's Coastal Resiliency Assessment is a landscape-level spatial analysis and modeling effort that identifies where natural habitats provide the greatest potential risk reduction for coastal communities. The Maryland Department of Natural Resources is taking steps to identify residential areas impacted by coastal hazards and rank shorelines where restoration and conservation efforts can provide coastal protection alongside habitat, water quality, and recreational benefits. Priority areas for restoration and conservation actions were identified based on the presence of existing habitat, its current role in risk-reduction along the shoreline, and the presence of nearby coastal neighborhoods.

With its extensive shoreline, Maryland's coasts experience flooding and erosion, caused by tides and storms and exacerbated by sea level rise. Natural habitats such as marshes and coastal forests can reduce the impacts of these hazards through the processes of wave attenuation, increased infiltration and sediment stabilization. By providing these benefits, coastal habitats represent natural adaptation solutions to better prepare communities for climate change.

While it is recognized that climate change will impact state facilities, investments, natural resources, and our low-lying rural and urban communities, the Maryland's Coastal Resiliency Assessment will help facilitate proactive solutions to enhance the resiliency of our coastal communities.

The Resiliency Assessment produced multiple data products that can be used in resiliency and adaptation planning, including:

- Shoreline Hazard Index- identifies high, moderate, and low hazard shorelines.
- Habitat Role and Hazard Reduction- identifies shorelines where habitats play a high, moderate, low, or nonexistent role in hazard reduction.
- Coastal Community Flood Risk Areas- rank residential areas from very low to very high risk based on probability of exposure to a flood event, population density, and social demographics (age, income, and language proficiency).
- Priority Shoreline Areas- identify Tier 1 and Tier 2 priorities for conservation and restoration actions. Tier 1 and Tier 2 shorelines represent areas where habitats have the potential to play a high or moderate role in risk reduction, respectively, for adjacent coastal communities.
- Marsh Potential Protection Index- ranks the potential of existing marshes to protect coastal communities based on marsh size, proximity to hazards, proximity to residential areas, proximity to other coastal habitats, and the likelihood that the marsh will persist into the year 2100.

#### **b. Flood Hazard**

The flood hazard in Maryland can be categorized as flash, riverine, and coastal. Flash flooding results from a combination of rainfall intensity and duration, and is further influenced by local topography and the ground's capacity to hold water. Riverine flooding is caused by persistent moderate or heavy rain over one or more days, sometimes combined with

snowmelt, causing a river to slowly rise and overflow its banks. Coastal flooding occurs when normally dry, low-lying land is flooded by seawater. The extent of coastal flooding is a function of the elevation inland floodwaters penetrate which is controlled by the topography of the coastal land exposed to flooding.

The flood hazard risk assessment results indicate that local jurisdictions with the highest risk to the flood hazard include: Anne Arundel, Baltimore, Frederick, Howard, Prince George's, St. Mary's, and Somerset counties, as well as, the City of Baltimore. Local hazard mitigation plans concur with this assessment. All eight (8) jurisdictions rated as having a "high risk" to the flood hazard in the State's Risk Assessment rated the flood hazard as a high risk, as well as, within their local plans.

Additionally, risk assessment results indicated that Allegany, Calvert, Cecil, Dorchester, Harford, Kent, Montgomery, Queen Anne's, Talbot, and Worcester Counties were all rated as medium-high risk.

The review of collected data used in the State's Risk Assessment yielded several notable items including:

- Anne Arundel, Baltimore, Cecil, Frederick, Montgomery, and Prince George's counties experienced the highest frequency of flood events according to the National Climatic Data Center (NCDC).
- Deaths attributed to the flood hazard within the NCDC dataset occurred in Anne Arundel, Baltimore, Frederick, Howard, and Montgomery counties, as well as, the City of Baltimore.
- Heavy rains from Tropical Storm Lee resulted in localized flooding within Howard County, specifically in the Valley Mede and Ellicott City areas on September 7, 2011. Properties that were impacted by flood waters were located along portions of Tiber Branch in Lower Ellicott City and Plumtree Branch in the Valley Mede area.

### **c. Winter Storm**

Winter weather can take many forms including snow, freezing rain, sleet and extreme cold that may occur singly or in combination. Some of the most significant winter storms that affect Maryland are known as "Nor'easters" because they are accompanied by strong northeast winds.

The winter storm hazard risk assessment results indicate that local jurisdictions with the highest risk to the winter storm hazard include: Allegany, Anne Arundel, Baltimore, Calvert, Frederick, Harford, Howard, Montgomery, Prince George's, St. Mary's, and Washington counties, as well as, the City of Baltimore. All eleven (11) jurisdictions rated the winter storm hazard as either "high" or "medium-high" within their local hazard mitigation plans with the exception of one (1), Baltimore City, which ranked winter storm hazard as a "medium" risk within their local hazard mitigation plan.

The review of collected data used in the State's Risk Assessment yielded several notable items including:

- More deaths were attributed by the winter storm hazard in Maryland within the NCDC database than any of the other eight (8) Hazard Identification Risk Assessment (HIRA) hazards.
- Baltimore County had the highest number of deaths attributed to the winter storm hazard in Maryland.
- Garrett County, which was ranked as having a "medium-high" risk, holds the highest record snowfall event in Maryland.

**d. Tornado**

A tornado is a violently rotating funnel-shaped column of air that extends from a thunderstorm cloud toward the ground. Tornadoes can touch the ground with winds of over 300 mph. While relatively short-lived, tornadoes are intensely focused and are one of nature's most violent storms.

The tornado hazard risk assessment results indicate that local jurisdictions with the highest risk to the tornado hazard include: Anne Arundel, Baltimore, Calvert, Charles, Frederick, and Prince George's counties. Four (4) of the six (6) local jurisdictions rated tornado hazard risk as "high" within their local hazard mitigation plans. The two (2) exceptions were Baltimore County and Prince George's County. Baltimore County rated tornado hazard risk as "medium" and Prince George's County did not assess the tornado hazard risk within their local plan.

The review of collected data used in the State's Risk Assessment yielded several notable items including:

- Local jurisdictions with the highest number of recorded events within the NCDC database included: Anne Arundel, Frederick, and Prince George's counties.
- Baltimore, Charles, and Prince George's counties had the highest recorded property damage amounts within the NCDC database.
- Frederick, Charles, St. Mary's, Prince George's, and Howard counties all experienced tornado events in 2015; these events were rated as either an EF0 or EF1.

**e. Wind**

Wind is the motion of air past a given point caused by a difference in pressure from one place to another. The effects can include blowing debris, interruptions in elevated power and communications utilities and intensified effects of winter weather. Two basic types of damaging wind events other than tropical systems affect Maryland: synoptic-scale winds and thunderstorm winds. Synoptic-scale winds are high winds that occur typically with cold frontal passages or Nor'easters. Downbursts cause the high winds in a thunderstorm.

The wind hazard risk assessment results indicate that local jurisdictions with the highest risk to the wind hazard include: Anne Arundel, Carroll, Charles, Frederick, Montgomery, and Prince George's counties. Four (4) of the six (6) local jurisdictions rated as having a "high" risk to the wind hazard did not assess wind as a hazard within their local hazard mitigation plans. Both Frederick and Prince George's counties assessed wind hazard within their local hazard mitigation plans as, "high" and "medium-high," respectively.

The review of collected data used in the State's Risk Assessment yielded several notable items including:

- Widespread severe storms and straight-line winds occurred in the summer of 2012 resulting in a Federal Disaster Declaration.
- Montgomery County had the highest recorded property damage amounts within the NCDC database.
- Local jurisdictions with recorded property and crop damage included: Calvert, Carroll, Charles, Frederick, Montgomery, St. Mary's, and Washington counties.

**f. Thunderstorm**

The thunderstorm hazard in Maryland includes both lightning and hail events. The effects of thunderstorm events can include damages from hail, power failure, and problems at communication towers due to lightning strikes.

The thunderstorm hazard risk assessment results indicate that local jurisdictions with the highest risk to the thunderstorm hazard include: Baltimore, Charles, Harford, Montgomery, and Prince George's counties. All five (5) local jurisdictions rated the thunderstorm hazard as either "high" or "medium-high" within their local hazard mitigation plans.

The review of collected data used in the State's Risk Assessment yielded several notable items including:

- Montgomery County had the highest number of recorded thunderstorm events within the NCDC database.
- Eleven (11) local jurisdictions had recorded deaths attributed to thunderstorms.
- Local jurisdictions with recorded property damages from thunderstorms included: Anne Arundel, Baltimore, Cecil, Frederick, Harford, Howard, Montgomery, and Talbot counties.

**g. Wildfire**

Wildfires are a common occurrence in Maryland. In an average year, the Maryland Forest Service responds to 500 wildfires, which burn more than 4,000 acres of land. Fire departments respond to over 5,000 wildfire incidents per year. While some wildfires in Maryland can burn hundreds or even thousands of acres, most are smaller in size, burning less than ten (10) acres. Even these smaller wildfires can threaten lives, homes, other structures, and our natural resources. Each year hundreds of homes and structures are threatened, and dozens are damaged or destroyed by wildfires.

The only natural cause of wildfires is lightning, and this accounts for only 3% of the wildfire ignitions in Maryland. Humans cause the remaining 97% of wildfires. Maryland's leading cause of wildfires is improper debris or outdoor burning that ignites an average of 29% of the fires each year. Arson, the second leading cause, accounts for around 25% of ignitions. Other causes include: equipment use, children playing with fire, smoking, campfires, railroads, and other miscellaneous ignitions from sources such as downed power lines, discarded ashes, and fireworks.

The wildfire hazard risk assessment results indicate that the local jurisdiction with the highest risk to the wildfire is Calvert County. Calvert County was the only local jurisdiction that rated wildfire as a "high" risk in their local hazard mitigation plan. Those jurisdictions with a "medium-high" risk include: Allegany, Anne Arundel, Baltimore, Frederick, Garrett, Prince George's, and Worcester counties.

The review of collected data used in the State's Risk Assessment yielded several notable items including:

- Local jurisdictions with the largest percent of land within "high" and "medium-high" risk wildfire areas according to the Maryland Forest Service include: Allegany, Calvert, Charles, Garrett, St. Mary's and Worcester counties.
- The City of Baltimore and both Caroline and Carroll counties were rated as having the lowest risk to the wildfire hazard.
- Four (4) local jurisdictions had recorded injuries attributed to wildfire including: Allegany, Anne Arundel, Frederick and Howard counties.

#### **h. Drought**

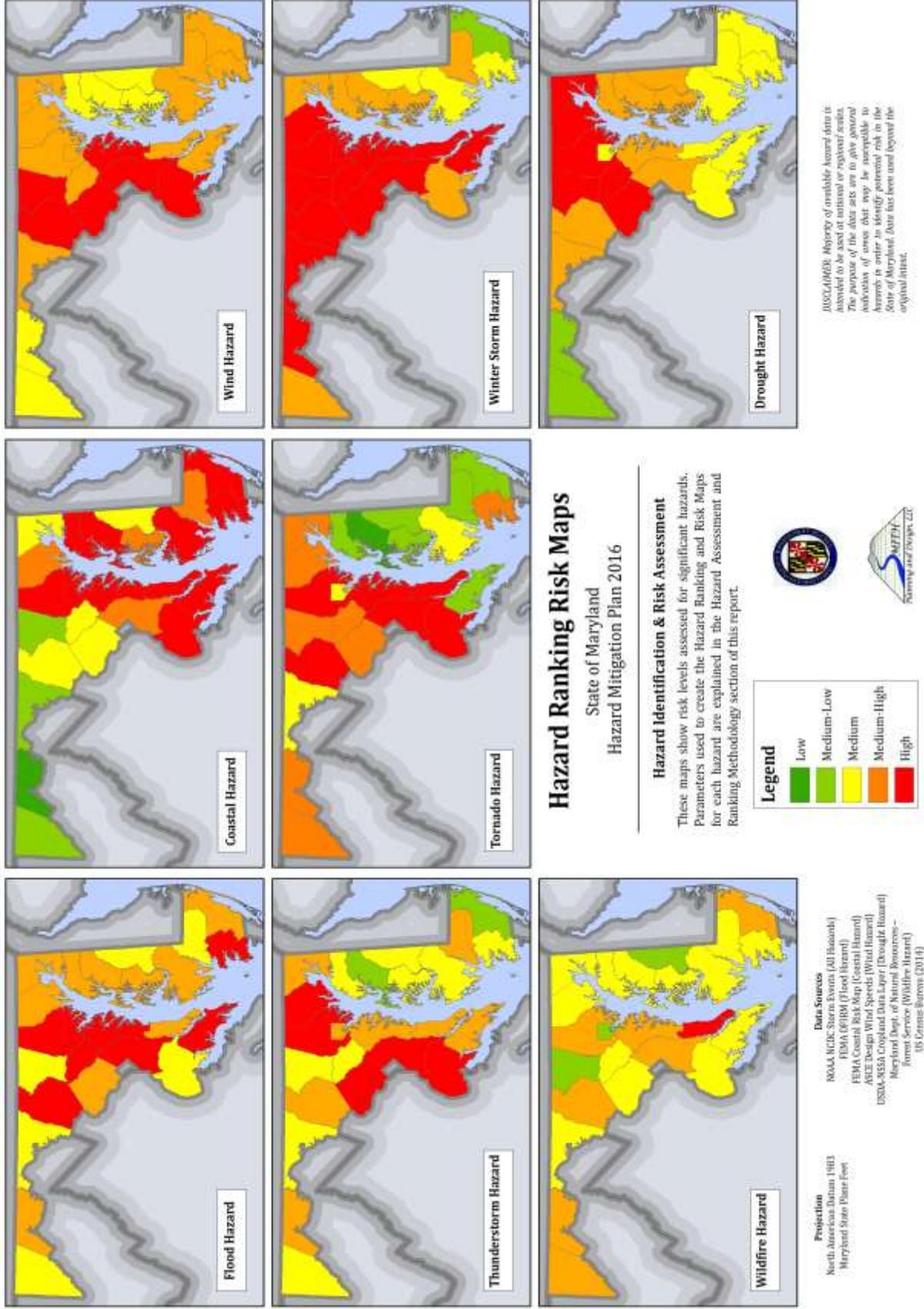
Maryland uses the U.S. Army Corps of Engineers' definition of drought, which states, "droughts are periods of time when natural or managed water systems do not provide enough water to meet established human and environmental uses because of natural shortfalls in precipitation or stream flow".

The drought hazard risk assessment results indicate that local jurisdictions with the highest risk to the drought hazard include: Baltimore, Carroll, Cecil, Harford, Howard, and Montgomery counties. Four (4) of the six (6) local jurisdictions rated the drought hazard as a "high" risk within their local hazard mitigation plans. Both Baltimore and Montgomery counties assessed drought within their local hazard mitigation plans as a "medium" risk.

The review of collected data used in the State's Risk Assessment yielded several notable items including:

- Caroline, Kent, Queen Anne's and Talbot counties had the highest number of recorded drought hazard events within the NCDC database.
- Local jurisdictions with the highest recorded crop damages within the NCDC database included: Baltimore, Carroll, Frederick, Harford, Howard, Montgomery, and Washington counties.
- Five (5) local jurisdictions had recorded injuries attributed to the drought hazard within the NCDC database including: Anne Arundel, Baltimore, Cecil, Prince George's counties, as well as, the City of Baltimore.

Map 2.1—Overall Hazard Ranking Risk Map

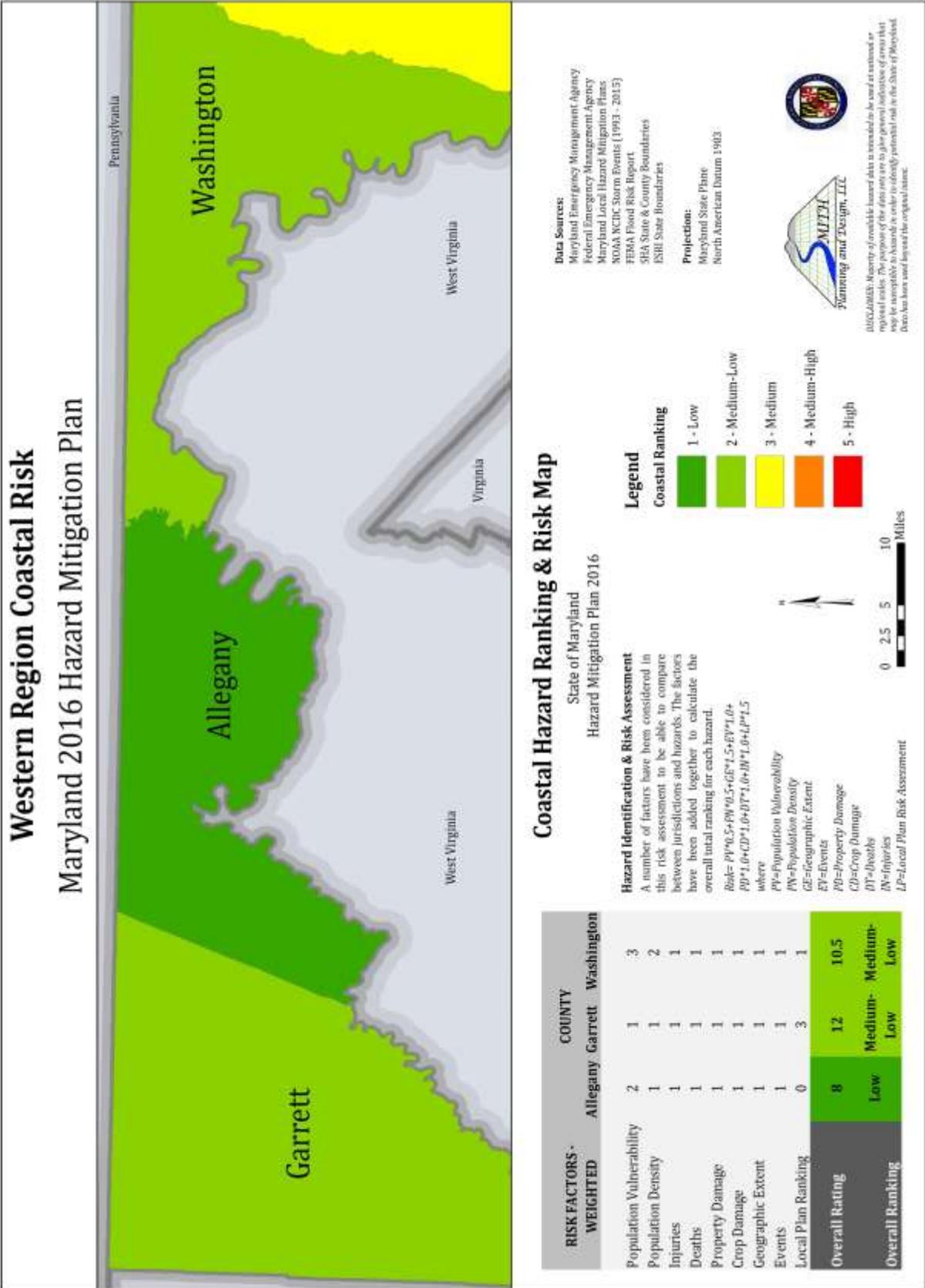


### 3. Regional Risk Assessment

The following regional maps were generated utilizing the risk assessment previously discussed. Regional maps were developed for the following regions: Western, Central, National Capital, Southern, Upper Eastern Shore and Lower Eastern Shore. Maps depict the following hazards for each region: Coastal, Flood, Winter Storm, Tornado, Wind, Thunderstorm, Wildfire and Drought.

#### a. Western Region

In reviewing the risk assessment for the Western Region, Winter Storm were ranked “high” for all regions. The risk assessment determined Flood, Thunderstorm, Wind and Wildfire to be “medium-high” for Allegany County. Washington County was ranked “medium-high” for Drought, while Allegany and Garrett Counties rank Drought as “medium-low.”



# Western Region Drought Risk Maryland 2016 Hazard Mitigation Plan



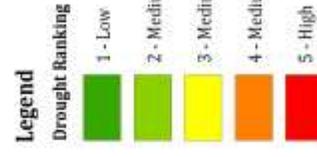
## Drought Hazard Ranking & Risk Map

State of Maryland  
Hazard Mitigation Plan 2016

**Hazard Identification & Risk Assessment**  
A number of factors have been considered in this risk assessment to be able to compare between jurisdictions and hazards. The factors have been added together to calculate the overall total ranking for each hazard.

$$Risk = PV * 0.5 + PN * 0.5 + GE * 1.5 + EV * 1.0 + PP * 1.0 + CD * 1.0 + IN * 1.0 + LF * 1.5$$

where  
 PV=Population Vulnerability  
 PN=Population Density  
 GE=Geographic Extent  
 EV=Events  
 PP=Property Damage  
 CD=Crop Damage  
 IN=Injuries  
 LF=Losses from Risk Assessment



**Data Sources:**  
 Maryland Emergency Management Agency  
 Federal Emergency Management Agency  
 Maryland Local Hazard Mitigation Plans  
 NOAA NCEC Storm Events [1995 - 2015]  
 2012 Agriculture Census  
 SHA State & County Boundaries  
 ESRI State Boundaries

**Projection:**  
 Maryland State Plane  
 North American Datum 1983



DISCLAIMER: Agency of available hazard data is intended to be used for statistical or general purposes. The purpose of this plan is to give general information of hazard that may be encountered and to help identify potential risk to the State of Maryland. It does not constitute and should not be used for engineering studies.

RISK FACTORS - WEIGHTED	COUNTY		
	Allegany	Garrett	Washington
Population Vulnerability	2	1	3
Population Density	1	1	2
Injuries	1	1	1
Deaths	1	1	1
Property Damage	1	1	1
Crop Damage	1	1	4
Geographic Extent	2	1	3
EVENTS	1	1	2
Local Plan Ranking	3	2	3
<b>Overall Rating</b>	<b>14</b>	<b>10.5</b>	<b>20.5</b>
<b>Overall Ranking</b>	<b>Medium-Low</b>	<b>Medium-Low</b>	<b>Medium-High</b>

# Western Region Flood Risk Maryland 2016 Hazard Mitigation Plan



## Flood Hazard Ranking & Risk Map

State of Maryland  
Hazard Mitigation Plan 2016

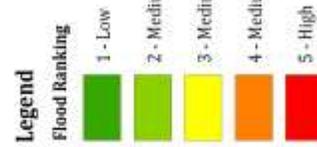
### Hazard Identification & Risk Assessment

A number of factors have been considered in this risk assessment to be able to compare between jurisdictions and hazards. The factors have been added together to calculate the overall total ranking for each hazard.

$$Risk = PV^{0.5} + PN^{0.5} + GE^{1.5} + EV^{*1.0} + PP^{*1.0} + CD^{*1.0} + IN^{*1.0} + LF^{*1.5}$$

- where
- PV=Population Vulnerability
- PN=Population Density
- GE=Geographic Extent
- EV=Events
- PP=Property Damage
- CD=Crop Damage
- IN=Injuries
- LF=Losses From Risk Assessment

RISK FACTORS - WEIGHTED	COUNTY		
	Allegany	Garrett	Washington
Population Vulnerability	2	1	3
Population Density	1	1	2
Injuries	1	1	1
Deaths	1	1	1
Property Damage	2	1	1
Crop Damage	1	1	1
Geographic Extent	1	1	1
Events	3	3	3
Local Plan Ranking	5	4	4
<b>Overall Rating</b>	<b>18.5</b>	<b>15.5</b>	<b>17</b>
<b>Overall Ranking</b>	<b>Medium-High</b>	<b>Medium</b>	<b>Medium</b>



**Data Sources:**  
 Maryland Emergency Management Agency  
 Federal Emergency Management Agency  
 Maryland Local Hazard Mitigation Plans  
 NOAA NCEC Storm Events (1993 - 2015)  
 FEMA DFIRM  
 SHA State & County Boundaries  
 ESRI State Boundaries

**Projection:**  
 Maryland State Plane  
 North American Datum 1983



DISCLAIMER: Agency of available hazard data is intended to be used for statistical or general purposes. The purpose of this plan is to give general information of flood risk. It is not intended to be used for individual property purposes and is not the State of Maryland. It is not intended to be used beyond the original intent.

# Western Region Thunderstorm Risk Maryland 2016 Hazard Mitigation Plan



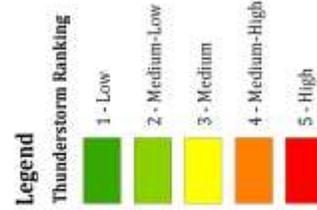
## Thunderstorm Hazard Ranking & Risk Map

State of Maryland  
Hazard Mitigation Plan 2016

**Hazard Identification & Risk Assessment**  
A number of factors have been considered in this risk assessment to be able to compare between jurisdictions and hazards. The factors have been added together to calculate the overall total ranking for each hazard.

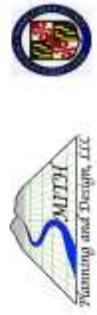
$$Risk = PV * 0.5 + PN * 0.5 + GE * 1.5 + EV * 1.0 + PP * 1.0 + CD * 1.0 + IN * 1.0 + LF * 1.5$$

where  
 PV = Population Vulnerability  
 PN = Population Density  
 GE = Geographic Extent  
 EV = Events  
 PP = Property Damage  
 CD = Crop Damage  
 IN = Injuries  
 LF = Losses From Risk Assessment



**Data Sources:**  
 Maryland Emergency Management Agency  
 Federal Emergency Management Agency  
 Maryland Local Hazard Mitigation Plans  
 NOAA NCEC Storm Events (1956 - 2015)  
 SRA State & County Boundaries  
 ESRI State Boundaries

**Projection:**  
 Maryland State Plane  
 North American Datum 1983



DISCLAIMER: Agency of available hazard data is intended to be used for statistical or general purposes. The purpose of this map is to give general information of hazard that may be present in the area. It does not constitute a warranty or endorsement of any product or service. The user assumes all liability for any use of this map.

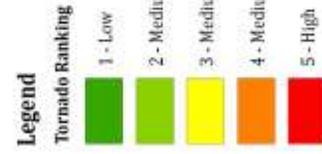
RISK FACTORS - WEIGHTED	COUNTY		
	Allegany	Garrett	Washington
Population Vulnerability	2	1	3
Population Density	1	1	2
Injuries	2	2	2
Deaths	1	1	1
Property Damage	1	1	1
Crop Damage	1	1	1
Geographic Extent	4	1	1
EVENTS	2	2	3
Local Plan Ranking	4	4	3
<b>Overall Rating</b>	<b>20.5</b>	<b>15.5</b>	<b>16.5</b>
<b>Overall Ranking</b>	<b>Medium-High</b>	<b>Medium</b>	<b>Medium</b>

# Western Region Tornado Risk Maryland 2016 Hazard Mitigation Plan



## Tornado Hazard Ranking & Risk Map

State of Maryland  
Hazard Mitigation Plan 2016



**Hazard Identification & Risk Assessment**  
A number of factors have been considered in this risk assessment to be able to compare between jurisdictions and hazards. The factors have been added together to calculate the overall total ranking for each hazard.

$$Risk = PV^{0.5} \cdot PN^{0.5} \cdot GE^{1.5} \cdot EV^{1.0} \cdot PD^{1.0} \cdot CD^{1.0} \cdot I^{1.0} \cdot LP^{1.5}$$

where  
 PV=Population Vulnerability  
 PN=Population Density  
 GE=Geographic Extent  
 EV=Events  
 PD=Property Damage  
 CD=Crop Damage  
 I=Injuries  
 LP=Local Plan Risk Assessment

**Data Sources:**  
 Maryland Emergency Management Agency  
 Federal Emergency Management Agency  
 Maryland Local Hazard Mitigation Plans  
 NOAA NCEC Storm Events (1950 - 2015)  
 Tornado Frequency & Intensity  
 SHA State & County Boundaries  
 ESRI State Boundaries

**Projection:**  
 Maryland State Plane  
 North American Datum 1983



DISCLAIMER: Agency of available hazard data is intended to be used for reference or informational purposes only. The data may not give a complete picture of the hazard. The data has been used and based on the original source.

RISK FACTORS - WEIGHTED	COUNTY		
	Allegany	Garrett	Washington
Population Vulnerability	2	1	3
Population Density	1	1	2
Injuries	2	2	2
Deaths	1	4	1
Property Damage	3	2	2
Crop Damage	2	1	2
Geographic Extent	2	2	2
Events	2	2	2
Local Plan Ranking	3	3	2
<b>Overall Rating</b>	<b>19</b>	<b>19.5</b>	<b>17.5</b>
<b>Overall Ranking</b>	<b>Medium-High</b>	<b>Medium-High</b>	<b>Medium</b>



# Western Region Wildfire Risk Maryland 2016 Hazard Mitigation Plan



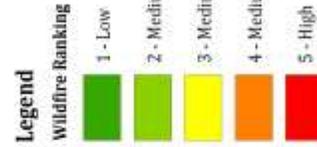
## Wildfire Hazard Ranking & Risk Map

State of Maryland  
Hazard Mitigation Plan 2016

**Hazard Identification & Risk Assessment**  
A number of factors have been considered in this risk assessment to be able to compare between jurisdictions and hazards. The factors have been added together to calculate the overall total ranking for each hazard.

$$Risk = PV * 0.5 + PN * 0.5 + GE * 1.5 + EV * 1.0 + PP * 1.0 + CD * 1.0 + IN * 1.0 + IJ * 1.0 + LF * 1.5$$

where  
 PV=Population Vulnerability  
 PN=Population Density  
 GE=Geographic Extent  
 EV=Events  
 PP=Property Damage  
 CD=Crop Damage  
 IN=Injuries  
 IJ=Injuries  
 LF=Losses from Risk Assessment



**Data Sources:**  
 Maryland Emergency Management Agency  
 Federal Emergency Management Agency  
 Maryland Local Hazard Mitigation Plans  
 NOAA NCEC Storm Events (1998-2015)  
 MD DNR Forest Service  
 SHA State & County Boundaries  
 ESRI State Boundaries

**Projection:**  
 Maryland State Plane  
 North American Datum 1983



DISCLAIMER: Agency of available hazard data is intended to be used for statistical or general purposes. The purpose of this plan is to give general information of hazard that may be encountered in the future. It is not intended to be used for individual property or business risk assessments. The data is not intended to be used for individual property or business risk assessments.

RISK FACTORS - WEIGHTED	COUNTY		
	Allegany	Garrett	Washington
Population Vulnerability	2	1	3
Population Density	1	1	2
Injuries	2	1	1
Deaths	1	1	1
Property Damage	1	1	1
Crop Damage	1	1	1
Geographic Extent	4	4	3
Events	4	4	4
Local Plan Ranking	3	3	2
<b>Overall Rating</b>	<b>21</b>	<b>19.5</b>	<b>18</b>
<b>Overall Ranking</b>	<b>Medium-High</b>	<b>Medium-High</b>	<b>Medium</b>

# Western Region Wind Risk Maryland 2016 Hazard Mitigation Plan



## Wind Hazard Ranking & Risk Map

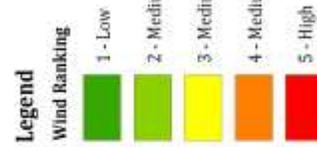
State of Maryland  
Hazard Mitigation Plan 2016

**Hazard Identification & Risk Assessment**  
A number of factors have been considered in this risk assessment to be able to compare between jurisdictions and hazards. The factors have been added together to calculate the overall total ranking for each hazard.

$$Risk = PV * 0.5 + PN * 0.5 + GE * 1.5 + EV * 1.0 + PP * 1.0 + CD * 1.0 + IN * 1.0 + LF * 1.5$$

where  
 PV=Population Vulnerability  
 PN=Population Density  
 GE=Geographic Extent  
 EV=Events  
 PP=Property Damage  
 CD=Crop Damage  
 IN=Injuries  
 LF=Losses from Risk Assessment

RISK FACTORS - WEIGHTED	COUNTY		Washington
	Allegany	Garrett	
Population Vulnerability	2	1	3
Population Density	1	1	2
Injuries	2	1	2
Deaths	1	1	1
Property Damage	2	2	2
Crop Damage	1	1	2
Geographic Extent	1	1	1
Events	4	3	4
Local Plan Ranking	0	4	0
<b>Overall Rating</b>	<b>13</b>	<b>16.5</b>	<b>15</b>
<b>Overall Ranking</b>	<b>Medium</b>	<b>Medium</b>	<b>Medium-High</b>



**Data Sources:**  
 Maryland Emergency Management Agency  
 Federal Emergency Management Agency  
 Maryland Local Hazard Mitigation Plans  
 NOAA NCEC Storm Events (1993 - 2015)  
 2012 IBC & IRC  
 SHA State & County Boundaries  
 ESRI State Boundaries

**Projection:**  
 Maryland State Plane  
 North American Datum 1983



DISCLAIMER: Agency of available hazard data is intended to be used for statistical or general purposes. The purpose of this plan is to give general information of hazard that may be encountered and to help identify potential risk to the State of Maryland. It does not represent and should not be used for engineering studies.

# Western Region Winter Storm Risk Maryland 2016 Hazard Mitigation Plan



## Winter Storm Hazard Ranking & Risk Map

State of Maryland  
Hazard Mitigation Plan 2016



**Hazard Identification & Risk Assessment**  
A number of factors have been considered in this risk assessment to be able to compare between jurisdictions and hazards. The factors have been added together to calculate the overall total ranking for each hazard.

$$Risk = PV^{0.5} \cdot PN^{0.5} \cdot GE^{1.5} \cdot EV^{1.0} \cdot PD^{1.0} \cdot CD^{1.0} \cdot DT^{1.0} \cdot IN^{1.0} \cdot LP^{1.5}$$

where  
 PV=Population Vulnerability  
 PN=Population Density  
 GE=Geographic Extent  
 EV=Events  
 PD=Property Damage  
 CD=Crop Damage  
 DT=Deaths  
 IN=Injuries  
 LP=Local Plan Risk Assessment

**Data Sources:**  
 Maryland Emergency Management Agency  
 Federal Emergency Management Agency  
 Maryland Local Hazard Mitigation Plans  
 NOAA NCEP Storm Events (1993 - 2015)  
 National Weather Service  
 SHA State & County Boundaries  
 ESRI State Boundaries

**Projection:**  
 Maryland State Plane  
 North American Datum 1983



**DISCLAIMER:** Agency of available hazard data is intended to be used for reference or informational purposes only. The data may not provide a complete picture of the hazard risk. The data has been used to generate the map and is not intended to be used for any other purpose.

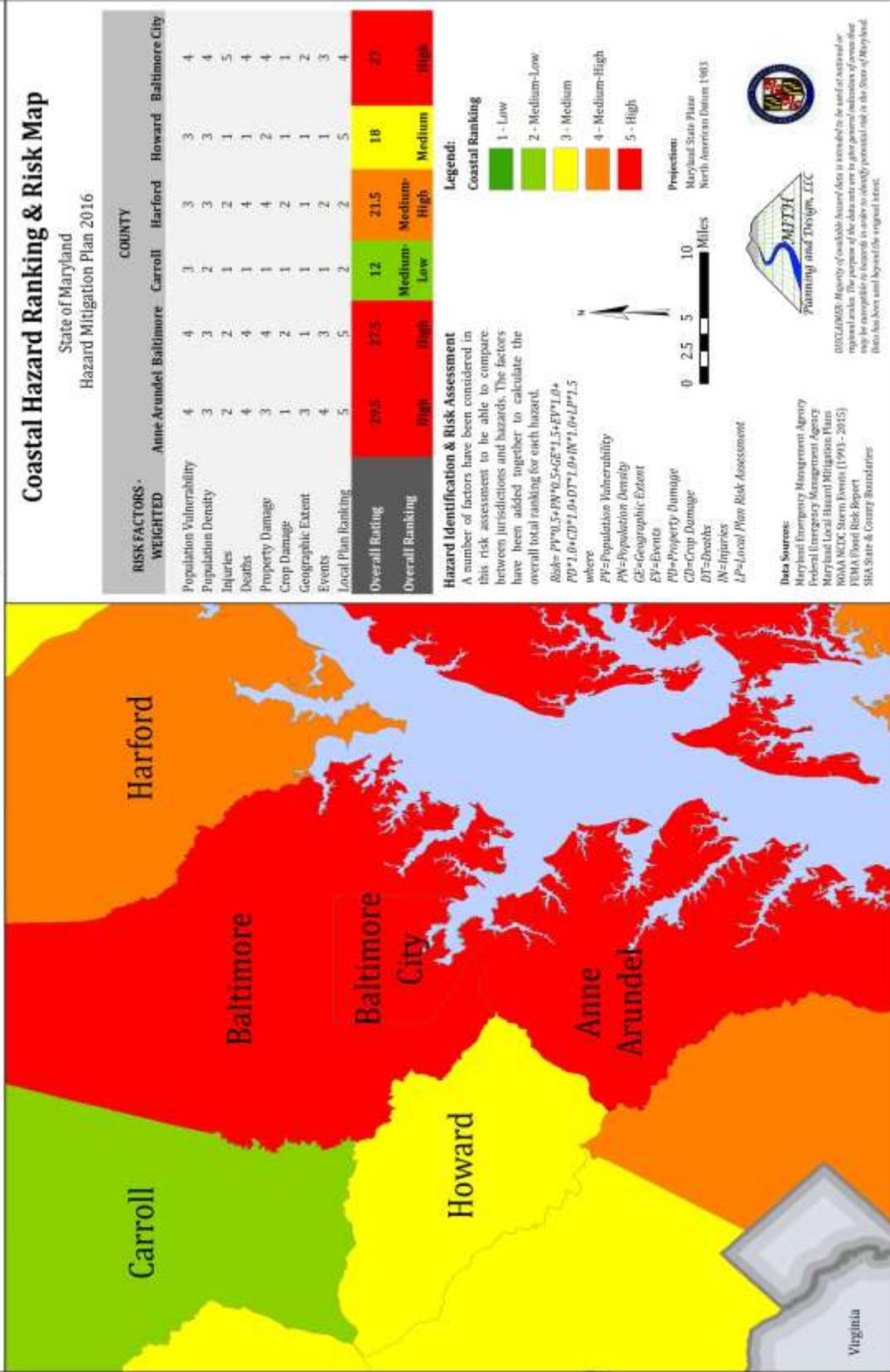
RISK FACTORS - WEIGHTED	COUNTY		
	Allegany	Garrett	Washington
Population Vulnerability	2	1	3
Population Density	1	1	2
Injuries	2	1	2
Deaths	4	1	4
Property Damage	1	1	1
Crop Damage	1	1	3
Geographic Extent	4	4	3
Events	4	4	4
Local Plan Ranking	5	5	5
<b>Overall Rating</b>	<b>2.7</b>	<b>2.3</b>	<b>28.5</b>
<b>Overall Ranking</b>	<b>High</b>	<b>High</b>	<b>High</b>



**b. Central Region**

Baltimore County ranked all hazards “high” with the exceptions of Wind and Wildfire which were ranked “medium-high.” Anne Arundel also ranked hazards as “high” or “medium-high.” The risk assessment for Flood indicated all Counties, including Baltimore City, were at “high” risk excluding Carroll and Harford Counties, which were ranked “medium” and “medium-high,” respectively.

**Central Region Coastal Risk  
Maryland 2016 Hazard Mitigation Plan**



**Central Region Drought Risk**  
 Maryland 2016 Hazard Mitigation Plan

**Drought Hazard Ranking & Risk Map**

State of Maryland  
 Hazard Mitigation Plan 2016

RISK FACTORS - WEIGHTED	COUNTY				
	Anne Arundel	Baltimore	Carroll	Harford	Howard - Baltimore City
Population Vulnerability	4	4	3	3	4
Population Density	3	3	2	3	4
Injuries	4	4	1	1	4
Deaths	1	1	1	1	1
Property Damage	1	1	1	1	1
Crop Damage	3	4	4	4	3
Geographic Extent	2	2	4	3	1
Events	2	2	2	2	2
Local Plan Ranking	0	3	5	5	1
<b>Overall Rating</b>	<b>17.5</b>	<b>24.3</b>	<b>25</b>	<b>24</b>	<b>18</b>
<b>Overall Ranking</b>	<b>Medium-High</b>	<b>High</b>	<b>High</b>	<b>High</b>	<b>Medium</b>

**Hazard Identification & Risk Assessment**

A number of factors have been considered in this risk assessment to be able to compare between jurisdictions and hazards. The factors have been added together to calculate the overall total ranking for each hazard.

$$Risk = PV(0.5) + PW(0.5) + GE(1.5) + ET(1.0) + PD(1.0) + CD(1.0) + DT(1.0) + IN(1.0) + LP(1.5)$$

where:

- PV=Population Vulnerability
- PW=Population Density
- GE=Geographic Extent
- ET=Events
- PD=Property Damage
- CD=Crop Damage
- DT=Deaths
- IN=Injuries
- LP=Local Plan Risk Assessment

**Legend:**

**Drought Ranking**

- 1 - Low
- 2 - Medium-Low
- 3 - Medium
- 4 - Medium-High
- 5 - High

Projection:  
 Maryland State Plane  
 North American Datum 1983



**Data Sources:**  
 Maryland Emergency Management Agency  
 Federal Emergency Management Agency  
 Maryland Local Hazard Mitigation Plans  
 NOAA NCEC Storm Events (1998 - 2015)  
 2012 Agriculture Census  
 SHA State & County Boundaries

DISCLAIMER: Agency of available hazard data is intended to be used as a reference or informational tool. The purpose of the data is to give general indications of areas that may be susceptible to hazards in order to identify potential risk to the State of Maryland. Data has been used beyond the original source.



# Central Region Thunderstorm Risk Maryland 2016 Hazard Mitigation Plan

## Thunderstorm Hazard Ranking & Risk Map

State of Maryland  
Hazard Mitigation Plan 2016

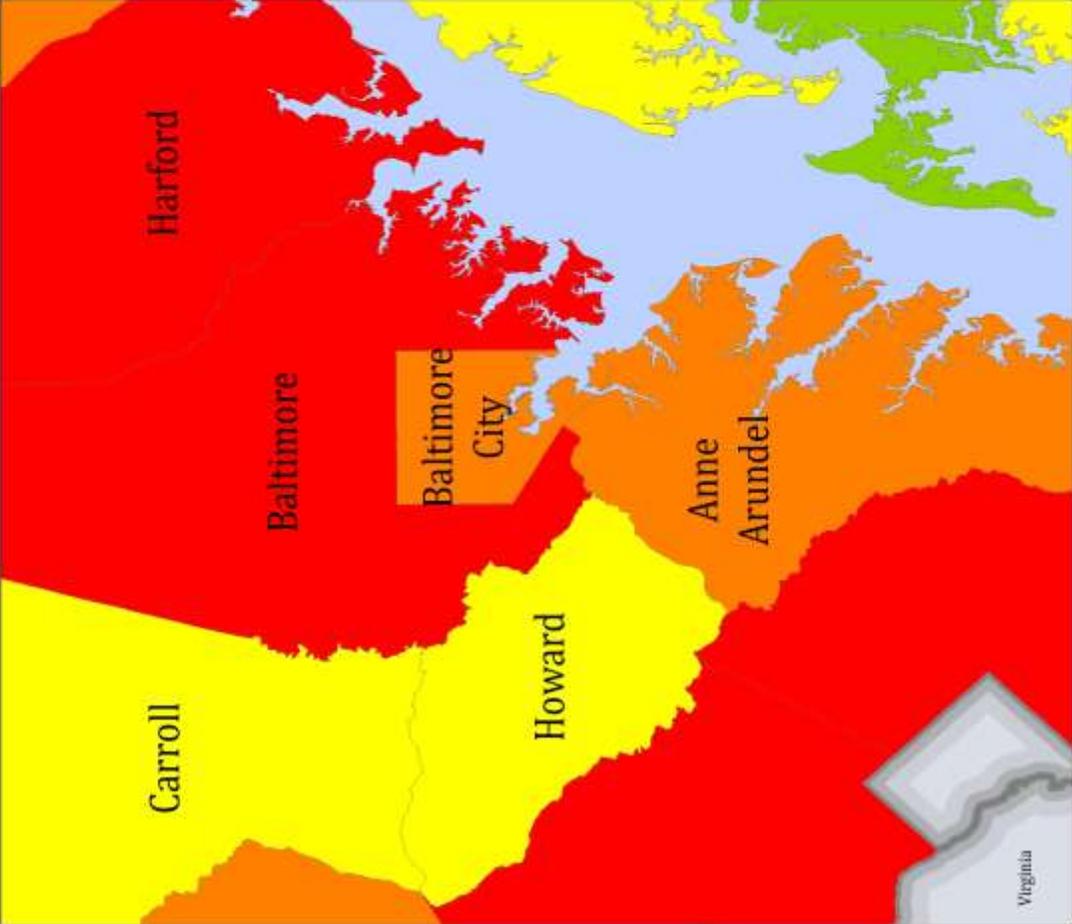
RISK FACTORS WEIGHTED	COUNTY				
	Anne Arundel	Baltimore	Carroll	Harford	Baltimore City
Population Vulnerability	4	4	3	3	4
Population Density	3	3	2	3	4
Injuries	2	2	2	2	2
Deaths	4	4	1	4	4
Property Damage	2	2	1	2	1
Crop Damage	1	1	1	1	1
Geographic Excess	4	2	4	3	2
Events	3	3	2	3	2
Local Plan Ranking	0	4	0	4	3
<b>Overall Rating</b>	<b>21.5</b>	<b>14.5</b>	<b>15.5</b>	<b>25.5</b>	<b>21.5</b>
<b>Overall Ranking</b>	<b>Medium-High</b>	<b>High</b>	<b>Medium</b>	<b>High</b>	<b>Medium-High</b>

**Hazard Identification & Risk Assessment**  
A number of factors have been considered in this risk assessment to be able to compare between jurisdictions and hazards. The factors have been added together to calculate the overall total ranking for each hazard.

$$Risk = PV * 0.5 + PW * 0.5 + GE * 1.5 + EV * 1.0 + PD * 1.0 + CD * 1.0 + DT * 1.0 + IN * 1.0 + LP * 1.5$$

where:  
 PV=Population Vulnerability  
 PW=Population Density  
 GE=Geographic Excess  
 EV=Events  
 PD=Property Damage  
 CD=Crop Damage  
 DT=Deaths  
 IN=Injuries  
 LP=Local Plan Risk Assessment

**Data Sources:**  
 Maryland Emergency Management Agency  
 Federal Emergency Management Agency  
 Maryland Local Hazard Mitigation Plans  
 NOAA NCEP Storm Events (1956-2015)  
 SHA State & County Boundaries  
 ESRI State Boundaries



**Legend:**  
**Thunderstorm Ranking**  
 1 - Low  
 2 - Medium-Low  
 3 - Medium  
 4 - Medium-High  
 5 - High

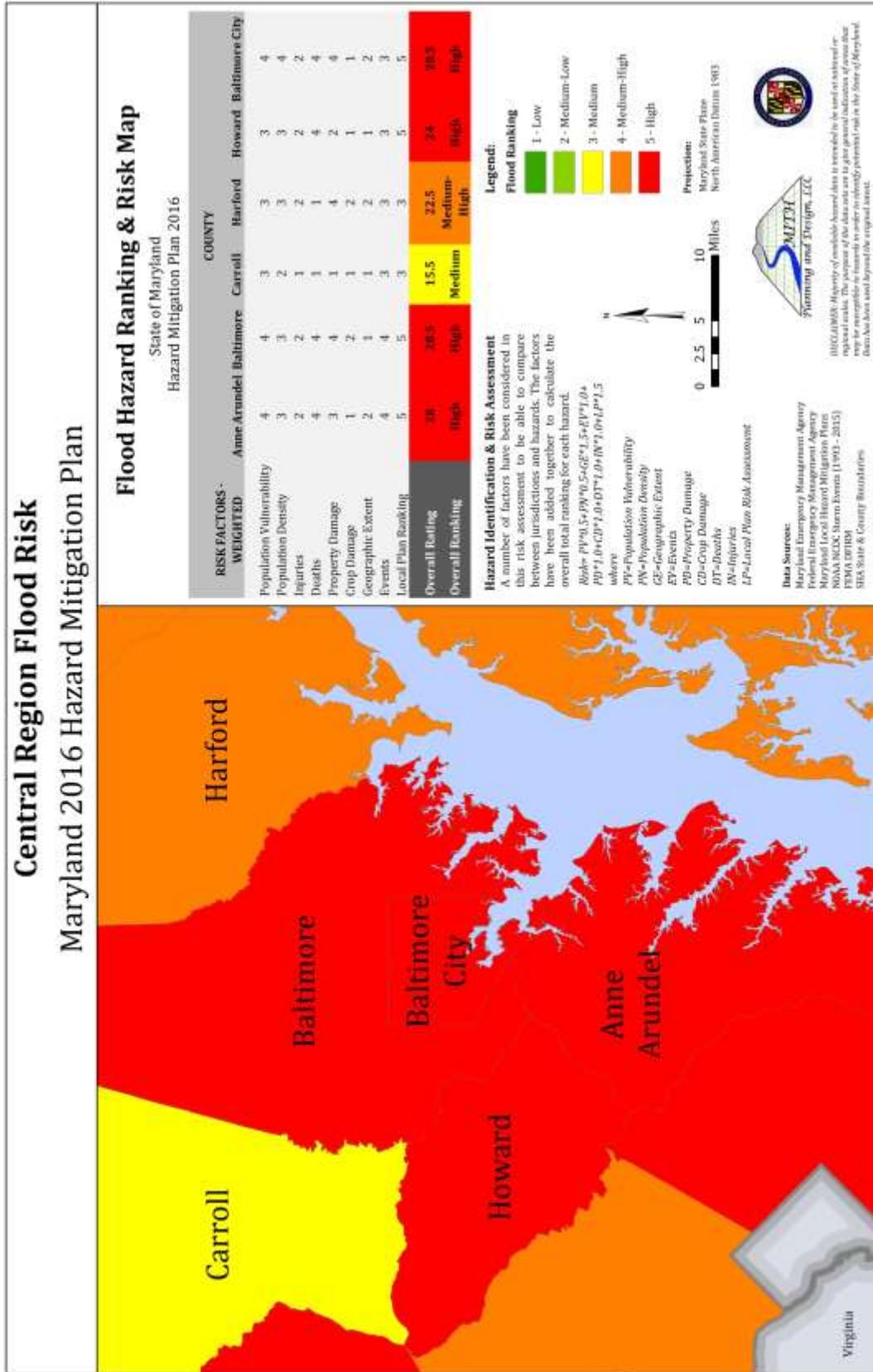
**Projection:**  
 Maryland State Plane  
 North American Datum 1983

0 2.5 5 10 Miles

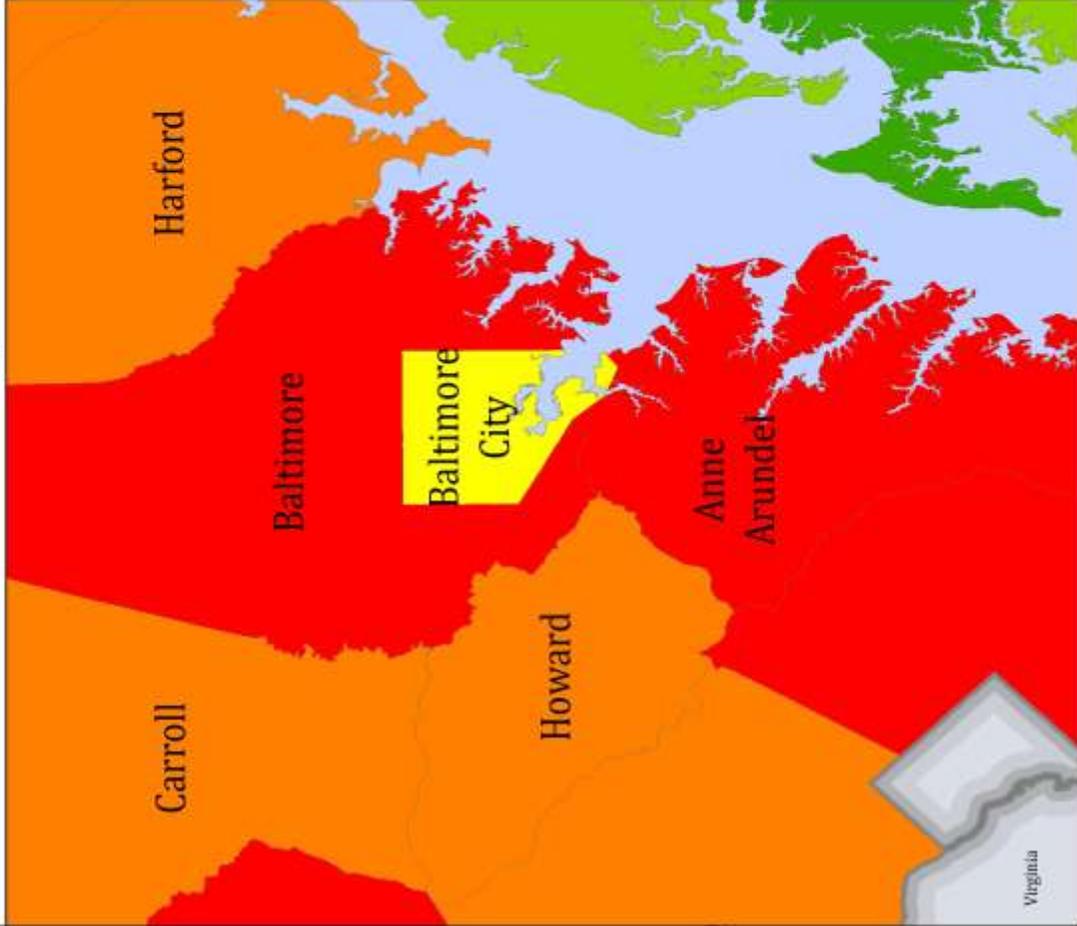


DISCLAIMER: Agency of available hazard data is available to be used for national or regional scale. The purpose of the information is to provide information of overall risk. It is not intended to be used for local scale or to identify potential risk in the future of any local. Data has been used beyond the original intent.

Central Region Flood Risk  
Maryland 2016 Hazard Mitigation Plan



**Central Region Tornado Risk**  
 Maryland 2016 Hazard Mitigation Plan



**Tornado Hazard Ranking & Risk Map**

State of Maryland  
 Hazard Mitigation Plan 2016

RISK FACTORS - WEIGHTED	COUNTY				
	Anne Arundel	Baltimore	Carroll	Harford	Howard - Baltimore City
Population Vulnerability	4	4	3	3	4
Population Density	3	3	2	3	4
Injuries	2	2	2	2	2
Deaths	1	1	1	1	1
Property Damage	3	4	3	3	2
Crop Damage	1	1	1	1	1
Geographic Exant	4	3	3	2	1
Events	4	3	3	2	1
Local Plan Ranking	5	3	3	4	3
<b>Overall Ranking</b>	<b>20</b>	<b>33.5</b>	<b>21.5</b>	<b>21</b>	<b>19</b>
<b>Overall Ranking</b>	<b>High</b>	<b>High</b>	<b>Medium-High</b>	<b>Medium-High</b>	<b>Medium-High</b>

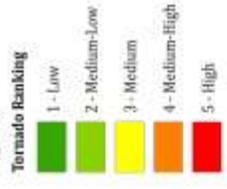
**Hazard Identification & Risk Assessment**

A number of factors have been considered in this risk assessment in the able to compare between jurisdictions and hazards. The factors have been added together to calculate the overall total ranking for each hazard.

$$Risk = PV * 0.5 + PW * 0.5 + GE * 1.5 + EY * 1.0 + PD * 1.0 + CD * 1.0 + DT * 1.0 + IN * 1.0 + LP * 1.5$$

- where:
- PV=Population Vulnerability
- PW=Population Density
- GE=Geographic Exant
- EY=Events
- PD=Property Damage
- CD=Crop Damage
- DT=Deaths
- IN=Injuries
- LP=Local Plan Risk Assessment

**Legend:**



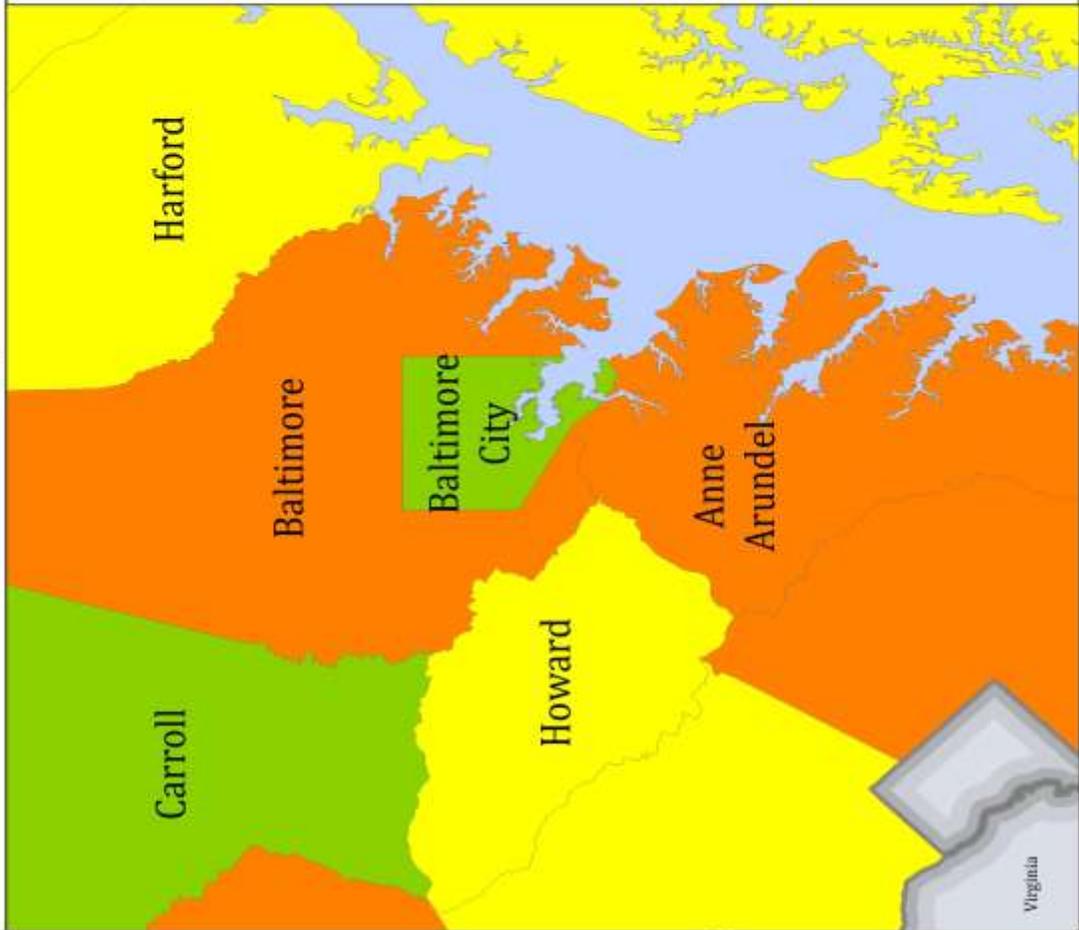
Projection:  
 Maryland State Plane  
 North American Datum 1983



**Data Sources:**  
 Maryland Emergency Management Agency  
 Federal Emergency Management Agency  
 Maryland Local Hazard Mitigation Plans  
 NOAA NCEC Storm Events (1950 - 2015)  
 Tornado Frequency & Intensity  
 SRA State & County Boundaries

**DISCLAIMER:** Heavy-duty weather data is available to be used at various or regional scales. The purpose of the data sets are to give general indications of areas that may be susceptible to hazards in order to identify potential risk in the State of Maryland. Data has been used beyond the original intent.

**Central Region Wildfire Risk**  
 Maryland 2016 Hazard Mitigation Plan



**Wildfire Hazard Ranking & Risk Map**

State of Maryland  
 Hazard Mitigation Plan 2016

RISK FACTORS - WEIGHTED	COUNTY					
	Anne Arundel	Baltimore	Carroll	Harford	Howard	Baltimore City
Population Vulnerability	4	4	3	3	3	4
Population Density	3	3	2	3	3	4
Injuries	2	1	1	1	2	1
Deaths	1	1	1	1	1	1
Property Damage	1	1	1	1	1	1
Crop Damage	1	1	1	1	1	1
Geographic Exant	3	2	1	2	2	1
Events	4	4	4	4	4	3
Local Plan Ranking	0	3	0	0	1	0
<b>Overall Ranking</b>	<b>17</b>	<b>19</b>	<b>12</b>	<b>14</b>	<b>16.5</b>	<b>12.5</b>
<b>Overall Ranking</b>	<b>Medium-High</b>	<b>Medium-High</b>	<b>Low</b>	<b>Medium</b>	<b>Medium</b>	<b>Medium-Low</b>

**Hazard Identification & Risk Assessment**

A number of factors have been considered in this risk assessment to be able to compare between jurisdictions and hazards. The factors have been added together to calculate the overall total ranking for each hazard.

$$Risk = PV * 0.5 + PW * 0.5 + GE * 1.5 + EY * 1.0 + PD * 1.0 + CD * 1.0 + DT * 1.0 + IN * 1.0 + LP * 1.5$$

- where:
- PV=Population Vulnerability
  - PW=Population Density
  - GE=Geographic Exant
  - EY=Events
  - PD=Property Damage
  - CD=Crop Damage
  - DT=Deaths
  - IN=Injuries
  - LP=Local Plan Risk Assessment

**Legend:**

- Wildfire Ranking**
- 1 - Low
  - 2 - Medium-Low
  - 3 - Medium
  - 4 - Medium-High
  - 5 - High

Projection:  
 Maryland State Plane  
 North American Datum 1983



**Data Sources:**  
 Maryland Emergency Management Agency  
 Federal Emergency Management Agency  
 Maryland Local Hazard Mitigation Plans  
 NOAA NCEC Storm Events (1998 - 2015)  
 MD DNR Forest Service  
 SRA State & County Boundaries

**DISCLAIMER:** Heavy-duty, suitable hazard data is necessary to be used as a national or regional scale. The purpose of the data sets are to give general indications of areas that may be susceptible to hazards in order to identify potential risk in the State of Maryland. Data has been used beyond the original intent.

# Central Region Wind Risk Maryland 2016 Hazard Mitigation Plan

## Wind Hazard Ranking & Risk Map

State of Maryland  
Hazard Mitigation Plan 2016

RISK FACTORS - WEIGHTED	COUNTY				
	Anne Arundel	Baltimore	Carroll	Harford	Howard - Baltimore City
Population Vulnerability	4	4	3	3	4
Population Density	3	3	2	3	4
Injuries	2	2	2	2	2
Deaths	4	4	4	1	1
Property Damage	2	2	2	2	2
Crop Damage	1	1	2	1	1
Geographic Extent	1	1	1	1	1
Events	4	4	4	4	3
Local Plan Ranking	0	3	0	4	3
<b>Overall Rating</b>	<b>10 - High</b>	<b>22.5 - Medium-High</b>	<b>10 - High</b>	<b>20.5 - Medium-High</b>	<b>19 - Medium-High</b>
<b>Overall Ranking</b>	<b>High</b>	<b>Medium-High</b>	<b>High</b>	<b>Medium-High</b>	<b>Medium-High</b>

### Hazard Identification & Risk Assessment

A number of factors have been considered in this risk assessment to be able to compare between jurisdictions and hazards. The factors have been added together to calculate the overall total ranking for each hazard.

$$Risk = PV(0.5 + PW(0.5 + GE(1.5 + EP(1.0 + PP(1.0 + CD(1.0 + DT(1.0 + IN(1.0 + LP(1.5$$

- where
- PV=Population Vulnerability
  - PW=Population Density
  - GE=Geographic Extent
  - EP=Events
  - PP=Property Damage
  - CD=Crop Damage
  - DT=Deaths
  - IN=Injuries
  - LP=Local Plan Risk Assessment

### Legend:

#### Wind Ranking

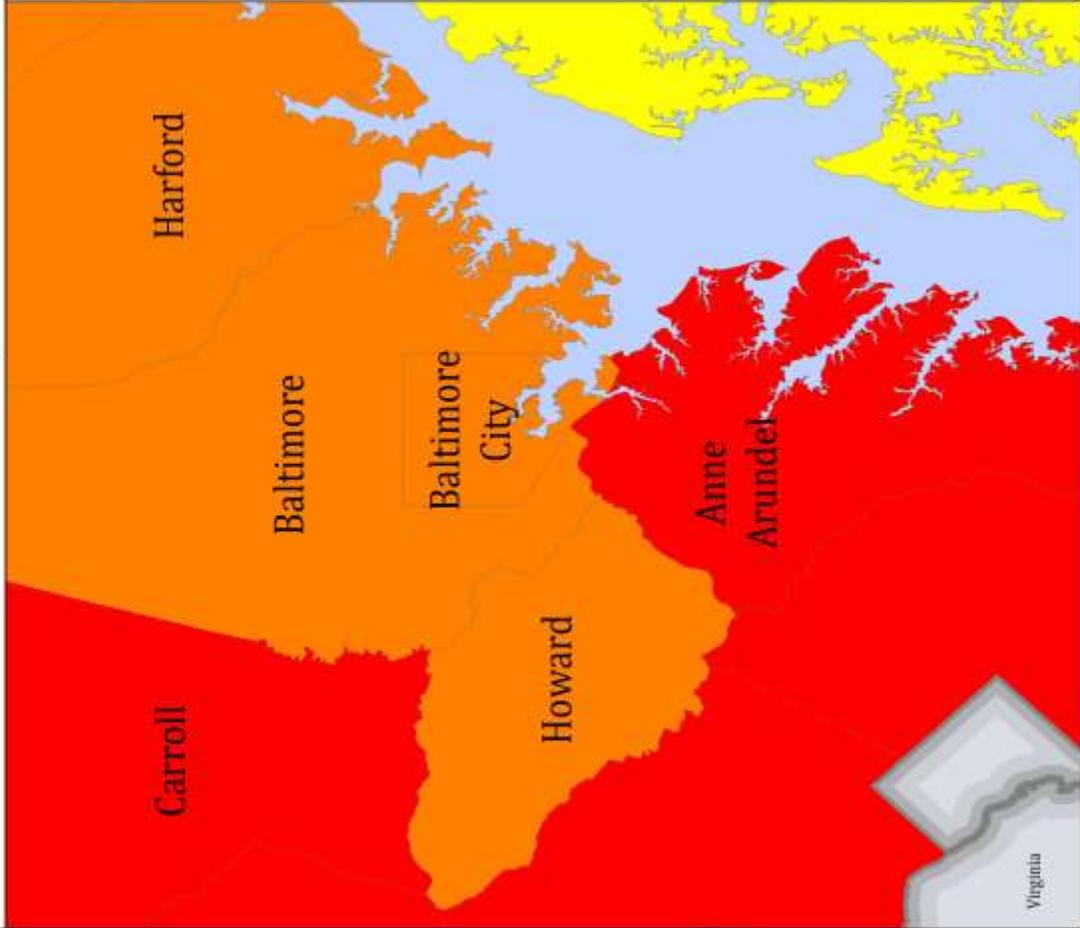
- 1 - Low
- 2 - Medium-Low
- 3 - Medium
- 4 - Medium-High
- 5 - High

Projection: Maryland State Plane North American Datum 1983

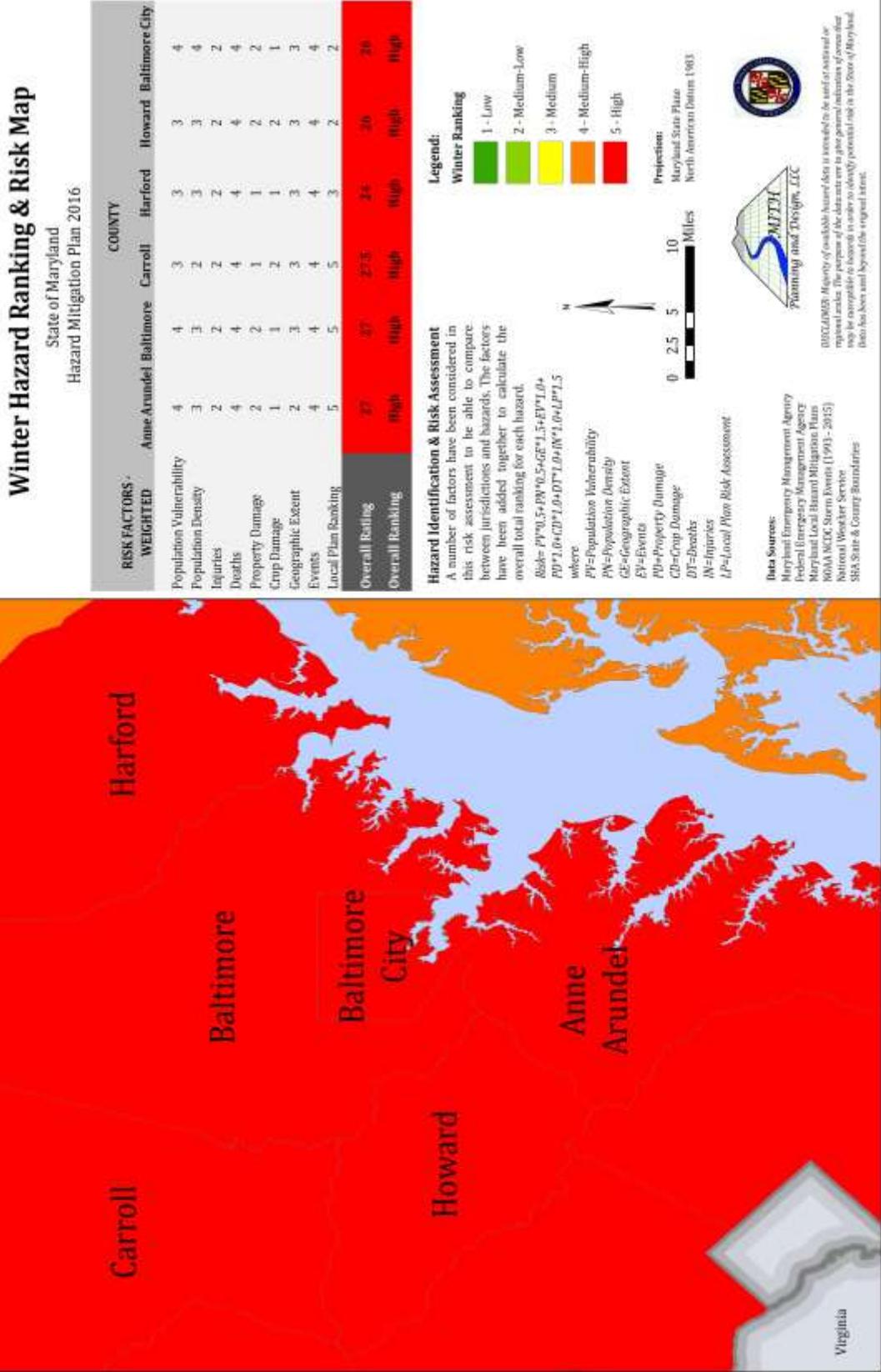


**Data Sources:**  
 Maryland Emergency Management Agency  
 Federal Emergency Management Agency  
 Maryland Local Hazard Mitigation Plans  
 NOAA NCEC Storm Events (1993 - 2015)  
 2012 IBC & IRC  
 SHA State & County Boundaries

DISCLAIMER: Agency of available hazard data is intended to be used as a reference for regional trends. The purpose of the data sets are to give general indications of overall risk maps for comparison in order to identify potential risk in the State of Maryland. Data has been used beyond the original source.



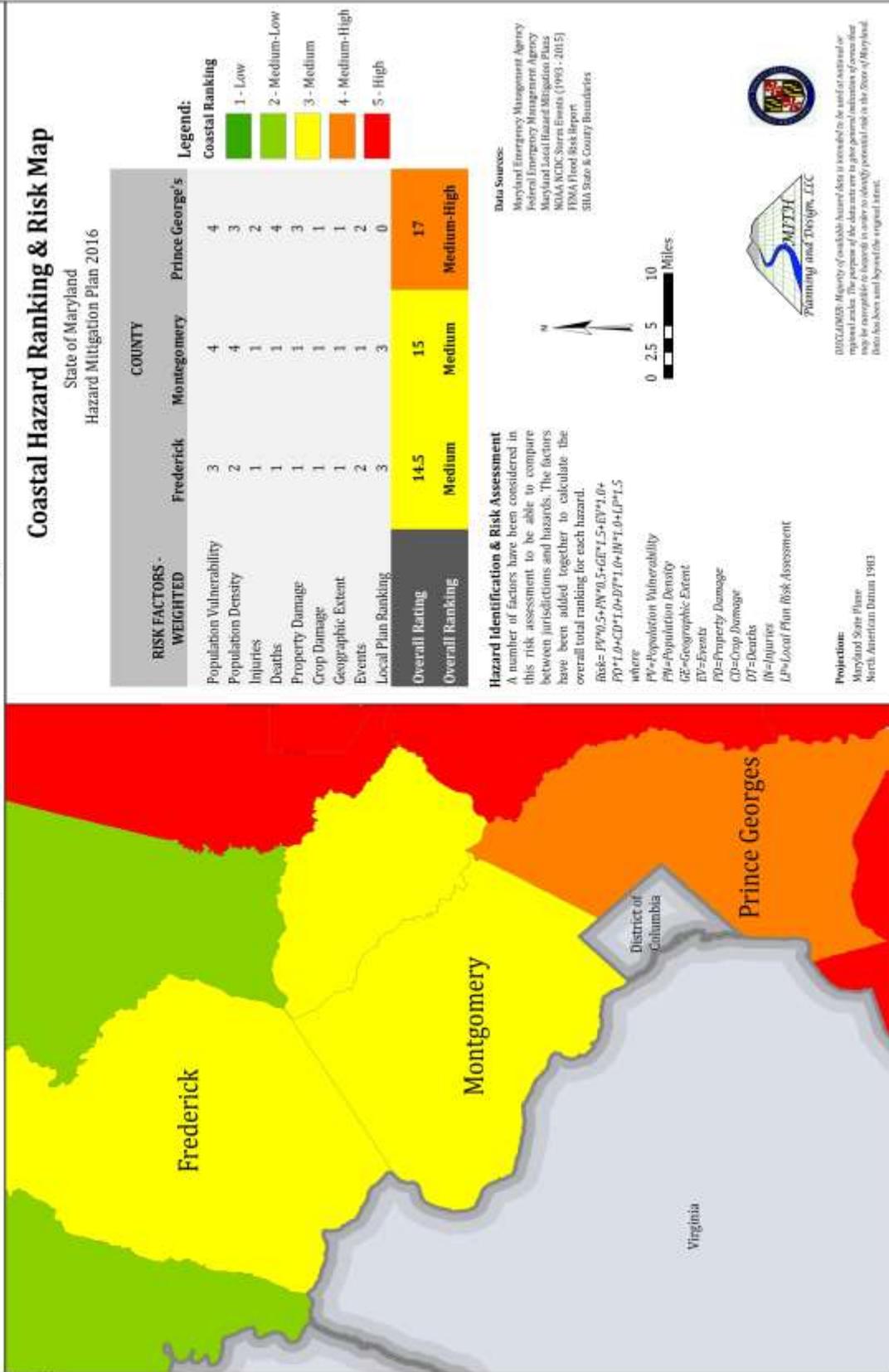
# Central Region Winter Risk Maryland 2016 Hazard Mitigation Plan



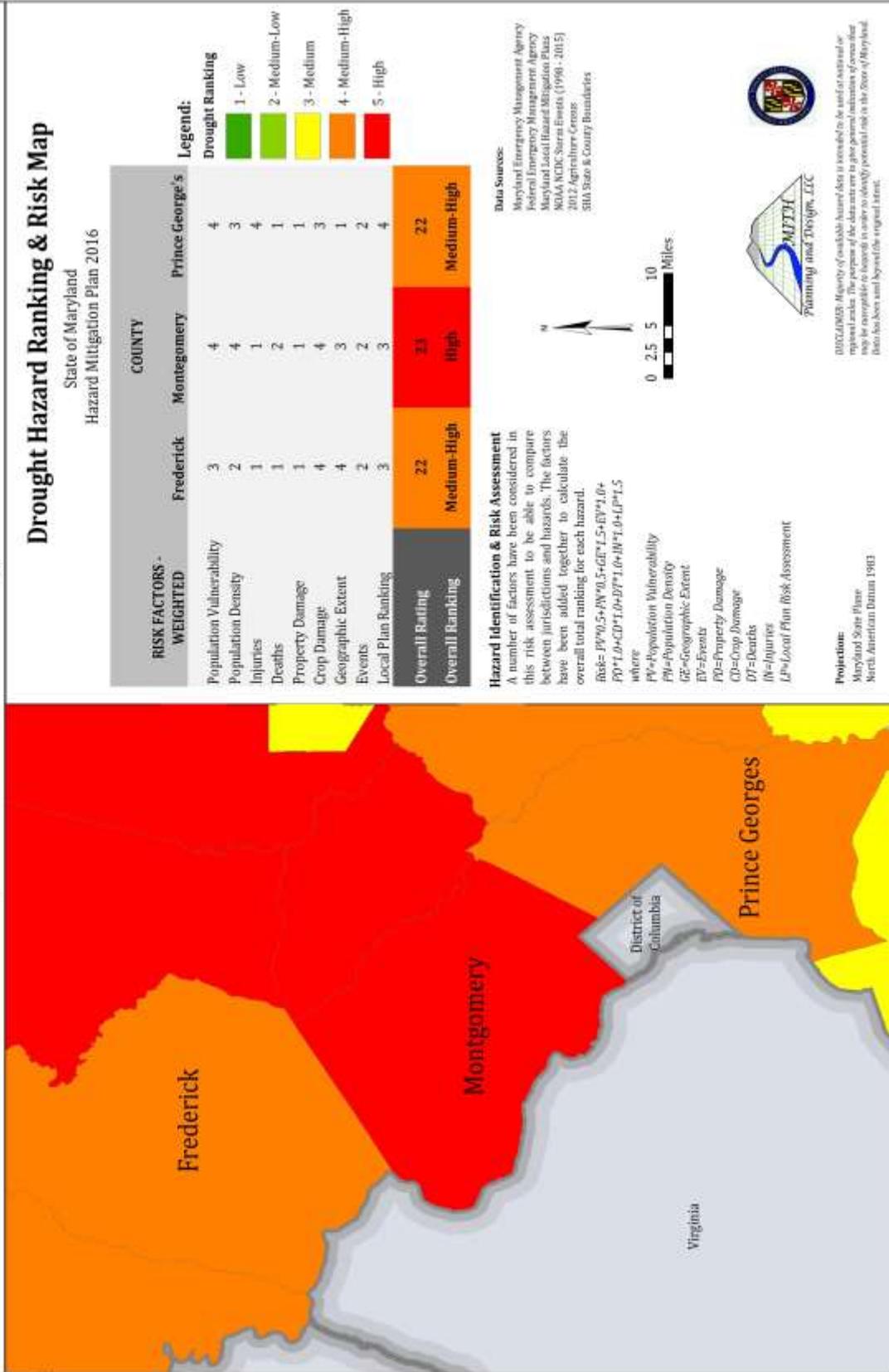
**c. National Capital Region**

Frederick and Prince George’s Counties’ risk assessment for flood were ranked “High,” while Montgomery County was “medium-high.” All counties were ranked “high” in regards to Winter Storm. Additionally, all counties were ranked “high” or “medium-high” for all hazards with the exception of Frederick and Montgomery Counties for Coastal and Montgomery County for Wildfire, which were ranked “medium.”

National Capital Region Coastal Risk  
Maryland 2016 Hazard Mitigation Plan



National Capital Region Drought Risk  
Maryland 2016 Hazard Mitigation Plan



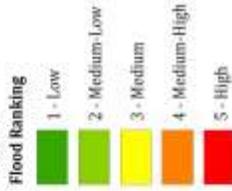
# National Capital Region Flood Risk Maryland 2016 Hazard Mitigation Plan

## Flood Hazard Ranking & Risk Map

State of Maryland  
Hazard Mitigation Plan 2016

RISK FACTORS - WEIGHTED	Frederick	Montgomery	Prince George's
Population Vulnerability	3	4	4
Population Density	2	4	3
Injuries	2	2	2
Deaths	4	4	1
Property Damage	1	1	3
Crop Damage	1	1	1
Geographic Extent	1	1	2
Events	4	4	4
Local Plan Ranking	5	3	5
<b>Overall Rating</b>	<b>23.5</b>	<b>22</b>	<b>25</b>
<b>Overall Ranking</b>	<b>High</b>	<b>Medium-High</b>	<b>High</b>

### Legend:



**Hazard Identification & Risk Assessment**  
A number of factors have been considered in this risk assessment to be able to compare between jurisdictions and hazards. The factors have been added together to calculate the overall total ranking for each hazard.

$$Risk = PV * 0.5 + IN * 0.5 + GE * 1.5 + EV * 1.0 + PD * 1.0 + CD * 1.0 + DT * 1.0 + IN * 1.0 + LP * 1.5$$

where:

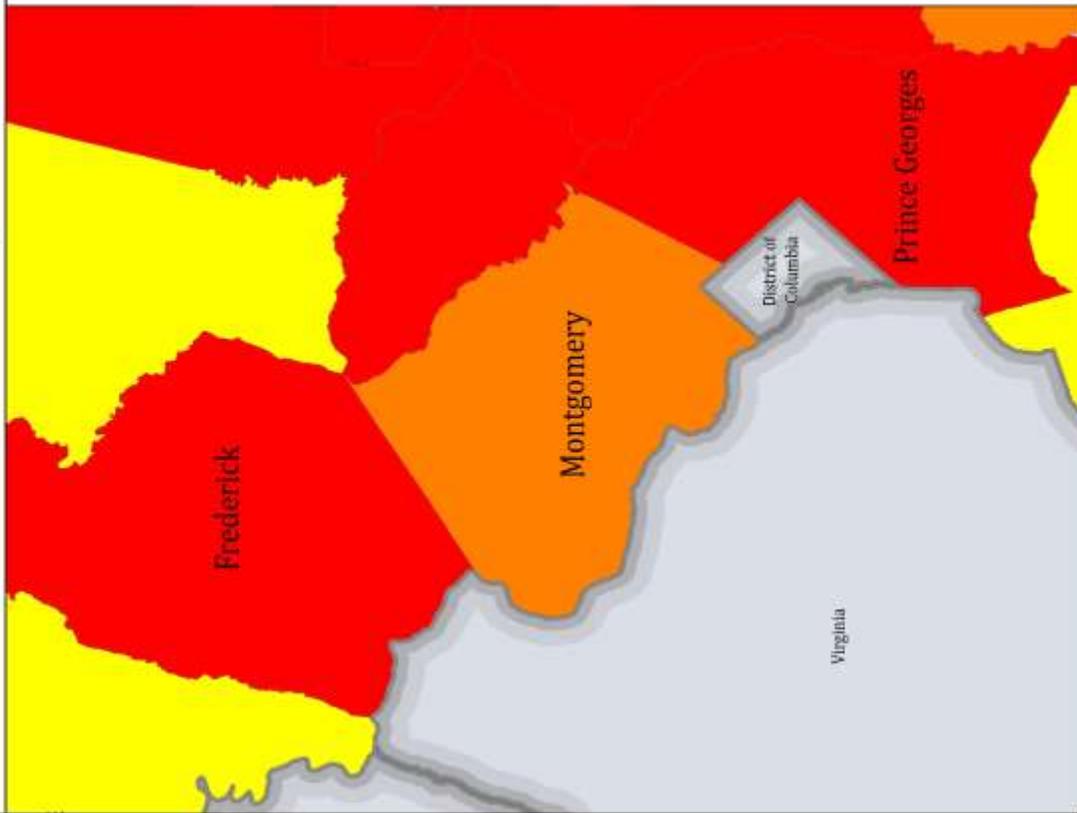
- PV=Population Vulnerability
- IN=Population Density
- GE=Geographic Extent
- EV=Events
- PD=Property Damage
- CD=Crop Damage
- DT=Deaths
- IN=Injuries
- LP=Local Plan Risk Assessment

**Data Sources:**  
Maryland Emergency Management Agency  
Federal Emergency Management Agency  
Maryland Local Hazard Mitigation Plans  
NOAA NCEC Storm Events (1993 - 2013)  
FEMA IFFRR  
SHA State & County Boundaries



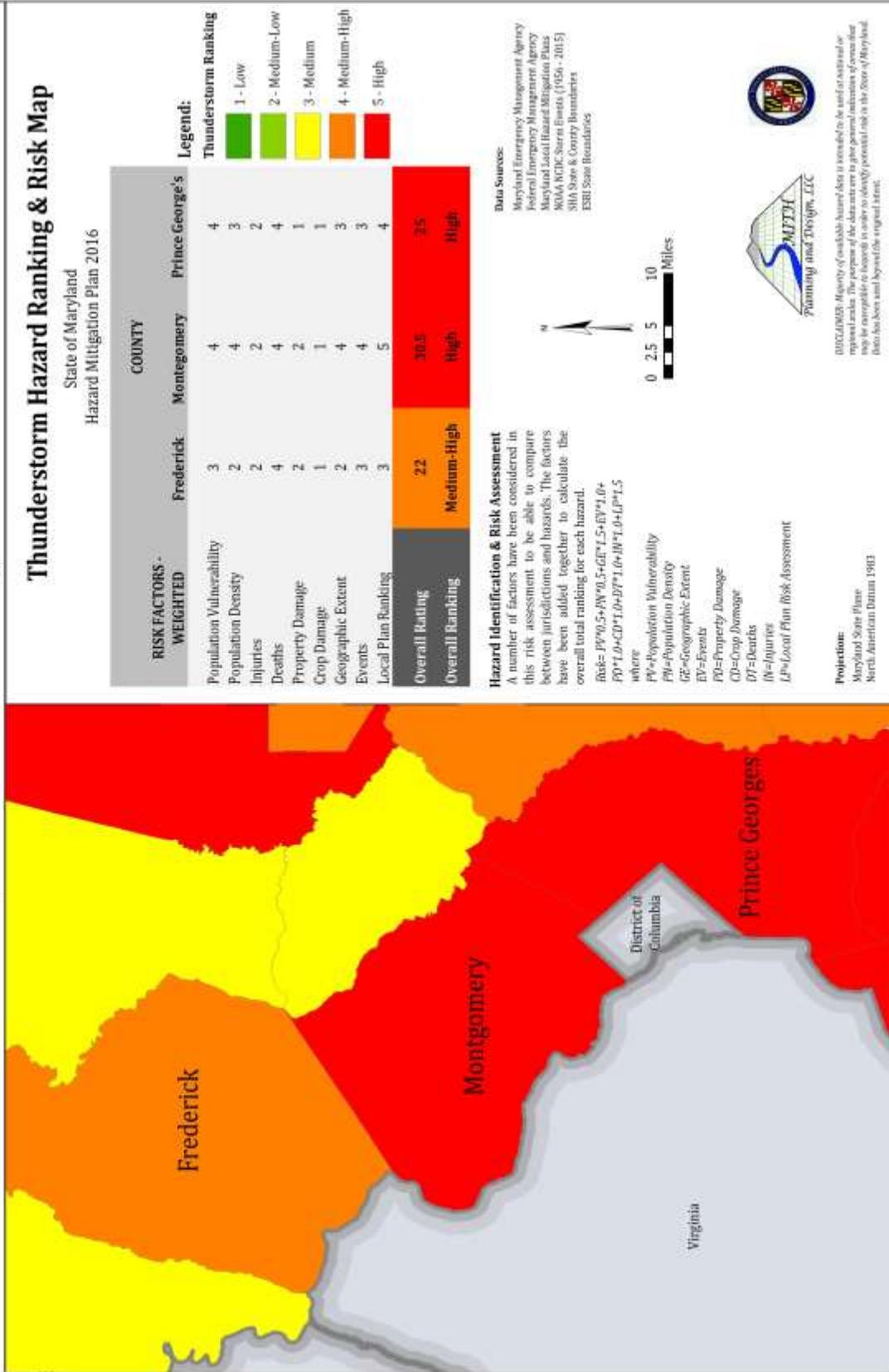
**DISCLAIMER:** Accuracy of available hazard data is essential to be used as evidenced or regional scales. The purpose of the data sets are to give general indications of overall flood risk for metropolitan in order to identify potential risk to the State of Maryland. Data has been used beyond the original source.

**Projection:**  
Maryland State Plane  
North American Datum 1983



# National Capital Region Thunderstorm Risk

## Maryland 2016 Hazard Mitigation Plan



National Capital Region Tornado Risk  
 Maryland 2016 Hazard Mitigation Plan

Tornado Hazard Ranking & Risk Map

State of Maryland  
 Hazard Mitigation Plan 2016

RISK FACTORS - WEIGHTED	COUNTY			Tornado Ranking Legend:
	Frederick	Montgomery	Prince George's	
Population Vulnerability	3	4	4	
Population Density	2	4	3	
Injuries	2	2	2	
Deaths	1	1	4	
Property Damage	2	2	4	
Crop Damage	2	1	1	
Geographic Extent	4	3	4	
Events	4	3	4	
Local Plan Ranking	5	1	0	
<b>Overall Rating</b>	<b>37</b>	<b>19</b>	<b>34.5</b>	
<b>Overall Ranking</b>	<b>High</b>	<b>Medium-High</b>	<b>High</b>	

**Hazard Identification & Risk Assessment**  
 A number of factors have been considered in this risk assessment to be able to compare between jurisdictions and hazards. The factors have been added together to calculate the overall total ranking for each hazard.

$$Risk = PV * 0.5 + IN * 0.5 + GE * 1.5 + EP * 1.0 + PD * 1.0 + CD * 1.0 + DT * 1.0 + I * 1.0 + L * 1.5$$

where

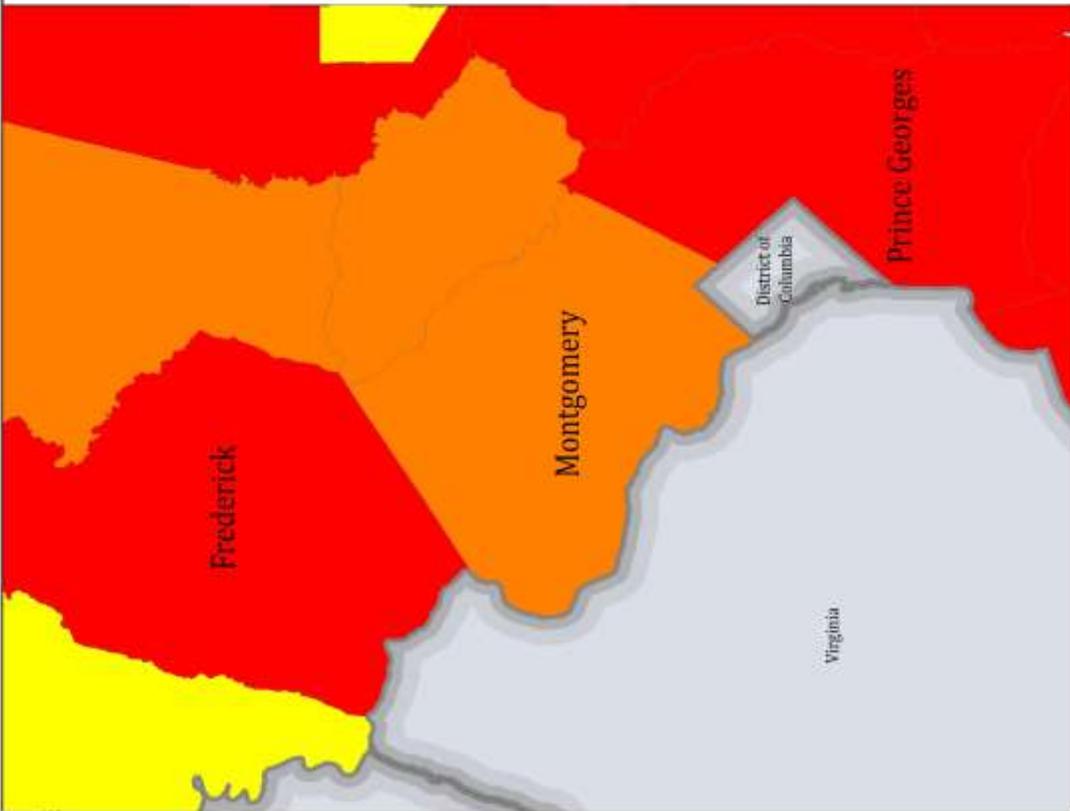
- PV=Population Vulnerability
- IN=Population Density
- GE=Geographic Extent
- EP=Events
- PD=Property Damage
- CD=Crop Damage
- DT=Deaths
- I=Injuries
- L=Local Plan Risk Assessment

**Projection:**  
 Maryland State Plane  
 North American Datum 1983

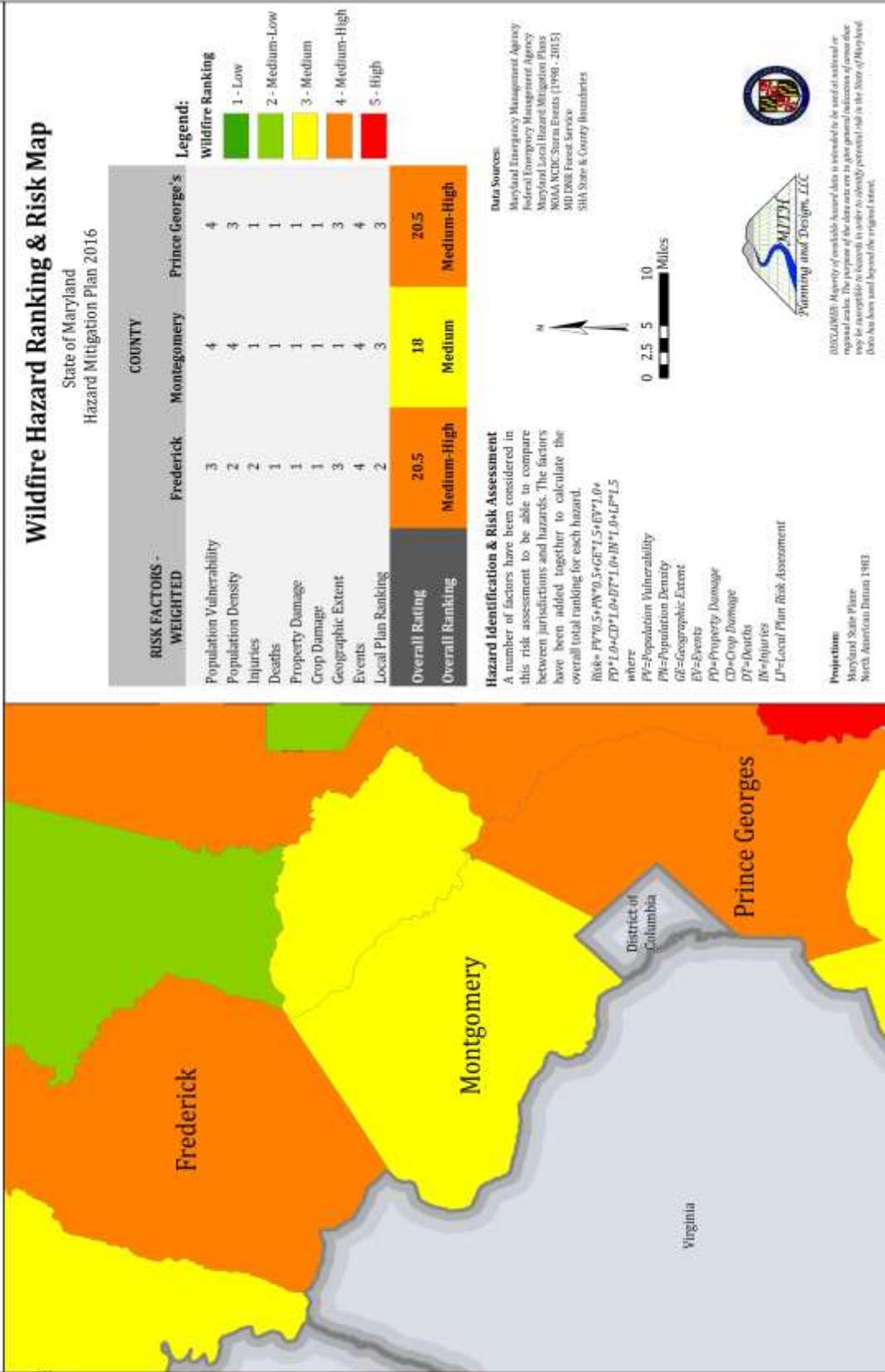
**Data Sources:**  
 Maryland Emergency Management Agency  
 Federal Emergency Management Agency  
 Maryland Local Hazard Mitigation Plans  
 NOAA NCDC Storm Events (1950 - 2015)  
 Storms Frequency & Intensity  
 SBA State & County Boundaries



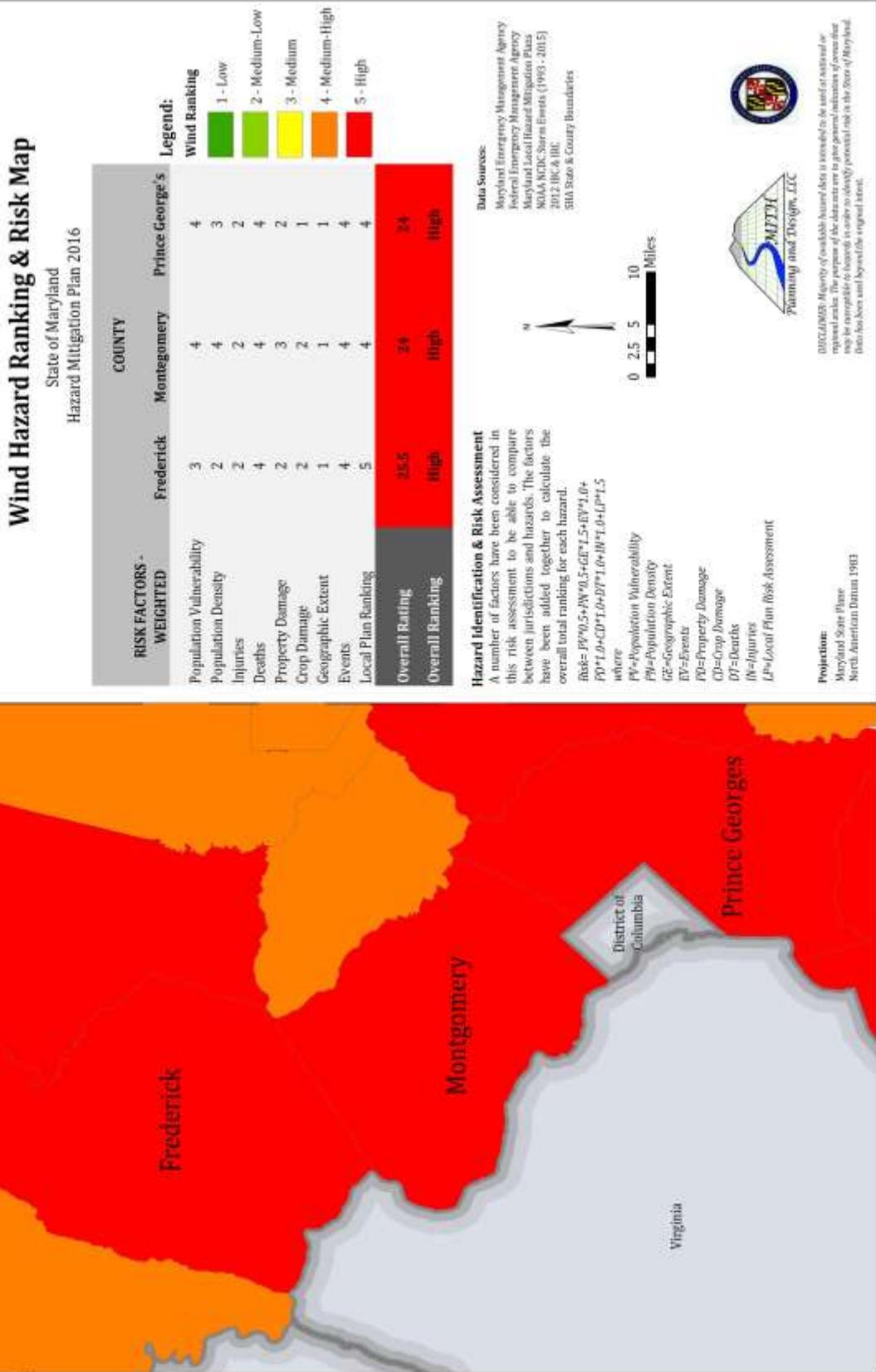
**DISCLAIMER:** Heavy-duty weather data is provided to be used as a general or regional index. The purpose of the data sets are to give general indications of areas that may be susceptible to hazards in order to identify potential risk in the State of Maryland. Data has been used beyond the original intent.



National Capital Region Wildfire Risk  
Maryland 2016 Hazard Mitigation Plan



# National Capital Region Wind Risk Maryland 2016 Hazard Mitigation Plan

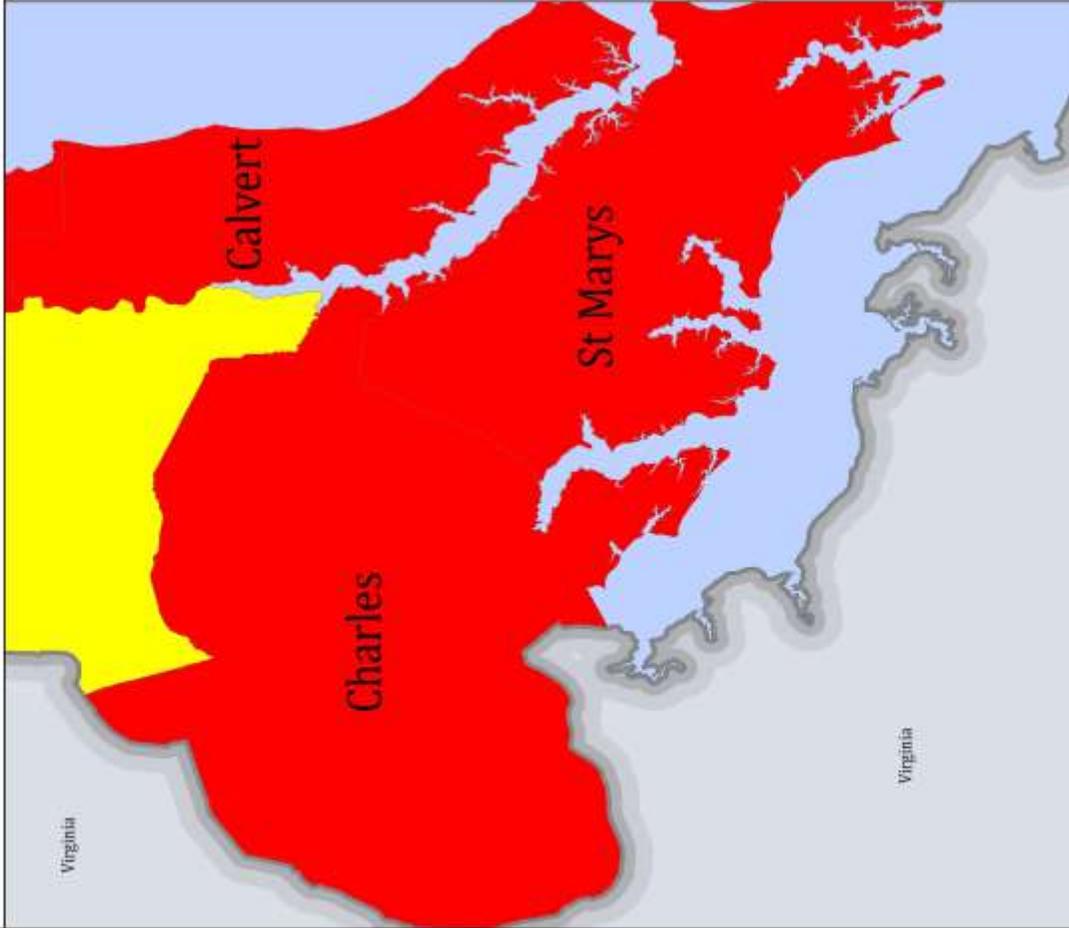




**d. Southern Region**

In terms of Flood risk, all counties within the Southern Region were ranked differently. St. Mary's County was ranked "High," while Calvert was "medium-high" and Charles was "medium." Furthermore, Calvert County was ranked "high" for Wildfire, however, Charles and St. Mary's Counties were ranked "medium." The risk assessment for all other hazards in the Southern Region were ranked "high" or "medium-high."

# Southern Region Coastal Risk Maryland 2016 Hazard Mitigation Plan



## Coastal Hazard Ranking & Risk Map

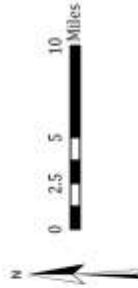
State of Maryland  
Hazard Mitigation Plan 2016

RISK FACTORS - WEIGHTED	Calvert	Charles	St. Marys	COUNTY
Population Vulnerability	2	3	2	2
Population Density	2	2	2	2
Injuries	2	2	2	2
Deaths	4	4	4	4
Property Damage	4	3	4	4
Crop Damage	1	1	2	2
Geographic Extent	4	3	4	4
Events	3	2	3	3
Local Plan Ranking	5	1	5	5
<b>Overall Rating</b>	<b>29.5</b>	<b>25</b>	<b>30.5</b>	
<b>Overall Ranking</b>	<b>High</b>	<b>High</b>	<b>High</b>	<b>High</b>

**Hazard Identification & Risk Assessment**  
A number of factors have been considered in this risk assessment to be able to compare between jurisdictions and hazards. The factors have been added together to calculate the overall total ranking for each hazard.

$$Risk = PV * 0.5 + PW * 0.5 + GE * 1.5 + EP * 1.0 + PD * 1.0 + CI * 1.0 + DT * 1.0 + IN * 1.0 + LP * 1.5$$

- where
- PV=Population Vulnerability
  - PW=Population Density
  - GE=Geographic Extent
  - EP=Events
  - PD=Property Damage
  - CI=Crop Damage
  - DT=Deaths
  - IN=Injuries
  - LP=Local Plan Risk Assessment



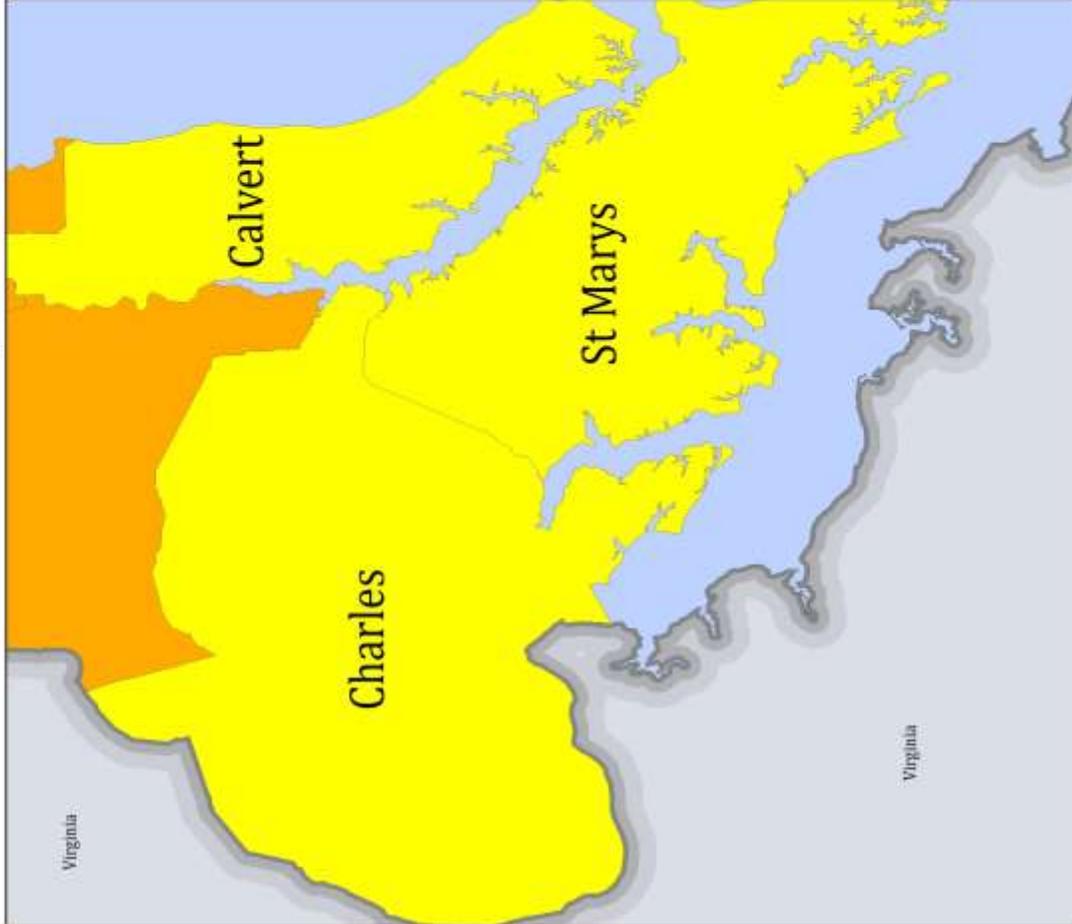
**Data Sources:**  
 Maryland Emergency Management Agency  
 Federal Emergency Management Agency  
 Maryland Local Hazard Mitigation Plans  
 NOAA NCEC Storm Events (1993 - 2015)  
 FEMA Flood Risk Report  
 All State & County Boundaries  
 Esri State Boundaries

**Projection:**  
 Maryland State Plane  
 North American Datum 1983



**DISCLAIMER:** Integrity of available hazard data is intended to be used at national or regional scales. The purpose of the data sets are to give general indications of current threat, not be acceptable to rely on to identify potential risk to the State of Maryland. Data has been used beyond the original intent.

# Southern Region Drought Risk Maryland 2016 Hazard Mitigation Plan



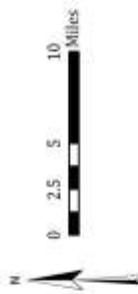
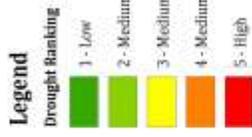
## Drought Hazard Ranking & Risk Map

State of Maryland  
Hazard Mitigation Plan 2016

RISK FACTORS - WEIGHTED	Calvert	COUNTY	Charles	St. Marys
Population Vulnerability	2	3	2	2
Population Density	2	2	2	2
Injuries	1	1	1	1
Deaths	1	1	1	1
Property Damage	1	1	1	1
Crop Damage	3	3	3	3
Geographic Extent	2	2	2	2
Events	2	2	2	2
Local Plan Ranking	3	2	3	3
<b>Overall Rating</b>	<b>17.5</b>	<b>16.5</b>	<b>17.5</b>	<b>17.5</b>
<b>Overall Ranking</b>	<b>Medium</b>	<b>Medium</b>	<b>Medium</b>	<b>Medium</b>

**Hazard Identification & Risk Assessment**  
A number of factors have been considered in this risk assessment to be able to compare between jurisdictions and hazards. The factors have been added together to calculate the overall total ranking for each hazard.

$Risk = PV \times 0.5 + PW \times 0.5 + GE \times 1.5 + EV \times 1.0 + PD \times 1.0 + CD \times 1.0 + DT \times 1.0 + IN \times 1.0 + LP \times 1.5$   
where  
 PV=Population Vulnerability  
 PW=Population Density  
 GE=Geographic Extent  
 EV=Events  
 PD=Property Damage  
 CD=Crop Damage  
 DT=Deaths  
 IN=Injuries  
 LP=Local Plan Risk Assessment



**Data Sources:**  
 Maryland Emergency Management Agency  
 Federal Emergency Management Agency  
 Maryland Local Hazard Mitigation Plans  
 NOAA NCEP Storm Events (1998 - 2015)  
 2012 Agriculture Census  
 2011 State & County Boundaries  
 ESRI State Boundaries

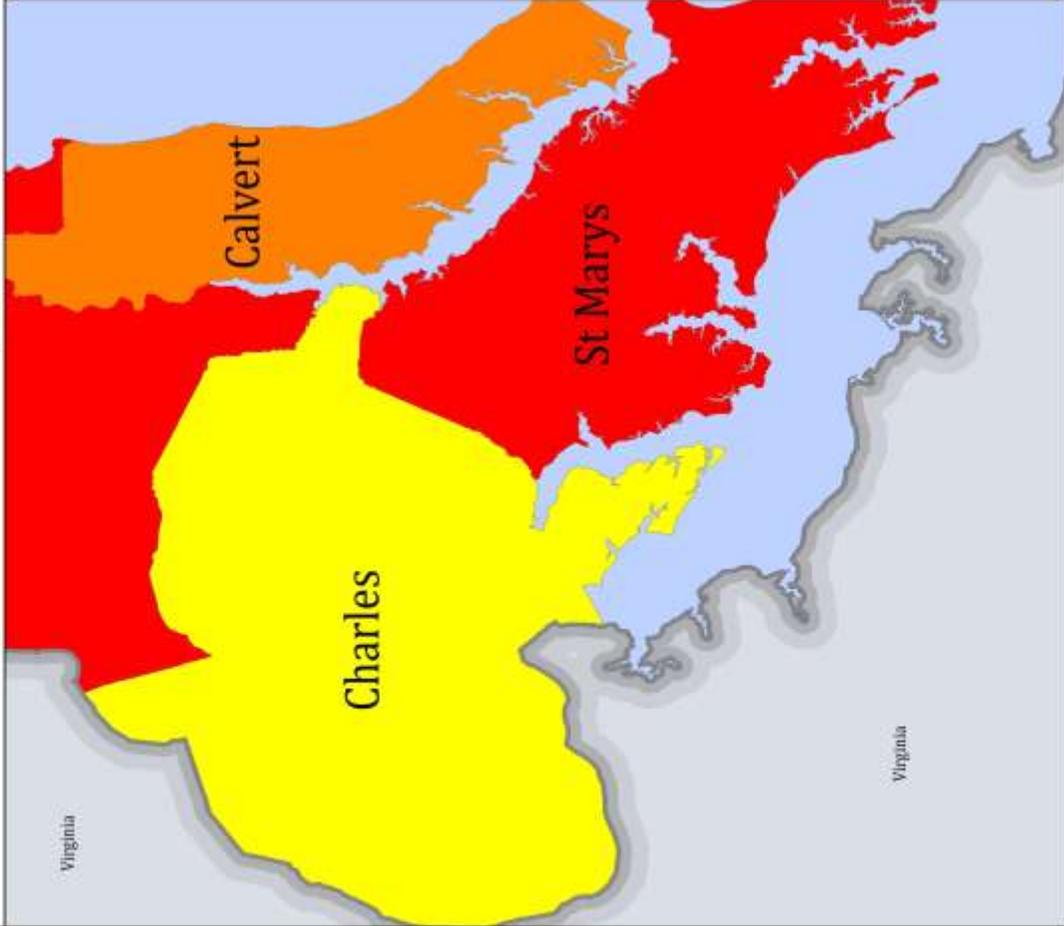
**Projection:**  
 Maryland State Plane  
 North American Datum 1983



**DISCLAIMER:** Heavy-duty, available hazard data is necessary to be used as warranted or regional scales. The purpose of the data sets are to give general indications of areas that may be susceptible to hazards in order to identify potential risk in the State of Maryland. Data has been used beyond the original intent.

# Southern Region Flood Risk

## Maryland 2016 Hazard Mitigation Plan



### Flood Hazard Ranking & Risk Map

State of Maryland  
Hazard Mitigation Plan 2016

RISK FACTORS - WEIGHTED	Calvert	Charles	St. Mary's
Population Vulnerability	2	3	2
Population Density	2	2	2
Injuries	1	1	1
Deaths	1	1	1
Property Damage	4	3	4
Crop Damage	1	1	2
Geographic Extent	2	2	2
Events	2	2	3
Local Plan Ranking	5	3	5
<b>Overall Rating</b>	<b>21.5</b>	<b>18</b>	<b>23.5</b>
<b>Overall Ranking</b>	<b>Medium-High</b>	<b>Medium</b>	<b>High</b>

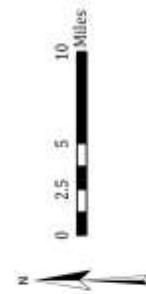
**Hazard Identification & Risk Assessment**  
A number of factors have been considered in this risk assessment to be able to compare between jurisdictions and hazards. The factors have been added together to calculate the overall total ranking for each hazard.

$$Risk = PV * 0.5 + PW * 0.5 + GE * 1.5 + EV * 1.0 + PD * 1.0 + CD * 1.0 + DT * 1.0 + IW * 1.0 + LP * 1.5$$

where:  
 PV=Population Vulnerability  
 PW=Population Density  
 GE=Geographic Extent  
 EV=Events  
 PD=Property Damage  
 CD=Crop Damage  
 DT=Deaths  
 IW=Injuries  
 LP=Local Plan Risk Assessment

**Legend**  
Flood Ranking

- 1 - Low
- 2 - Medium-Low
- 3 - Medium
- 4 - Medium-High
- 5 - High



**Data Sources:**  
 Maryland Emergency Management Agency  
 Federal Emergency Management Agency  
 Maryland Local Hazard Mitigation Plans  
 NOAA NCEC Storm Events (1993 - 2015)  
 FEMA OFDM  
 SHA State & County Boundaries  
 ESRI State Boundaries

**Projections:**  
 Maryland State Plane  
 North American Datum 1983



**DISCLAIMER:** Agency of available hazard data is intended to be used as national or regional scales. The purpose of the data sets are to give general indications of areas that may be susceptible to hazards in order to identify potential risk in the State of Maryland. Data has been used beyond the original intent.

Southern Region Thunderstorm Risk  
Maryland 2016 Hazard Mitigation Plan



Thunderstorm Hazard Ranking & Risk Map

State of Maryland  
Hazard Mitigation Plan 2016

**Hazard Identification & Risk Assessment**  
A number of factors have been considered in this risk assessment to be able to compare between jurisdictions and hazards. The factors have been added together to calculate the overall total ranking for each hazard.

RISK FACTORS - WEIGHTED	COUNTY	
	Calvert	St. Marys
Population Vulnerability	2	2
Population Density	2	2
Injuries	2	1
Deaths	4	1
Property Damage	1	1
Crop Damage	1	1
Geographic Extent	2	2
Events	2	3
Local Plan Ranking	5	4
<b>Overall Rating</b>	<b>22.5</b>	<b>19.5</b>
<b>Overall Ranking</b>	<b>Medium-High</b>	<b>Medium-High</b>

$Risk = PV(0.5) + PW(0.5) + CD(1.5) + E(1.0) +$   
 $PP(1.0) + CP(1.0) + DT(1.0) + IN(1.0) + LP(1.5)$   
where  
PV=Population Vulnerability  
PW=Population Density  
CD=Geographic Extent  
E=Events  
PP=Property Damage  
CP=Crop Damage  
DT=Deaths  
IN=Injuries  
LP=Local Plan Risk Assessment

**Legend**

- Thunderstorm Ranking**
- 1 - Low
  - 2 - Medium-Low
  - 3 - Medium
  - 4 - Medium-High
  - 5 - High

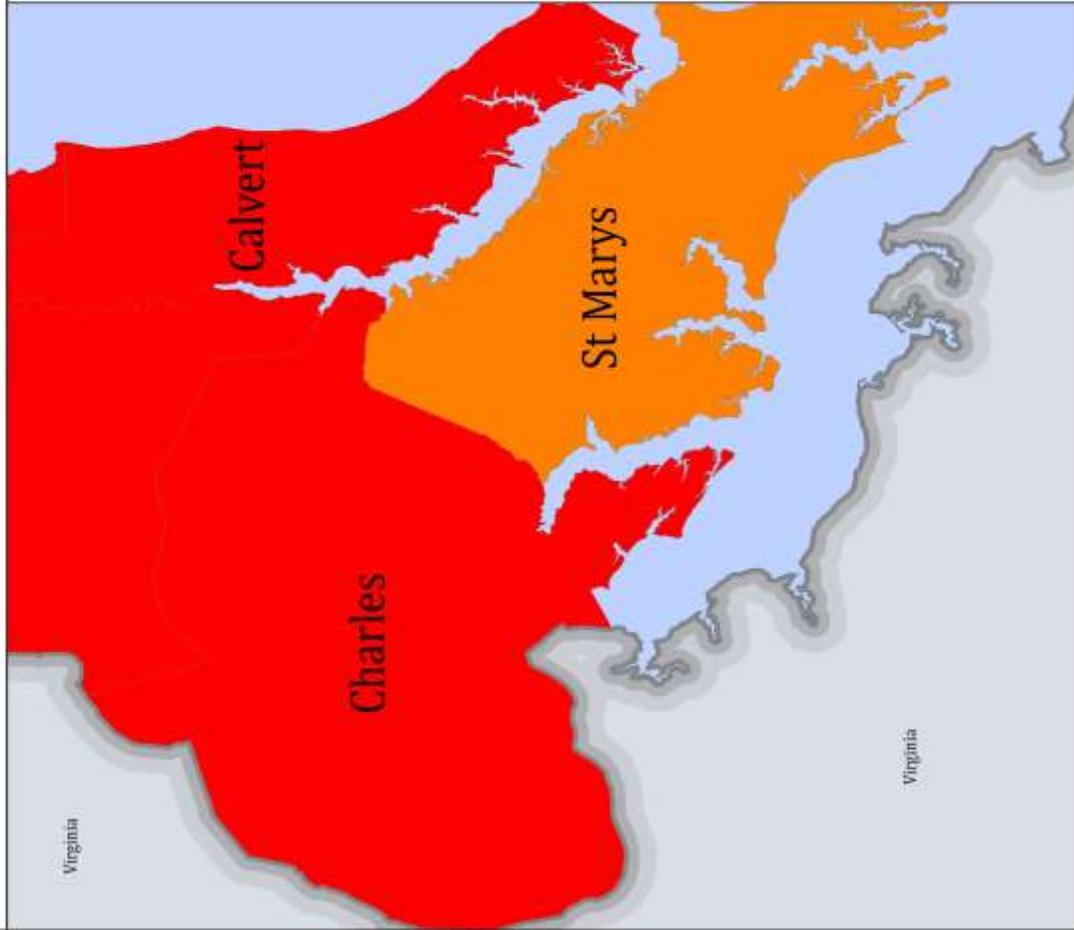
**Data Sources**  
Maryland Emergency Management Agency  
Federal Emergency Management Agency  
Maryland Local Hazard Mitigation Plans  
NOAA NCEC Storm Events (1996 - 2015)  
SHA State & County Boundaries  
ESRI State Boundaries

**Projection:**  
Maryland State Plane  
North American Datum 1983



**DISCLAIMER:** Hazardity of candidate hazard data is intended to be used as a national or regional scale. The purpose of the data sets are to give general indications of areas that may be susceptible to hazard in order to identify potential risk in the State of Maryland. Data has been used beyond the original intent.

# Southern Region Tornado Risk Maryland 2016 Hazard Mitigation Plan



## Tornado Hazard Ranking & Risk Map

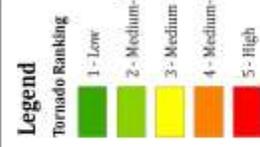
State of Maryland  
Hazard Mitigation Plan 2016

RISK FACTORS - WEIGHTED	Calvert	Charles	St. Marys
Population Vulnerability	2	3	2
Population Density	2	2	2
Injuries	2	2	2
Deaths	4	4	1
Property Damage	3	4	2
Crop Damage	1	1	1
Geographic Extent	2	3	2
Events	2	3	2
Local Plan Ranking	5	4	5
<b>Overall Rating</b>	<b>24.3</b>	<b>27</b>	<b>20.5</b>
<b>Overall Ranking</b>	<b>High</b>	<b>High</b>	<b>Medium-High</b>

**Hazard Identification & Risk Assessment**  
A number of factors have been considered in this risk assessment to be able to compare between jurisdictions and hazards. The factors have been added together to calculate the overall total ranking for each hazard.

$$Risk = PV(0.5) + PW(0.5) + GE(1.5) + EV(1.0) + PD(1.0) + CD(1.0) + DT(1.0) + IN(1.0) + LP(1.5)$$

where  
 PV=Population Vulnerability  
 PW=Population Density  
 GE=Geographic Extent  
 EV=Events  
 PD=Property Damage  
 CD=Crop Damage  
 DT=Deaths  
 IN=Injuries  
 LP=Local Plan Risk Assessment



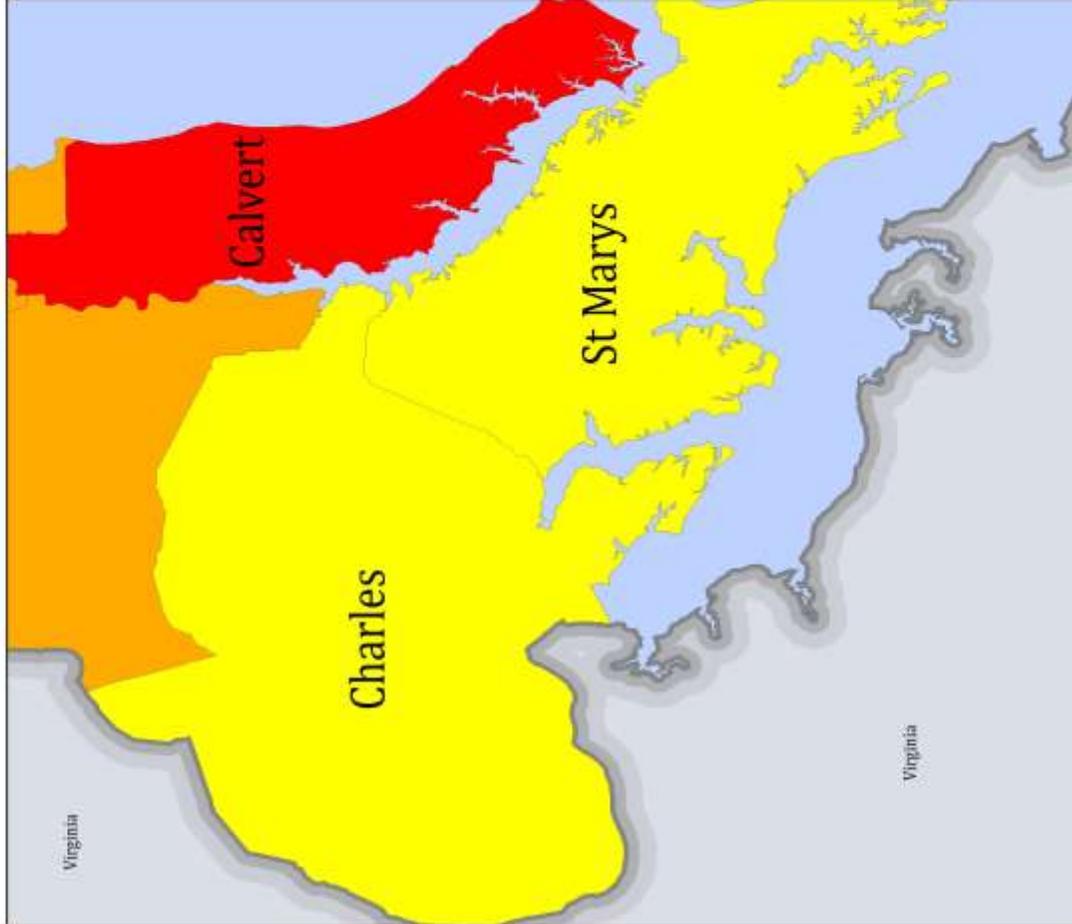
**Data Sources:**  
 Maryland Emergency Management Agency  
 Federal Emergency Management Agency  
 Maryland Local Hazard Mitigation Plans  
 NOAA NCEC Storm Events (1950-2015)  
 Tornado Frequency & Intensity  
 SHA State & County Boundaries  
 ESRI State Boundaries

**Projection:**  
 Maryland State Plane  
 North American Datum 1983



**DISCLAIMER:** Integrity of available hazard data is assumed to be used at national or regional scales. The purpose of the data sets are to give general indications of areas that may be susceptible to flooding in order to identify potential risk in the State of Maryland. Data has been used beyond the original intent.

# Southern Region Wildfire Risk Maryland 2016 Hazard Mitigation Plan



## Wildfire Hazard Ranking & Risk Map

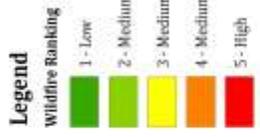
State of Maryland  
Hazard Mitigation Plan 2016

RISK FACTORS - WEIGHTED	Calvert	Charles	St. Marys
Population Vulnerability	2	3	2
Population Density	2	2	2
Injuries	1	1	1
Deaths	1	1	1
Property Damage	1	1	1
Crop Damage	1	1	1
Geographic Extent	4	4	4
Events	4	4	4
Local Plan Ranking	5	1	1
<b>Overall Rating</b>	<b>23.5</b>	<b>18</b>	<b>17.5</b>
<b>Overall Ranking</b>	<b>High</b>	<b>Medium</b>	<b>Medium</b>

**Hazard Identification & Risk Assessment**  
A number of factors have been considered in this risk assessment to be able to compare between jurisdictions and hazards. The factors have been added together to calculate the overall total ranking for each hazard.

$$Risk = PV(0.5) + PW(0.5) + GE(1.5) + EV(1.0) + PD(1.0) + CD(1.0) + DT(1.0) + IN(1.0) + LP(1.5)$$

where  
 PV=Population Vulnerability  
 PW=Population Density  
 GE=Geographic Extent  
 EV=Events  
 PD=Property Damage  
 CD=Crop Damage  
 DT=Deaths  
 IN=Injuries  
 LP=Local Plan Risk Assessment



**Data Sources:**  
 Maryland Emergency Management Agency  
 Federal Emergency Management Agency  
 Maryland Local Hazard Mitigation Plan  
 NOAA NCEP Storm Events (1998 - 2015)  
 MD DNR Forest Service  
 SHA State & County Boundaries  
 ESRI State Boundaries

**Projection:**  
 Maryland State Plane  
 North American Datum 1983



**DISCLAIMER:** Integrity of available hazard data is essential to be used at national or regional scales. The purpose of the data sets is to give general indications of areas that may be susceptible to flooding in order to identify potential risk in the State of Maryland. Data has been used beyond the original intent.

# Southern Region Wind Risk Maryland 2016 Hazard Mitigation Plan



## Wind Hazard Ranking & Risk Map

State of Maryland  
Hazard Mitigation Plan 2016

RISK FACTORS - WEIGHTED	COUNTY	
	Calvert	St. Marys
Population Vulnerability	2	3
Population Density	2	2
Injuries	2	2
Deaths	1	4
Property Damage	2	2
Crop Damage	2	2
Geographic Extent	1	1
Events	4	4
Local Plan Ranking	0	0
<b>Overall Rating</b>	<b>14.5</b>	<b>17.5</b>
<b>Overall Ranking</b>	<b>Medium-High</b>	<b>Medium-High</b>

**Hazard Identification & Risk Assessment**  
A number of factors have been considered in this risk assessment to be able to compare between jurisdictions and hazards. The factors have been added together to calculate the overall total ranking for each hazard.

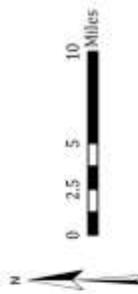
$$Risk = PV * 0.5 + PW * 0.5 + GE * 1.5 + EV * 1.0 + IP * 1.0 + CD * 1.0 + DT * 1.0 + IN * 1.0 + LP * 1.5$$

where  
 PV=Population Vulnerability  
 PW=Population Density  
 GE=Geographic Extent  
 EV=Events  
 IP=Property Damage  
 CD=Crop Damage  
 DT=Deaths  
 IN=Injuries  
 LP=Local Plan Risk Assessment

**Legend**

**Wind Ranking**

- 1 - Low
- 2 - Medium-Low
- 3 - Medium
- 4 - Medium-High
- 5 - High



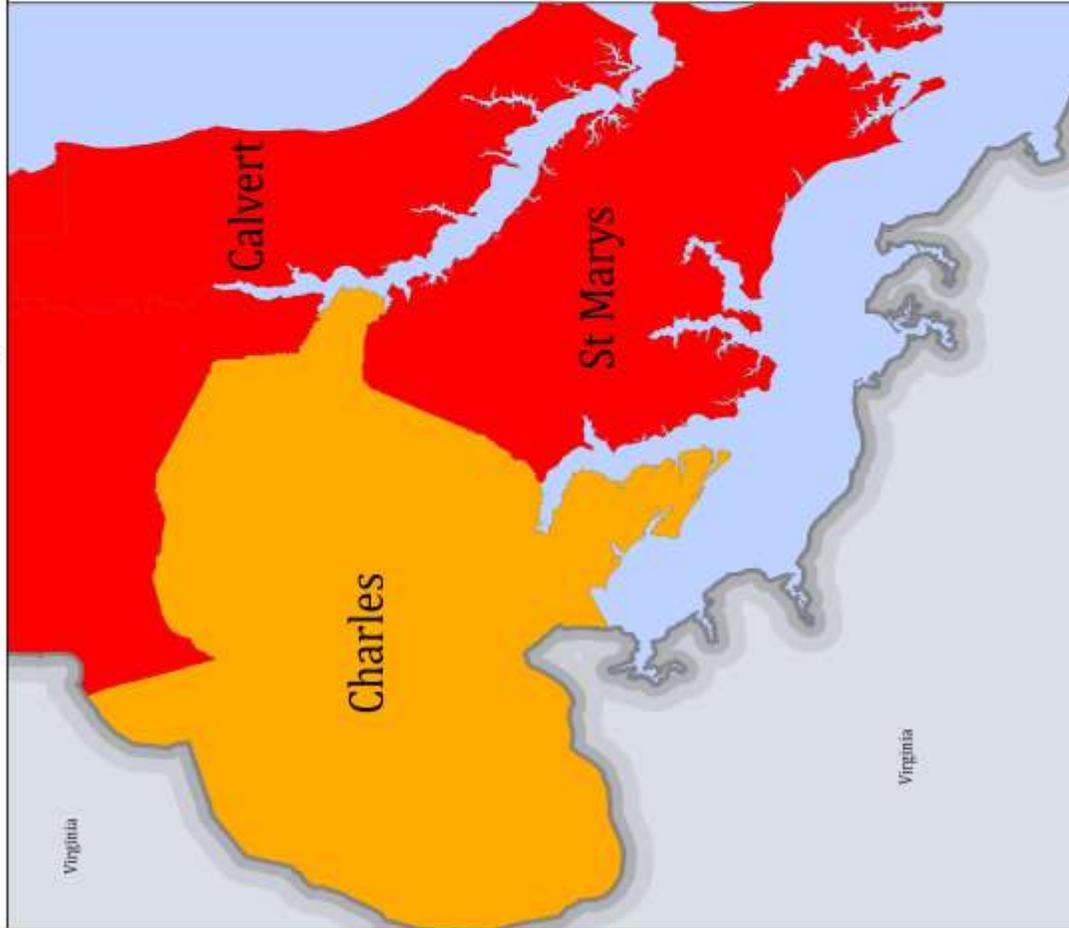
**Data Sources:**  
 Maryland Emergency Management Agency  
 Federal Emergency Management Agency  
 Maryland Local Hazard Mitigation Plans  
 NOAA NCEP Storm Events (1956 - 2015)  
 2012 IUC & IBC  
 SHA State & County Boundaries  
 ESRI State Boundaries

**Projection:**  
 Maryland State Plane  
 North American Datum 1983



**DISCLAIMER:** Integrity of available hazard data is essential to be used at national or regional scales. The purpose of the data sets is to give general indications of areas that may be susceptible to flooding in order to identify potential risk in the State of Maryland. Data has been used beyond the original intent.

**Southern Region Winter Storm Risk**  
 Maryland 2016 Hazard Mitigation Plan



**Winter Storm Hazard Ranking & Risk Map**

State of Maryland  
 Hazard Mitigation Plan 2016

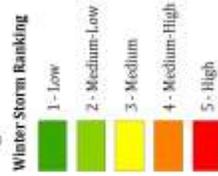
RISK FACTORS - WEIGHTED	Calvert	Charles	St. Marys
Population Vulnerability	2	3	2
Population Density	2	2	2
Injuries	2	2	2
Deaths	4	4	4
Property Damage	1	1	1
Crop Damage	1	1	1
Geographic Extent	1	1	1
Events	4	4	4
Local Plan Ranking	5	3	5
<b>Overall Rating</b>	<b>23</b>	<b>20.5</b>	<b>23</b>
<b>Overall Ranking</b>	<b>High</b>	<b>Medium-High</b>	<b>High</b>

**Hazard Identification & Risk Assessment**  
 A number of factors have been considered in this risk assessment to be able to compare between jurisdictions and hazards. The factors have been added together to calculate the overall total ranking for each hazard.

$Risk = PV \times 0.5 + PW \times 0.5 + GE \times 1.5 + EV \times 1.0 + PD \times 1.0 + CD \times 1.0 + DT \times 1.0 + IN \times 1.0 + LP \times 1.5$

where:  
 PV=Population Vulnerability  
 PW=Population Density  
 GE=Geographic Extent  
 EV=Events  
 PD=Property Damage  
 CD=Crop Damage  
 DT=Deaths  
 IN=Injuries  
 LP=Local Plan Risk Assessment

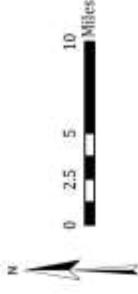
**Legend**



**Data Sources**  
 Maryland Emergency Management Agency  
 Federal Emergency Management Agency  
 Maryland Local Hazard Mitigation Plans  
 NOAA NCEC Storm Events (1993 - 2015)  
 National Weather Service  
 SHA State & County Boundaries  
 ESRI State Boundaries

**Projection**  
 Maryland State Plane  
 North American Datum 1983

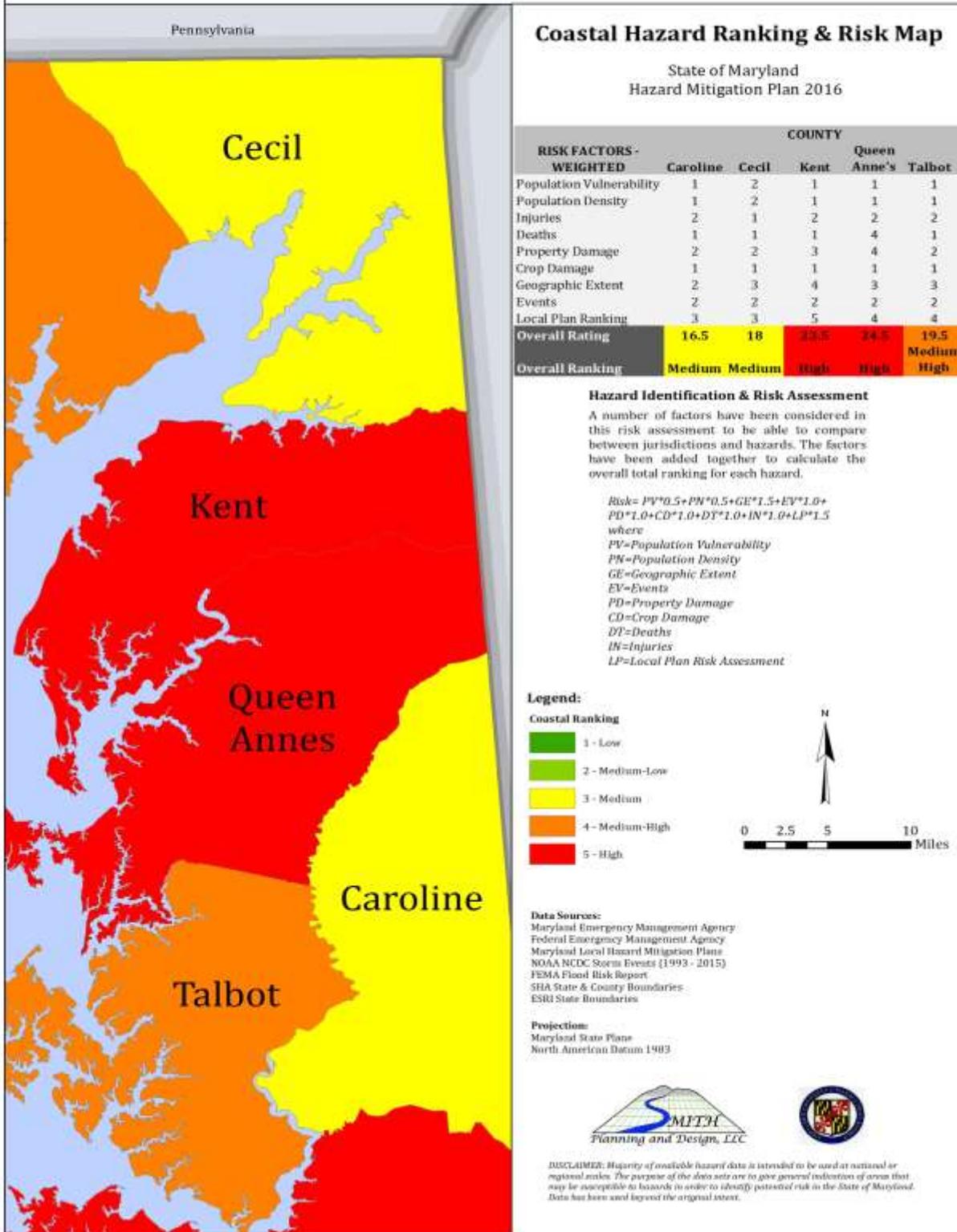
**DISCLAIMER:** Agency of available hazard data is intended to be used for national or regional scale. The purpose of the data is not to provide a guarantee of accuracy or completeness. The data is not intended to be used for individual property level risk assessment. Data has been used beyond the project intent.



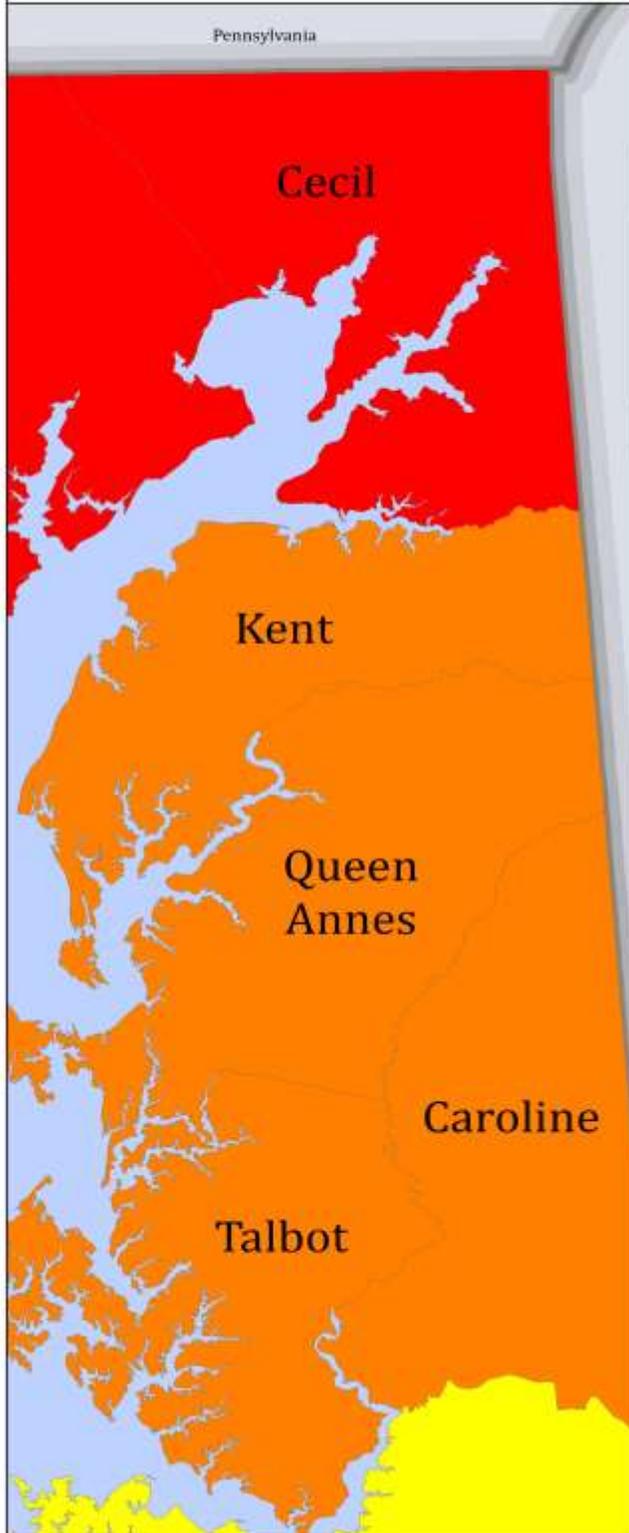
**e. Upper Eastern Shore Region**

In regards to the Coastal hazard, Talbot County was assessed as having a “medium-high” risk, while surrounding coastal counties were ranked “high.” Cecil County was ranked “medium-high” for both Thunderstorm, Wind and Tornado, however, the remaining counties with the Upper Eastern Shore Region ranked these hazards as “low” to “medium” risk.

## Upper Eastern Shore Region Coastal Risk Maryland 2016 Hazard Mitigation Plan



# Upper Eastern Shore Region Drought Risk Maryland 2016 Hazard Mitigation Plan



## Drought Hazard Ranking & Risk Map

State of Maryland  
Hazard Mitigation Plan 2016

RISK FACTORS - WEIGHTED	COUNTY				
	Caroline	Cecil	Kent	Queen Anne's	Talbot
Population Vulnerability	1	2	1	1	1
Population Density	1	2	1	1	1
Injuries	1	4	1	1	1
Deaths	1	1	1	1	1
Property Damage	1	1	1	1	1
Crop Damage	1	1	1	1	1
Geographic Extent	4	4	4	4	4
Events	4	4	4	4	4
Local Plan Ranking	3	5	3	4	3
<b>Overall Rating</b>	<b>19.5</b>	<b>26.5</b>	<b>19.5</b>	<b>21</b>	<b>19.5</b>
<b>Overall Ranking</b>	<b>Medium-High</b>	<b>High</b>	<b>Medium-High</b>	<b>Medium-High</b>	<b>Medium-High</b>

### Hazard Identification & Risk Assessment

A number of factors have been considered in this risk assessment to be able to compare between jurisdictions and hazards. The factors have been added together to calculate the overall total ranking for each hazard.

$$Risk = PV*0.5 + PN*0.5 + GE*1.5 + EV*1.0 + PD*1.0 + CD*1.0 + DT*1.0 + IN*1.0 + LP*1.5$$

where

PV=Population Vulnerability

PN=Population Density

GE=Geographic Extent

EV=Events

PD=Property Damage

CD=Crop Damage

DT=Deaths

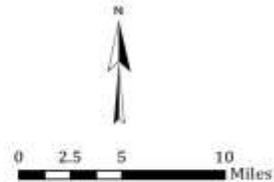
IN=Injuries

LP=Local Plan Risk Assessment

### Legend:

#### Drought Ranking

- 1 - Low
- 2 - Medium-Low
- 3 - Medium
- 4 - Medium-High
- 5 - High



### Data Sources:

Maryland Emergency Management Agency  
Federal Emergency Management Agency  
Maryland Local Hazard Mitigation Plans  
NOAA NCEC Storm Events (1995 - 2015)  
2012 Agriculture Census  
SHA State & County Boundaries  
ESRI State Boundaries

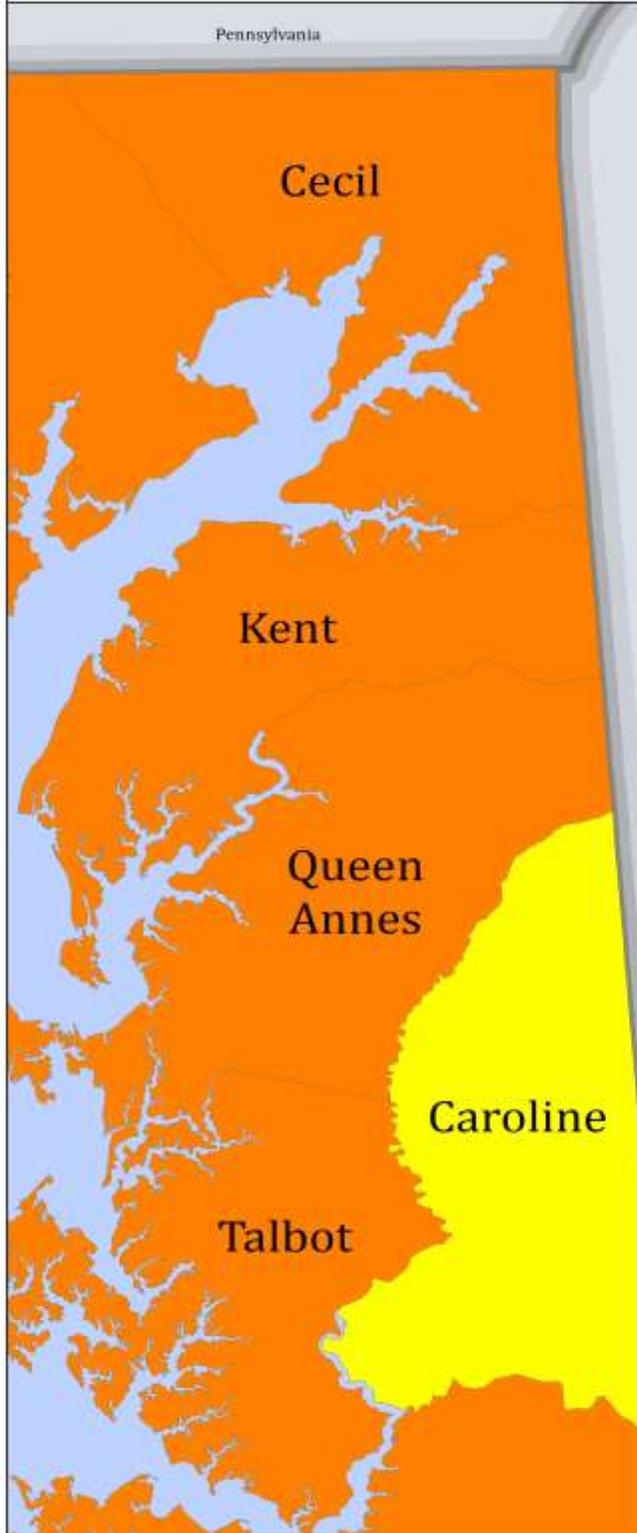
### Projection:

Maryland State Plane  
North American Datum 1983



**DISCLAIMER:** Majority of available hazard data is intended to be used at national or regional scales. The purpose of the data sets are to give general indication of areas that may be susceptible to hazards in order to identify potential risk in the State of Maryland. Data has been used beyond the original intent.

# Upper Eastern Shore Region Flood Risk Maryland 2016 Hazard Mitigation Plan



## Flood Hazard Ranking & Risk Map

State of Maryland  
Hazard Mitigation Plan 2016

RISK FACTORS - WEIGHTED	COUNTY				
	Caroline	Cecil	Kent	Queen Anne's	Talbot
Population Vulnerability	1	2	1	1	1
Population Density	1	2	1	1	1
Injuries	2	2	1	2	1
Deaths	1	1	1	1	1
Property Damage	2	2	3	4	2
Crop Damage	1	1	1	1	1
Geographic Extent	1	2	2	2	3
Events	3	4	2	3	3
Local Plan Ranking	4	3	5	4	5
<b>Overall Rating</b>	<b>17.5</b>	<b>19.5</b>	<b>19.5</b>	<b>21</b>	<b>21</b>
<b>Overall Ranking</b>	<b>Medium</b>	<b>High</b>	<b>High</b>	<b>High</b>	<b>High</b>

### Hazard Identification & Risk Assessment

A number of factors have been considered in this risk assessment to be able to compare between jurisdictions and hazards. The factors have been added together to calculate the overall total ranking for each hazard.

$$Risk = PV*0.5 + PN*0.5 + GE*1.5 + EV*1.0 + PD*1.0 + CD*1.0 + DT*1.0 + IN*1.0 + LP*1.5$$

where

PV=Population Vulnerability

PN=Population Density

GE=Geographic Extent

EV=Events

PD=Property Damage

CD=Crop Damage

DT=Deaths

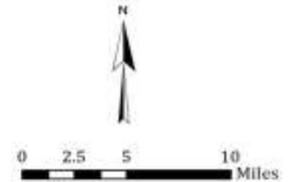
IN=Injuries

LP=Local Plan Risk Assessment

### Legend:

#### Flood Ranking

- 1 - Low
- 2 - Medium-Low
- 3 - Medium
- 4 - Medium-High
- 5 - High



### Data Sources:

Maryland Emergency Management Agency  
Federal Emergency Management Agency  
Maryland Local Hazard Mitigation Plans  
NOAA NCDC Storm Events (1993 - 2015)  
FEMA DFIRM  
SHA State & County Boundaries  
ESH State Boundaries

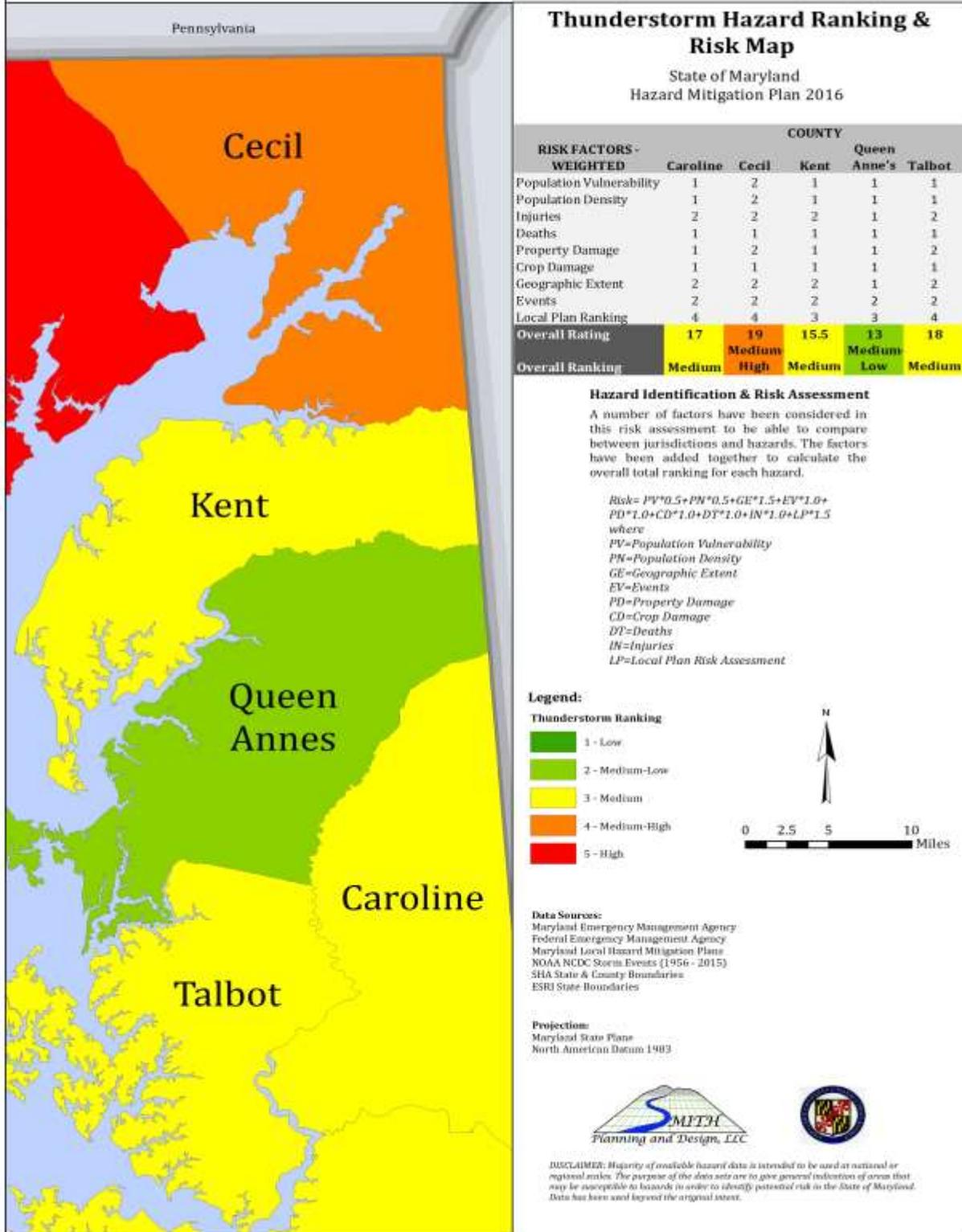
### Projection:

Maryland State Plane  
North American Datum 1983

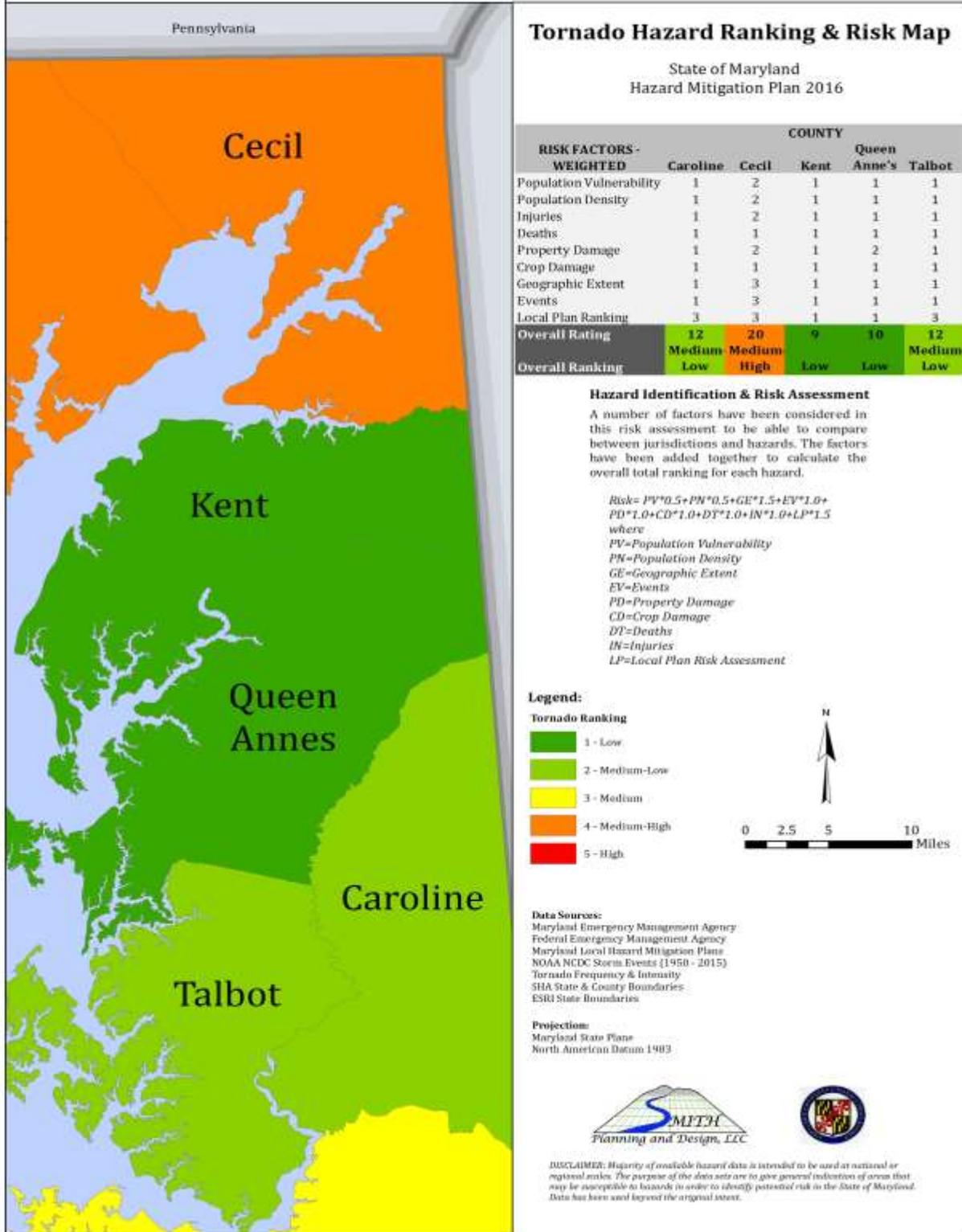


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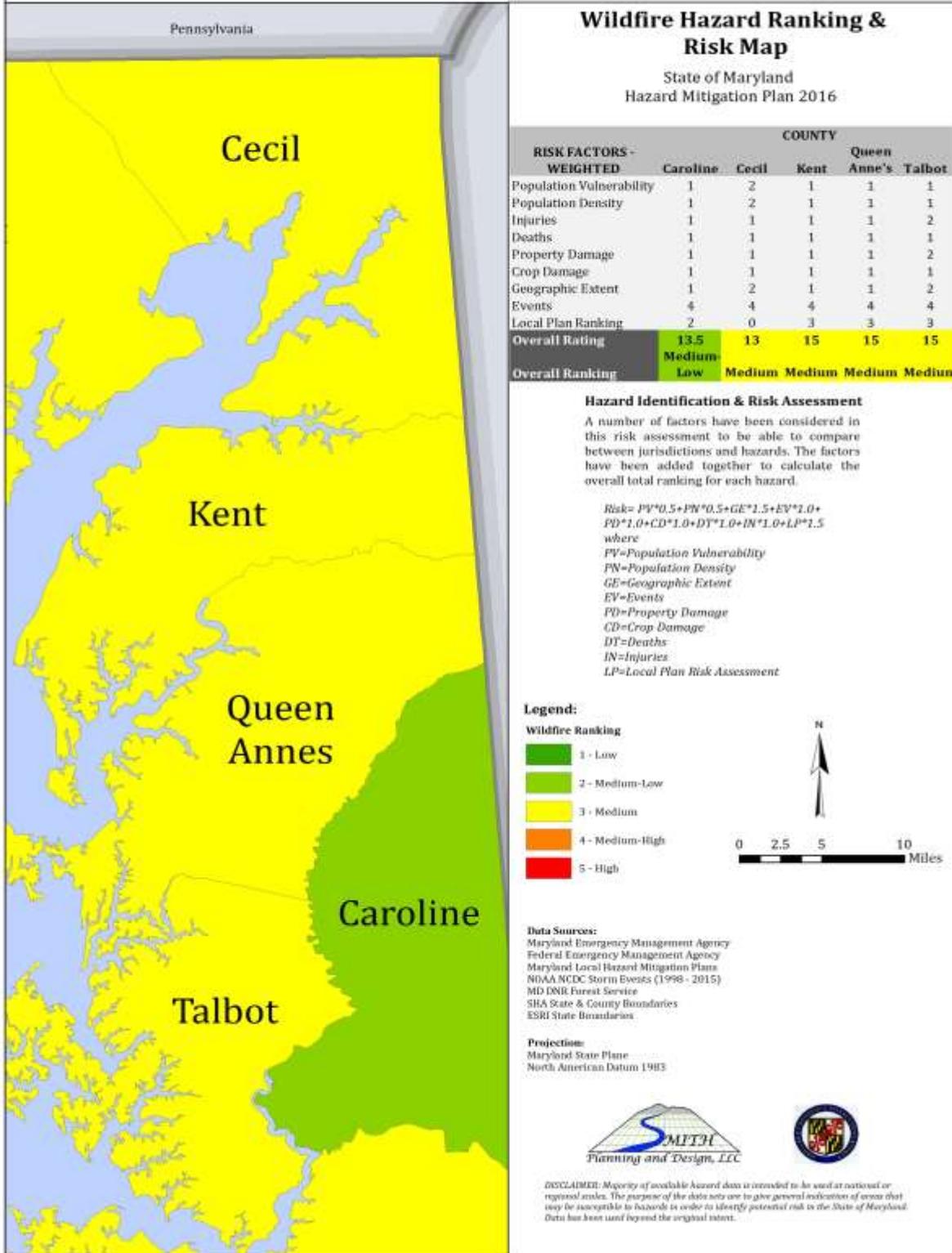
## Upper Eastern Shore Region Thunderstorm Risk Maryland 2016 Hazard Mitigation Plan



## Upper Eastern Shore Region Tornado Risk Maryland 2016 Hazard Mitigation Plan



## Upper Eastern Shore Region Wildfire Risk Maryland 2016 Hazard Mitigation Plan



## Upper Eastern Shore Region Wind Risk Maryland 2016 Hazard Mitigation Plan



### Wind Hazard Ranking & Risk Map

State of Maryland  
Hazard Mitigation Plan 2016

RISK FACTORS - WEIGHTED	COUNTY				
	Caroline	Cecil	Kent	Queen Anne's	Talbot
Population Vulnerability	1	2	1	1	1
Population Density	1	2	1	1	1
Injuries	1	2	2	2	1
Deaths	1	4	1	1	1
Property Damage	1	2	2	2	1
Crop Damage	1	1	1	1	2
Geographic Extent	3	1	1	1	1
Events	4	4	4	4	4
Local Plan Ranking	0	0	0	0	0
<b>Overall Rating</b>	<b>13.5</b>	<b>16.5</b>	<b>12.5</b>	<b>12.5</b>	<b>11.5</b>
<b>Overall Ranking</b>	<b>Medium</b>	<b>High</b>	<b>Medium</b>	<b>Medium</b>	<b>Medium</b>

#### Hazard Identification & Risk Assessment

A number of factors have been considered in this risk assessment to be able to compare between jurisdictions and hazards. The factors have been added together to calculate the overall total ranking for each hazard.

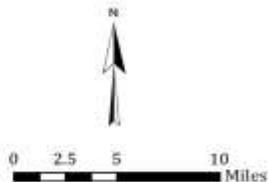
$$Risk = PV*0.5 + PN*0.5 + GE*1.5 + EV*1.0 + PD*1.0 + CD*1.0 + DT*1.0 + IN*1.0 + LP*1.5$$

- where
- PV=Population Vulnerability
  - PN=Population Density
  - GE=Geographic Extent
  - EV=Events
  - PD=Property Damage
  - CD=Crop Damage
  - DT=Deaths
  - IN=Injuries
  - LP=Local Plan Risk Assessment

#### Legend:

##### Wind Ranking

- 1 - Low
- 2 - Medium-Low
- 3 - Medium
- 4 - Medium-High
- 5 - High



#### Data Sources:

- Maryland Emergency Management Agency
- Federal Emergency Management Agency
- Maryland Local Hazard Mitigation Plans
- NOAA NCDC Storm Events (1956 - 2015)
- 2012 IBC & IIRC
- SHA State & County Boutelaries
- ESRI State Boundaries

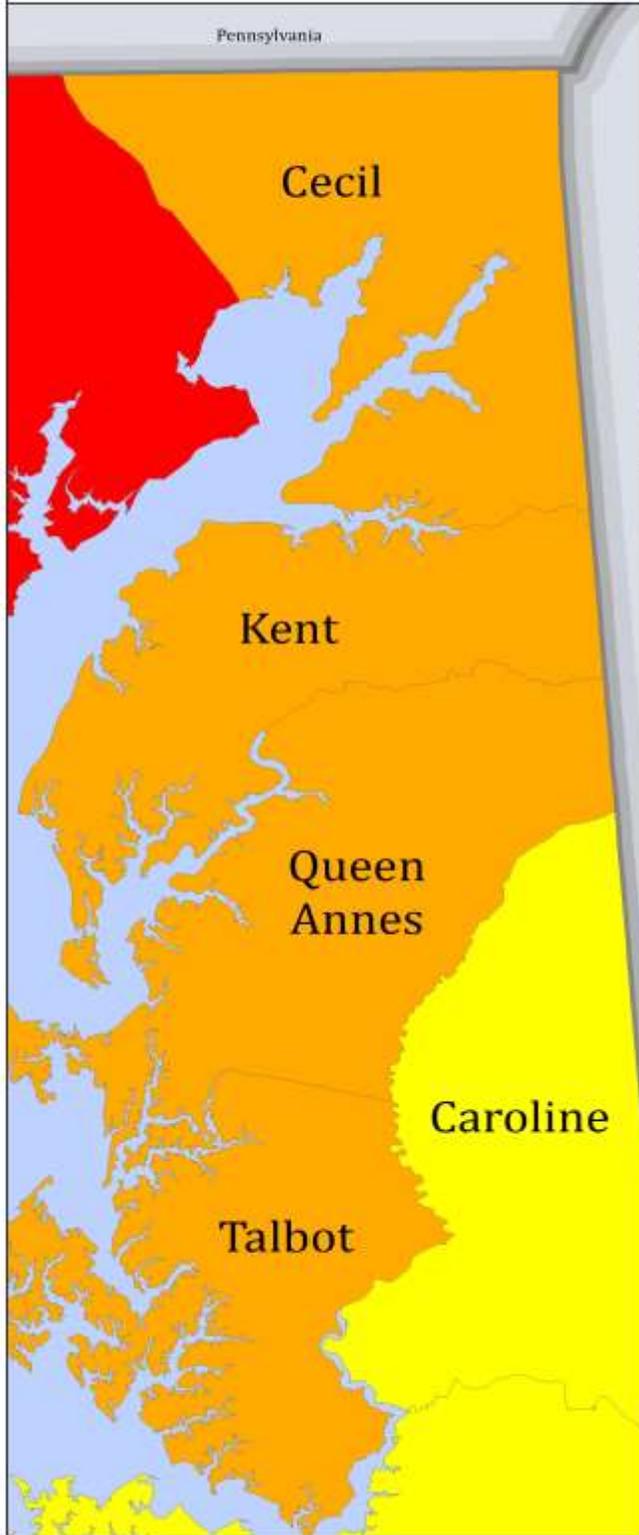
#### Projection:

- Maryland State Plane
- North American Datum 1983



DISCLAIMER: Majority of available hazard data is intended to be used at national or regional scales. The purpose of the data sets are to give general indication of areas that may be susceptible to hazards in order to identify potential risk in the State of Maryland. Data has been used beyond the original intent.

# Upper Eastern Shore Region Winter Storm Risk Maryland 2016 Hazard Mitigation Plan



## Winter Storm Hazard Ranking & Risk Map

State of Maryland  
Hazard Mitigation Plan 2016

RISK FACTORS - WEIGHTED	COUNTY				
	Caroline	Cecil	Kent	Queen Anne's	Talbot
Population Vulnerability	1	2	1	1	1
Population Density	1	2	1	1	1
Injuries	1	1	1	2	1
Deaths	1	1	1	4	4
Property Damage	1	2	1	1	1
Crop Damage	1	1	1	1	1
Geographic Extent	2	2	2	2	1
Events	4	4	4	4	4
Local Plan Ranking	3	3	5	4	5
<b>Overall Rating</b>	<b>16.5</b>	<b>18.5</b>	<b>19.5</b>	<b>22</b>	<b>21</b>
<b>Overall Ranking</b>	<b>Medium</b>	<b>High</b>	<b>High</b>	<b>High</b>	<b>High</b>

### Hazard Identification & Risk Assessment

A number of factors have been considered in this risk assessment to be able to compare between jurisdictions and hazards. The factors have been added together to calculate the overall total ranking for each hazard.

$$Risk = PV*0.5 + PN*0.5 + GE*1.5 + EV*1.0 + PD*1.0 + CD*1.0 + DT*1.0 + IN*1.0 + LP*1.5$$

where

PV=Population Vulnerability

PN=Population Density

GE=Geographic Extent

EV=Events

PD=Property Damage

CD=Crop Damage

DT=Deaths

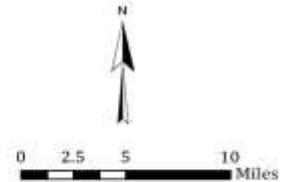
IN=Injuries

LP=Local Plan Risk Assessment

### Legend:

#### Winter Storm Ranking

- 1 - Low
- 2 - Medium-Low
- 3 - Medium
- 4 - Medium-High
- 5 - High



### Data Sources:

Maryland Emergency Management Agency  
Federal Emergency Management Agency  
Maryland Local Hazard Mitigation Plans  
NOAA NCDC Storm Events (1993 - 2015)  
National Weather Service  
SHA State & County Boundaries  
ESRI State Boundaries

### Projection:

Maryland State Plane  
North American Datum 1983

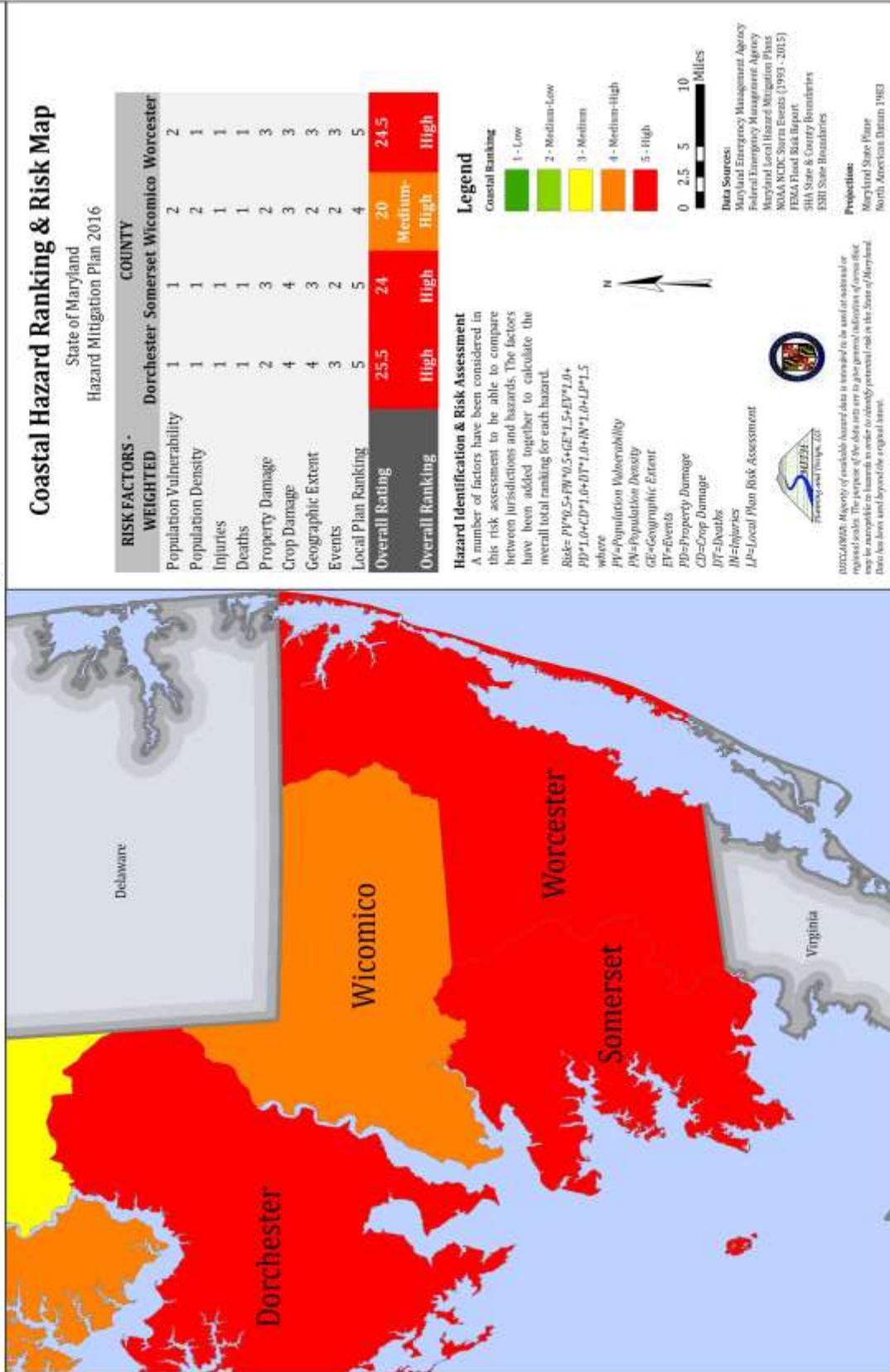


DISCLAIMER: Majority of available hazard data is intended to be used at national or regional scales. The purpose of the data sets are to give general indication of areas that may be susceptible to hazards in order to identify potential risk to the State of Maryland. Data has been used beyond the original intent.

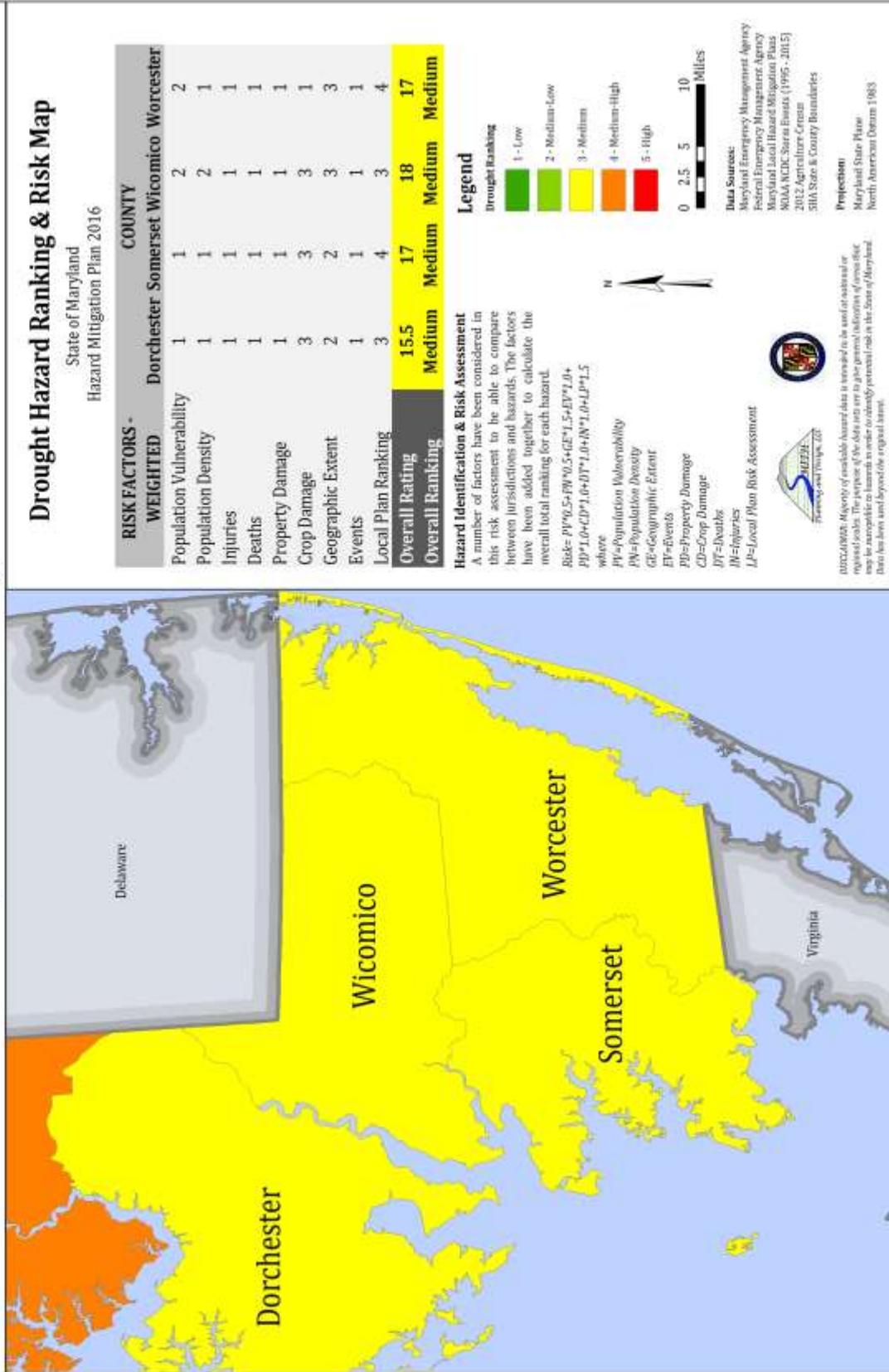
**f. Lower Eastern Shore Region**

Wicomico County ranked Thunderstorm and Winter Storm as “medium-high,” while the risk assessment ranked the surrounding counties at a lower risk. The risk assessment for Wildfire ranked Worcester County as “medium-high,” while Dorchester, Wicomico and Somerset Counties were “medium.”

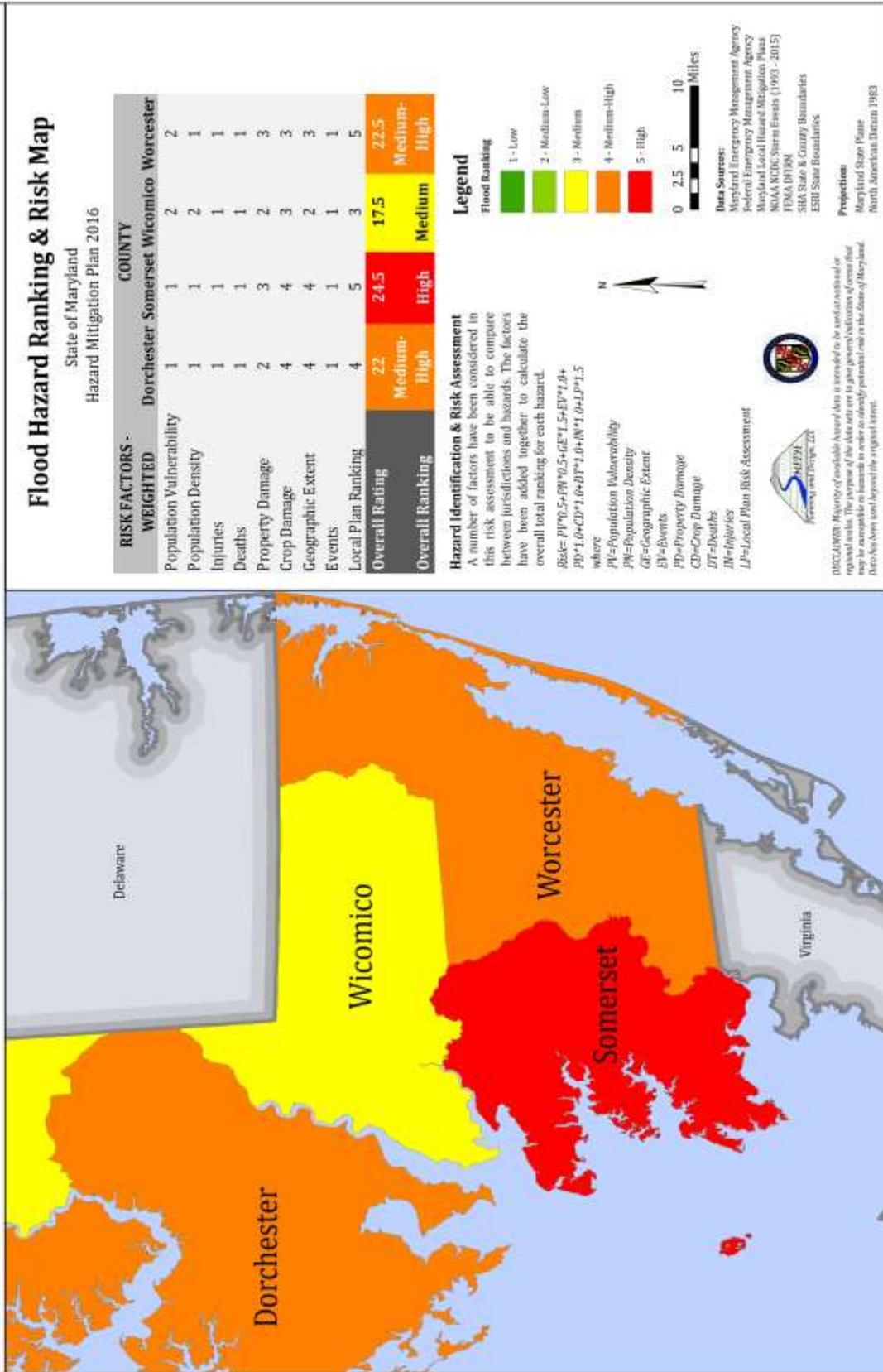
**Lower Eastern Shore Region Coastal Risk**  
 Maryland 2016 Hazard Mitigation Plan



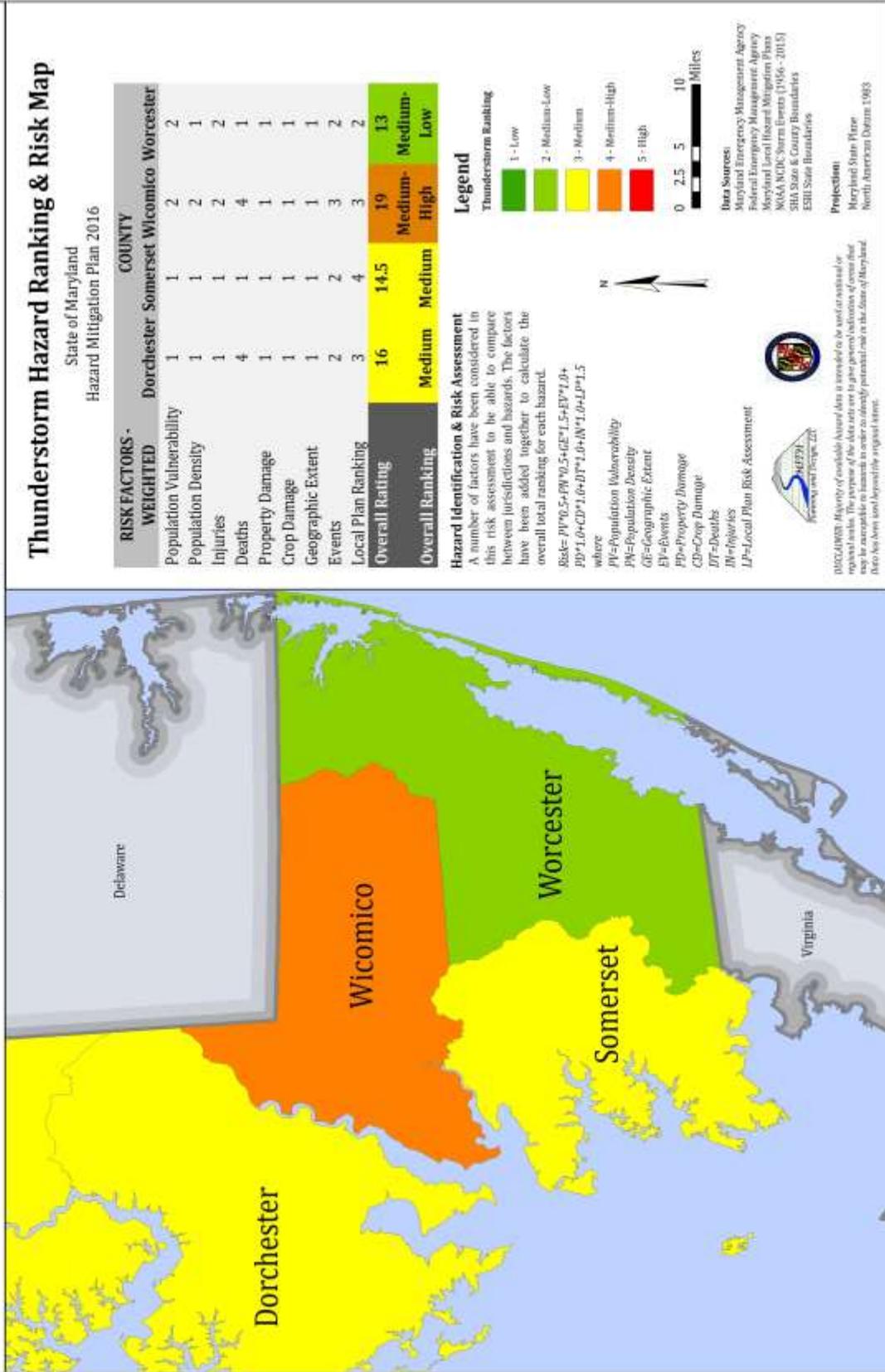
# Lower Eastern Shore Region Drought Risk Maryland 2016 Hazard Mitigation Plan



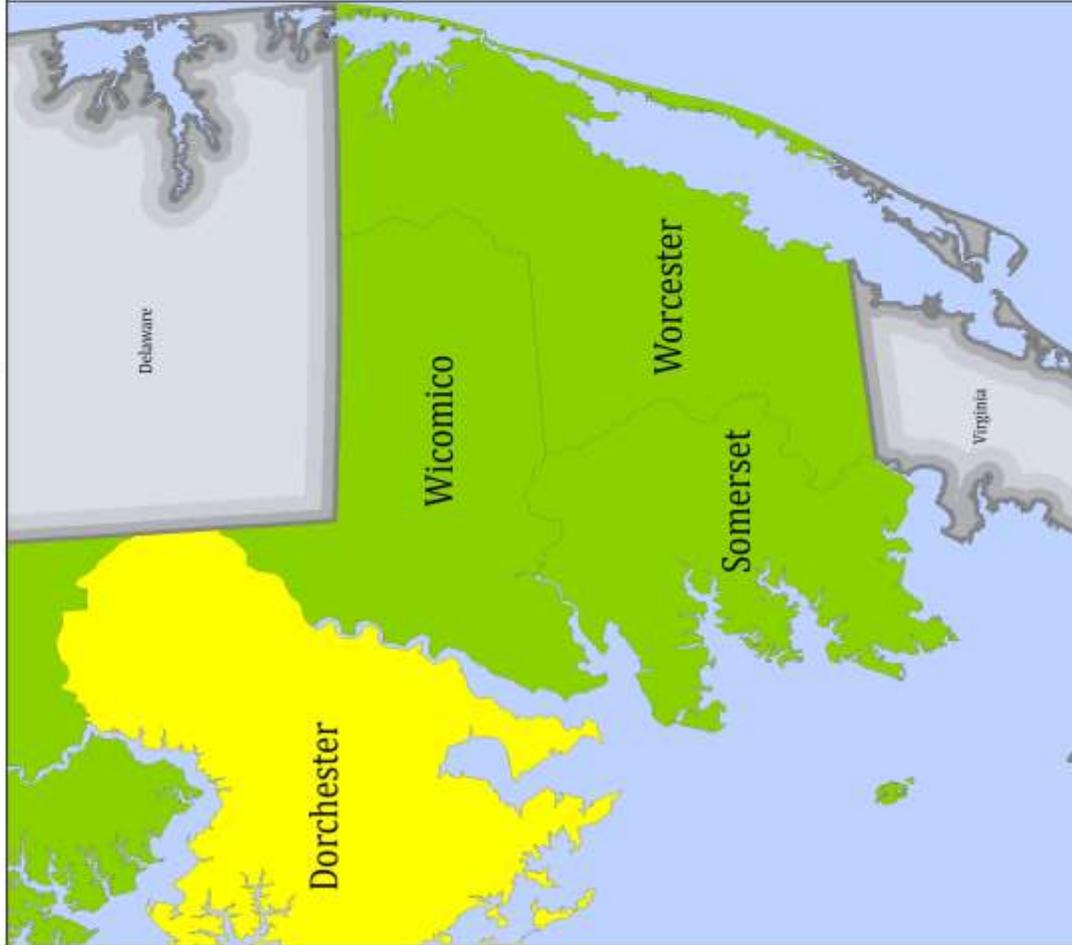
**Lower Eastern Shore Region Flood Risk**  
 Maryland 2016 Hazard Mitigation Plan



**Lower Eastern Shore Region Thunderstorm Risk**  
**Maryland 2016 Hazard Mitigation Plan**



**Lower Eastern Shore Region Tornado Risk**  
 Maryland 2016 Hazard Mitigation Plan



**Tornado Hazard Ranking & Risk Map**

State of Maryland  
 Hazard Mitigation Plan 2016

RISK FACTORS - WEIGHTED	COUNTY			
	Dorchester	Somerset	Wicomico	Worcester
Population Vulnerability	1	1	2	2
Population Density	1	1	2	1
Injuries	2	1	2	1
Deaths	4	1	1	1
Property Damage	3	1	1	1
Crop Damage	1	1	1	1
Geographic Extent	1	1	1	1
Events	1	1	1	1
Local Plan Ranking	3	3	3	3
<b>Overall Rating</b>	<b>18</b>	<b>12</b>	<b>14</b>	<b>12.5</b>
<b>Overall Ranking</b>	<b>Medium</b>	<b>Low</b>	<b>Medium-Low</b>	<b>Medium-Low</b>

**Hazard Identification & Risk Assessment**

A number of factors have been considered in this risk assessment to be able to compare between jurisdictions and hazards. The factors have been added together to calculate the overall total ranking for each hazard.

Risk =  $PI^0.5 + PV^0.5 + GE^*1.5 + EV^*1.0 + PP^*1.0 + CD^*1.0 + IT^*1.0 + IN^*1.0 + LP^*1.5$

where

- PI=Population Vulnerability
- PV=Population Density
- GE=Geographic Extent
- EV=Events
- PP=Property Damage
- CD=Crop Damage
- IT=Injuries
- IN=Injuries
- LP=Local Plan Risk Assessment

**Legend**



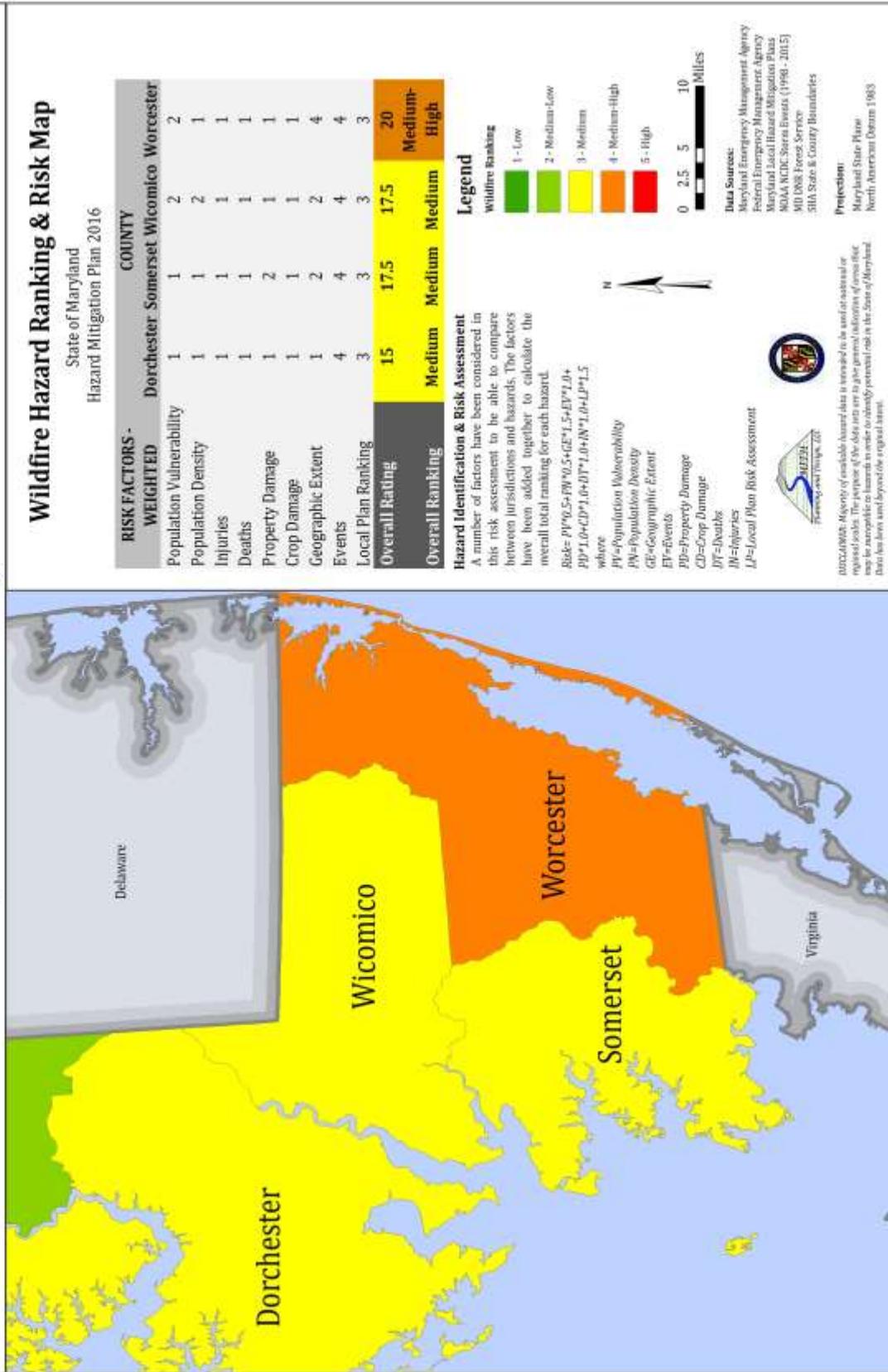
**Data Sources:**  
 Maryland Emergency Management Agency  
 Federal Emergency Management Agency  
 Maryland Local Hazard Mitigation Plans  
 NOAA NCEC Storm Events (1950-2015)  
 Tornado Frequency & Intensity  
 SRA State & County Boundaries

**Predictions:**  
 Maryland State Plane  
 North American Datum 1983

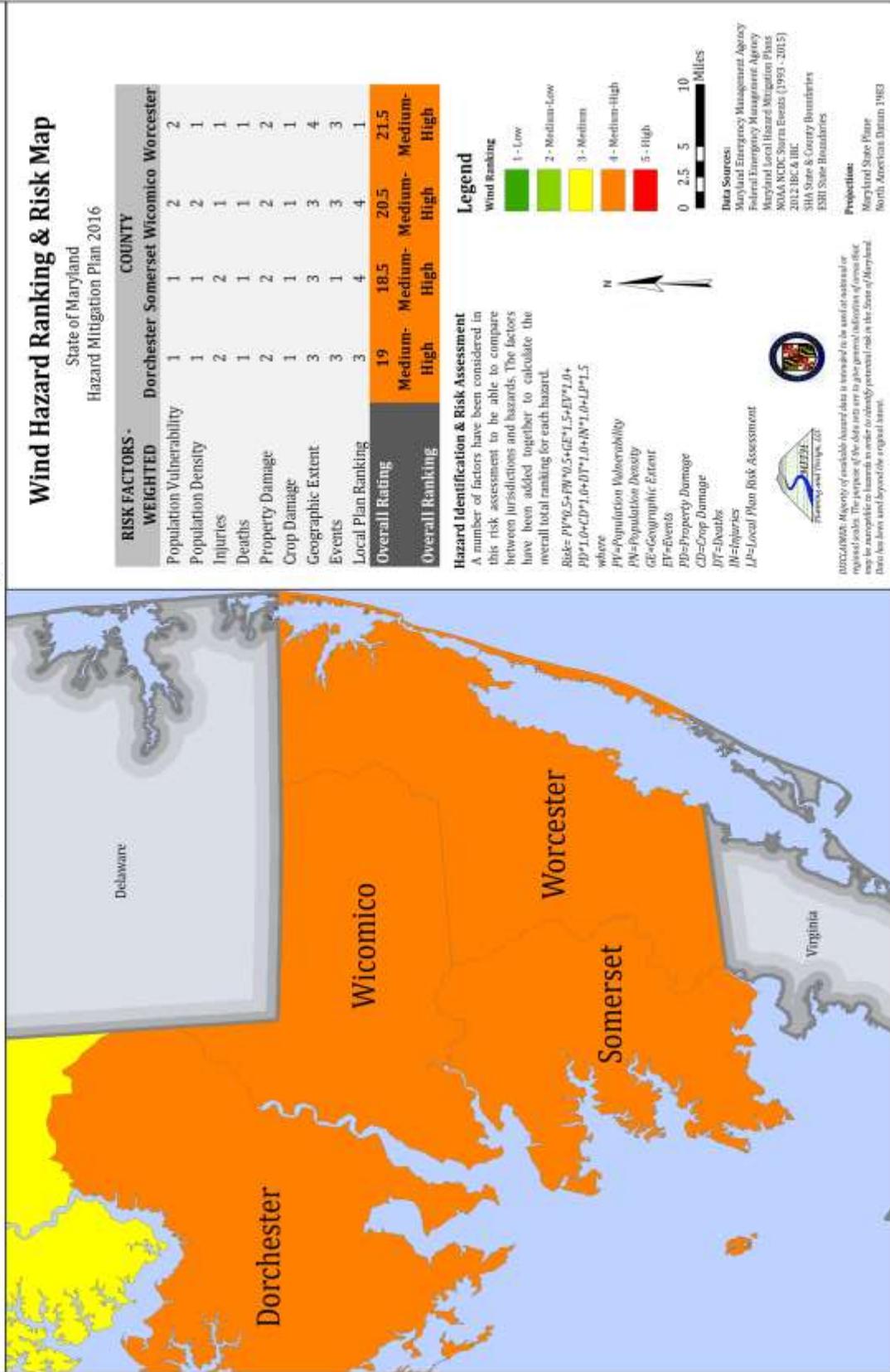


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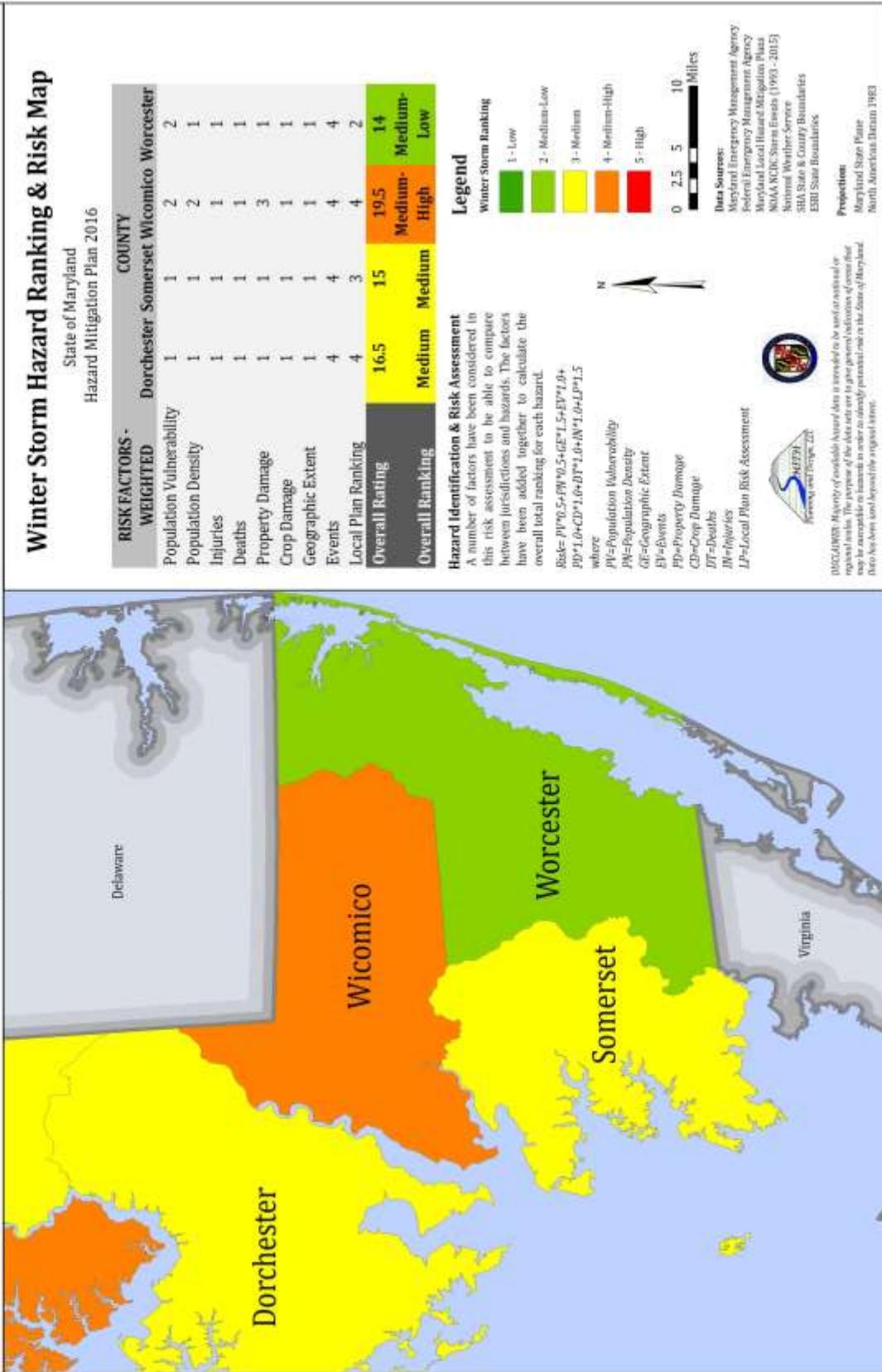
# Lower Eastern Shore Region Wildfire Risk Maryland 2016 Hazard Mitigation Plan



**Lower Eastern Shore Region Wind Risk**  
 Maryland 2016 Hazard Mitigation Plan



**Lower Eastern Shore Region Winter Storm Risk**  
 Maryland 2016 Hazard Mitigation Plan



## 4. Risk Assessment Methodology

The risk assessment method utilized for assessing and prioritizing the eight (8) hazards were based on a blend of quantitative factors extracted from the National Climatic Data Center and other available data sources. These included:

- Historical occurrence;
- Vulnerability of population in hazard area;
- Historical impacts, in terms of human lives and property, and;
- How the Local plans ranked hazards.

The following nine (9) ranking parameters were used to develop jurisdictional based hazard rankings for the eight (8) hazards: Coastal, Flood, Wind, Thunderstorm, Winter Storm, Drought, Wildfire and Tornado. Each parameter was rated on a scale of one (1) through four (4).

### Task 1: Population

Total Resident Population for Maryland's Jurisdictions, April 1, 2010 thru July 1, 2014  
Population Division, U.S. Census Bureau, release data March 26, 2015  
Prepared by the Maryland Department of Planning, March 2015

### Task 2: Population Vulnerability

Calculated as a percent of total population in Maryland per County.  
Total Resident Population for Maryland's Jurisdictions, April 1, 2010 thru July 1, 2014.  
Population Division, U.S. Census Bureau, release data March 26, 2015  
Prepared by the Maryland Department of Planning, March 2015

### Task 3: Population Density

Calculated on population per square mile for each County divided by total area (square mile).  
Total Resident Population for Maryland's Jurisdictions, April 1, 2010 thru July 1, 2014.  
Population Division, U.S. Census Bureau, data release: March 26, 2015  
Prepared by the Maryland Department of Planning, March 2015

### Task 4: Injuries & Deaths

National Climatic Data Center - Storm Event Database thru 12/31/2015  
*\*12/31/2015 best available data*  
Maryland DNR Forest Service - 1/1/2010 to 12/31/2014 (Wildfire only)  
Data was added extending the latest record date to 12/31/2015. Note: Latest record date for *2011 Maryland Hazard Mitigation Plan* data was 2010.

### Task 5: Property & Crop Damage

National Climatic Data Center - Storm Event Database thru 12/31/2015  
*\*12/31/2015 best available data*

Maryland DNR Forest Service - 1/1/2010 to 12/31/2014 (Wildfire only)

The sum of all property and crop damages were calculated per hazard per jurisdiction. Specified date ranges were identified per hazard utilizing best available data. Based upon the date ranges per hazard and the total calculated damages, the Consumer Price Index (CPI) inflation rate was utilized to adjust the total for 2015 equivalency per those hazards noted on data tables.

## **Task 6: Geographic Extent**

### **6.1 Drought**

2012 Land in Farms per Acres - USDA Census of Agriculture

Utilized farmland total acreage per county divided by total land area per county to determine percent of farmland-crop susceptibility.

### **6.2 Flood**

Preliminary and Effective DFIRMS as of January 8, 2016 - FEMA

Calculated percent of land within the 100-year flood zone.

### **6.3 Coastal**

Maryland Coastal Study - Flood Risk Reports

Calculated percent of coastal land area within the county.

### **6.4 Wind**

2012 International Building Code & 2012 International Residential Code - Wind Load

Basic wind speeds for detached dwellings per IRC section R301.2.1 were utilized.

### **6.5 Tornado**

National Climatic Data Center - Storm Event Database thru 12/31/2015  
*\*12/31/2015 best available data*

Sum of all tornadoes and intensity rating per event weighted.

### **6.6 Winter Storm**

National Weather Service - Average Annual Snowfall

Average Annual Snowfall totals for each jurisdiction were utilized.

### **6.7 Thunderstorm**

National Climatic Data Center - Storm Event Database thru 12/31/2015  
*\*12/31/2015 best available data*

Average number based on: Number of events with two (2) inches or greater hail and lightning events with Injuries/Deaths.

## 6.8 Wildfire

Maryland DNR Forest Service

The percent of area in “high” and “medium-high” on the Maryland DNR Forest Service Risk Assessment Layer.

### Task 7: Events

National Climatic Data Center - Storm Event Database thru 12/31/2015

*\*12/31/2015 best available data*

Obtained total events in NCDC database for each hazard in each jurisdiction. Calculated for each jurisdiction for annualized events.

### Task 8: Local Hazard Ranking

Local Hazard Mitigation Plans - 2010-2016

Utilized most recent hazard rankings from local hazard mitigation plans.

### Task 9: Overall Ranking

Utilized the following weighted risk factors in the equation below to determine each jurisdiction’s risk due to each hazard.

#### Weighted Risk Factors:

Population Vulnerability	<i>PV</i>	<b>0.5</b>
Population Density	<i>PN</i>	<b>0.5</b>
Injuries	<i>IN</i>	<b>1</b>
Deaths	<i>DT</i>	<b>1</b>
Property Damage (Annualized)	<i>PD</i>	<b>1</b>
Crop Damage (Annualized)	<i>CD</i>	<b>1</b>
Geographic Extent (Hazard Dependent)	<i>GE</i>	<b>1.5</b>
Events (Annualized)	<i>EV</i>	<b>1</b>
Local Plan Ranking	<i>LOCAL</i>	<b>1.5</b>

#### Equation:

$$(PV*0.5) + (PN*0.5) + IN + DT + PD + CD + (GE*1.5) + EV (LOCAL*1.5)$$

## 5. Risk Assessment Data

The following tables were developed and utilized for *Section 2 Risk Assessment*. Tables 14-22 were compiled by utilizing the data from Tables 1-11 and then assigned an overall score from Tables 12 and 13.

Table 2. 1 - Hazards & Timeframe - January 2016

Hazards & Timeframe - January 2016				
Hazard	NCDC Data	Earliest Record Date	Latest Record Date	Recording Period Length
COASTAL	HURRICANE STORM SURGE/TIDE TROPICAL STORM COASTAL FLOOD TROPICAL DEPRESSION	3/13/1993	12/31/2015	23
FLOOD	FLASH FLOOD FLOOD HEAVY RAIN	3/4/1993	12/31/2015	23
WINTER STORM	BLIZZARD HEAVY SNOW ICE STORM SLEET/FREEZING RAIN WINTER STORM WINTER WEATHER FREEZING FOG COLD/WIND CHILL EXTREME COLD/WIND CHILL FROST/FREEZE LAKE-EFFECT SNOW	1/9/1993	12/31/2015	23
WIND	HIGH WIND STRONG WIND THUNDERSTORM WIND	5/30/1956	12/31/2015	60
TORNADO	FUNNEL CLOUD TORNADO WATERSPOUT	8/11/1950	12/31/2015	66
THUNDERSTORM	HAIL LIGHTNING	7/16/1956	12/31/2015	60
WILDFIRE	WILD/FOREST FIRE WILD/FOREST FIRES WILDFIRE NATIONAL REPORTING SYSTEM	1/1/1998	12/31/2015	18
DROUGHT	DROUGHT EXCESSIVE HEAT	1/1/1995	12/31/2015	21

Table 2.2 - Population - January 2016

Population - January 2016					
County	2014 Population Estimates	2014 Population Vulnerability	2014 Population Density	Ranking	County Area
Allegany County	72952	1.220573605	169.770745	1	429.7089
Anne Arundel County	560133	9.371690362	1339.60903	3	418.1317
Baltimore County	826925	13.83543739	1361.88658	3	607.1908
Calvert County	90613	1.516063111	416.864296	2	217.3681
Caroline County	32538	0.544399385	100.279468	1	324.4732
Carroll County	167830	2.807995232	370.973567	2	452.4042
Cecil County	102838	1.720601881	285.791067	2	359.8363
Charles County	154747	2.589101104	270.417058	2	572.2531
Dorchester County	32578	0.545068633	57.2474985	1	569.0729
Frederick County	243675	4.076972164	365.180697	2	667.2724
Garrett County	29679	0.49656492	45.2414746	1	656.0131
Harford County	250105	4.184553701	558.161696	3	448.0870
Howard County	309284	5.174688658	1219.8536	3	253.5419
Kent County	19820	0.33161214	69.6501678	1	284.5650
Montgomery County	1030447	17.24060218	2035.65835	4	506.1984
Prince George's County	904430	15.13218809	1818.05609	3	497.4709
Queen Anne's County	48804	0.816548885	130.08163	1	375.1798
St. Mary's County	110382	1.846821961	302.031162	2	365.4656
Somerset County	25859	0.432651783	82.4952689	1	313.4604
Talbot County	37643	0.629812099	137.710551	1	273.3487
Washington County	149573	2.502533938	319.870745	2	467.6045
Wicomico County	101539	1.698868068	265.75728	2	382.0742
Worcester County	51675	0.864584125	108.863363	1	474.6776
City of Baltimore	622793	10.42006658	7678.58332	4	81.1078
Annapolis	38856	0.650107029	5799.40299	4	6.7000
Ocean City	7089	0.11860739	1541.08696	3	4.6000
Totals	5976862				10007.8065

Table 2.3 - Injuries & Deaths - January 2016

Injuries & Deaths - January 2016								
County	COASTAL	COASTAL	DROUGHT	DROUGHT	FLOOD	FLOOD	THUNDER STORM	THUNDER STORM
	Deaths	Injuries	Deaths	Injuries	Deaths	Injuries	Deaths	Injuries
Allegany County	0	0	0	0	0	0	0	1
Anne Arundel County	1	2	1	0	2	2	2	15
Baltimore County	2	4	4	0	2	36	1	3
Calvert County	1	2	0	0	0	0	1	1
Caroline County	0	1	0	0	0	1	0	1
Carroll County	0	0	0	0	0	0	0	12
Cecil County	0	0	1	0	0	5	0	4
Charles County	1	2	0	0	0	0	1	0
Dorchester County	0	0	0	0	0	0	0	0
Frederick County	0	0	0	0	8	1	2	5
Garrett County	0	0	0	0	0	0	0	4
Harford County	1	2	0	0	0	17	1	3
Howard County	0	0	0	0	1	2	0	0
Kent County	0	1	0	0	0	0	0	8
Montgomery County	0	0	0	2	1	5	1	4
Prince George's County	1	2	2	0	0	6	1	5
Queen Anne's County	1	1	0	0	0	2	0	0
St. Mary's County	1	2	0	0	0	0	0	0
Somerset County	0	0	0	0	0	0	0	0
Talbot County	0	1	0	0	0	0	0	6
Washington County	0	0	0	0	0	0	0	1
Wicomico County	0	0	0	0	0	0	1	1
Worcester County	0	0	0	0	0	0	0	1
City of Baltimore	1	2	4	0	5	4	2	1

*Table 2.4 -Injuries & Deaths cont. - January 2016*

Injuries & Deaths - January 2016								
County	TORNADO	TORNADO	WILDFIRE	WILDFIRE	WIND	WIND	WINTER STORM	WINTER STORM
	Deaths	Injuries	Deaths	Injuries	Deaths	Injuries	Deaths	Injuries
Allegany County	0	6	0	1	0	5	6	167
Anne Arundel County	0	1	0	3	2	27	6	166
Baltimore County	0	66	0	0	1	26	15	332
Calvert County	2	2	0	0	0	7	5	161
Caroline County	0	0	0	0	0	0	0	0
Carroll County	0	3	0	0	1	31	8	166
Cecil County	0	2	0	0	2	8	0	0
Charles County	1	122	0	0	1	4	4	165
Dorchester County	1	16	0	0	0	2	0	0
Frederick County	0	1	0	1	1	13	7	166
Garrett County	1	12	0	0	0	0	0	0
Harford County	0	12	0	0	0	10	8	166
Howard County	0	2	0	1	0	15	8	166
Kent County	0	0	0	0	0	2	0	0
Montgomery County	0	1	0	0	1	8	8	166
Prince George's County	2	60	0	0	1	9	6	166
Queen Anne's County	0	0	0	0	0	4	1	1
St. Mary's County	0	4	0	0	0	12	4	161
Somerset County	0	0	0	0	0	4	0	0
Talbot County	0	0	0	0	0	0	2	0
Washington County	0	1	0	0	0	8	7	166
Wicomico County	0	2	0	0	0	0	0	0
Worcester County	0	0	0	0	0	0	0	0
City of Baltimore	0	3	0	0	0	30	8	166

Table 2.5-Property & Crop Damage - January 2016

Property & Crop Damage - January 2016								
County	COASTAL UPDATE		COASTAL RANKING		DROUGHT UPDATE		DROUGHT RANKING	
	2015 CPI Property Damage	2015 CPI Crop Damage	Property Damage	Crop Damage	2015 Actual Property Damage	2015 Actual Crop Damage	Property Damage	Crop Damage
Allegany County	0	0	1	1	0	0	1	1
Anne Arundel County	9.754 m	0	3	1	0	1.67m	1	3
Baltimore County	675.279 m	82 k	4	2	0	5.87m	1	4
Calvert County	25.499 m	16 k	4	1	0	1.67m	1	3
Caroline County	1.878 m	0	2	1	0	0	1	1
Carroll County	82 k	0	1	1	0	5.6m	1	4
Cecil County	1.937 m	0	2	1	0	0	1	1
Charles County	14.685 m	25 k	3	1	0	1.67m	1	3
Dorchester County	4.244 m	8.44 m	2	4	0	2m	1	3
Frederick County	8 k	0	1	1	0	24.87m	1	4
Garrett County	0	0	1	1	0	0	1	1
Harford County	24.159 m	82 k	4	2	0	4.16m	1	4
Howard County	827 k	0	2	1	0	4.64m	1	4
Kent County	17.623 m	0	3	1	0	0	1	1
Montgomery County	496 k	0	1	1	0	7.36m	1	4
Prince George's County	7.198 m	33 k	3	1	0	1.67m	1	3
Queen Anne's County	62.383 m	0	4	1	0	0	1	1
St. Mary's County	149.627 m	82 k	4	2	0	1.67m	1	3
Somerset County	9.806 m	2.482 m	3	4	0	2m	1	3
Talbot County	2.068 m	0	2	1	0	0	1	1
Washington County	0	0	1	1	0	21.17m	1	4
Wicomico County	1.323 m	1.754 m	2	3	0	2m	1	3
Worcester County	17.743 m	1.688 m	3	3	0	0	1	1
City of Baltimore	418.054 m	0	4	1	0	1.67m	1	3

Data Sources: NCDC, MDS (Wildfire)

Note: CPI - Consumer Price Index

Note: k = Thousands of Dollars

Note: m = Millions of Dollars

Table 2.6-Property & Crop Damage cont. - January 2016

Property & Crop Damage - January 2016								
County	FLOOD UPDATE		FLOOD RANKING		THUNDERSTORM UPDATE		THUNDERSTORM RANKING	
	2015 CPI Property Damage	2015 CPI Crop Damage	Property Damage	Crop Damage	2015 Actual Property Damage	2015 Actual Crop Damage	Property Damage	Crop Damage
Allegany County	16.931 m	41 k	3	1	107 k	10 k	1	1
Anne Arundel County	9.544 m	0	3	1	1.436 m	0	2	1
Baltimore County	4.921 m	0	2	1	1.061 m	10 k	2	1
Calvert County	885 k	0	1	1	251 k	0	1	1
Caroline County	13.916 m	1.671 m	3	3	109 k	0	1	1
Carroll County	2.896 m	0	2	1	398 k	15 k	1	1
Cecil County	11.782 m	0	3	1	676 k	0	2	1
Charles County	455 k	0	1	1	155 k	50 k	1	1
Dorchester County	0	0	1	1	22 k	0	1	1
Frederick County	36.35 m	0	4	1	1.409 m	15 k	2	1
Garrett County	5.712 m	0	3	1	6k	0	1	1
Harford County	6.341 m	0	3	1	846 k	500 k	2	1
Howard County	455 k	0	1	1	942 k	1 k	2	1
Kent County	3.574 m	0	2	1	26 k	5 k	1	1
Montgomery County	3.704 m	256 k	2	2	6.049 m	15 k	2	1
Prince George's County	6.994 m	0	3	1	707 k	1 k	1	1
Queen Anne's County	9.697 m	0	3	1	63.5 k	0	1	1
St. Mary's County	1.167 m	0	2	1	674 k	0	1	1
Somerset County	0	0	1	1	3 k	0	1	1
Talbot County	10.052 m	0	3	1	1.212 m	0	2	1
Washington County	29.422 m	82 k	4	1	161 k	6 k	1	1
Wicomico County	0	0	1	1	105 k	0	1	1
Worcester County	8 k	0	1	1	3 k	0	1	1
City of Baltimore	3.126 m	0	2	1	35 k	0	1	1

Data Sources: NCDC, MDS (Wildfire)

Note: CPI - Consumer Price Index

Note: k = Thousands of Dollars

Note: m = Millions of Dollars

Table 2.7-Property & Crop Damage cont. - January 2016

Property & Crop Damage - January 2016								
County	TORNADO UPDATE		TORNADO RANKING		WILDFIRE UPDATE		WILDFIRE RANKING	
	2015 Actual Property Damage	2015 Actual Crop Damage	Property Damage	Crop Damage	2015 Actual Property Damage	2015 Actual Crop Damage	Property Damage	Crop Damage
Allegany County	5.317 m	295 k	3	2	31296.84	0	1	1
Anne Arundel County	7.121 m	0	3	1	12900	0	1	1
Baltimore County	36.812 m	8 k	4	1	2495.25	0	1	1
Calvert County	11.352 m	5 k	3	1	4418.55	0	1	1
Caroline County	375 k	0	1	1	9114.9	0	1	1
Carroll County	8.168 m	20 k	3	1	2450.1	0	1	1
Cecil County	3.355 m	0	2	1	19191.09	0	1	1
Charles County	116.707 m	10 k	4	1	44638.4	0	1	1
Dorchester County	5.727 m	0	3	1	20590.76	0	1	1
Frederick County	2.182 m	50 k	2	2	18882.27	0	1	1
Garrett County	2.583 m	0	2	1	3853.3	0	1	1
Harford County	6.202 m	14 k	3	1	5913.95	0	1	1
Howard County	3.998 m	0	2	1	7294.93	0	1	1
Kent County	503 k	0	1	1	2336.59	0	1	1
Montgomery County	4.747 m	40 k	2	1	5188.78	0	1	1
Prince George's County	111.202 m	6 k	4	1	8194.15	0	1	1
Queen Anne's County	526 k	0	2	1	4154.37	0	1	1
St. Mary's County	4.120 m	21 k	2	1	10210.25	0	1	1
Somerset County	68 k	0	1	1	116543.85	0	2	1
Talbot County	76 k	0	1	1	4813.43	0	1	1
Washington County	1.618 m	95 k	2	2	2493.2	0	1	1
Wicomico County	133 k	0	1	1	8599	0	1	1
Worcester County	290 k	0	1	1	5328.8	0	1	1
City of Baltimore	200 k	0	1	1	405	0	1	1

Data Sources: NCDC, MDS (Wildfire)

Note: CPI - Consumer Price Index

Note: k = Thousands of Dollars

Note: m = Millions of Dollars

Table 2.8-Property & Crop Damage cont. - January 2016

Property & Crop Damage - January 2016								
County	WIND UPDATE		WIND RANKING		WINTER STORM UPDATE		WINTER STORM RANKING	
	2015 Actual Property Damage	2015 Actual Crop Damage	Property Damage	Crop Damage	2015 Actual Property Damage	2015 Actual Crop Damage	Property Damage	Crop Damage
Allegany County	518 k	8 k	2	1	25 k	0	1	1
Anne Arundel County	4.983 m	18 k	2	1	2.175 m	0	2	1
Baltimore County	3.91 m	12 k	2	1	1.667 m	30 k	2	1
Calvert County	1.733 m	57 k	2	2	10 k	0	1	1
Caroline County	754 k	1 k	1	1	200 k	0	1	1
Carroll County	1.575 m	125 k	2	2	173 k	50 k	1	2
Cecil County	2.338 m	1 k	2	1	1.350 m	0	2	1
Charles County	1.265 m	86 k	2	2	5 k	0	1	1
Dorchester County	2.543 m	0	2	1	0	0	1	1
Frederick County	2.327 m	178 k	2	2	280 k	127 k	1	2
Garrett County	1.274 m	0	2	1	354 k	0	1	1
Harford County	1.142 m	23 k	2	1	68 k	0	1	1
Howard County	1.733 m	23 k	2	1	638 k	50 k	2	2
Kent County	702 k	1 k	2	1	125 k	0	1	1
Montgomery County	10.925 m	57 k	3	2	2.945 m	75 k	2	2
Prince George's County	4.919 m	17 k	2	1	1.09 m	101 k	2	2
Queen Anne's County	1.210 m	1 k	2	1	320 k	0	1	1
St. Mary's County	4.661 m	98 k	2	2	15 k	0	1	1
Somerset County	1.345 m	0	2	1	0	0	1	1
Talbot County	596 k	1 k	1	2	400 k	0	1	1
Washington County	2.069 m	158 k	2	2	35 k	1.005 m	1	3
Wicomico County	1.285 m	0	2	1	5 m	0	3	1
Worcester County	3.7 m	0	2	1	20 k	0	1	1
City of Baltimore	1.147 m	3 k	2	1	1.605 m	0	2	1

Data Sources: NCDC, MDS (Wildfire)

Note: CPI - Consumer Price Index

Note: k = Thousands of Dollars

Note: m = Millions of Dollars

MARYLAND HAZARD MITIGATION PLAN

Table 2.9 -Geographic Extent - January 2016

County	Geographic Extent - January 2016									
	COASTAL % of Coastal Land Area	DROUGHT % Crop from 2012 Agriculture Census	FLOOD % in 100-yr Flood Zone (A, AE, AO & VE)	THUNDERSTORM 2"> hail and lightning events with Injuries/Deaths	TORNADO SVRGIS (intensity & frequency)	WILDFIRE MD Forestry % in High & MED_ HIGH RISK	WIND ASCE Wind Design Speed	WINTER STORM Average Snowfall Total		
Allegany	0.00%	13.25%	4.91%	4	2	8.782492509	90	4		
Anne Arundel	64.00%	10.50%	14.35%	4	4	2.593485505	90	2		
Baltimore	15.00%	18.41%	8.68%	2	3	1.716134497	90	3		
Calvert	93.00%	24.11%	10.57%	2	2	7.056891403	90	1		
Caroline	37.00%	73.24%	7.67%	2	1	0.101973929	110	2		
Carroll	0.00%	45.85%	5.73%	4	3	0.28735403	90	3		
Cecil	59.00%	33.32%	11.29%	2	3	2.154480663	90	2		
Charles	63.00%	16.14%	13.54%	3	3	6.389977313	90	1		
Dorchester	98.00%	33.30%	57.50%	1	1	0.012462	110	1		
Frederick	0.00%	42.80%	7.04%	2	4	2.567998421	90	3		
Garrett	0.00%	22.65%	3.65%	1	2	8.893589387	90	4		
Harford	4.00%	22.85%	13.92%	3	2	1.408375667	90	3		
Howard	0.00%	23.33%	5.53%	1	1	0.997371437	90	3		
Kent	87.00%	74.77%	13.33%	2	1	0	90	2		
Montgomery	0.00%	20.02%	8.10%	4	3	0.322174948	90	3		
Prince George's	7.00%	10.46%	10.84%	3	4	2.66949766	90	2		
Queen Anne's	74.00%	65.94%	12.19%	1	1	0	90	2		
St. Mary's	81.00%	28.14%	14.40%	2	2	6.627036634	110	1		
Somerset	96.00%	30.11%	56.49%	1	1	0.467411766	110	1		
Talbot	Pending	72.19%	28.17%	2	1	0	90	1		
Washington	0.00%	44.51%	7.71%	1	2	3.662942533	90	3		
Wicomico	49.00%	34.51%	18.23%	1	1	2.047613933	110	1		
Worcester	54.00%	32.68%	26.69%	1	1	3.904144725	120	1		
Baltimore City	38.00%	0.00%	11.36%	2	1	0	90	3		

MARYLAND HAZARD MITIGATION PLAN

Table 2.10 - Events - January 2016

Events - January 2016																
County	COASTAL		COASTAL		DROUGHT		DROUGHT		FLOOD		FLOOD		THUNDER STORM		THUNDER STORM	
	Event Total	Annualized	Event Total	Annualized	Event Total	Annualized	Event Total	Annualized	Event Total	Annualized	Event Total	Annualized	Event Total	Annualized	Event Total	Annualized
Allegany County	1	0.043478261	1	0.04761905	1	0.04761905	57	2.47826087	38	0.633333333	38	0.633333333	38	0.633333333	38	0.633333333
Anne Arundel County	26	1.130434783	15	0.71428571	15	0.71428571	97	4.2173913	102	1.7	102	1.7	102	1.7	102	1.7
Baltimore County	16	0.695652174	19	0.9047619	19	0.9047619	136	5.91304348	101	1.683333333	101	1.683333333	101	1.683333333	101	1.683333333
Calvert County	14	0.608695652	14	0.666666667	14	0.666666667	38	1.65217391	46	0.766666667	46	0.766666667	46	0.766666667	46	0.766666667
Caroline County	9	0.391304348	76	3.61904762	58	2.52173913	58	2.52173913	19	0.316666667	19	0.316666667	19	0.316666667	19	0.316666667
Carroll County	2	0.086956522	9	0.42857143	9	0.42857143	70	3.04347826	66	1.1	66	1.1	66	1.1	66	1.1
Cecil County	5	0.217391304	68	3.23809524	97	4.2173913	97	4.2173913	42	0.7	42	0.7	42	0.7	42	0.7
Charles County	10	0.434782609	18	0.85714286	43	1.86956522	43	1.86956522	79	1.316666667	79	1.316666667	79	1.316666667	79	1.316666667
Dorchester County	12	0.52173913	2	0.0952381	19	0.82608696	19	0.82608696	27	0.45	27	0.45	27	0.45	27	0.45
Frederick County	3	0.130434783	14	0.666666667	121	5.26086957	121	5.26086957	85	1.416666667	85	1.416666667	85	1.416666667	85	1.416666667
Garrett County	1	0.043478261	2	0.0952381	57	2.47826087	57	2.47826087	40	0.666666667	40	0.666666667	40	0.666666667	40	0.666666667
Harford County	8	0.347826087	13	0.61904762	73	3.17391304	73	3.17391304	75	1.25	75	1.25	75	1.25	75	1.25
Howard County	2	0.086956522	14	0.666666667	76	3.30434783	76	3.30434783	39	0.65	39	0.65	39	0.65	39	0.65
Kent County	10	0.434782609	77	3.666666667	52	2.26086957	52	2.26086957	28	0.466666667	28	0.466666667	28	0.466666667	28	0.466666667
Montgomery County	2	0.086956522	16	0.76190476	135	5.86956522	135	5.86956522	156	2.6	156	2.6	156	2.6	156	2.6
Prince George's County	3	0.130434783	15	0.71428571	100	4.34782609	100	4.34782609	93	1.55	93	1.55	93	1.55	93	1.55
Queen Anne's County	11	0.47826087	77	3.666666667	61	2.65217391	61	2.65217391	17	0.283333333	17	0.283333333	17	0.283333333	17	0.283333333
St. Mary's County	19	0.826086957	15	0.71428571	65	2.82608696	65	2.82608696	68	1.133333333	68	1.133333333	68	1.133333333	68	1.133333333
Somerset County	11	0.47826087	2	0.0952381	9	0.39130435	9	0.39130435	19	0.316666667	19	0.316666667	19	0.316666667	19	0.316666667
Talbot County	11	0.47826087	75	3.57142857	58	2.52173913	58	2.52173913	33	0.55	33	0.55	33	0.55	33	0.55
Washington County	1	0.043478261	14	0.666666667	66	2.86956522	66	2.86956522	83	1.383333333	83	1.383333333	83	1.383333333	83	1.383333333
Wicomico County	8	0.347826087	2	0.0952381	17	0.73913043	17	0.73913043	32	0.533333333	32	0.533333333	32	0.533333333	32	0.533333333
Worcester County	21	0.913043478	1	0.04761905	27	1.17391304	27	1.17391304	29	0.483333333	29	0.483333333	29	0.483333333	29	0.483333333
City of Baltimore	14	0.608695652	18	0.85714286	59	2.56521739	59	2.56521739	22	0.366666667	22	0.366666667	22	0.366666667	22	0.366666667

MARYLAND HAZARD MITIGATION PLAN

Table 2.11 -Events cont. - January 2016

Events - January 2016												
County	TORNADO		TORNADO		WILDFIRE		WIND		WIND		WINTER STORM	
	Event Total	Annualized	Event Total	Annualized	Event Total	Annualized	Event Total	Annualized	Event Total	Annualized	Event Total	Annualized
Allegany County	9	0.13636364	459	25.5	164	2.73333333	278	12.0869565	278	12.0869565	278	12.0869565
Anne Arundel County	22	0.33333333	193	10.7222222	327	5.45	124	5.39130435	124	5.39130435	124	5.39130435
Baltimore County	23	0.34848485	377	20.9444444	320	5.33333333	276	12	276	12	276	12
Calvert County	19	0.28787879	403	22.3888889	158	2.63333333	86	3.73913043	86	3.73913043	86	3.73913043
Caroline County	7	0.10606061	454	25.2222222	185	3.08333333	121	5.26086957	121	5.26086957	121	5.26086957
Carroll County	17	0.25757576	118	6.55555556	225	3.75	192	8.34782609	192	8.34782609	192	8.34782609
Cecil County	18	0.27272727	448	24.8888889	251	4.18333333	161	7	161	7	161	7
Charles County	29	0.43939394	1114	61.8888889	336	5.6	106	4.60869565	106	4.60869565	106	4.60869565
Dorchester County	12	0.18181818	726	40.3333333	80	1.33333333	65	2.82608696	65	2.82608696	65	2.82608696
Frederick County	34	0.51515152	486	27	321	5.35	192	8.34782609	192	8.34782609	192	8.34782609
Garrett County	11	0.16666667	265	14.7222222	112	1.86666667	174	7.56521739	174	7.56521739	174	7.56521739
Harford County	29	0.43939394	422	23.4444444	204	3.4	149	6.47826087	149	6.47826087	149	6.47826087
Howard County	12	0.18181818	111	6.16666667	156	2.6	136	5.91304348	136	5.91304348	136	5.91304348
Kent County	6	0.09090909	125	6.94444444	222	3.7	130	5.65217391	130	5.65217391	130	5.65217391
Montgomery County	24	0.36363636	226	12.55555556	372	6.2	161	7	161	7	161	7
Prince George's County	29	0.43939394	166	9.22222222	311	5.18333333	127	5.52173913	127	5.52173913	127	5.52173913
Queen Anne's County	11	0.16666667	292	16.2222222	219	3.65	133	5.7826087	133	5.7826087	133	5.7826087
St. Mary's County	26	0.39393939	576	32	180	3	82	3.56521739	82	3.56521739	82	3.56521739
Somerset County	5	0.07575758	250	13.8888889	53	0.88333333	57	2.47826087	57	2.47826087	57	2.47826087
Talbot County	9	0.13636364	392	21.7777778	203	3.38333333	121	5.26086957	121	5.26086957	121	5.26086957
Washington County	14	0.21212121	398	22.1111111	227	3.78333333	177	7.69565217	177	7.69565217	177	7.69565217
Wicomico County	9	0.13636364	527	29.2777778	106	1.76666667	63	2.73913043	63	2.73913043	63	2.73913043
Worcester County	14	0.21212121	168	9.33333333	82	1.36666667	90	3.91304348	90	3.91304348	90	3.91304348
City of Baltimore	4	0.06060606	24	1.33333333	133	2.21666667	140	6.08695652	140	6.08695652	140	6.08695652

Table 2.12 -Local Rankings - January 2016

Local Rankings - January 2016										
County	Year	COASTAL	DROUGHT	FLOOD	THUNDERSTORM	TORNADO	WILDFIRE	WIND	WINTER STORM	
Allegany County	7/12/2012*	0	3	5	4	3	3	0	5	
Anne Arundel County	2012*	5	0	5	0	5	0	0	5	
Baltimore County	2014*	5	3	5	4	3	3	3	4	
Calvert County	11/20/2011*	5	3	5	5	5	5	0	5	
Caroline County	2011*	3	3	4	4	3	2	0	3	
Carroll County	11/2013*	2	5	3	0	3	0	0	5	
Cecil County	1/12/16*	5	3	5	1	3	0	0	1	
Charles County	6/12/2012*	4	2	3	4	4	1	0	3	
Dorchester County	2011*	5	3	4	3	3	3	3	4	
Frederick County	2010	3	3	5	3	5	3	5	5	
Garrett County	2012*	3	2	4	4	3	3	4	5	
Harford County	2012*	2	5	3	4	4	0	4	3	
Howard County	2012*	5	5	5	3	5	1	5	3	
Kent County	2013*	5	3	5	3	1	3	0	5	
Montgomery County	2012*	3	3	3	5	1	3	0	5	
Prince George's County	2010	0	4	5	4	0	3	4	4	
Queen Anne's County	2012*	4	4	4	3	1	3	0	4	
St. Mary's County	5/27/2011*	5	3	5	5	5	1	0	5	
Somerset County	4/25/2012*	5	4	5	4	3	3	4	3	
Talbot County	2011	4	3	5	4	3	3	0	5	
Washington County	10/2/2012*	1	3	4	3	2	2	0	5	
Wicomico County	2016*	4	3	3	3	3	3	4	4	
Worcester County	10/7/2014*	5	4	5	2	3	3	4	2	
City of Baltimore		4	1	5	3	3	0	3	3	
City of Annapolis		1	0	5	3	5	1	1	3	
Ocean City	2016*	5	0	3	3	2	1	4	3	

Note: \* Denotes updated Local Plan Note: Ranking Scale – High-5, Medium High-4, Medium-3, Medium Low-2, Low-1, Not Ranked-0

Table 2.13-Ranking Scales- January 2016

Score	Population Vulnerability Geometrical Interval	Population Density Geometrical Interval	Annualized Events - All events excluding Coastal & Flood	Annualized Events - Coastal	Annualized Events - Flood	Injuries/Deaths	Property Damage	Crop Damage
1	0.00	0	0	0	0	None	0.00	0.00
2	0.85	174.7392	0.11	0.11	1.50	Injury	500 K	50 K
3	2.25	546.3805	1.01	0.50	2.30	N/A	5 M	501 K
4	6.12	1919.7552	2.51	1.00	3.50	Death	> 20 M	> 2 M

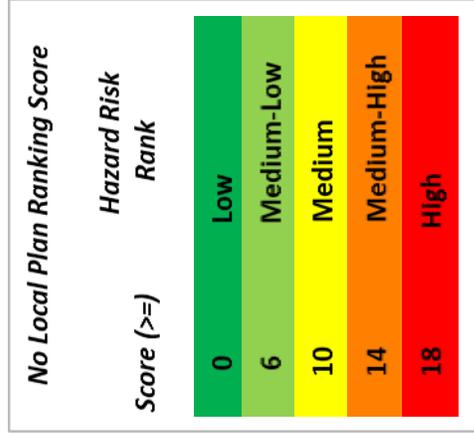


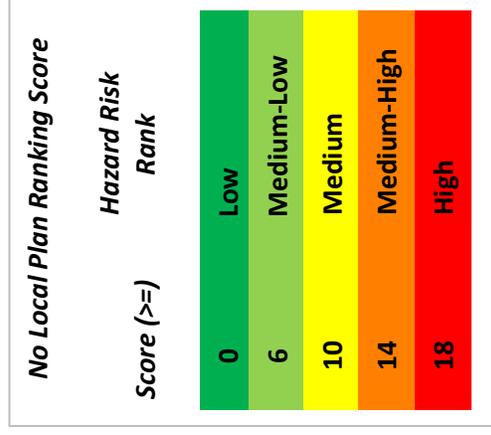
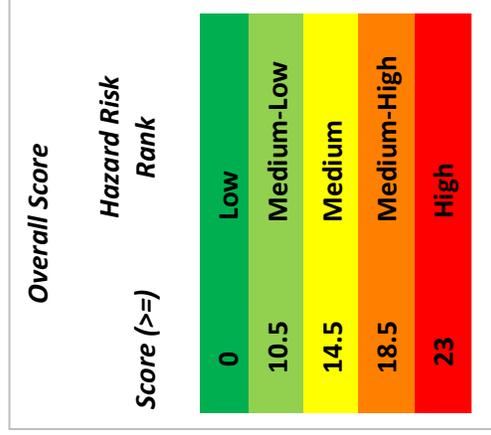
Table 2.14 -Ranking Scale cont. - January 2016

Ranking Scales - January 2016									
Max Geographical Extent (Hazard Dependent)									
Score	COASTAL	DROUGHT	FLOOD	THUNDERSTORM	TORNADO	WILDFIRE	WIND	WINTER STORM	Score
1	0.00	0	0.00	0-2 events	0-10 events	0	0.00	10"-19"	1
2	25.00	0.18	10.00	3-5 events	11-17 events	0.4674	60.00	20"-29"	2
3	50.00	0.3421	20.00	6-8 events	18-22 events	2.1545	74.00	30"-39"	3
4	75.00	0.49	30.00	>9 events	>23 event	3.9041	95.00	>40"	4
Source:	COASTAL: Risk Area	DROUGHT: CDL MD	FLOOD: DFIRMS	THUNDERSTORM: NCDC	TORNADO: NCDC	WILDFIRE: MD DNR Forest Service Risk Assessment Layer	WIND: ASCE	WINTER STORM: National Weather Service	
Calculated Using:	% of Coastal Land Area	% Crop Area	% Area in 100-yr Floodplain	Average number based on: Number of events, 2"> hail and lightning events with Injuries/Deaths	Sum of all tornados weighted by F-scale (F1*1.5, F2*2, F3*3, F4*4)	% Area in High and Med-High	ASCE Design Wind Speeds	Average Snowfall Total	

Overall Risk Factors & Score- January 2016

WEIGHTING		
Population Vulnerability	PV	0.5
Population Density	PN	0.5
Injuries	IN	1
Deaths	DT	1
Property Damage (Annualized)	PD	1
Crop Damage (Annualized)	CD	1
Geographic Extent (Hazard Dependent)	GE	1.5
Events (Annualized)	EV	1
Local Plan Ranking	LOCAL	1.5

NOTE: Values represented as zero (*highlighted in gray*) under LP (Local Plan) the “No Local Plan Ranking Score” was utilized.



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Table 2.16 -Overall Ranking: Coastal - January 2016

(SORTED BY FIPS CODE)		Overall Ranking- January 2016										COASTAL
		POPULATION		Cst_IN	Cst_DT	Cst_PD	Cst_CD	Cst_GE	Cst_EV	Cst_Local	Cst_RS	Cst_Rank
County	FIPS	PV	PN	Cst_IN	Cst_DT	Cst_PD	Cst_CD	Cst_GE	Cst_EV	Cst_Local	Cst_RS	Cst_Rank
Allegany County	24001	2	1	1	1	1	1	1	1	0	8	Low
Anne Arundel County	24003	4	3	2	4	3	1	3	4	5	29.5	High
Baltimore County	24005	4	3	2	4	4	2	1	3	5	27.5	High
Calvert County	24009	2	2	2	4	4	1	4	3	5	29.5	High
Caroline County	24011	1	1	2	1	2	1	2	2	3	16.5	Medium
Carroll County	24013	3	2	1	1	1	1	1	1	2	12	Medium-Low
Cecil County	24015	2	2	1	1	2	1	3	2	3	18	Medium
Charles County	24017	3	2	2	4	3	1	3	2	4	25	High
Dorchester County	24019	1	1	1	1	2	4	4	3	5	25.5	High
Frederick County	24021	3	2	1	1	1	1	1	2	3	14.5	Medium
Garrett County	24023	1	1	1	1	1	1	1	1	3	12	Medium-Low
Harford County	24025	3	3	2	4	4	2	1	2	2	21.5	Medium-High
Howard County	24027	3	3	1	1	2	1	1	1	5	18	Medium
Kent County	24029	1	1	2	1	3	1	4	2	5	23.5	High
Montgomery County	24031	4	4	1	1	1	1	1	1	3	15	Medium
Prince George's County	24033	4	3	2	4	3	1	1	2	0	17	Medium-High
Queen Anne's County	24035	1	1	2	4	4	1	3	2	4	24.5	High
St. Mary's County	24037	2	2	2	4	4	2	4	3	5	30.5	High
Somerset County	24039	1	1	1	1	3	4	3	2	5	24	High
Talbot County	24041	1	1	2	1	2	1	3	2	4	19.5	Medium-High
Washington County	24043	3	2	1	1	1	1	1	1	1	10.5	Medium-Low
Wicomico County	24045	2	2	1	1	2	3	2	2	4	20	Medium-High
Worcester County	24047	2	1	1	1	3	3	3	3	5	24.5	High
City of Baltimore	24510	4	4	2	4	4	1	2	3	4	27	High

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Table 2.17 -Overall Ranking: Drought - January 2016

(SORTED BY FIPS CODE)		Overall Ranking- January 2016										DROUGHT		
		POPULATION		FIPS	Drt_IN	Drt_DT	Drt_PD	Drt_CD	Drt_GE	Drt_EV	Drt_Local	Drt_RS	Drt_Rank	
County	FIPS	PV	PN											
Allegany County	24001	2	1	1	1	1	1	1	2	1	3	14	Medium_Low	
Anne Arundel County	24003	4	3	4	1	1	3	2	2	2	0	17.5	Medium-High	
Baltimore County	24005	4	3	4	4	1	4	3	2	2	3	24.5	High	
Calvert County	24009	2	2	1	1	1	3	2	2	2	3	17.5	Medium	
Caroline County	24011	1	1	1	1	1	1	4	4	4	3	19.5	Medium-High	
Carroll County	24013	3	2	1	1	1	4	4	4	2	5	25	High	
Cecil County	24015	2	2	4	1	1	1	4	4	4	5	26.5	High	
Charles County	24017	3	2	1	1	1	3	2	2	2	2	16.5	Medium	
Dorchester County	24019	1	1	1	1	1	3	2	2	1	3	15.5	Medium	
Frederick County	24021	3	2	1	1	1	4	4	4	2	3	22	Medium-High	
Garrett County	24023	1	1	1	1	1	1	1	1	1	2	10.5	Medium-Low	
Harford County	24025	3	3	1	1	1	4	3	3	2	5	24	High	
Howard County	24027	3	3	1	1	1	4	3	3	2	5	24	High	
Kent County	24029	1	1	1	1	1	1	4	4	4	3	19.5	Medium-High	
Montgomery County	24031	4	4	1	1	2	4	3	3	2	3	23	High	
Prince George's County	24033	4	3	4	1	1	3	1	1	2	4	22	Medium-High	
Queen Anne's County	24035	1	1	1	1	1	1	4	4	4	4	21	Medium-High	
St. Mary's County	24037	2	2	1	1	1	3	2	2	2	3	17.5	Medium	
Somerset County	24039	1	1	1	1	1	3	2	2	1	4	17	Medium	
Talbot County	24041	1	1	1	1	1	1	4	4	4	3	19.5	Medium-High	
Washington County	24043	3	2	1	1	1	4	3	3	2	3	20.5	Medium-High	
Wicomico County	24045	2	2	1	1	1	3	3	3	1	3	18	Medium	
Worcester County	24047	2	1	1	1	1	1	3	3	1	4	17	Medium	
City of Baltimore	24510	4	4	4	1	1	3	1	1	2	1	18	Medium	

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Table 2.18 -Overall Ranking: Flood - January, 2016

(SORTED BY FIPS CODE)		Overall Ranking- January 2016										FLOOD
		POPULATION			Fld_IN	Fld_DT	Fld_PD	Fld_CD	Fld_GE	Fld_EV	Fld_Local	Fld_RS
County	FIPS	PV	PN	Fld_IN	Fld_DT	Fld_PD	Fld_CD	Fld_GE	Fld_EV	Fld_Local	Fld_RS	Fld_Rank
Allegany County	24001	2	1	1	1	2	1	1	3	5	18.5	Medium-High
Anne Arundel County	24003	4	3	2	4	3	1	2	4	5	28	High
Baltimore County	24005	4	3	2	4	4	2	1	4	5	28.5	High
Calvert County	24009	2	2	1	1	4	1	2	2	5	21.5	Medium-High
Caroline County	24011	1	1	2	1	2	1	1	3	4	17.5	Medium
Carroll County	24013	3	2	1	1	1	1	1	3	3	15.5	Medium
Cecil County	24015	2	2	2	1	2	1	2	4	3	19.5	Medium-High
Charles County	24017	3	2	1	1	3	1	2	2	3	18	Medium
Dorchester County	24019	1	1	1	1	2	4	4	1	4	22	Medium-High
Frederick County	24021	3	2	2	4	1	1	1	4	5	23.5	High
Garrett County	24023	1	1	1	1	1	1	1	3	4	15.5	Medium
Harford County	24025	3	3	2	1	4	2	2	3	3	22.5	Medium-High
Howard County	24027	3	3	2	4	2	1	1	3	5	24	High
Kent County	24029	1	1	1	1	3	1	2	2	5	19.5	Medium-High
Montgomery County	24031	4	4	2	4	1	1	1	4	3	22	Medium-High
Prince George's County	24033	4	3	2	1	3	1	2	4	5	25	High
Queen Anne's County	24035	1	1	2	1	4	1	2	3	4	21	Medium-High
St. Mary's County	24037	2	2	1	1	4	2	2	3	5	23.5	High
Somerset County	24039	1	1	1	1	3	4	4	1	5	24.5	High
Talbot County	24041	1	1	1	1	2	1	3	3	5	21	Medium-High
Washington County	24043	3	2	1	1	1	1	1	3	4	17	Medium
Wicomico County	24045	2	2	1	1	2	3	2	1	3	17.5	Medium
Worcester County	24047	2	1	1	1	3	3	3	1	5	22.5	Medium-High
City of Baltimore	24510	4	4	2	4	4	1	2	3	5	28.5	High

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Table 2.19-Overall Ranking: Thunderstorm - January 2016

(SORTED BY FIPS CODE)		Overall Ranking- January 2016										
		POPULATION			THUNDERSTORM							
County	FIPS	PV	PN	TS_IN	TS_DT	TS_PD	TS_CD	TS_GE	TS_EV	TS_Local	TS_RS	TS_Rank
Allegany County	24001	2	1	2	1	1	1	4	2	4	20.5	Medium-High
Anne Arundel County	24003	4	3	2	4	2	1	4	3	0	21.5	Medium-High
Baltimore County	24005	4	3	2	4	2	1	2	3	4	24.5	High
Calvert County	24009	2	2	2	4	1	1	2	2	5	22.5	Medium-High
Caroline County	24011	1	1	2	1	1	1	2	2	4	17	Medium
Carroll County	24013	3	2	2	1	1	1	4	2	0	15.5	Medium
Cecil County	24015	2	2	2	1	2	1	2	2	4	19	Medium-High
Charles County	24017	3	2	1	4	1	1	3	3	4	23	High
Dorchester County	24019	1	1	1	4	1	1	1	2	3	16	Medium
Frederick County	24021	3	2	2	4	2	1	2	3	3	22	Medium-High
Garrett County	24023	1	1	2	1	1	1	1	2	4	15.5	Medium
Harford County	24025	3	3	2	4	2	1	3	3	4	25.5	High
Howard County	24027	3	3	1	1	2	1	1	2	3	16	Medium
Kent County	24029	1	1	2	1	1	1	2	2	3	15.5	Medium
Montgomery County	24031	4	4	2	4	2	1	4	4	5	30.5	High
Prince George's County	24033	4	3	2	4	1	1	3	3	4	25	High
Queen Anne's County	24035	1	1	1	1	1	1	1	2	3	13	Medium-Low
St. Mary's County	24037	2	2	1	1	1	1	2	3	5	19.5	Medium-High
Somerset County	24039	1	1	1	1	1	1	1	2	4	14.5	Medium
Talbot County	24041	1	1	2	1	2	1	2	2	4	18	Medium
Washington County	24043	3	2	2	1	1	1	1	3	3	16.5	Medium
Wicomico County	24045	2	2	2	4	1	1	1	3	3	19	Medium-High
Worcester County	24047	2	1	2	1	1	1	1	2	2	13	Medium-Low
City of Baltimore	24510	4	4	2	4	1	1	2	2	3	21.5	Medium-High

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Table 2.20-Overall Ranking: Tornado - January 2016

(SORTED BY FIPS CODE)		Overall Ranking- January 2016										TORNADO
		POPULATION		Tm_IN	Tm_DT	Tm_PD	Tm_CD	Tm_GE	Tm_EV	Tm_Local	Tm_RS	Tm_Rank
County	FIPS	PV	PN	Tm_IN	Tm_DT	Tm_PD	Tm_CD	Tm_GE	Tm_EV	Tm_Local	Tm_RS	Tm_Rank
Allegany County	24001	2	1	2	1	3	2	2	2	3	19	Medium-High
Anne Arundel County	24003	4	3	2	1	3	1	4	4	5	28	High
Baltimore County	24005	4	3	2	1	4	1	3	3	3	23.5	High
Calvert County	24009	2	2	2	4	3	1	2	2	5	24.5	High
Caroline County	24011	1	1	1	1	1	1	1	1	3	12	Medium-Low
Carrroll County	24013	3	2	2	1	3	1	3	3	3	21.5	Medium-High
Cecil County	24015	2	2	2	1	2	1	3	3	3	20	Medium-High
Charles County	24017	3	2	2	4	4	1	3	3	4	27	High
Dorchester County	24019	1	1	2	4	3	1	1	1	3	18	Medium
Frederick County	24021	3	2	2	1	2	2	4	4	5	27	High
Garrett County	24023	1	1	2	4	2	1	2	2	3	19.5	Medium-High
Harford County	24025	3	3	2	1	3	1	2	2	4	21	Medium-High
Howard County	24027	3	3	2	1	2	1	1	1	5	19	Medium-High
Kent County	24029	1	1	1	1	1	1	1	1	1	9	Low
Montgomery County	24031	4	4	2	1	2	1	3	3	1	19	Medium-High
Prince George's County	24033	4	3	2	4	4	1	4	4	0	24.5	High
Queen Anne's County	24035	1	1	1	1	2	1	1	1	1	10	Low
St. Mary's County	24037	2	2	2	1	2	1	2	2	5	20.5	Medium-High
Somerset County	24039	1	1	1	1	1	1	1	1	3	12	Medium-Low
Talbot County	24041	1	1	1	1	1	1	1	1	3	12	Medium-Low
Washington County	24043	3	2	2	1	2	2	2	2	2	17.5	Medium
Wicomico County	24045	2	2	2	1	1	1	1	1	3	14	Medium-Low
Worcester County	24047	2	1	1	1	1	1	1	1	3	12.5	Medium-Low
City of Baltimore	24510	4	4	2	1	1	1	1	1	3	16	Medium

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Table 2.21 -Overall Ranking: Wildfire - January 2016

(SORTED BY FIPS CODE)		Overall Ranking- January 2016										WILDFIRE		
		POPULATION		Wf_IN	Wf_DT	Wf_PD	Wf_CD	Wf_GE	Wf_EV	Wf_Local	Wf_RS	Wf_Rank		
FIPS	PV	PN	Wf_IN	Wf_DT	Wf_PD	Wf_CD	Wf_GE	Wf_EV	Wf_Local	Wf_RS	Wf_Rank			
Allegany County	2	1	2	1	1	1	4	4	3	21	Medium-High			
Anne Arundel County	4	3	2	1	1	1	3	4	0	17	Medium-High			
Baltimore County	4	3	1	1	1	1	2	4	3	19	Medium-High			
Calvert County	2	2	1	1	1	1	4	4	5	23.5	High			
Caroline County	1	1	1	1	1	1	1	4	2	13.5	Medium-Low			
Carroll County	3	2	1	1	1	1	1	4	0	12	Medium-Low			
Cecil County	2	2	1	1	1	1	2	4	0	13	Medium			
Charles County	3	2	1	1	1	1	4	4	1	18	Medium			
Dorchester County	1	1	1	1	1	1	1	4	3	15	Medium			
Frederick County	3	2	2	1	1	1	3	4	3	20.5	Medium-High			
Garrett County	1	1	1	1	1	1	4	4	3	19.5	Medium-High			
Harford County	3	3	1	1	1	1	2	4	0	14	Medium			
Howard County	3	3	2	1	1	1	2	4	1	16.5	Medium			
Kent County	1	1	1	1	1	1	1	4	3	15	Medium			
Montgomery County	4	4	1	1	1	1	1	4	3	18	Medium			
Prince George's County	4	3	1	1	1	1	3	4	3	20.5	Medium-High			
Queen Anne's County	1	1	1	1	1	1	1	4	3	15	Medium			
St. Mary's County	2	2	1	1	1	1	4	4	1	17.5	Medium			
Somerset County	1	1	1	1	2	1	2	4	3	17.5	Medium			
Talbot County	1	1	1	1	1	1	1	4	3	15	Medium			
Washington County	3	2	1	1	1	1	3	4	2	18	Medium			
Wicomico County	2	2	1	1	1	1	2	4	3	17.5	Medium			
Worcester County	2	1	1	1	1	1	4	4	3	20	Medium-High			
City of Baltimore	4	4	1	1	1	1	1	3	0	12.5	Medium-Low			

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Table 2.22 -Overall Ranking: Wind - January 2016

(SORTED BY FIPS CODE)		Overall Ranking- January 2016										Wd_RS	Wd_Rank
		POPULATION		WIND									
County	FIPS	PV	PN	Wd_IN	Wd_DT	Wd_PD	Wd_CD	Wd_GE	Wd_EV	Wd_Local	Wd_RS	Wd_Rank	
Allegany County	24001	2	1	2	1	2	1	1	4	0	13	Medium	
Anne Arundel County	24003	4	3	2	4	2	1	1	4	0	18	High	
Baltimore County	24005	4	3	2	4	2	1	1	4	3	22.5	Medium-High	
Calvert County	24009	2	2	2	1	2	2	1	4	0	14.5	Medium-High	
Caroline County	24011	1	1	1	1	1	1	3	4	0	13.5	Medium	
Carroll County	24013	3	2	2	4	2	2	1	4	0	18	High	
Cecil County	24015	2	2	2	4	2	1	1	4	0	16.5	Medium-High	
Charles County	24017	3	2	2	4	2	2	1	4	0	18	High	
Dorchester County	24019	1	1	2	1	2	1	3	3	3	19	Medium-High	
Frederick County	24021	3	2	2	4	2	2	1	4	5	25.5	High	
Garrett County	24023	1	1	1	1	2	1	1	3	4	16.5	Medium	
Harford County	24025	3	3	2	1	2	1	1	4	4	20.5	Medium-High	
Howard County	24027	3	3	2	1	2	1	1	4	5	22	Medium-High	
Kent County	24029	1	1	2	1	2	1	1	4	0	12.5	Medium	
Montgomery County	24031	4	4	2	4	3	2	1	4	0	20.5	High	
Prince George's County	24033	4	3	2	4	2	1	1	4	4	24	High	
Queen Anne's County	24035	1	1	2	1	2	1	1	4	0	12.5	Medium	
St. Mary's County	24037	2	2	2	1	2	2	3	4	0	17.5	Medium-High	
Somerset County	24039	1	1	2	1	2	1	3	1	4	18.5	Medium-High	
Talbot County	24041	1	1	1	1	1	2	1	4	0	11.5	Medium	
Washington County	24043	3	2	2	1	2	2	1	4	0	15	Medium-High	
Wicomico County	24045	2	2	1	1	2	1	3	3	4	20.5	Medium-High	
Worcester County	24047	2	1	1	1	2	1	4	3	4	21.5	Medium-High	
City of Baltimore	24510	4	4	2	1	2	1	1	3	3	19	Medium-High	

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Table 2.23-Overall Ranking: Winter Storm - January 2016

(SORTED BY FIPS CODE)		POPULATION				Overall Ranking- January 2016											WINTER STORM			
		FIPS	PV	PN	WW_IN	WW_DT	WW_PD	WW_CD	WW_GE	WW_EV	WW_Local	WW_RS	WW_Rank	WW_IN	WW_DT	WW_PD	WW_CD	WW_GE	WW_EV	WW_Local
Allegany County	24001	2	1	2	4	1	1	4	27	High	Allegany County	24001	2	1	2	4	1	4	27	High
Anne Arundel County	24003	4	3	2	4	2	1	2	27	High	Anne Arundel County	24003	4	3	2	4	1	2	27	High
Baltimore County	24005	4	3	2	4	2	1	2	27	High	Baltimore County	24005	4	3	2	4	1	3	27	High
Calvert County	24009	2	2	2	4	1	1	4	23	High	Calvert County	24009	2	2	2	4	1	1	23	High
Caroline County	24011	1	1	1	1	1	1	4	16.5	Medium	Caroline County	24011	1	1	1	1	2	4	16.5	Medium
Carroll County	24013	3	2	2	4	1	2	4	27.5	High	Carroll County	24013	3	2	2	4	3	4	27.5	High
Cecil County	24015	2	2	1	1	2	1	4	18.5	Medium-High	Cecil County	24015	2	2	1	2	2	4	18.5	Medium-High
Charles County	24017	3	2	2	4	1	1	4	20.5	Medium-High	Charles County	24017	3	2	2	1	1	4	20.5	Medium-High
Dorchester County	24019	1	1	1	1	1	1	4	16.5	Medium	Dorchester County	24019	1	1	1	1	1	4	16.5	Medium
Frederick County	24021	3	2	2	4	1	2	4	27.5	High	Frederick County	24021	3	2	2	2	3	4	27.5	High
Garrett County	24023	1	1	1	1	1	1	4	23	High	Garrett County	24023	1	1	1	1	4	4	23	High
Harford County	24025	3	3	2	4	1	1	4	24	High	Harford County	24025	3	3	2	1	3	4	24	High
Howard County	24027	3	3	2	4	2	2	4	26	High	Howard County	24027	3	3	2	2	3	4	26	High
Kent County	24029	1	1	1	1	1	1	4	19.5	Medium-High	Kent County	24029	1	1	1	1	2	4	19.5	Medium-High
Montgomery County	24031	4	4	2	4	2	2	4	30	High	Montgomery County	24031	4	4	2	2	3	4	30	High
Prince George's County	24033	4	3	2	4	2	2	4	26.5	High	Prince George's County	24033	4	3	2	2	2	4	26.5	High
Queen Anne's County	24035	1	1	2	4	1	1	4	22	Medium-High	Queen Anne's County	24035	1	1	2	1	2	4	22	Medium-High
St. Mary's County	24037	2	2	2	4	1	1	4	23	High	St. Mary's County	24037	2	2	2	1	1	4	23	High
Somerset County	24039	1	1	1	1	1	1	4	15	Medium	Somerset County	24039	1	1	1	1	1	4	15	Medium
Talbot County	24041	1	1	1	4	1	1	4	21	Medium-High	Talbot County	24041	1	1	1	1	1	4	21	Medium-High
Washington County	24043	3	2	2	4	1	3	4	28.5	High	Washington County	24043	3	2	2	3	3	4	28.5	High
Wicomico County	24045	2	2	1	1	3	1	4	19.5	Medium-High	Wicomico County	24045	2	2	1	1	1	4	19.5	Medium-High
Worcester County	24047	2	1	1	1	1	1	4	14	Medium-Low	Worcester County	24047	2	1	1	1	1	4	14	Medium-Low
City of Baltimore	24510	4	4	2	4	2	1	4	26	High	City of Baltimore	24510	4	4	2	1	3	4	26	High

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## SECTION III: VULBERABILITY ASSESSMENT

### STATE MITIGATION PLAN REVIEW GUIDE

Released March 2015 FP 302-094-2

This *State Mitigation Plan Review Guide* is FEMA’s official policy on and interpretation of the natural hazard mitigation planning requirements. The intended use of the *Guide* is to facilitate consistent evaluation and approval of state mitigation plans, as well as to facilitate state compliance with the mitigation planning requirements when updating plans.

Figure 3.1—State Mitigation Review Guide S4, S5 & S6

Element	Requirement
<p>S4. Does the risk assessment provide an overview of the probabilities of future hazard events? [44 CFR §201.4(b) and (c) (2) (i)]</p> <p><i>Intent:</i> To understand the probability of hazard events in the future as the basis for anticipated impacts of hazard risks statewide.</p>	<p>a. The risk assessment must provide a summary of the probability of future hazard events that includes projected changes in occurrences for each hazard in terms of location, extent, intensity, frequency, and/or duration.</p> <p>b. Probability must include consideration of changing future conditions, including the effects of long-term changes in weather patterns and climate on identified hazards.</p>
<p>S5. Does the risk assessment address the vulnerability of state assets located in hazard areas and estimate the potential dollar losses to these assets? [44 CFR §201.4(c) (2)] (ii) and 201.4 (c)(2)(iii)]</p> <p><i>Intent:</i> To understand vulnerability of assets critical for state resilience as a basis for identifying and prioritizing mitigation actions.</p>	<p>a. The risk assessment must include an analysis of the potential impacts of hazard events to state assets and a summary of assets most vulnerable to the identified hazard. These assets may be located in the identified hazard areas or affected by the probability of future hazard events.</p> <p>b. The risk assessment must estimate potential dollar losses to state assets located in identified hazard areas.</p> <p>Vulnerability and potential losses are not a list or inventory of state facilities but a summary of the potential impacts to those assets from the identified hazards. Factors affecting vulnerability may include asset use and function as well as construction type, age, or intended use.</p>
<p>S6. Does the risk assessment include an overview and analysis of the vulnerability of jurisdictions to the identified hazards and the potential losses to vulnerable structures? [44 CFR §§201.4(c)(2)(ii) and 201.4(c)(2)(iii)]</p> <p><i>Intent:</i> To understand potential impacts of future hazard events on jurisdictions throughout the state as the basis for identifying and prioritizing mitigation actions.</p>	<p>a. The risk assessment must provide a current summary of the most vulnerable jurisdictions based on the state, local, and tribal, as applicable, risk assessments. Vulnerability must be analyzed in terms of:</p> <ol style="list-style-type: none"> <li>1. Jurisdictions most threatened by the identified hazards (based on hazard location, extent, and probability).</li> <li>2. Jurisdictions most susceptible to damage and loss from hazard events related to populations and assets (such as, structures, infrastructure, critical facilities, and systems). These populations and assets may be located in the identified hazard areas or affected by the probability of future hazard events.</li> </ol>

	<p>b. The risk assessment must include a summary of the potential losses to the identified vulnerable structures based on estimates in the local risk assessments as well as the state risk assessment.</p> <p>c. <i>If the state is interested in an increased Federal cost share under the FMA program, the risk assessment must address repetitive loss (RL) and SRL properties.<sup>16</sup> (See RL1 in Section 3.8 Repetitive Loss Strategy.)</i></p>

## 1. Probability

Probability means the likelihood of the hazard occurring and may be defined in term of general descriptors (for example, unlikely, likely, highly likely), historical frequencies, statistical probabilities (for example: 1% chance of occurrence in any given year), and/or hazard probability maps.

Each of the eight (8) Maryland identified hazards have been rated using the probability assessment chart below. In depth risk and vulnerability data and analysis has been included under each hazard within the *Hazard Identification and Risk Assessment* section and this section of the Plan.

*Table 3.1—Probability Rating*

Rating	Probability	Maryland Identified Hazards
<b>1</b>	<p style="text-align: center;"><b>Unlikely</b></p> <p>Hazard event is likely to occur less than once every thirty years.</p>	<p><i>Note: Hazards that were deemed unlikely were screened out during the initial hazard identification planning process phase.</i></p>
<b>2</b>	<p style="text-align: center;"><b>Likely</b></p> <p>Hazard event is likely to occur less than every five (5) years, but more often than once every thirty years.</p>	<p>Wildfire Tornado Drought</p>
<b>3</b>	<p style="text-align: center;"><b>Highly Likely</b></p> <p>Hazard event is likely to occur more than once every five (5) years.</p>	<p>Flood Coastal Hazards Winter Storm Wind Thunderstorm</p>

The risk and vulnerability assessment consider the likelihood of certain hazard events occurring in the future. Summaries of potential of the probability of future hazard events, including projected changes in terms of location, extent, intensity, and/or frequency have been included under specific hazard within this the *Hazard Identification & Risk Assessment* and this section of the Plan. Specifically, challenges posed by climate change, such as more intense storms, frequent heavy precipitation, drought, extreme flooding, and higher sea-levels, alter the hazards impacting the State, particularly in type and magnitude.

### a. Probability of Future Hazards

The *2014 National Climate Assessment* summarizes the impacts of climate change on the United States, now and in the future. According to the *2014 National Climate Assessment, Highlights for the Northeast Region* include:

**KEY MESSAGE: CLIMATE RISKS TO PEOPLE**

Heat waves, coastal flooding, and river flooding will pose a growing challenge to the region’s environmental, social, and economic systems. This will increase the vulnerability of the region’s residents, especially its most disadvantaged populations.

**KEY MESSAGE: STRESSED INFRASTRUCTURE**

Infrastructure will be increasingly compromised by climate-related hazards, including sea-level rise, coastal flooding, and intense precipitation events.

**KEY MESSAGE: AGRICULTURE AND ECOSYSTEMS IMPACTS**

Agriculture, fisheries, and ecosystems will be increasingly compromised over the next century by climate change impacts. Farmers can explore new crop options, but these adaptations are not cost or risk-free. Moreover, adaptive capacity, which varies throughout the region, could be overwhelmed by a changing climate.

**KEY MESSAGE: PLANNING AND ADAPTATION**

While a majority of states and a rapidly growing number of municipalities have begun to incorporate the risk of climate change into their planning activities, implementation of adaptation measures is still at early stages.

According to the 2014 *National Climate Assessment Overview*, human-induced climate change means much more than just hotter weather. Increases in ocean and freshwater temperatures, frost-free days, and heavy downpours have all been documented. Global sea-level has risen, and there have been large reductions in snow-cover extent, glaciers, and sea ice. Regional impacts for the Northeast were reported in the *2014 National Climate Assessment Overview* as follows: Communities are

affected by heat waves, more extreme precipitation events, and coastal flooding due to sea-level rise and storm surge. The assessment also reported impacts for coastal areas as follows: Coastal lifelines, such as water supply infrastructure and evacuation routes, are increasingly vulnerable to higher sea-levels and storm surges, inland flooding and other climate-related changes.

Large increases in heavy precipitation have occurred in the Northeast, as shown on the map from the *2014 National Climate Assessment Overview-Overall Change in Very Heavy Precipitation*, shown on the next page. Maryland is shown in the very dark blue, the Northeast area, which is of particular concern.

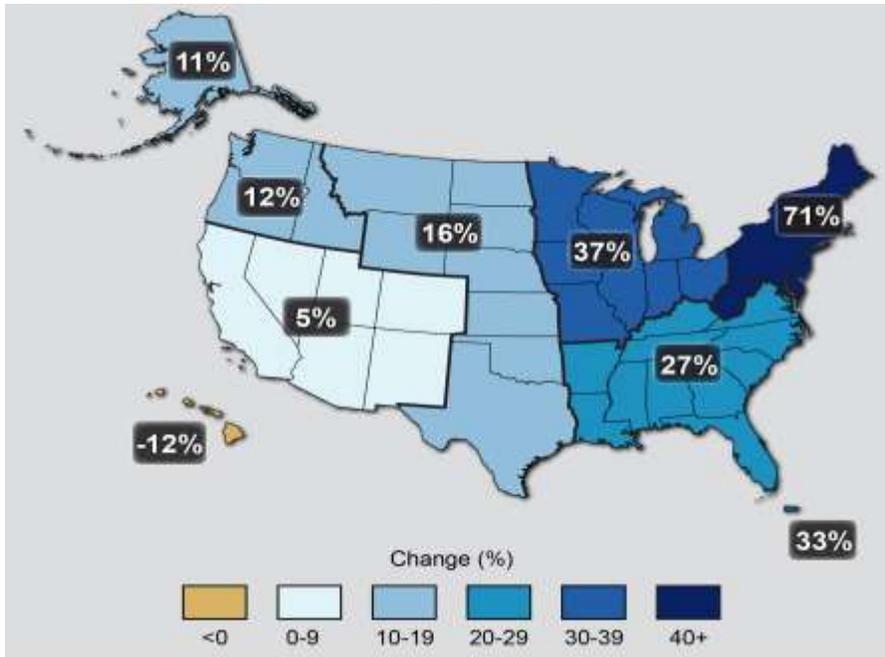
**2014 NATIONAL CLIMATE ASSESSMENT**

**CLIMATE CHANGE: PRESENT & FUTURE**

**Evidence for climate change abounds, from the top of the atmosphere to the depths of the oceans. Scientists and engineers from around the world have meticulously collected this evidence, using satellites and networks of weather balloons, thermometers, buoys, and other observing systems. Evidence of climate change is also visible in the observed and measured changes in location and behavior of species and functioning of ecosystems. Taken together, this evidence tells an unambiguous story: the planet is warming, and over the last half century, this warming has been driven primarily by human activity.**

*Source: The Maryland Coastal Resiliency Assessment (The Nature Conservancy, March 2016. Maryland Coastal Resiliency Assessment. M.R. Canick, N. Carlozo and D. Foster. Bethesda, MD). .restoration*

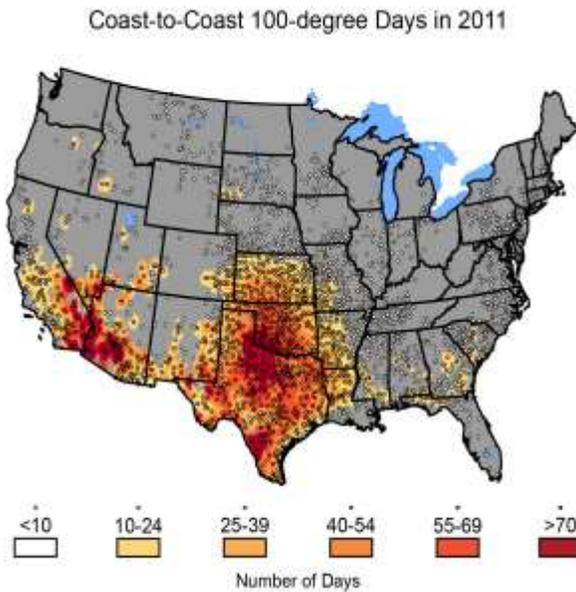
*Figure 3.2—Overall Change in Very Heavy Precipitation*



*Percent changes in the amount of precipitation falling in very heavy events (the heaviest 1%) from 1958 to 2012 for each region. There is a clear national trend toward a greater amount of precipitation being concentrated in very heavy events, particularly in the Northeast and Midwest. (Figure source: updated from Karl et al. 2009).*

Hurricanes Irene and Sandy demonstrated the region’s vulnerability to extreme weather events and the potential for adaptation to reduce impacts. Hurricane Irene produced a broad swath of very heavy rain (greater than five (5) inches in total and two (2) to three (3) inches per hour in some locations) from southern Maryland to northern Vermont from August 27 to 29, 2011. These heavy rains were part of a broader pattern of wet weather preceding the storm that exacerbated the flooding.

*Figure 3.3—2011 100-Degree Days*



According to the *2014 National Climate Assessment*, heat waves are periods of abnormally hot weather lasting days to weeks. The assessment finds that the number of heat waves has been increasing in recent years. The assessment displayed the following map to illustrate Coast-to-Coast 100-degree days in 2011.

*National Climate Assessment-Caption: Map shows numbers of days with temperatures above 100°F during 2011. The record temperatures and drought during the summer of 2011 represent conditions that will be more likely in the U.S. as climate change continues. When outdoor temperatures increase, electricity demands for cooling increase, water availability decreases, and water temperatures increase. Alternative energy*

*technologies may require little water (for example, solar and wind) and can enhance resilience of the electricity sector, but still face land-use and habitat considerations. The projected*

*increases in drought and heat waves provide an example of the ways climate changes will challenge energy, water, and land systems. (Figure source: NOAA NCDC, 2012).*

While Maryland is not shown on the map as having record temperatures above 100°F during 2011, the continued national trend of heat waves and higher temperatures, specifically temperatures exceeding 90°F, which Maryland has posted with frequency in recent years, may lead to increasing drought vulnerability in the future.

Maryland has been working diligently to assess future vulnerability and identify selective adaptation and mitigation methods, programs, and projects to create a more resilient Maryland. These efforts have been highlighted throughout the Plan, displaying Maryland collaborative and forward thinking approach to resiliency.

Note: At this time, Maryland has focused primarily on the hazards highlighted for the Northeast Region in the 2014 National Climate Assessment, coastal and riverine flooding. As such, hazards significance in terms of impacts from climate change to Maryland's moderate to low risk hazards were considered low.

## 2. State Assets

State assets include state-owned and/or operated facilities. The first step in the analysis of potential impacts of hazard events to state assets included updating the State Asset Database. The State Treasurer's Office provided an updated inventory of all state owned and leased facilities, referred to as Maryland Property Schedule Database. This database was modified to include additional attribute categories consistent with the process of risk and vulnerability assessment, referred to as the State Asset Database.

The 2011 State Asset Database used during the vulnerability assessment contained 6,688 parcels with facilities. Data entries that lacked point data (x & y coordinates) from the State Treasurer's Office Property Schedule were not included in the 2011 State Asset Database. The updated 2016 State Asset Database includes 7,891 parcels containing facilities. All data entries from the State Treasurer's Office Property Schedule were included in the 2016 State Asset Database and utilized in the 2016 vulnerability assessment update.

Facilities were categorized based upon the State Agency that owns and/or operates the facility using the following facility types:

- Administration;
- Corrections;
- Department of Natural Resources;
- Education;
- Environmental;
- Fire/Police;
- Health Related;
- Historic;
- Judicial/Legal;
- Military;
- Social Services;
- Transportation; and
- Utility/Infrastructure.

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Table 3.2–State Assets by Facility Type

Jurisdiction	Administration	Corrections	Department of Natural Resources	Education	Environment	Fire/Police	Health Related	Historic	Judicial/Legal	Military	Social Services	Transportation	Utility/Infrastructure	Total State Assets	Total Built in or Prior to 1965	% of State Assets 50 yrs. Or Older
Allegany	18	41	46	77	2	5	54	10	6	7	22	37	1	326	46	14%
Anne Arundel	76	120	145	15	9	7	79	1	48	6	33	100	13	652	57	9%
Baltimore	42	33	168	104	9	25	148	0	18	68	108	114	0	837	350	42%
Baltimore City	104	79	1	322	10	0	86	0	30	8	99	198	1	938	189	20%
Calvert	11	2	6	54	0	4	10	0	5	3	2	16	43	156	44	28%
Caroline	13	1	63	4	0	2	5	0	4	0	2	21	0	115	29	25%
Carroll	14	30	24	4	28	4	103	0	5	2	11	22	0	247	100	40%
Cecil	11	1	204	7	2	7	24	0	3	2	3	52	0	316	10	3%
City of Annapolis	53	1	18	6	2	3	3	0	27	1	3	12	14	143	139	97%
Charles	13	6	57	35	2	1	8	0	7	4	14	19	0	166	37	22%
Dorchester	5	1	13	100	1	1	26	0	4	6	5	12	0	174	13	7%
Frederick	14	3	86	23	2	4	12	0	7	3	27	24	0	205	70	34%
Garrett	8	2	172	31	1	3	29	0	3	0	47	23	0	319	108	34%
Harford	15	4	101	17	6	3	7	6	10	28	9	37	0	243	78	32%
Howard	63	61	206	24	3	13	23	0	9	2	5	16	0	425	156	37%
Kent	8	1	7	3	1	1	12	0	3	1	5	12	0	54	4	7%
Montgomery	23	3	85	25	3	2	13	0	10	2	17	44	0	227	60	26%
Ocean City	0	0	0	0	0	0	0	0	2	0	2	1	0	5	0	0%
Prince George's	43	10	132	412	6	7	29	0	14	7	64	31	0	755	268	35%
Queen Anne's	6	8	33	32	2	4	8	0	4	2	0	17	1	117	23	20%
Somerset	8	66	60	99	1	1	18	0	6	1	4	11	0	275	44	16%
St. Mary's	15	1	109	99	2	4	9	97	5	9	9	9	0	368	130	35%
Talbot	9	1	20	6	5	5	9	0	6	2	3	25	0	91	11	12%
Washington	21	70	96	22	6	3	49	0	7	45	18	30	0	367	89	24%
Wicomico	24	8	15	91	1	7	42	0	8	4	12	14	1	227	53	23%
Worcester	8	3	93	3	0	2	12	0	6	0	4	12	0	143	21	15%
<b>TOTALS</b>	<b>625</b>	<b>556</b>	<b>1,960</b>	<b>1,615</b>	<b>104</b>	<b>118</b>	<b>818</b>	<b>114</b>	<b>257</b>	<b>213</b>	<b>528</b>	<b>909</b>	<b>74</b>	<b>7,891</b>	<b>2,130</b>	<b>-</b>

*\*Note:* Within the Social Services facility type category, properties labeled as Real Estate Owned (REO is a term used in the United States to describe a class of property owned by a lender—typically a bank, government agency, or government loan insurer) are included within the State Treasurer's Office Property Schedule under this category, and therefore included within the State Asset Database.

*\*\*Note:* State Assets are included in the table on a structure basis and not parcel basis. There may be multiple structures on one parcel, such as colleges, state parks, hospitals, etc.

Jurisdictions containing the highest number of state asset facilities included: Baltimore, Anne Arundel, and Prince George's counties, along with the City of Baltimore.

**a. Historic State Owned Structures**

The updated State Asset Database was further enhanced to include state owned historic structures. An additional attribute column "Historic" was added to the database. Facilities built in 1965 and prior were designated as historic within the database. Local Jurisdictions containing the highest percentage of state assets that are fifty (50) years and older include: Baltimore and

Carroll County. Notably, of the 139 state asset facilities within the City of Annapolis, 97% of these assets were built in or prior to 1965. These facilities were built prior to modern codes, which may increase the vulnerability of the historic structures to various hazards.

### 3. Critical Facilities

Critical facilities refer to structures that the state determines must continue to operate before, during, and after an emergency and/or hazard event and/or are vital to health and safety. Maryland published *Local Hazard Mitigation Plan Guidance* in May of 2015 to ensure continuity between local and State Hazard Mitigation Plan documents. Considering that there are various perspectives on types of facilities designated as critical, the *HAZUS-MH User's Manual* essential facility definition and facility types were adopted as the basis for the minimum critical facility types in Maryland. As part of the local guidance, the State determined at a minimum the following critical facilities must be included in both the State and local plan update process:

- Fire Stations;
- Hospital and Medical Clinics;
- Police Stations;
- Emergency Operations Centers; and
- Schools (K-12 & Colleges).

Local jurisdictions were encouraged to include additional critical facilities at their discretion. As a result of the critical facility data outreach and vetting process used during the plan development process, the *State of Maryland Critical Facility Database* was finalized. This database was one of the 2011 FEMA recommendations for the plan update. The database is the first statewide critical facility database, utilized for vulnerability assessment.

The database contains 2,768 facilities statewide. Many of these facilities were built prior to modern building codes, in fact, 769 facilities were built in 1965 or prior, and are fifty (50) plus years old.

Jurisdictions containing the highest numbers of critical facilities included: Baltimore County, City of Baltimore, Prince George’s County, and Montgomery County. As these jurisdictions constitute the largest populations within the State, a large number of critical facilities are needed to provide for public safety.

*Table 3.3–Maryland Critical Facilities by Facility Type*

Jurisdiction	EOC	Fire	Medical	Police	School	Total Critical Facilities	Total Built in or Prior to 1965	% of Critical Facilities 50 yrs. Or older
Allegany	1	29	3	4	33	70	32	46%
Anne Arundel	1	32	5	11	90	139	29	21%
Baltimore	1	58	4	14	350	427	83	19%
Baltimore City	2	40	104	11	301	458	201	44%
Calvert	2	8	22	2	39	73	14	19%
Caroline	1	7	9	4	9	30	12	40%
Carroll	2	14	12	5	82	115	39	34%
Cecil	1	21	10	4	55	91	36	40%

Jurisdiction	EOC	Fire	Medical	Police	School	Total Critical Facilities	Total Built in or Prior to 1965	% of Critical Facilities 50 yrs. Or older
City of Annapolis	1	4	3	1	29	38	11	29%
Charles	1	18	3	6	52	80	13	16%
Dorchester	1	15	5	5	18	44	19	43%
Frederick	1	30	8	4	77	120	36	30%
Garrett	1	4	1	0	13	19	8	42%
Harford	1	28	8	9	69	115	21	18%
Howard	1	12	4	4	91	112	5	4%
Kent	1	7	4	2	11	25	10	40%
Montgomery	1	39	25	6	149	220	55	25%
Ocean City	1	5	0	1	2	9	1	11%
Prince George's	1	39	6	4	200	250	16	6%
Queen Anne's	1	16	5	3	24	49	26	53%
Somerset	2	7	2	3	12	26	9	35%
St. Mary's	2	16	3	1	21	43	15	35%
Talbot	1	7	10	6	21	45	13	29%
Washington	2	23	3	6	53	87	27	31%
Wicomico	1	13	4	6	42	66	27	41%
Worcester	1	15	1	8	18	43	20	47%
<b>TOTALS</b>	<b>32</b>	<b>501</b>	<b>264</b>	<b>130</b>	<b>1841</b>	<b>2768</b>	<b>769</b>	<b>-</b>

**a. Historic Critical Facilities**

Local Jurisdictions containing the highest percentage of critical facilities that are fifty years and older include: Queen Anne’s, Wicomico, Allegany County, and Dorchester Counties. These facilities were built prior to modern codes, which increases the vulnerability of the historic structures to various hazards.

**4. Loss Estimations**

Loss estimations were calculated and incorporated into both the *Critical Facilities Database* and the *State Asset Database*. The *Critical Facilities Database* included assessment values for each of the facilities, however content value was not available. Therefore, content value was calculated by dividing the total assessed value by three (3) to produce an estimated content value for each facility.

Many of the facilities within the *State Asset Database* contained both building and content values already designated by the State Treasurer’s Office. However, if a building value but no content value was included, the building value was divided by three (3) to produce an estimated content value for each facility. Conversely, if the content value but no building value was included, the content value was multiplied by three (3) to produce an estimated building value. This estimation process was also conducted in the 2011 Plan. In some cases, many of the facilities located on one (1) property were assigned the same building and content value. In order to reduce this duplication, only one (1) facility on the entire property was used when summing potential losses. The “comments” filed in the *State Asset Database* designates if a facility’s values include other facilities on the same property.

## 5. Flood Vulnerability

The vulnerability of state assets and critical facilities located in flood hazard areas and estimated potential losses have been assessed. Estimated losses to both state assets and critical facilities are based upon assessed value, obtained from the Maryland State Treasurer’s Office.

Flood hazard areas identified on the Flood Insurance Rate Map (FIRM) are designated as a Special Flood Hazard Area (SFHA). High risk SFHA are defined as the area that will be inundated by the flood event having a 1-percent chance of being equaled or exceeded in any given year. The 1-percent annual chance flood is also referred to as the base flood or 100-year flood. Moderate to low flood hazard areas, labeled 0.2-percent-annual-chance or Zone X, are the areas between the limits of the base flood and the 0.2-percent-annual-chance (or 500-year) flood.

*Table 3.4—FEMA Flood Zones*

Flood Zone	Description
<b>SFHA-High Risk Areas</b>	
A	Areas with a 1% annual chance of flooding and a 26% chance of flooding over the life of a 30-year mortgage. Because detailed analyses are not performed for such areas; no depths or base flood elevations are shown within these zones.
AE	Areas with a 1% annual chance of flooding and a 26% chance of flooding over the life of a 30-year mortgage. Base flood elevations derived from detailed analyses are provided. AE Zones are now used on new format FIRMs instead of A1-A30 Zones.
VE	Coastal areas with a 1% or greater chance of flooding and an additional hazard associated with storm waves. These areas have a 26% chance of flooding over the life of a 30-year mortgage. Base flood elevations derived from detailed analyses are shown at selected intervals within these zones.
<b>Moderate Risk Areas</b>	
0.2% Annual Chance Flood Hazard	Areas outside the 1% annual chance floodplain, areas of 1% annual chance sheet flow flooding where average depths are less than 1 foot, areas of 1% annual chance stream flooding where the contributing drainage area is less than 1 square mile, or areas protected from the 1% annual chance flood by levees. No Base Flood Elevations or depths are shown within this zone. Insurance purchase is not required in these zones.
<b>Minimum Risk Areas</b>	
X	Area of minimal flood hazard, usually depicted on FIRMs as above the 500-year flood level. Zone X is the area determined to be outside the 500-year flood and protected by levee from 100-year flood.

Source: FEMA: *Definitions of FEMA Flood Zone Designations*

As discussed throughout the plan document, specifically within the both the risk and vulnerability assessment sections, flooding has been designated as a high hazard for Maryland. Areas that are considered at minimum or moderate risk may become high risk areas in the future due to climate change and coastal sea-level rise. According to the National Oceanic and Atmospheric Administration (NOAA) report, *Sea-level Rise and Nuisance Flood Frequency around the United States*, so-called “nuisance flooding” has increased on all three (3) U.S coasts. Furthermore, the report finds that of the forty-five (45) locations analyzed, eight (8) of the top ten (10) U.S. cities that have seen an increase in nuisance flooding are on the East Coast. Particularly concerning to Maryland, the report finds that the City of Annapolis and City of Baltimore lead the list with an increase in number of flood days of more than 920 percent since 1960.

**Table 3.5–Nuisance Flooding**

Jurisdiction	Nuisance Level Meters above mean higher high water mark	Average nuisance flood days, 1957-1963	Average nuisance flood days, 2007-2013	Percent of Increase
City of Annapolis	0.29	3.8	39.3	10.34%
Baltimore City	0.41	1.3	13.1	10.0%

Data Source: National Oceanic and Atmospheric Administration (NOAA) report, *Sea-level Rise and Nuisance Flood Frequency around the United States*

\*More than one flood on average between 1957-1963, and for nuisance levels above 0.25 meters.

**a. Critical Facilities within FEMA Flood Zones**

The Maryland Critical Facility Database was expanded to include FEMA Flood Zones. Each Critical Facility was assessed to determine if the facility was within a flood zone, and, if so, the flood zone was identified within the database. Jurisdictions containing the highest number of critical facilities within one of the FEMA identified SFHA’s included the City of Baltimore and Somerset County.

Moderate flood hazard areas and minimal flood hazard areas are also shown on the FIRM, and were identified in relation to critical facilities within the Critical Facility Database. Due to climate change impacts, these areas have been considered in light of both current and future conditions. An increase in low-grade flooding, or flooding in areas of moderate or even minimum risk, are likely to increase in Maryland due to sea-level rise, increased number of storms, and increased precipitation during storm events. Increased precipitation and storm intensity may affect critical facilities within the “moderate risk” or 0.2% (or 500-year flood) zones, particularly in both Allegany and Prince Georges Counties. Sea-level rise coupled with increases in precipitation and storm intensity may also increase vulnerability to critical facilities in the future, particularly in coastal communities. Baltimore County, City of Baltimore, and Queen Anne’s County have many critical facilities within the FEMA “X” Zone, the minimal risk area, which may indicate areas of increasing risk over time. The total critical facilities within the State currently identified in FEMA “X” Zone, minimal flooding risk area, totals 2,613 facilities.

**Table 3.6–Critical Facilities within FEMA Flood Zones**

Jurisdiction	Critical Facility Totals	Critical Facilities w/in FEMA Flood Zones						Historical Total built prior to 1965
		SFHA-High Risk			Moderate Risk	Levee	Minimum Risk	
		A	AE	VE	0.2%	X Protected by Levee	X	
Allegany	70	0	7	0	3	1	59	32
Anne Arundel	139	1	0	0	0	0	138	29
Baltimore	427	1	5	0	0	0	421	83
Baltimore City	458	0	10	0	0	0	379	201
Calvert	73	0	0	0	0	0	73	14
Caroline	30	0	1	0	0	0	29	12
Carroll	115	0	0	0	0	0	165	39
City of Annapolis	38	0	0	0	0	0	38	11
Cecil	91	0	1	0	0	0	90	36
Charles	80	0	0	0	0	0	80	13

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Dorchester	44	0	4	0	0	0	20	11
Frederick	120	0	4	0	0	0	116	36
Garrett	19	0	0	0	0	0	19	8
Harford	115	0	2	0	0	0	113	21
Howard	112	0	0	0	0	0	35	5
Kent	25	0	1	0	0	0	24	10
Montgomery	220	0	0	0	0	0	219	55
Ocean City	9	0	1	1	0	0	7	1
Prince George's	250	0	2	0	2	0	246	16
Queen Anne's	49	0	2	0	0	0	47	26
Somerset	26	0	7	0	0	0	19	9
St. Mary's	43	0	0	0	0	0	43	15
Talbot	45	0	1	0	0	0	44	13
Washington	87	1	1	0	1	0	84	27
Wicomico	66	0	2	0	0	0	64	27
Worcester	43	0	2	0	0	0	41	20
<b>TOTALS</b>	<b>2,774</b>	<b>3</b>	<b>53</b>	<b>1</b>	<b>6</b>	<b>1</b>	<b>2,613</b>	<b>770</b>

**b. Historic Critical Facilities within FEMA Flood Zones**

There are twenty-three (23) critical facilities that were built either in 1965 or prior that are within a FEMA designated flood zone. Allegany and Dorchester counties have the highest number of historic critical facilities, five (5) and four (4), respectively. Total loss estimations for both building value and content value indicate that Allegany County, Baltimore City, and Somerset County have the highest total loss estimations per jurisdiction.

*Table 3.7—Historic Critical Facilities within FEMA Flood Zones*

Jurisdiction	Historical Critical Facility Totals in Flood Zones	Loss Estimates		
		Building Value	Content Value	Total Loss
Allegany	5	\$5,164,500	\$1,721,500	\$6,886,000
Anne Arundel	0	\$0	\$0	\$0
Baltimore	1	\$207,800	\$69,300	\$277,100
Baltimore City	3	\$4,135,300	\$1,378,400	\$5,513,700
Calvert	0	\$0	\$0	\$0
Caroline	0	\$0	\$0	\$0
Carroll	0	\$0	\$0	\$0
City of Annapolis	0	\$0	\$0	\$0
Cecil	0	\$0	\$0	\$0
Charles	0	\$0	\$0	\$0
Dorchester	4	\$1,008,100	\$336,000	\$1,344,100
Frederick	1	\$590,500	\$196,800	\$787,300
Garrett	0	\$0	\$0	\$0
Harford	0	\$0	\$0	\$0
Howard	0	\$0	\$0	\$0
Kent	1	\$235,500	\$78,500	\$314,000
Montgomery	0	\$0	\$0	\$0
Ocean City	0	\$0	\$0	\$0
Prince George's	0	\$0	\$0	\$0
Queen Anne's	1	\$200,900	\$67,000	\$267,900
Somerset	2	\$4,209,900	\$1,403,300	\$5,613,200
St. Mary's	0	\$0	\$0	\$0
Talbot	1	\$1,307,700	\$435,900	\$1,743,600
Washington	3	\$1,964,200	\$654,700	\$2,618,900

Wicomico	0	\$0	\$0	\$0
Worcester	1	\$54,500	\$18,200	\$72,700
<b>TOTALS</b>	<b>23</b>	<b>\$19,078,900</b>	<b>\$6,359,600</b>	<b>\$25,438,500</b>

**c. Critical Facility Loss Estimations**

Loss estimations were completed for all facilities contained within the New Maryland Critical Facility Database. Loss estimations included both building and content values.

*Table 3.8—Critical Facilities Loss Estimations*

Jurisdiction	Critical Facility Totals	Loss Estimates		
		Building Value	Content Value	Total Loss
Allegany	70	\$407,256,100	\$135,752,000	\$543,008,100
Anne Arundel	139	\$1,070,254,100	\$356,751,400	\$1,427,005,500
Baltimore	427	\$2,356,871,700	\$785,623,900	\$3,142,495,600
Baltimore City	458	\$6,985,107,300	\$2,328,369,100	\$9,313,476,400
Calvert	73	\$463,442,100	\$154,480,700	\$617,922,800
Caroline	30	\$8,514,000	\$28,252,200	\$113,008,900
Carroll	115	\$1,069,909,600	\$356,636,500	\$1,426,546,100
City of Annapolis	38	\$517,658,100	\$172,552,700	\$690,210,800
Cecil	91	\$390,260,000	\$130,086,700	\$520,346,700
Charles	80	\$589,289,300	\$196,429,800	\$785,719,100
Dorchester	44	\$59,832,900	\$19,944,300	\$79,777,200
Frederick	120	\$1,157,114,300	\$385,704,800	\$1,542,819,100
Garrett	19	\$118,508,900	\$39,503,000	\$158,011,900
Harford	115	\$1,007,301,700	\$335,767,200	\$1,343,068,900
Howard	112	\$915,094,400	\$305,031,500	\$1,220,125,900
Kent	25	\$67,540,500	\$22,513,500	\$90,054,000
Montgomery	220	\$3,373,282,400	\$1,124,427,500	\$4,497,709,900
Ocean City	9	\$34,403,400	\$11,467,800	\$45,871,200
Prince George's	250	\$1,005,822,580	\$335,274,200	\$1,341,096,800
Queen Anne's	49	\$255,792,800	\$85,264,300	\$341,057,100
Somerset	26	\$131,931,500	\$43,977,200	\$175,908,700
St. Mary's	43	\$343,849,400	\$114,616,500	\$458,465,900
Talbot	45	\$166,116,600	\$55,372,200	\$221,488,800
Washington	87	\$772,391,000	\$257,463,700	\$1,029,854,700
Wicomico	66	\$699,831,900	\$233,277,300	\$933,109,200
Worcester	43	\$183,102,800	\$61,034,300	\$244,137,100
<b>TOTALS</b>	<b>2772</b>	<b>\$24,150,479,380</b>	<b>\$8,075,574,300</b>	<b>\$32,028,076,100</b>

**d. State Assets within FEMA Flood Zones**

The Maryland State Asset Database was expanded to include FEMA Flood Zones. Each state asset was assessed to determine if the facility was within a flood zone, and, if so, the flood zone was identified within the database. Jurisdictions containing the highest number of state assets within one of the FEMA identified SFHA's included St. Mary's and Somerset counties, along with the City of Baltimore.

Moderate flood hazard areas and minimal flood hazard areas are also shown on the FIRM, and were identified in relation to critical facilities within the State Asset Database. Due to climate change impacts, these areas have been considered in light of both current and future conditions. An increase in low-grade flooding, or flooding in areas of moderate or even minimum risk, are likely to increase in Maryland due to sea-level rise, increased number of storms, and increased precipitation during storm events. Increased precipitation and storm intensity may affect state

assets within the “moderate risk” or 0.2% (or 500-year flood) zones, particularly in both Allegany and Prince George’s Counties. Sea-level rise coupled with increases in precipitation and storm intensity may also increase vulnerability to state assets in the future, particularly in coastal communities. Baltimore, Prince George’s and Anne Arundel counties, along with the City of Baltimore have many state assets within the FEMA “X” Zone, the minimal risk area, which may indicate areas of increasing risk over time. The total state assets within the State currently identified in FEMA “X” Zone, minimal flooding-risk area, totals 7,593 facilities.

Table 3.9—State Assets within FEMA Flood Zones

Jurisdiction	State Asset Total	State Assets w/in FEMA Flood Zone						Historical State Assets
		SFHA-High Risk			Moderate Risk	Levee	Minimum	Total built in Flood Zone
		A	AE	VE	0.2%	X Protected by Levee	X	
Allegany	326	1	0	0	4	0	321	0
Anne Arundel	652	0	6	0	0	0	646	1
Baltimore	837	0	2	0	0	0	835	0
Baltimore City	938	1	37	0	0	0	900	6
Calvert	156	0	0	0	0	0	156	0
Caroline	115	0	0	0	0	0	115	0
Carroll	247	1	0	0	0	0	246	0
City of Annapolis	143	0	5	0	0	0	138	2
Cecil	316	0	0	0	0	0	316	0
Charles	166	0	2	0	0	0	164	0
Dorchester	174	0	8	0	0	0	166	1
Frederick	205	3	3	0	0	0	199	1
Garrett	319	0	0	0	0	0	319	0
Harford	243	0	2	0	0	0	241	0
Howard	425	0	0	0	0	0	425	0
Kent	54	0	1	0	0	0	43	0
Montgomery	227	0	0	0	0	0	227	0
Ocean City	5	0	4	0	0	0	1	0
Prince George’s	755	0	7	0	2	0	746	0
Queen Anne’s	117	0	1	0	0	0	116	0
Somerset	275	0	58	0	0	0	217	11
St. Mary’s	368	0	82	1	0	0	285	39
Talbot	91	0	2	0	0	0	89	0
Washington	367	1	2	0	0	0	364	0
Wicomico	227	0	22	0	0	0	205	0
Worcester	143	1	30	0	0	0	113	1
<b>TOTAL</b>	<b>7,891</b>	<b>8</b>	<b>274</b>	<b>1</b>	<b>6</b>	<b>0</b>	<b>7,593</b>	<b>62</b>

**e. Historic State Assets within FEMA Flood Zones**

There are sixty-two (62) state assets that were built either in 1965 or prior that are within a FEMA designated flood zone. City of Baltimore and Somerset County have the highest loss estimations of historic state assets, while Somerset and St. Mary’s counties have the highest number of state assets, eleven (11) and thirty-nine (39), respectively within FEMA flood zones.

**Table 3.10—Historic State Assets within FEMA Flood Zones**

Jurisdiction	Historical State Assets Totals in Flood Zones	Loss Estimates		
		Building Value	Content Value	Total Loss
Allegany	0	\$0	\$0	\$0
Anne Arundel	1	\$124,000	\$41,300	\$165,300
Baltimore	0	\$0	\$0	\$0
Baltimore City	6	\$223,606,300	\$2,695,300	\$226,301,600
Calvert	0	\$0	\$0	\$0
Caroline	0	\$0	\$0	\$0
Carroll	0	\$0	\$0	\$0
City of Annapolis	2	\$2,644,100	\$636,100	\$3,280,100
Cecil	0	\$0	\$0	\$0
Charles	0	\$0	\$0	\$0
Dorchester	1	\$67,400	\$74,700	\$142,000
Frederick	1	\$3,420,500	\$29,900	\$3,450,400
Garrett	0	\$0	\$0	\$0
Harford	0	\$0	\$0	\$0
Howard	0	\$0	\$0	\$0
Kent	0	\$0	\$0	\$0
Montgomery	0	\$0	\$0	\$0
Ocean City	0	\$0	\$0	\$0
Prince George's	0	\$0	\$0	\$0
Queen Anne's	0	\$0	\$0	\$0
Somerset	11	\$37,114,500	\$1,619,100	\$38,733,600
St. Mary's	39	\$3,004,800	\$1,127,900	\$4,132,700
Talbot	0	\$0	\$0	\$0
Washington	0	\$0	\$0	\$0
Wicomico	0	\$0	\$0	\$0
Worcester	1	\$2,658,300	\$886,100	\$3,544,400
<b>TOTALS</b>	<b>62</b>	<b>\$272,639,900</b>	<b>\$7,110,400</b>	<b>\$279,750,100</b>

**f. State Assets Loss Estimations**

Loss estimations were completed for all facilities contained within the Updated 2016 State Asset Database. Loss estimations included both building and content values. There are two hundred eighty-nine (289) state assets within a FEMA designated flood zone. City of Baltimore and Somerset County have the highest state asset loss estimations, while Somerset and St. Mary's counties have the highest number of state assets, fifty-eight (58) and eighty-three (83), respectively within FEMA flood zones.

**Table 3.11—State Assets Loss Estimations**

Jurisdiction	State Asset Totals in Flood Zones	Loss Estimates		
		Building Value	Content Value	Total Loss
Allegany	5	\$973,100	\$324,400	\$1,297,500
Anne Arundel	6	\$9,090,000	\$2,276,400	\$11,366,400
Baltimore	2	\$641,900	\$214,000	\$855,900
Baltimore City	38	\$770,086,500	\$23,293,100	\$793,379,600
Calvert	0	\$0	\$0	\$0
Caroline	0	\$0	\$0	\$0
Carroll	1	\$4,300	\$1,400	\$5,700
City of Annapolis	5	\$4,820,000	\$1,283,400	\$6,103,500
Cecil	0	\$0	\$0	\$0

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Charles	2	\$156,200	\$52,100	\$208,300
Dorchester	8	\$296,200	\$244,100	\$540,300
Frederick	6	\$40,578,400	\$11,234,80	\$51,813,200
Garrett	0	\$0	\$0	\$0
Harford	2	\$87,800	\$29,300	\$117,100
Howard	0	\$0	\$0	\$0
Kent	1	\$730,900	\$243,600	\$974,500
Montgomery	0	\$0	\$0	\$0
Ocean City	4	\$241,500	\$78,200	\$319,800
Prince George's	9	\$12,361,900	\$1,085,000	\$13,446,900
Queen Anne's	1	\$274,400	\$91,500	\$365,900
Somerset	58	\$125,934,100	\$4,254,400	\$130,188,500
St. Mary's	83	\$8,166,500	\$2,919,600	\$11,086,100
Talbot	2	\$243,300	\$23,100	\$266,400
Washington	3	\$223,900	\$74,600	\$298,500
Wicomico	22	\$85,765,600	\$1,515,900	\$87,281,500
Worcester	31	\$39,794,400	\$12,857,400	\$52,651,800
<b>TOTALS</b>	<b>289</b>	<b>\$1,100,470,900</b>	<b>\$50,861,500</b>	<b>\$1,162,567,400</b>

**g. Coastal Communities Flood Loss Estimations FEMA Risk MAP Products**

During the preparation of the *Maryland Hazard Mitigation Plan*, the State was fortunate in that FEMA provided Risk Mapping, Assessment, and Planning (Risk MAP) products to all of Maryland's coastal communities, with the exception of Talbot County, which is slated for completion in September, 2016. Flood Risk Reports (FRR) providing non-regulatory information to use in conjunction with other data sources to provide a comprehensive picture of flood risk. Flood risk analysis results include potential losses for the refined 1-percent annual chance Coastal Flood Risk Study. Potential losses within the various FRR's were computed using state-level tax data (parcel centroids from the MD Department of Planning) and, where available, local building footprints to estimate loss ratios for the 1-percent annual chance flood scenario. FRR loss estimations included residential, commercial, and other building.

*Table 3.12—Flood Risk Project Refined Losses by Jurisdiction*

Flood Risk Project Refined Losses by Jurisdiction			
Jurisdiction	Inventory Estimated Value	1% (100-yr) Dollar Losses	Loss Percentage
Anne Arundel County	\$720,700,000	\$86,200,000	11.96%
Baltimore City	\$132,585,900,000	\$1,524,800,000	1.15%
Baltimore County	\$826,500,000	\$103,300,000	12.50%
Calvert County	\$194,800,000	\$20,700,000	10.63%
Caroline County	\$11,600,000	\$1,500,000	12.93%
Cecil County	\$169,700,000	\$41,900,000	24.69%
Charles County	\$54,900,000	\$9,300,000	16.94%
Dorchester County	\$482,400,000	\$37,100,000	7.69%
Harford County	\$414,100,000	\$8,300,000	2.00%
Kent County	\$289,900,000	\$31,500,000	10.87%
Prince George's County	\$1,100,000	\$300,000	27.27%
Queen Anne's County	\$256,200,000	\$21,800,000	8.51%
St. Mary's County	\$294,500,000	\$24,100,000	8.18%
Wicomico County	\$137,600,000	\$11,400,000	8.28%
Worcester County	\$1,633,500,000	\$36,800,000	2.25%
Somerset County	\$594,400,000	\$88,500,000	14.89%

\*Source - FEMA Flood Risk Reports per jurisdiction.

\*\*Talbot County Flood Risk Report not published at time of table generation.

Although the City of Baltimore was listed as having the largest estimated inventory value and also the largest dollar loss potential due to a 100-year flood event, the City of Baltimore’s loss percentage was the lowest in the State at 1.15%. Similarly, Worcester County has the second highest estimated inventory value yet its estimated loss potential was very low at 2.25%. Conversely, Prince George’s County has the lowest estimated inventory value and dollar loss potential, yet has the highest calculated loss percentage. Statewide, the average loss percentage due to a 100-year flood event is 11.3%.

**h. Flood Hazard Consequence Analysis**

A consequence analysis, derived from the Emergency Management Accreditation Program (EMAP) has been performed to better understand and outline the impacts that a flood event would have on the public; responders; continuity of operations including delivery of services; property, facilities and infrastructure; the environment; the economic condition of the state, and public confidence in the states governance. The results of the consequence analysis are shown in Table 3.12.

*Table 3.13–Flood Hazard Consequence Analysis*

Subject	Impacts
Healthy and Safety of the Public	Home and property owners within the FEMA 100-year flood zone are most at risk to impacts from a flood event. Impacts to the public include potential for injury or loss of life, destruction and/or loss of land and property, and contamination of water due to flood.
Health and Safety of Responders	First responders, such as fire and police, would be called to the incident area(s) to evacuate people, close roads, and attend to any injured. For a flood event, as with all disaster events, responders face the risk of personal injury while performing necessary job functions.
Continuity of Operations (incl. delivery of services)	The impacts on continuity of operations will be limited, unless a facility is within a flood hazard area during a severe flood event. Delivery of services may be slowed or halted in these areas if key roadways become impassable due to flooding.
Property, facilities, and infrastructure	Home and landowners within flood zones may experience damage to or loss of property depending upon the severity of flooding in the area. Infrastructure may experience impacts in the form of damages from flooding, debris blockages, temporary closure of transportation routes, and the potential inability of the stormwater system to handle floodwaters in a severe event.
Environment	Floods impact the environment by spreading pollution; overloading water and wastewater treatment plants; carrying silt and debris; and disturbing wildlife and the natural area.
Economic condition of the state	A major flood event would be costly for state and local governments in terms of emergency response, delivery of services, disaster cleanup, and future mitigation projects. Some of the costs could be recouped through federal grant reimbursements, but local governments would still feel the fiscal impact of a major event.
Public confidence in state governance	Public confidence will largely depend upon how effectively the State of Maryland, and county and local governments prepare for and respond to a flood event.

## 6. Coastal Hazards Vulnerability

Coastal Hazards included in the plan are tropical storms, hurricanes, sea-level rise, shoreline erosion, and Nor'easters.

### a. Critical Facilities within High Hazard Coastal Areas

Coastal areas assessed as having a highest risk to coastal hazards include: Anne Arundel, Baltimore, Calvert, Charles, Dorchester, Kent, Queen Anne's, St. Mary's, Somerset, and Worcester counties, as well as, the City of Baltimore, City of Annapolis and Ocean City. Loss estimations indicate that Anne Arundel, Baltimore, and Carroll counties, as well as, the City of Baltimore have the highest critical facility building value and content loss estimations.

*Table 3.14—Critical Facilities within High Hazard Coastal Areas*

Jurisdiction	Critical Facilities Totals	Critical Facilities Loss Estimations		
		Building Value	Content Value	Total Loss
Anne Arundel	139	\$1,070,254,100	\$356,751,400	\$1,427,005,500
Baltimore	427	\$2,356,871,700	\$785,623,900	\$3,142,495,600
Baltimore City	458	\$6,985,107,300	\$2,328,369,100	\$9,313,476,400
Calvert	73	\$463,442,100	\$154,480,700	\$617,922,800
Carroll	115	\$1,069,909,600	\$356,636,500	\$1,426,546,100
City of Annapolis	38	\$517,658,100	\$172,552,700	\$690,210,800
Charles	80	\$589,289,300	\$196,429,800	\$785,719,100
Dorchester	44	\$59,832,900	\$19,944,300	\$79,777,200
Kent	25	\$67,540,500	\$22,513,500	\$90,054,000
Ocean City	9	\$34,403,400	\$11,467,800	\$45,871,200
Queen Anne's	49	\$255,792,800	\$85,264,300	\$85,264,300
Somerset	26	\$131,931,500	\$43,977,200	\$175,908,700
St. Mary's	43	\$343,849,400	\$114,616,500	\$458,465,900
Worcester	43	\$183,102,800	\$61,034,300	\$244,137,100
<b>TOTALS</b>	<b>2,774</b>	<b>\$14,128,985,500</b>	<b>\$4,709,662,000</b>	<b>\$18,582,854,700</b>

### b. Critical Facility within FEMA “VE” Flood Zone

The “VE” flood zone is an area inundated by 1 percent annual chance flooding with velocity hazard (wave action); base flood elevations have been determined. The new Maryland Critical Facility Database indicates that there is one (1) critical facility within Maryland, in the Town of Ocean City, located within the FEMA identified and regulated “VE” flood zone.

### c. State Assets within High Hazard Coastal Areas

Coastal areas assessed as having a highest risk to coastal hazards include: Anne Arundel, Baltimore, Calvert, Charles, Dorchester, Kent, Queen Anne's, St. Mary's, Somerset, and Worcester counties, as well as, the City of Baltimore, City of Annapolis and Ocean City. Loss estimations indicate that the City of Baltimore and Somerset County have the highest state asset building value and content loss estimations.

*Table 3.15—State Assets within High Hazard Coastal Areas*

Jurisdiction	State Asset Totals	State Assets Loss Estimations		
		Building Value	Content Value	Total Loss
Anne Arundel	652	\$3,444,136,800	\$429,712,400	\$3,873,849,200
Baltimore	837	\$4,732,739,000	\$628,197,700	\$5,360,936,700
Baltimore City	938	\$10,704,503,400	\$1,130,865,100	\$11,835,368,600
Calvert	156	\$240,181,600	\$34,055,500	\$274,237,200
Carroll	247	\$689,289,500	\$80,955,400	\$770,244,800
City of Annapolis	316	\$848,250,600	\$88,835,300	\$937,085,900
Charles	166	\$166,512,000	\$20,856,900	\$187,369,000
Dorchester	174	\$263,837,200	\$37,364,000	\$301,201,200
Kent	54	\$69,165,300	\$15,149,500	\$84,314,800
Ocean City	5	\$671,400	\$221,500	\$892,900
Queen Anne's	117	\$185,617,500	\$22,860,800	\$208,478,400
Somerset	275	\$12,984,385,500	\$284,245,000	\$13,268,630,400
St. Mary's	368	\$959,812,500	\$245,592,000	\$1,205,404,500
Worcester	143	\$124,020,600	\$17,071,800	\$141,092,200
<b>TOTALS</b>	<b>4,448</b>	<b>\$35,413,122,900</b>	<b>\$3,035,982,900</b>	<b>\$38,449,105,800</b>

**d. State Assets within FEMA “VE” Flood Zone**

The updated State Asset Database indicates that there is one (1) State asset within Maryland, in St. Mary’s County, located within the FEMA identified and regulated “VE” flood zone.

**e. Sea-Level Rise**

Sea-level Rise (SRL) within the *Maryland Coastal Resiliency Assessment* is the vulnerability of the coast to long-term sea-level change. According to the *Updating Maryland’s Sea-Level Rise Projections*, a 2013 technical report to, Maryland is particularly vulnerable to sea-level rise because of a combination of rising seas and sinking land, is projected to face from 0.7 meters to 1.7 meters in relative sea-level rise by the year 2100, with a best-estimate projection of 1.1 meters. Results of the SLR hazard rank by County within the *Maryland Coastal Resiliency Assessment* indicate that Charles, Somerset, and Worcester Counties are at “Very High Risk”, while Caroline, Dorchester, Talbot, and Wicomico Counties were ranked as “High Risk”.

The Maryland Department of Natural Resources has elevation data collected over the last ten (10) years using aerial-based laser surveying instruments (LiDAR). These data have been used to identify areas at risk of inundation and flooding in coastal counties. This vulnerability mapping depicts land at risk to inundation under the following sea-level rise scenarios: 0 -2 feet, 2 - 5 feet, and 5 - 10 feet. As new data are collected and added to the database, updated sea-level rise inundation zones can be developed for 50 and 100-year planning windows.

### **Maryland Coastal Resiliency Assessment**

With its extensive shoreline, Maryland's coasts experience flooding and erosion, caused by tides and storms and exacerbated by sea-level rise. Natural habitats, such as marshes and coastal forests, can reduce the impacts of these hazards through the processes of wave attenuation, increased infiltration and sediment stabilization. While the Maryland Department of Natural Resources (DNR) utilizes various tools to target restoration and protection of habitats based on ecological, water quality and other criteria, these tools do not evaluate the risk-reduction benefits of natural features such as forests, marshes, dunes, oyster reefs, and underwater grasses. To support the DNR in their efforts to incorporate risk-reduction benefits into decision-making, The Nature Conservancy (TNC) partnered with the Chesapeake and Coastal Services (CCS) to conduct a Statewide Coastal Resiliency Assessment.

In order to spatially assess where natural habitats have the greatest potential to reduce risk for people, it is important to address three questions: where are the hazards, where are the people, and where are the habitats? The project team used spatially explicit computer modeling informed by scientific literature and local expert opinion to answer these questions and identify where natural habitats provide the greatest potential risk reduction for Maryland's coastal communities. The products of the Assessment include calculation of a Shoreline Hazard Index, which estimates the relative exposure to coastal hazards for the entire Maryland shoreline; delineation of Coastal Community Flood Risk Areas; selection of Priority Shoreline Areas for conservation and/or restoration; and the calculation of a Marsh Protection Potential Index. Habitats play a large potential role in risk reduction for MD coastal residents. The results of this Assessment provide tools to target coastal adaptation efforts so that protecting or restoring natural habitats also provides the greatest risk reduction benefit to coastal residential communities.

*Source: The Maryland Coastal Resiliency Assessment (The Nature Conservancy, March 2016. Maryland Coastal Resiliency Assessment. M.R. Canick, N. Carlozo and D. Foster. Bethesda, MD).*

#### **f. Sea-Level Rise Consequence Analysis**

A consequence analysis, derived from the Emergency Management Accreditation Program (EMAP) has been performed to better understand and outline the impacts that sea-level rise may have on the public; responders; continuity of operations including delivery of services; property, facilities and infrastructure; the environment; the economic condition of the state, and public confidence in the states governance. The results of the consequence analysis are shown in Table 3.16.

**Table 3.16–Sea-level Consequence Analysis**

Subject	Impacts
Healthy and Safety of the Public	Home and landowners along the coastline are most at risk to impacts from sea-level rise. Impacts to the public include destruction and/or loss of land and property, displacement of populations, and negative economic impacts to coastal tourism. Significant sea-level rise is expected to occur over a period of 50-100 years, which means it is unlikely that sea-level rise will result in injury or loss of life.
Health and Safety of Responders	Similarly to the public, first responders would likely face minimal adverse impacts due to long-term sea-level rise. The potential exception would be in the case of a temporary rise in sea-level as caused by a severe tropical cyclone event. In this case, first responders would be exposed to the standard occupational hazards involved in dealing with a coastal flooding event.
Continuity of Operations (incl. delivery of services)	The impacts on continuity of operations will be limited, unless a facility is within the incident area. In this case, state and critical facilities within the high risk area (defined as “near certain to highly likely of 0-2 feet of inundation) will face economic impacts related to costs of mitigation measures, relocation, and potential damages.
Property, facilities, and infrastructure	Home and landowners within coastal regions may experience damage to or loss of property depending upon the severity of water inundation in the area. Infrastructure may experience impacts in the form of damages to roads/bridges and/or the complete loss of transportation routes.
Environment	Sea-level rise will alter the landscape. Changes in the shoreline will occur, with some areas of shore becoming completely inundated, while others are damaged from erosion. Vegetation and wildlife habitat along the coast may be damaged or destroyed within inundation areas.
Economic condition of the state	Sea-level rise and major changes to the coastline will drain state, county, and local resources. The economic costs related to mitigation and relocation measures will be high, in addition to the economic burden caused by loss of land.
Public confidence in state governance	Public confidence will largely depend upon how effectively the State of Maryland, and county and local governments prepare for and respond to sea-level rise.

**g. Shoreline Erosion**

Shoreline erosion was assessed statewide and results were published within the *Maryland Coastal Resiliency Assessment*. Priority Shoreline Areas were identified and defined as those areas where protection and restoration of natural habitats has the greatest potential to reduce the coastal hazard risk faced by residential communities. Two tiers of priority were determined. Tier 1 or High Priority areas are those shoreline segments where 1) the habitat role in reducing shoreline hazard is high and at least one (1) Coastal Community Flood Risk Area is located within two (2) kilometers or 2) The shoreline hazard transitions from moderate to high if habitats are lost and at least one (1) Coastal Community Flood Risk Area is located within two (2) kilometers. Tier 2 or Moderate Priority areas are those shoreline segments where 1) the habitat role in reducing shoreline hazard is moderate and at least one (1) Coastal Community Flood Risk Area is located within 2 kilometers or 2) the shoreline hazard transitions from low to moderate if habitats are lost and at least one (1) Coastal Community Flood Risk Area is located within 2 kilometers. Shoreline segments that met none of the criteria were not considered priorities in the Assessment but have been priorities for other reasons, such as ecological value. Tier 1 areas comprise 22% of the MD coastline and Tier 2 areas comprise an additional 40% of the MD coastline.

The Erosion Vulnerability Assessment Tool (EVA) is a shoreline planning tool developed by the Baltimore District Army Corps of Engineers and Maryland Department of Natural Resources to

identify shorelines with historic patterns of instability, as well as shorelines that support valued natural, social, or economic VA uses a 50-year planning window to estimate and project the shoreline position in 50 years. These projections inform local planners about potential risks to current infrastructure and valued resources. EVA can be used to flag at-risk areas and prioritize erosion control measure sites.

Maryland’s Blue Infrastructure Near-shore Assessment (BI) identifies high priority shoreline segments and watersheds for conservation and management to maintain and improve coastal habitats. These areas support productive and diverse coastal ecosystems, fisheries, and human uses. Data components of the BI include sensitive species, shoreline-dependent species, spawning and nursery areas, protected lands, impervious surface, hardened shores, fish blockages, water quality, and natural infrastructure such as coastal marshes, submerged aquatic vegetation, oyster bars and beaches. Maryland’s high priority BI areas have been incorporated into the GreenPrint TEAs and all BI areas are considered during environmental review and land conservation decisions.

**h. Shoreline Erosion Consequence Analysis**

A consequence analysis, derived from the Emergency Management Accreditation Program (EMAP) has been performed to better understand and outline the impacts that sea-level rise may have on the public; responders; continuity of operations including delivery of services; property, facilities and infrastructure; the environment; the economic condition of the state, and public confidence in the states governance. The results of the consequence analysis are shown in Table 3.17.

*Table 3.17–Shoreline Erosion Consequence Analysis*

Subject	Impacts
Healthy and Safety of the Public	Home and land owners along the coastline are most at risk to impacts from shoreline erosion. Impacts to the public include destruction and/or loss of land and property. Shoreline erosion can occur suddenly during a tropical cyclone event, such as a hurricane. In this case, people in coastal areas at the time of the event are at an increased risk of injury due to erosion, in addition to the distinct hazards a hurricane brings.
Health and Safety of Responders	First responders would likely face minimal adverse impacts due to long term shoreline erosion caused by sea-level rise. However, an exception would be in the case of sudden erosion which can be caused by a severe tropical cyclone event. In this case, first responders would be exposed to the standard occupational hazards involved in dealing with a coastal erosion/flooding event.
Continuity of Operations (incl. delivery of services)	The impacts on continuity of operations will be limited, unless a facility is within a coastal area during a severe tropical cyclone event that causes shoreline erosion. In this event, delivery of services may be slowed or halted in coastal areas if key roadways become impassable due to erosion.
Property, facilities, and infrastructure	Home and land owners within coastal regions may experience damage to or loss of property depending upon the severity of shoreline erosion in the area. Infrastructure may experience impacts in the form of damages to roads/bridges and/or the complete loss of transportation routes.
Environment	Shoreline erosion will negatively impacts beaches, wetlands, marshes, and coastal habitats. With the loss of environments, coastal areas may experience more frequent and destructive flooding.
Economic condition of the state	At present, it is estimated that nearly 70% of shoreline in the state is being eroded to some degree. Erosion of the shoreline at this level will drain state, county, and local resources. The economic costs related to mitigation projects, relocation, loss of land, and more severe flooding will be high.

Public confidence in state governance	Public confidence will largely depend upon how effectively the State of Maryland, and county and local governments prepare for and respond to shoreline erosion.
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**i. Nor'easter**

Nor'easters may occur anytime of the year, but are most frequent and strongest between September and April. These storms develop between Georgia and New Jersey within 100 miles of the coastline and generally move north or northeastward. In addition to heavy snow and rain, Nor'easters can bring gale force winds greater than 56 miles per hour. These storms may produce rough seas, coastal flooding, and beach erosion. All of Maryland's coastal communities are vulnerable to Nor'easters, however Ocean City is particularly vulnerable and has experienced notable Nor'easter events, with reported damages in excess of one million dollars per event.

**j. Nor'easter Consequence Analysis**

A consequence analysis, derived from the Emergency Management Accreditation Program (EMAP) has been performed to better understand and outline the impacts that a Nor'easter event would have on the public; responders; continuity of operations including delivery of services; property, facilities and infrastructure; the environment; the economic condition of the state, and public confidence in the states governance. The results of the consequence analysis are shown in the Table 3.18.

*Table 3.18–Nor'easter Consequence Analysis*

Subject	Impacts
Healthy and Safety of the Public	Home and land owners along the coastline are most at risk to impacts from a nor'easter event. Impacts to the public include potential for injury or loss of life, and destruction and/or loss of land and property due to flood and high winds.
Health and Safety of Responders	First responders, such as fire and police, would be called to the incident area(s) to evacuate people, close roads, and attend to any injured. For a nor'easter event, as with all disaster events, responders face the risk of personal injury while performing necessary job functions.
Continuity of Operations (incl. delivery of services)	The impacts on continuity of operations will be limited, unless a facility is within a coastal area during a severe nor'easter event. Delivery of services may be slowed or halted in coastal areas if key roadways become impassable due to flooding.
Property, facilities, and infrastructure	Home and landowners within coastal regions may experience damage to or loss of property depending upon the severity of flooding and winds in the area. Infrastructure may experience impacts in the form of damages to roads and bridges, temporary closure of transportation routes, and the potential inability of the stormwater system to handle floodwaters in a severe event.
Environment	Shoreline erosion will be the major impact to the coastal environment during a Nor'easter.
Economic condition of the state	A major Nor'easter event would be costly for state and local governments due to the potential for damages from flooding and high winds. Some of the costs could be recouped through federal grant reimbursements, but local governments would still feel the fiscal impact of a major event.
Public confidence in state governance	Public confidence will largely depend upon how effectively the State of Maryland, and county and local governments prepare for and respond to a nor'easter event.

**k. Future Development of State Assets & Coastal Hazards**

Maryland's Critical Area Program is unique not only because of the significant resources that it is designed to protect, but because it is one of only a few regulatory land use programs in the

country that involve a cooperative implementation effort between State and local governments. The purpose of this arrangement is to provide local governments with the flexibility needed to address the unique physical, economic, and social characteristics of the particular jurisdiction while ensuring that the goals, purposes, policies, and criteria of Maryland’s Critical Area Program are implemented in a consistent and uniform manner throughout the State.

Critical Area development standards include assessing climate resilient practices that address coastal hazards, extreme weather events, sea-level rise, and other impacts. (COMA 27.02.05.02.A (2) State agencies shall submit proposed development proposal to the Commission for approval.

**Criteria for Development by a State Agency or State-owned Land-Consideration for Climate Change**

Required development standards apply to a proposed development activities, no matter the Critical Area Designation. This includes the following considerations for Climate Change:

- To the maximum extent practicable, a state agency will preserve, protect and maintain a potential wetland area.
- The state agency will demonstrate that it considered the likelihood of inundation by sea-level rise over the course of the design life of the project.
- The state agency identifies the climate resilient practices that were incorporated into the project in order to avoid or minimize extreme weather events, sea-level rise, and other impacts.

**7. Winter Storm Vulnerability**

The northern and western areas of Maryland typically experience the most extreme winter weather and with the highest frequency of events. Notably, Garrett County, Maryland’s more western jurisdiction had a record snowfall of fifty-four (54) inches during 2016’s Winter Storm Jonas event. Local jurisdictions with the highest risk to winter storm hazard include: Allegany, Anne Arundel, Baltimore, Calvert, Frederick, Harford, Howard, Montgomery, Prince George’s, St. Mary’s, and Washington counties, as well as, the City of Baltimore.

Electrical utilities and communications as well as transportation infrastructure are vulnerable to damages from winter storms. Damage to power lines or communication towers has the potential to cause power and communication outages for residents, businesses and critical facilities. In the event of damage to power and/or communication lines, Continuity of Operation Plans provide a means to continue services for state and critical facilities. Additionally, Emergency Operation Centers (EOCs) are activated to further ensure the continuation of services during a severe winter storm event. Public utilities often provide staff to both the state and local emergency operation centers. In addition to lost revenues, downed power lines present a threat to personal safety. Further, downed wires have been known to spark fires.

Vulnerability to these damages varies in large part due to specific factors; for example, proactive measures such as regular tree maintenance and utility system winterization can minimize property vulnerability. Localities accustomed to winter weather events are typically more prepared to deal with them and therefore less vulnerable than localities that rarely experience winter weather.

Human vulnerability is based on the availability, reception and understanding of advanced warnings of impending significant winter weather events (i.e., Winter Storm Watches and Warnings issued by the National Weather Service (NWS) and heeding the advice of local officials.

**a. Critical Facilities & Winter Storm Hazard**

Winter Storm loss estimations indicate that Baltimore and Montgomery counties, as well as, the City of Baltimore have the highest critical facility building value and content loss estimations.

*Table 3.19– Critical Facilities Winter Storm Loss Estimations*

Jurisdiction	Critical Facilities Totals	Critical Facilities Loss Estimations		
		Building Value	Content Value	Total Loss
Allegany	70	\$407,256,100	\$135,752,000	\$543,008,100
Anne Arundel	139	\$1,070,254,100	\$356,751,400	\$1,427,005,500
Baltimore	427	\$2,356,871,700	\$785,623,900	\$3,142,495,600
Baltimore City	458	\$6,985,107,300	\$2,328,369,100	\$9,313,476,400
Calvert	73	\$463,442,100	\$154,480,700	\$617,922,800
Frederick	120	\$1,157,114,300	\$385,704,800	\$1,542,819,100
Garrett	19	\$118,508,900	\$39,503,000	\$158,011,900
Harford	115	\$1,007,301,700	\$335,767,200	\$1,343,068,900
Howard	112	\$915,094,400	\$305,031,500	\$1,220,125,900
Montgomery	220	\$3,373,282,400	\$1,124,427,500	\$4,497,709,900
Prince George's	250	\$1,005,822,580	\$335,274,200	\$1,341,096,800
St. Mary's	43	\$343,849,400	\$114,616,500	\$458,465,900
Washington	87	\$772,391,000	\$257,463,700	\$1,029,854,700
<b>TOTALS</b>	<b>2,774</b>	<b>\$18,819,182,837</b>	<b>\$6,658,765,500</b>	<b>\$26,616,634,000</b>

**b. State Assets & Winter Storm Hazard**

Winter Storm loss estimations indicate that Baltimore and Prince George's Counties, as well as, the City of Baltimore have the highest critical facility building value and content loss estimations.

*Table 3.20– State Assets Winter Storm Loss Estimations*

Jurisdiction	State Asset Totals	State Assets Loss Estimations		
		Building Value	Content Value	Total Loss
Allegany	326	\$1,123,857,400	\$75,691,400	\$1,199,548,800
Anne Arundel	652	\$3,444,136,800	\$429,712,400	\$3,873,849,200
Baltimore	837	\$4,732,739,000	\$628,197,700	\$5,360,936,700
Baltimore City	938	\$10,704,503,400	\$1,130,865,100	\$11,835,368,600
Calvert	156	\$240,181,600	\$34,055,500	\$274,237,200
Frederick	205	\$259,073,800	\$37,040,300	\$296,114,000
Garrett	319	\$406,378,700	\$34,084,600	\$440,463,400
Harford	243	\$374,275,300	\$32,597,000	\$405,920,300
Howard	425	\$661,902,900	\$67,393,100	\$729,296,200
Montgomery	227	\$407,932,200	\$68,334,100	\$476,266,300
Prince George's	755	\$4,547,775,200	\$674,511,300	\$5,222,286,600
St. Mary's	368	\$959,812,500	\$245,592,000	\$1,205,404,500
Washington	367	\$517,704,700	\$47,365,500	\$565,070,100
<b>TOTALS</b>	<b>5,818</b>	<b>\$28,380,273,500</b>	<b>\$3,505,440,000</b>	<b>\$31,884,761,900</b>

**c. Winter Storm Consequence Analysis**

A consequence analysis, derived from the Emergency Management Accreditation Program (EMAP) has been performed to better understand and outline the impacts that a winter storm

event would have on the public; responders; continuity of operations including delivery of services; property, facilities and infrastructure; the environment; the economic condition of the state, and public confidence in the states governance. The results of the consequence analysis are shown in the Table 3.21.

*Table 3.21–Winter Storm Consequence Analysis*

Subject	Impacts
Healthy and Safety of the Public	Home and landowners in northern and western regions of the state are most vulnerable to impacts from a winter storm event, but no portion of the state invulnerable. Impacts to the public include potential for dangerous road conditions resulting in accidents, freezing temperatures, and injury or loss of life.
Health and Safety of Responders	Emergency responders, such as fire and police, would be called to the incident area(s) to evacuate people, close roads due to dangerous conditions, perform wellness checks, and attend to any injured. During a winter storm event, as with all disaster events, responders face the risk of personal injury while performing necessary job functions.
Continuity of Operations (incl. delivery of services)	Winter storms tend to affect whole regions, and sometimes an entire state. Because of this, there is a chance that continuity of operations may be affected depending upon the geographic extent and severity of the winter storm event. Delivery of services may be slowed or halted in affected areas due to snow and ice accumulations, dangerous road conditions, freezing temperatures, and/or momentary losses in power and communications.
Property, facilities, and infrastructure	Home and landowners throughout the state may experience varying levels of damage to property depending upon received snow and ice loads, although damage is usually minimal. Infrastructure may experience impacts in the form of damage to roadways (particularly during snow removal), and interruptions to above ground power and communication systems.
Environment	Winter storms impact the environment by damaging vegetation and tree limbs. Additionally, rapid snowmelt may also lead to flash flood events, which causes further environmental impacts.
Economic condition of the state	A major winter weather event would be costly for state and local governments due to the potential for damages associated with property (during severe storms), storm cleanup, and loss of power. Some of the costs could be recouped through federal grant reimbursements, but local governments would still feel the fiscal impact of a major event.
Public confidence in state governance	Public confidence will largely depend upon how effectively the State of Maryland, and county and local governments prepare for and respond to a winter storm event.

## 8. Thunderstorm Vulnerability

Thunderstorms include both lightning and hail events. Baltimore, Charles, Harford, Montgomery, and Prince George’s counties were shown to have the highest risk to the thunderstorm hazard.

### a. Critical Facilities & Thunderstorm Hazard

Thunderstorm loss estimations indicate that Montgomery and Baltimore Counties have the highest critical facility building value and content value loss estimations.

**Table 3.22– Critical Facilities Thunderstorm Loss Estimations**

Jurisdiction	Critical Facilities Totals	Critical Facilities Loss Estimations		
		Building Value	Content Value	Total Loss
Baltimore	427	\$2,356,871,700	\$785,623,900	\$3,142,495,600
Charles	80	\$589,289,300	\$196,429,800	\$785,719,100
Harford	115	\$1,007,301,700	\$335,767,200	\$1,343,068,900
Montgomery	220	\$3,373,282,400	\$1,124,427,500	\$4,497,709,900
Prince George’s	250	\$1,005,822,580	\$335,274,200	\$1,341,096,800
<b>TOTALS</b>	<b>2,774</b>	<b>\$8,332,567,680</b>	<b>\$2,777,522,600</b>	<b>\$11,091,662,800</b>

**b. State Assets & Thunderstorm Hazard**

Thunderstorm loss estimations indicate that Prince George’s and Baltimore Counties have the highest critical facility building value and content value loss estimations.

**Table 3.23– State Assets Thunderstorm Loss Estimations**

Jurisdiction	State Asset Totals	State Assets Loss Estimations		
		Building Value	Content Value	Total Loss
Baltimore	837	\$4,732,739,000	\$628,197,700	\$5,360,936,700
Charles	166	\$166,512,000	\$20,856,900	\$187,369,000
Harford	243	\$374,275,300	\$32,597,000	\$405,920,300
Montgomery	227	\$407,932,200	\$68,334,100	\$476,266,300
Prince George’s	755	\$4,547,775,200	\$674,511,300	\$5,222,286,600
<b>TOTALS</b>	<b>2,228</b>	<b>\$10,229,233,700</b>	<b>\$1,424,497,000</b>	<b>\$11,652,778,900</b>

**c. Thunderstorm Consequence Analysis**

A consequence analysis, derived from the Emergency Management Accreditation Program (EMAP) has been performed to better understand and outline the impacts that a thunderstorm event would have on the public; responders; continuity of operations including delivery of services; property, facilities and infrastructure; the environment; the economic condition of the state, and public confidence in the states governance. The results of the consequence analysis are shown in Table 3.24.

**Table 3.24–Thunderstorm Consequence Analysis**

Subject	Impacts
Healthy and Safety of the Public	Home and land owners throughout the state are at risk to impacts from a thunderstorm event in the form of lightning and hail. Lightning is very dangerous, even observed at several miles away. As such, members of the public should seek shelter immediately. In addition, hail poses the threat of personal injury, particularly as hail stones reach larger sizes.
Health and Safety of Responders	First responders, such as fire and police, would be called to the incident area(s) to evacuate people, close roads due to fallen trees and/or debris blockages, and attend to any injured. For a high wind event, as with all disaster events, responders face the risk of personal injury while performing necessary job functions.
Continuity of Operations (incl. delivery of services)	The impacts on continuity of operations will be limited, unless a facility is directly adversely affected by lightning or hail caused by a thunderstorm.

	Delivery of services may be slowed or halted in affected areas due to momentary losses in power and communications.
Property, facilities, and infrastructure	Home and land owners throughout the state may experience damage to property depending upon the amount of lightning strikes and severity of hail in the area. Infrastructure may experience impacts in the form of fire caused by lightning strikes, roof and crop damage from hail, and interruptions to above ground power and communication systems.
Environment	Lightning and hail impact the environment primarily from wildfire caused by lightning, and crop damage caused by hail.
Economic condition of the state	A major thunderstorm event would be costly for state and local governments due to the potential for damages associated with property, debris generation, and loss of power. Some of the costs could be recouped through federal grant reimbursements, but local governments would still feel the fiscal impact of a major event.
Public confidence in state governance	Public confidence will largely depend upon how effectively the State of Maryland, and county and local governments prepare for and respond to a severe thunderstorm event.

## 9. Wind Vulnerability

Local jurisdictions with the highest risk to the wind hazard include Anne Arundel, Carroll, Charles, Frederick, Montgomery, and Prince George’s Counties.

State and critical facilities within high risk areas may be impacted by high winds due to power outages and/or communication failure. In some instances, communications systems utilize backup generators to ensure continuation of services for first responders. These backup generators not only ensure the continued safety of the public during an event, but also the safety of emergency response personnel.

### a. Critical Facilities & Wind Hazard

Wind loss estimations indicated that Montgomery, Prince George’s, and Frederick counties have the highest critical facility building value and content value loss estimations.

*Table 3.25– Critical Facilities Wind Loss Estimations*

Jurisdiction	Critical Facilities Totals	Critical Facilities Loss Estimations		
		Building Value	Content Value	Total Loss
Anne Arundel	139	\$1,070,254,100	\$356,751,400	\$1,427,005,500
Carroll	115	\$1,069,909,600	\$356,636,500	\$1,426,546,100
Charles	80	\$589,289,300	\$196,429,800	\$785,719,100
Frederick	120	\$1,157,114,300	\$385,704,800	\$1,542,819,100
Montgomery	220	\$3,373,282,400	\$1,124,427,500	\$4,479,282,400
Prince George’s	250	\$1,005,822,580	\$335,274,200	\$1,341,096,800
<b>TOTALS</b>	<b>2,774</b>	<b>\$7,108,559,137</b>	<b>\$2,755,224,200</b>	<b>\$11,002,469,000</b>

### b. State Assets & Wind Hazard

Wind loss estimations indicated that Anne Arundel, Prince George’s, and Carroll Counties have the highest critical facility building value and content value loss estimations.

**Table 3.26– State Assets Wind Loss Estimations**

Jurisdiction	State Asset Totals	State Assets Loss Estimations		
		Building Value	Content Value	Total Loss
Anne Arundel	652	\$3,444,136,800	\$429,712,400	\$3,873,849,200
Carroll	247	\$689,289,500	\$80,955,400	\$770,244,800
Charles	166	\$166,512,000	\$20,856,900	\$187,369,000
Frederick	205	\$259,073,800	\$37,040,300	\$296,114,000
Montgomery	227	\$407,932,200	\$68,334,100	\$476,266,300
Prince George’s	755	\$4,547,775,200	\$674,511,300	\$5,222,286,600
<b>TOTALS</b>	<b>2,252</b>	<b>\$9,514,719,500</b>	<b>\$1,311,410,400</b>	<b>\$10,826,129,900</b>

**c. Wind Consequence Analysis**

A consequence analysis, derived from the Emergency Management Accreditation Program (EMAP) has been performed to better understand and outline the impacts that a wind event would have on the public; responders; continuity of operations including delivery of services; property, facilities and infrastructure; the environment; the economic condition of the state, and public confidence in the states governance. The results of the consequence analysis are shown in the Table 3.27.

**Table 3.27–Wind Consequence Analysis**

Subject	Impacts
Healthy and Safety of the Public	Home and land owners throughout the state are at risk to impacts from a high wind event. Impacts to the public include potential for injury or loss of life, and destruction of property due to high winds.
Health and Safety of Responders	First responders, such as fire and police, would be called to the incident area(s) to evacuate people, close roads due to fallen trees and/or debris blockages, and attend to any injured. For a high wind event, as with all disaster events, responders face the risk of personal injury while performing necessary job functions.
Continuity of Operations (incl. delivery of services)	The impacts on continuity of operations will be limited, unless a facility is directly adversely affected by a severe wind event. Delivery of services may be slowed or halted in affected areas due to momentary losses in power and communications.
Property, facilities, and infrastructure	Home and land owners throughout the state may experience damage to property depending upon the severity of winds in the area. Infrastructure may experience impacts in the form of blowing debris, and interruptions to above ground power and communication systems.
Environment	High winds impact the environment by potentially spreading debris and pollution; damaging sewer and wastewater treatment plants; and disturbing wildlife and natural areas.
Economic condition of the state	A major wind event would be costly for state and local governments due to the potential for damages associated with property, debris generation, and loss of power. Some of the costs could be recouped through federal grant reimbursements, but local governments would still feel the fiscal impact of a major event.
Public confidence in state governance	Public confidence will largely depend upon how effectively the State of Maryland, and county and local governments prepare for and respond to a high wind event.

## 10.Drought Vulnerability

Short-term droughts can impact agricultural productivity, while longer term droughts are more likely to impact not only agriculture, but also water supply. Maryland’s diverse geology and water resources affect its vulnerability to drought. Ground water is the most commonly used source of water supply and is obtained from both confined and unconfined aquifers according to the Maryland Department of the Environment. In fact, some regions of the State like Southern Maryland and the Eastern Shore rely exclusively on ground water for their water needs. Also, many individual homeowners in rural areas pump ground water from their own wells. Public water suppliers like the Washington Suburban Sanitary Commission rely on surface waters for their water supply. According to the Maryland Department of the Environment Water Resources, about two-thirds of Maryland’s citizens regularly consume water that originates from a surface water source. In general, counties that have invested in water supply and distribution infrastructure are generally less vulnerable to drought. However, communities relying on the Potomac and Susquehanna Rivers and their tributaries for water are more vulnerable during a drought than those using the Chesapeake Bay. This is due to the lack of recharge from surrounding watersheds that flow into the rivers. A standardized methodology for estimating drought vulnerability does not exist. As opposed to posing a direct threat to life and property, drought impact is primarily measured by its potential and actual economic effect on the agricultural sector as well as municipal and industrial water supplies. This economic effect can also be expected to affect related sectors such as wholesale and retail trade. Property and infrastructure is not directly affected by extreme heat associated with drought, however property and infrastructure is affected by secondary hazards caused by extreme heat, such as wildfires.

Local jurisdictions with the highest risk to drought include Baltimore, Carroll, Cecil, Harford, and Montgomery Counties.

### a. Critical Facilities & Drought Hazard

Drought loss estimations indicate that Baltimore and Montgomery counties have the highest critical facility building value and content value loss estimations.

*Table 3.28– Critical Facilities Drought Loss Estimations*

Jurisdiction	Critical Facilities Totals	Critical Facilities Loss Estimations		
		Building Value	Content Value	Total Loss
Baltimore	427	\$2,356,871,700	\$785,623,900	\$3,142,495,600
Carroll	115	\$1,069,909,600	\$356,636,500	\$1,426,546,100
Cecil	91	\$390,260,000	\$130,086,700	\$520,346,700
Harford	115	\$1,007,301,700	\$335,767,200	\$1,343,068,900
Montgomery	220	\$3,373,282,400	\$1,124,427,500	\$4,479,282,400
<b>TOTALS</b>	<b>2,774</b>	<b>\$8,197,625,400</b>	<b>\$2,732,541,800</b>	<b>\$10,911,739,700</b>

### b. State Assets & Drought Hazard

Drought loss estimations indicate that Baltimore and Carroll counties have the highest critical facility building value and content value loss estimations.

**Table 3.29– State Assets Drought Loss Estimations**

Jurisdiction	State Asset Totals	State Asset Loss Estimations		
		Building Value	Content Value	Total Loss
Baltimore	837	\$4,732,739,000	\$628,197,700	\$5,360,936,700
Carroll	247	\$689,289,500	\$80,955,400	\$770,244,800
Cecil	143	\$225,324,000	\$44,458,100	\$269,782,100
Harford	243	\$374,275,300	\$32,597,000	\$405,920,300
Montgomery	227	\$407,932,200	\$68,334,100	\$476,266,300
<b>TOTALS</b>	<b>1,697</b>	<b>\$6,429,560,000</b>	<b>\$854,542,300</b>	<b>\$7,283,150,200</b>

**c. Drought Consequence Analysis**

A consequence analysis, derived from the Emergency Management Accreditation Program (EMAP) has been performed to better understand and outline the impacts that a drought event would have on the public; responders; continuity of operations including delivery of services; property, facilities and infrastructure; the environment; the economic condition of the state, and public confidence in the states governance. The results of the consequence analysis are shown on the table.

**Table 3.30–Drought Consequence Analysis**

Subject	Impacts
Healthy and Safety of the Public	Droughts can affect home and land owners in a local, regional, or statewide context. Typically, drought events take a long time to develop and may be either short-term or long-term events. Impacts to the public during a drought take the form of crop damage/failures, water rationing and other water source impacts, and wildfires.
Health and Safety of Responders	First responders, such as fire and police, would be most concerned with the secondary impacts of drought, such as wildfires. As such, first responders would be called to incident area(s) to evacuate people from the fire area, close roads, create fire breaks, and attend to any injured. During a wildfire event, as with all disaster events, responders face the risk of personal injury while performing necessary job functions.
Continuity of Operations (incl. delivery of services)	The impacts on continuity of operations due to drought will be very limited. Generally, buildings and infrastructure, which are essential to continuity of operations and delivery of services, are not impacted by drought.
Property, facilities, and infrastructure	Property and infrastructure is typically not vulnerable to drought. However, the water supply infrastructure may be impacted by drought during a long-term event.
Environment	Droughts impact the environment by causing wildfires, overloading water and wastewater treatment plants, creating dust storms, and disturbing wildlife and natural areas.
Economic condition of the state	A major land drought event would draw upon state, county, and local resources. Some of the costs could be recouped through federal grant reimbursements, but local governments would still feel the fiscal impact of a major event.
Public confidence in state governance	Public confidence will largely depend upon how effectively the state, county, or local government responds to the drought event.

**11.Tornado Vulnerability**

Tornadoes are considered to be low frequency, high-impact events. All areas of Maryland face nearly uniform susceptibility to tornadoes. The parameters utilized in the risk assessment considered nine (9) different criteria. As a result of the risk assessment, which included past

occurrences and damages, Anne Arundel, Baltimore, Calvert, Charles, Frederick, and Prince George’s counties were determined to be at the highest risk.

**a. Critical Facilities & Tornado Hazard**

Tornado loss estimations indicate that Baltimore, Frederick, and Anne Arundel counties have the highest critical facility building value and content value loss estimations.

*Table 3.31– Critical Facilities Tornado Loss Estimations*

Jurisdiction	Critical Facilities Totals	Critical Facilities Loss Estimations		
		Building Value	Content Value	Total Loss
Anne Arundel	139	\$1,070,254,100	\$356,751,400	\$1,427,005,500
Baltimore	427	\$2,356,871,700	\$785,623,900	\$3,142,495,600
Calvert	73	\$463,442,100	\$154,480,700	\$617,922,800
Charles	80	\$589,289,300	\$196,429,800	\$785,719,100
Frederick	120	\$1,157,114,300	\$385,704,800	\$1,542,819,100
Prince George’s	250	\$1,005,822,580	\$335,274,200	\$1,341,096,800
<b>TOTALS</b>	<b>2,774</b>	<b>\$5,485,680,937</b>	<b>\$2,214,264,800</b>	<b>\$8,857,058,900</b>

**b. State Assets & Tornado Hazard**

Tornado loss estimations indicate that Baltimore, Prince George’s, and Anne Arundel counties have the highest critical facility building value and content value loss estimations.

*Table 3.32– State Assets Tornado Loss Estimations*

Jurisdiction	State Asset Totals	State Assets Loss Estimations		
		Building Value	Content Value	Total Loss
Anne Arundel	652	\$3,444,136,800	\$429,712,400	\$3,873,849,200
Baltimore	837	\$4,732,739,000	\$628,197,700	\$5,360,936,700
Calvert	156	\$240,181,600	\$34,055,500	\$274,237,200
Charles	166	\$166,512,000	\$20,856,900	\$187,369,000
Frederick	205	\$259,073,800	\$37,040,300	\$296,114,000
Prince George’s	755	\$4,547,775,200	\$674,511,300	\$5,222,286,600
<b>TOTALS</b>	<b>2,771</b>	<b>\$13,390,418,400</b>	<b>\$1,824,374,100</b>	<b>\$15,214,792,700</b>

Electrical utilities and communications infrastructure are vulnerable to tornadoes. Damage to power lines or communication towers has the potential to cause power and communication outages for residents, businesses and critical facilities. In the event of power loss due to a tornado, state and critical facilities utilize Continuity of Operations Plan (COOP) to continue performance of essential functions. In addition to lost revenues, downed power lines present a threat to public safety and emergency responders. Fire, police, and EMT responders are called upon to perform evacuations, close roads, attend to the injured, and direct traffic away from the impacted area.

**c. Tornado Consequence Analysis**

A consequence analysis, derived from the Emergency Management Accreditation Program (EMAP) has been performed to better understand and outline the impacts that a tornado event would have on the public; responders; continuity of operations including delivery of services;

property, facilities and infrastructure; the environment; the economic condition of the state, and public confidence in the states governance. The results of the consequence analysis are shown in the Table 3.33.

*Table 3.33–Tornado Consequence Analysis*

Subject	Impacts
Healthy and Safety of the Public	Home and landowners throughout the state are at risk to impacts from tornado events. Impacts to the public include potential for injury or loss of life, and destruction of property due to rotating vortex and/or straight-line winds
Health and Safety of Responders	First responders, such as fire and police, would be called to the incident area(s) to evacuate people, close roads due to fallen trees and/or debris blockages, and attend to any injured. For a tornado event, as with all disaster events, responders face the risk of personal injury while performing necessary job functions.
Continuity of Operations (incl. delivery of services)	The impacts on continuity of operations will be limited, unless a facility is directly within the path of destruction of a tornado. Delivery of services may be slowed or halted in affected areas due downed trees, blocked roadways, and/or momentary losses in power and communications.
Property, facilities, and infrastructure	Home and land owners throughout the state may experience varying levels of damage to property depending upon the severity of winds in the area. Infrastructure may experience impacts in the form of blowing debris, and interruptions to above ground power and communication systems.
Environment	Tornados, much like other high wind events, impact the environment by potentially spreading debris and pollution; damaging sewer and wastewater treatment plants; and disturbing wildlife and natural areas.
Economic condition of the state	A major tornado event would be costly for state and local governments due to the potential for damages associated with property, debris generation, and loss of power. Some of the costs could be recouped through federal grant reimbursements, but local governments would still feel the fiscal impact of a major event.
Public confidence in state governance	Public confidence will largely depend upon how effectively the State of Maryland, and county and local governments prepare for and respond to a tornado event.

## 12. Wildfire Vulnerability

State and critical facilities in high wildfire potential areas are most vulnerable to impacts from a wildfire event. Risk assessments results indicate that jurisdictions with the highest risk to wildfire include Allegany, Anne Arundel, Baltimore, Calvert, Frederick, Garrett, Prince George’s, and Worcester counties.

It is essential for these counties to ensure their Continuity of Operation Plans are up to date and utilized during such an event. Emergency responders, such as fire and police, are responsible for the evacuation of persons from the fire area, closing roads, creating firebreaks, and attending to the injured. As such, emergency responders are at risk for personal injury due to the nature of their job responsibilities. However, public confidence is ensured by the immediate and effective response of state, county, and/or local personnel.

### a. Critical Facilities & Wildfire Hazard

Wildfire loss estimations indicate that Baltimore, Frederick, and Anne Arundel counties have the highest critical facility building value and content value loss estimations.

**Table 3.34– Critical Facilities Wildfire Loss Estimations**

Jurisdiction	Critical Facilities Totals	Critical Facilities Loss Estimations		
		Building Value	Content Value	Total Loss
Anne Arundel	139	\$1,070,254,100	\$356,751,400	\$1,427,005,500
Baltimore	427	\$2,356,871,700	\$785,623,900	\$3,142,495,600
Calvert	73	\$463,442,100	\$154,480,700	\$617,922,800
Frederick	120	\$1,157,114,300	\$385,704,800	\$1,542,819,100
Garrett	19	\$118,508,900	\$39,503,000	\$158,011,900
Prince George’s	250	\$1,005,822,580	\$335,274,200	\$1,341,096,800
Worcester	43	\$183,102,800	\$61,034,300	\$244,137,100
<b>TOTALS</b>	<b>2,774</b>	<b>\$5,198,003,337</b>	<b>\$2,118,372,300</b>	<b>\$8,473,488,800</b>

**b. State Assets & Wildfire Hazard**

Wildfire loss estimations indicate that Baltimore, Prince George’s, and Anne Arundel counties have the highest critical facility building value and content value loss estimations.

**Table 3.35– State Assets Wildfire Loss Estimations**

Jurisdiction	State Asset Totals	State Assets Loss Estimations		
		Building Value	Content Value	Total Loss
Anne Arundel	652	\$3,444,136,800	\$429,712,400	\$3,873,849,200
Baltimore	837	\$4,732,739,000	\$628,197,700	\$5,360,936,700
Calvert	156	\$240,181,600	\$34,055,500	\$274,237,200
Frederick	205	\$259,073,800	\$37,040,300	\$296,114,000
Garrett	319	\$406,378,700	\$34,084,600	\$440,463,400
Prince George’s	755	\$4,547,775,200	\$674,511,300	\$5,222,286,600
Worcester	143	\$124,020,600	\$17,071,800	\$141,092,200
<b>TOTALS</b>	<b>3,067</b>	<b>\$13,754,305,700</b>	<b>\$1,854,673,600</b>	<b>\$15,608,979,300</b>

**c. Wildfire Consequence Analysis**

A consequence analysis, derived from the Emergency Management Accreditation Program (EMAP) has been performed to better understand and outline the impacts that a wildfire event would have on the public; responders; continuity of operations including delivery of services; property, facilities and infrastructure; the environment; the economic condition of the state, and public confidence in the states governance. The results of the consequence analysis are shown in the Table 3.36.

**Table 3.36–Wildfire Consequence Analysis**

Subject	Impacts
Healthy and Safety of the Public	Home and land owners in high wildfire risk zones in the state are most vulnerable to impacts from a wildfire event. Impacts to the public include destruction of property, injuries related to burns and smoke inhalation, and road closures.
Health and Safety of Responders	First responders, such as fire and police, would be called to the incident area(s) to evacuate people from the fire area, close roads, create fire breaks, and attend to any injured. During a wildfire event, as with all disaster events, responders face the risk of personal injury while performing necessary job functions.

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Continuity of Operations (incl. delivery of services)	The impacts on continuity of operations will be limited, unless a facility is directly within the path of destruction of a wildfire. Delivery of services may be slowed or halted in affected areas due to blocked roadways, and/or momentary losses in power and communications caused by destroyed infrastructure.
Property, facilities, and infrastructure	Home and land owners within a wildfire area may experience varying levels of damage to property depending upon the severity of the fire and the amount of decline in air quality within the hazard area. Infrastructure may experience impacts in the form of interruptions to above ground power and communication systems, and road detours and closures.
Environment	Wildfires impact the environment by spreading pollution, creating health problems by reducing air quality from the spread of ash and smoke, and disturbing or destroying wildlife and natural areas.
Economic condition of the state	A major wildfire event would be costly for state and local governments due to the potential for damages associated with property, infrastructure, and impacts to health and air quality. Some of the costs could be recouped through federal grant reimbursements, but local governments would still feel the fiscal impact of a major event.
Public confidence in state governance	Public confidence will largely depend upon how effectively the State of Maryland, and county and local governments prepare for and respond to a wildfire event.



## SECTION IV: MARYLAND LAND DEVELOPMENT & POPULATION

### STATE MITIGATION PLAN REVIEW GUIDE

Released March 2015 FP 302-094-2

This *State Mitigation Plan Review Guide (Guide)* is FEMA’s official policy on and interpretation of the natural hazard mitigation planning requirements. The intended use of the *Guide* is to facilitate consistent evaluation and approval of state mitigation plans, as well as to facilitate state compliance with the mitigation planning requirements when updating plans.

Figure 4.1—State Mitigation Review Guide S7

ELEMENT	REQUIREMENTS
<p>S7. Was the risk assessment revised to reflect changes in development? [44 CFR §201.4(d) <sup>17</sup>]</p> <p><i>Intent - To ensure that the mitigation strategy addresses the risk and vulnerabilities to existing and potential development, and takes into consideration possible future conditions that can impact statewide vulnerability.</i></p>	<p>The plan must provide a summary of the changes in development that have occurred or are projected to occur in hazard prone areas based on the state, local, and tribal, as applicable, risk assessments, specifically:</p> <ul style="list-style-type: none"> <li>a. Changes in land use and the built environment;</li> <li>b. Changes in population demographics that may affect vulnerability to hazard events; and</li> <li>c. Changes to the vulnerability of state-owned or operated buildings, infrastructure, and critical facilities.</li> </ul> <p><u>Changes in development</u> means recent development, potential and projected land use and development, or conditions that may affect risk and vulnerability to the state and jurisdictions within the state, such as changes in population demographics.</p>

### 1. Land Development

According to the Maryland Department of Planning (MDP), despite state programs designed to reverse the urban sprawl trend, sprawling land use is still a concern for Maryland. Maryland continues to develop and implement programs designed to protect farms and forests, to limit development along the shoreline of the Chesapeake and its tidal tributaries, and to foster growth generally within the boundaries of existing communities.

Priority Funding Areas (PFAs) were created in 1997 to encourage development in and around existing towns and cities by concentrating public investment for new infrastructure such as roads and schools in those areas.

#### Priority Funding Areas

PFAs are geographic growth areas, as either defined under State law or as designated by local jurisdictions, where the State targets investments in infrastructure. The law directs the use of State funds for roads, water and sewer plants, economic development and other “growth-related” projects to PFAs, recognizing that these investments are the most important tool the State has to influence growth and development.

Priority Funding Areas were established to meet three key goals:

- To preserve existing communities;
- To make the most efficient and effective use of taxpayer dollars for costly infrastructure by targeting state resources to build on past investments; and,
- To reduce development pressure on critical farmland and natural resource areas by encouraging projects in already developed areas.

**a. State Funding Subject to the PFA Law - “Growth-Related” Projects**

**Department of Housing and Community Development (DHCD)** - DHCD Programs defined as “growth-related”, for which funding is limited to PFAs, include:

- Programs under the Community Development Administration (CDA) and Maryland Home Finance Program, Subtitles 2, 3 and 8, of Title 4, Housing and Community Development Article - These programs provide low interest mortgages to qualified first time homebuyers for the construction or purchase of newly constructed single family homes.
- CDA’s program under Subtitles 2, 4 and 15, of Title 4 for the acquisition or construction of newly constructed multifamily rental housing.
- State funding for neighborhood revitalization projects, which include the Community Legacy program, the Community Investment Tax Credit, and the Neighborhood Business Works program.

**Department of General Services (DGS)** - While it has no capital budget itself, the Department of General Services is responsible for acquiring, leasing, and maintaining most of the State’s facilities. Thus, DGS is responsible for ensuring that the State’s “growth related funding” for leases and land acquisition of property by the State is limited to PFAs.

**Department of Business and Economic Development (DBED)** - DBED programs defined as “growth-related”, and therefore subject to PFA restrictions, include:

- The Maryland Industrial Development Financing Authority (MIDFA), which encourages private sector financing in economic development projects by issuing private activity revenue bonds and by providing credit insurance.
- The Maryland Small Business Development Financing Authority (MSBDFA), which provides financial assistance to small businesses that are not able to qualify for financing from private lending institutions or are owned by socially and economically disadvantaged persons.
- The Maryland Economic Development Assistance Authority Fund (MEDAAF), which provides loans and grants to businesses and local jurisdictions.
- The Economic Development Opportunities Program Fund (Sunny Day Fund), which promotes Maryland’s participation in extraordinary economic development opportunities that provide significant returns to the State through creating and retaining employment and the creation of significant capital investments in Priority Funding Areas.
- Maryland Economic Adjustment Fund (MEAF), which assists business entities located in the State with modernization of manufacturing operations, the development of commercial applications for technology, and exploration of new markets.

**Maryland Department of the Environment (MDE)** - The following MDE programs are subject to PFA restrictions:

- The Maryland Water Quality Revolving Loan Fund (MWQRLF), which provides financial assistance to local governments and private citizens for a wide variety of projects to protect or improve the quality of Maryland’s rivers, streams, lakes, the Chesapeake Bay and other water resources.

- The Drinking Water Supply Financial Assistance Program, which provides financial assistance to local governments for the acquisition, construction, rehabilitation, and improvement of publicly owned water supply facilities throughout the State.
- The Supplemental Assistance Program, which provides grants to local governments for planning, design, and construction of needed wastewater treatment facilities.
- Maryland Drinking Water Revolving Loan Fund (MDWRLF), which provides financial assistance to local governments and private citizens to protect or improve the quality of community water systems and ensure their compliance with national primary drinking water standards.

**Maryland Department of Transportation (MDOT)** - For MDOT, “growth-related” projects include all major capital projects, defined as “any new, expanded, or significantly improved facility or service that involves planning, environmental studies, design, right-of-way, construction, or purchase of essential equipment related to the facility or service.” MDOT lists such projects in its Consolidated Transportation Program (CTP) as “Major Projects,” and details the PFA status of each project as part of that report.

MDOT’s modal administrations that undertake major capital projects for which PFA restrictions apply include the State Highway Administration (SHA), the Maryland Transit Administration (MTA), the Maryland Aviation Administration (MAA), the Maryland Port Administration (MPA), the Motor Vehicle Administration (MVA), and the Secretary’s Office (TSO).

Transportation projects that are explicitly excluded from PFA restrictions include existing Maryland Transportation Authority (MDTA) facilities projects, project planning, initial project planning, and “Minor Capital Projects,” which are projects for the preservation and rehabilitation of existing facilities or services that do not increase capacity.

It should also be noted that a number of MDOT’s capital projects are not location-specific, meaning that they involve system-wide improvements, such as local transit assistance programs and transit vehicle acquisition by MTA, and facility management system improvements by MVA.

**Maryland Historical Trust (MHT)** - Though not required to do so by law, MHT voluntarily restricts certain of its programs to PFAs in order to further the aims of Smart Growth.

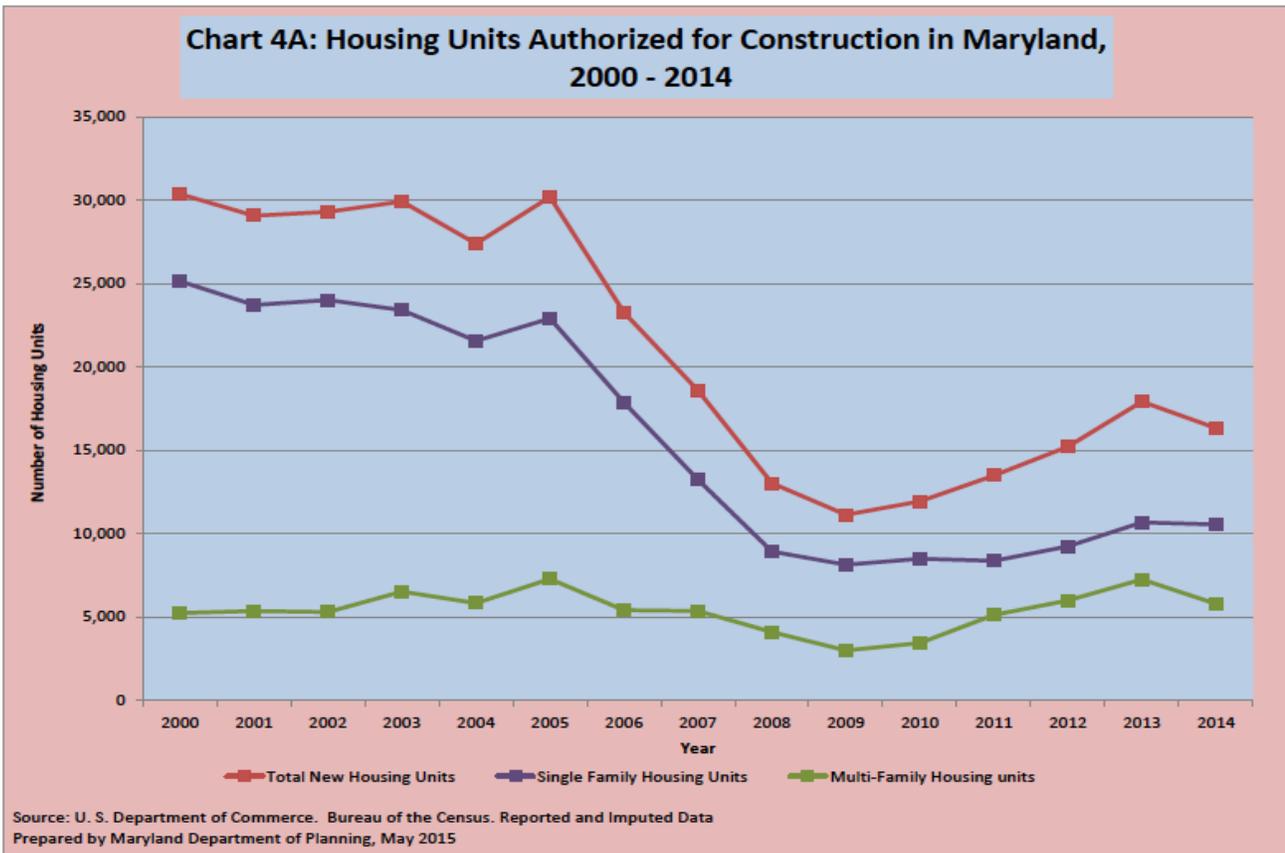
**b. Priority Funding Areas and Hazard Mitigation**

Priority Funding Areas (PFAs) are shown on map products and are displayed as color differentiated polygons, depending on whether the property is located within county or municipal boundaries, or areas designated as rural village. The polygonal PFA areas encompass an entire designated area, typically the entire parcel of land. This methodology of PFA identification and delineation does not account for potential hazard areas that are not suitable for development. Rather the polygon/parcel level representation on mapping products may lead to misunderstandings as to where suitable land exists for development, let alone, for prioritization. Consideration should be given to hazard areas, and should not be included within PFA mapping products.

## 2. Changes in Land Development

According to Maryland Department of Planning (MDP), Maryland’s housing market for both single and multi-family units experienced a significant decline beginning in 2005 and bottoming out in 2009. This drastic decline in development was particularly significant to the single family home market. At the end of this four (4) year period, the number of units slated for construction was approximately one third of the quantity approved in 2005. From 2009 to 2013, the number of authorized housing units showed a slight but upward trend, indicating that development activities and home construction were recovering. It is interesting to note that development of multi-family units saw a greater percent increase during this time period, and according to Chart 4A, the number of authorized multi-family units in 2013 had recovered to 2005 levels. This trend may be due to the increased number of families that had to rent rather than purchase homes because of more stringent criteria banks were applying for mortgage approvals following the housing market crash. In terms of hazard mitigation, this change in land development trend potentially reduces the number of new structures proposed within identified hazard areas, as well as reducing the quantity of structures that could be damaged by any given hazard event, thereby potentially reducing hazard related losses to both life and property.

Figure 4.2—Authorized Housing Units for Construction in Maryland



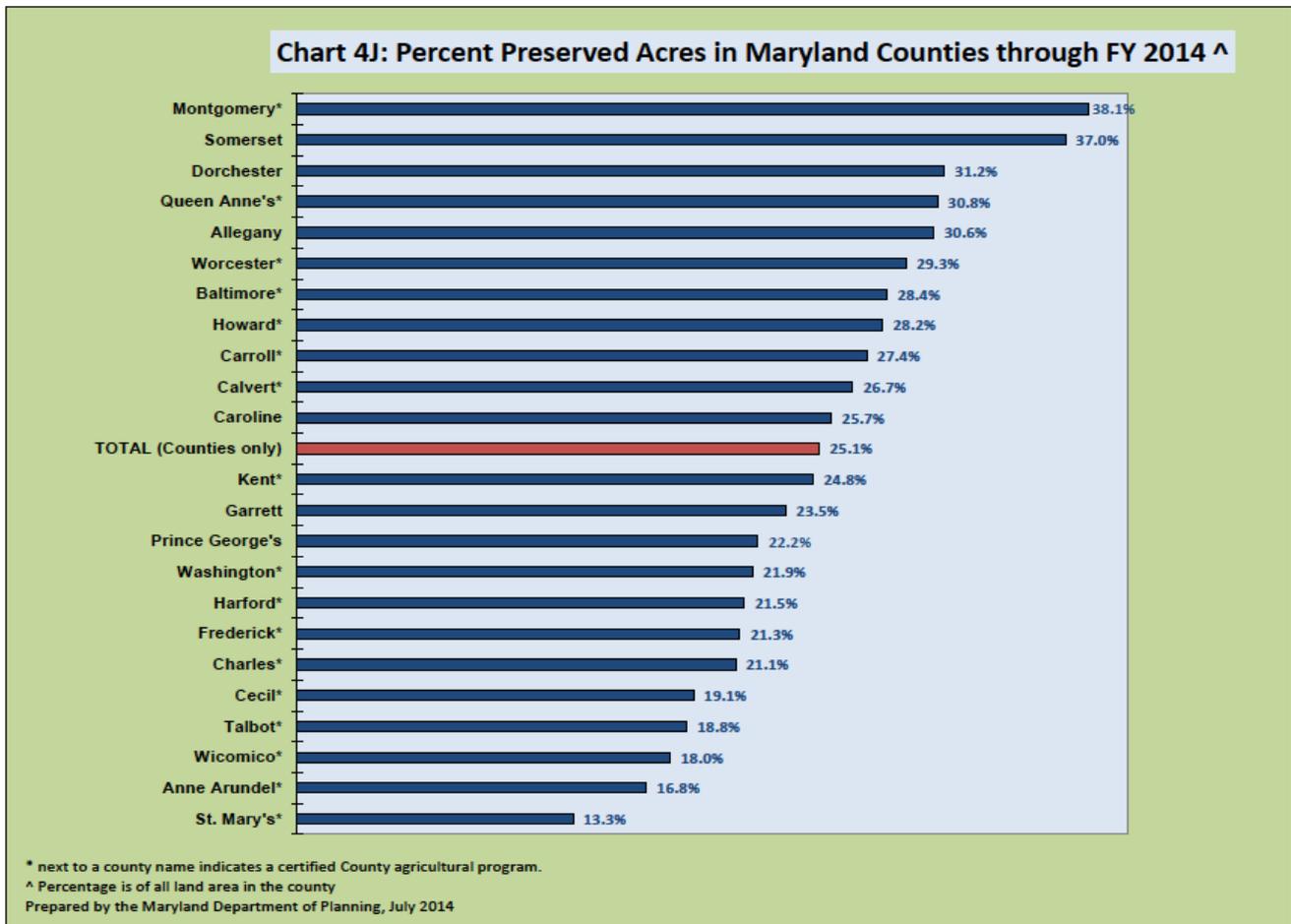
Although Maryland is ranked within the top five (5) states in terms of population density, it has one of the strongest records of land preservation, including agricultural, private, and through other preservation methodologies and programs. Typically the three (3) primary methods of land preservation include easement sale, easement donation or dedication, and the sale of transferable development rights. Whether the land preservation is a required component of land development such as compliance with the Maryland Forest Conservation Act, or due to an agricultural landowner

seeking tax credits through programs such as the Conservation Reserve Enhancement Program (CREP) or Maryland Environmental Trust (MET), the preserved acreage typically coincides with environmentally sensitive areas such as stream buffers, riparian areas, high quality forests, steep slopes, highly erodible soils, or other critical features.

Land preservation can also be utilized to reduce and minimize hazard losses by preventing development within identified hazard areas. For example, floodplain buyout programs mitigate hazard losses by reducing the number of properties that experience repetitive losses.

According to MDP and illustrated on Figure 4.3, Montgomery and Somerset counties have the highest percentage of preserved acreage, while Anne Arundel and St. Mary's counties have the lowest. The state average of preserved acreage across all jurisdictions (counties only) is twenty-five percent (25%).

Figure 4.3—Percent of Preserved Acres in Maryland Counties



### 3. Changes in Population

Population changes in Maryland from 2010-2015 certainly could affect and correlate with Maryland's development trends. New development and economic growth is typically not associated with a declining population. Likewise, the converse typically holds true in that a growing population results in new growth and development activities. Overall, Maryland's population increased by approximately four percent (4.0%) over the 2010-2015 time period.

The jurisdictions with the greatest population growth were Howard (9.2%), Montgomery (7.0%), and Charles (6.5%) counties. The jurisdictions with the highest population loss were Allegany (-3.4%), Somerset (-2.7%) and Garrett (-2.1%) counties. Jurisdictions that did not experience a significant population growth change (<1.0%) included Dorchester County (-0.7%), Talbot County (-0.7%), Ocean City (-0.20%), City of Baltimore (0.1%), Worcester County (0.2%), and Carroll County (0.3%).

*Table 4.1—Population Change per MD Jurisdiction - 2010 to 2015*

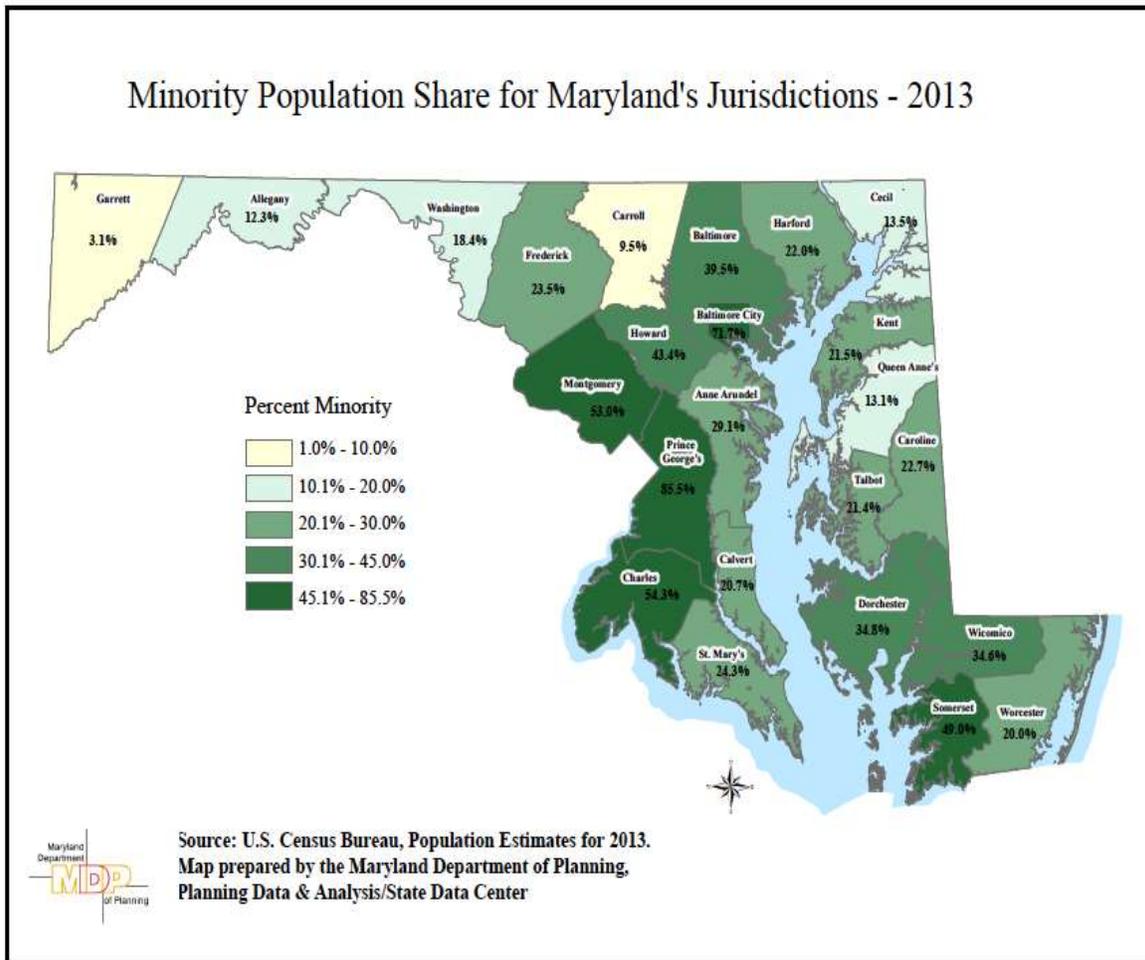
County	2010 Population	Estimated Population July 1, 2015	Percent of Change 4/1/2010-7/1/2015
Allegany County	75,087	72,528	-3.4%
Anne Arundel County	537,656	564,195	4.9%
Baltimore County	805,029	831,128	3.2%
Calvert County	88,737	90,595	2.1%
Caroline County	33,066	32,579	-1.5%
Carroll County	167,134	167,627	0.3%
Cecil County	101,108	102,382	1.3%
Charles County	146,551	156,118	<b>6.5%</b>
Dorchester County	32,618	32,384	-0.7%
Frederick County	233,385	245,322	5.1%
Garrett County	30,097	29,460	-2.1%
Harford County	244,826	250,290	2.2%
Howard County	287,085	313,414	<b>9.2%</b>
Kent County	20,197	19,787	-2.0%
Montgomery County	971,777	1,040,116	<b>7.0%</b>
Prince George's County	863,420	909,535	5.3%
Queen Anne's County	47,798	48,904	2.3%
St. Mary's County	105,151	111,413	6.0%
Somerset County	26,470	25,768	-2.7%
Talbot County	37,782	37,512	-0.7%
Washington County	147,430	149,585	1.5%
Wicomico County	98,733	102,370	3.7%
Worcester County	51,454	51,540	0.2%
City of Baltimore	620,961	621,849	0.1%
City of Annapolis	38,394	38,856	1.2%
Town of Ocean City	7,102	7,089	-0.2%
<b>TOTALS</b>	<b>5,773,552</b>	<b>6,006,401</b>	<b>4.0%</b>

\*Source - Maryland Department of Planning Census

**a. Minority Population**

The Minority Population Share for Maryland’s Jurisdictions-2013 Map, prepared by the Maryland Department of Planning, indicates that Montgomery, Prince George’s, Charles, and Somerset counties have the highest percent of minority populations.

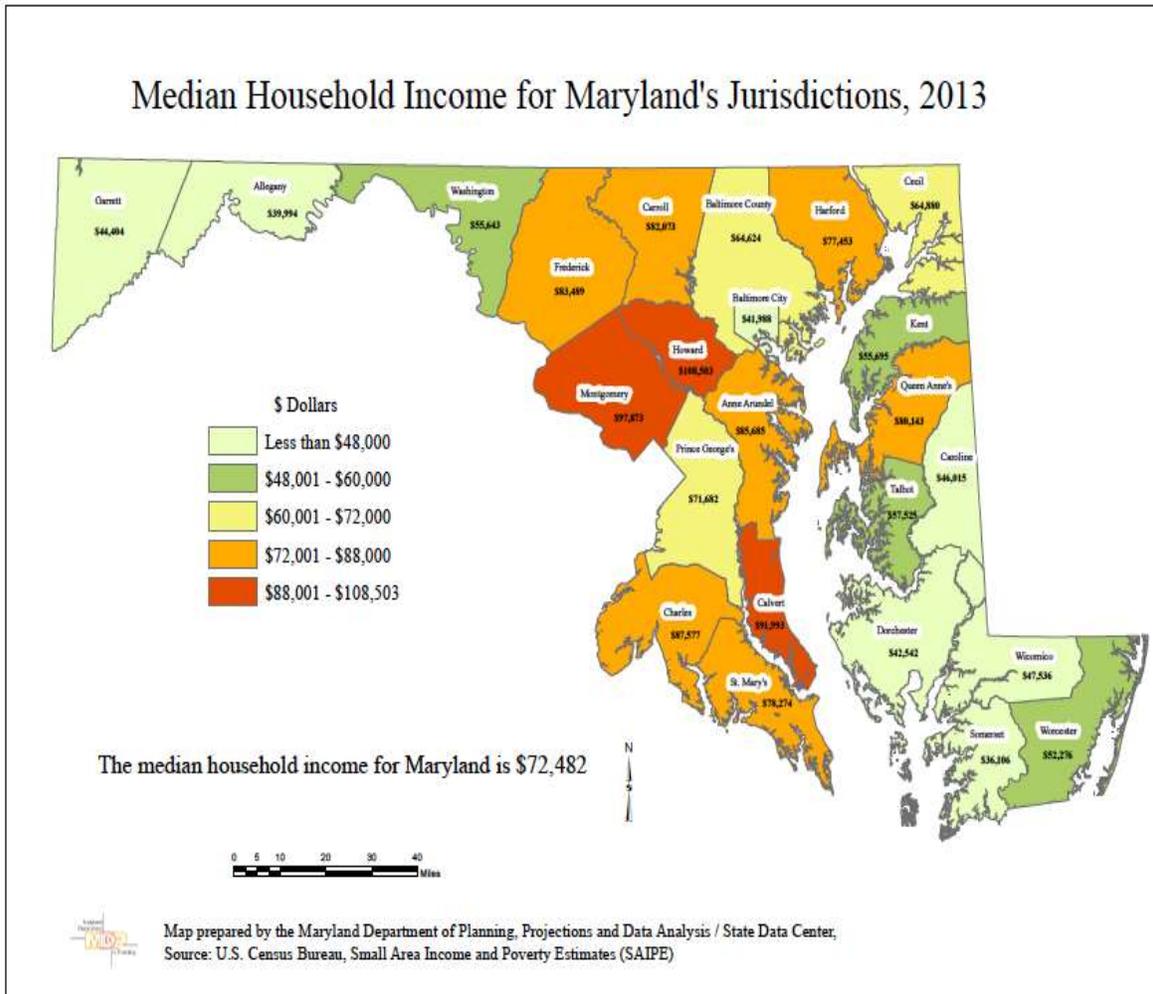
*Figure 4.4—Minority Population Share for Maryland's Jurisdictions - 2013*



**b. Median Income**

According to MDP, the median household income for Maryland is \$72,482. Montgomery, Howard, and Calvert counties have the highest median household incomes. Comparing median income to population growth, the three (3) counties with the greatest rate of population decline (Garrett, Allegany, & Somerset), are also in the lowest tier of median household income. Conversely, the two (2) counties with the greatest rate of population growth (Howard & Montgomery) are in the highest tier of median household income.

Figure 4.5—Median Household Income for Maryland's Jurisdictions - 2013



In terms of hazard risk and impact susceptibility, the lower socio-economic households, counties, and regions are at a greater vulnerability due to hazard impacts for several reasons. Lower income families typically cannot afford additional insurance protection and are less likely to recover from hazard impacts based on financial considerations. Additionally, their risk may be compounded by the fact that the only affordable housing options at their income level are located in higher risk hazard areas.

#### 4. Changes in Vulnerability of State Assets & Critical Facilities

Maryland's Critical Area Program is unique not only because of the significant resources that it is designed to protect, but because it is one of only a few regulatory land use programs in the country that involve a cooperative implementation effort between State and local governments. The purpose of this arrangement is to provide local governments with the flexibility needed to address the unique physical, economic, and social characteristics of the particular jurisdiction while ensuring that the goals, purposes, policies, and criteria of Maryland's Critical Area Program are implemented in a consistent and uniform manner throughout the State.

Critical Area development standards include assessing climate resilient practices that address coastal hazards, extreme weather events, sea-level rise, and other impacts. (COMAR

27.02.05.02.A (2)) State agencies shall submit proposed development proposal to the Commission for approval.

**Criteria for Development by a State Agency or State-owned Land - Consideration for Climate Change**

Required development standards apply to a proposed development activities, no matter the Critical Area Designation. This includes the following considerations for Climate Change:

- To the maximum extent practicable, a state agency will preserve, protect and maintain a potential wetland area.
- The state agency will demonstrate that it considered the likelihood of inundation by sea-level rise over the course of the design life of the project.
- The state agency identifies the climate resilient practices that were incorporated into the project in order to avoid or minimize extreme weather events, sea-level rise, and other impacts.



## SECTION V: MITIGATION STRATEGIES

### STATE MITIGATION PLAN REVIEW GUIDE

Released March 2015 FP 302-094-2

This *State Mitigation Plan Review Guide (Guide)* is FEMA’s official policy on and interpretation of the natural hazard mitigation planning requirements. The intended use of the *Guide* is to facilitate consistent evaluation and approval of state mitigation plans, as well as to facilitate state compliance with the mitigation planning requirements when updating plans.

Figure 5.1—State Mitigation Review Guide S8, S9 & S10

ELEMENT	REQUIREMENTS
<p>S8. Does the mitigation strategy include goals to reduce long-term vulnerabilities from the identified hazards? [44 CFR §201.4(c)(3)(i)<sup>18</sup>]</p> <p><b>Intent:</b> <i>To guide development and implementation of hazard mitigation actions. Goals are statements of the vision for the future.</i></p>	<ul style="list-style-type: none"> <li>a. The plan must identify hazard mitigation goals representing what the state seeks to accomplish through mitigation plan implementation.</li> <li>b. The goals must be consistent with the hazards and vulnerabilities identified in the risk assessment.</li> <li>c. The goals must address reducing the vulnerability of jurisdictions within the state as well as the vulnerability of state-owned or operated buildings, infrastructure, and critical facilities.</li> <li>d. <i>If the state is interested in an increased Federal cost share under the FMA program, the plan must include goals to address RL and SRL properties. (See RL2 in Section 3.8 Repetitive Loss Strategy.)</i></li> </ul>
<p>S9. Does the plan prioritize mitigation actions to reduce vulnerabilities identified in the risk assessment? [44 CFR §§201.4(c)(3)(iii)<sup>19</sup> and (iv)<sup>20</sup>]</p> <p><b>Intent:</b> <i>To establish specific hazard mitigation actions that will be implemented to reduce the vulnerabilities identified in the risk assessment. This is the heart of the mitigation plan, and is essential to leading statewide mitigation programs to reduce risk.</i></p>	<ul style="list-style-type: none"> <li>a. The plan must identify actions based on the current risk assessment to reduce the vulnerability of jurisdictions within the state as well as the vulnerability of state-owned or operated buildings, infrastructure, and critical facilities.</li> <li>b. The plan must describe the process used by the state to evaluate and prioritize actions that are cost effective, environmentally sound, and technically feasible.</li> <li>c. The plan must describe how each action contributes to the hazard mitigation goals.</li> <li>d. The plan must describe how the local and tribal, as applicable, mitigation strategies are linked with the state mitigation strategy.</li> </ul>
<p>S10. Does the plan identify current and potential sources of funding to implement mitigation actions and activities? [44 CFR §201.4(c)(3)(iv)]</p> <p><b>Intent:</b> <i>For the responsible entity to take action to complete activities and projects as funding opportunities to implement them arise.</i></p>	<ul style="list-style-type: none"> <li>a. Each mitigation action or project must include the identification of current and/or potential sources of Federal, state, local, tribal, as applicable, or private funding for implementation.</li> <li>b. At a minimum, the plan must identify FEMA mitigation funding sources, including, if applicable, but not limited to HMGP, PDM, FMA, and PA C-G.<sup>21</sup></li> <li>c. <i>If the state is interested in an increased Federal cost share under the FMA program, the plan must address identify current and potential sources of funding with respect to RL and SRL properties. (See RL4 in Section 3.8 Repetitive Loss Strategy.)</i></li> </ul>

## 1. Hazard Mitigation Goals

Hazard Mitigation goals were reviewed and updated to represent Maryland’s long-term hazard mitigation priorities. Goals identified are consistent with the hazards and vulnerabilities identified within the Hazards Identification, Risk and Vulnerability Assessment sections of this plan.

Maryland Hazard Mitigation Plan Goal - To protect life, property, and the environment from hazard events through:

- Increased public awareness of hazards, mitigation, preparedness, and resiliency.
- Enhanced coordination with local jurisdictions and linkages between state and local mitigation and resiliency efforts.
- Protection of State assets, infrastructure, and critical facilities.
- Promote actions that protect natural resources, while enhancing hazard mitigation and community resiliency.
- Efficient use of State resources.

**Goals are broad, long-term policy and vision statements that explain what is to be achieved by implementing the mitigation strategy.**

## 2. Mitigation Action Development & Implementation

During the development of the Plan the Maryland Resiliency Partnership met periodically to discuss plan sections and ideas for potential mitigation actions/strategies. Risk assessments conducted throughout the plan development process provided the foundation for the formation of actions that reduce hazard vulnerability of local jurisdictions within the State, as well as the vulnerability of State assets, infrastructure, and critical facilities. The group met on May 26, 2016 for the Maryland Resiliency Partnership Strategy Session to complete the culminating activity, which was the development of Mitigation Action Implementation Worksheets.

The development of the mitigation action strategies was documented as part of an ongoing planning effort. A concerted effort was made to flush out existing mitigation strategy ideas and ensure additional opportunities for new implementable mitigation actions and ideas throughout the planning process. As a result of the “strategy session,” a comprehensive list of new mitigation action strategies was developed for incorporation into the 2016 Maryland HMP.

Maryland’s strong partnerships and resource sharing are evident in the various types and robust nature of the actions produced. The contributing participants of the Maryland Resiliency Partnership Group included representatives from various state agencies and other organizations:

- |  |  |
|--|--|
| <ul style="list-style-type: none"> <li>• Maryland Department of the Environment;</li> <li>• Maryland Department of Natural Resources;</li> <li>• Maryland Department of Information Technology;</li> <li>• Maryland Emergency Management Agency;</li> <li>• Maryland Geologic Survey;</li> <li>• Maryland Historical Trust;</li> </ul> | <ul style="list-style-type: none"> <li>• Maryland State Highway Administration;</li> <li>• Maryland Transit Administration;</li> <li>• Maryland Environmental Service;</li> <li>• Eastern Shore Land Conservancy;</li> <li>• Federal Emergency Management Agency;</li> <li>• Natural Resources Defense Council;</li> <li>• AMEC Foster Wheeler; and</li> <li>• Smith Planning and Design.</li> </ul> |
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The Mitigation Action Implementation Worksheets developed by the resiliency group were completed for each of the identified mitigation actions. These worksheets were further refined and additional information was added in order to fully develop each into an action for implementation. As a result of this collaborative effort, thirty-seven (37) mitigation action worksheets were developed.

### 3. Mitigation Action Implementation Worksheet Evaluation, Prioritization & Ranking

The developed Mitigation Action Worksheets were reviewed by mitigation staff and presented during the July 5, 2016 and July 18, 2016 Mitigation Advisory Committee (MAC) meeting. MAC members reviewed and discussed the mitigation implementation actions in order to work through a prioritization and ranking process.

The process used by Maryland to evaluate and prioritize actions considered that each action rated as a high priority be cost effective, environmentally sound, and technically feasible. Actions were linked to the overall goals of the plan and demonstrate how each implementation action contributed to the achievement of the plan. Additionally, many of the implementation actions are inherently linked to the mitigation strategies within Maryland local hazard mitigation plan documents. In an effort to ensure that these linkages are continuously made throughout the planning cycle, Maryland mitigation staff has produced a local plan guidance document and will continue to provide ongoing technical assistance.

The July 5, 2016 and July 18, 2016 MAC meetings resulted in the prioritization and ranking of thirty-six (36) identified and implementable mitigation actions. Mitigation actions that scored an 85% or higher were ranked as high; 70% to 84% were ranked as medium; and 0% to 69% were ranked as low. Figure 5.2 is a sample of the priority ranking questionnaire utilized by the MAC to review, discuss, and score each of the thirty-six (36) mitigation implementation strategies. Each MAC member was given an opportunity to answer the following four (4) questions per mitigation implementation strategy questionnaire:

- Is the project cost effective?
- Is the project environmentally sound?
- Is the project technically feasible?
- Does the project meet at least one (1) of the MAC Priority Ranking Parameters?

Preliminary results of the questionnaires were compiled and presented to the MAC during the July 5, 2016 meeting and finalized during the July 18, 2016 meeting. MAC members reviewed and discussed each action. Modifications were made and finalized results are presented on Table 5.1.

Figure 5.2—Sample Priority Ranking Questionnaire

Please review and complete the <i>Priority Ranking</i> questions.				
Mitigation Action/Project Title	QUESTIONS	YES	NO	SCORE
<i>Priority Ranking</i>	Is the project cost-effective?			
	Is the project environmentally sound?			
	Is the project technically feasible?			
	Does the project meet at least one (1) of the MAC Priority Ranking Parameters?			
Background/Issue:				
Issues for Immigration:				
Responsible Agency:				
Partners:				
Potential Funding:				
Cost Estimate:				
Benefit (Losses Avoided):				
Timeline:				
Worksheet Completed by:				

The order of the mitigation actions presented in Table 5.1 corresponds to the ranking score from high-to-low for each category.

*Table 5.1—Mitigation Action Priority Ranking Results*

Priority Ranking Category	Mitigation Action / Project Title
<b>HIGH</b>	#1 - Completion of Elevation Certificates for Historic Properties at Risk to Flooding #3 - Enhance Maryland Flood Maps ( <a href="http://www.mdffloodmaps.org">www.mdffloodmaps.org</a> ) #6 - Flood Risk Freeboard Layer #8 - Conduct Survey & Evaluation of Historic Properties and other Cultural Resources in Coastal High Hazard Areas - Zones AE & VE #10 - Incorporation of HAZUS Runs (Planning and Recovery efforts post disaster) for <a href="http://www.mdffloodmaps.org">www.mdffloodmaps.org</a> #11 - Vulnerability Assessment - Hurricane Wind Enhanced HAZUS #12 - Review and Revise the Mitigation Advisory Committee (MAC) Priority Ranking System to include consideration and prioritization of SRL and RL related projects #13 - Obtain Elevation Certificates for State Facilities in Special Flood Hazard Areas & Integrate all Elevation Certificates into Online System ( <a href="http://www.mdffloodmaps.org">www.mdffloodmaps.org</a> ) #14 - All Hazards Risk, Mitigation & Resiliency Outreach #15 - Coastal Restoration to Mitigate Coastal Hazards for Vulnerable Communities #18 - Increase opportunities for formal and informal communication and adaptation planning, facilitate the exchange of ideas within the Chesapeake Bay watershed, and pilot green/grey infrastructure to prepare for and respond to climate impacts to vulnerable jurisdictions. #20 - Maryland Repetitive Loss (RL) & Severe Repetitive Loss (SRL) Property Inventory Update #22 - Technical Assistance to Identify, Address, and Incorporate Coastal Hazards into Local Planning #24 - Table Top Exercises Prior to Flood Event / Hazard #26 - Mobile Lidar Capture #30 - Inventory Susceptible Wells & Retrofit with Protection #33 - Roadway Flooding Vulnerability Assessment
Priority Ranking Category	Mitigation Action / Project Title
<b>MEDIUM</b>	#4 - Flood Risk Assessment Screen for Coastal Hazards for Architectural & Archeological Survey Collector Application #5 - Flood Mitigation Guidance for Historic Properties #7 - Education & Outreach on Historic Properties and Coastal Hazards Mitigation and Climate Change Resiliency #16 - Statewide Participation in the NFIP #19 - Resiliency Partnership Resource Website #21 - State Highway Administration (SHA) and other State Agency Data Integration to support Flood Risk Assessment #23 - Complete FEMA Form AW-501 to Support Update of the FEMA SRL & RL Property Databases #28 - Coast Smart Council Implementation to Mitigate Coastal Hazards for Vulnerable State Capital Projects #31 - Gather and Present Mitigation GIS data that can be used operationally during Recovery & Response #34 - Target Restoration, Preservation, & Mitigation within Special Flood Hazard Areas using the Water Resource Registry
<b>LOW</b>	#2 - Elevation Project Application Enhancement #9 - Hazard Mitigation / Climate Resiliency Officer Position #17 - All Hazards Plan Integration - State to Local Implementation #25 - Archeological Survey on State-Owned Land & Water in High Hazard Areas

	#27 - Development of Backup Groundwater Systems #29 - Improve Knowledge / Data Availability #32 - Increase All Hazards Private Sector Resiliency #35 - FME Tool Integration / Future HAZUS Updates #36 - Floodplain Management Training
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#### 4. Prioritized Mitigation Implementation Actions

The Mitigation Implementation Action Strategies presented and described herein address the identified hazards for the Maryland Hazard Mitigation Plan. These strategies form the core of the Plan and have been grouped into the following six (6) broad categories.

*Table 5.2–Mitigation Strategies by Category*

Category	Mitigation Strategy
<b>Prevention</b>	#6 - Flood Risk Freeboard Layer #12 - Review and Revise the Mitigation Advisory Committee (MAC) Priority Ranking System to include consideration and prioritization of SRL and RL related projects #22 - Technical Assistance to Identify, Address, and Incorporate Coastal Hazards into Local Planning #26 - Mobile Lidar Capture #16 - Statewide Participation in the NFIP #23 - Complete FEMA Form AW-501 to Support Update of the FEMA SRL & RL Property Databases #28 - Coast Smart Council Implementation to Mitigate Coastal Hazards for Vulnerable State Capital Projects #17 - All Hazards Plan Integration - State to Local Implementation
<b>Property Protection</b>	#1 - Completion of Elevation Certificates for Historic Properties at Risk to Flooding #8 - Conduct Survey & Evaluation of Historic Properties and other Cultural Resources in Coastal High Hazard Areas - Zones AE & VE #11 - Vulnerability Assessment - Hurricane Wind Enhanced HAZUS #13 - Obtain Elevation Certificates for State Facilities in Special Flood Hazard Areas & Integrate all Elevation Certificates into Online System ( <a href="http://www.mdfloodmaps.org">www.mdfloodmaps.org</a> ) #20 - Maryland Repetitive Loss (RL) & Severe Repetitive Loss (SRL) Property Inventory Update #33 - Roadway Flooding Vulnerability Assessment #4 - Flood Risk Assessment Screen for Coastal Hazards for Architectural & Archeological Survey Collector Application #19 - Resiliency Partnership Resource Website #21 - State Highway Administration (SHA) and other State Agency Data Integration to support Flood Risk Assessment #2 - Elevation Project Application Enhancement #25 - Archeological Survey on State-Owned Land & Water in High Hazard Areas #35 - FME Tool Integration / Future HAZUS Updates
<b>Public Education &amp; Awareness</b>	#3 - Enhance Maryland Flood Maps ( <a href="http://www.mdfloodmaps.org">www.mdfloodmaps.org</a> ) #10 - Incorporation of HAZUS Runs (Planning and Recovery efforts post disaster) for <a href="http://www.mdfloodmaps.org">www.mdfloodmaps.org</a> #14 - All Hazards Risk, Mitigation & Resiliency Outreach #5 - Flood Mitigation Guidance for Historic Properties #7 - Education & Outreach on Historic Properties and Coastal Hazards Mitigation and Climate Change Resiliency #9 - Hazard Mitigation / Climate Resiliency Officer Position #29 - Improve Knowledge / Data Availability #32 - Increase All Hazards Private Sector Resiliency #36 - Floodplain Management Training

Category	Mitigation Strategy
<b>Natural Resources Protection</b>	#15 - Coastal Restoration to Mitigate Coastal Hazards for Vulnerable Communities #18 - Increase opportunities for formal and informal communication and adaptation planning, facilitate the exchange of ideas within the Chesapeake Bay watershed, and pilot green/grey infrastructure to prepare for and respond to climate impacts to vulnerable jurisdictions #34 - Target Restoration, Preservation, & Mitigation within Special Flood Hazard Areas using the Water Resource Registry
<b>Emergency Services</b>	#24 - Table Top Exercises Prior to Flood Event / Hazard #31 - Gather and Present Mitigation GIS data that can be used operationally during Recovery & Response
<b>Structural Projects</b>	#30 - Inventory Susceptible Wells & Retrofit with Protection #27 - Development of Backup Groundwater Systems

Mitigation Action Implementation Strategy Worksheets were utilized to generate a numerical priority ranking score for each mitigation action; the developed worksheet for each mitigation implementation action is included in this section. Individual scores from each MAC member are not included on the worksheets; however, the ranking category (H-High, M-Medium, or L-Low) for each action/project is indicated on each implementation worksheet within the “Priority Ranking” box under “Score”.

<b>Mitigation Implementation Strategy</b>	
<b>Mitigation Action/Project Title:</b>	<b>#1 - Completion of Elevation Certificates for Historic Properties at Risk to Flooding</b>
<b>Priority Ranking</b>	<u>SCORE</u>  <b>H</b>
<b>Background/Issue:</b>	<p>Reduce flood risk for historic properties statewide, by obtaining 250 elevation certificates for structures within SFHA; these structures may include residential or commercial. Elevation Certificates and applying flood risk mitigation practices to reduce possible damages in ways that also preserve the historic integrity of the properties and allow properties listed in the National Register of Historic Places to retain their historic designation.</p> <p>Perform analysis to identify the high risk structures, where the highest priorities are those structures or communities where depth of flooding 3' or greater in relation to the base flood elevation.</p> <p>Use the information gathered from the elevation certificate to perform a HAZUS UDF file to begin creating the cost/benefit analysis for anticipated potential losses to these structures or communities. This cost/benefit analysis will be used to identify processes to flood prevents historical structures in the future.</p>
<b>Ideas for Integration:</b>	Use risk data with HAZUS to populate cost/benefit analysis in order to inform project application and fund project. Incorporate information into local hazard mitigation plans.
<b>Responsible Agency:</b>	Maryland Department of the Environment Maryland Emergency Management Agency Maryland Historical Trust
<b>Partners:</b>	Maryland Department of the Environment Maryland Emergency Management Agency Maryland Historical Trust Maryland Environmental Service
<b>Potential Funding:</b>	Hazard Mitigation Assistance
<b>Cost Estimate:</b>	\$250,000
<b>Benefits: (Losses Avoided)</b>	Mitigate losses to historical structures within the state of Maryland to continue to preserve the history and culture of the citizens in the state.
<b>Timeline:</b>	1 Year

<b>Mitigation Implementation Strategy</b>	
<b>Mitigation Action/Project Title:</b>	<b>#2 - Elevation Project Application Enhancement</b>
<b>Priority Ranking</b>	<u>SCORE</u>  L
<b>Background/Issue:</b>	Develop of electronic/web-based applications for structural elevation projects are difficult to manage and are often misunderstood by local residents/county staff. We need a better conceptual application process with working process.
<b>Ideas for Integration:</b>	Provide for engineering contract/analysis for pre-application review process
<b>Responsible Agency:</b>	Maryland Emergency Management Agency Maryland Environmental Service
<b>Partners:</b>	Maryland Department of the Environment Maryland Historical Trust
<b>Potential Funding:</b>	Hazard Mitigation Assistance
<b>Cost Estimate:</b>	\$10,000 - \$20,000 per elevation project - associated engineering & soil analysis cost
<b>Benefits: (Losses Avoided)</b>	Positive cost benefit and assurance going into projects for staff and resident
<b>Timeline:</b>	1 year (Declaration Dependent)

<b>Mitigation Implementation Strategy</b>	
<b>Mitigation Action/Project Title:</b>	<b>#3 - Enhance Maryland Flood Maps (www.mdfloodmaps.org)</b>
<b>Priority Ranking</b>	<u>SCORE</u>  <b>H</b>
<b>Background/Issue:</b>	MD Flood Maps has integrated updated DFIRMs and other state data to date. Newly completed non-regulatory coastal Hazus data and proposed Hazus riverine data (when completed) should be integrated with MDE Flood Maps to expand the application and account for all aspects of flood risk in the state. Also, include Maryland Historical Trust and other critical infrastructure including relevant datasets made as input from the State Hazard Mitigation Plan for Maryland. Additionally, the State recognizes that floodplains are constantly changing through permitting processes along with supplemental LOMA's and LOMR's issued through FEMA. As a result, the State would like to create an upload functionality for models, photos, etc. in order to maintain a comprehensive repository of flood-related data for Maryland. Outreach will also be necessary to inform local floodplain managers and engineers on the use of the upload tool. Finally, the State would like to ensure there is no disparity between the data that Maryland has inside of mdfloodmaps versus FEMA data sources. Workflow processes will be established and implemented in order to assure systems between both State and Federal government are in sync.
<b>Ideas for Integration:</b>	Using one application to account for all Maryland flood risk data will enable Maryland to have a one-stop site for data sharing and opportunities for related data, and collaboration.
<b>Responsible Agency:</b>	Maryland Department of the Environment
<b>Partners:</b>	Maryland Department of the Environment Maryland Emergency Management Agency Maryland Department of Information Technology  Maryland Environmental Service Maryland Historical Trust
<b>Potential Funding:</b>	Pre-Disaster Mitigation Assistance Cooperating Technical Partners  Hazard Mitigation Grant Program CBIG
<b>Cost Estimate:</b>	\$87,000
<b>Benefits: (Losses Avoided)</b>	One stop shopping for flood risk evaluation and mitigation opportunities. This information will be extremely valuable to local floodplain managers, engineers, and the public for submitting permit applications for waterway construction permits in addition to grant applications for Hazard Mitigation Grant Program funding. Additionally, the public will be able to use these resources in order to better evaluate their flood risk including estimated losses, flood zone designations, water surface elevations, depth of flooding, etc.
<b>Timeline:</b>	Predicated on funding availability: Upload functionality - eight (8) weeks Integrating HAZUS data as identified in benefits section - two (2) weeks Document and implement sync protocol between state and federal partners - four (4) weeks

<b>Mitigation Implementation Strategy</b>	
<b>Mitigation Action/Project Title:</b>	<b>#4 - Elevation Project Application Enhancement - Historic Structures</b>
<b>Priority Ranking</b>	<u>SCORE</u>  <b>M</b>
<b>Background/Issue:</b>	Current survey collector application can be adapted to also capture information on flood & coastal hazards. For use in developing mitigation actions or post-disaster to record information on damages and specific impacts of events.
<b>Ideas for Integration:</b>	Local hazard mitigation plans & local preservation plans
<b>Responsible Agency:</b>	Maryland Historical Trust
<b>Partners:</b>	Local governments National Park Service Maryland Emergency Management Agency
<b>Potential Funding:</b>	CLG (Certified Local Government) Pre Disaster Mitigation Grant Program Hazard Mitigation Grant Program
<b>Cost Estimate:</b>	
<b>Benefits: (Losses Avoided)</b>	Preservation of Cultural Resources
<b>Timeline:</b>	2-3 years

<b>Mitigation Implementation Strategy</b>	
<b>Mitigation Action/Project Title:</b>	<b>#5 - Develop Flood Mitigation Guidance for Historic Properties</b>
<b>Priority Ranking</b>	<u>SCORE</u>  <b>M</b>
<b>Background/Issue:</b>	Guidance for managing changes to historic properties is provided by the Department of the Interior through the National Park Service, which maintains the National Register of Historic Places. No guidance has been forthcoming, which leaves State Historic Preservation Offices and local government at a loss for how to comprehensively and consistently address mitigation actions and their impacts to historic properties. Guidance is needed at the State level so that the Maryland Historical Trust can provide a path forward for historic property owners who wish to become more resilient to natural hazards and climate change while respecting the historic integrity of the property.
<b>Ideas for Integration:</b>	Preserve Maryland (Statewide Preservation Plan); State Hazard Mitigation Plan; National Park Service
<b>Responsible Agency:</b>	Maryland Historical Trust
<b>Partners:</b>	National Park Service
<b>Potential Funding:</b>	Staff time
<b>Cost Estimate:</b>	
<b>Benefits: (Losses Avoided)</b>	Mitigation of historic properties in ways that balance preservation and protection from the effects of natural hazards and climate change.
<b>Timeline:</b>	1 year

<b>Mitigation Implementation Strategy</b>	
<b>Mitigation Action/Project Title:</b>	<b>#6 - Develop Flood Risk Freeboard Layer - mdfloodmaps</b>
<b>Priority Ranking</b>	<u>SCORE</u>  <b>H</b>
<b>Background/Issue:</b>	Many Maryland jurisdictions implement freeboard/elevation requirements for development/permitting. This is enforced with the current regulatory boundaries, however; a layer does not currently exist to assess increased flood risk/freeboard outside of the 100-year extents. This project would develop additional floodplain boundaries reflecting selected freeboard increases (1-ft, 2-ft, 3-ft, Etc.)
<b>Ideas for Integration:</b>	Information can be included into the local plans and support local permitting
<b>Responsible Agency:</b>	Maryland Department of the Environment
<b>Partners:</b>	Maryland Emergency Management Agency State Highway Administration
<b>Potential Funding:</b>	Hazard Mitigation Assistance Cooperating Technical Partner Program
<b>Cost Estimate:</b>	\$500,000
<b>Benefits: (Losses Avoided)</b>	Support local permitting and floodplain management
<b>Timeline:</b>	TBD

<b>Mitigation Implementation Strategy</b>	
<b>Mitigation Action/Project Title:</b>	<b>#7 - Education &amp; Outreach on Historic Properties and Coastal Hazards Mitigation and Climate Change Resiliency</b>
<b>Priority Ranking</b>	<u>SCORE</u>  <b>M</b>
<b>Background/Issue:</b>	Local government may not have the technical knowledge or staff to plan for the protection of historic properties and other cultural resources in ways that balance protection with preservation. This leaves historic properties vulnerable to the effects of natural hazards and leaves property owners trapped in a cycle of damage and repair. For example, historic properties have not been protected from flooding because they were perceived as too difficult to work with and due to grandfathering and low flood insurance premiums, historic property owners have not had much encouragement or impetus to mitigate their property. However, Biggert-Waters and the HFIAA eliminated the grandfathering of pre-FIRM structures and required flood insurance premiums to slowly increase to reflect the actuarial cost of the risk of flood. This creates a situation where historic property owners will begin to seek mitigation to reduce the cost of their flood insurance. Online training modules and conducting onsite workshops (in conjunction with the Maryland Resiliency Partnership) can help local government to learn how to integrate historic properties into hazard mitigation and climate change resiliency plans and actions. Workshops can be held to help historic property owners learn how to protect their property from the effects of coastal hazards and climate change (mostly flood- and sea level rise-related).
<b>Ideas for Integration:</b>	Preserve Maryland (Statewide Preservation Plan); State Hazard Mitigation Plan (Future Plan Update: Develop Cultural Resource Section); CRS Users Group meetings and outreach.
<b>Responsible Agency:</b>	Maryland Historical Trust
<b>Partners:</b>	Maryland Emergency Management Agency Maryland Department of the Environment Department of Natural Resources Preservation Maryland Local governments Maryland Silver Jackets
<b>Potential Funding:</b>	CLG (Certified Local Governments); HMGP; Technical assistance available from state agencies.
<b>Cost Estimate:</b>	\$25,000 Annually
<b>Benefits: (Losses Avoided)</b>	Increase local awareness of hazard risk and opportunities for mitigation and resiliency of historic properties; all the same things in the "All Hazards Risk, Mitigation & Resiliency Outreach" example provided at the meeting on 5/25 at MEMA.
<b>Timeline:</b>	1 year

<b>Mitigation Implementation Strategy</b>	
<b>Mitigation Action/Project Title:</b>	<b>#8 - Conduct Survey &amp; Evaluation of Historic Properties and other Cultural Resources in Coastal High Risk Hazard Areas - AE &amp; VE Zones</b>
<b>Priority Ranking</b>	<u>SCORE</u>  <b>H</b>
<b>Background/Issue:</b>	<ul style="list-style-type: none"> <li>- Little survey conducted since 1990s</li> <li>- Not known how many historic properties and cultural resources are at risk to damage/destruction by natural hazards &amp; the effects of climate change.</li> <li>- Cannot conduct a risk assessment or identify protection measures without knowing where properties are and their importance in the local community.</li> </ul>
<b>Ideas for Integration:</b>	Maryland Historical Trust's Preserve Maryland Plan (not correct title) Local Hazard Mitigation Plans; Local Preservation Plans Local Flood Mitigation Area Plans
<b>Responsible Agency:</b>	Maryland Historical Trust
<b>Partners:</b>	Maryland Emergency Management Agency Maryland Department of the Environment
<b>Potential Funding:</b>	CLG (Certified Local Government), CoastSmart, Pre Disaster Mitigation Grant Program Flood Mitigation Assistance Hazard Mitigation Grant Program Technical assistance available from state agencies
<b>Cost Estimate:</b>	\$15,000- \$30,000/Community
<b>Benefits: (Losses Avoided)</b>	Preserving Historical Properties & Cultural Resources
<b>Timeline:</b>	Local Hazard Mitigation Plan Cycle (5 years)

<b>Mitigation Implementation Strategy</b>	
<b>Mitigation Action/Project Title:</b>	<b>#9 - Hazard Mitigation / Climate Change Resiliency Officer Position</b>
<b>Priority Ranking</b>	<u>SCORE</u>  <b>L</b>
<b>Background/Issue:</b>	Currently this position is funded only for two (2) years under a Hurricane Sandy Disaster Relief Grant from the National Park Service. When the two (2) year period ends, there is no one at Maryland Historical Trust (MHT) with experience in hazard mitigation planning or floodplain regulations who can continue to participate meaningfully in the Maryland Resiliency Partnership or the Maryland Silver Jacket or who can advise the SHPO or the Office Chiefs at the MHT on matters related to mitigation and resilience and cultural resources.
<b>Ideas for Integration:</b>	Continued participation and representation in the Maryland Resiliency Partnership and the Maryland Silver Jackets.
<b>Responsible Agency:</b>	Maryland Historical Trust
<b>Partners:</b>	Maryland Department of the Environment Maryland Emergency Management Agency DNR US Army Corp. of Engineers Preservation Maryland Local governments
<b>Potential Funding:</b>	Maryland Department of the Environment Maryland Emergency Management Agency Maryland Department of Natural Resources US Army Corp of Engineers Preservation Maryland Local governments
<b>Cost Estimate:</b>	\$55,000/year
<b>Benefits: (Losses Avoided)</b>	Continued integration among state agencies in matters of mitigation planning and projects to leverage state resources and provide a coordinated response to increasing resiliency across the state.
<b>Timeline:</b>	1-2 Years

<b>Mitigation Implementation Strategy</b>	
<b>Mitigation Action/Project Title:</b>	#10 - Incorporation of HAZUS Runs (Planning & Recovery efforts post disaster) for <a href="http://www.mdfloodmaps.org">www.mdfloodmaps.org</a>
<b>Priority Ranking</b>	<u>SCORE</u>  <b>H</b>
<b>Background/Issue:</b>	Incorporate HAZUS runs (Coastal and Riverine) into existing online tool to show public users their risk to multiple hazards. Framework is in existence on tool, only requires minimal development time.  Mdfloodmaps.com has currently received approximately 130K site hits through its existence. The information currently maintained in the state plan will be available through the site in the form of HAZUS returns for the following: Debris Tons/Loss Estimates per structures/Population displacement/Shelters
<b>Ideas for Integration:</b>	Dissemination of information to both the public and state and local agencies is the next step in the process of communication risk.
<b>Responsible Agency:</b>	Maryland Department of the Environment Maryland Emergency Management Agency Maryland Environmental Service
<b>Partners:</b>	Maryland Department of the Environment Maryland Emergency Management Agency Maryland Environmental Service FEMA Region III
<b>Potential Funding:</b>	Hazard Mitigation Assistance
<b>Cost Estimate:</b>	\$15,000 (frame work is currently in existence in current mdfloodmaps.com application) the cost will cover mockups and implementation of currently available datasets for communities within the state.
<b>Benefits: (Losses Avoided)</b>	Public Outreach-Communication Risk
<b>Timeline:</b>	1 year and as new HAZUS runs are performed throughout the State.

<b>Mitigation Implementation Strategy</b>	
<b>Mitigation Action/Project Title:</b>	<b>#11 - Complete Vulnerability Assessment for Hurricane Wind Enhanced HAZUS</b>
<b>Priority Ranking</b>	<u>SCORE</u>  <b>H</b>
<b>Background/Issue:</b>	Enhanced Hazus has completed for Coastal Risk Map products in Maryland. This analysis did not contain information specific to hurricane wind risk. Hazus has a separate model to determine hurricane wind risk. Hazus hurricane wind runs should include critical facilities, state assets, damage, and loss estimations. In addition, the Enhanced Hazus Hurricane Wind should include debris generation and shelter needs as results from the study.
<b>Ideas for Integration:</b>	Local Hazard Mitigation Plans Flood Mitigation Assistance Plans
<b>Responsible Agency:</b>	Maryland Emergency Management Agency Local Jurisdictions
<b>Partners:</b>	Maryland Emergency Management Agency Local Jurisdictions FEMA
<b>Potential Funding:</b>	Hazard Mitigation Assistance State Funding
<b>Cost Estimate:</b>	\$8,000 per jurisdiction 17 MD Coastal Jurisdictions
<b>Benefits: (Losses Avoided)</b>	Life savings Property Protection Improved Future Development Planning
<b>Timeline:</b>	1-5 Years

<b>Mitigation Implementation Strategy</b>	
<b>Mitigation Action/Project Title:</b>	<b>#12 - Review &amp; Revise the Mitigation Advisory Committee (MAC) Project Priority Ranking System to include Consideration and Prioritization of SRL and RL related projects.</b>
<b>Priority Ranking</b>	<u>SCORE</u>  <b>H</b>
<b>Background/Issue:</b>	At this time, no formal priority regarding Repetitive Loss (RL) and Severe Repetitive Loss (SRL) exists within the Mitigation Advisory Council's (MAC) Project Ranking System.
<b>Ideas for Integration:</b>	Advise project applicants of the changes to the MAC's Project Ranking System and the emphasis placed on RL & SRL projects. Include information regarding projects involving RL or SRL components within information packet provided to MAC members.
<b>Responsible Agency:</b>	Maryland Emergency Management Agency
<b>Partners:</b>	Mitigation Advisory Committee
<b>Potential Funding:</b>	N/A
<b>Cost Estimate:</b>	N/A
<b>Benefits: (Losses Avoided)</b>	Prioritization of Flood Mitigation Projects related to RL & SRL
<b>Timeline:</b>	Less than one year

<b>Mitigation Implementation Strategy</b>	
<b>Mitigation Action/Project Title:</b>	<b>#13 - Obtain Elevation Certificates for State Facilities (including Critical Facilities) in Special Flood Hazard Areas (SFHA) - Integrate all Elevation Certificates into Online System</b>
<b>Priority Ranking</b>	<u>SCORE</u>  <b>H</b>
<b>Background/Issue:</b>	<p>Need better evaluation of flood risk at state and critical facilities in SFHA. The new Maryland hazard mitigation state facility database has identified State Facilities within the SFHA, the next steps include:</p> <ul style="list-style-type: none"> <li>- Assess the risk of flooding based on flood depths using the available data in Maryland.</li> <li>- Identify high risk versus low risk facilities (depth of flooding 3' or greater, depth of flooding 0'-3', etc.).</li> <li>- Fieldwork/Evaluate Structures/Obtain elevation certificates for pre-firm structures.</li> <li>- Document strategies for mitigating high-risk facilities.</li> </ul>
<b>Ideas for Integration:</b>	This information may be used by various state agencies and will be made available at a one-stop Maryland data website.
<b>Responsible Agency:</b>	Maryland Department of the Environment Maryland Emergency Management Agency
<b>Partners:</b>	Maryland Department of the Environment Maryland Emergency Management Agency Maryland Insurance Agency Maryland Department of Information Technology Maryland Environmental Service Department of General Services
<b>Potential Funding:</b>	Pre-Disaster Mitigation Assistance Hazard Mitigation Grant Program Cooperating Technical Partners
<b>Cost Estimate:</b>	Can be tiered based on available funding to complete a given work activity. Total cost will be variable based on how many high risk facilities are identified. In the planning phase of the project. Total estimated cost to complete project: \$250,000 - Any remaining funds would be applied to implementing portions of mitigation strategies identified at high risk facilities.
<b>Benefits: (Losses Avoided)</b>	Better understanding of risk and opportunity to prioritize projects based on new flood depth grids and facility elevation certificates.
<b>Timeline:</b>	1-3 years, based on funding availability.

<b>Mitigation Implementation Strategy</b>	
<b>Mitigation Action/Project Title:</b>	<b>#14 - All Hazards Risk, Mitigation &amp; Resiliency Outreach</b>
<b>Priority Ranking</b>	<u>SCORE</u>  <b>H</b>
<b>Background/Issue:</b>	<p>The public should have access to coordinated, prompt, reliable, and actionable information through the use of clear, consistent, assessable, and culturally and linguistically appropriate methods to effectively relay information regarding hazards.</p> <p>Digital media:</p> <ol style="list-style-type: none"> <li>1. Quarterly spread safety warnings through Twitter to 4 million people in the State (including Tweets and Retweets).</li> <li>2. Quarterly spread safety warnings through Facebook to an excess of a million followers.</li> <li>3. Quarterly, update the MEMA website to provide risk, mitigation &amp; resiliency (all hazards) information.</li> <li>4. Produce one YouTube video per year to highlight a Maryland hazard.</li> <li>5. Promote hazard mitigation and resiliency opportunities through social media.</li> </ol>
<b>Ideas for Integration:</b>	MEMA State Mitigation Operations Plan
<b>Responsible Agency:</b>	Maryland Emergency Management Agency
<b>Partners:</b>	Maryland Silver Jackets Mitigation Advisory Committee
<b>Potential Funding:</b>	FEMA Hazard Mitigation Grant Program (HMGP) Information and technical assistance available from State agencies
<b>Cost Estimate:</b>	Community Outreach Efforts - \$25,000 annually
<b>Benefits: (Losses Avoided)</b>	<ul style="list-style-type: none"> <li>• Increase public awareness of Maryland’s hazard risk and opportunities for mitigation and resiliency.</li> <li>• Using outreach activities to facilitate technical assistance programs that address measures that citizens can take or facilitate funding for mitigation measures.</li> <li>• Encourage homeowners to undertake mitigation measures such as the installation of backflow valves.</li> <li>• Educating citizens about safety measures minimizes potential loss of life, injuries and property damage.</li> </ul>
<b>Timeline:</b>	Hazard Mitigation Plan Cycle - 2016-2021

<b>Mitigation Implementation Strategy</b>	
<b>Mitigation Action/Project Title:</b>	<b>#15 - Coastal Restoration to Mitigate Hazards for Vulnerable Communities</b>
<b>Priority Ranking</b>	<u>SCORE</u>  <b>H</b>
<b>Background/Issue:</b>	Natural feature complexes can reduce the impacts of coastal hazards (i.e. flooding and erosion) on vulnerable jurisdictions and state facilities. DNR's Coastal Resiliency Assessment identifies residential areas at risk to coastal hazards and prioritizes shorelines for proactive restoration to enhance coastal community resiliency.
<b>Ideas for Integration:</b>	<p>A number of tools are available to target implementation of restoration projects that will enhance community resiliency:</p> <ul style="list-style-type: none"> <li>• MEMA's State Hazard Mitigation Plan identifies critical infrastructure at risk to coastal hazards; DNR's Coastal Resiliency Assessment identifies residential areas at risk to coastal hazards; SHA's Vulnerability Study identifies highways vulnerable to flooding/Sea-level rise; and local jurisdictions identify areas of hazard/risk in local hazard mitigation plans. State, County, and Federal protected lands offer opportunities for natural feature restoration to enhance resiliency of nearby communities. These tools will be considered together to identify, plan, and implement restoration projects that will reduce vulnerability of jurisdictions within the state.</li> <li>• The US Army Corps of Engineers is developing the Chesapeake Bay Comprehensive Water Resources and Restoration Plan, which can be leveraged for implementation.</li> <li>• Through the Chesapeake Bay Program two (2) year Climate Resiliency Workplan, Maryland DNR has committed to plan, design and pursue construction of on-the-ground resiliency projects - such as living shorelines, wetland restoration, and stormwater management - to reduce the vulnerability of jurisdictions of the State. The Climate Resiliency Workgroup has also committed to assessing planned on-the-ground restoration projects to evaluate designs, develop metrics, and monitor performance to evaluate if projects accommodate for climate change impacts.</li> </ul>
<b>Responsible Agency:</b>	MD DNR, MEMA, and Chesapeake Bay Program Climate Resiliency Workgroup
<b>Partners:</b>	Local/State floodplain managers or planners Land owners (public or private)
<b>Potential Funding:</b>	FEMA Hazard Mitigation Grant Program Chesapeake & Atlantic Coastal Bays Trust Fund CoastSmart Communities Track B - Green Infrastructure Resiliency NOAA Regional Coastal Resilience, Coastal Ecosystem Resiliency, Coastal and Marine Habitat Restoration USFWS National Coastal Wetlands Conservation Grant Program EPA Integrating Human Health and Well-Being with Ecosystem Services
<b>Cost Estimate:</b>	Cost will depend on Project and Scale. Estimates include \$8,000/acre for wetland restoration, \$6,000/acre for forest restoration, and \$150 - \$1,500/foot for living shorelines depending on energy environment.

MARYLAND HAZARD MITIGATION PLAN

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<b>Benefits: (Losses Avoided)</b>	Demonstrate benefits of natural features (i.e. water quality, habitat, and coastal protection). Enhance ability of vulnerable communities to recover from hazards.
<b>Timeline:</b>	2016-2021

<b>Mitigation Implementation Strategy</b>	
<b>Mitigation Action/Project Title:</b>	<b>#16 - Statewide Participation in the NFIP</b>
<b>Priority Ranking</b>	<u>SCORE</u>  <b>M</b>
<b>Background/Issue:</b>	Encourage full statewide participation in the NFIP. Currently seven (7) jurisdictions within the State of Maryland do not participate and include: Town of Friendship Heights, Town of Goldsboro, Town of Hebron, Town of Laytonsville, Town of North Chevy Chase, Town of Pittsville, and City of Taneytown. Both Goldsboro and Taneytown contain floodplain areas.
<b>Ideas for Integration:</b>	Include NFIP participation in the Montgomery, Caroline, Wicomico and Carroll County local hazard mitigation plan updates. Also include NFIP participation in county comprehensive plans and municipal growth plans.
<b>Responsible Agency:</b>	Maryland Department of Environment Maryland Emergency Management Agency Maryland Local Governments
<b>Partners:</b>	State and Local Floodplain Managers and Planners
<b>Potential Funding:</b>	FEMA Hazard Mitigation Grant Program (HMGP) Technical assistance available from State agencies
<b>Cost Estimate:</b>	Technical Assistance Community Outreach Efforts - \$5,000 - \$10,000
<b>Benefits: (Losses Avoided)</b>	<ul style="list-style-type: none"> <li>• More than 20 percent of NFIP claims come from outside of mapped Special Flood Hazard Areas.</li> <li>• About 25% of all flood insurance claims are paid out for losses located in low to moderate risk flood hazard areas.</li> <li>• FEMA can sanction communities by placing them on probation or suspending them from the NFIP. Probation is the first step towards suspension and gives communities time to bring violations into compliance with the ordinance. During probation policyholders will see a \$50 surcharge on their flood insurance premiums when a policy is renewed or issued. If communities neglect to address violations during probation, FEMA will place them on suspension. When communities are suspended policies will not be renewed or issued. Property owners located within the SFHA will not receive federal disaster assistance or federally insured loans or financing.</li> <li>• Fees are not required for a community to join the NFIP. All that is required for a community to join is that it adopt and enforce a flood plain management ordinance regulating development within the Special Flood Hazard Area (SFHA) identified on a FEMA flood insurance rate map.</li> </ul>
<b>Timeline:</b>	Hazard Mitigation Plan Cycle - 2016-2021

<b>Mitigation Implementation Strategy</b>	
<b>Mitigation Action/Project Title:</b>	<b>#17 - All Hazards Plan Integration - State to Local Implementation</b>
<b>Priority Ranking</b>	<b><u>SCORE</u></b>  <b>L</b>
<b>Background/Issue:</b>	Utilize FEMA guidance and State integration results from the 2016 State Plan to assist implement at local levels.
<b>Ideas for Integration:</b>	State to local consistency Local plan recognition
<b>Responsible Agency:</b>	Maryland Emergency Management Agency
<b>Partners:</b>	Maryland Department of Planning Maryland Department of Natural Resources Maryland Department of the Environment Maryland Historical Trust
<b>Potential Funding:</b>	DNR Coast Smart Communities Grant MEMA HMA - HMGP/PDM (Planning Funds) Addendum studies to local plans
<b>Cost Estimate:</b>	\$20,000/County
<b>Benefits: (Losses Avoided)</b>	Agency awareness -Recognition of resources
<b>Timeline:</b>	1-15 Years

<b>Mitigation Implementation Strategy</b>	
<b>Mitigation Action/Project Title:</b>	<b>#18 - Increase opportunities for communication about adaptation planning in Maryland, facilitate the exchange of ideas between Chesapeake Bay watershed partners, and pilot green/grey infrastructure to prepare for and respond to climate impacts in vulnerable communities.</b>
<b>Priority Ranking</b>	<b><u>SCORE</u></b>  <b>H</b>
<b>Background/Issue:</b>	<p>The State of Maryland and the Chesapeake Bay Program Climate Resiliency Workgroup has committed to the following actions to enhance the resiliency of Chesapeake Bay communities to the impacts of coastal erosion, coastal flooding, more intense and more frequent storms and sea level rise.</p> <ul style="list-style-type: none"> <li>- <b>Support Green/Gray Pilot Projects:</b> Pursue implementation of pilot projects through the Systems Approach to Geomorphic Engineering (SAGE) community of practice to test new and emerging design principles and implementation methodologies for green/gray infrastructure; and investigate climate resilience indicators to assess the effectiveness and ecological response of green/gray infrastructure to coastal storms and climate change effects.</li> <li>- <b>Outreach &amp; Professional Sharing:</b> Facilitate a workshop on the role of natural infrastructure/living shorelines as part of adaptation/mitigation strategies for the built environment, and share information across sectors on climate change indicators identified by partners such as the Department of Interior.</li> </ul>
<b>Ideas for Integration:</b>	The Climate Resiliency Workgroup coordinates climate-related efforts to address climate resiliency for the Chesapeake Bay Program. The Workgroup consists of representatives from the Chesapeake Bay watershed states and jurisdictions, as well as federal agencies. Information exchange about the ability of natural and nature-based infrastructure to reduce vulnerabilities to coastal communities can be integrated into local and state hazard mitigation plans within Maryland and other Bay watershed states and jurisdictions.
<b>Responsible Agency:</b>	Chesapeake Bay Program Climate Resiliency Workgroup Maryland Department of Natural Resources
<b>Partners:</b>	Chesapeake Bay Program Office
<b>Potential Funding:</b>	Hazard Mitigation Assistance
<b>Cost Estimate:</b>	
<b>Benefits: (Losses Avoided)</b>	<ul style="list-style-type: none"> <li>- Increase the resiliency of the Chesapeake Bay Watershed, including its living resources, habitats, public infrastructure and communities, to withstand adverse impacts from changing environmental and climate conditions.</li> <li>- Continually pursue, design, and construct restoration and protection projects to enhance the resiliency of Bay and aquatic ecosystems from the impacts of coastal erosion, coastal flooding, more intense and more frequent storms, and sea level rise.</li> </ul>
<b>Timeline:</b>	2016-2017

<b>Mitigation Implementation Strategy</b>	
<b>Mitigation Action/Project Title:</b>	<b>#19 - Resiliency Partnership Resource Website</b>
<b>Priority Ranking</b>	<u>SCORE</u>  <b>M</b>
<b>Background/Issue:</b>	Create central location for all agency work relating to flood awareness hazard mitigation.
<b>Ideas for Integration:</b>	Integrating all agencies - open to state & local programs
<b>Responsible Agency:</b>	Maryland Department of Natural Resources
<b>Partners:</b>	Maryland Department of Transportation Maryland Historical Trust Maryland Department of the Environment Maryland Emergency Management Agency
<b>Potential Funding:</b>	NOAA Maryland Department of Natural Resources
<b>Cost Estimate:</b>	\$20,000 (On-going maintenance)
<b>Benefits: (Losses Avoided)</b>	Collaboration and programmatic sustainability. Effort of agencies - (Less) work reduction.
<b>Timeline:</b>	1 Year Development-Ongoing

<b>Mitigation Implementation Strategy</b>	
<b>Mitigation Action/Project Title:</b>	<b>#20 - Maryland Repetitive Loss (RL) and Severe Repetitive Loss (SRL) Property Inventory Update</b>
<b>Priority Ranking</b>	<u>SCORE</u>  <b>H</b>
<b>Background/Issue:</b>	The last statewide inventory of repetitive loss properties was completed in 2002. It included a GIS shapefile with locations, elevations, pictures and mitigation recommendations. Since that time, there have been several flood disasters resulting in numerous properties being added to the repetitive loss and severe repetitive loss lists. This information would help the Maryland Emergency Management Agency (MEMA) in identifying mitigation projects, and communities participating in or interested in joining the Community Rating System (CRS).
<b>Ideas for Integration:</b>	Results could be included in future updates of the state and local hazard mitigation plans. The data could also assist communities participating in, or interested in joining, the CRS as part of their annual outreach requirements for locally identified repetitive loss areas.
<b>Responsible Agency:</b>	Maryland Department of the Environment (MDE) Maryland Environmental Service (MES)
<b>Partners:</b>	Maryland Emergency Management Agency (MEMA) Local Floodplain Managers Local Emergency Managers
<b>Potential Funding:</b>	Hazard Mitigation Assistance
<b>Cost Estimate:</b>	\$3,000-\$10,000 per County (more if building elevations are obtained)
<b>Benefits: (Losses Avoided)</b>	Consistent, statewide dataset. Would reduce time, effort and ultimately cost to locals in analyzing the RL and SRL data as part of their hazard mitigation plan update and annual outreach requirements for CRS.
<b>Timeline:</b>	Approximately 18 months (longer if elevations are obtained): Research: 2-3 months; Field work: 6-8 months; Data development and analysis: 2-3 months; Coordination with local jurisdictions: 3-4 months

<b>Mitigation Implementation Strategy</b>	
<b>Mitigation Action/Project Title:</b>	#21 - State Highway Administration (SHA) and other State Agency Data Integration to Support Flood Risk Enhancement
<b>Priority Ranking</b>	<u>SCORE</u>  <b>M</b>
<b>Background/Issue:</b>	SHA possesses/has access to existing and future information (Bridge data/TOPO data) that can support the enhancement of existing flood risk models as well as supplement MD flood maps information. This information will be submitted to FEMA upon request.
<b>Ideas for Integration:</b>	SHA partnership with Maryland Department of the Environment and FEMA
<b>Responsible Agency:</b>	Maryland Department of the Environment
<b>Partners:</b>	State Highway Administration FEMA
<b>Potential Funding:</b>	TBD
<b>Cost Estimate:</b>	TBD
<b>Benefits: (Losses Avoided)</b>	Improved flood risk information to support more informed decision making
<b>Timeline:</b>	0-3 Years

<b>Mitigation Implementation Strategy</b>	
<b>Mitigation Action/Project Title:</b>	<b>#22 - Technical Assistance to Identify, Address, and Incorporate Coastal Hazards into Local Planning</b>
<b>Priority Ranking</b>	<u>SCORE</u>  <b>H</b>
<b>Background/Issue:</b>	The Chesapeake & Coastal Service at Maryland Department of Natural Resources provides technical assistance to local partners through the CoastSmart Communities Program, Working Waterfronts Program, Coastal Atlas data viewing platform, and data products such as the Coastal Resiliency Assessment. These programs and tools are available to assist counties and municipalities in identifying, addressing, and incorporating coastal hazards into their planning efforts. The CoastSmart Communities Program offers competitive grants to address the impacts of hazards, including localized flooding, storm events and sea level rise. The Working Waterfronts Program offers grants to support the revitalization of working waterfront communities and economies through planning or implementation that considers flooding and storm surge impacts.
<b>Ideas for Integration:</b>	Technical assistance to local communities often results in new or revised authorities, local codes and ordinances, programs, or comprehensive/waterfront plans that are adopted by a municipality or county. The development and implementation of these products is often advanced through collaboration with state agencies and partners, such as the Maryland Department of Planning, Maryland Emergency Management Agency, or Critical Area Commission. Financial assistance through the Working Waterfronts Program has been included in the Chesapeake Bay Program's Climate Resiliency two (2) year work plan to enhance the resiliency of Chesapeake communities.
<b>Responsible Agency:</b>	Maryland Department of Natural Resources
<b>Partners:</b>	Local and state planners; floodplain managers -MEMA, MDP, Critical Area -Chesapeake Bay Program Climate Resiliency Workgroup
<b>Potential Funding:</b>	NOAA FEMA Hazard Mitigation Grant Program
<b>Cost Estimate:</b>	Up to an additional \$75,000 needed
<b>Benefits: (Losses Avoided)</b>	<ul style="list-style-type: none"> <li>- Provide the resources and technical expertise required to identify and address coastal hazards in day-to-day decision-making and long-term planning for community development, preservation, and perseverance.</li> <li>- Support a watershed approach addressing both tidally influenced/coastal flooding and localized flooding caused by rain/storm events.</li> <li>- Increase the awareness of residents, business owners, elected officials, and planners around existing hazards and actions that can be taken to maintain a community's identity and cultural heritage while acknowledging changes that could impact that vision.</li> <li>- Pursuing green infrastructure that will help address floodplain and stormwater management while also improving water quality.</li> </ul>
<b>Timeline:</b>	2016-2021

<b>Mitigation Implementation Strategy</b>	
<b>Mitigation Action/Project Title:</b>	<b>#23 - Complete FEMA Form AW-501 to Support Update of the FEMA SRL and RL Property Databases</b>
<b>Priority Ranking</b>	<u>SCORE</u>  <b>M</b>
<b>Background/Issue:</b>	<p>RL &amp; SRL loss data provided to local jurisdictions should be verified on a regular basis. Repetitive loss listings should be reviewed for accuracy, correct addresses, and to determine whether the properties are actually in the community's corporate limits, and to determine whether the insured building(s) have been removed, retrofitted, or otherwise protected from the cause of repetitive flooding. The results of the review should then be recorded on the Repetitive Loss List Community Certification (CC-RL). Those properties that are identified as in need of update are then placed on the Repetitive Loss Update Worksheet (AW-501) and submitted to FEMA.</p> <p>Each jurisdiction should be categorized and those communities containing ten (10) or more Repetitive Loss properties that have not been mitigated should be prioritized.</p>
<b>Ideas for Integration:</b>	Use updated and verified information in hazard mitigation and flood mitigation planning documents. This information may then be used to designate Repetitive Loss Areas within local communities.
<b>Responsible Agency:</b>	Local Jurisdictions Maryland Department of the Environment
<b>Partners:</b>	Maryland Emergency Management Agency (MEMA) Local Floodplain Managers Local Emergency Managers
<b>Potential Funding:</b>	Hazard Mitigation Grant Program (HMGP) Flood Mitigation Assistance (FMA) Pre-Disaster Mitigation (PDM)
<b>Cost Estimate:</b>	\$3,000-\$5,000 per jurisdiction
<b>Benefits: (Losses Avoided)</b>	Prioritization of Flood Mitigation Projects
<b>Timeline:</b>	1-5 years

<b>Mitigation Implementation Strategy</b>	
<b>Mitigation Action/Project Title:</b>	<b>#24 - Develop and Promote Table Top Exercises Prior to Flood Event / Hazard</b>
<b>Priority Ranking</b>	<u>SCORE</u>  <b>H</b>
<b>Background/Issue:</b>	<p>Tabletop exercises with state and local government to identify actions and responsibilities for entities prior to an event occurring. Focus on the integration of floodplain management and risk data within the local Emergency Operation Center.</p> <p>Annually the state emergency officials alongside community local emergency managers and Department of Public Works (DPW) and Planners, etc.- state agencies that could be involved - will meet to discuss way to minimize community risk in addition to identifying areas of concern and ways to reduce potential flood damage through tours of the areas and identifying/clearing potential stream blockages, etc.</p> <p>As a large scale event, such as a hurricane, approaches the region, the state will host a webinar to outline what actions the community should be taking to prepare for the event, <del>in an effort to reduce potential losses from both an insurance and emergency standpoint</del></p>
<b>Ideas for Integration:</b>	Identify insurance and mitigation needs that may be identified prior, during, and post disaster event. Integrate data acquisition into overall emergency management to ensure that opportunities are not overlooked.
<b>Responsible Agency:</b>	Maryland Department of the Environment Maryland Emergency Management Agency Local Government Department of Natural Resources
<b>Partners:</b>	Maryland Department of the Environment Maryland Emergency Management Agency Local Government CoastSmart Metropolitan Planning Organization
<b>Potential Funding:</b>	Flood: Emergency Advance Measures for Flood Prevention Emergency Management Preparedness Grant
<b>Cost Estimate:</b>	\$3,000 per Tabletop Exercise
<b>Benefits: (Losses Avoided)</b>	Mitigate losses in community. Improves coordination and data gathering, analysis, and project development. Identifies and solidifies partnerships.
<b>Timeline:</b>	Annual face to face meeting with communities Webinar open to all communities within the state, days prior to large scale events such as hurricanes and tropical storms, when available.

<b>Mitigation Implementation Strategy</b>	
<b>Mitigation Action/Project Title:</b>	<b>#25 - Archeological Survey on State-Owned Land and Water in High Hazard Areas</b>
<b>Priority Ranking</b>	<u>SCORE</u>  <b>L</b>
<b>Background/Issue:</b>	Natural hazards and climate change are damaging and destroying terrestrial, submerged and semi-submerged archeological sites. Coastal erosion along Maryland’s western shore is particularly destructive to unidentified sites and inundation due to flooding and sea level rise on the Eastern Shore will also negatively impact archeological sites. Unfortunately, both soft and hard shoreline protection actions are destructive to terrestrial and marine archeological sites. Survey and evaluation are needed to identify archeological sites and determine the need for further work or protection in situ in areas vulnerable to coastal hazards and in areas slated to receive shoreline protective measures.
<b>Ideas for Integration:</b>	Preserve Maryland (Statewide Preservation Plan); State Hazard Mitigation Plan
<b>Responsible Agency:</b>	Maryland Historical Trust
<b>Partners:</b>	DNR, Archeological Society of Maryland
<b>Potential Funding:</b>	Technical assistance from state agencies NOAA National Park Service
<b>Cost Estimate:</b>	
<b>Benefits: (Losses Avoided)</b>	
<b>Timeline:</b>	1-5 Years

<b>Mitigation Implementation Strategy</b>	
<b>Mitigation Action/Project Title:</b>	<b>#26 - Mobile Lidar Capture</b>
<b>Priority Ranking</b>	<u>SCORE</u>  <b>H</b>
<b>Background/Issue:</b>	In order to enhance both planning and design and maintain our roadway assets the Maryland State Highway Administration is exploring moving to a 3D point cloud capture via mobile Lidar. <i>Note: Point cloud assets provided via image</i>
<b>Ideas for Integration:</b>	MEMA, MDE, DNR, DOIT, USACE, SILVER JACKETS
<b>Responsible Agency:</b>	Maryland Department of the Environment State Highway Administration
<b>Partners:</b>	Silver Jackets Department of Information Technology
<b>Potential Funding:</b>	Federal Transportation Funds
<b>Cost Estimate:</b>	TBD Estimates about \$1 M/year
<b>Benefits: (Losses Avoided)</b>	Increase spatial accuracy of assets Reusable asset capture - Line of sight hazard detection - Crossfall curvature of roadway
<b>Timeline:</b>	1-2 Years

<b>Mitigation Implementation Strategy</b>	
<b>Mitigation Action/Project Title:</b>	<b>#27 - Development of Backup Groundwater Systems - request more information from USGS rep - Mark</b>
<b>Priority Ranking</b>	<b><u>SCORE</u></b>  <b>L</b>
<b>Background/Issue:</b>	With increases in watershed development and potential increases in strong storms, surface water reservoirs are more readily polluted. Backup groundwater supply systems would mitigate potential disasters.
<b>Ideas for Integration:</b>	Washington Suburban Sanitary Commission (SSC) City of Baltimore
<b>Responsible Agency:</b>	WSSC City of Baltimore
<b>Partners:</b>	Local Jurisdictions WSSC City of Baltimore Maryland Department of the Environment
<b>Potential Funding:</b>	Mitigation Grant Programs WSSC City of Baltimore
<b>Cost Estimate:</b>	Needs to be developed
<b>Benefits: (Losses Avoided)</b>	Alternate Water Supply, Public Safety
<b>Timeline:</b>	Less than 10 years

<b>Mitigation Implementation Strategy</b>	
<b>Mitigation Action/Project Title:</b>	<b>#28 - CoastSmart Council Implementation to Mitigate Coastal Hazards for Vulnerable State Capital Projects</b>
<b>Priority Ranking</b>	<u>SCORE</u>  <b>M</b>
<b>Background/Issue:</b>	<p>The MD CoastSmart Council was created in response to the House Bill 615 enacted during the 2014 legislative session to ensure the State makes safe and fiscally-wise capital investments in the future. In July of 2015 the Council released the first draft of the MD Coast Smart Construction Program, a guidance document intended to support State agency efforts to incorporate Coast Smart siting and design criteria into new construction and major reconstruction projects to avoid or minimize hazards from coastal flooding, sea-level rise and storm surge.</p> <p>Beginning October 1, 2016, and for every year thereafter, all Units of State Government shall report to the Coast Smart Council on individual State agency actions, which will be undertaken within the previous fiscal year and related to the Coast Smart Construction Program.</p>
<b>Ideas for Integration:</b>	<ul style="list-style-type: none"> <li>- State Hazard Mitigation Plan/State Disaster Recovery Plan</li> <li>- Maryland Coastal Resiliency Assessment</li> <li>- SHA Vulnerability Assessment</li> <li>- State agency programs/guidance</li> <li>- Chesapeake Bay Program Climate Resiliency Workgroup</li> </ul>
<b>Responsible Agency:</b>	<p>Maryland Department of Natural Resources MEMA Maryland Department of the Environment</p>
<b>Partners:</b>	<p>Coast Smart Council Members from the following state, local and private sector partners: Maryland Department of Planning, BayLand Consultants &amp; Designers, University of Maryland Center for Environmental Science, Maryland Department of Budget and Management, Maryland Department of the Environment, Town of Ocean City, GWWO Architects, University of Maryland College Park, Maryland Department. of Transportation, Maryland Department of Commerce, Maryland Department of General Services, Maryland Emergency Management Agency, Somerset County, and Maryland Critical Area Commission.</p>
<b>Potential Funding:</b>	DNR-funded staff, may benefit from potential funding for tool development and/or integration of existing tools
<b>Cost Estimate:</b>	Cost estimates for building resiliency to be included in Council annual report
<b>Benefits: (Losses Avoided)</b>	<p>Ensure the State makes safe and fiscally-wise capital investments in the future.</p> <p>Council can demonstrate the value and use of Natural and Nature-Based Features to protect State capital projects and infrastructure.</p>
<b>Timeline:</b>	2014-Ongoing

<b>Mitigation Implementation Strategy</b>	
<b>Mitigation Action/Project Title:</b>	<b>#29 - Improve Knowledge / Data Availability</b>
<b>Priority Ranking</b>	<u>SCORE</u>  <b>L</b>
<b>Background/Issue:</b>	Maryland Transit Administration through an environmental management system has developed GIS data that is viewable agency-wide. Planning and engineering data and studies are not shared there, neither is other state data.
<b>Ideas for Integration:</b>	Internet Message Access Protocol (IMAP) linkage, Maryland Department of the Environment linkage, Reference/create engineering & planning data, local jurisdiction links supplemental customization.
<b>Responsible Agency:</b>	Maryland Transit Administration
<b>Partners:</b>	Maryland Emergency Management Agency Maryland Department of the Environment Department of Information Technology
<b>Potential Funding:</b>	Transportation Alternatives Program Hazard Mitigation Grant Program Capital Budget (MTA)
<b>Cost Estimate:</b>	\$25,000
<b>Benefits: (Losses Avoided)</b>	Encourages consideration of resilience in project development and system preservation.
<b>Timeline:</b>	1 year

<b>Mitigation Implementation Strategy</b>	
<b>Mitigation Action/Project Title:</b>	<b>#30- Inventory Susceptible Wells &amp; Retrofit with Protection</b>
<b>Priority Ranking</b>	<u>SCORE</u>  <b>H</b>
<b>Background/Issue:</b>	Wells are direct access routed to drinking water aquifers. If a well is flooded, floodwaters will get into the aquifer creating a polluted water supply.  If floodwater reach a well or covers the top of the well casing, assume the well is contaminated. Water from the well should not be used for drinking, cooking, or brushing teeth.
<b>Ideas for Integration:</b>	Local counties Department of Housing and Mental Hygiene MD Geological Survey (DNR)
<b>Responsible Agency:</b>	County Health Departments
<b>Partners:</b>	Local Counties Department of Housing and Mental Hygiene Maryland Department of the Environment MD Geological Survey
<b>Potential Funding:</b>	Department of Housing and Mental Hygiene Hazard Mitigation Assistance
<b>Cost Estimate:</b>	\$150K/county for inventory  \$50/well cover
<b>Benefits: (Losses Avoided)</b>	Maintenance of Drinking Water Supply
<b>Timeline:</b>	Inventory: 1 year  Retrofit: 1-2 years

<b>Mitigation Implementation Strategy</b>	
<b>Mitigation Action/Project Title:</b>	<b>#31 - Gather and Present Mitigation GIS Data that can be used Operationally during Response and Recovery</b>
<b>Priority Ranking</b>	<u>SCORE</u>  <b>M</b>
<b>Background/Issue:</b>	Maryland's emergency mapping solutions like OSPREY and MD Geo Share are built to present and share situational awareness and support prioritization and decision-making. Currently some operations staff aren't aware of the multiple types of mitigation data that present risk during planned events or potential affected areas and severity during unplanned events.
<b>Ideas for Integration:</b>	Gather best current data, evaluate plan to keep updated on different mitigation plan cycles. Have plans in place for pre-landfall storm study data to be able to quickly support Emergency Management. Easily consumable by current viewers used in EOCs like OSPREY
<b>Responsible Agency:</b>	Maryland Emergency Management Agency
<b>Partners:</b>	Maryland Department of the Environment
<b>Potential Funding:</b>	Federal Emergency Management Agency Flood Mitigation Assistance Program (FMA)
<b>Cost Estimate:</b>	
<b>Benefits: (Losses Avoided)</b>	Riverine depth grids can show the potentials damage of residences in a 10-100yr flood. USGS high water marks during an event for a flood study can create a depth grid to help inform during recovery.
<b>Timeline:</b>	

<b>Mitigation Implementation Strategy</b>	
<b>Mitigation Action/Project Title:</b>	<b>#32 - Increase All Hazards Private Sector Resiliency</b>
<b>Priority Ranking</b>	<u>SCORE</u>  <b>L</b>
<b>Background/Issue:</b>	The private sector is incredibly important during disaster recovery. People are dependent on specific business types and on continued employment at a stable workplace, especially in smaller communities.
<b>Ideas for Integration:</b>	Analysis of new state business data for vulnerabilities and prioritization of outreach.
<b>Responsible Agency:</b>	Maryland Emergency Management Agency
<b>Partners:</b>	Maryland Emergency Management Agency
<b>Potential Funding:</b>	Federal Emergency Management Agency Flood Mitigation Assistance Program (FMA)
<b>Cost Estimate:</b>	
<b>Benefits: (Losses Avoided)</b>	Business downtime shortened or removed after disaster to support community. Less jobs lost or shorter working down time.
<b>Timeline:</b>	

<b>Mitigation Implementation Strategy</b>	
<b>Mitigation Action/Project Title:</b>	<b>#33 - Roadway Flooding Vulnerability Assessment</b>
<b>Priority Ranking</b>	<u>SCORE</u>  <b>H</b>
<b>Background/Issue:</b>	Assess vulnerability to roadway flooding of all tidally influenced counties. Analysis includes current storm related flooding in 2015 as well as sea level change predictions for 2050 and 2100 with storm surge.
<b>Ideas for Integration:</b>	Data can be utilized in state and county hazard mitigation plans.
<b>Responsible Agency:</b>	Maryland State Highway Administration
<b>Partners:</b>	Salisbury University ESRGC Department of Information Technology
<b>Potential Funding:</b>	FHWA/State of Maryland
<b>Cost Estimate:</b>	To date: \$700k Future: \$500k
<b>Benefits: (Losses Avoided)</b>	Identification of vulnerability
<b>Timeline:</b>	Complete December 2017

<b>Mitigation Implementation Strategy</b>	
<b>Mitigation Action/Project Title:</b>	<b>#34 - Target Restoration, Preservation, &amp; Mitigation within Special Flood Hazard Areas using the Water Resource Registry</b>
<b>Priority Ranking</b>	<u>SCORE</u>  <b>M</b>
<b>Background/Issue:</b>	<p>Watershed Resource Registry (WRR) is an interactive resource screening GIS tool created to improve resource planning and mitigation decision-making using the watershed approach, by integrating regulatory and non-regulatory programs. WRR includes modeling to target areas for restoration and preservation of wetlands, riparian natural stormwater infrastructure. The Maryland State Highway Administration uses the WRR to identify potential mitigation and stewardship opportunities. The WRR began as a pilot Registry that grew out of the Green Highways Partnership and a project proposed by the Maryland State Highway Administration for US 301 in Prince George’s and Charles Counties, Maryland. The analysis was expanded to the remaining portions of the state. One of the greatest problems of floodplain management in urbanizing areas is the increase in peak flow caused by watershed development. As forests, fields and farms are covered by impermeable surfaces, such as streets, rooftops and parking lots, more rain runs off at a faster rate. When an area is urbanized, the rate of runoff can increase five-fold or more. A great deal of damage from local drainage problems can be avoided by requiring all structures to be elevated. Sediment from disturbed ground can reduce the capacity of the drainage system and adversely affect water quality.</p> <p>Regulating developments according to a stormwater management <b>master plan</b> that analyzes the combined effects of existing and expected development on drainage through and out of the watershed.</p>
<b>Ideas for Integration:</b>	<p>Using information within the WRR to assist in stormwater management master plan development and plan updates for regulating development earns points under the NFIP-Community Rating System. This information may also be used in both Flood Mitigation Plans and Hazard Mitigation Plans.</p> <p>Evaluate inventory of areas representing buy-out locations for opportunities of restoration and/or preservation of wetlands and riparian corridors using the WRR analyses.</p>
<b>Responsible Agency:</b>	<p>Environmental Protection Agency  Maryland State Highway Administration  Maryland Department of the Environment  Maryland Emergency Management Agency  Maryland Department of Natural Resources</p>
<b>Partners:</b>	<p>US Army Corp of Engineers  USFUS  Environmental Protection Agency  Maryland State Highway Administration  Maryland Department of the Environment  Maryland Emergency Management Agency  Maryland Department of Natural Resources</p>

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<b>Potential Funding:</b>	CBRAP CGIG Hazard Mitigation Grant Program
<b>Cost Estimate:</b>	1. Study SFHA's for potential restoration and preservation \$ 2. Implementation - varies
<b>Benefits: (Losses Avoided)</b>	Minimize loss of life & property Address water quality Less erosion (bank stabilization) Informs development decisions Informs mitigation project development and prioritization
<b>Timeline:</b>	Ongoing

Mitigation Implementation Strategy				
<b>Mitigation Action/Project Title:</b>	#35 - FME (Feature Manipulation Engine) Tool Integration / Future HAZUS Updates			
<b>Priority Ranking</b>	<b>QUESTIONS</b>	<b>YES</b>	<b>NO</b>	<b>SCORE</b>
	Is the project cost-effective?			L
	Is the project environmentally sound?			
	Is the project technically feasible?			
Does the project meet at least one (1) of the MAC Priority Ranking Parameters?	✓			
<b>Background/Issue:</b>	FEMA is developing a FME (Feature Manipulation Engine) tool to support future building footprint and other data updates. This tool will facilitate efficient periodic Hazus updates based on improved data.			
<b>Ideas for Integration:</b>	Local and state planning and decision-making.			
<b>Responsible Agency:</b>	Maryland Department of the Environment Maryland Emergency Management Agency			
<b>Partners:</b>	Maryland Department of the Environment Maryland Emergency Management Agency			
<b>Potential Funding:</b>	Hazard Mitigation Assistance			
<b>Cost Estimate:</b>	Est. \$100k annually			
<b>Benefits: (Losses Avoided)</b>	Enhanced and more accurate loss assessments			
<b>Timeline:</b>	Annually, beginning in 2017			

Mitigation Implementation Strategy				
<b>Mitigation Action/Project Title:</b>	<b>#36 - Floodplain Management Training</b>			
<b>Priority Ranking</b>	<b>QUESTIONS</b>	<b>YES</b>	<b>NO</b>	<b>SCORE</b>
	Is the project cost-effective?			<b>L</b>
	Is the project environmentally sound?			
	Is the project technically feasible?			
Does the project meet at least one (1) of the MAC Priority Ranking Parameters?	✓			
<b>Background/Issue:</b>	<ol style="list-style-type: none"> <li>1. Emergency Disaster Management Training for non-emergency managers</li> <li>2. Surveyor Elevation Certificate Training - Statewide</li> <li>3. Provide FEMA training for floodplain managers/planners/city works/engineers                             <ol style="list-style-type: none"> <li>a. Specific to surveyors for E.C</li> <li>b. All staff (County) that might be involved in disaster response.</li> </ol> </li> </ol>			
<b>Ideas for Integration:</b>	MDE, MEMA, and County Staff <ol style="list-style-type: none"> <li>1. Identify importance for Hazard Mitigation Assistance (HMA) application E.C is correct.</li> <li>2. ESF at county and state with county emergency management staff.</li> </ol>			
<b>Responsible Agency:</b>	Maryland Department of the Environment Maryland Emergency Management Agency			
<b>Partners:</b>	Resiliency Partnership			
<b>Potential Funding:</b>	Hazard Mitigation Assistance			
<b>Cost Estimate:</b>	\$30,000			
<b>Benefits: (Losses Avoided)</b>	Better educated staff Disaster awareness			
<b>Timeline:</b>	1-2 Years			

Federal and State Grant funding programs that may assist in implementing Hazard Mitigation Plans and mitigation action strategies/project are listed in the following table.

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**Table 5.3–Federal & State Grant Funding List**

The following is a list of Federal and State Grants that may assist in implementing Hazard Mitigation Plans. <i>Note: This information is subject to change at any time, contact the federal or state agency for current grant status.</i>					
Grant Program Name	Address and Telephone Contact Information	Eligible Activities	Federal, State and Local Cost Share Requirements	Other Program Characteristics	Grant Application Due Date
Federal Emergency Management Agency, Hazard Mitigation Grant Program (HGMP)	Maryland Emergency Management Agency 5401Rue Saint Lo Drive Reisterstown, MD 21136	All Hazards Mitigation Planning. Acquisition, relocation, elevation and flood-proofing of flood-prone insured properties, flood mitigation planning, wind retrofit, stormwater improvements, education and awareness.	Federal - 75% Non Federal - 12.5%	Local government must be in compliance with the National Flood Insurance Program to be eligible. Projects must be cost effective, environmentally sound and solve a problem. Repetitive loss properties are a high priority.	After a Presidential Disaster Declaration
Federal Emergency Management Agency, Pre Disaster Mitigation Grant Program (PDM)	Maryland Emergency Management Agency 5401Rue Saint Lo Drive Reisterstown, MD 21136	Funding these plans and projects reduces overall risks to the population and structures, while also reducing reliance on funding from actual disaster declarations.	Federal - 75% Non Federal - 25%	PDM grants are to be awarded on a competitive basis and without reference to state allocations, quotas, or other formula-based allocation of funds.	Annual-Spring/Summer
Federal Emergency Management Agency, Flood Mitigation Assistance Program (FMA)	Maryland Emergency Management Agency 5401Rue Saint Lo Drive Reisterstown, MD 21136	Assist States and communities to implement measures that reduce or eliminate the long-term risk of flood damage to buildings, manufactured homes, and other structures insured under the National Flood Insurance Program.	RL: Federal - 90% Non Federal - 10%  SRL: Federal - 100% Non Federal - 0%	Available once a Flood Mitigation Plan has been developed and approved by FEMA.	Annual-Spring/Summer
National Flood Insurance Program (NFIP)	Maryland Emergency Management Agency 5401Rue Saint Lo Drive Reisterstown, MD 21136	Provides financial protection by enabling persons to purchase insurance against floods, mudslide or flood related erosion.	Varies	Includes Federally backed insurance against flooding, available to individuals and businesses that participate in the NFIP	Anytime
U.S. Economic Development Administration, Economic Adjustment Program	U.S. Department of Commerce Economic Development Administration Curtis Center, 601 Walnut Street, Ste 140 South Philadelphia, PA 19106-3323 215-597-4603	Improvements and reconstruction of public facilities after a disaster or industry closing. Research studies designed to facilitate economic development.	Federal - 50%-70% Local- 30%-50%	Documenting economic distress, job impact and proposing a project that is consistent with a Comprehensive Economic Development Strategy are important funding selection criteria.	Anytime

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Grant Program Name	Address and Telephone Contact Information	Eligible Activities	Federal, State and Local Cost Share Requirements	Other Program Characteristics	Grant Application Due Date
U.S Economic Development Administration, Public Works and Development Facilities	U.S. Department of Commerce Economic Development Administration Curtis Center, 601 Walnut Street, Ste 140 South Philadelphia, PA 19106-3323 215-597-4603	Water and sewer, Industrial access roads, rail spurs, port improvements technological and related infrastructure	Federal - 50%-70% Local- 30%-50%	Documenting economic distress, job impact and projects that is consistency with a Comprehensive Economic Development Strategy are important funding selection criteria.	Quarterly Basis
Small Business Administration (SBA) Pre-disaster Mitigation Loan Program	James Rivera, Office of Disaster Assistance, Small Business Administration, 409 3rd Street, SW, STE 6050 Washington, DC 20416;202-205-6734	Activities done for the purpose of protecting real and personal property against disaster related damage.	No information	The mitigation measures must protect property or contents from damage that may be caused by future disasters and must conform to the priorities and goals of the state or local government's mitigation plan.	
Community Development Block Grants / States Program	U.S Department of Housing and Urban Development, Office of Block Grant Assistance, 451 7th Street SW., Washington, DC 20410-7000;202-708-1112	Used for long-term recovery needs, such as: rehabilitation residential and commercial building; homeownership assistance, including down-payment assistance and interest rate subsidies; building new replacement housing; code enforcement; acquiring, construction, or reconstructing public facilities.	No information	Citizen participation procedures must be followed. At least 70 percent of funds must be used for activities that principally benefit persons of low and moderate income. Formula grants to States for non-entitlement communities.	After a Presidential Disaster Declaration
Fire Suppression Assistance Program	Infrastructure Division, Response and Recovery Directorate, FEMA, 500 C Street SW., Washington DC 20024 ; 202-646-2500.	Provides real-time assistance for the suppression of any fire on public (non-Federal) or privately owned forest or grassland that threatens to become a major disaster.	Federal - 70% Local - 30%	The State must first meet annual floor cost (if percent of average fiscal year fire costs) on a single declared fire. After the State's out-of-pocket expenses exceed twice the average fiscal year costs, funds are made available for 100 percent of all costs for each declared fire.	Funds form President's Disaster Relief Fund for use in a designated emergency or major disaster area.
Historic Preservation: Repair and Restoration of Disaster-Damaged Historic Properties	Infrastructure Division, Response and Recovery Directorate, FEMA, 500 C Street SW., Washington DC 20024 ; 202-646-4621.	To evaluate the effects of repairs to, restoration of, or mitigation hazards to disaster-damaged historic structures working in concert with the requirements of the Stafford Act.	Federal - 75% Local - 25%	Eligible to State and local governments, and any political subdivision of a State. Also, eligible are private non-profit organizations that operate educational, utility, emergency, or medical facilities.	After a Presidential Disaster Declaration

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Grant Program Name	Address and Telephone Contact Information	Eligible Activities	Federal, State and Local Cost Share Requirements	Other Program Characteristics	Grant Application Due Date
Transportation: Emergency Relief Program	Federal Highway Administration, FHWA, DOT, 1200 New Jersey Avenue Washington, DC 20590; 202-366-4043	Provides aid for the repair of Federal-aid roads, roads on Federal lands and county level federal-aid roads.	Federal - 100%	Application is submitted by the State department of transportation for damages to Federal-aid highway routes, and by the applicable Federal agency for damages to roads on Federal lands.	After serious damage to Federal-aid roads or roads on Federal lands caused by a natural disaster or by catastrophic failure.
Animals: Emergency Haying and Grazing	Emergency and Non-insured Assistance Programs, FSA, USDA, 1400 Independence Ave, SW, Washington, DC 20013; 202-720-4053	To help livestock producers in approved counties when the growth and yield of hay and pasture have been substantially reduced because of a widespread natural disaster.	No information	Assistance is provided by the Secretary of Agriculture to harvest hay or graze cropland or other commercial use of forage devoted to the Conservation Reserve Program (CRP) in response to a drought or other similar emergency.	Anytime
Emergency Watershed Protection Program	Natural Resources Conservation Service 1400 Independence Avenue, SW Washington, DC 20250	Implementing emergency recovery measures for runoff retardation and erosion prevention to relieve imminent hazards to life and property created by a natural disaster that causes a sudden impairment of a watershed.	Federal - 75% Local - 25%	It cannot fund operation and maintenance work or repair private or public transportation facilities or utilities. The work cannot adversely affect downstream water rights and funds cannot be used to install measures not essential to the reduction of hazards.	TBD
Watershed Protection and Flood Prevention Program	Natural Resources Conservation Service 1400 Independence Avenue, SW Washington, DC 20250	To provide technical and financial assistance in carrying out works of improvement to protect, develop, and utilize the land and water resources in watersheds.	Varies due to project type.	Watershed area must not exceed 250,000 acres. Capacity of a single structure is limited to 25,000 acre-feet of total capacity and 12,500 acre-feet of floodwater detention capacity.	TBD
Watershed Surveys and Planning	Natural Resources Conservation Service 1400 Independence Avenue, SW Washington, DC 20250	To provide planning assistance to Federal, State, and local agencies for the development of coordinated water and related programs in watersheds and river basins. Emphasis is on flood damage reduction, erosion control, water conservation, preservation of wetlands and water quality improvements.	No information	These watershed plans form the basis for installing needed works of improvement and include estimated benefits and costs, cost-sharing, operation and maintenance arrangements, and other information necessary to justify the need for Federal assistance in carrying out the plan.	Anytime

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Grant Program Name	Address and Telephone Contact Information	Eligible Activities	Federal, State and Local Cost Share Requirements	Other Program Characteristics	Grant Application Due Date
Emergency Advance Measures for Flood Prevention	USACE 441 G Street, NW, Washington DC 20314; 202-761-0011	To perform activities prior to flooding or flood fight that would assist in protecting against loss of life and damages to property due to flooding.	No information	There must be an immediate threat of unusual flooding present before advance measures can be considered. Any work performed under this program will be temporary in nature and must have a favorable benefit cost ratio.	Governor of State must request assistance
Emergency Streambank and Shoreline Protection	USACE 441 G Street, NW, Washington DC 20314; 202-761-0011	Authorizes the construction of emergency streambank protection measures to prevent damage to highways, bridge approaches, municipal water supply systems, sewage disposal plants, and other essential public works facilities endangered by floods or storms due to bank erosion.	No information	Churches, hospitals, schools, and other non-profit service facilities may also be protected under this program. This authority does not apply to privately-owned property or structures.	TBD
Small Flood Control Projects	USACE 441 G Street, NW, Washington DC 20314; 202-761-0011	Authorizes the construction of small flood control projects that have not already been specifically authorized by Congress.	No information	There are two general categories of projects: structural and nonstructural. Structural projects may include levees, floodwalls, diversion channels, pumping plants, and bridge modifications. Nonstructural projects have little or no effect on water surface elevations, and may include flood proofing, the relocation of structures, and flood warning systems.	TBD
Flood: Emergency Advance Measures for Flood Prevention	USACE 441 G Street, NW, Washington DC 20314; 202-761-0011	To mitigate, before an event, the potential loss of life and damages to property due to floods.	No information	Assistance may consist of temporary levees, channel cleaning, preparation for abnormal snowpacks, etc.	Governor of State must request assistance
Continuing Authorities Program (CAP)	USACE 441 G Street, NW, Washington DC 20314; 202-761-0011	Initiates a short reconnaissance effort to determine Federal interest in proceeding. If there is interest, a feasibility study is performed.	Federal - 65% Local-35%	A local sponsor must identify the problem and request assistance. Small flood control projects are also available.	Anytime

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Grant Program Name	Address and Telephone Contact Information	Eligible Activities	Federal, State and Local Cost Share Requirements	Other Program Characteristics	Grant Application Due Date
Hazardous Materials: State Access to the Oil Spill Liability Trust Fund	Director, USCG National Pollution Funds Center, U.S. Coast Guard Stop 7605 2703 Martin Luther King Jr. Avenue, SE Washington, DC 20593-7605 202-795-6000	To encourage greater State participation in response to actual or threatened discharges of oil.	No information	Eligible to States and U.S. Trust Territories and possessions.	Anytime
Emergency Management Assistance (EMA)	Maryland Emergency Management Agency 5401Rue Saint Lo Drive Reisterstown, MD 21136	Funds may be used for salaries, travel expenses, and other administrative cost essential to the day-to-day operations of State and Local emergency management agencies. Program also includes management processes that ensure coordinated planning, accountability for progress, and trained qualified staffing.	Federal - 50%	EMA funded activities may include specific mitigation management efforts not otherwise eligible for Federal funding. Management Assistance program funds may not be used for construction, repairs, equipment, materials or physical operations required for damage mitigation projects for public or private buildings, roads, bridges, or other facilities.	Anytime



## SECTION VI: MITIGATION IMPLEMENTATION STATUS REPORT

### STATE MITIGATION PLAN REVIEW GUIDE

Released March 2015 FP 302-094-2

This *State Mitigation Plan Review Guide (Guide)* is FEMA’s official policy on and interpretation of the natural hazard mitigation planning requirements. The intended use of the *Guide* is to facilitate consistent evaluation and approval of state mitigation plans, as well as to facilitate state compliance with the mitigation planning requirements when updating plans.

Figure 6.1–State Mitigation Review Guide S11

ELEMENT	REQUIREMENTS
<p>S11. Was the plan updated to reflect progress in statewide mitigation efforts and changes in priorities? [44 CFR §201.4(d)]</p> <p><i>Intent: To evaluate progress in implementing the mitigation strategy and to ensure the plan reflects current conditions, including financial, legal, and political realities and post-disaster conditions.</i></p>	<p>a. The plan must describe the status of hazard mitigation actions in the previous plan by identifying those that have been completed or not completed. For those actions not completed, the plan must provide a narrative describing the status (for example, is the action relevant or will it be included in the plan update).</p> <p>b. The prioritization of mitigation actions and activities must be updated based on the updated analysis of risks, capabilities, and progress.</p>

### 1. Mitigation Implementation Status Report

Hazard mitigation projects that have been initiated and completed using Hazard Mitigation Grant Program (HMGP) and Pre-Disaster Mitigation (PDM) grant funding since 2010 include five project categories: Prevention, Emergency Services, Property Protection, and Structural.

Table 6.1–Hazard Mitigation Project Funding

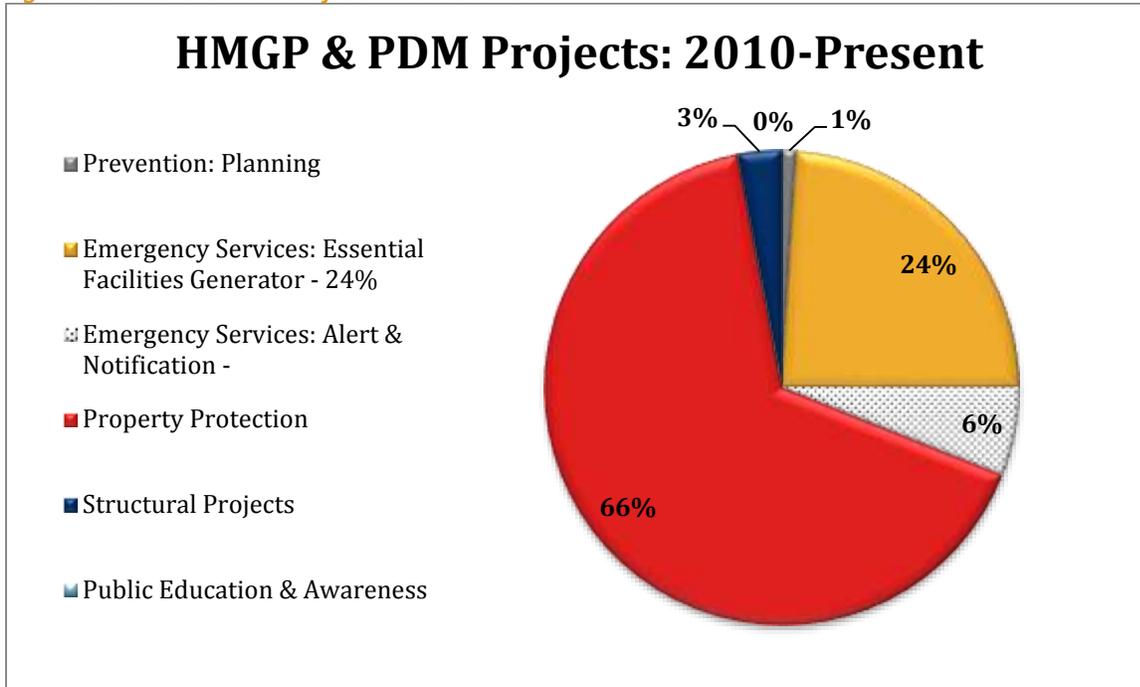
	Jurisdiction	Project Title	Total Cost (100%) (Federal Funds & Local Matching Funds)
<b>Prevention: Planning</b>			
DR 1910	Baltimore	Hazard Mitigation Plan	\$ 79,651
DR1910	Carroll	Hazard Mitigation Plan	\$ 8,369
DR 1910	Worcester	Hazard Mitigation Plan	\$ 30,000
			<b>Total: \$ 118,020</b>
<b>Emergency Services: Essential Facilities Generator Installation</b>			
DR 4034	Harford	EOC	\$2,936,000
DR 4034	Garrett	EOC (Comms. Bldg.)	\$ 411,766
DR 4034	Garrett	Oakland VFD	\$ 33,226
2010 L-PDM	Baltimore	Middle River VFD	\$ 69,244
2010 L-PDM	Caroline	Ridgeley WWTP & Town Hall	\$ 125,000
			<b>Total: \$ 3,575,236</b>
<b>Emergency Services: Alert &amp; Notification</b>			
DR 1910	Cecil	Highway Warning Signs	\$ 356,077

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DR 4034	Garrett	Mobile Message Sign Boards	\$ 85,025
DR 4034	Ocean City	Mobile Message Sign Boards	\$ 23,000
DR 1875	Baltimore City	Alert System Notification	\$ 67,287
DR 4038	Allegany	Reverse 9-1-1 Notification	\$ 27,836
DR 4038	Frederick	School Alert System	\$ 56,030
DR 4038	Cecil	Port Deposit Warning System	\$ 23,418
DR 1910	Prince Georges	Dam Warning	\$ 281,759
			<b>Total: \$ 920,432</b>
<b>Property Protection</b>			
DR 1875	Calvert	Cliff Property Acquisition	\$ 4,471,285
DR 1910	Allegany	Midland Fire Hall Acquisition	\$ 317,255
DR 1910	Baltimore	Cockeysville Acquisition	\$ 4,060,000
DR 1910	Calvert	Cliff Property Acquisition	\$ 680,303
DR 1910	St. Mary's	Piney Pt. Rd. Elevation	\$ 92,800
DR 1910	Wicomico	Greenhill Church Rd. Elevation	\$ 85,037
DR 1910	Prince George's	Public Safety Bldg. Flood proofing	\$ 150,000
			<b>Total: \$ 9,856,680</b>
<b>Structural Projects</b>			
DR 1910	St. Mary's	EOC Roof Hardening	\$ 500,000
DR 1875	Washington	Hagerstown Gates	\$ 19,500
			<b>Total: \$ 519,500</b>

Property Protection projects were amongst the most prevalent types of projects funded since 2010 using HMGP and PDM grant funding at 66%, followed by Emergency Services-Essential Facility Generator projects at 24%. Property Protection projects primarily mitigate Maryland's highest risk hazard "Flood", while Emergency Services-Essential Facility Generator projects may be categorized as "All Hazard".

Figure 6.2—HMGP & PDM Projects: 2010 to Present

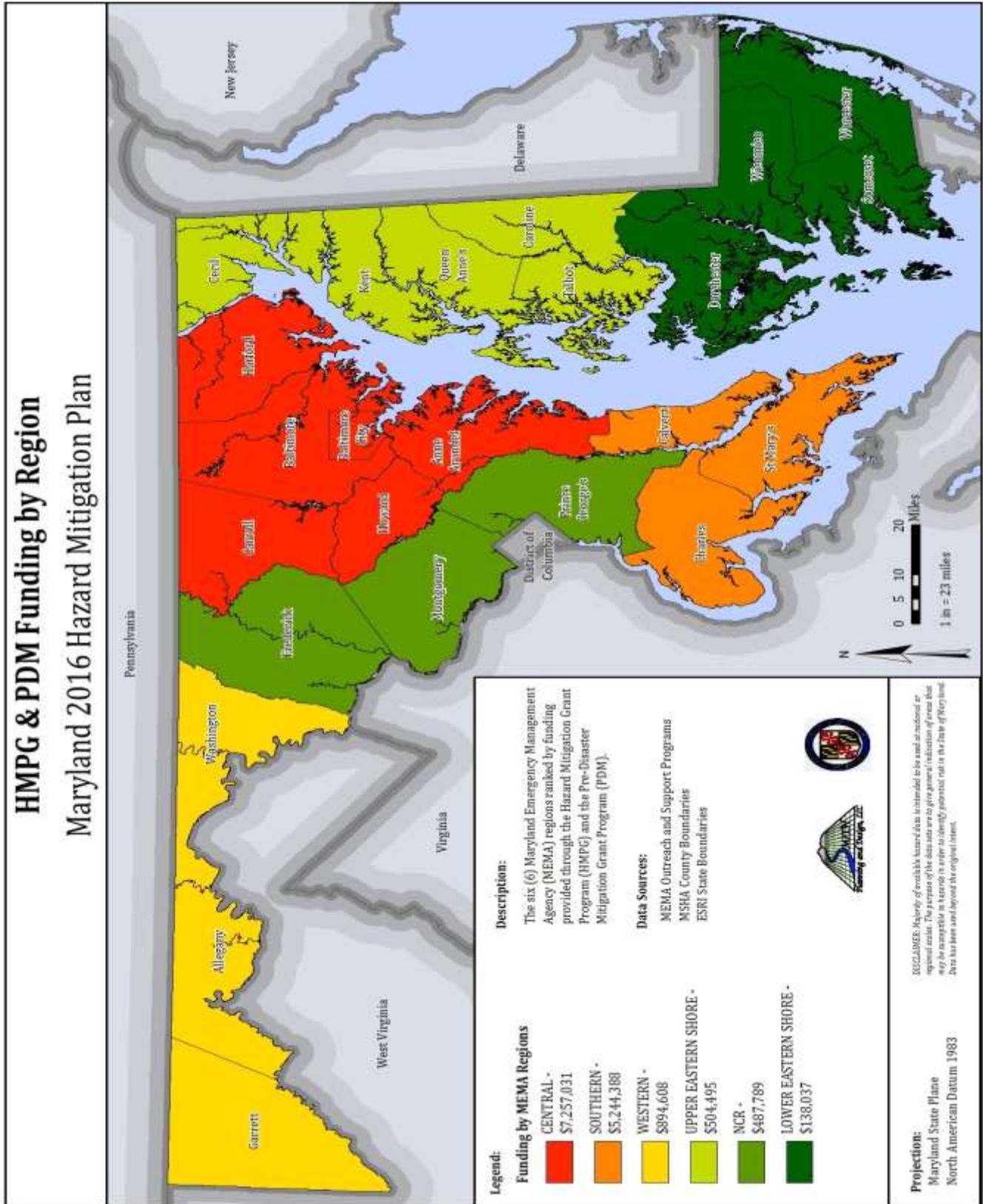


Essential Facility Generator projects were not eligible projects prior to 2012 under both the HMGP grant programs. As such, many local jurisdictions applied for grant funding for generator projects. Particularly following severe winter storm events and Hurricane Sandy, local jurisdictions prioritized generator projects as “high” within their local hazard mitigation plans.

## 2. HMGP & PDM Funding by Region

HMGP and PDM grant funded projects per region indicates that the highest total of grant funding was used for projects within the Central Region at \$7,257,031. Hazards impacting this Region rated as “high” in terms of risk and vulnerability include: Flood and Coastal Flood. Two large projects funded within the Central Region included the Cockeysville Acquisition Project in Baltimore County and the EOC Generator Project in Harford County.

Map 6.1—HMPG & PDM Funding by Region



There were (42) forty-two lead/support agencies identified in the *2011 Maryland State Hazard Mitigation Plan Update* - Table 4-3. Mitigation Action Plan. In order to update mitigation actions identified in the 2011 Plan, the State Hazard Mitigation Officer along with the Mitigation Advisory Committee developed a point of contact listing and for confirmation on a status update. A customized Adobe Fillable Status Form was developed for each agency and distributed in June of 2015.

Agencies on the listing below provided status updates during the data collection effort.

- Baltimore Emergency Management/Planning
- Department of General Services
- Department of Business and Economic Development
- Department of Housing and Community Development
- Department of Human Resources
- FEMA CAPSSE(Community Assistance Program - State Support Services) and State Funding
- Maryland Dam Safety
- Maryland Department of Information and Technology
- Maryland Department of Planning
- Maryland Department of the Environment
- Maryland State Department of Education
- Maryland State Treasurer's Office (Office of the State Treasurer)
- MEMA-Mitigation, Operations, and Planning
- National Weather Service
- State Mitigation Advisory Council
- The Office of the Governor-Larry Hogan

*Figure 6.3—Sample Mitigation Strategy Questionnaire*

**Maryland Hazard Mitigation Plan  
State Agency Mitigation Strategies  
Questionnaire**

During the 2015 update, each agency is requested to update the status of 2011 strategies that are specific to their agency. A customized questionnaire form has been developed in order to capture agency specific information, rather than using a Share Point site that would require agency representatives to sift through the various pages of mitigation strategy sections.

Please complete the following questionnaire based upon your best available information. There are (8) eight Action Items associated with your agency as the Lead Agency. These action items appear in descending order of high, medium, or low priority.

Upon completion, please email this questionnaire to: [khoady@umtsp-d.com](mailto:khoady@umtsp-d.com).

If you have any question or concerns, please contact:  
 Mark D. James  
 State Hazard Mitigation Officer, Mitigation Division  
 Preparedness Director at  
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Date of completion:

**Action Item #1 - Medium Priority:**  
 Develop state wide strategy to provide funding and technical assistance to local jurisdictions for mitigation planning and project development.

Has the action item been completed:

Yes  
 No

If yes, please provide a brief summary of the action completed and the date of completion (Month/Year).

Following the spring 2015 Mitigation Status Report data collection effort, a second effort was initiated in the spring of 2016. Additional information was received and updates to previously collected information were incorporated into the report.

Five subcommittees identified mitigation actions during the *2011 Maryland State Hazard Mitigation Plan Update*:

1. Programs, Planning, Policy and Funding
2. Educations and Outreach Activities
3. Risk Assessment & Vulnerability
4. Local Planning Interface
5. Mitigation of High Hazard Structures

Each action item was evaluated, ranked and grouped by a subcommittee and assigned a priority ranking. In order to ascertain the status of one hundred and seven (107) mitigation actions in the previous plan and identify those actions that have been completed or remain incomplete during the planning cycle, the Mitigation Action Status Report was completed during the 2016-update process, Table 6.3. Finding of the report indicate that of the fifty-five (55) action items that were ranked “high” in 2011, thirty-three (33) have been completed. However, thirteen (13) of those actions ranked as “high”, were deemed no longer applicable and/or were recommended for removal by the respondents. Removing those items changes the total number of actions ranked as “high” to forty-two (42), therefore the percentage of action items completed is seventy-nine percent (79%).

*Table 6.2–Mitigation Action Status Report Compilation - 2011 to 2016*

Priority Ranking	Distribution by Group										TOTAL
	Planning, Policy, Programs & Funding		Education & Outreach Activities		Risk Assessment		Local Planning efforts		Mitigation of High Hazard Structures		
	Complete/Ongoing	Incomplete	Complete/Ongoing	Incomplete	Complete/Ongoing	Incomplete	Complete/Ongoing	Incomplete	Complete/Ongoing	Incomplete	
High	1	-	12	2	11	-	3	-	6	7	55
Medium	7	-	8	-	2	-	4	1	3	6	40
Low	2	-	2	-	-	-	2	-	1	2	12

*Note: Actions items no longer applicable and/or recommended for removal include thirteen (13) ranked as “High”, ten (10) ranked as “Medium”, and three (3) ranked as “Low”.*

The Mitigation Advisory Council (MAC) reviewed the report and ideas for new mitigation action items were discussed for inclusion in the 2016 Plan. The MAC met on July 5, 2016 to review and prioritize 2016 mitigation actions.

Table 6.3—Overall Mitigation Action Status Report – 2011 to 2016

ID #	Project Description	Objective	Lead/Support Agency	Funding Source	Target Completion Date	Interim Measure of Success	Priority
<b>Programs, Planning, Policy and Funding</b>							
PPP-1	Develop state wide strategy to provide funding and technical assistance to local jurisdictions for mitigation planning and project development.	1, 7	MEMA/Mitigation	EMPG; HMGP	Short-term	Within six months after plan adoption, MEMA has a draft strategy for review by State Mitigation Advisory Committee.	Medium
<p><b>2016 Status Update: MEMA/Mitigation – Yes, completed. Since 2011 MEMA Mitigation Section has worked closely with all 25 Jurisdictions and provided access to funding for an up to date approved Mitigation Plan. HMA Funding has also been made available to all jurisdictions for various mitigation projects. MEMA Mitigation Section efforts have resulted in jurisdictions submitting projects that have been funded under both HMGP and PDM and Projects valued over \$20 Million on standby awaiting funding.</b></p>							
PPP-5	Work with state commercial insurance carriers to provide recommendations on preventative loss measures.	4	Maryland State Treasurer	Staff resources	Short-term	Within six months of plan adoption, hold meetings with each of the state's commercial insurers to discuss this initiative and assess viability.	Medium
<p><b>2016 Status Update: Maryland State Treasurer: Not Completed/Ongoing. As I meet with State agencies and colleges, loss preventive measures pertaining to food, hurricane, snow, etc. are shared and discussed. Loss prevention CD's with guidance materials and resources for emergency planning, response plans, mitigation activities are also provided to agencies and schools. Property surveys and wind surveys are conducted by the excess property insurance carrier. Recommendations are presented to improve fire protection, and minimize risks associated with natural hazards.</b></p>							
PPP-6	Identify utilities and other facilities, that could contaminate the Potomac River and other major drinking water sources statewide, if impacted by disaster (i.e., chemical spill due to flood) and work with them to ensure appropriate risk reduction measures are in place.	2, 6	Maryland Department of Environment; Interstate Commission on the Potomac River Basin; SBRC	HMA funds; staff time	Long-term	Within nine months of plan adoption, identify likely facility owners that could have major impact on drinking water supply.	Medium
<p><b>2016 Status Update: MDE Water Supply Program – The Water Supply Program has taken efforts to help water systems improve their emergency plans for chemical spills. Maryland's AG's office advised that we cannot share Tier II chemical reports with the water systems due to security reasons. As a result, the Water Supply Program sent a letter to all community water systems recommending that they become members of their Local Emergency Planning Committee and also work with their local fire departments. This will allow them to gain better knowledge about the Tier II facilities and develop spill prevention and emergency response plans. MDE – contact Water Supply Program</b></p>							

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ID #	Project Description	Objective	Lead/Support Agency	Funding Source	Target Completion Date	Interim Measure of Success	Priority
PPP-7	Broaden/increase participation in statewide lessons learned sessions post-event to share corrective after action plans.	1	MEMA/Operations	Staff resources	Short-term	Within three months of plan adoption, identify protocol for holding statewide information sharing sessions.	Low
<p><b>2016 Status Update: MEMA/Operations – Yes, complete/on-going. This action is repeated after every Agency activation as MEMA strives to improve its Awareness, Preparedness, Response and Recovery missions.</b></p> <p><b>Note: Both of these action items do not have to be repeated in the 2016 update.</b></p>							
PPP-8	Review how information is shared statewide (between MEMA and jurisdictions and among jurisdictions) during an incident or event, and implement corrective actions.	1	MEMA/Operations	Staff resources	Short-term	Within one year of plan adoption, complete an evaluation of current information sharing mechanisms and identify means to improve and increase information sharing mechanisms.	Medium
<p><b>2016 Status Update: MEMA/Operations – Yes, completed/on-going. Through the Maryland Joint Operations Center (MJOC) information sharing has significantly increased using several methods to include email, conference calls, videos, webinars, WebEOC, voicemails, and radios. This action item is also on-going as technology continues to improve then the MJOC will adjust accordingly.</b></p> <p><b>Note: Both of these action items do not have to be repeated in the 2016 update.</b></p>							
PPP-9	Ensure the state is taking full advantage of Risk MAP and obtain full participation by all counties.	3	Maryland Department of Environment	FEMA Mapping Program	On-going	Within one year of plan adoption, assess Harford County's experience with Risk MAP pilot and adjust MD mapping program as needed.	Medium
<p><b>2016 Status Update: Not complete/on-going – Nearly all Maryland counties now have an effective, or preliminary, DFIRM. As the FEMA Map Modernization program is winding down, the focus has shifted from updating FIRMs to the Risk MAP program where the risks will be analyzed and including the local planning. Risk MAP Products are currently being developed with the initial focus on coastal counties.</b></p>							
PPP-10	Prioritize HMA funding for mitigation of repetitive loss properties and severe repetitive loss properties.	1, 2,3,	State Mitigation Advisory Committee	HMA funds	Short-term	Within three months of plan adoption, ensure that the State Mitigation Advisory Committee makes consideration of repetitive loss/severe repetitive loss status a major consideration in project selection.	Medium

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ID #	Project Description	Objective	Lead/Support Agency	Funding Source	Target Completion Date	Interim Measure of Success	Priority
PPP-11	Increase coordination and information sharing within watersheds and inter-state to better enable communities to mitigate cross-border impacts (e.g., understanding flood conditions upstream in PA).	1	Governor's Office/Director of Intergovernmental Affairs; MEMA?? (SRBC? NWS?)	Staff resources	Short-term	Within six months of plan adoption, identify relevant stakeholders.	Low
<p><b>2016 Status Update: NWS – Completed –</b> The Mid Atlantic River Forecast Center, which serves the Susquehanna river basin is typically included on weather conference calls pertaining to river flooding (June 2013).</p> <p><b>MEMA – No, longer applicable. This action item can be removed as a low priority for MEMA.</b></p>							
PPP-14	Identify resources to support technical assistance and funding for state agencies for mitigation.	7	MEMA/Mitigation	Staff resources	Long-term	Within one year of plan adoption, secure resources for at least one new project for a state agency.	Low
<p><b>2016 Status Update: MEMA/Mitigation- No, ongoing – MEMA works closely with Local Jurisdictions and with partners, MDE, DNR, and MES to provide information, tools, and guidance to successfully apply for funding under HMA programs.</b></p>							
PPP-18	Develop methodology to integrate state COOP plans with 2014 state hazard mitigation plan	7	MEMA/Planning	Staff resources	Short-term	Within six months of plan adoption, review state COOP and identify linkages with state HIRA.	Low
<p><b>2016 Status Update: MEMA/Planning – No, not complete. MEMA is currently still in the process of updating the Statewide Coop Plan and to date have completed the State of Maryland Mitigation Operations Plan. Both plans will need to be integrated with the 2016 Hazard Mitigation Plan update.</b></p>							

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ID #	Project Description	Objective	Lead/Support Agency	Funding Source	Target Completion Date	Interim Measure of Success	Priority
PPP-19	Require, through policy, that new state capital improvement projects incorporate hazard mitigation principles (e.g., prohibit new projects in hazard-prone areas such as floodplains or the coastal high hazard area; requiring above code design requirements for critical facilities).	5	MEMA/Mitigation; Governor's Office	Staff resources	Long-term	Within four months of plan adoption, identify process through which Executive Orders are developed.	Medium
<p><b>2016 Status Update: –Complete. New critical facilities are prohibited in 100 floodplain and within Chesapeake Bay Critical Areas. In addition, areas of critical state concern has been designated and are identified as: tidal wetlands, non-tidal wetlands, protection enhancement rail service, and special areas.</b></p>							
PPP-20	Maintain and implement the State of Maryland Drought Monitoring and Response Plan, which outlines the methods and steps the State will take to monitor and respond to drought conditions when they occur.	7	Maryland Department of Environment	Staff resources	On-going	Within one year of plan adoption, review drought plan and reaffirm content.	Medium
<p><b>2016 Status Update: MDE Water Supply Program – This is an on-going activity. Wells and stream gages used in the evaluation are changed as different data became available. So has the analysis for the stream gage indicator. Internal documents have been updated to reflect current procedures, but the official public plan has not been updated since originally issued.</b></p>							
<p><b>MDE – Contact Water Supply Program</b></p>							
LP-7	Utilize the State Mitigation Advisory Committee and add local plan information affecting the State to quarterly agendas. Review regional trends and/or region specific mitigation strategies for inclusion into the 2011 Maryland State Hazard Mitigation Plan Update.	1	MEMA	MEMA Staff Time	Ongoing	State Mitigation Advisory Committee meeting agendas/minutes	Medium
<p><b>2016 Status Update: MEMA – No, no longer applicable. This action item can be removed.</b></p>							

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ID #	Project Description	Objective	Lead/Support Agency	Funding Source	Target Completion Date	Interim Measure of Success	Priority
LP-8	Ensure that local flood damage prevention regulations are up to date and consistently enforced.	2, 3, 6	Maryland Department of Environment (MDE) – NFIP, FEMA CAP-SSSE and State Funding	State Funding	Ongoing	MDE - NFIP: Community Assessment Reports	High
<p><b>2016 Status Update: MDE (Answered for FEMA CAPSSSE &amp; State Funding on this question) – Not complete/on-going – This will continue to be an on-going issue until all floodplain mapping has been completed by FEMA, and communities are no longer required to update their floodplain management ordinances as part of the process. However, there will be a need for ordinances to be revised by communities as new guidance is provided by FEMA, or as inconsistencies are discovered during implementation.</b></p>							
<b>Mitigation of Structures</b>							
MS-1	Apply for mitigation grant funding to acquire and demolish homes or other structures identified by local governments to be in imminent danger of collapse due to sinkholes, landslide, coastal erosion or other forms of mass movement.	1, 3	MEMA/ Co-lead with MDE	HMA Programs	Ongoing	Identify grant source.	Low
<p><b>2016 Status Update: MDE – Not complete/on-going – MDE continues to work closely with MEMA, and notifies MEMA when potential projects are identified. MDE also participates on the Mitigation Advisory Committee chaired by the SHMO.</b></p>							
<p><b>MEMA – No, on-going. . MEMA works closely with Local Jurisdictions and with partners MDE, DNR, MES, and The Maryland Silver Jackets to provide access to HMA program and best practices for mitigation properties in areas threatened by various natural hazards.</b></p>							
MS-2	Dredge shipping channel in the Port of Baltimore and Chesapeake Bay Shipping Channels to maintain interstate maritime commerce. Install intrusion detection as part of channelization process.	2, 6	USACE, MD Port Administration, USCG	USACE	Ongoing	Seek and obtain funding for project.	Medium
<p><b>2016 Status Update: Ongoing – Dredging is an ongoing program by MPA and USACE. USGS does not dredge, however maintains aids for navigation.</b></p>							
MS-3	Conduct stream bank stabilization and channel improvements throughout the state.	2, 6	MDE, DNR and counties	DNR, County budgets	Ongoing	Prioritize stream bank hazard levels.	Medium

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ID #	Project Description	Objective	Lead/Support Agency	Funding Source	Target Completion Date	Interim Measure of Success	Priority
<b>2016 Status Update: Ongoing – Any impacts to regulated streams and wetlands with the State of Maryland require mitigation. For instance, the Inter County Connector Project completed during the Plan cycle included stream restoration and wetland creation projects.</b>							
MS-4	Investigate increasing the minimum wind standard in the Statewide Building Code for critical facilities.	5, 6	MEMA	MEMA budget	Ongoing	Research other states or jurisdictions that have increased their building codes for wind standards.	High
<b>2016 Status Update: No, not complete – No longer applicable. MEMA works closely with Local Jurisdictions and with partners MDE, DNR, MES, and the Maryland Silver Jackets to provide access to relevant information and best practices on hazard mitigation.</b>							
MS-5	The Department of Housing and Community Development will provide continued support to ensure that local building codes are up to date and consistently enforced.	6	Housing and Community Development	HCD	Ongoing		High
<b>2016 Status Update: Completed: Adopted the 2015 building codes on Jan 1, 2015. Counties enforce the codes.</b>							
MS-6	Incorporate climate change and coastal hazard considerations into building codes for coastal communities (e.g. freeboard, septic siting).	7	MDE, DNR	MEMA budget	Long Term	Determine appropriate climate change studies to utilize.	High
<b>2016 Status Update: MDE – Not complete/on-going – The Maryland Department of Natural Resources, Coastal Zone Management Program is taking the lead on this. However, as communities are required to update their floodplain management ordinances, many are adopting higher standards that include additional freeboard, regulating the Coastal A Zone (CAZ) where wave action is still likely and regulating to the 500-year floodplain. All of these higher standards can help a community build long-term resiliency.</b>							
MS-7	Repair aging dam and levee structures.	2, 6	MD Dept. of the Environment, USACE	MDE budget	Long Term	Prioritize aging dam and levee structures.	Medium
<b>2016 Status Update: MDE – MD Dam Safety would be better for this item.</b>							
MS-8	Update automated control gates on aging dams and levees and link to warning systems. Make warning system data (alarms and video monitoring) available to state and local governments.	2, 6	MD Dam Safety (within MDE)	MDE budget	Long Term	Prioritize aging dam and levee structures.	Medium

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ID #	Project Description	Objective	Lead/Support Agency	Funding Source	Target Completion Date	Interim Measure of Success	Priority
<p><b>2016 Status Update: No longer applicable – There are no dams in Maryland with automated gates. MDE – Contact Dam Safety</b></p>							
MS-9	Incorporate hazard and risk analysis into databases of publicly-owned structures.	7	DGS, local jurisdictions, USACE	DGS Budget and local jurisdictions' budgets	Long Term	Determine which publicly-owned facilities should be included in the database.	High
<p><b>2016 Status Update: DGS: Not Completed – No longer applicable. The Department of General Services is only responsible for DGS owned/managed facilities. Please revisit this strategy to incorporate all State agencies with facilities to create a better profile. Since the last plan, Emergency Support Function #3 (Infrastructure) is now lead by DLLR.</b></p>							
MS-10	Conduct a feasibility analysis for a temporary floodwall or other protective measure for Baltimore Harbor and other flood prone urban areas in the State.	2, 3, 6	MDE, MEMA, Baltimore EM/Planning, other urban EM	MDE Budget and local jurisdictions' budgets, HMA funding	Short Term	Identify sponsoring agency/budget for project.	Medium
<p><b>2016 Status Update: MDE Dam Safety (They helped answer for MDE) – This is a community-specific goal, and would be initiated at the local level. MDE – It's not clear who this action item belongs to. This is a community-specific goal, and would be initiated at the local level. Baltimore Emergency Management/Planning: No, not complete. Not sure who or which agency was assigned this task. There are several projects that are in place that can be made applicable to this strategy.</b></p>							
<p><b>MEMA – No, no longer applicable. This action item can be removed.</b></p>							
MS-11	Identify flood protection techniques for flood prone wastewater treatment plants.	2, 3, 6	MDE, MEMA	HMA Programs	Short Term	Secure funding.	High
<p><b>2016 Status Update: MDE Dam Safety (They helped answer for MDE) – This may be more applicable to the folks who handle water waste. MDE – It's not clear who this action item belongs to. Someone from MDE's Water Management Administration may be more appropriate to respond to this. I'm not aware of specific guidance related to treatment plants, but there's a lot of information available from FEMA and the Corps of Engineers on flood proofing techniques.</b></p>							
<p><b>MEMA – No not complete, on-going. MEMA works closely with Local Jurisdictions and with partners MDE, DNR, MES, and the Maryland Silver Jackets to provide access to relevant information and best practices on hazard mitigation.</b></p>							

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ID #	Project Description	Objective	Lead/Support Agency	Funding Source	Target Completion Date	Interim Measure of Success	Priority
MS-12	Explore the development and implementation of a notification process similar to that required for schools for other critical and State-owned and critical facilities at risk, such as nursing homes.	2, 6	DGS, MEMA, Legislature	MEMA budget	Ongoing	Identify and research pilot communities with similar systems	Medium
<p><b>2016 Status Update: DGS: Not Complete.</b> The Department of General Services has incorporated the Nixle email and text message system for all State entities. However, it is at the discretion of the state employees to sign-up for this alert system.</p> <p><b>MEMA – No, no longer applicable.</b> This action item can be removed or make a priority for the Department of General Services that has responsibility for State owned facilities and DHMH for medical facilities and nursing homes.</p>							
MS-13	Install traffic maintenance and evacuation message signing along flood-prone highways in Cecil County. Investigate evacuation and detour messaging in other flood prone areas throughout the state.	2, 6	SHA	SHA budget	Ongoing	Secure message boards and solidify work schedule.	High
<p><b>2016 Status Update: Yes, complete – Cecil County project has been completed, while a similar project is in progress in the Town of Ocean City.</b></p>							
MS-14	Identify mitigation measures for nuclear power plant.	2, 6	Constellation Energy, NRC (Federal), Public Service Commission	NRC	Long Term	Develop nuclear mitigation actions work group.	High
<p><b>2016 Status Update: No status updated provided.</b></p>							
MS-15	Develop and implement a plan to improve pump stations susceptible to damage in flood-prone areas.	2, 3, 6	MDE, local PW/PU departments	Local PW departments HMA programs	Long Term	Identify pump stations in flood-prone areas.	High
<p><b>2016 Status Update: MDE Dam Safety (They helped answer for MDE) – This was partially answered by the Water Supply Program, but may be more applicable to the folks who handle water waste.</b></p> <p><b>MDE Water Supply Program – This item may have been intended to apply to water waste systems only. For water supply systems, it is addressed in the planning process, with all new pump stations either outside of the hundred year floodplain or dry flood proofed.</b></p> <p><b>MDE – It's not clear if "pump stations" pertains to water supply or wastewater systems. Contact MDE Water Supply Program</b></p>							

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ID #	Project Description	Objective	Lead/Support Agency	Funding Source	Target Completion Date	Interim Measure of Success	Priority
MS-16	Identify flood prone roads and replace/mitigate undersized and clogged culverts.	2, 3, 6	MDOT	MDOT, HMA programs	Ongoing	Identify appropriate points of contact in each jurisdiction to help identify roadways.	High
<b>2016 Status Update: Ongoing - Flooded roads usually self-resolve soon after the rain stops or water recedes, typically with little damage, local resident are usually aware and detours are implemented as needed.</b>							
MS-17	Install trash racks upstream of critical bridges to preserve structures.	2, 6	MDOT and local DOTs, DNR, MDE	MDOT	Ongoing	Secure funding.	High
<b>2016 Status Update: Ongoing - Trash racks and re-sized culverts can have other adverse effects up and down stream and have significant permitting requirements.</b>							
MS-18	Re-profile and reconstruct roads in low-lying areas that are prone to flooding.	2, 3, 6	MDOT and local DOTs	MDOT	Long Term	Identify and prioritize low-lying roads that are prone to flooding.	High
<b>2016 Status Update: Ongoing - Re-sized culverts can have other adverse effects up and down stream and have significant permitting requirements.</b>							
MS-19	Support the construction of tornado safe rooms in critical facilities, public schools, or individual residences.	2, 6	DHR, MEMA	HMA Programs	Short Term	Seek and secure funding.	High
<b>2016 Status Update: DHR: No longer applicable - When DHR/OEO conducts annual site visits for State Shelter buildings, they identify an area within the shelter that can be used to shelter during tornado, and however, the area is not a "tornado safe room". DHR also notes "Tornado Hardened Hallways" within State Shelter buildings. DHR does not have the authority to mandate the public schools to construct tornado safe rooms. There would need to be regulations (COMAR) in place to allow an agency to mandate that the schools comply.</b>							
<b>MEMA - No, no longer applicable - MEMA works closely with Local Jurisdictions and with partners MDE, DNR, MES, and the Maryland Silver Jackets to provide access to relevant information and best practices on hazard mitigation.</b>							
MS-20	Promote as a model tornado and high wind mitigation project the hardening of the La Plata police station. This project was funded as part of an effort to use HMGP funds to protect critical facilities and ensure continuity of operations.	2, 6	MEMA	HMA Programs		Seek and secure funding.	Low
<b>2016 Status Update: MEMA - No, no longer applicable. This action item can be removed.</b>							

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ID #	Project Description	Objective	Lead/Support Agency	Funding Source	Target Completion Date	Interim Measure of Success	Priority
MS-21	Assess all police and fire facilities, designated shelters, and other state structures statewide for current and potential use as safe rooms.	2, 6	Local jurisdictions, MEMA	HMA Programs	Short Term	Seek and secure funding.	High
<b>2016 Status Update: MEMA – No not complete, no longer applicable. MEMA works closely with Local Jurisdictions and with partners MDE, DNR, MES, and the Maryland Silver Jackets to provide access to relevant information and best practices on hazard mitigation.</b>							
MS-22	Develop shelter-in-place plans/provisions for public facilities.	2, 6	DGS, DHCD, DHR	DGS and MEMA Local Gov't, NGOs Private	Ongoing	Develop plan table of contents and work plan to complete plan by 2013.	High
<b>2016 Status Update: DHCD – Completed: By law, DHCD adopted the building codes. This has been completed on Jan 1, 2015. DGS – Not Completed. Ongoing. The Department of General Services is currently rewriting their preparedness plans for DGS owned/managed facilities. They also need to be revisited, as to account for all State agencies who oversee facilities.</b>							
<b>DHR – Yes, has been completed – The training that DHR/OEO provides to staff includes shelter-in-place plans that can be used in any facility. DHR/OEO also includes this in training provided to the resource parents (previously called foster parents). Again, DHR does not have the authority to develop plans for shelter-in-place for public facilities. DHR will be requesting that all LDSS' provide a shelter-in-place plan for their facility.</b>							
MS-23	Retrofit BWI airport to resist wind and blast.	2, 6	MAA	MAA	Long Term	Identify potential funding sources.	Medium
<b>2016 Status Update: No status updated provided.</b>							
MS-24	Retrofit BWI to include a safe room for travelers and employees in the event of a disaster.	2, 6	MAA	MAA	Short Term	Identify potential funding sources.	Medium
<b>2016 Status Update: No status updated provided.</b>							
MS-25	Harden or develop MTA transit facilities to serve as safe rooms.	2, 6	MTA	MTA	Long Term	Seek and secure funding.	Medium
<b>2016 Status Update: No status updated provided.</b>							
MS-26	Provide backup power (generators and hookups) for state shelters.	2, 6	DHR, Dept. of Education, MEMA	DHR, HMGP 5% match	Short Term	Seek and secure funding.	Medium

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ID #	Project Description	Objective	Lead/Support Agency	Funding Source	Target Completion Date	Interim Measure of Success	Priority
	<p><b>2016 Status Update:</b> DHR - Yes, item is complete. DHR has pre-wired 2 state shelters, (UMD-College Park: Richie Coliseum and UMBC: Retriever Athletic center). The Jewish Community Center has an installed generator and Harford County VFD "The Level", and Talbot County Community Center has a generator on site. DHR has received over-the-target funding to pre-wire Towson University this year and UMES next year. The other State Shelters/Transfer Points are Baltimore City Convention Center, Coppin State University, Frostburg State University, Garrett College, Ocean City Convention Center, Perdue Stadium, College of Southern MD, Morgan State University, Royal Farm Arena, and Timonium Fairgrounds. DHR has a plan/proposal to pre-wire 2 State Shelters every year for the next few years. There are 12 additional designated State Shelters. Department of Education – received filled out form by DHR for this questionnaire.</p>						
	<p><b>MEMA – No, no longer applicable. HMA funds are not eligible for generator purchases at State shelters.</b></p>						
MS-27	Within MDOT, harden police, fire, and EOC facilities to protect against wind and ensure effective COOP.	2, 6	MDOT	MDOT	Long Term	Seek and secure funding.	Medium
	<p><b>2016 Status Update: No status updated provided.</b></p>						
MS-28	Identify and mitigate sinkholes. Evaluate drainage in the area to prevent development of new sinkholes.	2, 6	MEMA, local jurisdictions, MDOT, DHCD, other agencies	HMA funding, local and State agency budgets, homeowners	Long Term	Identify points of contact within each jurisdiction to help identify sinkhole problem areas.	High
	<p><b>2016 Status Update: DHCD – Not Complete – No longer applicable.</b></p>						
	<p><b>MEMA – No, not complete, no longer applicable - MEMA works closely with Local Jurisdictions and with partners MDE, DNR, MES, and the Maryland Silver Jackets to provide access to relevant information and best practices on hazard mitigation.</b></p>						
MS-29	Improve stormwater management throughout the state.	2, 3, 6	DNR and jurisdictions	DNR, County budgets	Long Term	Determine specific aspects that need to be improved.	High
	<p><b>2016 Status Update: No status updated provided.</b></p>						

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ID #	Project Description	Objective	Lead/Support Agency	Funding Source	Target Completion Date	Interim Measure of Success	Priority
MS-30	Maximize use of HMA grants for eligible mitigation projects such as acquisition/demolition, elevation, relocation and flood-proofing of nonresidential structures. Encourage local communities, partner agencies and universities to develop a list of pre-scoped mitigation projects.	2, 3, 6	Localities	Local EM departments	Short Term	Develop a working group to discuss mitigation projects state-wide.	Medium
<b>2016 Status Update: MEMA has streamlined the HMA application process by creating outreach material for residents and county government that are interested in acquisition and elevation.</b>							
MS-31	Continue the strategic placement of dredged material containment islands to mitigate the effects of wave action and storm surge along populated shorelines and exposed wetland habitat of the Chesapeake Bay.	6	USACE	USACE	Ongoing		Low
<b>2016 Status Update: No status updated provided.</b>							
PPP-17	Conduct detailed site assessment of critical facilities to develop site specific state mitigation actions.	2	Treasurer	Long-term	Within three months of plan adoption, develop short list of at-risk facilities.	Within three months of plan adoption, develop short list of at-risk facilities.	Low
<b>2016 Status Update: Office of the State Treasurer – No longer applicable. This is addressed in discussions with the agencies as well as property surveys. The facilities deemed critical are agency specific, with respect to their daily operations, and is not limited to the State Hazard Mitigation Plan.</b>							

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ID #	Project Description	Objective	Lead/Support Agency	Funding Source	Target Completion Date	Interim Measure of Success	Priority
MS-32	Examining the FEMA-MEMA repetitive loss and severe repetitive loss data sets to seek candidate properties that could potentially be mitigated through the FEMA RFC, SRL or other HMA funding programs or any other available funding sources on an annual basis. Prioritize jurisdictions that will receive planning & project grants through HMA programs to those jurisdictions with SRL and RL properties.	3	MEMA	Internal	Annually	N/A	High
<p><b>2016 Status Update: MEMA – Yes, complete. MEMA works closely with Local Jurisdictions and with partners MDE, DNR, MES, and the Maryland Silver Jackets to provide access to relevant information and best practices on hazard mitigation. Mass mailing to SL and SLR property owners have been completed. Property owners and provided information on mitigation techniques and available funding opportunities under the various HMA programs.</b></p> <p><b>Also, on-going - MEMA works closely with Local Jurisdictions and with partners MDE, DNR, MES, and the Maryland Silver Jackets to provide access to relevant information and best practices on hazard mitigation for their SL and SRL properties.</b></p>							
<b>2014 Vulnerability Assessment</b>							
VA-1	Define “critical facility” for 2014 plan update.	7	MEMA	State agency funding	Short term	Contact appropriate local and state agencies to provide input on definition.	High
<p><b>2016 Status Update: MEMA – Yes, completed – Action was completed and reflected in the 2014 Plan update. This action was repeated and completed for the 2016 Plan update.</b></p> <p><b>Also, on-going – This information gathered to define “critical facilities” may need to be updated in future plan updates.</b></p>							
VA-2	Further develop, centralize and maintain a critical facility database.	2	MEMA	State agency funding	Long term	Convene a work group to discuss developing and maintaining a critical facility inventory.	High
<p><b>2016 Status Update: MEMA – Yes, completed – As part of the Plan Updated, county and state critical facilities were identified and confirmed.</b></p>							

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ID #	Project Description	Objective	Lead/Support Agency	Funding Source	Target Completion Date	Interim Measure of Success	Priority
VA-3	Inventory hazard risks to state-owned facilities and identify their risks to hazards including climate change related (sea level rise, coastal and riverine stream erosion, and increased flooding) hazards.	2	Department of General Services, Treasurer's Office, Department of Management and Budget	FEMA Unified Hazard Mitigation Assistance funding	As funding is available	Convene a work group to discuss developing and maintaining a state-owned facility inventory.	High
<p><b>2016 Status Update: DGS: Not Complete.</b> No longer applicable. The Department of General Services is only responsible for DGS owned/managed facilities. Please revisit this strategy to incorporate all State agencies with facilities to create a better profile. Since the last plan, Emergency Support Function #3 (Infrastructure) is now lead by DLLR.</p> <p>Office of State Treasurer: Not Complete. Ongoing. This is ongoing. Initial hazard rankings were obtained for the 2011 Mitigation Plan and populated onto the State property schedule. As new properties are added, the rankings are included based on property address, county and zip. Rankings will be updated again based on the 2015 Update.</p>							
VA-4	In coordination with the MSGIC and local jurisdictions, organize and convene a 2014 Vulnerability Assessment working group to discuss the review/refinement of the 2011 HIRA.	7	Maryland State GIS Council (MSGIC), MEMA, Governor's Office of Technology, State Climatologist	State agency funding	Short term	Integrate the existing HIRA data into the MD IMAC. Coordinate with NWS as appropriate.	High
<p><b>2016 Status Update: The Governor's Office of Information and Technology – Yes, completed/on-going – MEMA has done extensive outreach for an updated HIRA. DoIT helped facilitate a workshop with local government GIS managers in support of the new HIRA 6/15. MSGIC was not formally involved, but many MSGIC members were. DoIT will help reconvene as many needed during the HIRA process.</b></p>							
<p><b>MEMA – Yes, ongoing – Refer to above response from DoIT.</b></p>							
VA-5	Develop tools, data templates, etc., to assist the jurisdictions in developing rating systems for vulnerability assessments and to ensure consistency across the state.	1, 7	MEMA	FEMA Unified Hazard Mitigation Assistance funding	Ongoing	Determine process for incorporating local plan hazard rankings into the State Mitigation Plan.	High
<p><b>2016 Status Update: MEMA – No, on-going - MEMA works closely with Local Jurisdictions and with partners MDE, DNR, MES, and the Maryland Silver Jackets to provide access to updated databases and guidance document for hazard mitigation planning and project development. Maryland currently have 14 communities participating in the CRS and through information sharing and presentations we hope to increase this number.</b></p>							

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ID #	Project Description	Objective	Lead/Support Agency	Funding Source	Target Completion Date	Interim Measure of Success	Priority
VA-6	Expand hazard profiles and mapping analysis for the 2011 hazards that are text-analysis only, in the 2014 vulnerability assessment.	7	MEMA	FEMA Unified Hazard Mitigation Assistance funding	Long term	In coordination with the MSGIC and local jurisdictions, organize and convene a 2014 Vulnerability Assessment working group to discuss the review/refinement of the 2011 HIRA.	High
<b>2016 Status Update: MEMA – No, on-going - MEMA works closely with Local Jurisdictions and with partners MDE, DNR, MES, and the Maryland Silver Jackets to provide access to updated databases for vulnerability and risk assessment.</b>							
VA-7	Determine feasibility of adding climate change as a ranking factor in the 2014 vulnerability assessment.	7	MEMA	FEMA Unified Hazard Mitigation Assistance funding	Long term	Develop tools, data templates, etc., to assist the jurisdictions in developing rating systems and to ensure consistency across the state.	Medium
<b>2016 Status Update: MEMA –No, on-going. This action will be continued for the 2016 plan update.</b>							
VA-8	Determine best way to identify and quantify uninsured losses to incorporate into 2014 VA.	7	MEMA – IA, SBA, local jurisdictions	State agency funding, locality funding	As funding is available	Identify agencies that keep data on uninsured losses.	Medium
<b>2016 Status Update: MEMA – No, no longer applicable. This action item can be removed.</b>							
VA-9	Determine feasibility of adding human-caused hazards into the 2014 VA (i.e., nuclear, terrorism, utilities)	7	MEMA	FEMA Unified Hazard Mitigation Assistance funding	Long term	Evaluate data available and level of effort required to add this to 2014 VA.	High
<b>2016 Status Update: MEMA – No, no longer applicable.</b>							
VA-10	Determine feasibility of adding human-health and safety risks in conjunction with other hazard occurrences (i.e., vector-borne illnesses, pandemic outbreaks, water contamination) in the 2014 VA.	7	MEMA	FEMA Unified Hazard Mitigation Assistance funding	Long term	Evaluate data available and level of effort required to add this to 2014 VA.	High

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ID #	Project Description	Objective	Lead/Support Agency	Funding Source	Target Completion Date	Interim Measure of Success	Priority
<b>2016 Status Update: MEMA – No longer applicable. This can be removed as an action item.</b>							
VA-11	Maintain access to the Data Exchange System NFIP database of repetitive loss properties through continued relationships with DEP's State NFIP Coordinator's office		MEMA	N/A	At least annually	Completed annually	High
<b>2016 Status Update: MEMA – Yes, no longer applicable. MEMA works closely with Local Jurisdictions and with partners MDE, DNR, MES, and the Maryland Silver Jackets to provide access to relevant information and best practices on hazard mitigation for their SL and SRL properties.</b>							
VA-12	Continue to pursue and develop clean datasets. Improve existing geo-coding by researching matches for properties with incomplete addresses and out of date addresses based on rural road designations that have changed		MEMA	Internal	Annual	Performed annually	High
<b>2016 Status Update: MEMA – No longer applicable – This can be removed from the Action Item list.</b>							
VA-13	Align Maryland RL property data, and SRL property data with validated FEMA NFIP RL and SRL property data, annually;		MEMA	Internal	Annual	Performed annually	High
<b>2016 Status Update: MEMA – Yes, defer this to MDE that manages the NFIP.</b>							
VA-14	Align Greatest Savings to the Fund (GSTF) data and the new 2011 methodology to inventory and further demonstrate the cost effectiveness of potential RL and SRL mitigation projects. Evaluate projects further for environmental soundness and technical feasibility to create successful HMA grant sub-applications.		MEMA	Internal	Annual	Performed annually	High
<b>2016 Status Update: MEMA – No longer applicable. This can be removed from the Action Item list but all actions related to NFIP will be deferred to MDE.</b>							

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ID #	Project Description	Objective	Lead/Support Agency	Funding Source	Target Completion Date	Interim Measure of Success	Priority
VA-15	Update listing of completed SRL and RL mitigated properties and FEMA's RL database with Maryland's mitigated properties database annually. Update of the merged database can also occur at HMA grant close-out or whenever improved local data becomes available.		MEMA	Internal	Annual	Performed annually	High
<b>2016 Status Update: MEMA – No longer applicable. This can be removed from the Action Item list but all actions related to NFIP will be deferred to MDE.</b>							
VA-16	Complete FEMA Form AW-501s for each mitigated property. Provide to FEMA through current FEMA databases or submittal to the region upon project close out Archive at MEMA.		MEMA	internal	Upon project close out per mitigated property	N/A	HIGH
<b>2016 Status Update: MEMA – No, on-going - MEMA works closely with Local Jurisdictions to provide assistance through HMA Programs and develop mitigation projects for SL and SRL properties. MEMA will continue to report to FEMA all successful projects using and will be reported to FEMA Form AW-501s.</b>							
VA-17	Merge the ICC RL database with Maryland's mitigated properties database annually.		MEMA				HIGH
<b>2016 Status Update: MEMA – No, no longer applicable. This is probably on-going but defer to MDE that manages the NFIP.</b>							
PPP-13	Work with responsible state agencies to identify mitigation strategies for state-owned facilities. Hazards to be addressed include: flood, hurricane wind, tornado, landslide, sinkhole, dam inundation, wildfire, heavy snow, and shoreline erosion.	2, 6, 7	MEMA/Mitigation	HMA funds; staff time	Long-term	Within three months of plan adoption, develop short list of at-risk facilities. Complete project scoping sheets for high priority structures (initiated as part of plan update).	Medium
<b>2016 Status Update: MEMA/Mitigation- Yes, completed – MEMA works closely with Local Jurisdictions and with partners MDE, DNR, and MES to provide information on flood plain planning and development. With each jurisdiction having an approved and adopted Hazard Mitigation Plan, mitigation strategies have been identified to address all threats and hazards.</b>							

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ID #	Project Description	Objective	Lead/Support Agency	Funding Source	Target Completion Date	Interim Measure of Success	Priority
PPP-17	MEMA will provide state direction to ensure that local jurisdictional plans must address the mitigation of severe repetitive loss and repetitive loss structures in the mitigation strategies section of every local jurisdiction \$322 plan with SRL or RL properties.		MEMA	Internal	As each local plan enters its 5-year update phase	Inclusion in each local plan update	High
<p><b>2016 Status Update: No, on-going - MEMA works closely with Local Jurisdictions and with partners MDE, DNR, MES, and the Maryland Silver Jackets share relevant information and best practices on hazard mitigation for SL and SRL properties to ensure safe development and risk reduction.</b></p>							
<b>Local Planning Interface</b>							
LP-1	Coordinate the distribution of mitigation related data produced by State agencies to local government entities and other State agencies. This data will include but not be limited to the State of Maryland Hazard Mitigation Plan, Maryland Hazard Analysis and Risk Assessment. These materials are important for both mitigation and other planning purposes. MEMA will also conduct training seminars for data recipients.	4	MEMA	FEMA: Hazard Mitigation Planning/ Management Costs - HMGP & PDM	Ongoing	Annual review at State Mitigation Advisory Committee meeting	High
<p><b>2016 Status Update: MEMA – No, on-going - MEMA works closely with Local Jurisdictions and with partners MDE, DNR, MES, and the Maryland Silver Jackets to provide access to relevant information, training, and best practices on hazard mitigation.</b></p>							
LP-2	Establish MEMA virtual library – (such as the Legislative Information System LIS- for Legislature) planning documents, specifically hazard mitigation plans. In addition, provide virtual training, virtual updates and information.	1, 7	MEMA	FEMA: Hazard Mitigation Planning - HMGP & PDM	Short Term	Virtual Library	Medium
<p><b>2016 Status Update: MEMA – Yes, on-going. Some aspects of this was established and is still available with secured access.</b></p>							

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ID #	Project Description	Objective	Lead/Support Agency	Funding Source	Target Completion Date	Interim Measure of Success	Priority
LP-3	Ensure State HIRA data is provided to local government. Expand distribution to include Planning Departments, Public Works, and Emergency Services. Provide technical assistance as necessary.	1, 7	MEMA	FEMA: Hazard Mitigation Planning - HMGP & PDM	Short Term	Completed Distribution Listing	High
<p><b>2016 Status Update: MEMA – No, in-process – With the current plan update cycle, MEMA works closely with Local Jurisdictions and with partners MDE, DNR, MES and The Maryland Silver Jackets to provide access to updated information produced for the 2016 Plan update. This will include, for example, The State of Maryland Local Hazard Mitigation Plan Guidance and updated Hazus data for coastal and riverine flood zones.</b></p>							
LP-4	Request that local governments advise MEMA when mitigation project locations are impacted by hazard events. Follow-up with regular contacts to ensure that information is consistently provided. Implement mechanisms and standards by which local mitigation related information may be shared with the State and stored.	1	MEMA & Local Jurisdictions	FEMA: Hazard Mitigation Planning - HMGP & PDM	Short Term	Distribution of standards and data upload mechanism	High
<p><b>2016 Status Update: MEMA – No, no longer applicable – This action items can be removed. MEMA however works with local jurisdictions and regional administrators to get updated reports on all projects.</b></p>							
LP-5	Ensure that local hazard data is analyzed and incorporated into State data sets, specifically HIRA.	7	MEMA	FEMA: Hazard Mitigation Planning - HMGP & PDM	Long Term	2014 State Plan Update	Medium
<p><b>2016 Status Update: MEMA – Yes, on-going. This action item is ongoing as new datasets become available. However, we defer to DOIT that “HIRA should be based on all datasets not just the property dataset”.</b></p>							
LP-6	Request State level data standards for both format and content.	1, 7	Maryland State Geographic Information Committee (MSGIC)	State Funding	Short Term	Distribution of data standards	Medium

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ID #	Project Description	Objective	Lead/Support Agency	Funding Source	Target Completion Date	Interim Measure of Success	Priority
<b>2016 Status Update: MSGIC – Yes, on-going.</b> iMaps is the central location for state level data and requires metadata to be completed prior to upload.							
LP-9	Provide technical assistance to local government with the administration and enforcement of building codes.	1	Department of Housing and Community Development	State Funding	Ongoing	DHCD Reports	High
<b>2016 Status Update: DHCD – Completed:</b> DHCD provides ongoing training on the IBC, IRC, IECC and the Accessibility Code in addition to other related codes. This can be found on our website under training.							
PPP-2	Update and distribute to counties, cities and towns the "Best Practices in Hazard Mitigation" to include projects since 2008 and exemplary planning practices.	1	MEMA/Mitigation	EMPG; HMGP	On-going	Within nine months after plan adoption, a data call for exemplary planning practices has been issued. In addition, new "best practice" projects have been identified.	Low
<b>2016 Status Update: MEMA/Mitigation – Yes, completed and circulated to all partners.</b>							
PPP-4	Create and implement a more structured training program targeting smaller jurisdictions to provide hazard mitigation information strategies, resources and methodologies using a regional approach incorporating seminars, webinars and/or other communication methods.	1, 4	MEMA/Mitigation	EMPG; HMGP	As funding is available	Within one year of plan adoption, schedule and hold two training courses. Work with Maryland Emergency Management Association to utilize annual conference for outreach on mitigation.	Medium
<b>2016 Status Update: MEMA/Mitigation – Yes, completed – MEMA works closely with Local Jurisdictions and with partners MDE, DNR, MES, and the Maryland Silver Jacket to provide information on Hazard Mitigation Strategies, resources and best practices. Several trainings have been offered throughout the state either through workshops or webinars.</b>							
PPP-12	Streamline information accessibility to jurisdictions, agencies and communities on funding sources, resources and mechanisms.	1	Maryland Department of Planning (MDP)	Staff resources	On-going	Within six months of plan adoption, ensure information on mitigation grants is included in on-line grants database, The Redbook, and in the Intergovernmental Monitor Newsletter.	Low

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ID #	Project Description	Objective	Lead/Support Agency	Funding Source	Target Completion Date	Interim Measure of Success	Priority
<p><b>2016 Status Update:</b> Completed – the Maryland Department of Planning publishes the catalog of State Assistance Programs on line. Called the Redbook Online, this resource is a database of financial and non-financial assistance offered by Maryland State government agencies. The Maryland Department of Planning maintains the database and each sponsoring agency provides updated information. The Red Book online has more than 700 programs providing financial assistance and technical services to governmental entities, civic and private organizations, and individuals.</p>							
PPP-16	Provide guidance on how local jurisdictions can work with private entities to implement mitigation projects.	1	MEMA/Mitigation	HMA funds; staff time	Short-term	Within nine months of plan adoption, develop draft guidelines.	Medium
<p><b>2016 Status Update: MEMA/Mitigation – No – on-going – MEMA continues to work closely with Local Jurisdictions and with partners MDE, DNR, and MES to provide information on potential project ideas and guidance on eligible applicants and the application process. MEMA has explored working with non-traditional applicants by initiating a pilot project working with Habitat for Humanity.</b></p>							
<b>Education and Outreach</b>							
EO-1	The Maryland Emergency Management Agency will continue to pursue public education initiatives concerning mitigation, including their information booth at the Maryland State Fair and information posted on the MEMA website.	4	MEMA	Internal agency funding, FEMA Unified HMA grand funding	Long Term	Identify sources of funding to execute initiatives	Medium
<p><b>2016 Status Update: MEMA – Yes, on-going. . MEMA works closely with Local Jurisdictions and with partners MDE, DNR, MES, and The Maryland Silver Jackets to provide access to relevant information, training, and best practices on hazard mitigation.</b></p>							
EO-2	Continue to sponsor and host the Annual Severe Storms Conference before the start of hurricane season.	4	MEMA	Internal agency funding	Ongoing	Solidify 2012 conference date and verify attendance.	High
<p><b>2016 Status Update: MEMA – Yes, no longer applicable. This conference is no longer sponsored and hosted by MEMA.</b></p>							
EO-3	Promote the use of NOAA weather radios and the satellite emergency alert and warning system by local governments.	1, 4	MEMA/ Co-lead with the Department of Housing and Community Development	EMPG funding, internal agency funding, local jurisdiction funding	Ongoing	Develop common message to disseminate to local jurisdictions regarding radio usage.	Medium

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ID #	Project Description	Objective	Lead/Support Agency	Funding Source	Target Completion Date	Interim Measure of Success	Priority
<b>2016 Status Update: DHCD – Not Completed. No longer applicable.</b>							
<b>MEMA – No, no longer applicable. This action item can be removed.</b>							
EO-4	The Maryland Department of the Environment will continue to implement the Drought Public Information Initiative, which disseminates public information provides education on appropriate water conservation activities for public and media.	4, 7	MDE	Internal agency funding	Long Term	Develop and/or ready for distribution at least one factsheet or brochure	Low
<b>2016 Status Update: MDE Water Supply Program – This is an on-going activity. The Maryland Department of Environment disseminates drought status reports every month during normal periods and more often during drought. Water conservation information is available on our website.</b>							
<b>MDE – Contact Dam Safety</b>							
EO-5	Develop and execute Public Service Announcements.	4	Governor's Office/MEMA	Internal agency funding	Long Term	At least one PSA written and ready for production	High
<b>2016 Status Update: MEMA – No, on-going. MEMA continues to provide PSA as needed.</b>							
EO-6	Provide factsheets and informational brochures on personal preparedness and hazards to the public.	4	MEMA	FEMA Unified HMA grant funding	Ongoing	Develop and/or ready for distribution at least one factsheet or brochure	High
<b>2016 Status Update: MEMA – No, on-going. MEMA works closely with Local Jurisdictions and with partners MDE, DNR, MES, and the Maryland Silver Jackets to provide access to relevant information on all hazards. In addition to standard brochures, information is now available via websites, and social media.</b>							
EO-7	Continue reaching out to businesses electronically to notify of immediate hazards.	4	DBED	Internal agency funding	Long Term	Development of a plan detailing how this will work	Medium
<b>2016 Status Update: Not completed. Ongoing. This is an ongoing process as both DBED and MEMA have established the Private Sector Integration Program that allows for information sharing.</b>							
EO-8	Continue providing businesses information on available SBA loans.	4	DBED	Internal agency funding	Long Term	Development of a plan or approach for accomplishing this action	Medium
<b>2016 Status Update: Not completed. Ongoing. This is ongoing and information is made available as needed.</b>							

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ID #	Project Description	Objective	Lead/Support Agency	Funding Source	Target Completion Date	Interim Measure of Success	Priority
EO-9	Develop literature on personal preparedness made available to the public at DHR customer service centers.	4	DHR/MEMA	MEMA internal funding	Long Term	Development of a plan to determine contents and potential sources for developing or securing this literature	Medium
<p><b>2016 Status Update: DHR – Not complete.</b> DHR has materials that are available and distributed to the public when shelters are open. DHR provides local Department of Social Services materials during training that can be distributed to the public. (This has been ongoing since 2007). DHR/OEO will have a folder on the intranet that the LDSS liaisons can access with materials on emergency preparedness that they can order for the LDSS waiting areas.</p>							
<p><b>MEMA – No, no longer applicable.</b> This action item can be removed.</p>							
EO-10	Work with independent youth and socially vulnerable individuals in state care to develop emergency plans.	4	DHR	Internal agency funding	Long Term	Rollout to Foster Parents first, then Independent Youth, and finally other communities.	Medium
<p><b>2016 Status Update: DHR – Yes, completed.</b> DHR/OEO provides training to staff on preparing both staff and clients on developing emergency plans. The training is ongoing and is provided throughout the State. Additionally, the DHR/OEI intranet provides material and links to websites that deal with developing emergency plans. These materials and trainings included information appropriate for vulnerable individuals and youth. The training also includes information on ADA compliance. DHR/OEO will continue to provide emergency preparedness training to the DHR Central and LDSS staff, as well as, the resource parents when requested. Additionally DHR/OEO provides training to the public upon request and has an annual Emergency Preparedness week in the lobby of DHR Central every September.</p>							
EO-11	Prepare and provide an Emergency Preparedness course provided to state employees to ensure safety of socially vulnerable individuals in state care.	1, 4	MEMA/DHR	Internal agency funding	Long Term	Rollout to Foster Parents first, then Independent Youth, and finally other communities.	High
<p><b>2016 Status Update: DHR – Yes, completed.</b> DHR/OEO is the lead for the training, NOT MEMA. DHR/OEO has been providing ongoing training to all DHR/LDSS employees since 2007. The training is offered to other State and county employees at the LDSS. The curriculum covers plans for the vulnerable clients who are under the care of the department.</p>							
<p><b>MEMA – No, no longer applicable.</b> This is on-going but action item can be removed. Training is made available to all state partners and local jurisdictions.</p>							
EO-12	Develop/send E-Newsletters on preparedness.	4	MEMA	Internal agency funding	Short Term	Development of a template for such a newsletter	Medium

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ID #	Project Description	Objective	Lead/Support Agency	Funding Source	Target Completion Date	Interim Measure of Success	Priority
<b>2016 Status Update: MEMA – No, on-going. This action item can be removed as the focus has shifted to social media engagement.</b>							
EO-13	Develop Preparedness tips through Twitter / Facebook / text messaging / email - work with state agencies to incorporate.	4	MEMA/DOIT/All Agencies	Internal Agency funding	Short Term	MEMA to initiate meeting with state agencies to discuss expansion of social media use.	High
<b>2016 Status Update: DOIT – Completed, but Ongoing. : DOIT has provided tools for agencies including MEMA to manage and monitor social media. MEMA now has a significant social media presence which can be reviewed on <a href="http://mema.maryland.gov">http://mema.maryland.gov</a>. This project will never be complete as there will always be a need for preparedness outreach.</b>							
<b>2016 Status Update: MEMA – Yes, MEMA has expanded its outreach using a wide variety of social media. On-going – this action is expected to continue and expand as needed.</b>							
EO-14	Provide list of hazard mitigation best practices to provide guidance and motivate local governments to reduce hazard impacts through mitigation.	1, 4	MEMA/Local government	Internal agency funding, FEMA Unified HMA grand funding	Short Term	Determine which practices should make the list	High
<b>MEMA – Yes, completed - MEMA works closely with Local Jurisdictions and with partners MDE, DNR, MES, and the Maryland Silver Jackets to provide access to relevant information and best practices on hazard mitigation.</b>							
EO-15	Ensure a State representative is made available for local hazard mitigation outreach meetings.	4	MEMA	Internal Agency Funding	Ongoing	Review scheduled meetings to determine which representative might attend	Medium
<b>2016 Status Update: MEMA – No, on-going. MEMA works closely with Local Jurisdictions and with partners MDE, DNR, MES, and the Maryland Silver Jackets to ensure adequate coverage at outreach meetings.</b>							
EO-16	Develop public presentations to government leaders and legislators on the importance of emergency preparedness and hazards that the state faces.	1, 4	MEMA/MACO/MML /State Agencies	Internal agency funding, FEMA Unified HMA grand funding	Long Term	Development of a presentation template that can be customized as needed	High
<b>2016 Status Update: MEMA – Yes, on-going - MEMA works closely with Local Jurisdictions and with partners MDE, DNR, MES, and the Maryland Silver Jackets to provide access to training and presentation on hazard mitigation.</b>							

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ID #	Project Description	Objective	Lead/Support Agency	Funding Source	Target Completion Date	Interim Measure of Success	Priority
EO-17	Maintain media advisory template based on risk.	4	MEMA	Internal Agency Funding	Ongoing	Ensure template is currently maintained.	High
<b>2016 Status Update: MEMA – Yes, on-going – MEMA Public Outreach branch maintains at the ready templates for media distribution and also for social media.</b>							
EO-18	Offer a variety of emergency management training opportunities for state and local employees.	1, 4	State Universities/MEMA	EMPG funding, internal agency funding, local jurisdiction funding	Long Term	Determine and prioritize training topics	High
<b>2016 Status Update: MEMA – No, on-going. - MEMA works closely with Local Jurisdictions and with partners MDE, DNR, MES, and The Maryland Silver Jackets to provide access to relevant information, training, and best practices on hazard mitigation.</b>							
<b>MEMA – No, on-going. - MEMA works closely with Local Jurisdictions and with partners MDE, DNR, MES, and The Maryland Silver Jackets to provide access to relevant information, training, and best practices on hazard mitigation.</b>							
EO-19	Investigate emergency public broadcast protocol on telecommunication networks for notification of impending disaster	4	MEMA	Internal Agency Funding	Short Term	Set up a meeting with communications providers to discuss potential options	High
<b>2016 Status Update: MEMA – No, on-going – MEMA works with its partners to constantly update methods for communication hazardous information. For example, SHA, DMS for alerts and warning, cable TV for scrolling messages and MOUs have been established with Clear Channel to provide emergency notifications on all billboards.</b>							
EO-20	Continue Coast Smart Program and expand outside of Coastal Region - Reaching out to EM and planning personnel.	4	DNR	Internal Agency Funding	Long Term	A plan for expansion of the program	High
<b>2016 Status Update: DNR – No, expansion has not occurred. The Program prohibits expansion beyond the coastal region.</b>							
EO-21	Reach out to civic organizations to become partners on emergency preparedness outreach programs.	4	MEMA	Internal Agency Funding	Long Term	Development of a list of which organizations with which to partner	High

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ID #	Project Description	Objective	Lead/Support Agency	Funding Source	Target Completion Date	Interim Measure of Success	Priority
<p><b>2016 Status Update: MEMA – Yes, on-going – MEMA through the Private Sector Integration Program (PSIP), works closely with Private sector partners to provide access to Hazardous conditions, training and presentation. MEMA continues to also work closely with the Voluntary Organizations Active In Disasters (VOAD) group.</b></p>							
EO-22	Investigate establishing training for developing multi-lingual Emergency Management representatives.	4	MEMA	Internal Agency Funding	Short Term	Determine languages needing to be included in investigation by March 2012.	High
<p><b>2016 Status Update: MEMA – No, no longer applicable. This action item can be removed.</b></p>							
EO-23	Push After Action Reports (AARs) and lessons learned to other jurisdictions' leaders, in the form of a newsletter coordinated amongst all state Offices of Emergency Management	1, 4	MEMA	FEMA Unified HMA grant funding	Ongoing	Develop newsletter template by January 2012.	Medium
<p><b>2016 Status Update: MEMA – No, no longer applicable. This action can be removed. AAR's are completed by MEMA after every event.</b></p>							
EO-24	Investigate improving communication between state agencies' mitigation programs and activities.	4, 7	MEMA	Internal Agency Funding	Short Term	Solicit feedback from agencies to determine communication weaknesses and potential improvements	High
<p><b>2016 Status Update: MEMA – Yes, on-going. MEMA works closely with Local Jurisdictions and with partners MDE, DNR, MES, and The Maryland Silver Jackets to provide access to training and best practices on hazard mitigation and information on HMA funding.</b></p>							
EO-25	Enhance outreach to at risk neighborhoods and new populations at-risk due natural hazards including climate change.	1, 4	MEMA/DNR	Internal agency funding	Long Term	Prioritize neighborhoods to target	High
<p><b>2016 Status Update: MEMA – No, no longer applicable. . MEMA works closely with Local Jurisdictions and with partners MDE, DNR, MES, and The Maryland Silver Jackets to reach out to at risk communities, SL and SRL communities with information on HMA programs and MDE services for flood prone areas.</b></p>							
EO-26	Leverage relationships with universities/scientists to educate through Cooperative Extension on hazards and climate change.	4	UMD/DNR	Internal agency funding	Long Term	Set up a meeting with at least two universities to discuss	High
<p><b>2016 Status Update: DNR – Yes, on-going – UMD Environment Center and Salisbury are now included in the CoastSmart Council.</b></p>							

MARYLAND HAZARD MITIGATION PLAN

ID #	Project Description	Objective	Lead/Support Agency	Funding Source	Target Completion Date	Interim Measure of Success	Priority
EO-27	Examine/investigate building hazards and climate change education into K-12 curricula and work with informal educators (museums, etc; i.e. St. Michaels) and establish life safety preparedness. [e.g. turn around, don't drown]	4	MSDE	Internal agency funding	Long Term	Development of an outline for potential approaches to incorporating into the curricula	Medium
<p><b>2016 Status Update: MSDE – DHR filled out this questionnaire for MSDE – No, Not complete. The examination and investigation of building hazards and climate change education should be delegated to MSDE. DHR does not participate nor do they have the authority to create curriculum for MSDE. This is no longer applicable.</b></p> <p><b>Note: DHR is engaged in ongoing site visits as a SME for the Criteria for Determination of Potential Areas for Public Shelter Use Under COMAR 23.03.02.29.</b></p>							
PPP-3	Conduct training on mitigation planning and project development such as HAZUS-MH, BCA, G-level Coastal Construction, Residential retrofit, G-318, project development.	4	MEMA/Mitigation	EMPG; HMGP 5% initiative, FEMA HMTAP	As funding is available	Within one year of plan adoption, schedule and hold two training courses.	Low
<p><b>2016 Status Update: MEMA/Mitigation – MEMA works closely with Local Jurisdictions and with partners MDE, DNR, MES, and The Maryland Silver Jackets to provide access to these trainings both in State and at EMI.</b></p>							
PPP-15	Hold a state-wide dam safety conference, including upstream organizations from neighboring states.	4, 5	Maryland Department of Environment, Dam Safety Program	Staff resources; conference registrations; sponsorship	Short-term	Within one year of plan adoption, identify funding mechanism for conference.	Medium
<p><b>2016 Status Update: Dam Safety – Action Complete – The Association of State Dam Safety Officials (ASDSO) coordinated a regional conference in Ocean City in March 2015. Many dam owners and regulatory officials from Maryland and Pennsylvania attended. Maryland Dam Safety intends to hold a dam owner workshop in FY 16, and is scheduled to participate in workshops with Montgomery and Howard County Emergency officials and dam owners.</b></p>							
<p><b>MDE – Contact Dam Safety</b></p>							

MARYLAND HAZARD MITIGATION PLAN

ID #	Project Description	Objective	Lead/Support Agency	Funding Source	Target Completion Date	Interim Measure of Success	Priority
EO-28	Develop and conduct education efforts that are targeted to repetitive loss property owners increase knowledge and awareness of mitigation grants by conducting various outreach activities.		MEMA	Internal	2013	N/A	High
<b>2016 Status Update: MEMA – No, on-going. MEMA works closely with Local Jurisdictions and with partners MDE, DNR, MES, and The Maryland Silver Jackets to mailings with HMA programs that can assist with mitigation in SL and SRL communities.</b>							
EO-29	Promoting mitigation of RL and SRL properties at regional meetings hosted by MEMA Regional Administrators attended by county and municipal emergency managers. These meetings will provide potential HMA grant sponsors with mitigation options information through a presentation and		MEMA	Internal	2012	N/A	High
<b>2016 Status Update: MEMA – No, no longer applicable. This action item can be removed.</b>							



## SECTION VII: MANAGEMENT & LOCAL MITIGATION PLANS

### STATE MITIGATION PLAN REVIEW GUIDE

Released March 2015 FP 302-094-2

This *State Mitigation Plan Review Guide (Guide)* is FEMA’s official policy on and interpretation of the natural hazard mitigation planning requirements. The intended use of the *Guide* is to facilitate consistent evaluation and approval of state mitigation plans, as well as to facilitate state compliance with the mitigation planning requirements when updating plans.

Figure 7.1—State Mitigation Review Guide S12, S13, S14, S15 & S16

ELEMENT	REQUIREMENTS
<p>S12. Does the plan discuss the evaluation of the state’s hazard management policies, programs, capabilities, and funding sources to mitigate the hazards identified in the risk assessment? [44 CFR §201.4(c)(3)(ii)<sup>22</sup>]</p> <p><b>Intent:</b> <i>To identify and build the state’s capabilities to reduce risk and increase resilience.</i></p>	<p>The plan must describe existing state pre- and post-disaster hazard management policies, programs, and capabilities to mitigate the hazards in the state, including:</p> <ul style="list-style-type: none"> <li>a. An evaluation of state laws, regulations, policies, and programs related to hazard mitigation, as well as to development in hazard-prone areas, to include the state’s administration of the: <ul style="list-style-type: none"> <li>1. National Flood Insurance Program (NFIP) and Community Rating System (CRS); and</li> <li>2. Risk Mapping, Assessment, and Planning (Risk MAP) program.</li> </ul> </li> <li>b. A discussion of state funding capabilities for hazard mitigation projects, including: <ul style="list-style-type: none"> <li>1. A general description of how the state has used its own funds for hazard mitigation projects; and</li> <li>2. A general discussion of how the state has used FEMA mitigation programs and funding sources, including but not limited to: <ul style="list-style-type: none"> <li>a. HMGP, PDM, and FMA; and</li> <li>b. PA C-G.</li> </ul> </li> </ul> </li> <li>c. A general summary of: <ul style="list-style-type: none"> <li>1. Obstacles and challenges; and</li> <li>2. Changes since the previous plan approval.</li> </ul> </li> </ul>
<p>S13. Does the plan generally describe and analyze the effectiveness of local and tribal, as applicable, mitigation policies, programs, and capabilities? [44 CFR §201.4(c)(3)(ii)]</p> <p><b>Intent:</b> <i>To ensure the state understands the local and tribal, as applicable, jurisdictions’ capabilities to accomplish hazard mitigation, particularly as capability varies across jurisdictions.</i></p>	<ul style="list-style-type: none"> <li>a. The plan must provide a general summary of current local and tribal, as applicable, policies, programs, and capabilities of jurisdictions to accomplish hazard mitigation.</li> <li>b. The plan must describe the effectiveness of local and tribal, as applicable, mitigation policies, programs, and capabilities, including: <ul style="list-style-type: none"> <li>1. Challenges to implementing local and tribal, as applicable, mitigation policies, programs, and capabilities.</li> </ul> </li> </ul> <p>Opportunities for implementing mitigation actions through local and tribal, as applicable, capabilities.</p>

<p>S14. Does the plan describe the process to support the development of approvable local and tribal, as applicable, mitigation plans? [44 CFR §§201.3(c)(5)<sup>23</sup> and 201.4(c)(4)(i)<sup>24</sup>]  <b><i>Intent:</i></b> <i>To direct state resources toward effective local and tribal, as applicable, mitigation planning.</i></p>	<p>a. The plan must describe how the state supports developing or updating FEMA-approvable local and tribal, as applicable, mitigation plans, including the process used to provide:</p> <ol style="list-style-type: none"> <li>1. Training;</li> <li>2. Technical assistance; and</li> <li>3. Funding [<i>NOTE: criteria for prioritizing funding for planning and project awards are addressed in S15.</i>]</li> </ol> <p>b. The plan must provide a summary of the:</p> <ol style="list-style-type: none"> <li>1. FEMA-approved local and tribal, as applicable, mitigation plan coverage;</li> <li>2. Barriers to developing or updating, adopting, and implementing FEMA-approved local and tribal, as applicable, mitigation plans; and</li> </ol> <p>c. Approach to remove barriers in order to advance local and tribal, as applicable, mitigation planning.</p>
<p>S15. Does the plan describe the criteria for prioritizing funding? [44 CFR §201.4(c)(4)(iii)<sup>25</sup>]  <b><i>Intent:</i></b> <i>To guide investment decisions and communicate state priorities for mitigation actions.</i></p>	<p>The plan must describe criteria for prioritizing jurisdictions to receive planning and project grants under available Federal and non-Federal programs. A principal criterion for prioritizing grants shall be the extent to which benefits are maximized.</p>
<p>S16. Does the plan describe the process and timeframe to review, coordinate, and link local and tribal, as applicable, mitigation plans with the state mitigation plan? [44 CFR §§201.3(c)(6),<sup>26</sup> 201.4(c)(2)(ii), 201.4(c)(3)(iii), and 201.4(c)(4)(ii)<sup>27</sup>]  <b><i>Intent:</i></b> <i>To streamline the review and approval of local and tribal, as applicable, mitigation plans, create a common understanding of risk, and align mitigation strategies between state, local, and tribal, as applicable, plans</i></p>	<p>a. The plan must describe the process and timeframe used by the state to review and submit approvable local and tribal, as applicable, mitigation plans to FEMA.</p> <p>b. The plan must describe the process and timeframe used by the state to coordinate and link risk assessments and mitigation strategy information from local and tribal, as applicable, mitigation plans into the state mitigation plan.</p>

## 1. State Capabilities, Programs, & Policies

Maryland has a variety of existing pre-and post-disaster hazard management policies, programs, and capabilities to mitigate hazards in the state. State Departments with related planning and program processes include:

- Maryland Department of the Environment: (NFIP, CRS, Stormwater Management Program, Dam Safety);
- Department of Natural Resources (Coast Smart, Climate Action Plan, Land Preservation and Recreation Plan, Chesapeake Bay Critical Areas Commission);
- Maryland Department of Planning;
- Maryland Historical Trust (Hazard Mitigation for Historic Properties);
- Maryland Department of Transportation (Consolidated Transportation Plan);
- MDOT Modal Plans: State Highway Administration, Maryland Transit Administration, Maryland Port Administration);

- Maryland Department of Housing and Community Development (CDBG, Sandy Recovery funds);
- Maryland Department of Business and Economic Development;
- Maryland Department of General Services;
- Maryland Insurance Administration;
- Department of Human Resources; and
- Maryland Energy Administration.

**a. Management of the NFIP & CRS**

The Maryland Department of the Environment with the support of the Maryland Emergency Management Agency manages the National Flood Insurance Program (NFIP) and encourages local participation in the Community Rating System (CRS). As part of local mitigation plan updates, the State recommends that all mitigation strategies that may be undertaken to qualify for CRS points be denoted. In addition, the three components utilized for NFIP compliance are encouraged within all local plans:

- Floodplain Identifications and Mapping;
- Floodplain Management, and
- Flood Insurance Education & Outreach.

**b. Floodplain Management Model Ordinance**

The *Maryland Model Floodplain Ordinance* (May, 2014) was prepared by the Maryland Department of the Environment (MDE) in response to the requirement that local jurisdictions adopt regulations that are fully comply with the requirements of the National Flood Insurance Program (NFIP). For most communities, the requirement to update regulations is triggered by revisions to the Flood Insurance Rate Maps (FIRMs) and associated Flood Insurance Study (FIS). One of the more significance portions of the model ordinance was the recommendation of 2' freeboard.

**c. Floodplain Management**

Changes since the last plan update included the addition of Maryland DFIRM Outreach Website. The Maryland Department of the Environment created Maryland’s Flood Risk Application to help communities and citizens make informed decisions about flood risk. The website enables users to determine flood risk, at <http://mdfloodmaps.org>

*Table 7.1–Maryland Floodplain Management*

<b>Maryland Floodplain Management</b>	
<b>Maryland Dept. of the Environment’s Role:</b>	<b>Local Jurisdiction’s Role:</b>
State Coordinating Office for the National Flood Insurance Program	Participating Community in the NFIP <ul style="list-style-type: none"> <li>• Flood Insurance Available to Homeowners, Businesses, and Renters</li> </ul>
Cooperating Technical Partner with FEMA	Agreed to Adopt and Enforce Floodplain Management Regulations <ul style="list-style-type: none"> <li>• Regulations Based Upon Mapped Flood zones</li> </ul>
Added Enhancements over Standard FEMA Program- <ul style="list-style-type: none"> <li>• Better Data</li> <li>• Better Modeling Techniques</li> <li>• Better for Applicants and County Staff</li> </ul>	Use FIRM’s and Flood Insurance Study (FIS) for “development” review process <ul style="list-style-type: none"> <li>• Apply NFIP requirements</li> </ul>

**d. Maryland CRS Users Group**

During the 2011-2016 planning cycle, the Maryland CRS Users Group was established and members participated in the various workshops and meetings. The group exemplifies the value of collaboration and supporting one another to achieve flood mitigation and resiliency goals.

*Table 7.2–Maryland CRS Users Group*

Maryland CRS Users Group		
Date	Activity	Location
9/20/2012	CRS Workshop	City of Annapolis
5/22/2013	Kick-Off Meeting	Wye Education & Research Center-Queenstown
9/20/2013	CRS Workshop-Silver Jackets Sponsored	Kent Island
1/14/2014	CRS User’s Group Meeting	Dorchester County
1/13/2016	CRS User’s Group Meeting	Charles County-LaPlata
5/24/2016	CRS User’s Group Meeting	Havre de Grace
9/08/2016	CRS User’s Group Meeting	Talbot County-Easton

**e. Enhanced HAZUS**

Beginning in 2014, Maryland with the assistance of FEMA has been pursuing the goal of completing Enhanced Hazus using User Defined Data (UDF) to not only support the update of the State hazard mitigation plan, but local hazard mitigation plan updates, as well. The *2011 State of Maryland Hazard Mitigation Plan* incorporated Hazus data into the plan update. At the time, this was the best available information for completing the vulnerability assessment. As the plan was finalized and subsequently disseminated to local jurisdictions, issues were identified. The Hazus program used in the 2011 Plan was a Level 1 Analysis. This type of Hazus analysis using default data already incorporated into the modeling program, the default data is produced at the national level, resulting in a diminished level of accuracy. In order to increase accuracy, the decision was made to develop Enhanced Hazus analysis per local jurisdiction, and incorporate Maryland defined facilities and new depth grids into all Hazus runs.

**f. Depth Grid**

The Federal Emergency Management Agency (FEMA) in cooperation with the Maryland Department of Environment (MDE), and Maryland Emergency Management Agency (MEMA) are developing Non-Regulatory Coastal Flood Risk Product for jurisdictions located within the coastal area of the Chesapeake Bay. The planning initiative is intended to assist local communities with increasing their resiliency to flooding and to better protect their citizens. Results are provided in a Flood Risk Report (FRR), which is not intended to be regulatory or the final authoritative source of all flood risk data in the project area. The reports are intended to be used in conjunction with other data sources to provide a comprehensive picture of flood risk within the project area.

FEMA’s Hazus program was utilized to determine coastal flood losses for the 1-percent-annual-chance flood event. In order to accurately calculate loss estimates, user defined data was imported into Hazus for the coastal flood risk product. First, depth grids were developed using the high-resolution digital elevation model (DEM) and FIRM Zones AE and VE with a static base flood elevation (BFE) for the approved Digital Flood Insurance Rate Maps (DFIRM). Flood depths were obtained by subtracting the water surface from the ground elevation; hence depth grids. Next, the user defined facility inventory was developed. User defined inventory includes: residential, commercial and other (industrial, agriculture, religion, government and educational). Building footprints were utilized to determine which structures

were located within the flood zone. The lowest adjacent grade was determined for each structure within the flood risk area to depict where the flood will be the highest on each structure affected. Additionally, information from the 2012 Maryland Property View Database was incorporated to ensure all necessary attributes were captured in order to obtain more accurate loss estimates. By inputting user defined data and inventory into the Hazus program, a site-to-site result versus an aggregated table of damages and losses is provided.

**g. Risk Mapping, Assessment, and Planning (Risk MAP)**

Risk MAP provides high quality flood maps and information, tools to better assess risk from flooding, and planning and outreach support to communities to help them take action to reduce flood risk.

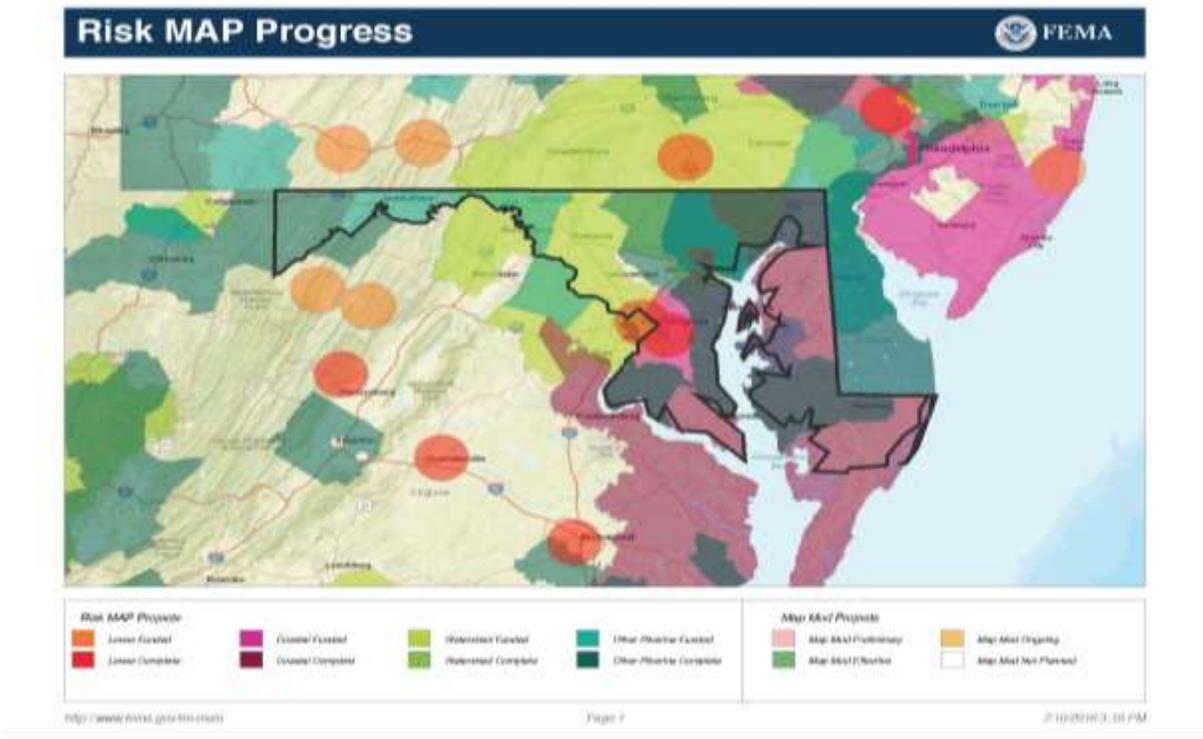
Coastal Risk Map Products will be used and incorporated into both the 2016 State of Maryland Hazard Mitigation Plan, but in local hazard mitigation plan updates, as well. Regional outreach meetings incorporated a FEMA Risk Map presentation to inform participants of the exciting new products available for this plan cycle.

FEMA has worked with Maryland to provide high quality flood maps and information, FEMA Risk Map Progress Data Summary and Map for Maryland is provided below.

*Table 7.3—FEMA Risk Map Progress Summary*

Coastal Funded	Coastal Completed	Watershed Funded	Watershed Complete	Other Riverine Funded	Other Riverine Complete
2	15	4	0	2	15

*Figure 7.2—FEMA Risk Map Progress*



**h. Maryland's Stormwater Management Program**

The State of Maryland has developed comprehensive stormwater management, and erosion and sediment control programs to reduce the adverse impacts of development on stormwater runoff. This program addresses both the temporary and the permanent impacts associated with development activities. Information on the Maryland Department of the Environment website describes the program and its requirements, and presents guidance on how to implement stormwater management in Maryland. Guidance, data, and training provided includes;

- Erosion and Sediment Control and Stormwater Management Plans for State and Federal Projects;
- Maryland's erosion and sediment control Certificate of Responsible Personnel Training: On-line Training and Exam Program;
- National Pollutant Discharge Elimination System (NPDES) stormwater permit to the Maryland State Highway Administration;
- 2015 Maryland Soil Erosion and Sediment Control Standards and Specifications for Forest Harvest Operations (Manual);
- MDE has developed a database structure for Phase II Municipal Separate Storm Sewer System (MS4) permittees to use for reporting stormwater best management practice (BMP) data;
- Fact Sheet on NPDES Phase II MS4 Permit restoration reporting and the database structure;
- Guidelines for Embankment Retrofit Design; and,
- Maryland Stormwater Seminars-October2013, MDE three regional seminars.

**i. Maryland's Stormwater Design Guidance**

MDE has published guidance on various technical procedures and calculations relevant to implementing environmental site design (ESD) for both new development and redevelopment. The following publications provide additional information for use when designing or reviewing stormwater plans:

- Environmental Site Design Process & Computations (July 2010)
- Model Standard Plan for Residential Construction (October 2009)
- Environmental Site Design Redevelopment Examples (December 2010)
- Stormwater Design Guidance - Addressing Quantity Control Requirements (June 2012)
- Stormwater Design Guidance - Rainwater Harvesting (June 2012)
- Stormwater Design Guidance - Submerged Gravel Wetlands (June 2012)
- Stormwater Design Guidance - Solar Panel Installations (January 2013)

Additionally, the Maryland Department of the Environment provides additional information and guidance on the use of alternative/innovative technologies for addressing Maryland's Stormwater Management requirements.

- Environmental Site Design and Innovative Technology (May 2013)
- Maryland's Stormwater Program & Alternative/Innovative Technologies (July 2014)
- Certification of Innovative Stormwater Management Technologies for Retrofit Applications (July 2014)
- MDE's Alternative/Innovative Technology Review Checklist (July 2014)
- MDE's List of Reviewed Alternative/Innovative Technologies (August 2015)

**j. Maryland Association of Floodplain and Stormwater Managers (MAFSM)**

According to the MAFSM website, the Maryland Association of Floodplain and Stormwater

Managers (MAFSM) was organized in 2004 by a group of private and public partners. The Association is organized exclusively for charitable, educational or scientific purposes within the meaning of Section 501(c)(3) of the Internal Revenue Code.

The purpose of MAFSM is to:

- Provide educational opportunities and dissemination of general and technical information to individuals concerned with sound floodplain and stormwater management
- Promote public awareness of sound floodplain and stormwater management and the linkages between them,
- Encourage the exchange of information, ideas, experiences, etc., among the practitioners of floodplain and stormwater management,
- Promote the professional status of floodplain and stormwater managers,
- Inform and provide technical information relative to legislation pertinent and necessary to the effective implementation of sound floodplain and stormwater management practices; and,
- Promote environmentally sound solutions to floodplain and stormwater problems.

**k. Maryland Silver Jackets**

The Maryland Silver Jackets Team first convened in 2010. Its outreach activities include educating residents on the difference between storm surge inundation maps that are part of hurricane evacuation studies and flood insurance rate maps developed for the National Flood Insurance Program. In addition, the team is focused on data sharing, and the Maryland Hazard Mitigation Grant program.

**l. National Resources Defense Council**

NRDC advocates for state and federal policies that account for increased floods risks and impacts on our water resources. NRDC successfully petitioned FEMA to require states to account for the risks of climate change in their State Hazard Mitigation Plans. NRDC has been involved in all aspects of plan development, in particular recommending ways to address climate change and sea level rise in Maryland. NRDC representatives participated in all Mitigation Advisory Committee meetings, regional outreach meetings and were involved in the development of plan strategies and action.

**m. Maryland Historical Trust-Cultural Resources Hazard Mitigation Planning Program**

The Cultural Resources Hazard Mitigation Program is aimed at protecting historic places, archeological sites, and cultural landscapes from the effects of natural hazards, such as flooding, wind and coastal erosion. The impacts of Hurricane Sandy in Maryland and to historic communities along the East Coast highlighted the need to protect the many landmarks, districts and sites that contribute so much to our economy and quality of life.

Through the two-year Program, MHT developed trainings, model guidance and educational materials to assist local governments in creating hazard mitigation plans for their cultural resources. MHT promotes a planning framework based on FEMA's Integrating Historic Property and Cultural Resources into Hazard Mitigation Planning, which is currently being utilized in Annapolis. MHT also offers one-on-one technical assistance to aid local governments in plan development and mitigation projects involving cultural resources.

## 2. Training & Technical Assistance

MEMA hazard mitigation staff provide technical assistance and training both pre and post disaster events.

*Table 7.4—MEMA Pre & Post Disaster Technical Assistance, Training & Outreach Matrix*

Technical Assistance, Training & Outreach	Pre Disaster	Post Disaster
MEMA Mitigation Staff Attendance and Mitigation Agenda Item at all FEMA Public Assistance Local Briefing meetings.		✓
Following disaster declarations Maryland distributes <i>Hazard Mitigation Grant Program</i> mailer to all Maryland repetitive loss and severe repetitive loss property owners.		✓
Mitigation Staff are assigned to State Damage Assessment Teams and are deployed to affected areas.		✓
MEMA routinely conducts maintenance and monitoring check for all generators purchased through Hazard Mitigation Assistance Programs.	✓	✓
Distribution of Maryland & FEMA Hazard Mitigation publications. <ul style="list-style-type: none"> <li>• <i>Maryland Application Guide Hazard Mitigation Grants</i></li> <li>• <i>Homeowners Application Guide-Hazard Mitigation Grants-Acquisition</i></li> <li>• <i>Homeowners Application Guide-Hazard Mitigation Grants-Elevations</i></li> </ul>	✓	✓
Regional & Local Mitigation & Resiliency Workshops. <ul style="list-style-type: none"> <li>• Crisfield Workshop: November 17, 2015</li> <li>• Smith Island Workshop: November 18, 2015</li> <li>• Beyond the Map (6) Regional Workshops: January-April 2016</li> </ul>	✓	✓
Training Programs: FEMA 318 & 393 Courses <ul style="list-style-type: none"> <li>• MEMA and the Maryland Department of the Environment worked together to prepare and conduct half-day workshops targeting floodplain managers. Pre and Post Disaster grant opportunities and the application process used at the local level was reviewed, along with building codes and requirements.</li> </ul>	✓	✓
Development of draft Maryland Floodplain Management Quick Guide	✓	
CRS Users Group Meetings	✓	✓
Maryland Resiliency Partnership	✓	✓
Silver Jackets (Army Corp. or Engineers facilitated Federal-State Partnership)	✓	✓
MEMA staff attendance at local Hazard Mitigation Plan Kick-Off Meetings, encouraging local planning efforts and highlighting new opportunities for data, mapping, strategies, and plan integration.	✓	
MEMA staff attendance at local mitigation planning and project meetings providing administration assistance and assistance with special projects.	✓	
Data distribution and technical assistance. <ul style="list-style-type: none"> <li>• Maryland data is hosted at mdfloodmaps.net and IMAPS. IMAPS is Maryland's Mapping &amp; GIS Portal</li> <li>• MEMA &amp; MDE routinely conduct community.</li> </ul>	✓	✓

Figure 7.3—Examples of MEMA Outreach Publications

# MITIGATION

## HAZARD MITIGATION GRANT PROGRAM

Part of your long term preparation for storm events can include mitigation measures to provide permanent protection from storm damage. Ocean City works in cooperation with the Maryland Emergency Management Agency to develop hazard mitigation strategies for the city, and to provide opportunities for property owners to participate in the Hazard Mitigation Grant Program (HMGP).

The HMGP provides grants to State and local governments to implement long-term hazard mitigation measures after a major storm disaster declaration. The purpose is to reduce the loss of life and property due to natural disasters and to enable mitigation measures to be implemented during the immediate recovery from a disaster.

HMGP funds may be used for projects that will reduce or eliminate losses from future disasters, and must provide savings greater than the cost of the project. All mitigation projects must be cost-effective, technically feasible, and meet Environmental Planning and Historic Preservation requirements in accordance with FEMA guidance. In addition, all mitigation activities must adhere to all relevant state and local regulations, and requirements.

### Who is eligible to Apply?

Locally self-governed governments (see map), and (2) selected fee applicants to cities or local or adjoining property owners.



### Eligible Projects

- ✓ Property Acquisition/Relocation
- ✓ Property Acquisition/Relocation
- ✓ Structural Repairs
- ✓ Storm resistant Roofing/Decking

### How do I apply for a Mitigation Grant?

1. Contact the Maryland Emergency Management Agency, or your local emergency management agency for more information.
2. Prepare a scope of work with the general concept of the project.
3. Get estimates of project cost.
4. Agree to the cost sharing formula for 75% Federal, 25% non-Federal.

**Dear Resident,**

As a result of hurricanes and other flooding events in recent years, the Maryland Emergency Management Agency is offering property owners the opportunity to apply for a grant to help pay for the cost of flood mitigation measures. Your property is either on the FEMA list of repetitive loss claims for Flood Insurance, or is otherwise in a flood hazard area and vulnerable to flood damage.

The information in this flyer explains the Hazard Mitigation Grant Program and how you can apply for a grant to elevate, relocate, or acquire your home. Please contact us with any questions. Thank you.

Russell L. Strickland, Executive Director

**More information on the Hazard Mitigation Grant Program:**

Mark Jones  
State Hazard Mitigation Officer  
Maryland Emergency Management Agency  
5485 Box Side La Drive  
Rockville, MD 21138  
Phone: 410.303.0663  
email: mark.jones@maryland.gov  
web: mema.maryland.gov




**MARYLAND**  
Emergency Management Agency  
42411-0000



## Hazard Mitigation Grant Program



**MARYLAND**  
Emergency Management Agency

Date: Tuesday, November 17, 2015  
Time: 5-8 PM  
Location: J. Millard Tawes Historical Museum, Second Floor

**FREE!**

### Refreshments will be provided!



## Be Flood Ready: A workshop to prepare you for the next time the water rises.

### Crisfield Flood Risk Workshop

Come learn how you can make your home safer, and reduce your risk to flooding. Topics will include:

- What are Flood Mapping and Elevations and Why are They Important?
- Safety Measures for New Construction and Renovations in the Floodplain
- Could You Be Getting Better Flood Insurance Coverage at a Lower Rate?
- Grants and Assistance to Retrofit Your House for Flooding

**Partners:**

- City of Crisfield
- Solomons County
- Solomons County Long-Term Recovery Committee (SC/LTC)
- Maryland Department of the Environment (DOR)
- Maryland Emergency Management Agency (MEMA)
- Maryland Department of Natural Resources (DNR)
- Maryland Department of Natural Resources (DNR)
- Maryland Department of Planning (MD/MDA) Historical Trust (MDHT)
- Federal Emergency Management Agency (FEMA)

**Crisfield Flood Risk Workshop**  
J. Millard Tawes Historical Museum  
3 North Street  
Crisfield, MD 21817  
Phone: 410-968-1333



## HOMEOWNER APPLICATION GUIDE HAZARD MITIGATION GRANTS

# ELEVATIONS



Maryland Emergency Management Agency



June 2015

### 3. State Funding Capabilities

The Maryland Emergency Management Agency provides local jurisdictions with guidance and support for their mitigation planning initiatives. MEMA hazard mitigation staff has worked with local governments to ensure that they have the resources necessary for effective and relevant hazard mitigation planning. The MEMA Hazard Mitigation program has facilitated funding (FEMA Pre-disaster Mitigation and Hazard Mitigation Grant Program planning funds and Flood Mitigation Assistance (FMA)) and technical assistance, and provided planning assistance to the following local governments: Maryland's 23 counties and 123 of the State's 139 municipalities, including the cities of Baltimore and Annapolis, and the Town of Ocean City. Consequently, nearly all county and municipal jurisdictions throughout Maryland have FEMA-approved and locally adopted hazard mitigation plans in effect.

The plans that have been approved and those currently under development, MEMA has provided financial support through several federally funded hazard mitigation grant programs. These MEMA-administered programs include the Pre-Disaster Mitigation Grant Program (PDM), the Hazard Mitigation Grant Program (HMGP), and the Flood Mitigation Assistance Program (FMA).

MEMA mitigation staff to track the status of local hazard mitigation plans uses the table and map on the following page.

MARYLAND HAZARD MITIGATION PLAN

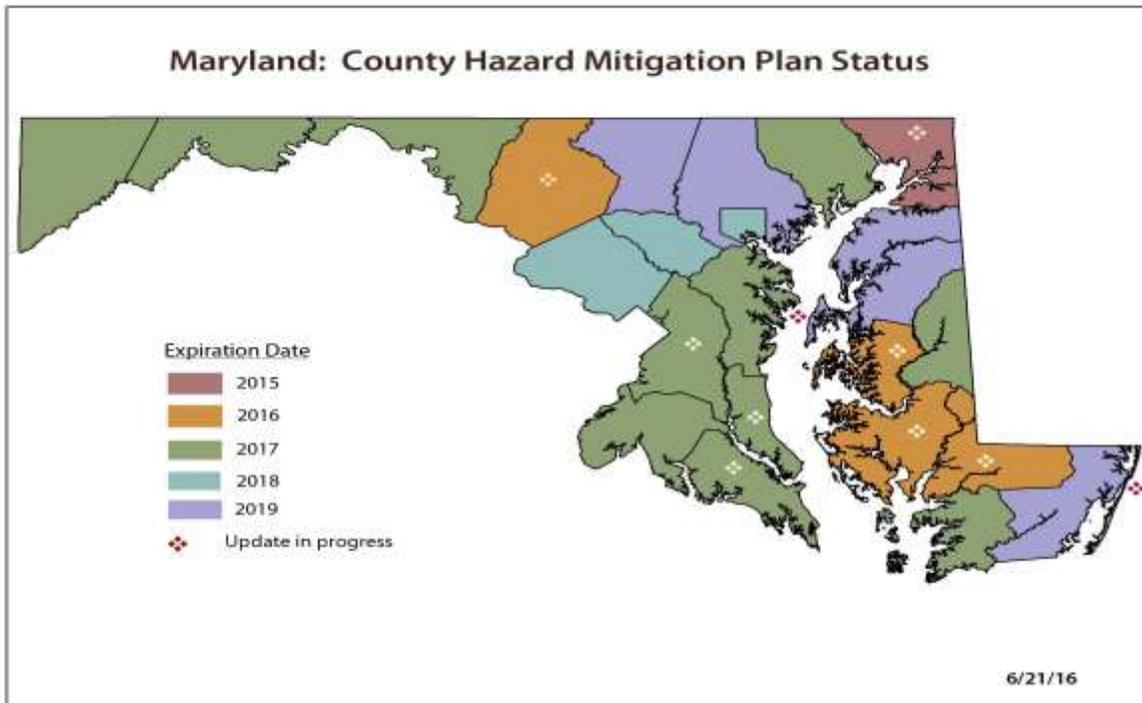
Table 7.5—Maryland Local Hazard Mitigation Plan Review Status - 3<sup>rd</sup> Cycle

		Plan expires	New Started	MEMA	FEMA	Status	HMGP ('12-'15)	Municipal (Adopted)	Comments
Cecil	* 4/26/2015	✓	✓	✓	✓	APA	✓	8 (1)	Approved by FEMA pending local adoption.
Frederick	*2/11/2016	✓	✓	✓	✓		✓	10 (4)	Under review at FEMA
Wicomico	* 4/4/2016	✓	✓	✓	✓		✓	8 (8)	Approved by FEMA pending local adoption.
Talbot	12/19/2016	✓						5 (4)	HMGP Planning grant - update in progress
Dorchester	12/19/2016	✓					✓	6 (3)	HMGP Planning grant - update in progress
Prince George's	2/6/2017	✓					✓	1 (1)	HMGP Planning grant - update in progress
St. Mary's	5/14/2017	✓					✓	1 (0)	HMGP Planning grant - update in progress
Caroline	8/25/2017						✓	10 (10)	Applying for 2016 PDM grant.
Washington	6/26/2017						✓	9(2)	Applying for 2016 PDM grant.
Anne Arundel	10/1/2017						✓	1(0)	Applying for 2016 PDM grant.
Ocean City	* 4/30/2017	✓					✓		HMGP Planning grant - update in progress
Charles	8/6/2017						✓	2 (0)	Applying for 2016 PDM grant.
Somerset	8/24/2017						✓	2(2)	Applying for 2016 PDM grant.
Calvert	5/20/2017	✓					✓	2 (1)	HMGP Planning grant - update in progress
Allegany	5/22/2017						✓	7 (3)	Applying for 2016 PDM grant.
Harford	7/23/2017						✓	3 (3)	
Annapolis City	3/20/2017	✓					✓		HMGP Planning grant - update in progress
Garrett	12/27/2017						✓	7 (6)	Applying for 2016 PDM grant.
Montgomery	4/1/2018						✓	7 (0)	Applying for 2016 PDM grant.
Baltimore City	10/3/2018						✓		
Queen Anne's	4/5/2019						✓	7 (1)	Applying for 2016 PDM grant.
Howard	12/3/2018						✓		
Carroll	3/1/2019						✓	8 (6)	
Worcester	10/7/2019						✓	3 (3)	
Kent	11/28/2019						✓	5 (5)	
Baltimore	9/17/2020						✓		

NOTE: APA = Approved by FEMA pending local adoption

NOTE: \* 3rd Cycle Update Initiated

Figure 7.4— Mapped Local Mitigation Plan Review Status



**a. Obstacles, Challenges, and Changes**

An ongoing challenge over the many hazard mitigation plans developed for both the State and local jurisdictions has been the gathering and organization of hazard risk data. Specifically, critical facility data can be problematic. The term alone “critical facility” oftentimes becomes confusing and a source of contention. In order to create a baseline, the State determined that at a minimum the following critical facilities must be included in both the State and local plan updates.

- Fire Stations
- Hospitals and Medical Clinics
- Police Stations
- Emergency Operations Centers
- Schools (K-12 & Colleges)

These five facility types were determined using *2001 FEMA 386-2 Understanding Your Risks and HAZUS-MH User’s Manual*. Local jurisdictions are encouraged to include additional critical facilities, as they deem appropriate,

The determination of the five minimum critical facility types enabled the State to accomplish a 2011 FEMA recommendation. The development of a state-wide critical facility database was completed as part of the Plan Update. The data within the *Maryland Critical Facility Database* was locally vetted, and is ready for use as a planning tool at both the State and local level. Additionally, update Maryland Property scheduled should be utilized for all new analysis.

The continuation of funding programs that support hazard mitigation at both the local and State level is necessary. The challenge of having too many priority projects and not enough funding to complete those projects and activities continue to plague the Maryland Mitigation

Advisory Committee. Despite challenges, Maryland and its local communities are not daunted and continue to pursue hazard mitigation and resiliency strategies.

## 4. Local Coordination & Capabilities

Jurisdictions in Maryland accomplish hazard mitigation through various policies, programs, and local capabilities. The State supports local mitigation efforts through training, technical assistance, and where available, funding. The State’s ongoing efforts to provide hazard data, planning resources, and communicate state priorities ensure that local jurisdictions are informed. This influences in some ways local risk assessments and mitigation strategies. Conversely, the State considers local hazard mitigation strategies and capabilities, which inform and influence the State’s risk assessment and mitigation priorities.

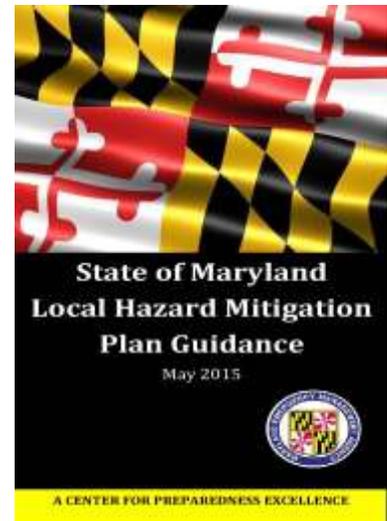
Local jurisdictions within the State have prepared and updated hazard mitigation plans for over a decade. FEMA planning guidebooks and various sources of reference materials have been used extensively. State and local hazard mitigation plans have been prepared on a timely schedule, thereby meeting the requirements set forth in the Disaster Mitigation Act of 2000. In order to achieve similar results and enhanced the combined efforts of the State and local jurisdictions during this round of hazard mitigation plan updates, the State Hazard Mitigation Planning Team developed a guidebook, providing recommendations for improved cooperation.

*Figure 7.5—Local Hazard Mitigation Plan Guidance*

### a. Local Hazard Mitigation Plan Guidance

The Maryland Emergency Management Agency developed local hazard mitigation plan guidance in May of 2015 to advise local jurisdictions of available resources, coordination activities, and minimum elements that should be included within their next local hazard mitigation plan updates. Maryland specific recommendations were presented as well as the introductions of ideas for both plan integration and resiliency. Minimum elements and recommendations included:

- Top Five Hazards that Impact Maryland and should be included in all local hazard mitigation plans-Flood, Coastal Hazards, Tornado, High Wind, and Severe Winter Weather;
- Essential Facilities definition and facility types that should be included in all local hazard mitigation plans-Police Stations, Fire/Rescue Stations, Emergency Operations Centers, Hospitals and Medical Clinics, and Schools (Maryland Essential Facility Database);
- Floodplain Management-recommendations and available resources;
- Resiliency-Community Preparedness and Resiliency;



*Source: Smith Planning and Design*

- Cultural Resources; and
- Plan Integration- Safe Growth Audit questionnaire.

**b. Local Plan Integration Efforts**

The *State of Maryland Local Hazard Mitigation Plan Guidance* encourages local jurisdictions to incorporate plan integration into all local hazard mitigation plan updates, as a minimum requirement. Local plan integration should consider plans, policies, codes, and programs that guide community development. In order to effectively integrate hazard mitigation comprehensively at a local level, the community’s planning framework must lead to development patterns that do not increase risks from known or potential hazards. To that end, the State will continue their efforts to encourage local governments to consider plan integration and at a minimum complete FEMA’s Safe Growth Audit for inclusion into their local hazard mitigation plan updates.

The goal of **safe growth** is to build environments that are safe for current and future generations and to protect buildings, transportation, utilities, and the natural environment.

**c. Local Capability Assessment**

The *State of Maryland Local Hazard Mitigation Plan Guidance* encourages local jurisdictions to provide a description and analysis of their current capacity to address threats and impacts from hazards as a minimum requirement. The guidance provides a series of capability assessment questions to assist and facilitate completion.

**5. Funding Criteria**

The Mitigation Advisory Committee (MAC) serves as the leadership group for the Mitigation Mission Area at the state level. The State departments and agencies engaged in mitigation operate according to their statutory authorities in a roundtable, group approach to making decisions. MEMA serves as the lead for the Mitigation Mission Area and the SHMO serves as chair of the MAC. The MAC is responsible for the review and prioritization of HMA-related projects that are recommended and forwarded to FEMA for funding. The final authority to submit projects to FEMA for funding rests with the Executive Director of MEMA. The MAC is also responsible for the maintenance and revisions of this Plan.

The MAC evaluates and prioritizes all eligible mitigation project applications using the following Project Ranking System (Note: The percentages and priorities noted below are based on the most recent FEMA mitigation grant guidance when this plan was most recently updated. The federal guidance and the total funds available may change each fiscal year.):

- Priority 1 - Hazard Mitigation Plan updates: Valid, adopted HMPs are a pre-requisite for project eligibility in a local jurisdiction. HMP updates are the first priority for all HMA programs. Funds may be allocated to these projects within applicable limits. For example, up to 7% of HMGP funds available may be allocated to the preparation of local HMPs and the State HMP.
- Priority 2 - 5% Initiative (HMGP Only): Up to 5% of HMGP funds available may be allocated for projects that do not meet normal benefit cost analysis, but contribute to hazard mitigation goals. Typically, these are public information, and alert and warning projects.
- Priority 3 - Hazard Mitigation Projects (excluding generators): The balance of funding after allocation above is available for standard mitigation projects, such as those listed below (items below are in no particular order): o Structure Elevations (both residential and non-

residential) o Structure Acquisition/Demolition (both residential and non-residential) o Flood proofing (non-residential structures only) o Public Infrastructure Retrofit Note: Standard Hazard Mitigation projects, including elevations and acquisitions that exceed FEMA cost caps must complete a Benefit Cost Analysis (BCA).

- Priority 4 - Generators for Critical Facilities: The balance of funds available after all other priorities have been met will be applied to generators using a three-step process.

The MAC is staffed from, but not limited to, the following departments, agencies, and associations:

- Maryland Emergency Management Agency (MEMA)
- Maryland Emergency Management Association
- Maryland Department of Business and Economic Development (DBED)
- Maryland Department of Housing and Community Development (DHCD)
- Maryland Department of Human Resources (DHR)
- Maryland Department of Natural Resources (DNR)
- Maryland Department of Planning (MDP)
- Maryland Department of the Environment (MDE)
- Maryland Department of Transportation (MDOT)
- Maryland Department of General Services (DGS)
- Maryland Insurance Administration (MIA)
- Maryland State Treasurer's Office
- Maryland Energy Administration (MEA)

## 6. Local Plan Review

Once a jurisdiction has completed their mitigation plan, the plan will be submitted to MEMA for review. The State Hazard Mitigation Officer or mitigation staff planner evaluates the plan for compliance with all applicable provisions of the Robert T. Stafford Disaster Relief and Emergency Assistance Act of 2000. MEMA will approve the plan or provide feedback regarding required revisions. If the local hazard mitigation plan meets all applicable requirements, the plan will be forwarded to the Federal Emergency Management Agency for review or approval.

The local legislative approval process for mitigation plans will differ by jurisdiction, as plan approval requirements vary widely throughout Maryland. Generally it is recommended that plan updates be conditionally approved by FEMA prior to adoption by county or city elected boards.

## 7. Plan Integration

Plan integration is the process by which the State and local government look critically at their existing planning framework and align efforts with the goal of building a safer, smarter community. Plan integration involves a two-way exchange of information and incorporation of ideas and concepts between hazard mitigation plans (state and local) and other community plans. Specifically, plan integration involves the incorporation of hazard mitigation principles and actions into community plans and community planning mechanisms into hazard mitigation plans.

Building safe and smart communities can be accomplished with the use of an effective Hazard Mitigation Plan and how well it is integrated into other State and local plans. Plan Integration involves the review and incorporation of agency plans, policies, codes, and programs that guide development. Successful integration occurs through collaboration among a diverse set of stakeholders.

### a. Plan Integration & Local Hazard Mitigation Plan Guidance

Maryland has been working diligently to demonstrate and encourage plan integration.

Technical assistance has been provided during a series of six (6) regional outreach meetings. During the regional outreach meetings held between January and April of 2016, a MEMA led session entitled “*Plan Integration-Why it is Important to Know and Understand Your Plan*” was incorporated into each of the six (6) meetings. Participants were provided plan integration worksheets and encouraged to use the 2015 FEMA publication, *Integration: Linking Local Planning Efforts*. Furthermore, participants were directed to the *2015 State of Maryland Local Hazard Mitigation Plan Guidance*, which includes Plan Integration as one of the minimum elements and recommendations within all Maryland local hazard mitigation plan updates.

In addition, MEMA staff provides ongoing technical assistance and routinely meet with local jurisdictions across the State. Jurisdictions applying for mitigation planning grant funding and/or those who are in the process of updating their local plans are provided with plan integration ideas and resources.

### b. Local Government Plan Integration-Maryland Perspective

There are three general areas where the integration of hazard mitigation planning with other local planning processes needs to be addressed:

- Local coordination with Emergency Management Planning
- Integration with local master plan/comprehensive planning structure/process
- Integration with other functional planning

Hazard mitigation planning at the local level is coordinated at the County level for all 23 counties in the State of Maryland, and the City of Baltimore. Municipalities participate in the County planning process and adopt the County plan in most cases, but particularly where

Figure 7.6—Guidance - Plan Integration



there is a need to be eligible for Hazard Mitigation grants. The City of Annapolis (Anne Arundel) and Ocean City (Worcester) prepare hazard mitigation plans independent of the Counties in which they are located.

All local plans are prepared in the context of the local emergency operations plan and this is not considered an area that requires major attention.

Local comprehensive plans and other plans are prepared under the general guidance and specific requirements of the State Land Use Article. Specific requirements and authorization under the Land Use Article vary between Charter (home rule), non-Charter, the City of Baltimore, and Montgomery and Prince George's County (under Maryland National Capital Planning Commission section).

The recommended elements of a local government comprehensive plan include:

- Community facilities element
- Area of critical State concern element;
- Goals and objectives element;
- Land use element;
- Development regulations element;
- Sensitive areas element;
- Transportation element;
- Water resources element.
- Mineral resources element.
- Municipal growth element.
- Fisheries element.
- Community renewal elements
- Conservation elements;
- Flood control elements;
- Housing elements;
- Natural resources elements;
- Pollution control elements;
- General location and extent of public utilities; and
- Priority preservation area element

All local plans have a Sensitive Areas element that addresses the floodplain, with some areas addressing the issue in greater detail. Some jurisdictions, such as Allegany County have a separate section to address flooding issues and the need to mitigate repetitive loss properties.

Also, all Counties that border the Chesapeake Bay are required to prepare and maintain a Chesapeake Bay Critical Areas Program in accordance with State requirements that encompasses all areas within 1000 feet of the tidal shoreline.

The following chart summarizes the status of local comprehensive plans and hazard mitigation plans with notation on jurisdictions have taken steps to expand the scope of hazard mitigation plans, or expanded hazard mitigation related issues in the comprehensive plans.

Table 7.6—Local Plan Integration Status

Jurisdiction	Comp Plan	Date	Sensitive Areas	Hazard Mitigation Addressed*	Critical Areas Program	Hazard Mitigation Plan	Plan Status
Allegany	✓	2014	✓	✓		2012	
Annapolis	✓	2009	✓	✓	✓	2014	Update in process
Anne Arundel	✓	2009	✓	✓	✓	2012	
Baltimore City	✓	2006	✓	✓	✓	2013	
Baltimore	✓	2010	✓	✓	✓	2015	
Calvert	✓	2010	✓	no	✓	2012	Update in process
Caroline	✓	2010	✓	no	✓	2012	
Carroll	✓	2014	✓	no		2014	
Cecil	✓	2010	✓	✓	✓	2016	Update completed
Charles	✓	2006	✓	✓	✓	2012	
Dorchester	✓	1996	✓	no	✓	2011	Updates in process
Frederick**	✓	2012	✓	✓		2016	Update completed
Garrett	✓	2008	✓	✓		2012	
Harford	✓	2012	✓	no	✓	2012	
Howard	✓	2012	✓	no		2013	
Kent	✓	2006	✓	✓	✓	2014	
Montgomery	✓	2006	✓	no		2013	
Ocean City	✓	2006	✓	✓	✓		Update in process
Prince George's	✓	2010	✓	✓	✓	2012	Update in process
Queen Anne's	✓	2010	✓	no	✓	2014	
Somerset	✓	2010	✓	no	✓	2012	
Saint Mary's	✓	2010	✓	✓	✓	2012	Update in process
Talbot	✓	2005	✓	no	✓	2011	Update in process ***
Washington	✓	2002	✓	no		2012	Update in process
Wicomico	✓	1999	✓	no	✓	2016	Update completed
Worcester	✓	2006	✓	✓	✓	2014	

\*Hazard Mitigation / Disaster Resiliency beyond what mentioned in Sensitive Areas Element

Notes: Allegany Co Comp Plan: Floodplains, Acquisition, RL/SRL properties addressed; Anne Arundel: Sea Level Rise addressed; Baltimore City All-Hazards Plan prepared by Planning Department and referenced in Comp Plan;

\*\*Frederick County has complete summary in a Hazard Mitigation Element in the Comp Plan

\*\*\* Talbot County is preparing a comprehensive resiliency plan.

Saint Mary's County HMP is incorporated by reference into the County Comp Plan

**c. State Plan Integration**

The structure of the planning process is unique to every local jurisdiction, so the opportunities for expanded plan integration will need to be tailored to each locality.

Likewise, agency coordination, cooperation and involvement in the mitigation planning process varies among jurisdictions, but multi-agency/department participation is required, and practiced by each jurisdiction.

Other areas where coordination and cooperation among local jurisdictions exist include:

- Maryland Department of Planning- Planning Directors Roundtable
- Maryland Chapter American Planning Association

- Maryland Association of Planning Commissioners
- Baltimore Metropolitan Council
- Metropolitan Washington Council of Governments
- Tri County Council for Western Maryland
- The Tri-County Council for the Lower Eastern Shore of Maryland
- Eastern Shore Land Conservancy
- Maryland Association of Counties
- Maryland Municipal League

**d. Integration with Overriding State Plan Guidance**

Maryland does not have an overriding Comprehensive Plan, but all State planning activities adhere to the general guidance and the following visions of the State Land Use Article:

*(1) quality of life and sustainability: a high quality of life is achieved through universal stewardship of the land, water, and air resulting in sustainable communities and protection of the environment;*

*(2) public participation: citizens are active partners in the planning and implementation of community initiatives and are sensitive to their responsibilities in achieving community goals;*

*(3) growth areas: growth is concentrated in existing population and business centers, growth areas adjacent to these centers, or strategically selected new centers;*

*(4) community design: compact, mixed-use, walkable design consistent with existing community character and located near available or planned transit options is encouraged to ensure efficient use of land and transportation resources and preservation and enhancement of natural systems, open spaces, recreational areas, and historical, cultural, and archaeological resources;*

*(5) infrastructure: growth areas have the water resources and infrastructure to accommodate population and business expansion in an orderly, efficient, and environmentally sustainable manner;*

*(6) transportation: a well-maintained, multimodal transportation system facilitates the safe, convenient, affordable, and efficient movement of people, goods, and services within and between population and business centers;*

*(7) housing: a range of housing densities, types, and sizes provides residential options for citizens of all ages and incomes;*

*(8) economic development: economic development and natural resource-based businesses that promote employment opportunities for all income levels within the capacity of the State's natural resources, public services, and public facilities are encouraged;*

*(9) environmental protection: land and water resources, including the Chesapeake and coastal bays, are carefully managed to restore and maintain healthy air and water, natural systems, and living resources;*

*(10) resource conservation: waterways, forests, agricultural areas, open space, natural systems, and scenic areas are conserved;*

*(11) stewardship: government, business entities, and residents are responsible for the creation of sustainable communities by collaborating to balance efficient growth with resource protection; and*

*(12) implementation: strategies, policies, programs, and funding for growth and development, resource conservation, infrastructure, and transportation are integrated across the local, regional, State, and interstate levels to achieve these visions.*

Numerous processes and structures exist to facilitate the programmatic and planning coordination among Maryland State Agencies:

- Smart Growth Sub-Cabinet;
- State Mitigation Advisory Committee;
- Maryland Resiliency Partnership;
- State Clearinghouse/MIRC (Maryland Intergovernmental Review & Coordination);
- Maryland Association of Stormwater and Floodplain Managers; and,
- Silver Jackets (Army Corp. of Engineers facilitated Federal-State Partnership).



## SECTION VIII: REPETITIVE LOSS STRATEGY

A Repetitive Loss Strategy identifies actions to reduce damage to Repetitive Loss (RL) and Severe Repetitive Loss (SRL) properties throughout the state.

### STATE MITIGATION PLAN REVIEW GUIDE

Released March 2015 FP 302-094-2

This *State Mitigation Plan Review Guide (Guide)* is FEMA’s official policy on and interpretation of the natural hazard mitigation planning requirements. The intended use of the *Guide* is to facilitate consistent evaluation and approval of state mitigation plans, as well as to facilitate state compliance with the mitigation planning requirements when updating plans.

Figure 8.1- State Mitigation Plan Review Guide RL

ELEMENT	REQUIREMENTS
RL. Did the state develop a Repetitive Loss Strategy? [44 CFR §201.4(c)(3)(v)]  <i>Intent: Describe how the state intends to reduce the number of repetitive loss properties (which must include severe repetitive loss properties).</i>	RL1. Did Element S6 (risk assessment) address RL and SRL properties? [44 CFR §§201.4(c)(2)(ii), 201.4(c)(2)(iii), and 201.4(c)(3)(v)] RL2. Did Element S8 (mitigation goals) address RL and SRL properties? [44 CFR §§201.4(c)(3)(i) & 201.4(c)(3)(v)] RL3. Did Element S9 (mitigation actions) address RL and SRL properties? [44 CFR §§201.4(c)(3)(iii) & 201.4(c)(3)(v)] RL4. Did Element S10 (funding sources) address RL and SRL properties? [44 CFR §§201.4(c)(3)(iv) and 201.4(c)(3)(v)] RL5. Did Element S13 (local and tribal [as applicable] capabilities) address RL and SRL properties? [44 CFR §§201.4(c)(3)(ii) and 201.4(c)(3)(v)] RL6. Did Element S15 (prioritizing funding) address RL and SRL properties? [44 CFR §§201.4(c)(4)(iii) and 201.4(c)(3)(v)]

## 1. Repetitive Loss & Severe Repetitive Loss Properties

According to the National Flood Insurance Program (NFIP) Data Exchange System there are nine hundred sixty-four (964) non-mitigated Repetitive Loss (RL) properties scattered throughout Maryland as of 20 April 2016, and sixteen (16) validated Severe Loss properties.

Local jurisdictions containing the highest concentrations of RL properties are: Baltimore County (including City of Baltimore), Worcester County (including Ocean City and Snow Hill) and Anne Arundel County (including the City of Annapolis), refer to the data on *NFIP Repetitive Loss (RL) & Severe Repetitive Loss (SRL) Data by Jurisdiction* table below.

**A Repetitive Loss (RL)** property is any insurable building for which two or more claims of more than \$1,000 were paid by the National Flood Insurance Program (NFIP) within any rolling ten-year period, since 1978. A RL property may or may not be currently insured by the NFIP.

Local jurisdictions containing the highest concentration of SRL properties include:

- Anne Arundel;
- Baltimore; and
- Worcester Counties.

**Severe Repetitive Loss (SRL)** properties are defined as single or multifamily residential properties that are covered under an NFIP flood insurance policy and:

(1) That have incurred flood-related damage for which four (4) or more separate claims payments have been made, with the amount of each claim (including building and contents payments) exceeding \$5,000, and with the cumulative amount of such claims payments exceeding \$20,000; or

(2) For which at least two (2) separate claims payments (building payments only) have been made under such coverage, with cumulative amount of such claims exceeding the market value of the property.

*In both instances, at least two (2) of the claims must be within ten (10) years of each other, and claims made within ten (10) days of each other will be counted as one (1) claim.*

Table 8.1- NFIP RL & SLR Data by Jurisdiction

County Municipality	Repetitive Loss (RL)		Severe Repetitive Loss (SRL) Total Number
	County & Municipal RL Totals	Overall Jurisdiction RL Total	
<b>Allegany County</b>	<b>15</b>	<b>21</b>	-
City of Cumberland	1		-
Midland	1		-
Westport	4		-
<b>Anne Arundel</b>	<b>89</b>	<b>97</b>	<b>4</b>
City of Annapolis	8		-
<b>Baltimore County</b>	<b>127</b>	<b>174</b>	2
Baltimore City	47		-
<b>Calvert</b>	<b>33</b>	<b>41</b>	-
Chesapeake Beach	3		-
North Beach	5		-
<b>Caroline</b>	<b>1</b>	<b>1</b>	-
<b>Carroll</b>	<b>9</b>	<b>9</b>	1
<b>Cecil</b>	<b>16</b>	<b>55</b>	-
Charlestown	1		-
Elkton	13		-
North East	11		-
Perryville	2		-
Port Deposit	12		-
<b>Charles</b>	<b>26</b>	<b>26</b>	-
<b>Dorchester</b>	<b>46</b>	<b>48</b>	-
Cambridge	2		-
<b>Frederick</b>	<b>21</b>	<b>25</b>	<b>1</b>
City of Frederick	1		-
Rock Hall	3		-
<b>Garrett</b>	<b>16</b>	<b>16</b>	<b>1</b>
<b>Harford</b>	<b>5</b>	<b>11</b>	-
Aberdeen	2		-
Havre de Grace	4		-
<b>Howard</b>	<b>8</b>	<b>8</b>	-

County <i>Municipality</i>	Repetitive Loss (RL)		Severe Repetitive Loss (SRL) Total Number
	County & Municipal RL Totals	Overall Jurisdiction RL Total	
<b>Kent</b>	1	4	1
<i>Chestertown</i>	2		-
<i>Millington</i>	1		-
<b>Montgomery</b>	47	47	-
<b>Prince George's</b>	43	43	-
<b>Queen Anne's</b>	34	34	-
<b>St. Mary's</b>	57	58	1
<i>Leonardtown</i>	1		-
<b>Somerset</b>	37	52	-
<i>Crisfield</i>	15		-
<b>Talbot</b>	10	24	-
<i>Easton</i>	1		-
<i>Oxford</i>	10		-
<i>St. Michaels</i>	3		-
<b>Washington</b>	38	48	1
<i>Funkstown</i>	1		-
<i>Hagerstown</i>	2		-
<i>Hancock</i>	3		-
<i>Sharpsburg</i>	2		-
<i>Williamsport</i>	3		-
<b>Wicomico</b>	12	17	-
<i>Salisbury</i>	5		-
<b>Worcester</b>	64	101	2
<i>Ocean City</i>	36		-
<i>Snow Hill</i>	1		-

## 2. NFIP Policies & Flood Risk

There are 42,650 total National Flood Insurance Program (NFIP) policies within the State of Maryland. The highest numbers of NFIP policies per jurisdiction in the State include: Ocean City, Worcester, Anne Arundel County, and the City of Baltimore.

*Table 8.2- NFIP Policies per Jurisdiction*

Jurisdiction	NFIP Policy Totals	Total Premiums/Total Paid
Allegany	338	\$432,192
Anne Arundel	3,948	\$3,205,405
Baltimore	1,804	\$2,014,447
Baltimore City	3,331	\$4,287,470
Calvert	927	\$714,293
Caroline	204	\$210,357
Carroll	242	\$198,614

Jurisdiction	NFIP Policy Totals	Total Premiums/Total Paid
City of Annapolis	1,321	\$1,272,517
Cecil	778	\$954,026
Charles	732	\$485,617
Dorchester	1,460	\$1,348,648
Frederick	606	\$636,545
Garrett	112	\$99,310
Harford	840	\$842,750
Howard	879	\$659,046
Kent	622	\$658,228
Montgomery	2,157	\$1,198,776
Ocean City	7,089	\$8,937,461
Prince George's	2,680	\$2,405,098
Queen Anne's	1,915	\$1,581,946
Somerset	1,800	\$1,487,878
St. Mary's	1,290	\$1,056,443
Talbot	2,426	\$1,949,129
Washington	326	\$343,560
Wicomico	565	\$490,920
Worcester	4,258	\$2,548,437
TOTALS	42,650	\$40,019,113

Source: Spreadsheet developed from Bureau.Net data-June 29, 2016

*Coastal Communities Flood Loss Estimations-FEMA Risk Map Products* indicate that the highest 1% (100-yr) dollar losses by jurisdiction are: City of Baltimore, Baltimore, Somerset, and Anne Arundel Counties, as discussed and shown on the table below.

During the preparation of the *Maryland Hazard Mitigation Plan*, the State was fortunate in that FEMA provided Risk Mapping, Assessment, and Planning (Risk MAP) products to all of Maryland's coastal communities, with the exception of Talbot County, which is slated for completion in September, 2016. Flood Risk Reports (FRR) provide non-regulatory information to use in conjunction with other data sources to provide a comprehensive picture of flood risk. Flood risk analysis results include potential losses for the refined 1-percent annual chance Coastal Flood Risk Study. Potential losses within the various FRR's were computed using state-level tax data (parcel centroids from the MD Department of Planning) and, where available, local building footprints to estimate loss ratios for the 1-percent annual chance flood scenario. FRR loss estimations included residential, commercial, and other buildings.

**Table 8.3- Flood Risk Project Refined Losses by Jurisdiction**

Jurisdiction	Inventory Estimated Value	1% (100-yr) Dollar Losses	Loss Percentage	NFIP Policy Totals	Total Premiums/ Total Paid
Anne Arundel County	\$720,700,000	\$86,200,000	11.96%	3,948	\$3,205,405
City of Baltimore	\$132,585,900,000	\$1,524,800,000	1.15%	3,331	\$4,287,470
Baltimore County	\$826,500,000	\$103,300,000	12.50%	1,804	\$2,014,447
Calvert County	\$194,800,000	\$20,700,000	10.63%	927	\$714,293
Caroline County	\$11,600,000	\$1,500,000	12.93%	204	\$210,357
Cecil County	\$169,700,000	\$41,900,000	24.69%	778	\$954,026
Charles County	\$54,900,000	\$9,300,000	16.94%	732	\$485,617
Dorchester County	\$482,400,000	\$37,100,000	7.69%	1,460	\$1,348,648
Harford County	\$414,100,000	\$8,300,000	2.00%	840	\$842,750
Kent County	\$289,900,000	\$31,500,000	10.87%	622	\$658,228
Jurisdiction	Inventory Estimated Value	1% (100-yr) Dollar Losses	Loss Percentage	NFIP Policy Totals	Total Premiums/ Total Paid
Prince George's County	\$1,100,000	\$300,000	27.27%	2,680	\$2,405,098
Queen Anne's County	\$256,200,000	\$21,800,000	8.51%	1,915	\$1,581,946
St. Mary's County	\$294,500,000	\$24,100,000	8.18%	1,290	\$1,056,443
Wicomico County	\$137,600,000	\$11,400,000	8.28%	565	\$490,920
Worcester County	\$1,633,500,000	\$36,800,000	2.25%	4,258	\$2,548,437
Somerset County	\$594,400,000	\$88,500,000	14.89%	1,800	\$1,487,878

\*Source - FEMA Flood Risk Reports per jurisdiction.

\*\*Talbot County Flood Risk Report not published at time of table generation.

Although the City of Baltimore is listed as having the largest estimated inventory value and also the largest dollar loss potential due to a 100-year flood event, the City of Baltimore's loss percentage is the lowest in the State at 1.15%. Similarly, Worcester County has the second highest estimated inventory value yet its estimated loss potential is very low at 2.25%. Conversely, Prince George's County has the lowest estimated inventory value and dollar loss potential, yet has the highest calculated loss percentage. Statewide, the average loss percentage due to a 100-year flood event is 11.3%.

### 3. Repetitive Loss and Severe Repetitive Loss Mitigation Goal & Mitigation Actions

- *RL & SRL Goal: Reduce flood-related losses, with an emphasis on reducing RL and SRL properties by 5% over the next hazard mitigation planning cycle.*
- *Complete a Maryland Repetitive Loss (RL) and Severe Repetitive Loss (SRL) Property Inventory Update.*
- *Complete FEMA Form AW-501 to support update of the FEMA SRL and RL property databases. Encourage and assist local jurisdictions to maintain and validate FEMA SRL and RL database on a regular basis. Prioritize Baltimore County (including the City of Baltimore), Worcester County (including Ocean City and Snow Hill), and Anne Arundel County (including the City of Annapolis).*
- *Review and revise the Mitigation Advisory Committee (MAC) Priority Ranking System to include consideration and prioritization of SRL and RL related projects.*

## 4. Repetitive Loss and Severe Repetitive Loss Funding Sources

The National Flood Insurance Program (NFIP) is continually faced with the task of paying claims while trying to keep the price of flood insurance at an affordable level. The program has a particular problem with repetitive loss properties. FEMA reported that repetitive loss properties represent only one percent of all flood insurance policies, yet before Hurricane Katrina, they accounted for nearly one-third of the claim payments (over \$4.5 billion to date).

Mitigation of flood risk to repetitive loss properties will reduce the overall costs to the National Flood Insurance Program (NFIP) as well as to individual homeowners. Accordingly, over the years, Congress has created a variety of funding sources to help repetitive loss property owners reduce their exposure to flood damage.

## 5. Repetitive Loss and Severe Repetitive Loss Prioritization

The Mitigation Advisory Committee (MAC) serves as the leadership group for the Mitigation Mission Area at the State level. The MAC helps to identify Maryland's hazards and associated risk. Additionally, the MAC is responsible for the review and prioritization of mitigation projects that are recommended and forwarded to FEMA for funding. The final authority to submit projects to FEMA for funding rests with the Executive Director of MEMA.

The MAC evaluates and prioritizes all eligible mitigation project applications using the following Project Ranking System (Note: The percentages and priorities noted below are based on the most recent FEMA mitigation grant guidance when this plan was most recently updated. The federal guidance and the total funds available may change each fiscal year.

- Priority 1 - Hazard Mitigation Plan updates: Valid, adopted HMPs are a pre-requisite for project eligibility in a local jurisdiction. HMP updates are the first priority for all Hazard Mitigation Assistance (HMA) programs. Funds may be allocated to these projects within applicable limits. For example, up to 7% of HMGP funds available may be allocated to the preparation of local HMPs and the State HMP.
- Priority 2 - 5% Initiative (HMGP Only): Up to 5% of HMGP funds available may be allocated for projects that do not meet normal benefit cost analysis, but contribute to hazard mitigation goals. Typically, these are public information, and alert and warning projects.
- Priority 3 - Hazard Mitigation Projects (excluding generators): The balance of funding after allocation above is available for standard mitigation projects, such as those listed below (items below are in no particular order):
  - Structure Elevations (both residential and non-residential);
  - Structure Acquisition/Demolition (both residential and non-residential);
  - Flood proofing (non-residential structures only); and
  - Public Infrastructure Retrofit (Note: Standard Hazard Mitigation projects, including elevations and acquisitions that exceed FEMA cost caps must complete a Benefit Cost Analysis (BCA).
- Priority 4 - Generators for Critical Facilities: The balance of funds available after all other priorities have been met will be applied to generators using a three-step process.

At this time, priority for SRL and RL mitigation planning and projects are not clearly articulated within the four (4) priorities contained in the MAC Priority Ranking System. As part of the plan update process, a new Mitigation Action has been added specific to the MAC Priority Ranking System.

**a. Repetitive Loss & 2016 Mitigation Implementation Actions**

Four (4) Repetitive Loss Implementation Actions were developed for the *2016 State of Maryland Hazard Mitigation Plan*. These implementation actions include:

- Completion of a Maryland Repetitive Loss (RL) and Severe Repetitive Loss (SRL) Inventory Mitigation Recommendations Update. The previous statewide inventory was last completed in 2002. The inventory included GIS shapefiles with locations, elevations, pictures, and mitigation recommendations.
- Completion of AW-501 FEMA Forms by local communities to support the update for the FEMA RL & SRL Property Database.
- Review and revision of the Mitigation Advisory Council (MAC) Priority Ranking System to include consideration and prioritization of RL and SRL related projects.
- Encourage the seven (7) communities who are not currently compliant to take steps to achieve compliance, resulting in Statewide NFIP Compliance.



# APPENDICES



## APPENDIX A: SOURCES

### Section 1:

#### **Federal Emergency Management Agency**

*State Mitigation Plan Review Guide, March 2015*

#### **Maryland Emergency Management Agency**

*Maryland State Hazard Mitigation Plan, August 2011*

#### **Maryland Emergency Management Agency**

*State of Maryland Local Hazard Mitigation Plan Guidance, May 2015*

#### **Maryland's Community Resiliency Grants**

"2016 Request for Proposals" Maryland Department of Natural Resources

CoastSmart Communities Initiative

"Building Coast-Smart Communities." *Building CoastSmart Communities RSS 20*. N.p., n.d. Web. 12 July 2016

#### **Maryland Commission on Climate Chance**

Prepared for: Larry Hogan, Governor, State of Maryland and the Maryland General Assembly, December 2015

#### **Maryland's "Climate Change and CoastSmart Executive Order"**

Website: <http://climatechange.maryland.gov/publications/executive-order-01.01.2014.14-strengthening-climate-action-in-maryland/>. November 19, 2016

#### **Maryland Silver Jackets**

Website: <http://silverjackets.nfrmp.us/State-Teams/Maryland>. March, 2016

#### **National Resources Defense Council**

Website: [www.nrdc.org](http://www.nrdc.org). 2016

#### **Maryland Department of Environment**

Maryland Historic Trust - Cultural Resources Hazard Mitigation Planning Program

Website: [https://mht.maryland.gov/grants\\_hazardmitigation.shtml](https://mht.maryland.gov/grants_hazardmitigation.shtml)

#### **IMAP, Maryland's Mapping & GIS Data Portal**

Website: <http://imap.maryland.gov>

#### **FEMA Coast Risk Products & Outreach Team**

Website: <https://www.fema.gov/risk-mapping-assessment-and-planning-risk-map>

Last Updated: 05/02/2016 - 09:27

#### **Maryland State Highway Administration**

Office of Planning and Preliminary Engineering

*"Maryland State Highway Adaptation and Vulnerability Assessment", 2015*

**Section 1 Continued:**

**Maryland Emergency Management Agency**  
*State Mitigation Operation Plan, December 2014*

**Maryland Model Floodplain Management Ordinance, May 2014**  
*"MD Model Floodplain Management Ordinance", May, 2014*  
Website: <http://mde.maryland.gov/programs/Water/FloodHazardMitigation/FloodPlainPermitting/Pages/Programs/WaterPrograms>

**Maryland Department of Housing and Community Development**  
*Housing and Building Energy Unit Initiatives*  
Website: <http://dhcd.maryland.gov>

**Maryland Department of Planning**  
*"Plan Maryland"*  
Website: <http://planning.maryland.gov/OurWork/growth-conservation.shtml>

**Maryland Department of Planning**  
*"Smart Growth"*  
Website: <http://planning.maryland.gov/OurWork/growth-conservation.shtml>

**Maryland Department of Environment**  
*"Maryland's Greenhouse Gas Reduction Plan Update" October 2015*  
Website: <http://www.mde.maryland.gov/programs/air/rggi/pages/air/rggi.aspx>

**Maryland Department of Environment**  
*"Chesapeake Bay Maryland Clear Cars Program"*  
Website: [www.mde.state.md.us](http://www.mde.state.md.us)

**Maryland Department of Environment**  
*"Watershed Improvement Plan"*  
Website: [www.mde.state.md.us](http://www.mde.state.md.us)

**Maryland Energy Administration**  
*"EmPower Maryland"*  
Website: [www.energy.maryland.gov](http://www.energy.maryland.gov)

**Maryland Energy Administration**  
*"Maryland Energy Assurance Plan"*  
Website: [www.energy.maryland.gov](http://www.energy.maryland.gov)

**Maryland Energy Administration**  
*"Renewable Portfolio Standards"*  
Website: [www.energy.maryland.gov](http://www.energy.maryland.gov)

**Maryland Energy Administration**  
*"Fuel Up Maryland"*  
Website: [www.energy.maryland.gov](http://www.energy.maryland.gov)

**Section 1 Continued:**

**Maryland Energy Administration**

*"Maryland Smart Energy Communities"*

Website: [www.energy.maryland.gov](http://www.energy.maryland.gov)

**Maryland Energy Administration**

*"Project Sunburst"*

Website: [www.energy.maryland.gov](http://www.energy.maryland.gov)

**Maryland Department of Transportation**

*"Transit Oriented Design"*

Website: <http://www.mdot.maryland.gov/newMDOT/Planning/TOD>

**Section 2:**

**National Oceanic and Atmospheric Administration - National Weather Service**

National Climatic Data Center - Storm Events Database.

Available at <http://www.ncdec.noaa.gov/stormevents/.2016>

**FEMA Coastal Flood risk Reports**

Website: <https://www.fema.gov/risk-map-flood-risk-products>

**State Hazard Identification Risk Assessment**

Website: <http://www.fema.gov/hazard-identification-and-risk-assessment>

**U.S Army Corps of Engineers**

Website: <http://www.usace.army.mil/Missions/Emergency-Operations/Drought/>

**U.S. Census Bureau - March 2015.**

*"Population Division"*

U.S. Census Bureau-American Fact Finder." Available at: [www.census.gov](http://www.census.gov). March 26, 2015.

**Maryland Department of Planning**

Prepared by the Maryland Department of Planning. March, 2015.

Website: <http://planning.maryland.gov>.

**Maryland Department of Natural Resources**

Forest Service - Wildfire Only. 2010-2014

Website: <http://dnr2.maryland.gov/forests/Pages/county-map.aspx>

**Maryland Emergency Management Agency**

*Maryland State Hazard Mitigation Plan, August 2011*

**United States Department of Agriculture**

Census of Agriculture

Website: <https://www.agcensus.usda.gov/>

**Section 2 Continued:**

**International Building Codes, 2012**

Wind Load

Website: <https://archive.org/stream/gov.law.icc.ibc.2012/icc.ibc.2012#page/n3/mode/2up>

**International Residential Codes, 2012**

IRC Section R301.2 - Basic Wind Speeds for Detached Dwellings

Website: <https://archive.org/details/gov.law.icc.irc.2012>

**National Weather Service**

Average Annual Snowfall by Jurisdiction

Website: [www.weather.gov](http://www.weather.gov)

**United States Department of Labor**

Bureau of Labor and Statistics - Consumer Price Index (CPI)

Website: <http://www.bls.gov/cpi/>

**Section 3:**

**National Climate Assessment, 2014**

Northeast Region

Website: <http://nca2014.globalchange.gov/report/regions/northeast>

**The Maryland Coastal Resiliency Assessment, 2016**

*(The Natural Conservancy, March 2016. Maryland Coastal Resiliency Assessment. M.R. Canick, N. Carlozo and D. Foster. Bethesda, MD)*

Website: [http://dnr2.maryland.gov/ccs/Documents/MARCH-2016\\_MDCoastalResiliencyAssessment.pdf](http://dnr2.maryland.gov/ccs/Documents/MARCH-2016_MDCoastalResiliencyAssessment.pdf)

**National Oceanic and Atmospheric Administration - National Weather Service**

National Climatic Data Center - Storm Events Database.

Available at <http://www.ncdc.noaa.gov/stormevents/>. 2016

**National Oceanic and Atmospheric Administration**

*NOAA Technical Report NOS CO-OPS 073*

*Sea Level Rise and Nuisance Flood Frequency Changes around the United States*

Website:

[http://tidesandcurrents.noaa.gov/publications/NOAA\\_Technical\\_Report\\_NOS\\_COOPS\\_073.pdf](http://tidesandcurrents.noaa.gov/publications/NOAA_Technical_Report_NOS_COOPS_073.pdf)

**Maryland Department of Assessments & Taxation**

*Maryland Property Schedule Database, 2016*

Website: <http://sdat.dat.maryland.gov/RealProperty/Pages/default.aspx>

**Maryland Emergency Management Agency**

*State of Maryland Local Hazard Mitigation Plan Guidance, May 2015*

**HAZUS-MH User's Manual**

Website: <https://www.fema.gov/hazus-mh-user-technical-manuals>

**Section 3 Continued:**

**FEMA Coastal Flood risk Reports**

Website: <https://www.fema.gov/risk-map-flood-risk-products>

**Updating Maryland's Sea-Level Rise Projections**

*Scientific and Technical Working Group*

*Maryland Climate Change Commission - June, 2013*

Website: <http://www.umces.edu/sites/default/files/pdfs/SeaLevelRiseProjections.pdf>

**Maryland Department of Natural Resources**

*Maryland's Blue Infrastructure Near-shore Assessment*

Website: <http://dnr2.maryland.gov/ccs/Pages/bi.aspx>

**Emergency Management Accreditation Program**

Website: <http://search.usa.gov/search?affiliate=fema&query=emergency+management+accreditation+program>

**Maryland Department of the Environment**

Water Resource Management

Website: [http://mde.maryland.gov/programs/Water/Water\\_Supply/Pages/waterresourcemanagement.aspx](http://mde.maryland.gov/programs/Water/Water_Supply/Pages/waterresourcemanagement.aspx)

**Section 4:**

**Maryland Department of Planning**

*"Priority Funding Areas"*

Maryland Department of Planning. March, 2015

Website: <http://planning.maryland.gov>

**Department of Housing and Community Development**

*"Growth-Related Projects"*

Website: <http://dhcd.maryland.gov/Pages/default.aspx>

**Department of General Services**

*"Growth-Related Funding"*

Website: <http://dgs.maryland.gov/Pages/default.aspx>

**Department of Business and Economic Development**

*"Growth-Related Projects"*

Website: <http://commerce.maryland.gov/commerce>

**Maryland Department of the Environment**

*"Growth-Related Funding"*

Website: <http://mde.maryland.gov/Pages/Home.aspx>

**Maryland Department of Transportation**

*"Growth-Related Projects"*

Website: <http://www.mdot.maryland.gov/>

**Section 4 Continued:**

**U.S. Census Bureau - March 2015**

*"Population Division"*

U.S. Census Bureau-American Fact Finder." Available at: [www.census.gov](http://www.census.gov). March 26, 2015.

**Section 5:**

**Hazard Mitigation Grant Program**

*"Grant Funding"*

Website: <http://www.fema.gov/hazard-mitigation-grant-program>

**Pre-Disaster Mitigation Grant Funding**

*"Grant Funding"*

Website: <http://www.fema.gov/pre-disaster-mitigation-grant-program>

**Section 6:**

**Hazard Mitigation Grant Program**

Website: <http://www.fema.gov/hazard-mitigation-grant-program>

**Pre-Disaster Grant Program**

Website: <http://www.fema.gov/pre-disaster-mitigation-grant-program>

**Mitigation Advisory Council, 2015**

**Section 7:**

**National Flood Insurance Program**

Website: <https://www.fema.gov/national-flood-insurance-program>

**Disaster Mitigation Act of 2000**

Website: <http://www.fema.gov/media-library/assets/documents/4596>

**Maryland Emergency Management Agency**

*State of Maryland Local Hazard Mitigation Plan Guidance, May 2015*

**Maryland Model Floodplain Management Ordinance, May 2014**

*"MD Model Floodplain Management Ordinance", May, 2014*

Website: <http://mde.maryland.gov/programs/Water/FloodHazardMitigation/FloodPlainPermitting/Pages/Programs/WaterPrograms>

**Maryland DFIRM Outreach Program**

Website: <http://mdfloodmaps.net/>

**Maryland Department of the Environment**

Maryland's Flood Risk Application

Website: <http://mdfloodsmaps.net/>

**Section 7 Continued:**

**Robert T. Stafford Disaster Relief and Emergency Assistance Act (Public Law 93-288) as amended**  
Website: <https://www.fema.gov/robert-t-stafford-disaster-relief-and-emergency-assistance-act-public-law-93-288-amended>

**Section 8:**

**National Flood Insurance Program**

Repetitive Loss & Severe Repetitive Loss

Website: <https://www.fema.gov/national-flood-insurance-program>

**FEMA Coastal Flood risk Reports**

Website: <https://www.fema.gov/risk-map-flood-risk-products>

**Nations Flood Insurance Program Repetitive Loss Update Worksheet**

AW-501 FEMA Form

<https://www.fema.gov/media-library/assets/documents/13146>

**BureauNet**

National Flood Insurance Program Database

Website: <http://bsa.nfipstat.fema.gov/>



## APPENDIX B: LIST OF ACRONYMS

- Benefit Cost Analysis (BCA)
- Chesapeake and Coastal Services (CCS)
- Climate Adoption Plan (CAP)
- Community Rating System (CRS)
- Conservation Reserve Enhancement Program (CREP)
- Consolidated Transportation Program (CTP)
- Consumer Price Index (CPI)
- Continuity of Operation Plan (COOP)
- Department of General Services (DGS)
- Department of Natural Resources (DNR)
- Digital Flood Insurance Rate Maps (DFIRMs)
- Emergency Management Accreditation Program (EMAP)
- Emergency Operations Centers (EOCs)
- Erosion Vulnerability Assessment Tool (EVA)
- Federal Emergency Management Agency (FEMA)
- Flood Insurance Rate maps (FIRMs)
- Flood Insurance Study (FIS)
- Flood Insurance Study (FIS)
- Flood Risk Reports (FRR)
- Geographic Information System (GIS)
- Hazard Identification Risk Assessment (HIRA)
- Hazard Mitigation Assistance (HMA)
- Hazard Mitigation Grant Program (HMGP)
- Hazard Mitigation Plan (HMP)
- Homeowners Flood Insurance Affordability Act (HFIAA)
- Hurricane Evacuation Study (HES)
- Internet Protocols (IP)
- Light Detection and Ranging (LiDAR)
- Maryland Aviation Administration (MAA)
- Maryland Department of Business and Economic Development (DBED)
- Maryland Department of environment (MDE)
- Maryland Department of Housing and Community Development (DHCD)
- Maryland Department of Human Resources (DHR)
- Maryland Department of Planning (MDP)
- Maryland Department of Transportation (MDOT)
- Maryland Drinking Water Revolving Loan Fund (MDWRLF)
- Maryland Economic Adjustment Fund (MEAF)
- Maryland Economic Development Assistance Authority Fund (MEDAAF)
- Maryland Emergency Administration (MEA)
- Maryland Emergency Management Agency (MEMA)
- Maryland emergency Preparedness Program (MEPP)
- Maryland Environment Trust (MET)
- Maryland Historic Trust (MHT)

- Maryland Industrial Development Financing Authority (MIDFA)
- Maryland Insurance Administration (MIA)
- Maryland Port Administration (MPA)
- Maryland Small Business Development Financing Authority (MSBDFA)
- Maryland Statewide Address initiative (MSAI)
- Maryland Transit Administration (MTA)
- Maryland Vehicle Administration (MVA)
- Maryland Water Quality Revolving Loan Fund (MWQRLF)
- Maryland's Blue Infrastructure near-shore Assessment (BI)
- Maryland's Coastal Resiliency Assessment
- Mitigation Advisory Council (MAC)
- National Climatic Data Center (NCDC)
- National Oceanic Atmospheric Administration (NOAA)
- Natural Resources Defense Council (NRDC)
- Operational and Situational Preparedness for Responding to an Emergency (OSPREY)
- Pre-Disaster Mitigation (PDM)
- Priority Funding Areas (PFAs)
- Repetitive Loss (RL)
- Risk Mapping, Assessment and Planning (Risk MAP)
- Sea-Level Rise (SLR)
- Severe Repetitive Loss (SRL)
- Special Flood Hazard Areas (SFHA)
- State Highway Administration (SHA)
- State of Maryland Mitigation Operations Plan (SMOP)
- Storm Surge Inundation Maps (SIMMs)
- The Natural Conservancy (TNC)
- The Secretary's Office (TSO)
- US Army Corps of Engineers (USACE)
- User Defined Data (UDD)
- Vulnerability Assessment Scoring Tool (VAST)
- Washington Metro Transit Authority (WMATA)
- Washington Suburban Sanitary Commission (WSSC)
- Watershed Resource Registry (WRR)



## APPENDIX C: CAPABILITIES ASSESSMENT

### Pre-disaster Mitigation Programs

Pre-Disaster Mitigation Programs Capabilities Assessment					
Agency	Programs, Plans, Policies, Regulations, Funding and Practices	Effect on Loss Reduction		Funding	Description
		Support	Facilitate		
US Army Corps of Engineers	Flood Control Projects	√		√	Design and construction of local flood control projects not specifically authorized by Congress. State, political subdivisions and other local agencies established within state law with full authority and ability to undertake required legal and financial responsibilities.
	Riverbank Protection	√	√	√	Design & construction of stream and river bank protection projects to safeguard highways, highway bridges, essential public works, churches, hospitals, schools and other non-profit public critical facilities endangered by flood-caused erosion. State, political subdivisions and other local agencies established within state law with full authority and ability to undertake required legal and financial responsibilities.
	Flood Control Clearing	√	√	√	Design and construction of snagging and clearing projects for navigable waters and their tributaries to reduce potential flood damage State, political subdivisions and other local agencies established within state law with full authority and ability to undertake required legal and financial responsibilities.
	Floodplain Management	√	√		Technical assistance in identification of flood-prone areas, potential losses and the flood hazard of proposed building sites; guidance in land use management to prevent flood damage. Funding limitations set by District Office. State, political subdivisions and other public organizations.
U.S. Department of Agriculture	Watershed Protection Loans	√	√	√	Loans to assist local sponsors provide the local share of the cost of watershed improvements for flood prevention, irrigation, drainage, water quality management, sediment control, fish and wildlife management, public water supplies and water storage. Sponsoring local organizations such as soil and water conservation districts with authority under state law to obtain give security for and raise revenues to repay loans.

MARYLAND HAZARD MITIGATION PLAN

Pre-Disaster Mitigation Programs Capabilities Assessment					
Agency	Programs, Plans, Policies, Regulations, Funding and Practices	Effect on Loss Reduction		Funding	Description
		Support	Facilitate		
	Emergency Watershed Protection	√	√		Technical services to determine eligibility and to plan needed measures. Financial assistance to construct approved measures. Any state agency, county (or group of counties), municipality, town, soil and water conservation district, flood prevention or control district or any other non-profit agency with authority under state law to carry out, maintain and operate watershed improvement works.
	Resource Conservation & Development	√	√	√	Grants and technical assistance to aid public agencies in implementing long-range resource conservation and development programs, including flood control projects. Public agencies and non-profit organizations having legal authority to plan, install, operate and maintain community projects benefiting the public.
	Forest Land Flood Prevention	√	√		Technical assistance in planning and application of measures to protect public health and safety, reduce flood hazards and control sedimentation from forest and related lands when existing local, state and federal programs do not provide adequate facilities and funds for immediate protective action. Also provides assistance in preparing requests for Section 216 funds for emergency treatment of watersheds impaired by fire, flood, earthquake or other natural disasters. State and local governments
<b>US Department of the Interior National Park Service</b>	Rivers, Trails and Conservation Assistance Program				The mission of the Rivers, Trails and Conservation Assistance program (RTCA) is to assist community-led natural resource conservation and outdoor recreation initiatives. RTCA staff provide guidance to communities so they can conserve waterways, preserve open space, and develop trails and greenways.
<b>FEMA</b>	National Flood Insurance Program (NFIP)	√	√	√	The National Flood Insurance Program aims to reduce the impact of flooding on private and public structures. It does so by providing affordable insurance to property owners and by encouraging communities to adopt and enforce floodplain management regulations. These efforts help mitigate the effects of flooding on new and improved structures. Overall, the program reduces the socio-economic impact of disasters by promoting the purchase and retention of general risk insurance, but also of flood insurance, specifically.

MARYLAND HAZARD MITIGATION PLAN

	<p>Flood Mitigation Assistance (FMA)</p> <p>Pre-Disaster Mitigation (PDM)</p> <p>Repetitive Flood Claims (RFC)</p> <p>Severe Repetitive Loss (SRL)</p>	<p>√</p>	<p>√</p>	<p>√</p>	<p>Currently, FEMA administers three programs that provide funding for eligible mitigation planning and projects that reduces disaster losses and protect life and property from future disaster damages. The three programs are the Hazard Mitigation Grant Program (HMGP), the Flood Mitigation Assistance (FMA) Program, and the Pre-Disaster Mitigation (PDM) Program.</p> <ul style="list-style-type: none"> <li>• <a href="#">HMGP</a> assists in implementing long-term hazard mitigation planning and projects following a Presidential major disaster declaration</li> <li>• <a href="#">PDM</a> provides funds for hazard mitigation planning and projects on an annual basis</li> <li>• <a href="#">FMA</a> provides funds for planning and projects to reduce or eliminate risk of flood damage to buildings that are insured under the National Flood Insurance Program (NFIP) on an annual basis</li> </ul> <p>HMGP funding is generally 15% of the total amount of Federal assistance provided to a State, Territory, or federally-recognized tribe following a major disaster declaration. PDM and FMA funding depends on the amount congress appropriates each year for those programs.</p> <p>The Repetitive Flood Claims (RFC) grant program is designed to reduce or eliminate the long-term risk of flood damage to structures that are insured under the National Flood Insurance Program (NFIP) and have had one or more claim payment(s) for flood damages. The RFC grants are awarded to Applicants on a nationwide basis without reference to State allocations, quotas, or other formula-based allocations. All grants are eligible for up to 100 percent Federal assistance.</p> <p>The Severe Repetitive Loss (SRL) Pilot Program provides funds to assist States, Indian Tribal governments, and local governments participating in the NFIP in reducing or eliminating the long-term flood risks to severe repetitive loss properties, thus reducing outlays from the NFIF. Severe repetitive loss was defined by the FIRA 2004. For a property to be designated SRL, it must: • Be a residential property currently insured under the National Flood Insurance Program; • Have incurred flood losses that resulted in either (1) four or more flood insurance claims payments that each exceeded \$5,000 with at least two of the payments occurring within a 10-year period, or (2) two or more flood insurance claims payments that cumulatively exceeded the value of the property.</p>
	<p>Community Assistance Program - State Support Services Element (CAP-SSSE)</p>	<p>√</p>	<p>√</p>	<p>√</p>	<p>Identify, prevent, resolve floodplain management issues and reduce flood hazards</p> <p>Communities participating in the National Flood Insurance Program are supported by the state NFIP coordinator's office. The Community Assistance Program (CAP) provides funding to States to provide technical assistance to communities in the National Flood Insurance Program (NFIP) and to evaluate</p>

MARYLAND HAZARD MITIGATION PLAN

Pre-Disaster Mitigation Programs Capabilities Assessment					
Agency	Programs, Plans, Policies, Regulations, Funding and Practices	Effect on Loss Reduction		Funding	Description
		Support	Facilitate		
					community performance in implementing NFIP floodplain management activities. The CAP is intended to identify, prevent, and resolve floodplain management issues in participating communities before they develop into problems requiring enforcement action. The CAP program is administered by MEMA, and federal funds are passed through to MDE. This allows greater coordination between the agencies, particularly in the areas of work program and business plan development.
NOAA	National Ocean Service (NOS)				NOS works closely with many partner agencies to ensure that Ocean and Coastal and areas are safe, healthy, and productive. National Ocean Service scientists, natural resource managers, and specialists ensure safe and efficient marine transportation, promote innovative solutions to protect coastal communities, and conserve marine and coastal places.
	National Geodetic Service				NGS provides the framework for all positioning activities in the Nation. The foundational elements - latitude, longitude, elevation, shoreline information and their changes over time - contribute to informed decision making and impact a wide range of important activities including mapping and charting, navigation, flood risk determination, transportation, land use and ecosystem management. NGS' authoritative spatial data, models, and tools are vital for the protection and management of natural and manmade resources and support the economic prosperity and environmental health of the Nation.
	Marine Fisheries Service				NOAA's Marine Fisheries Service is designed to restore and enhance habitats that support valuable fisheries and protected resources, improve the quality of our water, provide recreational opportunities for the public's use and enjoyment and buffer our coastal communities from the impacts of storms and sea level rise.
	Center for Operational Oceanographic Products and Services (CO-OPS)				CO-OPS provides the national infrastructure, science, and technical expertise to monitor, assess, and distribute tide, current, water level, and other coastal oceanographic products and services that support NOAA's mission of environmental stewardship and environmental assessment and prediction. CO-OPS provides operationally sound observations and monitoring capabilities coupled with operational Nowcast Forecast modeling.

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		Support	Facilitate		
	Office of Coast Survey				NOAA's Office of Coast Survey ensures safe, efficient and environmentally sound marine transportation that brings an uninterrupted flow of people and goods into and out of our nation's ports.
	NOAA Coastal Services Center Grants Program				<p>NOAA's Office of Ocean and Coastal Resource Management (OCRM) provides national leadership to state and territory coastal programs and estuarine research reserves to keep America's coasts healthy and resilient. OCRM activities are mandated by the Coastal Zone Management Act, MPA Executive Order, and Coral Reef Conservation Act.</p> <p>NOAA's Office of Response and Restoration (OR&amp;R) protects coastal and marine resources, mitigates threats, reduces harm, and restores ecological function. The Office provides comprehensive solutions to environmental hazards caused by oil, chemicals, and marine debris. OR&amp;R also assists local communities to revitalize waterfronts through environmental remediation and restoration.</p> <p>NOAA's National Weather Service (NWS) is tasked with providing "weather, hydrologic, and climate forecasts and warnings for the United States, its territories, adjacent waters and ocean areas, for the protection of life and property and the enhancement of the national economy." This is done through a collection of national and regional centers, and 122 local weather forecast offices (WFOs). Maryland is supported by four local weather offices. These offices and national centers provide public forecasts and warnings of hazardous weather phenomena and floods, and training programs on disaster safety guidelines.</p> <p>The NWS also provides educational materials for preventing injury that are readily available at the various NOAA websites providing information on impending hazardous weather conditions, including expected intensity. This information is also conveyed via various public and social media communication tools.</p>

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		Support	Facilitate		
	Environmental Literacy Grants Program				<p>Since 2005, NOAA's Office of Education has promoted the improvement of public environmental literacy through our Environmental Literacy Grants (ELG) program. These grants represent a significant portion of the Office of Education's efforts to support the agency's cross-cutting priority for increasing environmental literacy, stewardship, and informed decision-making among our nation's citizenry.</p> <p>Environmental Literacy Grants K-12 Education Funding Program</p> <p>NOAA Bay-Watershed Education and Training Grants Program</p>
	NOAA Regional Coastal Resilience Grants			√	<p>NOAA is committed to helping coastal communities address increasing risks from extreme weather events, climate hazards, and changing ocean conditions. To that end, NOAA's National Ocean Service is providing up to \$9 million in competitive grant awards through the Regional Coastal Resilience Grants program.</p> <p>Awards are made for project proposals that advance resilience strategies, often through land and ocean use planning, disaster preparedness projects, environmental restoration, hazard mitigation planning, or other regional, state, or community planning efforts. Successful proposals demonstrate regional coordination among project stakeholders, leverage resources (such as funds, programs, partnerships, and others), and create economic and environmental benefits for coastal communities. Project results are evaluated using clear measures of success, with the end goal being improved preparation, response, and recovery.</p>
Maryland Department of Planning	The Patuxent River Commission				The Patuxent River Commission, created in 1980, is responsible for reviewing the operation of State and local agencies with regard to their impact on the Patuxent River and its watershed.
	Resource Conservation - Chesapeake Bay				In 2014, MDP worked with state and federal agencies across the watershed to develop the amended <a href="#">Chesapeake Bay Agreement</a> , which articulates the actions necessary to advance bay clean-up by 2025.

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Maryland Department of Natural Resources	Maryland's Coastal Program				<p>The Maryland Coastal Program, which is funded by the Coastal Zone Management Act of 1972, is administered by the National Oceanic and Atmospheric Administration's (NOAA) Office of Ocean and Coastal Resource Management. In 1978, numerous state laws and policies were created to protect Maryland's coastal and marine resources while allowing for development. Together, they form Maryland's Coastal Program. The area covered by these laws adds up to roughly two-thirds of the state's land area and are comprised of approximately 68% of the State's residents. The program encourages partnerships while making available both funding and technical assistance to local governments, state agencies, educational institutions, and non-profits.</p> <p>The DNR, as the lead agency for this program, addresses non-point source pollution reduction, coastal hazards mitigation, habitat and living resources protection, and erosion.</p>
	The Shoreline Conservation Service				<p>Provides technical and financial assistance to Maryland property owners in resolving shoreline and stream bank erosion problems. Assistance is provided through site visits and evaluations, problem assessments and recommended solutions</p>
	Coast Smart Communities Initiative				<p>The Maryland Department of Natural Resources (DNR) <i>CoastSmart</i> Communities Initiative is a program dedicated to assisting Maryland's coastal communities address short- and long-term coastal hazards, such as coastal flooding, storm surge, and sea level rise. <i>CoastSmart</i> connects local planners to essential information, tools, people, and trainings.</p> <p><i>CoastSmart</i> provides:</p> <ul style="list-style-type: none"> <li>• <i>CoastSmart</i> Communities Grant program</li> <li>• Training for local practitioners</li> <li>• Links to supportive information, tools, visualizations, and networks</li> </ul> <p>The <i>CoastSmart</i> Communities Grant (CCG) provides financial assistance to local governments with preference given to projects that focus specifically on reducing community vulnerability to coastal hazards and/or sea level rise. The grant requires that the project result in a modification, adoption or implementation of an ordinance, code, plan, or program.</p>

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	MD Coastal Resiliency Assessment				With its extensive shoreline, Maryland's coasts experience flooding and erosion, caused by tides and storms and exacerbated by sea level rise. Natural habitats, such as marshes and coastal forests, can reduce the impacts of these hazards through the processes of wave attenuation, increased infiltration and sediment stabilization. While the Maryland Department of Natural Resources (DNR) utilizes various tools to target restoration and protection of habitats based on ecological, water quality and other criteria, these tools do not evaluate the risk-reduction benefits of natural features such as forests, marshes, dunes, oyster reefs, and underwater grasses. To support the DNR in their efforts to incorporate risk-reduction benefits into decision making, The Nature Conservancy (TNC) partnered with the Chesapeake and Coastal Services (CCS) to conduct a Statewide Coastal Resiliency Assessment.
	Engineering and Construction				The Engineering and Construction Unit of the Department of Natural Resources is responsible for recreational facility and waterway improvements, State facility and waterway design, engineering and construction management, and the maintenance of existing land and water based facilities.

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	The Chesapeake Bay Critical Area Commission				<p>The Chesapeake Bay Critical Area Commission protects nontidal wetlands and other resources that affect the health of the Chesapeake Bay. Nontidal wetlands are transitional areas between uplands and tidal zones that are covered with, or saturated by water for all or part of the year. Examples of nontidal wetlands are marshes, swamps, bogs, and streams that are not influenced by tidal waters. Nontidal wetlands provide important flood control benefits, are valuable areas for fish and wildlife habitat, and help to maintain water quality.</p> <p>The Chesapeake Bay Critical Area Protection Program created a 100-foot, naturally vegetated, forested buffer landward from the Mean High Water Line of tidal waters or from the edge of tidal wetlands and tributary streams. Acting as a water quality filter, this buffer is successful at reducing the impact of humans on habitats. To ensure better water quality and to protect wildlife habitats, all lands within 1,000 feet of tidal waters or adjacent tidal wetlands are designated as "Critical Areas." The minimum standards established by the State and adopted by the local jurisdictions for the conservation of nontidal wetlands in the Critical Area include: (a) the establishment and maintenance of a vegetated buffer of 25 feet around areas identified as nontidal wetlands; (b) new development must not substantially damage or change the character of nontidal wetlands; (c) only new development that is intrinsically water-dependent, or of substantial economic benefit to the public, is allowed to disturb nontidal wetlands. In the event of such development, measures must be taken to replace lost nontidal wetlands and to provide for water quality benefits and habitat protection equal to or greater than that provided by the original wetlands.</p>
	Maryland's Green Infrastructure Network				<p>The State of Maryland has enacted several land conservation programs, a variety of agricultural preservation efforts and private conservation easement agreements and regulations that help preserve wetlands and shorelines. These initiatives have addressed specific needs related to wetlands, endangered species, recreation, and farmland. The Maryland Green Infrastructure program builds upon these existing conservation programs by identifying, conserving, and connecting large contiguous areas of natural land and providing a focal point to coordinate existing conservation programs. As a result of the Program, the need for storm water management and flood control projects has been reduced statewide as flood prone properties, water resources, and wetlands have been acquired and protected.</p>

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	Maryland GreenPrint Program				In 2001, the State of Maryland established the GreenPrint program, which earmarked funds specifically to protect land through Maryland's land acquisition programs, including the Green Infrastructure Network, Rural Legacy Program, and Project Open Space. Through this program, the State has been able to acquire ecologically sensitive or hazard prone lands including forests, wetlands, and floodplains.
	Mid-Atlantic Interstate Forest Fire Protection Compact				The Mid-Atlantic Interstate Forest Fire Protection Compact (MAIFFPC) includes the states of Pennsylvania, Delaware, New Jersey, Maryland, Virginia, West Virginia, and Ohio. The purpose of the MAIFFPC is to promote effective prevention and control of wildfires in the Mid-Atlantic region by developing and integrating forest fire plans, developing and maintaining effective wildfire suppression programs in each of the member states, providing mutual aid for fire suppression, and training efforts. The MAIFFPC also acts as a liaison between various fire control agencies by facilitating the mobilization of firefighting resources during periods of national emergencies. Member states of the MAIFFPC are responsible for protecting over 35,000,000 acres of woodlands in the Mid-Atlantic States.
	Open Burning Regulations				The DNR Maryland Forest Service enforces open air burning regulations within the State. These regulations apply to those activities occurring within 200 feet of woodland, or those activities adjacent to flammable materials that could ignite and carry fire to woodland. Under these regulations, a person may not engage in open air burning unless there is a natural or constructed fire break that is free of flammable material of at least 10 feet completely around the material to be burned, adequate personnel and equipment are present to prevent the fire from escaping, at least one responsible person remains at the location of the fire until the last spark is out, and burning occurs during the hours of 4:00 pm and 12:00 midnight.
	Program Open Space				Through Program Open Space, DNR aids in the return of developed floodplain properties to open space. Program Open Space provides funding to local government to purchase properties in floodplains and other critical areas. Through this program, the State's long term commitment to hazard mitigation and the conservation of natural resources are emphasized. Today in Maryland, Program Open Space has awarded more than 5,800 grants to local governments.

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	Firewise Maryland Program				<p>The goal of the Firewise Maryland program is to reduce the threat of wildfires in the Wildland-Urban Interface. To that end, we provide the following services, free of charge, to qualifying Maryland residents and communities:</p> <ul style="list-style-type: none"> <li>• Targeted Wildland-Urban Interface Community outreach and education</li> <li>• Public outreach and education</li> <li>• Public event displays and staffing</li> <li>• HOA meeting presentations</li> <li>• Community wildfire protection planning</li> <li>• Community wildfire risk assessments</li> <li>• Wildfire home risk assessment and Home Ignition Zone analysis for WUI homeowners</li> <li>• Community “Reduce the Risk” clean-up days, with brush chipping services</li> <li>• Hazard fuel reduction projects</li> <li>• Assistance becoming a nationally recognized <a href="#">Firewise Community</a></li> <li>• Smokey Bear public appearances</li> </ul>

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Maryland Department of the Environment	Comprehensive Flood Management Grant Program (CFMGP)				<p>The Comprehensive Flood Management Grant Program (CFMGP), established in 1976, promotes the development of local flood management plans, funds watershed studies, and supports capital projects for flood control and watershed management. This program also provides for grants for the acquisition of flood damaged owner-occupied dwellings. Elevations and home relocations are also eligible for funding and acquired land is converted to open space in perpetuity. Since its inception in 1976, the program has received nearly \$32 million in appropriations in general obligation bonds and pay-as-you-go funds. Over 400 properties have been removed from harm's way. In recent years the program has been used primarily to fund 50% for the non-federal share of the FEMA Hazard Mitigation Grant Program (HN4GP) funds which pay up to 75% of the cost of flood mitigation projects.</p> <p>In the 1998 General Assembly Session, a bill was passed which increases the maximum grant available under this program. The CFMGP share of projects that do not include federal funds was increased from 50% to 75%. The cost share for federally-funded projects remains the same at 50% of the non-federal share, which is typically 12.5% CFMGP, 12.5% local government, and 75% federal.</p> <p>Unfortunately no additional state funds have been allocated to the CFMGP since 2004. MEMA hazard mitigation staff will continue to work with MDE to secure funding for this important program in the future.</p>
	Nontidal Wetlands Protection Act and Program				<p>The Nontidal Wetlands Protection Act and Program was created by the MDE, DNR, the US Army Corps of Engineers, and the Maryland Historical Trust. The act regulates nontidal wetlands and state-wide waterways, works to ascertain that harmful activities are discontinued, and that mitigation in the form of compensation takes place to ensure that "no net loss" occurs in wetlands. The Act also allows for the development of watershed management plans that may become the basis for regulatory decisions (a number of plans have already been developed and adopted).</p>

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	Maryland Commission on Climate Change				<p>Maryland's Commission on Climate Change is charged with advising the Governor and General Assembly on ways to mitigate the causes of, prepare for, and adapt to the consequences of climate change and maintaining and strengthening the State's existing Greenhouse Gas Reduction Plan, also referred to as <i>the Plan</i>. Commission priorities include building broader partnerships with federal, State and local governments and the private sector to reduce greenhouse gas emissions and prepare for the likely impacts of climate change in Maryland, better communicating with and educating Marylanders about the urgency of the challenge and options to address it, and establishing action plan goals and timetables for implementation.</p> <p>The Commission, originally created by a 2007 Executive Order, was strengthened by a 2014 Executive Order and 2015 legislation with requirements to expand the Commission membership and maintain a comprehensive action plan, with 5-year benchmarks, to achieve science-based reductions in Maryland's greenhouse gas emissions.</p>
	Wetlands and Waterways Program				Staff of the MDE Wetlands and Waterways Program administers the regulatory and planning functions of the program that address the protection, conservation and management of the State's tidal and nontidal wetlands, waterways, and floodplains.
	Dam Safety Program				<p>The Maryland Dam Safety Division is responsible for issuing waterway construction permits for new dams and ponds and permitting alterations to existing impoundment structures. The program is intended to protect public safety by ensuring that dams are properly built, maintained and operated. The Division also conducts construction inspections and works closely with dam owners and emergency management professionals to develop and exercise Emergency Action Plans to be used in the event of a dam failure.</p>

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	Stormwater Management Program				<p>Maryland stormwater management efforts are respected throughout the nation. The Environment Article Title 4, Subtitle 2, Annotated Code of Maryland provides the state with the authority to manage stormwater runoff. In October of 2007 the “Stormwater Management Act” came into effect under the direction of the Maryland Department of the Environment. The State of Maryland has developed comprehensive stormwater management, and erosion and sediment control programs to reduce the adverse impacts of development on stormwater runoff. This program addresses both the temporary and the permanent impacts associated with development activities. Information describing this program and its requirements, and guidance on how to implement stormwater management in Maryland is found on the following link:</p> <p><a href="http://www.mde.state.md.us/programs/Water/StormwaterManagementProgram/SedimentandStormwaterHome/Pages/Programs/WaterPrograms/sedimentandstormwater/home/index.aspx">http://www.mde.state.md.us/programs/Water/StormwaterManagementProgram/SedimentandStormwaterHome/Pages/Programs/WaterPrograms/sedimentandstormwater/home/index.aspx</a>.</p>
Maryland Department of Housing and Community Development	Building Code Enforcement				<p>Through continued training and educational seminars, DHCD continues to improve and enhance code enforcement practices and procedures. These activities enable building officials and others to learn from past experiences and stay up to date on current mitigation techniques while providing opportunities for partnerships with interests from private industry, including builders, suppliers, insurance representatives, and lenders.</p>
Maryland Department of Transportation	Maryland Port Administration Hurricane Preparedness Plan				<p>The purpose of this plan is to establish policy and procedures for protecting personnel and securing Maryland Port Administration (MPA) property and equipment in preparation for hurricane force weather. The MPA will provide guidance, act as liaison to the U.S. Coast Guard, and disseminate advisory information to MPA tenants in preparation for a possible hurricane strike on Baltimore. The goal is to minimize potential deaths, injuries, and property damage and return MPA facilities to normal operations as quickly as possible after a hurricane impact on the Baltimore area.</p>

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	Sinkhole Mapping Program				<p>The Maryland State Highway Administration (SHA) has commissioned the Maryland Geological Survey to prepare geologic maps for use as a predictive tool for sinkhole development. Mapping activities to identify locations where sinkholes might develop began in Frederick County in early 2000. The resulting maps and susceptibility index, a measure of the relative sinkhole susceptibility for each unit of area, will be used by the SHA, land use planners, and developers for assessing the likelihood of sinkhole development within the mapped areas. This information will allow the SHA to avoid building roads in areas known to be prone to sinkholes, which will help to prevent development in these areas.</p> <p>In the past few years, mapping of geologic and karst features in Washington County has been completed.</p> <p>This project is funded in part by the in part by the Maryland State Highway Administration and the STATEMAP component of the U.S. Geological Survey, National Cooperative Geologic Mapping Project.</p>
Natural Resources Conservation Services of Maryland	Conservation Stewardship Program				<p>Through CSP, participants take additional steps to improve resource condition including soil quality, water quality, water quantity, air quality, and habitat quality, as well as energy. Eligible lands include private and Tribal agricultural lands, cropland, grassland, pastureland, rangeland and nonindustrial private forest land. CSP is available to all producers, regardless of operation size or type of crops produced, in all 50 states, the District of Columbia and the Caribbean and Pacific Island areas. Applicants may include individuals, legal entities, joint operations or Indian tribes that meet the stewardship threshold for at least two priority resource concerns when they apply. They must also agree to meet or exceed the stewardship threshold for at least one additional priority resource concern by the end of the contract.</p>

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	Conservation Innovation Grants				The Conservation Innovation Grant program (CIG) is a voluntary program intended to stimulate the development and adoption of innovative conservation approaches and technologies while leveraging Federal investment in environmental enhancement and protection, in conjunction with agricultural production. Under CIG, Environmental Quality Incentives Program (EQIP) funds are used to award competitive grants to non-Federal governmental or non-governmental organizations, Tribes, or individuals. CIG enables NRCS to work with other public and private entities to accelerate technology transfer and adoption of promising technologies and approaches to address some of the Nation's most pressing natural resource concerns. CIG will benefit agricultural producers by providing more options for environmental enhancement and compliance with Federal, State, and local regulations. The Natural Resources Conservation Service (NRCS) administers CIG. The CIG requires a 50-50 match between the agency and the applicant
Maryland Association of Soil Conservation Districts	Soil Conservation				The Maryland Association of Soil Conservation Districts (MASCD) serves as the voice for Maryland's 24 soil and water conservation districts on state legislative issues. It also provides a forum for training, policy-making and the exchange of information at their annual and quarterly gatherings. MASCD Mission is to: promote practical and effective soil, water, and related natural resources programs to all citizens through individual conservation districts on a voluntary basis through leadership, education, cooperation and local direction.

**Disaster Response, Recovery and Community Preparedness**

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Agency	Programs, Plans, Policies, Regulations, Funding and Practices	Effect on Loss Reduction		Funding	Description
		Support	Facilitate		
FEMA	National Dam Safety Program (NDSP)	√	√	√	Grants to reduce the risks to life and property from dam failure, through the establishment and maintenance of an effective dam safety program. States with new and existing impoundment structures.
	Homeland Security Grant Program	√	√	√	The State Homeland Security Program (SHSP) enhances capabilities through planning, equipment, and training and exercise activities.
	Hazard Mitigation Grant Program (HMGP)	√	√	√	Grants to state and local governments to support hazard mitigation projects per the disaster-specific Mitigation Strategy state priorities. Projects included incentive projects at up to 5% of the total HMGP allocation, planning projects at up to 7% of the allocation and structural projects that are cost-beneficial at >88% of the allocation.
	Fire Management Assistance Grant			√	Federal assistance under Section 420 of the Act is provided in accordance with continuing Federal-State agreement for Fire Suppression (the Agreement) signed by the Governor and Regional Director. The Agreement contains the necessary terms and conditions consistent with the provisions of applicable laws, Executive orders, and regulations, as the Associate Director may require and specifies the type and extent of Federal Assistance.

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	Individuals and Households Program (IHP)	√	√	√	<p>Federal law authorizes grants to disaster victims with disaster related expenses and needs that cannot be met through other available governmental disaster assistance programs.</p> <p>The Federal share of a grant to an individual family under this program shall be equal to 75% of the actual cost of meeting such an expense or need and shall be made only on condition that the remaining 25% of such costs is paid to the individual or family from funds made available by the State. No individual or family shall receive any grant or grants under this program aggregating more than a maximum amount established by Federal regulation with respect to any one major disaster.</p> <p>The State:                      Maintains an Individual and Family Grant Program Administrative Plan                      Coordinates administration of the Individual and Family Grant Program through WVDHSEM supervised by the State Coordinating Officer.</p>
	Public Assistance Program and Policy Guide (PAPPG)	√	√	√	<ul style="list-style-type: none"> <li>The PAPPG is a comprehensive, consolidated program and policy document for the Public Assistance Program. The PAPPG supersedes all previous publications and the majority of previous policies. Any policy or guidance document not superseded by the PAPPG is provided below. The PAPPG is applicable for disasters declared on or after January 1, 2016. 9500 series policies are not superseded by the PAPPG. To view the remaining FEMA Public Assistance policies and guidance not superseded by the PAPPG visit the following link: <a href="https://www.fema.gov/public-assistance-policy-and-guidance">https://www.fema.gov/public-assistance-policy-and-guidance</a></li> </ul>

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	Community Disaster Loan Program	√	√	√	To provide funds to any eligible jurisdiction in a designated disaster area that has suffered a substantial loss of tax and other revenue. The jurisdiction must demonstrate a need for financial assistance to perform its governmental functions. Disaster-related expenses during the year of occurrence and the three succeeding fiscal years. Loans not to exceed 25 percent of the local government's annual operating budget for the fiscal year in which the major disaster occurs, up to a maximum of \$5 million.
	Regional Catastrophic Preparedness Grant Program (RCPGP)			√	Provides funding to support coordination of regional all-hazard planning for catastrophic events, including the development of integrated planning communities, plans, protocols, and procedures.
	Preparedness Grants (formerly known as the Infrastructure Protection Program)			√	Supports specific activities to strengthen security at ports and enhance transit, trucking and intercity bus systems
	Emergency Management Performance Grants (EMPG)			√	This program is a critical part of state and local governments' ability to operate, sustain, and enhance their emergency management programs' effectiveness.
	Community Emergency Response Teams	√	√	√	Provides grant funding to volunteer organizations that make local communities safe and prepare to respond to any emergency situation. CERT trains people to respond to communities in their own local communities.
	Educational outreach programs	√			Educational materials for preventing injury are readily available at the FEMA website. (FEMA, 2003c)
U.S. Army Corps of Engineers	Drought Assistance				Coordinate the development of drought plans and procedures for lakes and dams within the State under the jurisdiction of the Corps of Engineers. Provide information and reports as needed. Coordinate USACOE drought related activities. Provide water from USACOE reservoirs and dams, as available during emergencies.

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USDA U.S. Department of Energy	Single Family Housing Guaranteed Loan Program	√	√	√	<p>This program assists approved lenders in providing low- and moderate-income households the opportunity to own adequate, modest, decent, safe and sanitary dwellings as their primary residence in eligible rural areas. Eligible applicants may build, rehabilitate, improve or relocate a dwelling in an eligible rural area. The program provides a 90% loan note guarantee to approved lenders in order to reduce the risk of extending 100% loans to eligible rural homebuyers.</p> <p>Applicants must:</p> <ul style="list-style-type: none"> <li>• Meet <a href="#">income-eligibility</a></li> <li>• Agree to personally occupy the dwelling as their primary residence</li> <li>• Be a U.S. Citizen, U.S. non-citizen national or Qualified Alien</li> <li>• Have the legal capacity to incur the loan obligation</li> <li>• Have not been suspended or debarred from participation in federal programs</li> <li>• Demonstrate the willingness to meet credit obligations in a timely manner</li> </ul> <p>Purchase a property that meets all program criteria</p>
	Single Family Housing Repair Loans & Grants	√	√	√	<p>Also known as the Section 504 Home Repair program, this provides loans to very-low-income homeowners to repair, improve or modernize their homes or grants to elderly very-low-income homeowners to remove health and safety hazards.</p> <p>To qualify, you must:</p> <ul style="list-style-type: none"> <li>• Be the homeowner <u>and</u> occupy the house</li> <li>• Be unable to obtain affordable credit elsewhere</li> <li>• Have a family income below 50 percent of the area median income</li> </ul> <p>For grants, be age 62 or older and not be able to repay a repair loan</p>

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	Farm Service Agency - Disaster Assistance	√	√	√	<p>Emergency Conservation program shares with agricultural producers the cost of rehabilitating eligible farmlands damaged by natural disaster. .</p> <p>Farm Service Agency provides emergency loans to assist producers recover from production and physical losses due to drought, flooding, other natural disasters or quarantine.</p> <p>Natural Resources Conservation Service's Emergency Watershed Protection Program (EWP) provides emergency measures, including purchase of floodplain easements for runoff retardation and soil erosion prevention to safeguard lives and property from floods, drought, and the products of erosion on the watershed. Food and Nutrition Service's Food Distribution division has the primary responsibility of supplying food to disaster relief organizations.</p>
	Disaster Food Stamp Program		√	√	<p>Under the DFSP, the Secretary of Agriculture approves State waivers to establish temporary eligibility standards for households not already enrolled in the Food Stamp Program that experience an adverse effect from the disaster. Eligibility verification and reporting requirements are temporarily relaxed so that benefits can be quickly provided to households that suddenly need food assistance but may not ordinarily qualify for food stamps.</p>
	Radiological Emergency Assistance		√	√	<p>Provision of specialized services, advisory services, counseling and dissemination of technical information to assist in responding to incidents involving loss of control of radioactive materials and supporting efforts to protect public health and safety.</p> <p>For any person or organization with knowledge of an incident believed to involve ionizing radiation or radioactive material hazardous to health and safety.</p>

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		Support	Facilitate		
U.S. Department of Energy EPA U.S. Department of Health and Human Services	Transportation Emergency Preparedness Program (TEPP)	√	√		In an effort to address responder concerns, the Department retooled its approach to emergency responder preparedness and implemented the more simplified and responder-friendly Transportation Emergency Preparedness Program (TEPP). TEPP integrates a basic approach to transportation emergency planning and preparedness activities under a single program with the goal to ensure DOE, its operating contractors, and state, tribal, and local emergency responders are prepared to respond promptly, efficiently, and effectively to accidents involving DOE shipments of radioactive material.
	Superfund Amendment and Reauthorization Act (SARA), Title III	√	√		Support programs that are designed to improve emergency planning, preparedness, mitigation, response and recovery capabilities with special emphasis on emergencies associated with hazardous materials.  For state and local governments and university-sponsored programs.
	Vector Control				Advice and technical assistance to prevent the spread of communicable diseases by disease-carrying animals or insects in the aftermath of a disaster.
U.S. Department of Housing and Urban Development	Comprehensive Planning Assistance	√	√		Grants to strengthen planning and decision-making capabilities of chief executives of state, regional and local agencies to promote more effective use of natural, economic and physical resources. Disaster mitigation and recovery planning are eligible activities.  For state agencies designated by the Governor; counties, cities, regional and local planning agencies, local development districts, economic development districts and localities that suffered a major disaster.
	Victim Identification	√	√	√	Fingerprint identification of disaster victims. For any authorized state or local law enforcement agency.

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Federal Bureau of Investigation NOAA National Weather Service	Forecasts and Warnings	√	√	√	<p>Public forecasts and warnings of hazardous weather phenomena and floods, and training programs on disaster safety rules. These are available to agencies and the public.</p> <p>Educational materials for preventing injury are readily available at the NOAA website and news of impending heat conditions, including expected intensity are broadcast on local radio, NOAA Weather Radio, and television stations.</p>
Small Business Administration	Disaster Loans	√	√	√	<p>The SBA offers four types of loans:</p> <p>Home and Personal Property Loans for homeowners and tenants to repair or replace disaster damages to real estate and/or personal property. Tenants are eligible for personal property losses only.</p> <p>Business Physical Disaster Loans are for businesses to repair or replace disaster damages to property owned by the business. These losses could be to real estate, machinery and equipment, leasehold improvements, inventory and supplies. Businesses of any size are eligible to apply.</p> <p>Economic Injury Disaster Loans are working capital loans for small businesses and small agricultural cooperatives to assist them through the disaster recovery period. These loans are available to applicants without credit available elsewhere.</p> <p>Military Reservists Economic Injury Loan provides funds to help an eligible small business meet its ordinary and necessary operating expenses that it could have met, but is unable to, because an essential employee was called-up to active duty in his or her role as a military reservist.</p>

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<p>U.S. Department of Housing and Urban Development</p>	<p>Housing Grants and Mortgage Insurance</p>	<p>√</p>	<p>√</p>	<p>√</p>	<ul style="list-style-type: none"> <li>- Community Development Block Grants: Grants to entitlement communities. Preferred use of funding is for long-term needs but may be used for emergency response activities.</li> <li>- Multi-family home mortgage insurance: Guaranteed/insured loans to finance the acquisition of proposed, under construction or existing single-family units. Homeowners are permitted to make a low down payment. For any person able to meet the cash investment, the mortgage payments and credit requirements.</li> <li>- Special Mortgage Insurance for Low and Moderate Income Families: Mortgage insurance for low and moderate-income families. The program can be used to finance rehabilitation of sub-standard properties. Anyone may apply; displaced households qualify for special terms.</li> <li>- Co-insurance: Joint mortgage insurance by the federal government and private lenders to facilitate homeownership financing. Everyone eligible for mortgage insurance under the full insurance programs may apply for co-insured loans to lenders approved by HUD as co-insurers. The co-insuring lender (any mortgage approved by FSA), based upon the characteristics of the property and the credit qualifications of the borrower, determines whether to make the loan.</li> <li>- Manufactured Home Loan Insurance to Finance Purchase of Manufactured Homes: To make reasonable financing of manufactured home purchases. Provided private lending institutions with federal insurance when they make loans for the purchase of manufactured homes to be used as primary residences. All families are eligible to apply.</li> <li>- Major Home Improvements Loan Insurance: Federal insurance of loans to help families repair or improve existing residential structures outside urban renewal areas. The program provides for long-term insured mortgage financing of major improvements or alterations to structures containing up to four family units. For any owner of the property to be improved or the lessee under a 99-year renewable lease or a lease having an expiration date at least ten years beyond the maturity date of the mortgage.</li> </ul> <p>Home Improvement Loan Insurance: For property owners and tenants under some conditions.</p>
<p>USDOT -</p>	<p>Hazardous Materials Emergency Preparedness (HMEP) Grant Program</p>	<p></p>	<p>√</p>	<p>√</p>	<p>Used by WVDHSEM/State Emergency Response Commission to grants to active Local Emergency Planning Committees for education and training to public sector employees for the purpose of responding to chemical accidents/incidents.</p>

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U.S. Public Health Service	Emergency Health Assistance			√	Provides emergency health care assistance.
American Red Cross, Salvation Army, Department of Agriculture and Consumer Services, VOAD, food banks, Meals-on-Wheels Association of America	Food			√	Food can be provided to disaster victims and workers in several ways: Direct provision of foodstuffs donated by individuals and groups to disaster victims through distribution centers as described above. Direct grants for food purchase or food stamp allotments (through section 409) provided to disaster victims (described earlier in the Federal Assistance section). Meals provided at feeding centers or from mobile distribution canteens. – Through section 410, provision of food stocks for emergency mass feeding or distribution to an area suffering a major disaster or emergency.
American Red Cross, Salvation Army, Maryland Volunteer Organizations Active in Disaster (VOAD)	Collection and Distribution of Donated Goods		√	√	Establish and manage centers for receipts and distribution of donated goods such as food, clothing, furniture, medical supplies, building materials, cleaning supplies, bedding, utensils and tools. This is usually organized with a designated distribution center.
Department of Social Services, Red Cross, Salvation Army, VOAD	Counseling		√	√	Crisis intervention counseling designed to assist disaster victims and responders in coping with their situation to avoid serious psychological impairment.
VOAD, Department of Health, AmeriCorps, NGOs	Homes Repair	√	√	√	Aid to homeowners to repair their homes in the absence of or to supplement FEMA's Minimal Repair Program. The ability of the listed agencies to provide assistance may vary for each event and is tied to the income level and demonstrated need of each victim.

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VOAD, Maryland National Guard, AmeriCorps, Others	Personnel	√	√	√	Provision of personnel to supplement the labor necessary to respond to emergency disaster events, especially for clean-up and damaged home repair.
MEMA	Private Sector Integration Program (PSIP)				The Maryland Emergency Management Agency (MEMA) is committed to incorporating the private sector into the emergency management framework to provide a voice to the business community during emergencies and increase information sharing between the private and public sectors. Members of MEMA's Private Sector Integration Program (PSIP) can access the Maryland Virtual Business Operations Center at any time during an emergency activation for situational awareness, incident-specific documents, and access to government officials staffing the State Emergency Operations Center.
VOAD, Department of Health, AmeriCorps, NGOs	Tidal Gauge Network				MEMA is currently exploring the use of Hazard Mitigation Grant Program funds to place additional tide gauges along the Chesapeake Bay. Water level information from these gauges will be available in real time via the Internet to State and local emergency management officials to assist with alert, warning, and response.
VOAD, Maryland National Guard, AmeriCorps, Others	Best Practices in Hazard Mitigation Publication				In the spring of 2004 MEMA published the Best Practices in Hazard Mitigation, Success Stories from Maryland. This publication recognized actions taken by the State and local governments to reduce loss of life and property damage associated with hazard events in Maryland. Distribution of this document to local planners, emergency management offices, and colleges and universities is on-going.
MEMA Maryland Department of Planning	Pre Disaster Mitigation Grant Program (PDM)	√	√	√	Funding for plans and projects that reduce overall risks to the population and structures, while also reducing reliance on funding from actual disaster declarations.
	Flood Mitigation Assistance Program (FMA)	√	√	√	Assist States and communities to implement measures that reduce or eliminate the long-term risk of flood damage to buildings, manufactured homes, and other structures insured under the National Flood Insurance Program.

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	National Flood Insurance Program (NFIP)	√	√	√	Provides financial protection by enabling persons to purchase insurance against floods, mudslide or flood related erosion.
	Agricultural Preservation				The MDP maps prime and productive agricultural lands statewide and collects data on development pressures, State and local preservation easements, and local planning and zoning initiatives to preserve agricultural lands.
	Consolidated Technical Assistance Program				The Consolidated Technical Assistance Program (CTAP) is funded through the Appalachian Regional Commission's Area Development Allocation for Maryland. This program provides financial assistance to local governments in Garrett, Allegany and Washington counties. This program supports a wide array of projects including the development of sensitive area plans, the acquisition and development of greenways in floodplains, and flood mitigation projects.
Maryland Department of Planning Maryland Department of Natural Resources	Demographic Database Development				The MDP maintains databases containing information on population, housing, employment, income, businesses, school enrollment, natural resources, and land use. These databases also include current electronic based maps with features such as street names, addresses, and parcel data. These databases have been utilized for several mitigation projects within the State.
	Development Pressure Mapping				The MDP has identified and mapped development pressures on resource lands and the degree of protection afforded to those lands by local zoning. This information is used in conjunction with data on land protected by easement in order to measure preservation efforts in the context of the threat posed by development.

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	Economic Growth, Resource Protection and Planning Act of 1992				<p>The Planning Act is intended to ensure that State Government activities and programs are consistent with the State's development policy. A total of eight visions are included in the Planning Act, which are implemented in part through MDP reviews of the required sensitive areas element of county and municipal comprehensive plans. Local governments are required to update, or at a minimum review, their plans once every six years. This element must address streams and their buffers, 100-year floodplains, steep slopes, endangered or threatened species habitats, and any other sensitive areas as may be identified by the local plan. The MDP then uses this element to develop land use planning recommendations for the specified sensitive areas, to establish funding resources for meeting the visions, and to ensure that development is taking place in suitable areas.</p> <p>Article 66B of the Planning Act addresses the sensitive areas required element of local comprehensive plans.<sup>2</sup> Sensitive areas include wetlands, floodplains, and other environmentally sensitive lands where special attention must be paid. A number of publications, such as the "Preparing a Sensitive Areas Element" and "Sensitive Areas," also focus on identifying what sensitive areas may exist and on the resources available to help protect them. The 2006 MDP publication Revisiting the Comprehensive Plan: the Six Year Review guidance document encourages hazard mitigation planning with comprehensive planning.</p>
	Land Preservation and Recreation Planning				The Maryland Department of Planning prepares guidelines for State and local land preservation and recreation plans. These plans address the four interrelated categories of recreation and resource protection, recreational lands and facilities, natural resource lands, and cultural heritage resources.
	Maryland Property View Database				The Maryland Property View Database is updated and maintained by the MDP. MD Property View is an electronic information system which contains data on every land parcel within the State. The records in this database contain over 100 data items for each parcel. Also contained within the database are scanned images of land parcels, satellite imagery, census data, zip code boundaries, land use and land cover data, and priority funding area boundaries.

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	Rural Legacy Program				The Rural Legacy Program provides the focus and funding necessary to protect large, contiguous tracts of land and other strategic areas from development. The program also enhances natural resource, agricultural, forestry, and environmental protection through cooperative efforts within State government and between State and local governments and land trusts. Protection is provided through the acquisition of easements and fee estates and the supporting activities of Rural Legacy sponsors and local governments.
	Smart Growth				The Smart Growth and Neighborhood Conservation initiatives of the Maryland Department of Planning coordinate State expenditures with local growth plans. The MDP worked to develop the original Smart Growth legislation, which was adopted in 1997 and continues to work with local and State agencies to implement the program. Technical assistance is provided to private and public organizations which support growth that fosters livable communities, preserves and protects the environment, and makes efficient use of State resources.
	Task Force on the Future for Growth and Development in Maryland				<p>This Task Force, created by House Bill 1141 in 2006, focuses on researching trends and population growth challenges as well as the impact of local policies on the environment and infrastructure. The group will study the linkage between smart growth, local land use plans, and various state-wide plans such as the state development, transportation, and housing plans. The Task Force also proposes that the state implement laws and recommendations that advance growth and development related best management practices. A final report of findings and recommendations was published in December, 2008.</p> <p>In January 2008, the 21 members of the Task Force were announced. The Task Force will be staffed by Maryland Department of Planning and will serve as the Governor's Smart Growth Advisory Board.</p>

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	Technical Assistance				The MDP offers training in the use of Maryland Property View and provides planning technical assistance and customized mapping services to local governments within the State. The MDP has also worked with the University of Maryland Urban Studies and Planning Program to develop and offer a certificate course in urban planning. This course is available to volunteer planning commissioners, zoning board members, realtors, elected and appointed officials, and others responsible for making decisions about future growth and development in Maryland. This course covers a range of planning topics including planning and zoning law, innovative planning tools, transportation, smart growth, housing, and economic development.

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	Maryland Shorelines Online				<p>A product of the Maryland Coastal Program, Maryland Shorelines Online is a joint tool of the Maryland Department of Natural Resources, the Towson University Center for Geographic Information Sciences, and the Maryland Geological Survey. This web based Geographical Information Systems (GIS) mapping tool provides a centralized site where Maryland communities and other stakeholders can access data on sea level rise and coastal hazards (i.e. erosion and other shoreline changes, coastal flooding). The tool provides best management practices and outreach resources.</p> <p>The GIS tool also provides an overview of laws, regulations, and permitting requirements that apply to coastal areas and are affected by sea level rise. The tool is targeted toward State and local planners who work with coastal issues, marine contractors, educators, and the general public. Technical and financial assistance, lesson plans for students, historical records on shoreline erosion, and the interactive map viewer Shorelines Changes Online are some of the resources available on the site. Also accessible is the Comprehensive Coastal Inventory Program (CCI) that provides maps, summary reports, tables, and photographs that outline the current status of coastal areas within the state. The site also provides links to remote sensing data resources and LIDAR (light detection and ranging) elevation data products. A total of seven LIDAR elevation data products have been developed.</p> <p>The Maryland Shorelines Online database was developed following an exhaustive survey of the State's entire tidal shoreline by boat. This survey took nearly four years to complete, and was the first such survey of its kind in the State.</p>
	Endangered and Protected Species Protection				<p>The Department of Natural Resources, in partnership with the U.S. Fish and Wildlife Service, administers funds to local jurisdictions that support projects that reduce the erosion of lands inhabited by protected freshwater mussels, the Delmarva Fox Squirrel, and other endangered and protected species.</p>

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Maryland Department of Natural Resources Maryland Department of the Environment	The Environmental Geology and Mineral Resources Program				The Environmental Geology and Mineral Resources Program is administered by the Maryland Geological Survey, a division within the DNR. Under the Program, investigations and surveys of the geology of Maryland are conducted to assess land resources and environmental hazards. An extensive project to digitize soil maps throughout the State is currently underway.
	The Rural Legacy Program				The Rural Legacy Program involves both the Department of Natural Resources and the Maryland Department of Planning. The program provides State funding to help local governments, landowners, and conservation organizations permanently preserve rural lands. It also encourages local governments and private land trusts to identify Rural Legacy areas and competitively apply for funds to create new or complement existing land conservation efforts.
	Seismometer at Soldiers Delight Natural Environment Area				The Maryland Geological Survey, through funding from the Maryland Emergency Management Agency, has installed a seismometer at Soldiers Delight Natural Environment Area. The seismometer was installed to aid in the evaluation of earthquake risk and to transmit earthquake information to emergency management personnel, the United States Geological Survey, and university seismic networks.
	Statewide Fire Monitoring System				The DNR Forest Service has installed and currently operates 12 automated Forest Technology Systems stations throughout the State. These stations collect fire weather data such as fuel moisture, humidity, temperature, and wind speed. This data is used by DNR Forest Service and Maryland's regional fire centers to determine fire danger ratings.
	Volunteer Fire Assistance Program				The DNR Volunteer Fire Assistance Program provides financial and technical assistance to State Foresters and other appropriate officials in order to organize, train, and equip fire departments in rural communities. A rural community may be an incorporated or unincorporated city or town having a population of 10,000 or less.

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	Watershed Services				Within the Watershed Services unit of DNR are programs which address coastal and natural resource issues. Planning and coordination of coastal hazard issues are undertaken through the Coastal Zone Management Program. The Geographic Information Service provides and manages an array of digital geographic data of the State and the Watershed Management and Analysis provides natural resource data analysis services to the Department.
	Wind and Water Technical Assistance Program				The Maryland Geological Survey has contracted with the Center for Geographic Information Sciences (CGIS) at Towson University to create digital maps of parts of Baltimore City. These maps will illustrate the distribution and thickness of artificial fill in the densely populated area around the Inner Harbor. They will be used by local government officials to anticipate possible flooding caused by failure of the artificial fill during an earthquake event.
	CoastSmart	√	√	√	<i>CoastSmart</i> Communities is a program dedicated to assisting Maryland's coastal communities address short- and long-term coastal hazards, such as coastal flooding, storm surge, and sea level rise. <i>CoastSmart</i> connects local planners to essential information, tools, people, and trainings.  Maryland's shorelines extend over 3,000 miles along the diverse landscapes of the Chesapeake Bay, the Coastal Bays, and the Atlantic Ocean. These landscapes are high susceptible to coastal storms, flooding, hurricanes, and are vulnerable to the long-term effects of a changing climate. These events are predicted to become more intense and more frequent in the future because of changes in sea level, temperature, wind and wave energy.

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	A Sea Level Rise Response Strategy for the State of Maryland				<p>Developed by a NOAA Coastal Management fellow at the Maryland Coastal Program, this strategy resulted in a proactive policy and implementation focused sea level rise planning framework which acknowledges that Maryland coastline sea level rise rates are approximately twice as high as worldwide rates. A Chesapeake Bay land subsidence rate that averages 1.3 mm per year causes much of this rise. In fact, having already risen one foot in the past century, sea level rise in Maryland is expected to rise 2-3 additional feet by 2100. An increase in coastal flooding, shoreline erosion, and salt-water integration with groundwater are among the outcomes of this phenomenon. Nationwide, following Louisiana and Southern Florida, the Chesapeake Bay region has been identified as the third most vulnerable region as far as sea level rise impacts are concerned.</p> <p>Recognizing the need for more data on the potential impacts of sea level rise, two assessment reports have been developed. The first of these reports, "Assessing the Economic Cost of Sea Level Rise",<sup>3</sup> was developed in 2001 by Towson University under the direction of the Maryland Coastal Program. The report focuses on coastal flooding resulting from sea level rise and the resulting economic impacts to Maryland communities within a pilot study area. The second report, "Determining Sea Level Inundation Potential",<sup>4</sup> was developed by DNR and the U.S. Geological Survey. Worcester and Dorchester Counties are the settings for this later study.</p> <p>Other DNR efforts to mitigate sea level rise include research support and the acquisition of high resolution topographic coastal data that is a basis for sea level rise inundation modeling. As a result of this modeling, which seeks to identify the impacts of both a gradual sea level rise and sea level rise that results from storm surge, sea level rise scenarios have been developed for Worcester, Dorchester, and Anne Arundel, and St. Mary's Counties.</p>

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	State Wetland Conservation Plan				The 2003 State Wetland Conservation plan was the product of a partnership between citizens, businesses, non-profits, and State, Federal and Local partners. It was created as a guide to integrate and improve upon all wetlands conservation and management related State, Local, Federal, and non-governmental programs. Funded by the Environmental Protection Agency, the plan provides historical wetlands acreage and distribution data and refers the reader to available wetland inventories and pertinent regulations. Just as importantly, the plan publicizes five major goals including the prioritization of areas for protection and an increase in the effectiveness of wetlands administration and regulations in Maryland.
Maryland Department of the Environment	Database Development and Maintenance				The MDE, in cooperation with MEMA, developed and maintained data sets which may be used for hazard mitigation including digital floodplain boundaries, dam locations and safety classifications, hazardous materials storage and handling facility locations, and hazardous materials incidents and oil spills.
Maryland Department of Housing and Community Development	Drought Public Information Initiative				The Water Management Administration of the MDE disseminates public information and provides education on appropriate drought activities and maintains a hotline for the public and media.
	Maryland Statewide Water Conservation Advisory Committee				The Maryland Statewide Water Conservation Advisory Committee was established by Executive Order in January 2000. The Committee charge was to set uniform indicators for evaluating drought conditions, consider water conservation efforts and the need for regional enhancements, assess well failures and programs for groundwater conservation, recommend mechanisms to address its findings, and respond to future droughts. Public education and outreach programs were also developed by the Committee. The Committee produced the State of Maryland Drought Monitoring and Response Plan which was published in November of 2000.
	Drought Monitoring and Response Plan				The State of Maryland Drought Monitoring and Response Plan outlines the methods and steps the State will take to monitor and respond to drought conditions when they occur.

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	Mining Program				MDE designs and manages construction contracts for mining projects, including extensive earthmoving operations, acid mine drainage treatment systems, stream restoration, water supply replacement, and mine subsistence control. MDE also regulates existing mining operations and works with the mining industry to reclaim abandoned mines and reduce the risk of mass movements of soil associated with those mines.
	Public Water Supply				The MDE Water Supply Program staff works closely with the operators of Maryland's water supply systems, advising them of steps to take to protect their water supply facilities. A letter and informational checklist have been sent to all community water systems to help them to assess their vulnerability and determine actions to minimize the risk of terrorist attacks. MDE staff also continually update water systems with the latest developments such as security related information and FBI advisories. Maryland's water systems have taken extra precautions, such as increasing security and surveillance of key water facility components, increasing the frequency of water quality monitoring, and applying optimum treatment in order to protect the safety of the State's public water supply.

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	Radiological Health Program				<p>The Radiological Health Program (RHP) was developed to control and monitor uses of radiation and to protect the public and the environment from inadvertent and unnecessary radiation exposure. The RHP also provides information on radiation activities.</p> <p>The RHP's Radioactive Materials (RAM) Division regulates almost 600 hospitals, doctors' offices, manufacturing and construction industries, radiographers, and other radioisotope users. Maryland is also an Atomic Energy Act Agreement State, which gives the State the authority to function exactly as the U.S. Nuclear Regulatory Commission in issuing and inspecting RAM licenses and pursuing penalty assessments. Out-of-state radioactive material licensees must report to the RHP before working in hospitals, on roads, in buildings, or other projects requiring the use of radioisotopes. The RHP's Radiation Machines Division performs the registration and inspection of approximately 3,000 dental and veterinary x-ray facilities in the State. They also certify and register approximately 1,600 medical and academic facilities with x-ray machines and accelerators. Radiological Health Program staff respond to any actual or staged emergencies at the Calvert Cliffs Nuclear Power Plant in Maryland, the Peach Bottom Atomic Power Station in Pennsylvania, any industrial, medical or transportation accident, or other serious incident involving radiation.</p>
	Voluntary Cleanup Program				<p>Established by the state legislature in 1997, Maryland's Voluntary Cleanup Program (VCP) is administered by the Waste Management Administration's Department of Environmental Restoration and Redevelopment Program (WAS ERRP). The VCP mission is to provide State oversight for voluntary cleanups of properties contaminated with hazardous substances. The goal of the program is to increase the number of sites cleaned by streamlining the cleanup process, while ensuring compliance with existing environmental regulations. Projects range from simple sites with a limited amount of contaminated soil to complex sites with multiple contaminants in soil, groundwater, surface water, sediment, and air.</p>

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	High Hazard Dams GIS Project				In 2000, grant funding became available to MDE to create a desktop database of dam information. The first phase of this effort focused on high hazard dams. High hazard dams are defined as those dams which are located upstream of developed or urban areas. A failure of these dams would likely cause serious damage to homes, industrial and commercial buildings, and major public utilities. A failure of a high hazard dam would also likely result in the loss of more than six lives. For each dam in this category, the dam location and inundation area maps were digitized and Maryland Property View, a GIS database of ownership information, was overlaid on the inundation area maps to identify structures and infrastructure impacted under dam failure scenarios. Additionally, the name, height, storage capacity, and danger level of the nearest town downstream were added to the GIS database for each dam. Photographs and inspection reports were also included.
	Smart Growth				As a partner in the State's Smart Growth initiative, the Department of Housing and Community Development encourages sustainable development practices and works toward preserving valuable natural resources from continued urban development. In existing communities, DHCD coordinates the revitalization of commercial and residential areas, builds and rehabilitates housing and infrastructure, and preserves historical and cultural resources.
	Community Development and Block Grants				Housing programs administered by DHCD may be used in conjunction with other funds to rebuild communities after a disaster. Community Development Block Grants (CDBG), available through a federally funded program sponsored by the Department of Housing and Urban Development (HUD) and administered in Maryland by DHCD may be used to acquire homes in hazard areas. These funds may also be used to finance renter and homeowner relocation costs when properties are acquired with monies from other sources.

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Maryland Department of Transportation	Strategic Highway Safety Plan				In an effort to improve overall highway safety throughout the entire network, the State Highway Administration has developed the Maryland Strategic Highway Safety Plan. This plan establishes policies for significantly enhancing highway safety throughout the State. The plan specifically addresses 23 identified program areas within the broader topics of drivers, pedestrians and cyclists, trucks and busses, highways, emergency services, and program management.
	Local Highway Safety Plan				In an effort to better ensure that traffic safety issues and circumstances within local areas of the State are addressed, the SHA has designated Local Highway Safety Coordinators for each of Maryland's 23 counties and Baltimore City. The Coordinators work with local task forces to identify traffic safety issues and problems, develop appropriate countermeasures, and implement or advocate for solutions. They also serve as the focal point for communication and cooperation among local government agencies and the private sector on key traffic safety matters. Additionally, SHA field officials participate in damage assessments post disaster as needed.

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Maryland Department of Business and Economic Development The Maryland Insurance Administration					<p>The primary function of the Maryland Department of Business and Economic Development (DBED) is to influence the economic development of the State. DBED focuses on job creation, new business creation, and development. The agency targets small and minority business development, encourages the cultural development of the state's organizations, and makes training and financial resources available. The website ChooseMaryland5 is the primary gateway that the business community and citizens may use to access these many resources.</p> <p>DBED partners with MEMA during all stages of emergencies and supports disaster affected businesses by making available and coordinating economic resources that assist them in economic recovery. DBED staff work in the State Emergency Operations Center (SEOC) during activation, and sit on the State Mitigation Advisory Committee. They also participate in the State Incident Assistance Teams (IATs), staff the Joint Field Offices as needed, make available economic advisors, and partner with the Federal Response Team as needed (i.e. conducting damage assessments).</p> <p>Some of the activities that DBED performs include the assessment of the economic impacts of disaster events, disaster funding, the provision of referrals and information, and support to businesses and to travelers.</p>

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Agency	Programs, Plans, Policies, Regulations, Funding and Practices	Effect on Loss Reduction		Funding	Description
		Support	Facilitate		
					<p>The Maryland Insurance Administration (MIA), originally named the Maryland Insurance Division in 1872, is responsible for regulating the State's \$26 billion insurance industry. The MIA is responsible for ensuring that the State's insurance regulations are adhered to by firms that provide property insurance and health plan coverage. Insurance rates are regulated by and approximately 110,000 producers and 1,500 insurance companies are licensed by MIA.</p> <p>This State agency also responds to consumer complaints, provides insurance related advice, and disburses educational materials (i.e. the 2006 disaster preparedness insurance guide). Online consumer targeted publications include those that explain available homeowners, auto, health, and life insurance products as well as those that assist property owners whose homes and businesses were damaged. Another service that MIA provides is assistance to citizens with filing claims.</p> <p>The MIA website<sup>6</sup> is accessible during emergency events and the agency's Public Affairs Unit works with the media to ensure that their disaster related activities are publicized. Through this and other methods, MIA encourages participation in and advocates for the National Flood Insurance Program (NFIP). At the start of hurricane season MIA publicizes the importance of flood insurance and ensures that consumers are aware of the 30-day waiting period that exists prior to new insurance policies taking effect. In May of 2007, MIA released a press document that highlighted the fact that hurricane related flooding led to approximately \$177 million in insured flood losses during the 2002 to 2006 hurricane seasons and that, as of the beginning of 2007, only about 3% of the State's households were insured for flooding.</p> <p>As in the 2006 flooding events, MIA supports localities with post disaster recovery. MIA also responds to emergencies and assigns staff to partner with other states agencies in the State Emergency Operations Center (SEOC) and in Disaster Recovery Centers (DRCs).</p>

MARYLAND HAZARD MITIGATION PLAN

Disaster Mitigation Programs Capabilities Assessment					
Agency	Programs, Plans, Policies, Regulations, Funding and Practices	Effect on Loss Reduction		Funding	Description
		Support	Facilitate		
					<p>Within the MIA, the lead for coordinating disaster response activities is the Consumer Education and Advocacy Unit (CEAU), which has a Consumer Education and Outreach section. This unit works directly with consumers on insurance related issues and takes part in public hearings such as those related to NFIP reforms. It is responsible for maintaining copies of disaster related publications and alerts that were disseminated to consumers and for ensuring that their website stays current. It also maintains a Carrier Reporting Database where insurance claim data that is provided by insurance providers is uploaded. MIA CEAU staff work with these insurance carriers and ensure that this database is an up to date source of the following data: the number of claims filed, the number of claims that were settled, the amounts paid out to those insured, as well as the physical locations of properties for which claims were filed. MIA's Disaster Response Plan is a resource document that supports the coordination of disaster response activities. Procedures for responding to emergencies as well as to consumer insurance related inquiries are outlined in this document. The document also outlines MIA's response and recovery role when partnering with other entities.</p> <p>The CEAU maintains an up to date contact database for Maryland licensed carriers as well as contact information for state, local, and federal officials that partner with MIA in its response and recovery role. The CEAU is also responsible for monitoring the WebEOC® tool that MEMA and partners use for event management. The CEAU also plays a role in maintaining disaster response and recovery supplies and it supports the Disaster Recovery Teams by ensuring that they stay up to date regarding consumer assistance procedures.</p>

MARYLAND HAZARD MITIGATION PLAN

Disaster Mitigation Programs Capabilities Assessment					
Agency	Programs, Plans, Policies, Regulations, Funding and Practices	Effect on Loss Reduction		Funding	Description
		Support	Facilitate		
U.S. Army Corps of Engineers	Drought Assistance				<p>Coordinate the development of drought plans and procedures for lakes and dams within the State under the jurisdiction of the Corps of Engineers.</p> <p>Provide information and reports as needed.</p> <p>Coordinate USACOE drought related activities.</p> <p>Provide water from USACOE reservoirs and dams, as available during emergencies.</p>

Disaster Mitigation Programs Capabilities Assessment					
Agency	Programs, Plans, Policies, Regulations, Funding and Practices	Effect on Loss Reduction		Funding	Description
		Support	Facilitate		
USDA	Single Family Housing Guaranteed Loan Program	√	√	√	<p>This program assists approved lenders in providing low- and moderate-income households the opportunity to own adequate, modest, decent, safe and sanitary dwellings as their primary residence in eligible rural areas. Eligible applicants may build, rehabilitate, improve or relocate a dwelling in an eligible rural area. The program provides a 90% loan note guarantee to approved lenders in order to reduce the risk of extending 100% loans to eligible rural homebuyers.</p> <p>Applicants must:</p> <ul style="list-style-type: none"> <li>• Meet <a href="#">income-eligibility</a></li> <li>• Agree to personally occupy the dwelling as their primary residence</li> <li>• Be a U.S. Citizen, U.S. non-citizen national or Qualified Alien</li> <li>• Have the legal capacity to incur the loan obligation</li> <li>• Have not been suspended or debarred from participation in federal programs</li> <li>• Demonstrate the willingness to meet credit obligations in a timely manner</li> </ul> <p>Purchase a property that meets all program criteria</p>



## APPENDIX D: 2016 Maryland Critical Facilities Database

This appendix is available for electronic review only by contacting the Maryland State Hazard Mitigation Officer:

Mark D James  
State Hazard Mitigation Officer  
Maryland Emergency Management Agency  
5401 Rue Saint Lo Drive,  
Reisterstown, MD 21136  
410-517-3600 (office)  
410-802-9990 (mobile)  
[mark.james@maryland.gov](mailto:mark.james@maryland.gov)



## APPENDIX E: 2016 State Asset Database

This appendix is available for electronic review only by contacting the Maryland State Hazard Mitigation Officer:

Mark D James  
State Hazard Mitigation Officer  
Maryland Emergency Management Agency  
5401 Rue Saint Lo Drive,  
Reisterstown, MD 21136  
410-517-3600 (office)  
410-802-9990 (mobile)  
[mark.james@maryland.gov](mailto:mark.james@maryland.gov)



## APPENDIX F: 2016 REFINED MARYLAND NFIP DATABASE

This appendix is available for electronic review only by contacting the Maryland State Hazard Mitigation Officer:

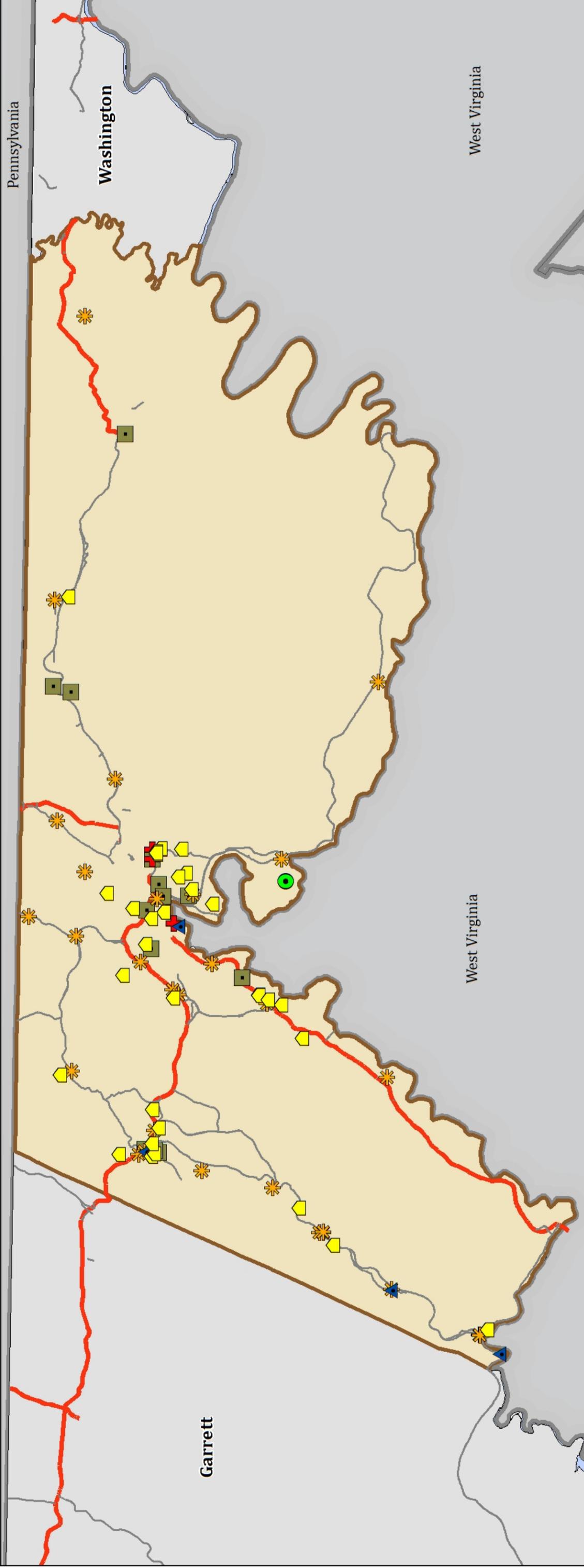
Mark D James  
State Hazard Mitigation Officer  
Maryland Emergency Management Agency  
5401 Rue Saint Lo Drive,  
Reisterstown, MD 21136  
410-517-3600 (office)  
410-802-9990 (mobile)  
[mark.james@maryland.gov](mailto:mark.james@maryland.gov)



## APPENDIX G: MARYLAND CRITICAL FACILITY & STATE ASSET MAPS PER JURISDICTION

# Allegany County Critical Facilities & State Assets

## Maryland 2016 Hazard Mitigation Plan

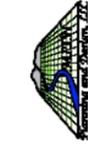


**Description:**

Critical Facility refers to structures that the State has determined must continue to operate before, during and after an emergency and/or disaster. State Assets are state owned and/or operated facilities.

In total there are 2,768 critical facilities and 7,891 state assets identified. When available, location information is provided for each point such as address, city, state, zip and latitude and longitude coordinates. Based on this information this data was imported and geolocated in ArcGIS.

Building information is also included (when available) such as Building value, contents values, number of stories and year built. Analyses within this plan use this data in unison with various hazard information.



*Types of Critical Facilities included: EOC, Fire, Medical, Police and School.*

*Types of State Assets included: Administrative, Airport, Correctional, Dept. of Natural Resources, Educational, Environmental, Fire and Police Departments, Health Related, Historic, Judicial/Legal, Military, Social Services, Transportation and Utility/Infrastructure.*

**Legend:**

- |         |                 |                 |                   |                    |
|---------|-----------------|-----------------|-------------------|--------------------|
| EOC     | US Routes       | Allegany County | Maryland Counties | Surrounding States |
| Fire    |                 |                 |                   |                    |
| Medical |                 |                 |                   |                    |
| Police  |                 |                 |                   |                    |
| School  |                 |                 |                   |                    |
|         | Maryland Routes |                 |                   |                    |

**Projection:**

Maryland State Plane  
North American Datum 1983

*DISCLAIMER: Majority of available hazard data is intended to be used at national or regional scales. The purpose of the data sets are to give general indication of areas that may be susceptible to hazards in order to identify potential risk in the State of Maryland. Data has been used beyond the original intent.*

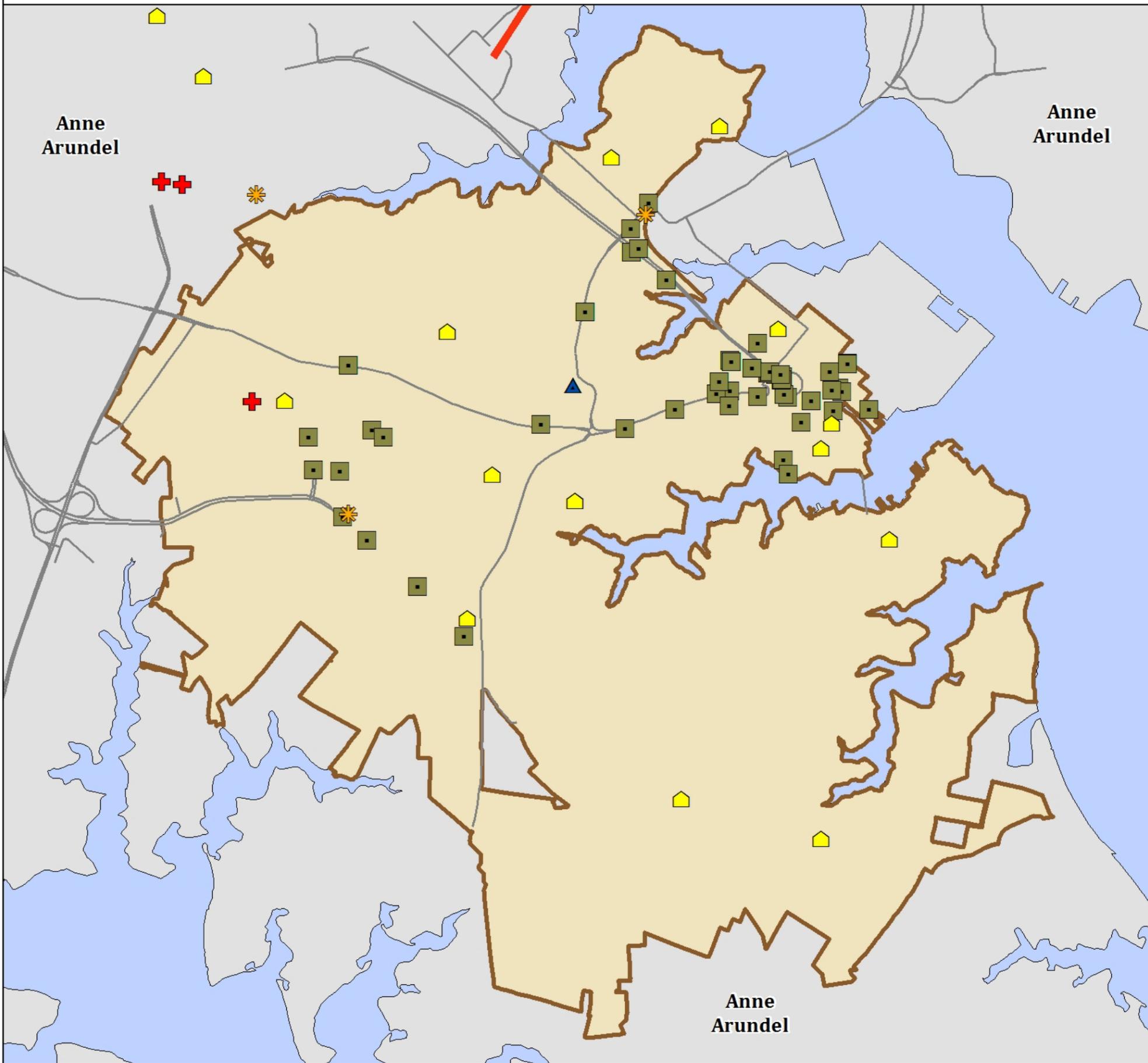


**Data Sources:**  
2016 Maryland Critical Facility Database  
2016 State Assets Database

ESRI State Boundaries  
MSHA County Boundaries

# Annapolis City Critical Facilities & State Assets

## Maryland 2016 Hazard Mitigation Plan



### Description:

Critical Facility refers to structures that the State has determined must continue to operate before, during and after an emergency and/or disaster. State Assets are state owned and/or operated facilities.

In total there are 2,768 critical facilities and 7,891 state assets identified. When available, location information is provided for each point such as address, city, state, zip and latitude and longitude coordinates. Based on this information this data was imported and geolocated in ArcGIS.

Building information is also included (when available) such as Building value, contents values, number of stories and year built. Analyses within this plan use this data in unison with various hazard information.

*Types of Critical Facilities included: EOC, Fire, Medical, Police and School.*

*Types of State Assets included: Administrative, Airport, Correctional, Dept. of Natural Resources, Educational, Environmental, Fire and Police Departments, Health Related, Historic, Judicial/Legal, Military, Social Services, Transportation and Utility/Infrastructure.*

### Data Sources:

2016 Maryland Critical Facility Database  
 2016 State Assets Database  
 ESRI State Boundaries  
 MSHA County Boundaries

### Legend:

#### Facility Type

-  EOC
-  Fire
-  Medical
-  Police
-  School
-  State Assets

-  Maryland Routes
-  US Routes
-  Annapolis City
-  Maryland Counties
-  Surrounding States



**Projection:**  
 Maryland State Plane  
 North American Datum 1983

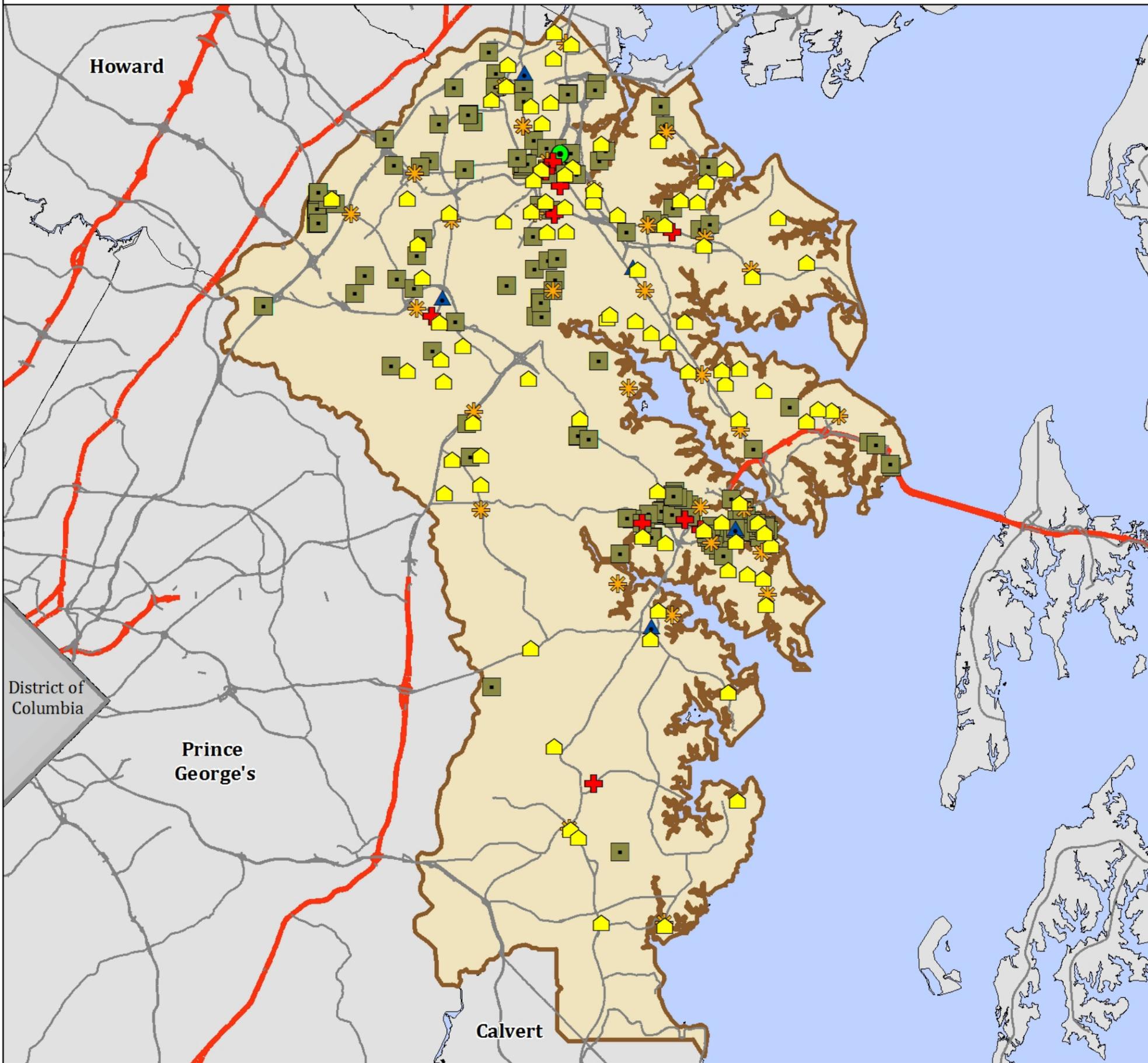


0 0.125 0.25 0.5  
 Miles  
 1 in = 0 miles

DISCLAIMER: Majority of available hazard data is intended to be used at national or regional scales. The purpose of the data sets are to give general indication of areas that may be susceptible to hazards in order to identify potential risk in the State of Maryland. Data has been used beyond the original intent.

# Anne Arundel County Critical Facilities & State Assets

## Maryland 2016 Hazard Mitigation Plan



### Description:

Critical Facility refers to structures that the State has determined must continue to operate before, during and after an emergency and/or disaster. State Assets are state owned and/or operated facilities.

In total there are 2,768 critical facilities and 7,891 state assets identified. When available, location information is provided for each point such as address, city, state, zip and latitude and longitude coordinates. Based on this information this data was imported and geolocated in ArcGIS.

Building information is also included (when available) such as Building value, contents values, number of stories and year built. Analyses within this plan use this data in unison with various hazard information.

*Types of Critical Facilities included: EOC, Fire, Medical, Police and School.*

*Types of State Assets included: Administrative, Airport, Correctional, Dept. of Natural Resources, Educational, Environmental, Fire and Police Departments, Health Related, Historic, Judicial/Legal, Military, Social Services, Transportation and Utility/Infrastructure.*

### Data Sources:

2016 Maryland Critical Facility Database  
 2016 State Assets Database  
 ESRI State Boundaries  
 MSHA County Boundaries

### Legend:

#### Facility Type

-  EOC
-  Fire
-  Medical
-  Police
-  School
-  State Assets

-  Maryland Routes
-  US Routes
-  Anne Arundel County
-  Maryland Counties
-  Surrounding States



### Projection:

Maryland State Plane  
 North American Datum 1983



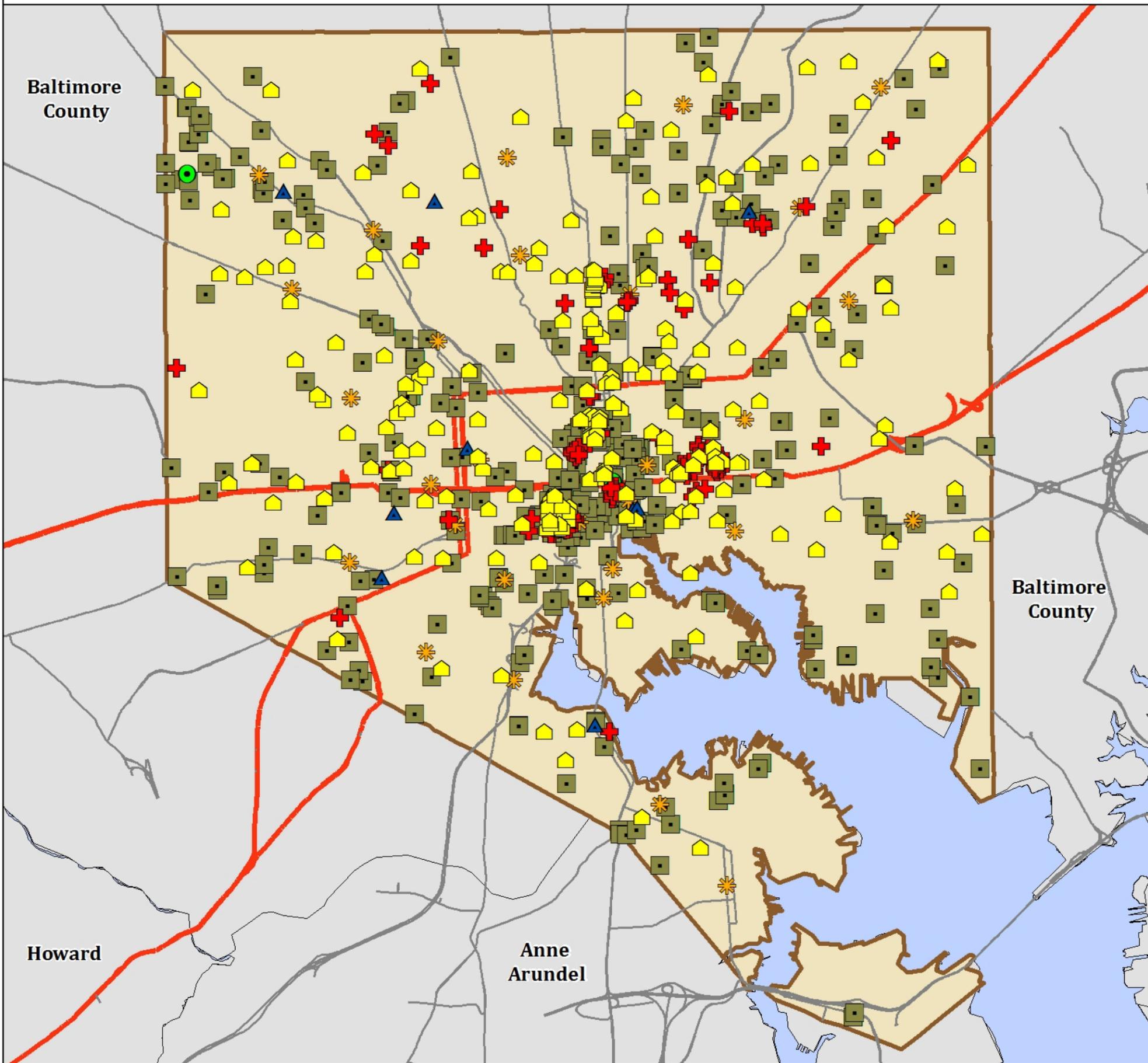
0 1.25 2.5 5  
 Miles

1 in = 4 miles

DISCLAIMER: Majority of available hazard data is intended to be used at national or regional scales. The purpose of the data sets are to give general indication of areas that may be susceptible to hazards in order to identify potential risk in the State of Maryland. Data has been used beyond the original intent.

# Baltimore City Critical Facilities & State Assets

## Maryland 2016 Hazard Mitigation Plan



### Description:

Critical Facility refers to structures that the State has determined must continue to operate before, during and after an emergency and/or disaster. State Assets are state owned and/or operated facilities.

In total there are 2,768 critical facilities and 7,891 state assets identified. When available, location information is provided for each point such as address, city, state, zip and latitude and longitude coordinates. Based on this information this data was imported and geolocated in ArcGIS.

Building information is also included (when available) such as Building value, contents values, number of stories and year built. Analyses within this plan use this data in unison with various hazard information.

*Types of Critical Facilities included: EOC, Fire, Medical, Police and School.*

*Types of State Assets included: Administrative, Airport, Correctional, Dept. of Natural Resources, Educational, Environmental, Fire and Police Departments, Health Related, Historic, Judicial/Legal, Military, Social Services, Transportation and Utility/Infrastructure.*

### Data Sources:

2016 Maryland Critical Facility Database  
 2016 State Assets Database  
 ESRI State Boundaries  
 MSHA County Boundaries

### Legend: Facility Type

- EOC
- Fire
- Medical
- Police
- School
- State Assets
- Maryland Routes
- US Routes
- Baltimore City
- Maryland Counties
- Surrounding States



**Projection:**  
 Maryland State Plane  
 North American Datum 1983



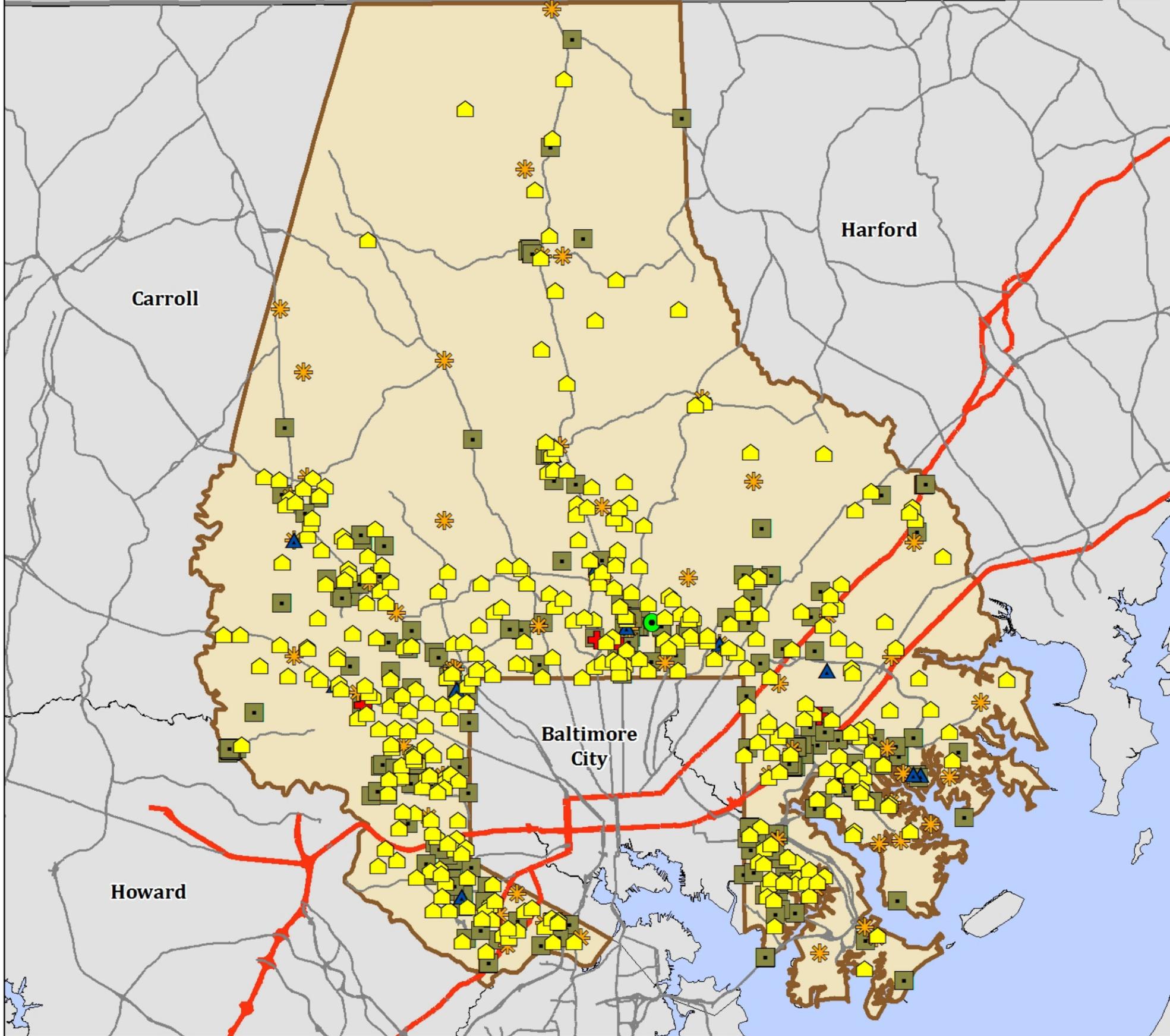
0 0.4250.85 1.7  
 Miles  
 1 in = 1 miles

DISCLAIMER: Majority of available hazard data is intended to be used at national or regional scales. The purpose of the data sets are to give general indication of areas that may be susceptible to hazards in order to identify potential risk in the State of Maryland. Data has been used beyond the original intent.

# Baltimore County Critical Facilities & State Assets

## Maryland 2016 Hazard Mitigation Plan

Pennsylvania



### Description:

Critical Facility refers to structures that the State has determined must continue to operate before, during and after an emergency and/or disaster. State Assets are state owned and/or operated facilities.

In total there are 2,768 critical facilities and 7,891 state assets identified. When available, location information is provided for each point such as address, city, state, zip and latitude and longitude coordinates. Based on this information this data was imported and geolocated in ArcGIS.

Building information is also included (when available) such as Building value, contents values, number of stories and year built. Analyses within this plan use this data in unison with various hazard information.

*Types of Critical Facilities included: EOC, Fire, Medical, Police and School.*

*Types of State Assets included: Administrative, Airport, Correctional, Dept. of Natural Resources, Educational, Environmental, Fire and Police Departments, Health Related, Historic, Judicial/Legal, Military, Social Services, Transportation and Utility/Infrastructure.*

### Data Sources:

2016 Maryland Critical Facility Database  
 2016 State Assets Database  
 ESRI State Boundaries  
 MSHA County Boundaries

### Legend: Facility Type

- EOC
- Fire
- Medical
- Police
- School
- State Assets
- Maryland Routes
- US Routes
- Baltimore County
- Maryland Counties
- Surrounding States



**Projection:**  
 Maryland State Plane  
 North American Datum 1983

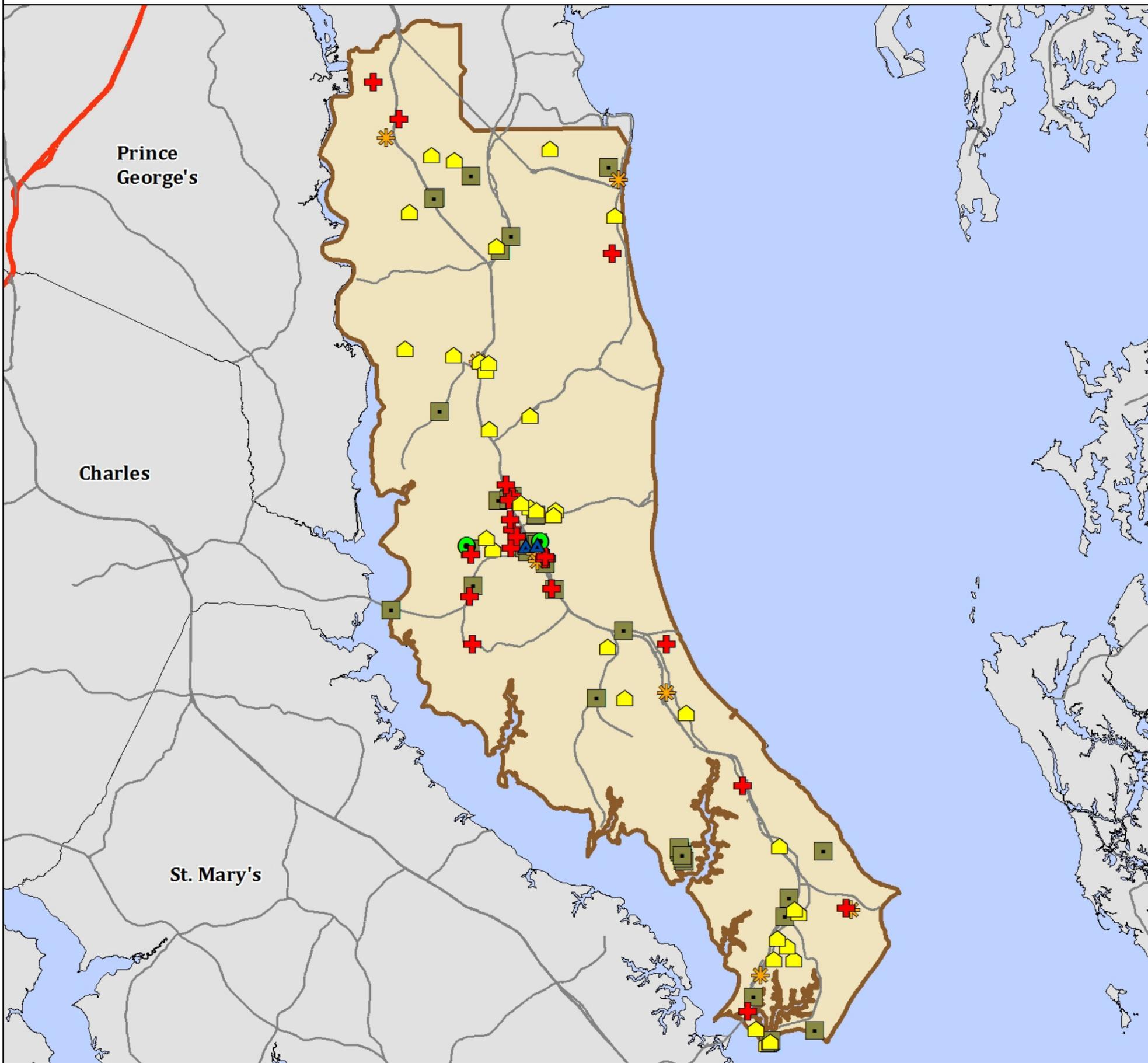


0 1.25 2.5 5  
 Miles  
 1 in = 4 miles

DISCLAIMER: Majority of available hazard data is intended to be used at national or regional scales. The purpose of the data sets are to give general indication of areas that may be susceptible to hazards in order to identify potential risk in the State of Maryland. Data has been used beyond the original intent.

# Calvert County Critical Facilities & State Assets

## Maryland 2016 Hazard Mitigation Plan



### Description:

Critical Facility refers to structures that the State has determined must continue to operate before, during and after an emergency and/or disaster. State Assets are state owned and/or operated facilities.

In total there are 2,768 critical facilities and 7,891 state assets identified. When available, location information is provided for each point such as address, city, state, zip and latitude and longitude coordinates. Based on this information this data was imported and geolocated in ArcGIS.

Building information is also included (when available) such as Building value, contents values, number of stories and year built. Analyses within this plan use this data in unison with various hazard information.

*Types of Critical Facilities included: EOC, Fire, Medical, Police and School.*

*Types of State Assets included: Administrative, Airport, Correctional, Dept. of Natural Resources, Educational, Environmental, Fire and Police Departments, Health Related, Historic, Judicial/Legal, Military, Social Services, Transportation and Utility/Infrastructure.*

### Data Sources:

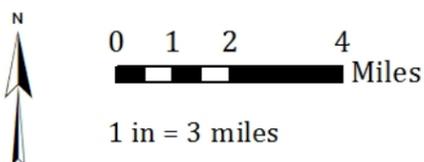
2016 Maryland Critical Facility Database  
 2016 State Assets Database  
 ESRI State Boundaries  
 MSHA County Boundaries

### Legend: Facility Type

- EOC
- Fire
- Medical
- Police
- School
- State Assets
- Maryland Routes
- US Routes
- Calvert County
- Maryland Counties
- Surrounding States



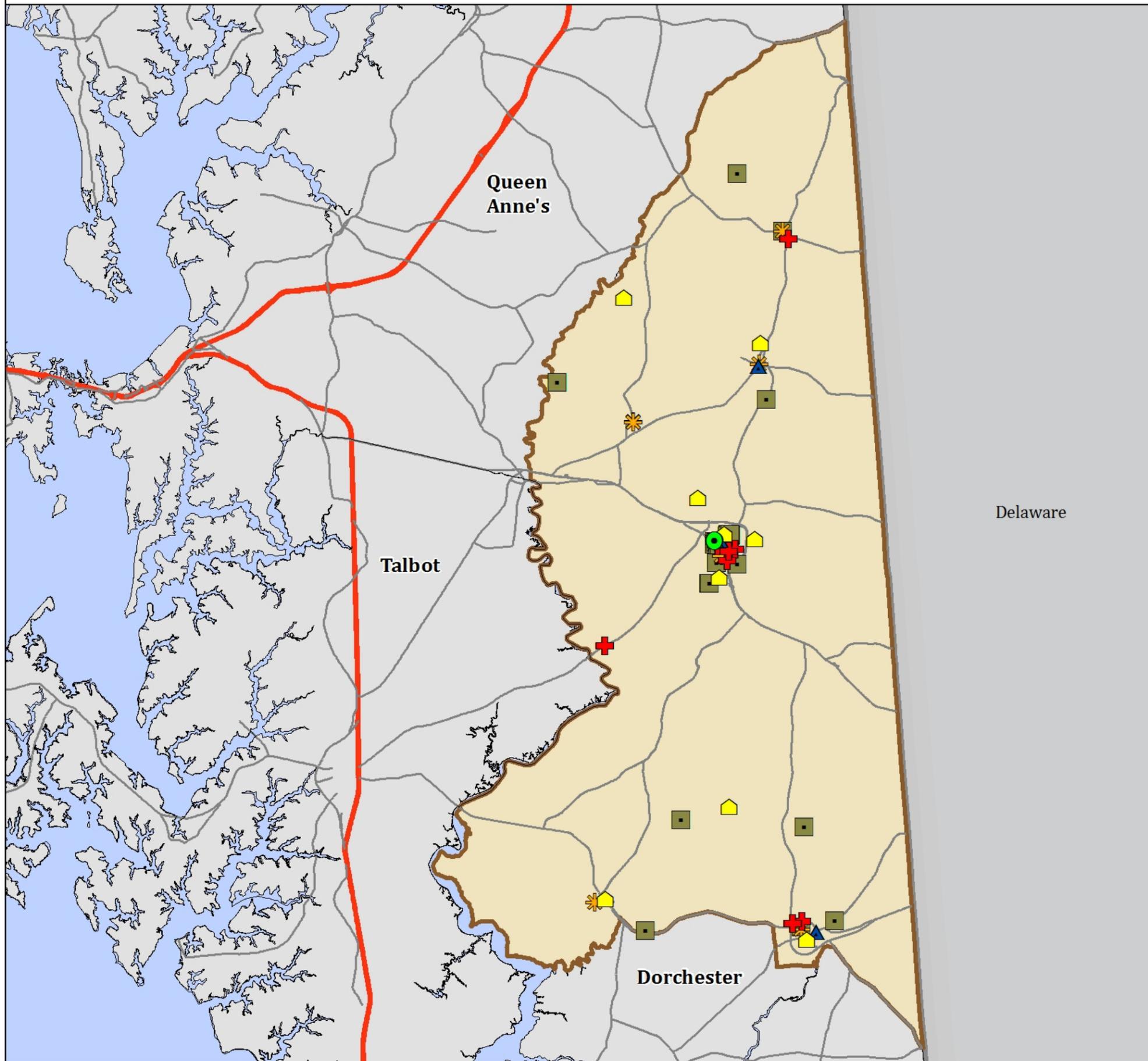
**Projection:**  
 Maryland State Plane  
 North American Datum 1983



*DISCLAIMER: Majority of available hazard data is intended to be used at national or regional scales. The purpose of the data sets are to give general indication of areas that may be susceptible to hazards in order to identify potential risk in the State of Maryland. Data has been used beyond the original intent.*

# Caroline County Critical Facilities & State Assets

## Maryland 2016 Hazard Mitigation Plan



**Description:**

Critical Facility refers to structures that the State has determined must continue to operate before, during and after an emergency and/or disaster. State Assets are state owned and/or operated facilities.

In total there are 2,768 critical facilities and 7,891 state assets identified. When available, location information is provided for each point such as address, city, state, zip and latitude and longitude coordinates. Based on this information this data was imported and geolocated in ArcGIS.

Building information is also included (when available) such as Building value, contents values, number of stories and year built. Analyses within this plan use this data in unison with various hazard information.

*Types of Critical Facilities included: EOC, Fire, Medical, Police and School.*

*Types of State Assets included: Administrative, Airport, Correctional, Dept. of Natural Resources, Educational, Environmental, Fire and Police Departments, Health Related, Historic, Judicial/Legal, Military, Social Services, Transportation and Utility/Infrastructure.*

**Data Sources:**

- 2016 Maryland Critical Facility Database
- 2016 State Assets Database
- ESRI State Boundaries
- MSHA County Boundaries

**Legend:**  
**Facility Type**

- EOC
- Fire
- Medical
- Police
- School
- State Assets

- Maryland Routes
- US Routes
- Caroline County
- Maryland Counties
- Surrounding States



**Projection:**  
Maryland State Plane  
North American Datum 1983

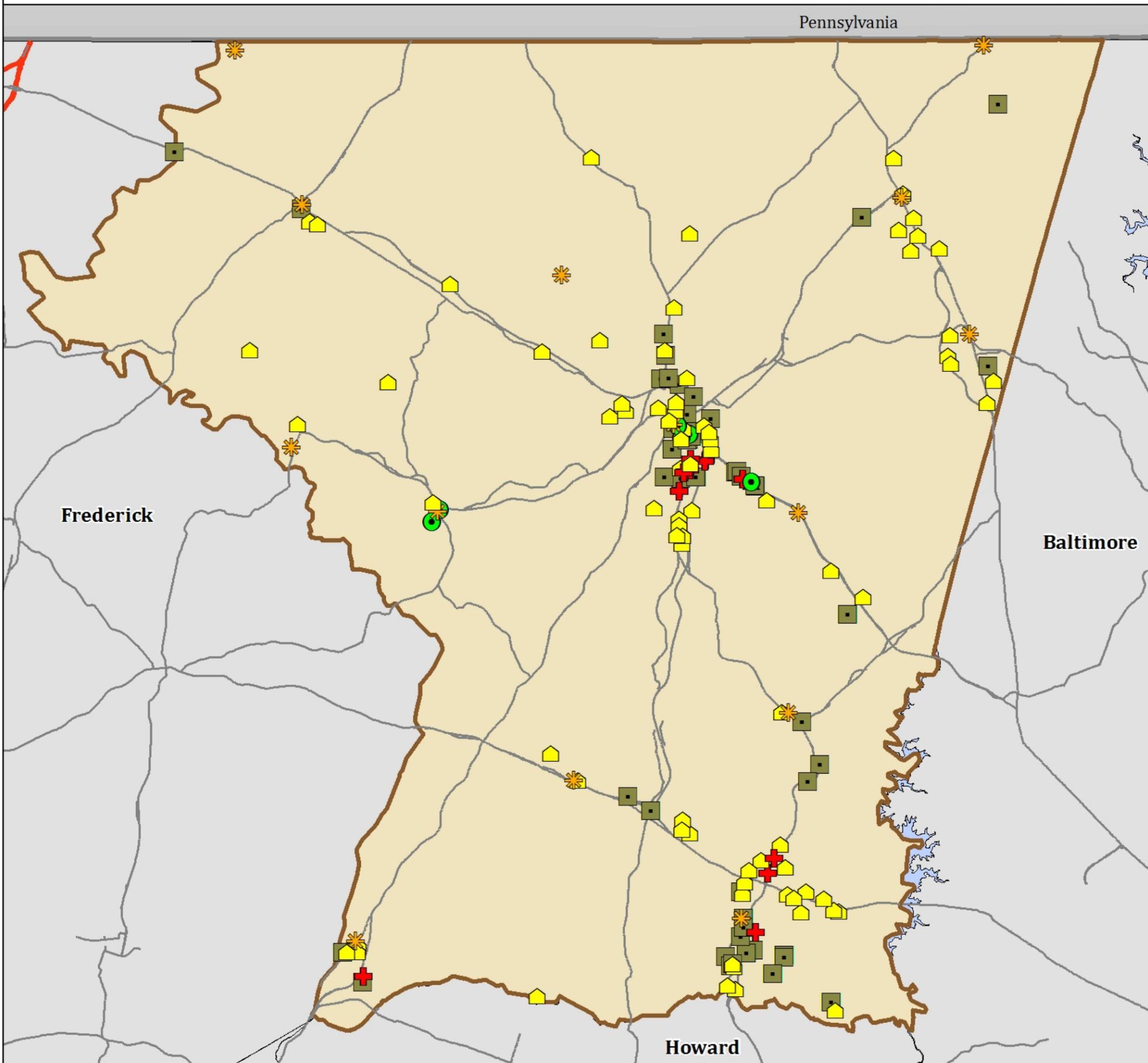


0 1.25 2.5 5  
Miles  
1 in = 4 miles

*DISCLAIMER: Majority of available hazard data is intended to be used at national or regional scales. The purpose of the data sets are to give general indication of areas that may be susceptible to hazards in order to identify potential risk in the State of Maryland. Data has been used beyond the original intent.*

# Carroll County Critical Facilities & State Assets

## Maryland 2016 Hazard Mitigation Plan



**Description:**

Critical Facility refers to structures that the State has determined must continue to operate before, during and after an emergency and/or disaster. State Assets are state owned and/or operated facilities.

In total there are 2,768 critical facilities and 7,891 state assets identified. When available, location information is provided for each point such as address, city, state, zip and latitude and longitude coordinates. Based on this information this data was imported and geolocated in ArcGIS.

Building information is also included (when available) such as Building value, contents values, number of stories and year built. Analyses within this plan use this data in unison with various hazard information.

*Types of Critical Facilities included: EOC, Fire, Medical, Police and School.*

*Types of State Assets included: Administrative, Airport, Correctional, Dept. of Natural Resources, Educational, Environmental, Fire and Police Departments, Health Related, Historic, Judicial/Legal, Military, Social Services, Transportation and Utility/Infrastructure.*

**Data Sources:**

- 2016 Maryland Critical Facility Database
- 2016 State Assets Database
- ESRI State Boundaries
- MSHA County Boundaries

**Legend:**  
**Facility Type**

- EOC
- Fire
- Medical
- Police
- School
- State Assets
- Maryland Routes
- US Routes
- Carroll County
- Maryland Counties
- Surrounding States



**Projection:**  
Maryland State Plane  
North American Datum 1983

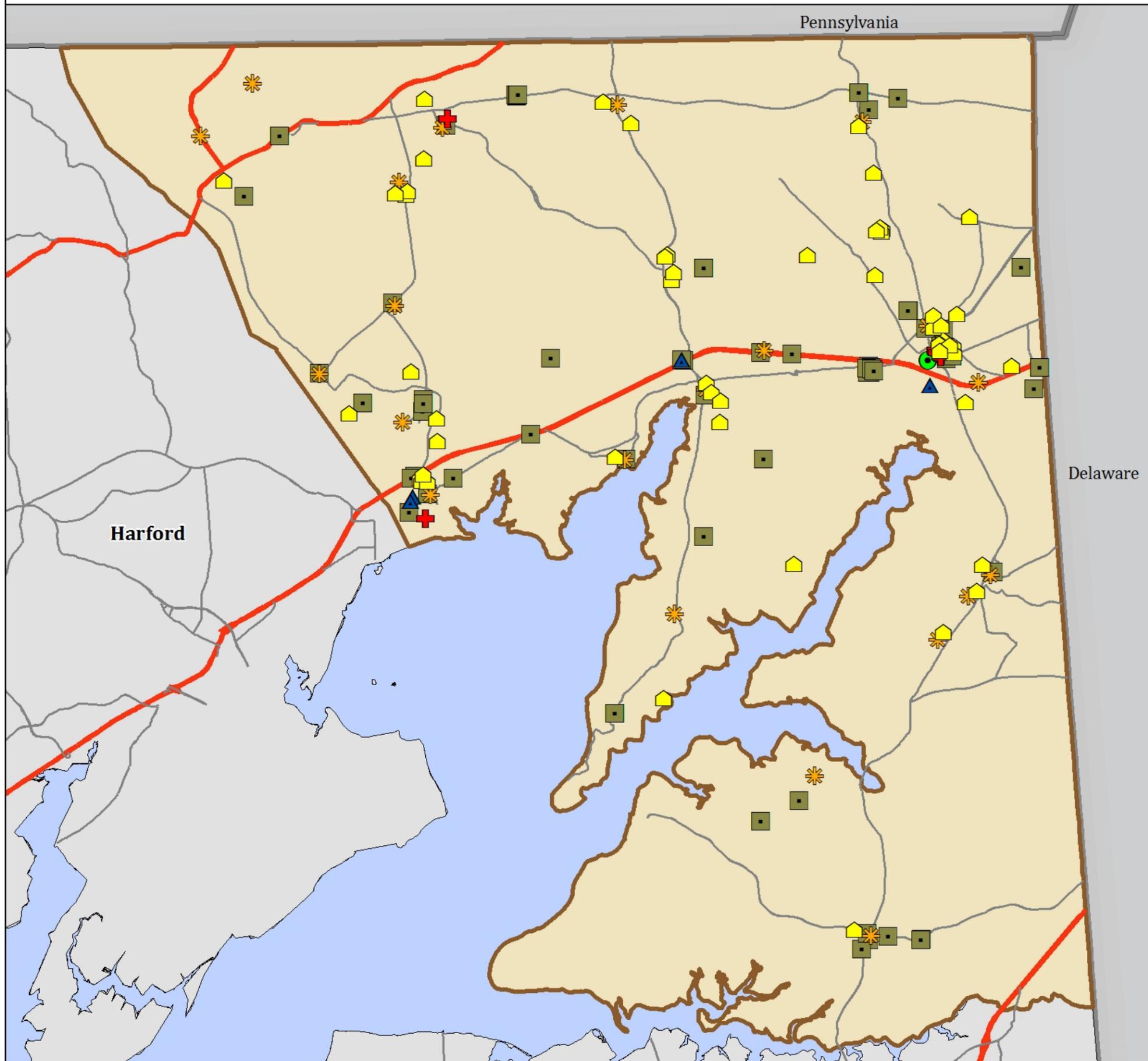


0 0.751.5 3  
Miles  
1 in = 3 miles

*DISCLAIMER: Majority of available hazard data is intended to be used at national or regional scales. The purpose of the data sets are to give general indication of areas that may be susceptible to hazards in order to identify potential risk in the State of Maryland. Data has been used beyond the original intent.*

# Cecil County Critical Facilities & State Assets

## Maryland 2016 Hazard Mitigation Plan



### Description:

Critical Facility refers to structures that the State has determined must continue to operate before, during and after an emergency and/or disaster. State Assets are state owned and/or operated facilities.

In total there are 2,768 critical facilities and 7,891 state assets identified. When available, location information is provided for each point such as address, city, state, zip and latitude and longitude coordinates. Based on this information this data was imported and geolocated in ArcGIS.

Building information is also included (when available) such as Building value, contents values, number of stories and year built. Analyses within this plan use this data in unison with various hazard information.

*Types of Critical Facilities included: EOC, Fire, Medical, Police and School.*

*Types of State Assets included: Administrative, Airport, Correctional, Dept. of Natural Resources, Educational, Environmental, Fire and Police Departments, Health Related, Historic, Judicial/Legal, Military, Social Services, Transportation and Utility/Infrastructure.*

### Data Sources:

2016 Maryland Critical Facility Database  
 2016 State Assets Database  
 ESRI State Boundaries  
 MSHA County Boundaries

### Legend: Facility Type

-  EOC
-  Fire
-  Medical
-  Police
-  School
-  State Assets
-  Maryland Routes
-  US Routes
-  Cecil County
-  Maryland Counties
-  Surrounding States



**Projection:**  
 Maryland State Plane  
 North American Datum 1983

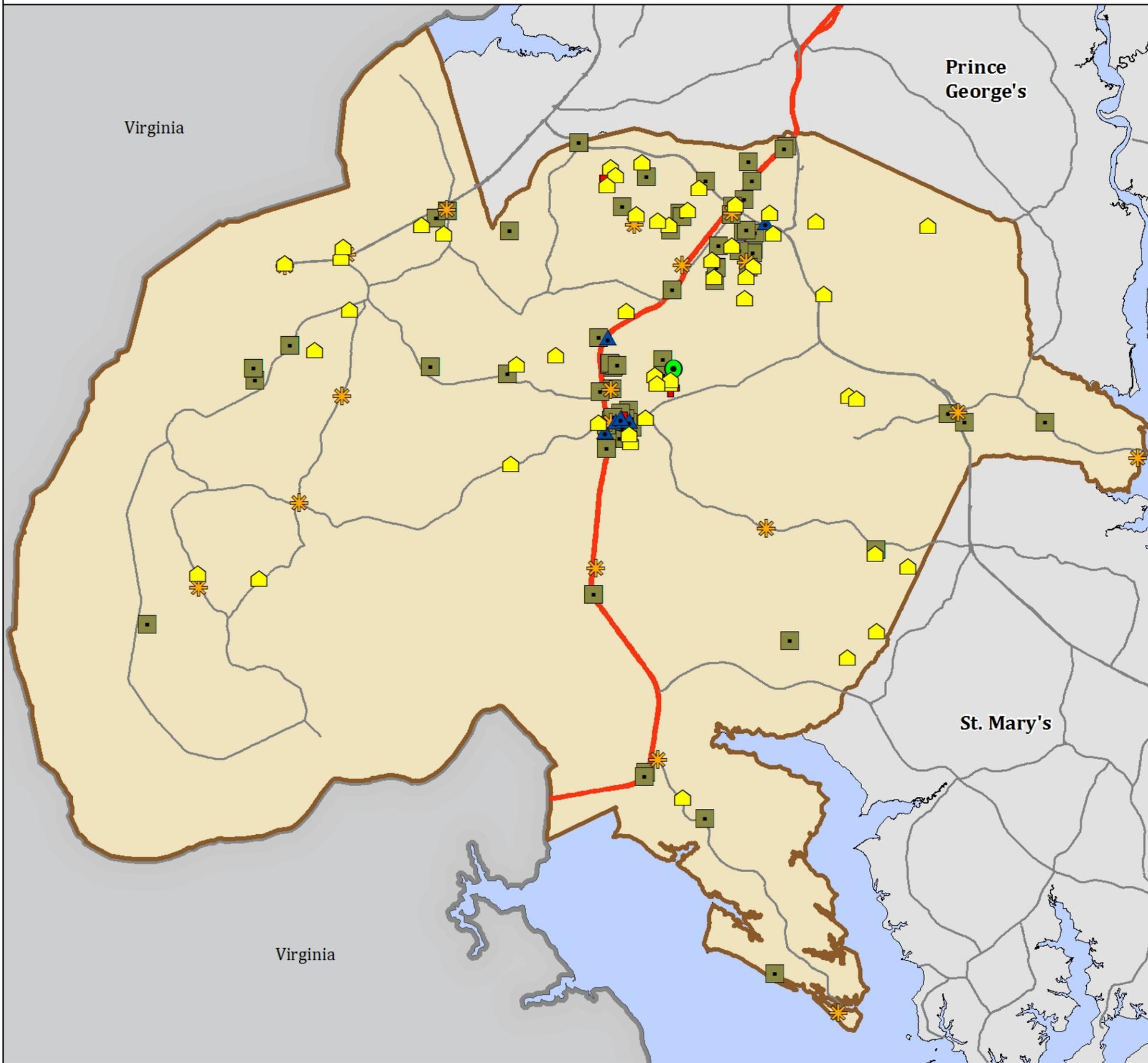


0 0.75 1.5 3  
 Miles  
 1 in = 3 miles

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# Charles County Critical Facilities & State Assets

## Maryland 2016 Hazard Mitigation Plan



### Description:

Critical Facility refers to structures that the State has determined must continue to operate before, during and after an emergency and/or disaster. State Assets are state owned and/or operated facilities.

In total there are 2,768 critical facilities and 7,891 state assets identified. When available, location information is provided for each point such as address, city, state, zip and latitude and longitude coordinates. Based on this information this data was imported and geolocated in ArcGIS.

Building information is also included (when available) such as Building value, contents values, number of stories and year built. Analyses within this plan use this data in unison with various hazard information.

*Types of Critical Facilities included: EOC, Fire, Medical, Police and School.*

*Types of State Assets included: Administrative, Airport, Correctional, Dept. of Natural Resources, Educational, Environmental, Fire and Police Departments, Health Related, Historic, Judicial/Legal, Military, Social Services, Transportation and Utility/Infrastructure.*

### Data Sources:

2016 Maryland Critical Facility Database  
 2016 State Assets Database  
 ESRI State Boundaries  
 MSHA County Boundaries

### Legend: Facility Type

- EOC
- Fire
- Medical
- Police
- School
- State Assets
- Maryland Routes
- US Routes
- Charles County
- Maryland Counties
- Surrounding States



**Projection:**  
 Maryland State Plane  
 North American Datum 1983

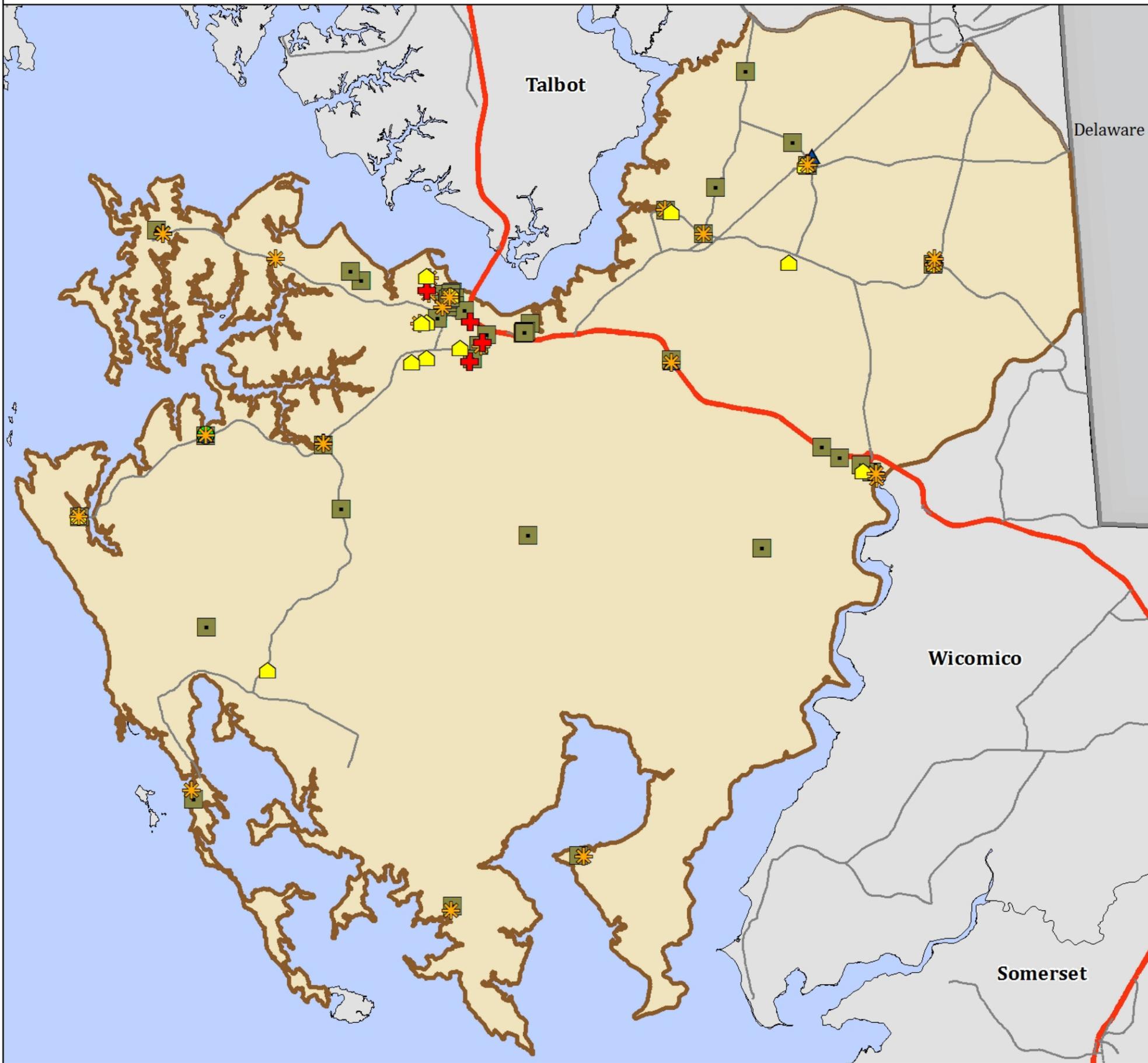


0 1 2 4  
 Miles  
 1 in = 3 miles

*DISCLAIMER: Majority of available hazard data is intended to be used at national or regional scales. The purpose of the data sets are to give general indication of areas that may be susceptible to hazards in order to identify potential risk in the State of Maryland. Data has been used beyond the original intent.*

# Dorchester County Critical Facilities & State Assets

## Maryland 2016 Hazard Mitigation Plan



### Description:

Critical Facility refers to structures that the State has determined must continue to operate before, during and after an emergency and/or disaster. State Assets are state owned and/or operated facilities.

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Building information is also included (when available) such as Building value, contents values, number of stories and year built. Analyses within this plan use this data in unison with various hazard information.

*Types of Critical Facilities included: EOC, Fire, Medical, Police and School.*

*Types of State Assets included: Administrative, Airport, Correctional, Dept. of Natural Resources, Educational, Environmental, Fire and Police Departments, Health Related, Historic, Judicial/Legal, Military, Social Services, Transportation and Utility/Infrastructure.*

### Data Sources:

2016 Maryland Critical Facility Database  
 2016 State Assets Database  
 ESRI State Boundaries  
 MSHA County Boundaries

### Legend: Facility Type

-  EOC
-  Fire
-  Medical
-  Police
-  School
-  State Assets
-  Maryland Routes
-  US Routes
-  Dorchester County
-  Maryland Counties
-  Surrounding States



**Projection:**  
 Maryland State Plane  
 North American Datum 1983

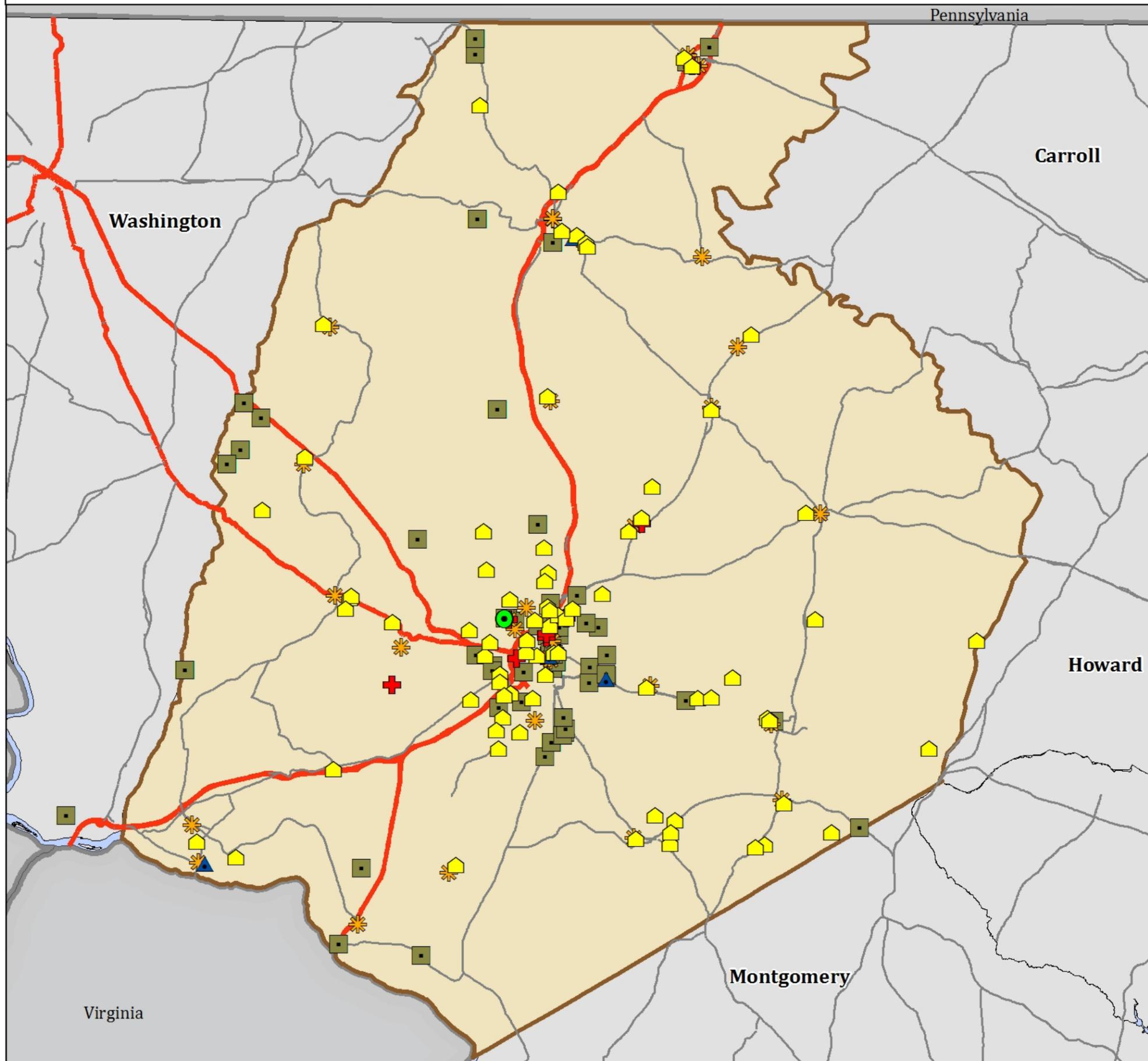


0 1 2 4  
 Miles  
 1 in = 3 miles

*DISCLAIMER: Majority of available hazard data is intended to be used at national or regional scales. The purpose of the data sets are to give general indication of areas that may be susceptible to hazards in order to identify potential risk in the State of Maryland. Data has been used beyond the original intent.*

# Frederick County Critical Facilities & State Assets

## Maryland 2016 Hazard Mitigation Plan



### Description:

Critical Facility refers to structures that the State has determined must continue to operate before, during and after an emergency and/or disaster. State Assets are state owned and/or operated facilities.

In total there are 2,768 critical facilities and 7,891 state assets identified. When available, location information is provided for each point such as address, city, state, zip and latitude and longitude coordinates. Based on this information this data was imported and geolocated in ArcGIS.

Building information is also included (when available) such as Building value, contents values, number of stories and year built. Analyses within this plan use this data in unison with various hazard information.

*Types of Critical Facilities included: EOC, Fire, Medical, Police and School.*

*Types of State Assets included: Administrative, Airport, Correctional, Dept. of Natural Resources, Educational, Environmental, Fire and Police Departments, Health Related, Historic, Judicial/Legal, Military, Social Services, Transportation and Utility/Infrastructure.*

### Data Sources:

- 2016 Maryland Critical Facility Database
- 2016 State Assets Database
- ESRI State Boundaries
- MSHA County Boundaries

### Legend:

#### Facility Type

- EOC
- Fire
- Medical
- Police
- School
- State Assets
- Maryland Routes
- US Routes
- Frederick County
- Maryland Counties
- Surrounding States



**Projection:**  
Maryland State Plane  
North American Datum 1983

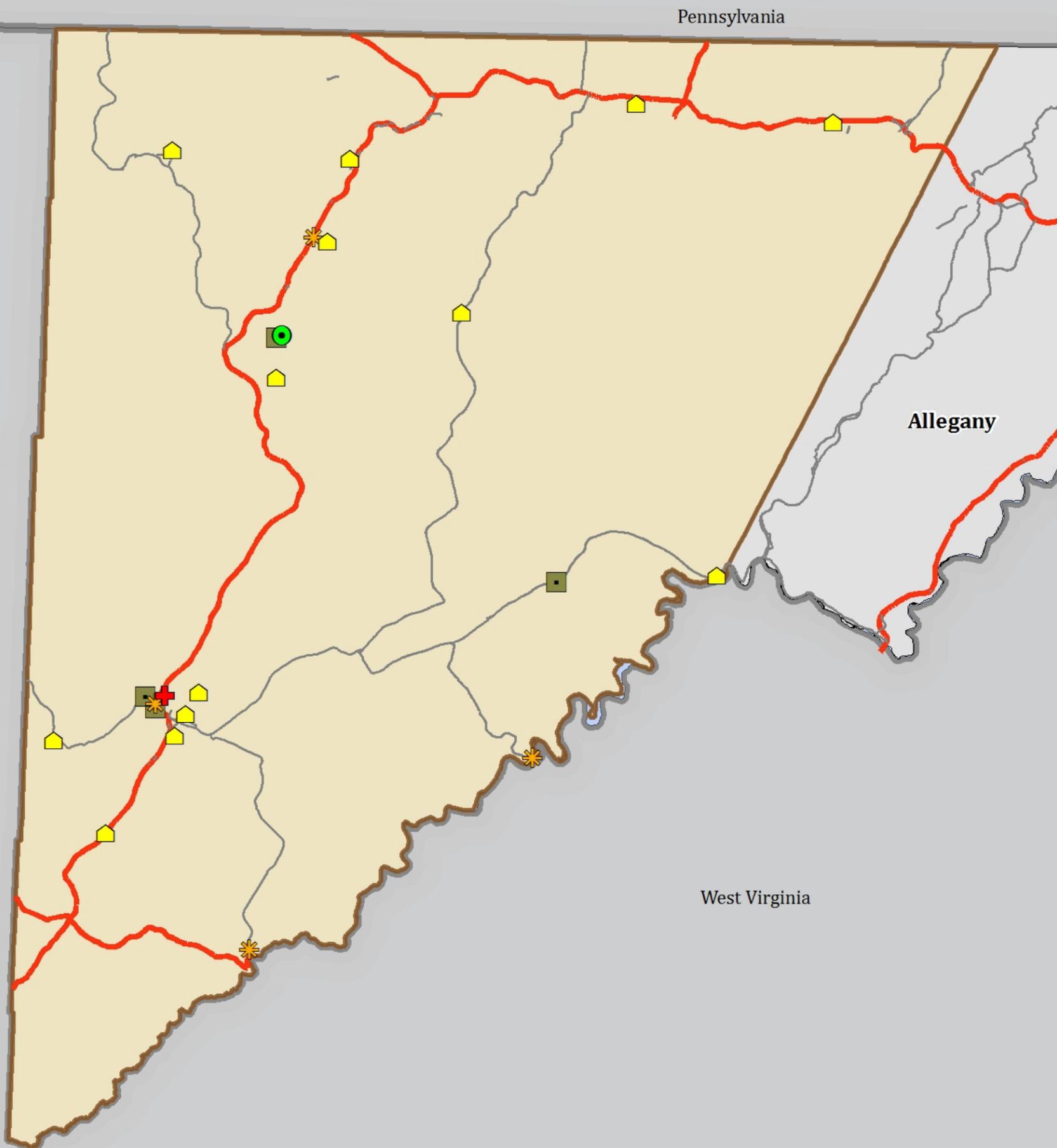


0 1 2 4  
Miles  
1 in = 4 miles

*DISCLAIMER: Majority of available hazard data is intended to be used at national or regional scales. The purpose of the data sets are to give general indication of areas that may be susceptible to hazards in order to identify potential risk in the State of Maryland. Data has been used beyond the original intent.*

# Garrett County Critical Facilities & State Assets

## Maryland 2016 Hazard Mitigation Plan



### Description:

Critical Facility refers to structures that the State has determined must continue to operate before, during and after an emergency and/or disaster. State Assets are state owned and/or operated facilities.

In total there are 2,768 critical facilities and 7,891 state assets identified. When available, location information is provided for each point such as address, city, state, zip and latitude and longitude coordinates. Based on this information this data was imported and geolocated in ArcGIS.

Building information is also included (when available) such as Building value, contents values, number of stories and year built. Analyses within this plan use this data in unison with various hazard information.

*Types of Critical Facilities included: EOC, Fire, Medical, Police and School.*

*Types of State Assets included: Administrative, Airport, Correctional, Dept. of Natural Resources, Educational, Environmental, Fire and Police Departments, Health Related, Historic, Judicial/Legal, Military, Social Services, Transportation and Utility/Infrastructure.*

### Data Sources:

2016 Maryland Critical Facility Database  
 2016 State Assets Database  
 ESRI State Boundaries  
 MSHA County Boundaries

### Legend: Facility Type

-  EOC
-  Fire
-  Medical
-  Police
-  School
-  State Assets
-  Maryland Routes
-  US Routes
-  Garrett County
-  Maryland Counties
-  Surrounding States



**Projection:**  
 Maryland State Plane  
 North American Datum 1983

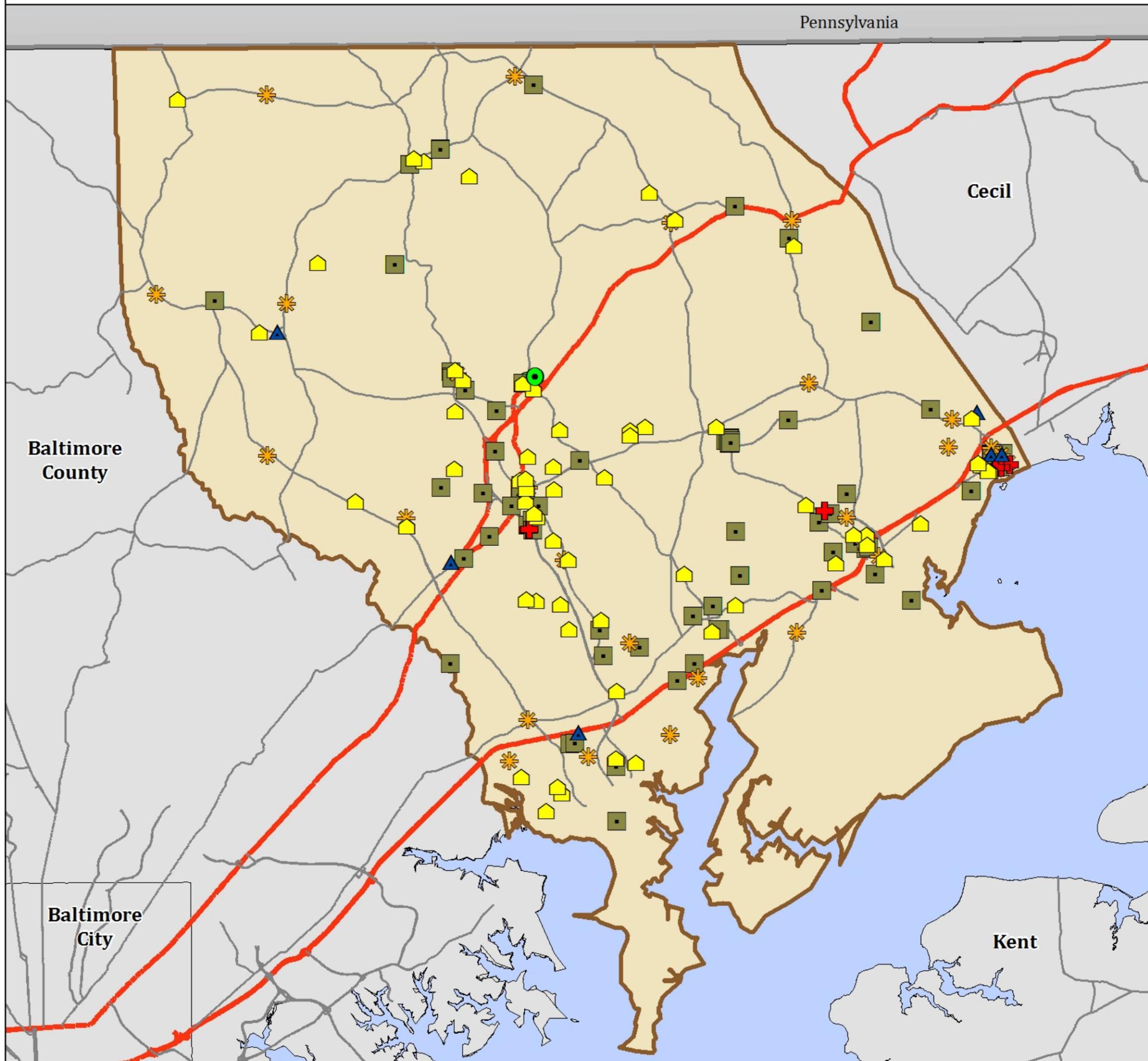


0 1.25 2.5 5  
 Miles  
 1 in = 4 miles

*DISCLAIMER: Majority of available hazard data is intended to be used at national or regional scales. The purpose of the data sets are to give general indication of areas that may be susceptible to hazards in order to identify potential risk in the State of Maryland. Data has been used beyond the original intent.*

# Harford County Critical Facilities & State Assets

## Maryland 2016 Hazard Mitigation Plan



### Description:

Critical Facility refers to structures that the State has determined must continue to operate before, during and after an emergency and/or disaster. State Assets are state owned and/or operated facilities.

In total there are 2,768 critical facilities and 7,891 state assets identified. When available, location information is provided for each point such as address, city, state, zip and latitude and longitude coordinates. Based on this information this data was imported and geolocated in ArcGIS.

Building information is also included (when available) such as Building value, contents values, number of stories and year built. Analyses within this plan use this data in unison with various hazard information.

*Types of Critical Facilities included: EOC, Fire, Medical, Police and School.*

*Types of State Assets included: Administrative, Airport, Correctional, Dept. of Natural Resources, Educational, Environmental, Fire and Police Departments, Health Related, Historic, Judicial/Legal, Military, Social Services, Transportation and Utility/Infrastructure.*

### Data Sources:

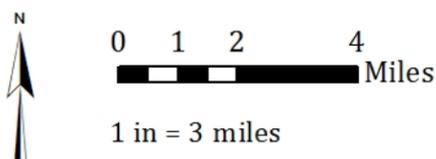
2016 Maryland Critical Facility Database  
 2016 State Assets Database  
 ESRI State Boundaries  
 MSHA County Boundaries

### Legend: Facility Type

-  EOC
-  Fire
-  Medical
-  Police
-  School
-  State Assets
-  Maryland Routes
-  US Routes
-  Harford County
-  Maryland Counties
-  Surrounding States



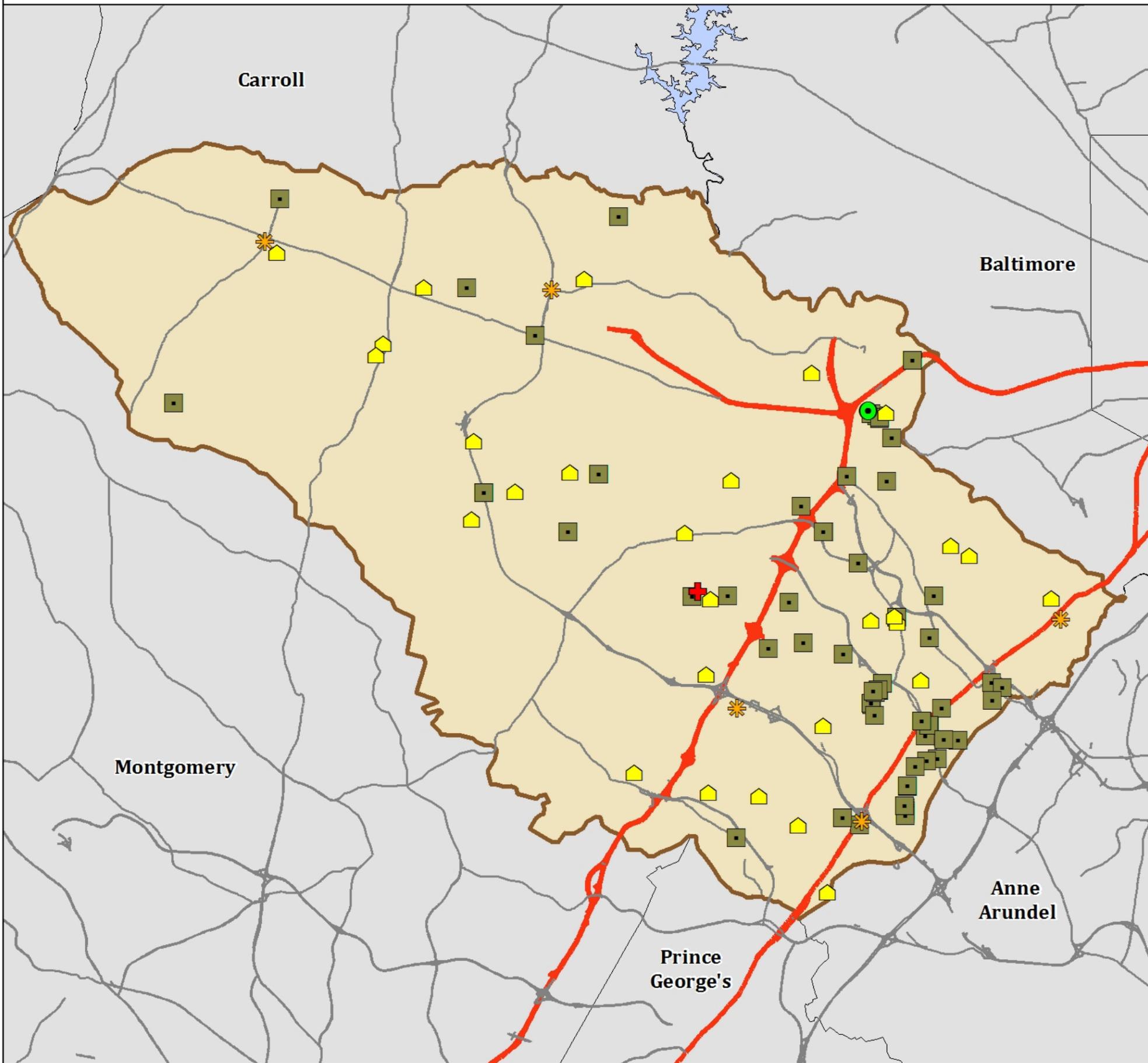
**Projection:**  
 Maryland State Plane  
 North American Datum 1983



DISCLAIMER: Majority of available hazard data is intended to be used at national or regional scales. The purpose of the data sets are to give general indication of areas that may be susceptible to hazards in order to identify potential risk in the State of Maryland. Data has been used beyond the original intent.

# Howard County Critical Facilities & State Assets

## Maryland 2016 Hazard Mitigation Plan



**Description:**

Critical Facility refers to structures that the State has determined must continue to operate before, during and after an emergency and/or disaster. State Assets are state owned and/or operated facilities.

In total there are 2,768 critical facilities and 7,891 state assets identified. When available, location information is provided for each point such as address, city, state, zip and latitude and longitude coordinates. Based on this information this data was imported and geolocated in ArcGIS.

Building information is also included (when available) such as Building value, contents values, number of stories and year built. Analyses within this plan use this data in unison with various hazard information.

*Types of Critical Facilities included: EOC, Fire, Medical, Police and School.*

*Types of State Assets included: Administrative, Airport, Correctional, Dept. of Natural Resources, Educational, Environmental, Fire and Police Departments, Health Related, Historic, Judicial/Legal, Military, Social Services, Transportation and Utility/Infrastructure.*

**Data Sources:**

- 2016 Maryland Critical Facility Database
- 2016 State Assets Database
- ESRI State Boundaries
- MSHA County Boundaries

**Legend:**  
**Facility Type**

- EOC
- Fire
- Medical
- Police
- School
- State Assets
- Maryland Routes
- US Routes
- Howard County
- Maryland Counties
- Surrounding States



**Projection:**  
Maryland State Plane  
North American Datum 1983

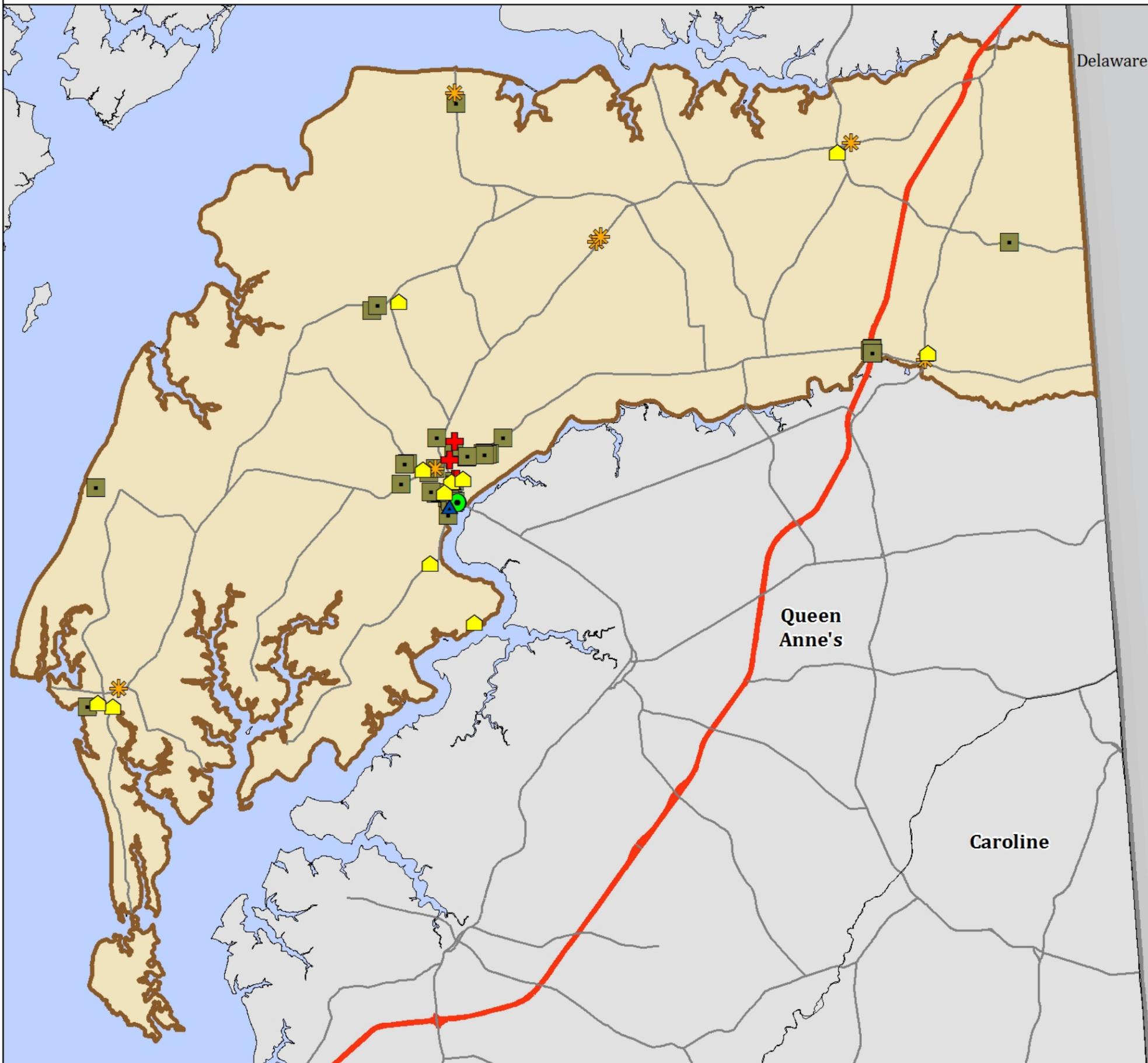


0 0.75 1.5 3  
Miles  
1 in = 3 miles

*DISCLAIMER: Majority of available hazard data is intended to be used at national or regional scales. The purpose of the data sets are to give general indication of areas that may be susceptible to hazards in order to identify potential risk in the State of Maryland. Data has been used beyond the original intent.*

# Kent County Critical Facilities & State Assets

## Maryland 2016 Hazard Mitigation Plan



### Description:

Critical Facility refers to structures that the State has determined must continue to operate before, during and after an emergency and/or disaster. State Assets are state owned and/or operated facilities.

In total there are 2,768 critical facilities and 7,891 state assets identified. When available, location information is provided for each point such as address, city, state, zip and latitude and longitude coordinates. Based on this information this data was imported and geolocated in ArcGIS.

Building information is also included (when available) such as Building value, contents values, number of stories and year built. Analyses within this plan use this data in unison with various hazard information.

*Types of Critical Facilities included: EOC, Fire, Medical, Police and School.*

*Types of State Assets included: Administrative, Airport, Correctional, Dept. of Natural Resources, Educational, Environmental, Fire and Police Departments, Health Related, Historic, Judicial/Legal, Military, Social Services, Transportation and Utility/Infrastructure.*

### Data Sources:

2016 Maryland Critical Facility Database  
 2016 State Assets Database  
 ESRI State Boundaries  
 MSHA County Boundaries

### Legend: Facility Type

- EOC
- Fire
- Medical
- Police
- School
- State Assets
- Maryland Routes
- US Routes
- Kent County
- Maryland Counties
- Surrounding States



**Projection:**  
 Maryland State Plane  
 North American Datum 1983

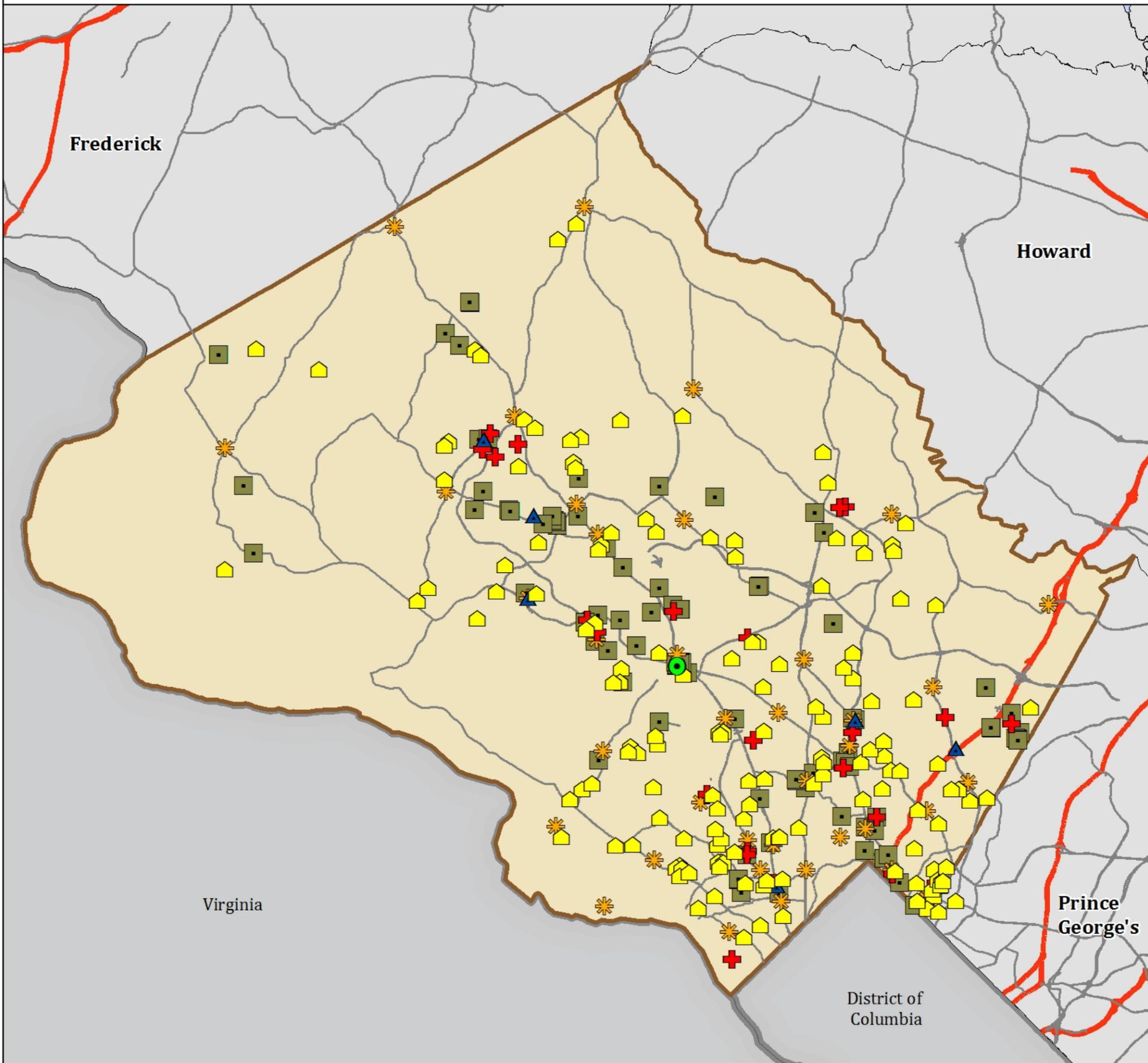


0 0.75 1.5 3  
 Miles  
 1 in = 3 miles

DISCLAIMER: Majority of available hazard data is intended to be used at national or regional scales. The purpose of the data sets are to give general indication of areas that may be susceptible to hazards in order to identify potential risk in the State of Maryland. Data has been used beyond the original intent.

# Montgomery County Critical Facilities & State Assets

## Maryland 2016 Hazard Mitigation Plan



### Description:

Critical Facility refers to structures that the State has determined must continue to operate before, during and after an emergency and/or disaster. State Assets are state owned and/or operated facilities.

In total there are 2,768 critical facilities and 7,891 state assets identified. When available, location information is provided for each point such as address, city, state, zip and latitude and longitude coordinates. Based on this information this data was imported and geolocated in ArcGIS.

Building information is also included (when available) such as Building value, contents values, number of stories and year built. Analyses within this plan use this data in unison with various hazard information.

*Types of Critical Facilities included: EOC, Fire, Medical, Police and School.*

*Types of State Assets included: Administrative, Airport, Correctional, Dept. of Natural Resources, Educational, Environmental, Fire and Police Departments, Health Related, Historic, Judicial/Legal, Military, Social Services, Transportation and Utility/Infrastructure.*

### Data Sources:

2016 Maryland Critical Facility Database  
 2016 State Assets Database  
 ESRI State Boundaries  
 MSHA County Boundaries

### Legend: Facility Type

-  EOC
-  Fire
-  Medical
-  Police
-  School
-  State Assets
-  Maryland Routes
-  US Routes
-  Montgomery County
-  Maryland Counties
-  Surrounding States



**Projection:**  
 Maryland State Plane  
 North American Datum 1983

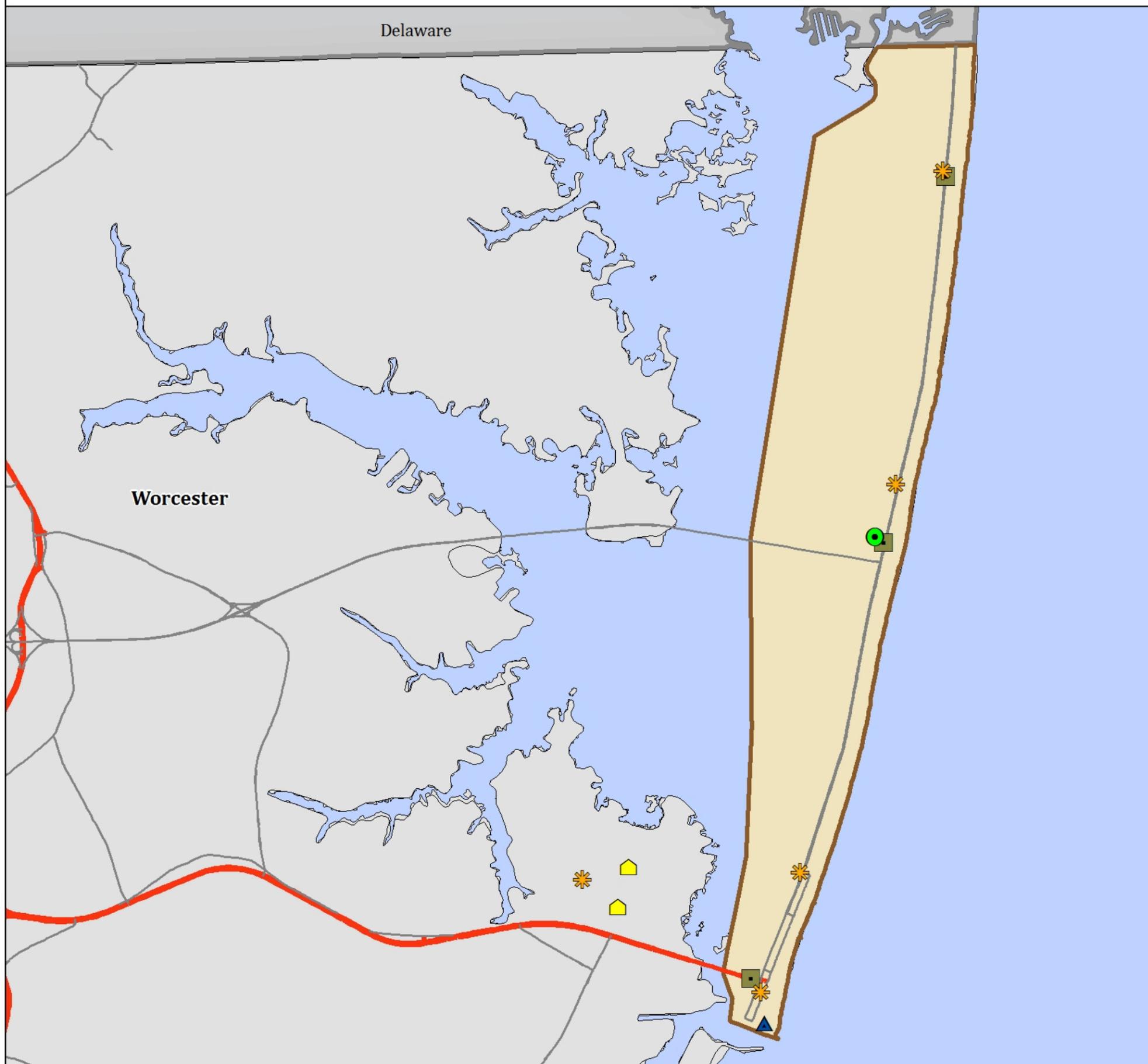


0 1 2 4  
 Miles  
 1 in = 3 miles

DISCLAIMER: Majority of available hazard data is intended to be used at national or regional scales. The purpose of the data sets are to give general indication of areas that may be susceptible to hazards in order to identify potential risk in the State of Maryland. Data has been used beyond the original intent.

# Ocean City Critical Facilities & State Assets

## Maryland 2016 Hazard Mitigation Plan



### Description:

Critical Facility refers to structures that the State has determined must continue to operate before, during and after an emergency and/or disaster. State Assets are state owned and/or operated facilities.

In total there are 2,768 critical facilities and 7,891 state assets identified. When available, location information is provided for each point such as address, city, state, zip and latitude and longitude coordinates. Based on this information this data was imported and geolocated in ArcGIS.

Building information is also included (when available) such as Building value, contents values, number of stories and year built. Analyses within this plan use this data in unison with various hazard information.

*Types of Critical Facilities included: EOC, Fire, Medical, Police and School.*

*Types of State Assets included: Administrative, Airport, Correctional, Dept. of Natural Resources, Educational, Environmental, Fire and Police Departments, Health Related, Historic, Judicial/Legal, Military, Social Services, Transportation and Utility/Infrastructure.*

### Data Sources:

2016 Maryland Critical Facility Database  
 2016 State Assets Database  
 ESRI State Boundaries  
 MSHA County Boundaries

### Legend: Facility Type

-  EOC
-  Fire
-  Medical
-  Police
-  School
-  State Assets
-  Maryland Routes
-  US Routes
-  Ocean City
-  Maryland Counties
-  Surrounding States



**Projection:**  
 Maryland State Plane  
 North American Datum 1983

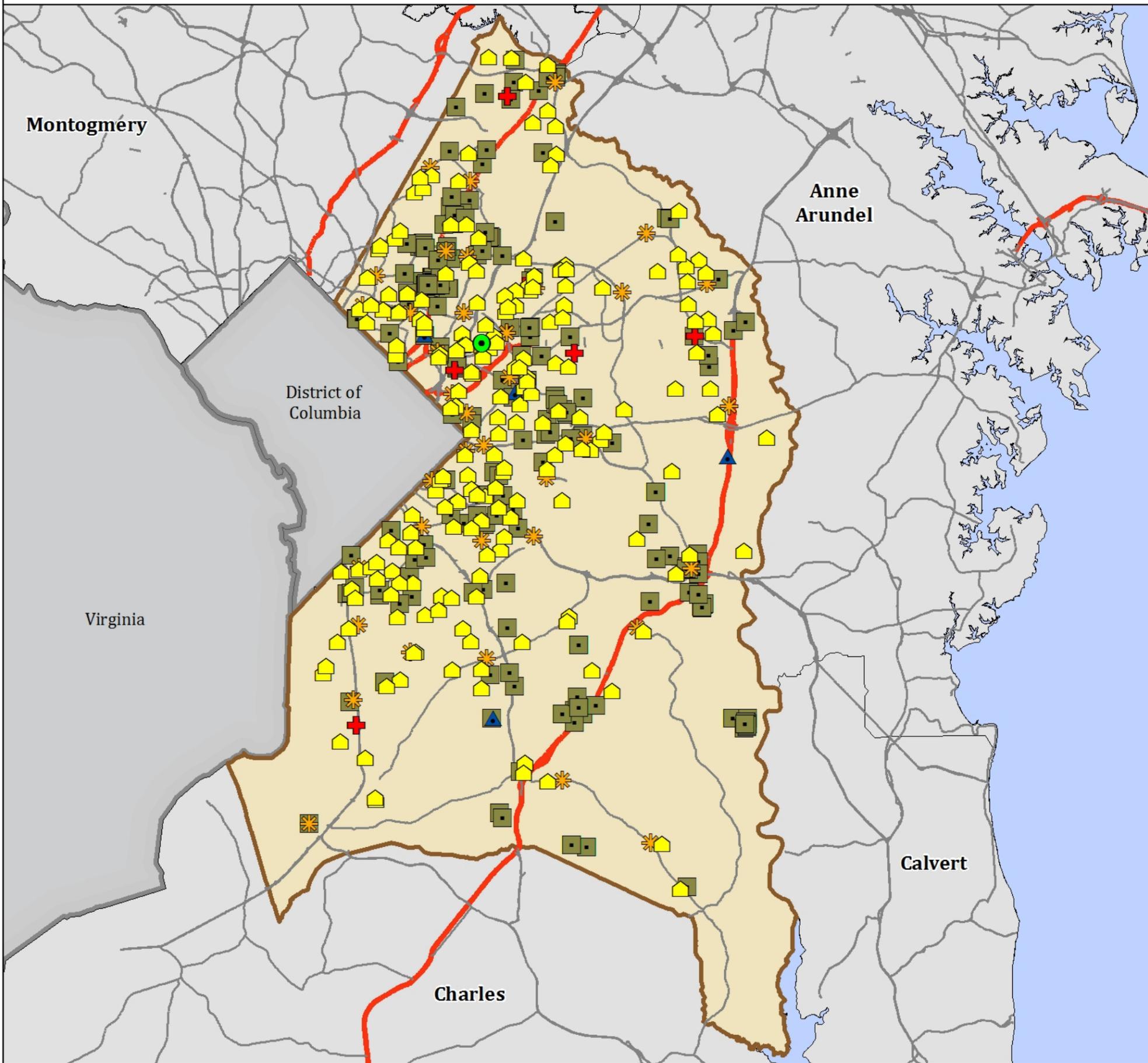


0 0.3250.65 1.3  
 Miles  
 1 in = 1 miles

DISCLAIMER: Majority of available hazard data is intended to be used at national or regional scales. The purpose of the data sets are to give general indication of areas that may be susceptible to hazards in order to identify potential risk in the State of Maryland. Data has been used beyond the original intent.

# Prince George's County Critical Facilities & State Assets

## Maryland 2016 Hazard Mitigation Plan



### Description:

Critical Facility refers to structures that the State has determined must continue to operate before, during and after an emergency and/or disaster. State Assets are state owned and/or operated facilities.

In total there are 2,768 critical facilities and 7,891 state assets identified. When available, location information is provided for each point such as address, city, state, zip and latitude and longitude coordinates. Based on this information this data was imported and geolocated in ArcGIS.

Building information is also included (when available) such as Building value, contents values, number of stories and year built. Analyses within this plan use this data in unison with various hazard information.

*Types of Critical Facilities included: EOC, Fire, Medical, Police and School.*

*Types of State Assets included: Administrative, Airport, Correctional, Dept. of Natural Resources, Educational, Environmental, Fire and Police Departments, Health Related, Historic, Judicial/Legal, Military, Social Services, Transportation and Utility/Infrastructure.*

### Data Sources:

2016 Maryland Critical Facility Database  
 2016 State Assets Database  
 ESRI State Boundaries  
 MSHA County Boundaries

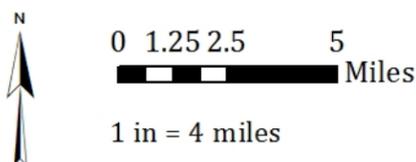
### Legend: Facility Type

- EOC
- Fire
- Medical
- Police
- School
- State Assets

- Maryland Routes
- US Routes
- Prince George's County
- Maryland Counties
- Surrounding States



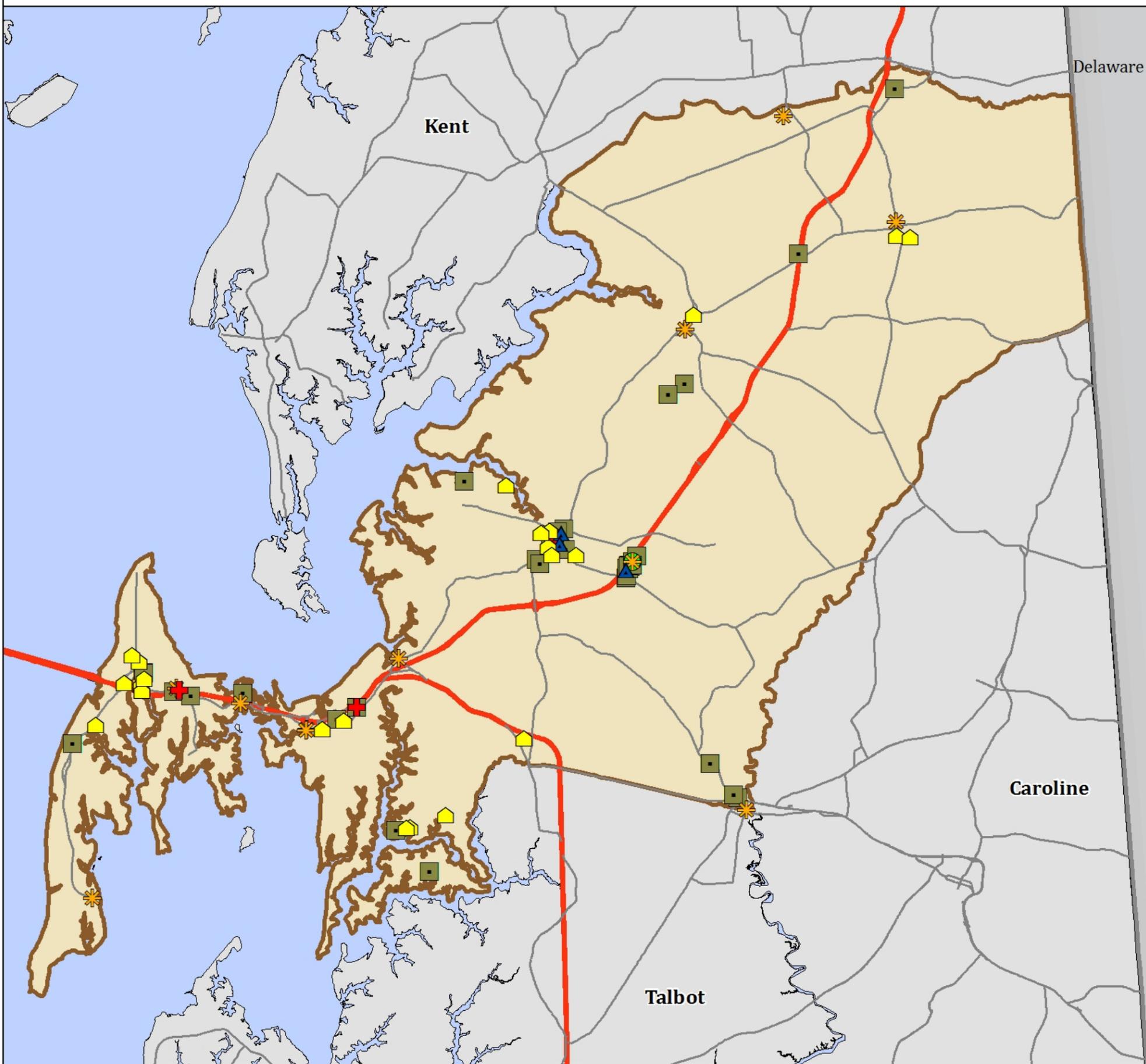
**Projection:**  
 Maryland State Plane  
 North American Datum 1983



*DISCLAIMER: Majority of available hazard data is intended to be used at national or regional scales. The purpose of the data sets are to give general indication of areas that may be susceptible to hazards in order to identify potential risk in the State of Maryland. Data has been used beyond the original intent.*

# Queen Anne's County Critical Facilities & State Assets

## Maryland 2016 Hazard Mitigation Plan



### Description:

Critical Facility refers to structures that the State has determined must continue to operate before, during and after an emergency and/or disaster. State Assets are state owned and/or operated facilities.

In total there are 2,768 critical facilities and 7,891 state assets identified. When available, location information is provided for each point such as address, city, state, zip and latitude and longitude coordinates. Based on this information this data was imported and geolocated in ArcGIS.

Building information is also included (when available) such as Building value, contents values, number of stories and year built. Analyses within this plan use this data in unison with various hazard information.

*Types of Critical Facilities included: EOC, Fire, Medical, Police and School.*

*Types of State Assets included: Administrative, Airport, Correctional, Dept. of Natural Resources, Educational, Environmental, Fire and Police Departments, Health Related, Historic, Judicial/Legal, Military, Social Services, Transportation and Utility/Infrastructure.*

### Data Sources:

2016 Maryland Critical Facility Database  
 2016 State Assets Database  
 ESRI State Boundaries  
 MSHA County Boundaries

### Legend: Facility Type

- EOC
- Fire
- Medical
- Police
- School
- State Assets
- Maryland Routes
- US Routes
- Queen Anne's County
- Maryland Counties
- Surrounding States



**Projection:**  
 Maryland State Plane  
 North American Datum 1983

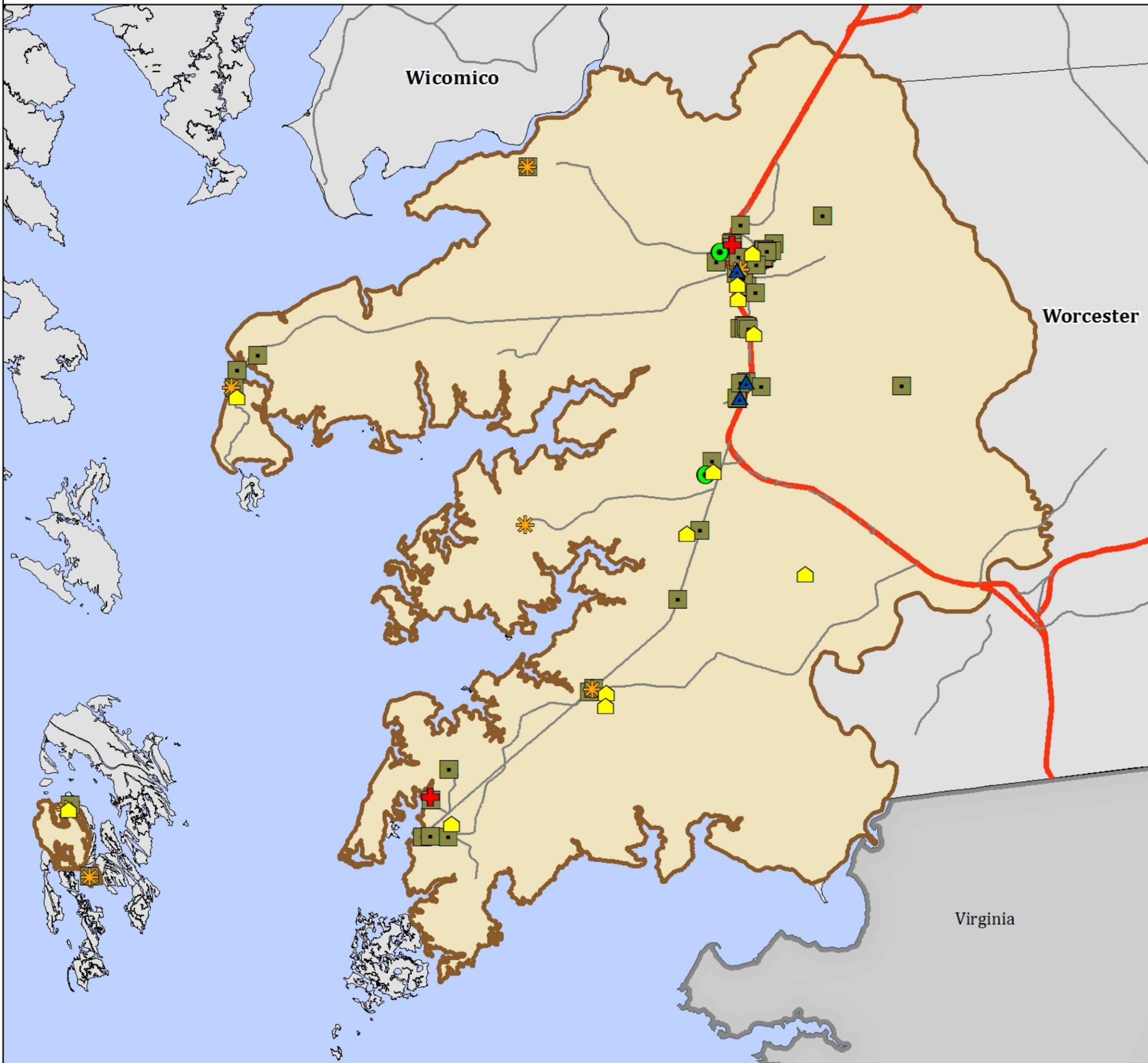


0 1 2 4  
 Miles  
 1 in = 3 miles

DISCLAIMER: Majority of available hazard data is intended to be used at national or regional scales. The purpose of the data sets are to give general indication of areas that may be susceptible to hazards in order to identify potential risk in the State of Maryland. Data has been used beyond the original intent.

# Somerset County Critical Facilities & State Assets

## Maryland 2016 Hazard Mitigation Plan



**Description:**

Critical Facility refers to structures that the State has determined must continue to operate before, during and after an emergency and/or disaster. State Assets are state owned and/or operated facilities.

In total there are 2,768 critical facilities and 7,891 state assets identified. When available, location information is provided for each point such as address, city, state, zip and latitude and longitude coordinates. Based on this information this data was imported and geolocated in ArcGIS.

Building information is also included (when available) such as Building value, contents values, number of stories and year built. Analyses within this plan use this data in unison with various hazard information.

*Types of Critical Facilities included: EOC, Fire, Medical, Police and School.*

*Types of State Assets included: Administrative, Airport, Correctional, Dept. of Natural Resources, Educational, Environmental, Fire and Police Departments, Health Related, Historic, Judicial/Legal, Military, Social Services, Transportation and Utility/Infrastructure.*

**Data Sources:**

- 2016 Maryland Critical Facility Database
- 2016 State Assets Database
- ESRI State Boundaries
- MSHA County Boundaries

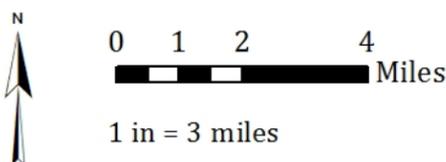
**Legend:**  
**Facility Type**

- EOC
- Fire
- Medical
- Police
- School
- State Assets

- Maryland Routes
- US Routes
- Somerset County
- Maryland Counties
- Surrounding States



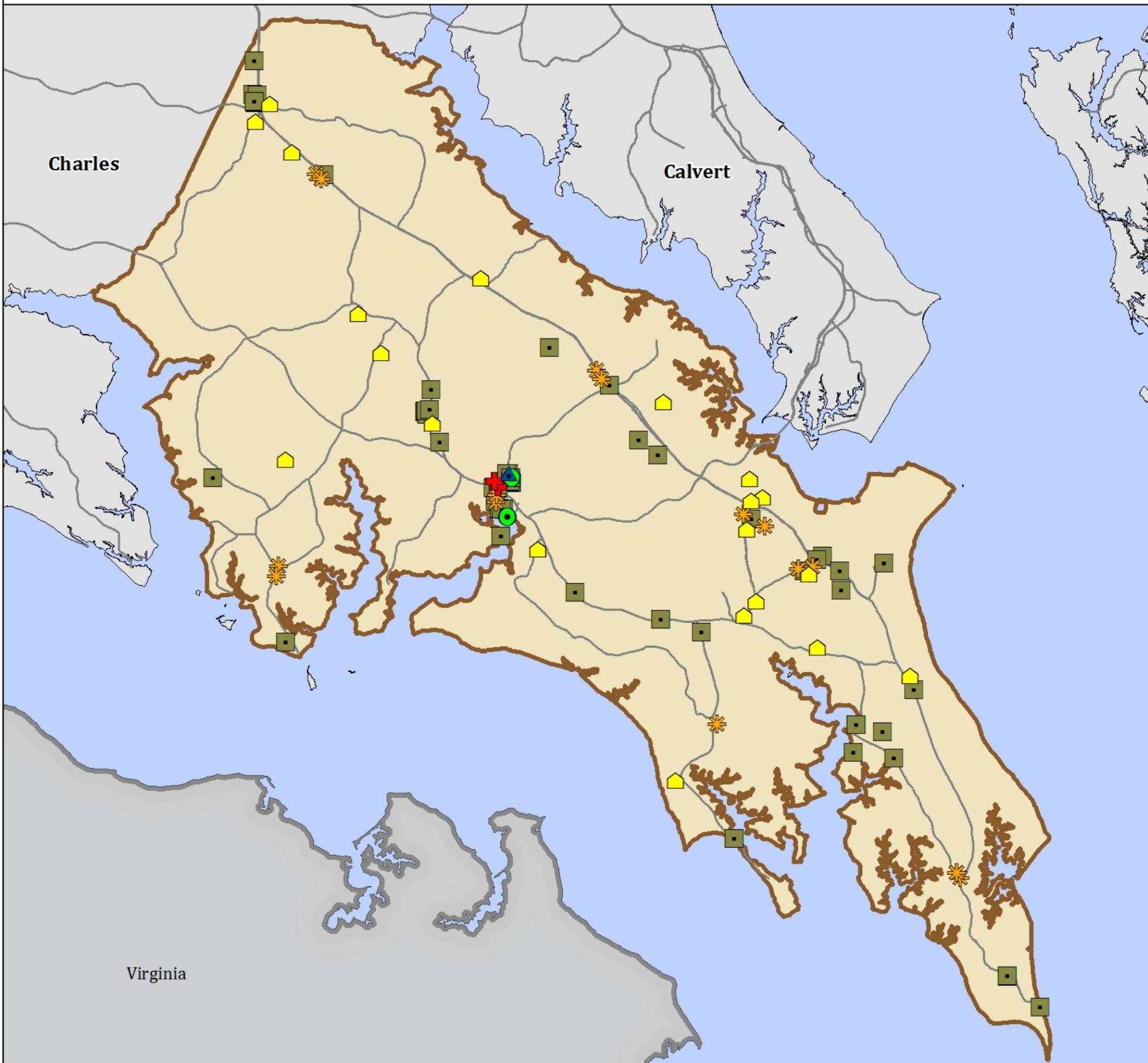
**Projection:**  
Maryland State Plane  
North American Datum 1983



*DISCLAIMER: Majority of available hazard data is intended to be used at national or regional scales. The purpose of the data sets are to give general indication of areas that may be susceptible to hazards in order to identify potential risk in the State of Maryland. Data has been used beyond the original intent.*

# St. Mary's County Critical Facilities & State Assets

## Maryland 2016 Hazard Mitigation Plan



### Description:

Critical Facility refers to structures that the State has determined must continue to operate before, during and after an emergency and/or disaster. State Assets are state owned and/or operated facilities.

In total there are 2,768 critical facilities and 7,891 state assets identified. When available, location information is provided for each point such as address, city, state, zip and latitude and longitude coordinates. Based on this information this data was imported and geolocated in ArcGIS.

Building information is also included (when available) such as Building value, contents values, number of stories and year built. Analyses within this plan use this data in unison with various hazard information.

*Types of Critical Facilities included: EOC, Fire, Medical, Police and School.*

*Types of State Assets included: Administrative, Airport, Correctional, Dept. of Natural Resources, Educational, Environmental, Fire and Police Departments, Health Related, Historic, Judicial/Legal, Military, Social Services, Transportation and Utility/Infrastructure.*

### Data Sources:

2016 Maryland Critical Facility Database  
 2016 State Assets Database  
 ESRI State Boundaries  
 MSHA County Boundaries

### Legend: Facility Type

-  EOC
-  Fire
-  Medical
-  Police
-  School
-  State Assets
-  Maryland Routes
-  US Routes
-  St. Mary's County
-  Maryland Counties
-  Surrounding States



**Projection:**  
 Maryland State Plane  
 North American Datum 1983

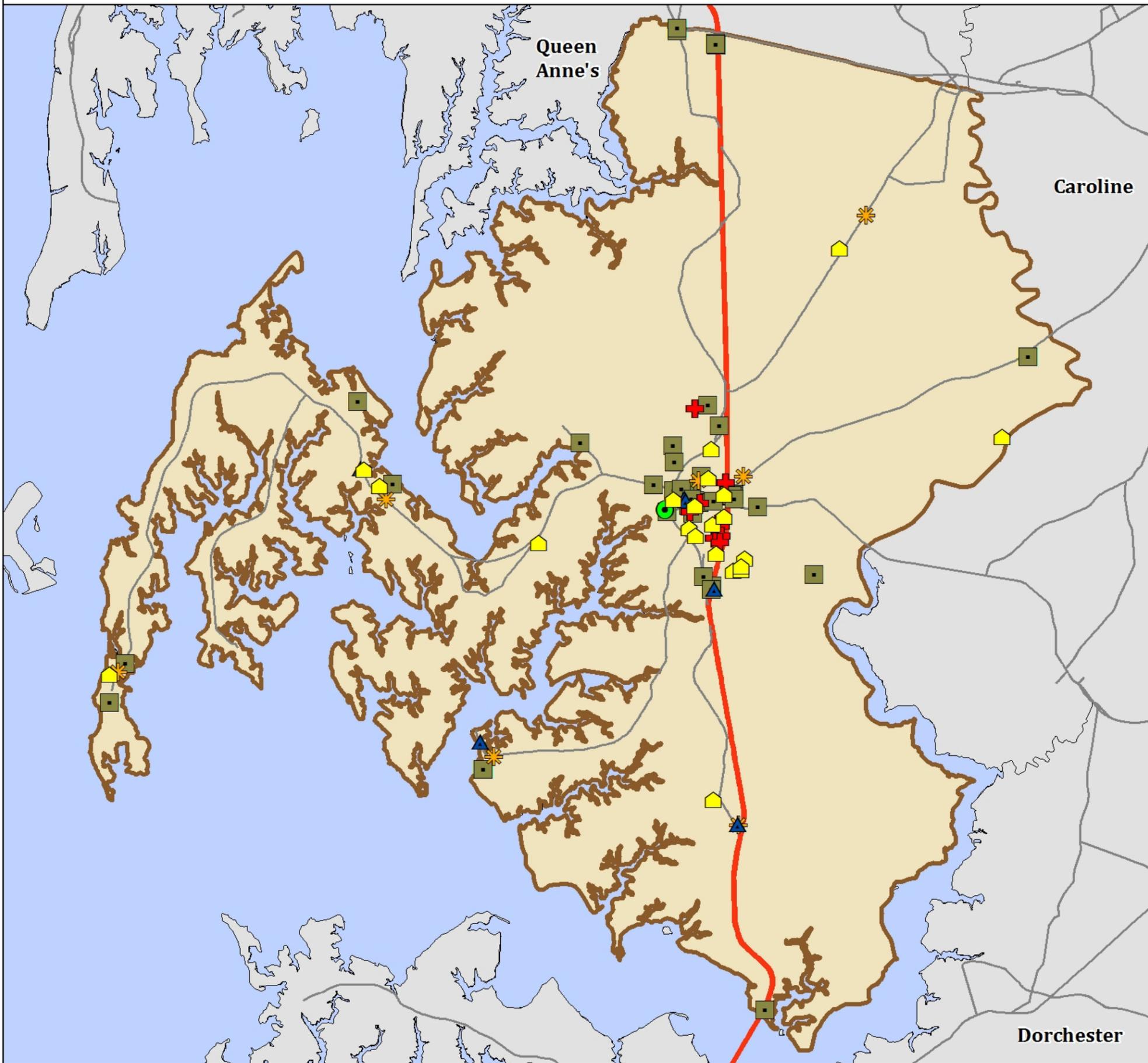


0 1 2 4  
 Miles  
 1 in = 3 miles

*DISCLAIMER: Majority of available hazard data is intended to be used at national or regional scales. The purpose of the data sets are to give general indication of areas that may be susceptible to hazards in order to identify potential risk in the State of Maryland. Data has been used beyond the original intent.*

# Talbot County Critical Facilities & State Assets

## Maryland 2016 Hazard Mitigation Plan



### Description:

Critical Facility refers to structures that the State has determined must continue to operate before, during and after an emergency and/or disaster. State Assets are state owned and/or operated facilities.

In total there are 2,768 critical facilities and 7,891 state assets identified. When available, location information is provided for each point such as address, city, state, zip and latitude and longitude coordinates. Based on this information this data was imported and geolocated in ArcGIS.

Building information is also included (when available) such as Building value, contents values, number of stories and year built. Analyses within this plan use this data in unison with various hazard information.

*Types of Critical Facilities included: EOC, Fire, Medical, Police and School.*

*Types of State Assets included: Administrative, Airport, Correctional, Dept. of Natural Resources, Educational, Environmental, Fire and Police Departments, Health Related, Historic, Judicial/Legal, Military, Social Services, Transportation and Utility/Infrastructure.*

### Data Sources:

2016 Maryland Critical Facility Database  
 2016 State Assets Database  
 ESRI State Boundaries  
 MSHA County Boundaries

### Legend: Facility Type

-  EOC
-  Fire
-  Medical
-  Police
-  School
-  State Assets
-  Maryland Routes
-  US Routes
-  Talbot County
-  Maryland Counties
-  Surrounding States



**Projection:**  
 Maryland State Plane  
 North American Datum 1983

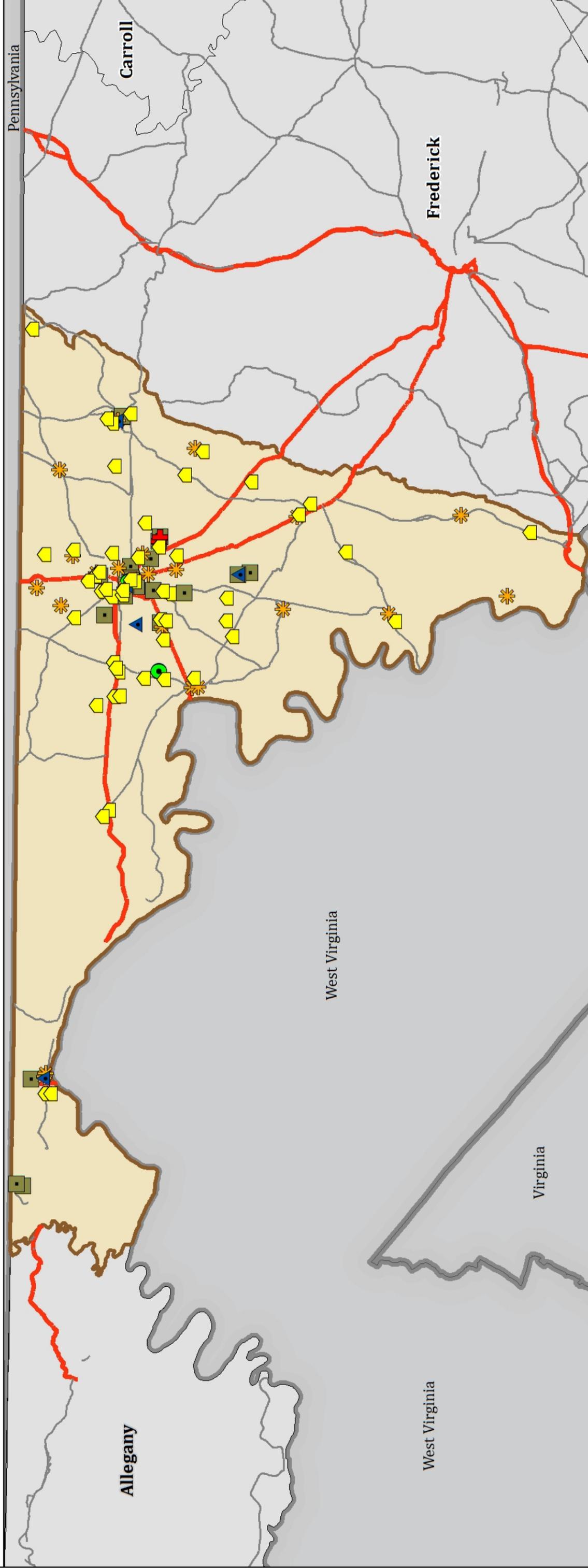


0 0.75 1.5 3  
 Miles  
 1 in = 3 miles

DISCLAIMER: Majority of available hazard data is intended to be used at national or regional scales. The purpose of the data sets are to give general indication of areas that may be susceptible to hazards in order to identify potential risk in the State of Maryland. Data has been used beyond the original intent.

# Washington County Critical Facilities & State Assets

## Maryland 2016 Hazard Mitigation Plan

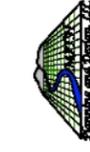


### Description:

Critical Facility refers to structures that the State has determined must continue to operate before, during and after an emergency and/or disaster. State Assets are state owned and/or operated facilities.

In total there are 2,768 critical facilities and 7,891 state assets identified. When available, location information is provided for each point such as address, city, state, zip and latitude and longitude coordinates. Based on this information this data was imported and geolocated in ArcGIS.

Building information is also included (when available) such as Building value, contents values, number of stories and year built. Analyses within this plan use this data in unison with various hazard information.



*Types of Critical Facilities included: EOC, Fire, Medical, Police and School.*

*Types of State Assets included: Administrative, Airport, Correctional, Dept. of Natural Resources, Educational, Environmental, Fire and Police Departments, Health Related, Historic, Judicial/Legal, Military, Social Services, Transportation and Utility/Infrastructure.*

### Legend:

- | Facility Type |         |
|---------------|---------|
|               | EOC     |
|               | Fire    |
|               | Medical |
|               | Police  |
|               | School  |
- 
- |  |                    |
|--|--------------------|
|  | Maryland Routes    |
|  | US Routes          |
|  | Washington County  |
|  | Maryland Counties  |
|  | Surrounding States |

### Projection:

Maryland State Plane  
North American Datum 1983

*DISCLAIMER: Majority of available hazard data is intended to be used at national or regional scales. The purpose of the data sets are to give general indication of areas that may be susceptible to hazards in order to identify potential risk in the State of Maryland. Data has been used beyond the original intent.*



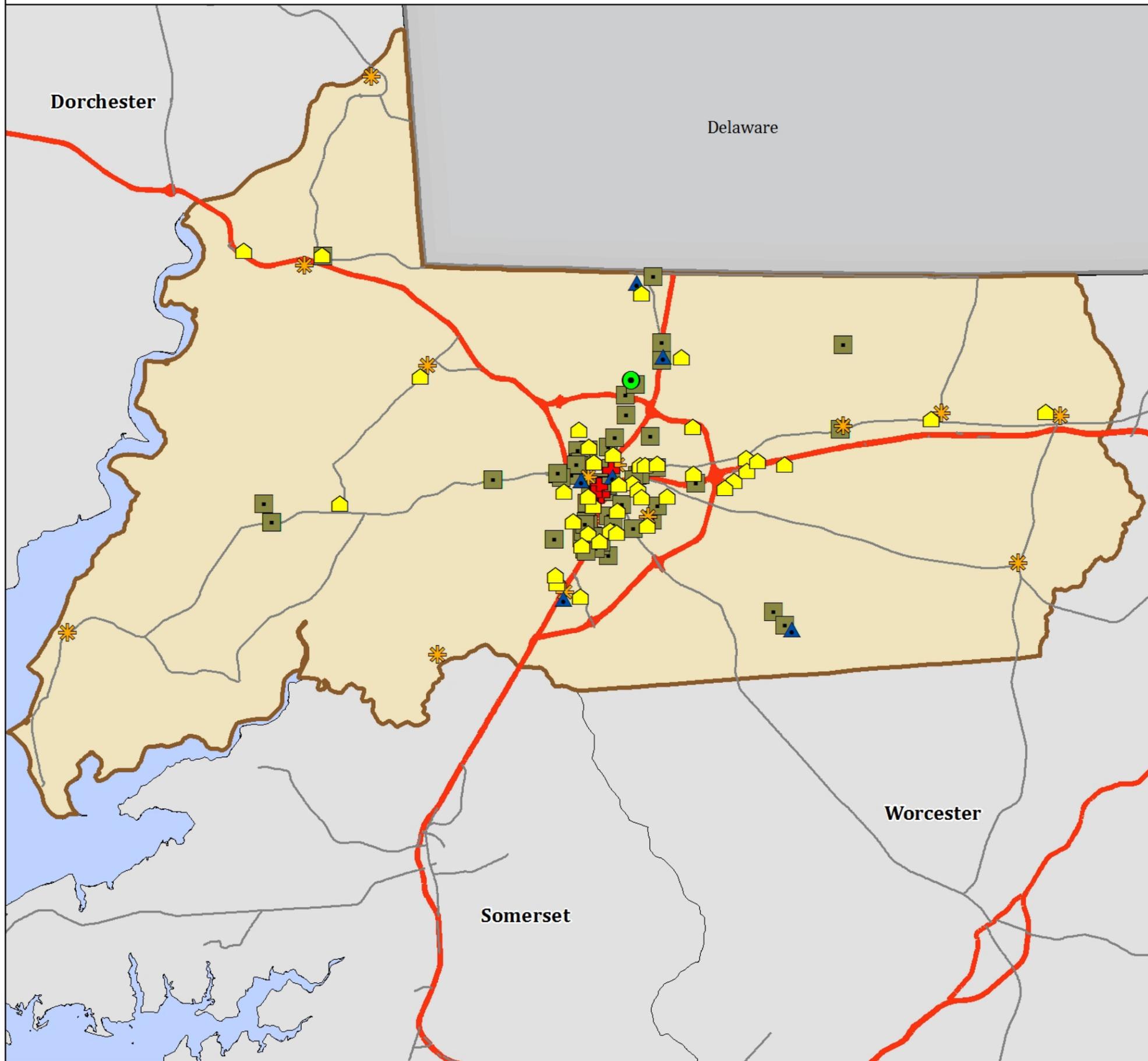
### Data Sources:

2016 Maryland Critical Facility Database  
2016 State Assets Database

ESRI State Boundaries  
MSHA County Boundaries

# Wicomico County Critical Facilities & State Assets

## Maryland 2016 Hazard Mitigation Plan



### Description:

Critical Facility refers to structures that the State has determined must continue to operate before, during and after an emergency and/or disaster. State Assets are state owned and/or operated facilities.

In total there are 2,768 critical facilities and 7,891 state assets identified. When available, location information is provided for each point such as address, city, state, zip and latitude and longitude coordinates. Based on this information this data was imported and geolocated in ArcGIS.

Building information is also included (when available) such as Building value, contents values, number of stories and year built. Analyses within this plan use this data in unison with various hazard information.

*Types of Critical Facilities included: EOC, Fire, Medical, Police and School.*

*Types of State Assets included: Administrative, Airport, Correctional, Dept. of Natural Resources, Educational, Environmental, Fire and Police Departments, Health Related, Historic, Judicial/Legal, Military, Social Services, Transportation and Utility/Infrastructure.*

### Data Sources:

2016 Maryland Critical Facility Database  
 2016 State Assets Database  
 ESRI State Boundaries  
 MSHA County Boundaries

### Legend: Facility Type

-  EOC
-  Fire
-  Medical
-  Police
-  School
-  State Assets
-  Maryland Routes
-  US Routes
-  Wicomico County
-  Maryland Counties
-  Surrounding States



**Projection:**  
 Maryland State Plane  
 North American Datum 1983

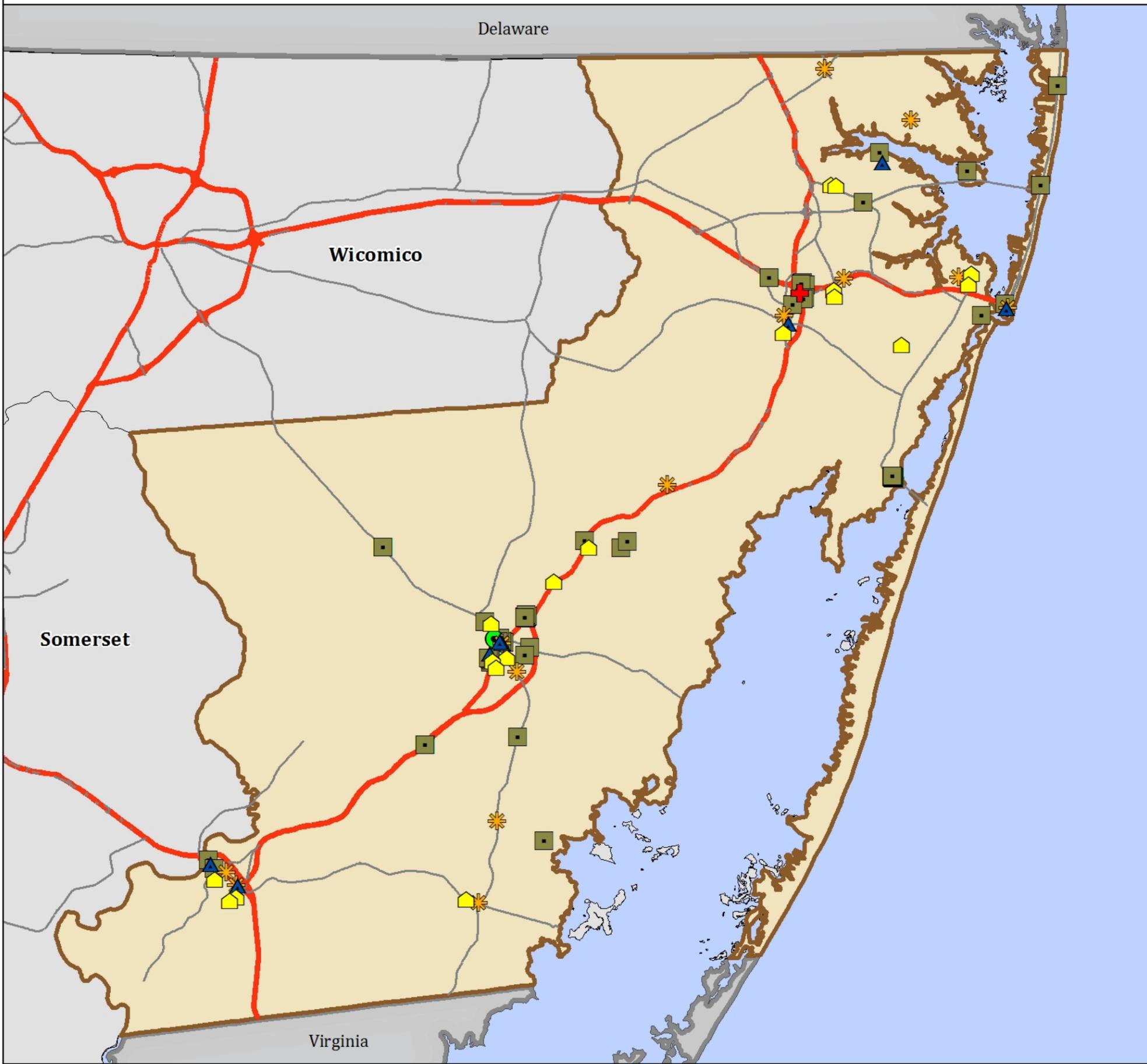


0 1 2 4  
 Miles  
 1 in = 3 miles

DISCLAIMER: Majority of available hazard data is intended to be used at national or regional scales. The purpose of the data sets are to give general indication of areas that may be susceptible to hazards in order to identify potential risk in the State of Maryland. Data has been used beyond the original intent.

# Worcester County Critical Facilities & State Assets

## Maryland 2016 Hazard Mitigation Plan



### Description:

Critical Facility refers to structures that the State has determined must continue to operate before, during and after an emergency and/or disaster. State Assets are state owned and/or operated facilities.

In total there are 2,768 critical facilities and 7,891 state assets identified. When available, location information is provided for each point such as address, city, state, zip and latitude and longitude coordinates. Based on this information this data was imported and geolocated in ArcGIS.

Building information is also included (when available) such as Building value, contents values, number of stories and year built. Analyses within this plan use this data in unison with various hazard information.

*Types of Critical Facilities included: EOC, Fire, Medical, Police and School.*

*Types of State Assets included: Administrative, Airport, Correctional, Dept. of Natural Resources, Educational, Environmental, Fire and Police Departments, Health Related, Historic, Judicial/Legal, Military, Social Services, Transportation and Utility/Infrastructure.*

### Data Sources:

- 2016 Maryland Critical Facility Database
- 2016 State Assets Database
- ESRI State Boundaries
- MSHA County Boundaries

### Legend: Facility Type

- EOC
- Fire
- Medical
- Police
- School
- State Assets
- Maryland Routes
- US Routes
- Worcester County
- Maryland Counties
- Surrounding States



**Projection:**  
Maryland State Plane  
North American Datum 1983



0 1 2 4  
Miles  
1 in = 3 miles

*DISCLAIMER: Majority of available hazard data is intended to be used at national or regional scales. The purpose of the data sets are to give general indication of areas that may be susceptible to hazards in order to identify potential risk in the State of Maryland. Data has been used beyond the original intent.*