2019 HAZARD MITIGATION PLAN
CAROLINE COUNTY, MARYLAND

Photo Sources:
Top Right: WBOC 16
Top Left: Star Democrat Newspaper
Bottom Right: Caroline County Website
Bottom Left: Department of Emergency Services

Caroline County Department of Emergency Services
9391 Double Hills Road
Denton, MD 21629

Prepared by:
Smith Planning & Design
76 Baltimore Street Cumberland, MD

Record of Change

Page Number	Section Affected and Comments	Date of Change

Overview

The *2019 Caroline County Hazard Mitigation Plan* (HMP) has been updated from the *2011 Caroline County Hazard Mitigation Plan*. The table below provides a summary by chapter of the new *2019 Caroline County Hazard Mitigation Plan*.

Chapter	Overview
1 - Introduction	Revised the purpose and detailed the planning process involved in creating the 2019 HMP. Detailed organization of the Plan, as well as the composition and members of the 2019 Hazard Mitigation Planning Committee (HMPC) and the review processes. Added new information on the State of Maryland Local Hazard Mitigation Grant Guidance recommendations, regional planning meetings, and the Hazard Identification Risk Assessment (HIRA), which includes county-wide risk perspectives and municipal vulnerability mitigation strategies.
2 - County Profile	Updated data tables pertaining to climate data, population, population projection, and permits. Added a future development and hazard vulnerability section. Added a new Priority Funding Area – Future Development section and corresponding maps.
3 - Hazard Identification	Updated municipal rankings. Detailed how the HMPC completed their hazard analysis and rankings. A new 2019 Plan hazard identified was sea level rise. Dam failure, hazardous material incidents and wildfires were not included in the Plan update. Detailed municipalities that participated in the previous 2011 Plan, as well as these that participated in the 2019 HMP process. 2019 HMP identified hazards based on both the hazard impact and probability of occurrence.
4 - Riverine Flooding	Updated the definition and types of flooding associated with riverine flooding, as well as disaster declarations for Maryland jurisdictions. Updated watershed information and added a watershed map. Identified and added flood events from local newspapers to the history of this hazard. Updated NOAA data, including tables on heavy rain events, flood events, and flash flood events. Depicted flood vulnerability for the County using tables and maps. Updated facilities at risk by flood zone and loss estimates. Updated maps showing the facilities that are in flood zones. Updated all available national flood insurance program data (repetitive loss properties, CRS data, etc.) pertaining to the County. Updated repetitive flooding locations within the County and were reviewed by the HMPC.
5 - Coastal Flood and Storms	Updated the definition and information associated with coastal storms including a table detailing the impacts of each storm category. Updated information on coastal storms that have affected the State of Maryland and Caroline County. Updated maps including storm surge, and facilities within the storm surge areas. Updated recent tropical storm events table and displayed pictures showing the results of flooding from past hurricanes in the County. Updated a SLOSH model study reported by MEMA describing the percent of the County that would be impacted by each storm surge category. Updated facilities at risk of storm surge in tables. Updated loss estimates for facilities impacted by storm surge and displayed them by their facility type and land use.

6 - Shoreline Erosion & Sea Level Rise	Updated information on expansive soils, sea level rise, and other factors that can produce shoreline erosion. Included new shoreline erosion tables pertaining to shoreline erosion rate. Updated critical and public facilities at risk, and loss estimates. Updated maps including shoreline erosion within the County and facilities in the shoreline erosion risk zone. Add a new sea level rise section to this chapter. Included is risk, projections, and vulnerability. New maps were created to show mean sea level rise inundation area projections. Also added was information on sea level rise mitigation strategies and vulnerability from the Eastern Shore Land Conservancy.
7 - Winter Storms	Updated characterizations and the impacts associated with winter storms. Added information regarding Presidential Declarations for Caroline County over the past decade. Updated storm events in the hazard history that significantly impacted the County. Updated a cold/wind chill and extreme cold/wind chill events table and a table detailing significant snow and ice storms. Added a new critical facilities table of structures constructed 1967 & prior. Completed revisions to winter storm vulnerable populations.
8 – Drought & Extreme Heat	Updated the definition of a drought and the types of drought that occur. Included information on the resulting effects of a drought. Added a drought severity classification table. Updated how the *2016 State of Maryland Hazard Mitigation Plan* and the HMPC ranked drought for the County. Updated extreme heat and drought events tables. Updated the history of drought for the County. Revised drought vulnerability to include information on water resources and populations at risk (using updated maps and tables).
9 - Severe Weather	Included all weather-related events with unpredictable hazard zones, including thunderstorm wind, tornados, lightning, hail, lightning, high wind, funnel cloud, tornado events. Updated vulnerability for each hazard identified in the chapter. Updated mass power outages to include the CAIDI average restoration time and the SADI average outage duration time by year.
10 - Human Impacted Hazards	Included human induced hazards (major fire/explosion and epidemic) that apply to the County. Updated information from the United States Fire Administration, which included fire deaths and general fire statistics for the County. Updated statistics on all reportable conditions related to epidemics obtained from the Maryland Infectious Disease and Health Administration and the type of information available to the public from the Caroline County Health Department website concerning human impacted hazards.
11 – Mitigation Status Report	Mitigation action items and projects identified in the 2011 Hazard Mitigation Plan were reviewed by the HMPC and representatives from each of the ten municipalities. A pie chart was added showing the status of the 2011 mitigation action items, as well as a new listing of additional action items not listed in the 2011 plan from the Town of Federalsburg, Denton, Greensboro, and Preston. Updated mitigation action status table.

12 – Capability and New Mitigation Strategies	Updated capability for each identified hazard in the document. The mitigation process including goals, objectives, actions, and how the HMPC identified and prioritized projects. The 2019 Caroline County Hazard Mitigation Planning Committee reviewed and modified the 2011 goals, objectives, and mitigation action items. The HMPC ranked each action item as "High," "Medium" or "Low" in the Rating column. Only action items that were not completed during the previous planning cycle (2011-2017) and new actions items were ranked. The purpose of this exercise was to determine the priority of action items. Those actions rated as "High" will be most beneficial to the County and developed into potential mitigation projects. Updated a comprehensive table displaying action items, associated goals and objectives, timeframe for completion, what hazard the action applies to, and their HMPC ranking. Included a new municipal mitigation action table that details mitigation actions specific to each municipality. Added new mitigation strategies for the County, including an in-depth table describing the project breakdown for each of the mitigation projects identified.
13 - Plan Maintenance & Implementation	N/A

TABLE OF CONTENTS

APPENDIX

LIST OF TABLES

LIST OF FIGURES

LIST OF MAPS

Chapter 1: Introduction

Introduction and Purpose

The 2019 Hazard Mitigation Plan has been prepared for Caroline County, Maryland, and its ten incorporated communities. The purpose of this Plan is to identify, plan, and implement cost-effective hazard mitigation measures through a comprehensive approach known as hazard mitigation planning. This document is the result of participation from a cross-section of community members including County and municipal officials, residents, business owners and other agencies.

State of Maryland Local Hazard Mitigation Grant Guidance

This document provides planning guidance for local governments to prepare an updated hazard mitigation plan. This guidance introduces Maryland specific recommendations for hazard mitigation planning and introduces ideas for both plan integration and resiliency. This Disaster Mitigation Act of 2000 (DMA 200) is intended to facilitate cooperation between the State and local governments. Focusing on hazard areas that are most important to the State and local jurisdictions will enhance our ability to set priorities for mitigation planning efforts and implementation of mitigation actions and projects.

Planning Requirements

The 2019 Hazard Mitigation Plan (HMP) forms the foundation for Caroline County and its municipality's long-term strategy to reduce disaster losses and break the cycle of disaster damage, reconstruction, and repeated damage.

To that end, in May 2018, Smith Planning and Design was contracted to update the *2011 Caroline County Hazard Mitigation Plan* and develop the *2019 Caroline County Hazard Mitigation Plan*, in accordance with the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Public Law 93-288), as amended by the Disaster Mitigation Act of 2000, and 44 CFR Part 201-Hazard Mitigation Planning.

As defined by DMA 2000-

Hazard Mitigation: any substantial action taken to reduce or eliminate the long-term risk to human life and property from hazards.

Planning: the act or process of making or carrying out plans; specifically, the establishment of goals, policies, and procedures for a social or economic unit.

As an incentive for State and local governments to develop hazard mitigation plans, the federal government requires mitigation planning as a component of eligibility for hazard mitigation project funding. The 2015 *Hazard Mitigation Assistance Unified Guidance and Addendum,* produced by the Federal Emergency Management Agency (FEMA), states that mitigation plans are the foundation for effective hazard mitigation. As such, local jurisdictions must have a FEMA-approved local hazard mitigation plan at the time of obligation of grant funds in order to be eligible for grant funding under the unified Hazard Mitigation Assistance (HMA) programs. This requirement reinforces the importance of mitigation planning and emphasizes planning for disasters before they occur.

Planning Process

In compliance with hazard mitigation planning requirements, extensive public participation was sought and encouraged throughout the mitigation plan update process. A Hazard Mitigation Planning

Committee (HMPC) was formed in June 2018, and was comprised of various County agencies, non-profit organizations, and municipal representatives. A series of regular HMPC meetings resulted in the development of an effective and current Countywide Hazard Mitigation Plan.

The HMPC was actively involved in reviewing previously identified hazards within the communities identified in the *2011 Caroline County Hazard Mitigation Plan* and in the review of the new hazard data gathered during the Plan update process. Hazard data coupled with local knowledge from various committee members was utilized to assess the County's vulnerability to hazards. Following this assessment, the Committee reviewed the status of the 2011 Mitigation Strategies recommendations to reduce and prevent potential damage from these hazards. Following the Mitigation Strategies review, the HMPC then worked together to update, review, and select the most appropriate and feasible mitigation measures to address the County's hazards for the 2019 Hazard Mitigation Plan.

The planning process commenced in June 2018 and a draft plan was submitted to the State in XXX, 2019. Special emphasis was placed on the following guiding principles:

- **Focus on the mitigation strategy.** The mitigation strategy is the Plan's primary purpose. All other sections contribute to and inform the mitigation strategy and specific hazard mitigation actions.

- **Process is an important as the Plan itself.** In mitigation planning, as with most other planning efforts, the Plan is only as good as the process and people involved in its development. The Plan should also serve as the written record, or documentation, of the planning process.
- **This is Caroline County's Plan.** To have value, the Plan must represent the current needs and values of the community and be useful for local officials and stakeholders. Develop the mitigation plan in a way that best serves your community's purpose and people.

The planning process involved five core components shown in Figure 1-1 below.

Figure 1-1: Planning Process

1. Organize Resources

The first step in the hazard mitigation plan update process was for Caroline County to organize their resources and ensure that they had adequate technical assistance and expertise to form a hazard mitigation committee. The committee included representatives from key County departments such as Planning & Codes Administration, Emergency Services, GIS, Public Works, Social Services, Health Department, Recreation and Parks, Soil Conservation, and representatives from the Towns of Ridgely, Denton, Greensboro, Henderson, Federalsburg, as well as the Maryland Rural Development Corporation and the Eastern Shore Land Conservancy. In addition, the Caroline County Department of Emergency Service served as the lead agency for the Plan Update and Smith Planning and Design provided technical support. Thus, the Hazard Mitigation Planning Committee (HMPC) was tasked with completing the Plan update. The following listing on Table 1-1 includes the members of the committee and the agencies they represent.

Table 1-1: Caroline County Hazard Mitigation Planning Committee

Member Name	Agency/Department
Bryan Ebling	CC Department of Emergency Services
Jeffrey Lugwig	CC Department of Emergency Services
Cindy Towers	CC Department of Emergency Services
Linda Woodall	CC Health Department
Jihane Ambroise	MEMA
Bill Hildebrand	MEMA
Jeannette DeLude	Town of Greensboro
Cindy Burns	Maryland Rural Development Corporation
Virginia Albers	Maryland Rural Development Corporation
John Garlick	Town of Federalsburg
Don Mulrine	Town of Denton
Stephanie Berkey	Town of Ridgely
Sandy Cook	Town of Henderson
Seth Hampton	CC Department of Planning &Codes Administration
Chris Kephart	CC Department of Planning &Codes Administration
Jennifer Shull	CC Department of Planning &Codes Administration
Theresa Bond	CC Department of Social Services
Kat Stork	CC Recreation & Parks
Susan Simmons	CC Recreation & Parks
John Shepard	Soil Conservation Caroline District
Jeff Dean	Soil Conservation Caroline District
Jim Bass	Eastern Shore Land Conservancy
Jake Jacobs	CC Public Works
Michele King	Smith Planning & Design
Virginia Smith	Smith Planning & Design

Source: Hazard Mitigation Planning Committee

Data Collection

The development of the mitigation plan update began with data collection. A kick-off meeting was held on June 4 and July 11, 2018 with the Hazard Mitigation Planning Committee (HMPC). For HMPC member's reference, hazards previous identified and profiled in the 2011 Plan were reviewed. To obtain a local hazard risk perspective for the update, the HMPC were asked to complete a Local Community Hazard Risk Perspective Survey. Furthermore, to obtain information on past hazard mitigation related to plans, policies, and projects, a questionnaire was distributed to specific agencies, departments or organizations. The questionnaire requested mitigation action status, current capabilities and possible new mitigation actions to be included in the Plan update.

Hazard Mitigation Planning Committee Meeting – July 11, 2018

Source: Hazard Mitigation Planning Committee

Immediately following the kick-off meeting, policy and regulatory information from each of the communities and the County was collected. This included comprehensive plans including the water resources elements, land use elements, priority preservations elements, zoning ordinances, development ordinances, building codes, and other relevant documents.

Information was collected from the Health Department, Public Works, Emergency Services, and Planning & Codes Administration, Social Services, as well as the Eastern Shore Land Conservancy and the Maryland Rural Development Corporation. Also, data and information from several State and Federal agencies were collected including the Maryland Emergency Management Agency, Maryland

Department of Natural Resources, the Federal Emergency Management Agency, Maryland Department of the Environment, and U.S. Army Corps of Engineers.

Regional Planning

Caroline County participated in various regional planning meetings throughout the planning process which provided key information that assisted with the hazard mitigation plan update, specifically with mitigation strategies. Meeting minutes are included in *Appendix C*. Meetings included:

- Upper Eastern Shore Communities for Complex Coordinated Terrorist Attacks (CCTA) Gap Analysis Workshop:
  - July 12, 2018

- Local Drug & Alcohol Abuse Council (LDAAC) Meeting:
  - August 23, 2018

In addition, Caroline County Department of Emergency Services actively participates on the Delmarva Emergency Task Force (DETF). This task force works to ensure that all jurisdictions on the Delmarva peninsula are prepared for hazards, including natural disasters, such as hurricanes, tropical storms, and nor'easters; and man-made disasters involving weapons of mass destruction, or chemical and biological agents. State, county and municipal emergency management personnel from all of Delaware, Maryland's nine Eastern Shore counties, and the two Virginia counties on the peninsula plan together for a coordinated regional response, including effective communications, resource sharing, shelter and evacuation strategies, and recovery plans.

2. Hazard Identification Risk Assessment - HIRA

The next step in the planning process was to identify and profile hazards and assess the County's vulnerability to these hazards. This process involved the HMPC to analyze the County's greatest hazard threats and determine its most significant vulnerabilities. The Hazard Identification and Vulnerability Assessment was performed in large part using GIS data from County and State sources. At the first HMPC meeting held on July 11, 2018, an overview of the hazards identified and profiled in the *2011 Caroline County Hazard Mitigation Plan* and the *2016 State of Maryland Hazard Mitigation Plan* specific to Caroline County as well as current hazard data tables were presented to the Committee. At this meeting, the HMPC members reviewed the list of identified hazards, and were given an opportunity to prioritize these hazards from a local community perspective.

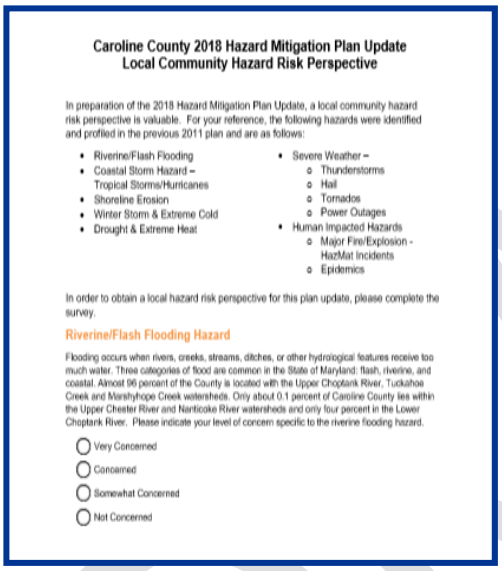
County-Wide Risk Perspective

In preparation of the 2019 Hazard Mitigation Plan Update, a local community hazard risk perspective was distributed at the July 11th HMPC meeting. The following hazards were identified and profiled in the 2011 Plan and are as follows:

- Riverine/Flash Flooding
- Coastal Storm Hazard – Tropical Storms/Hurricanes
- Shoreline Erosion
- Winter Storm & Extreme Cold
- Drought & Extreme Heat
- Severe Weather
  - Thunderstorms
  - Hail
  - Tornados
  - Power Outages
- Human Impacted Hazards
  - Major Fire/Explosion - HazMat Incidents
  - Epidemics

To obtain a local hazard risk perspective for the Plan update, each HMPC member in attendance were asked to indicate their level of concern specific to the hazards listed above. The levels of concern were as follows: ***Very Concerned, Concerned, Somewhat Concerned, or Not Concerned.*** The results were tabulated and are included in *Chapter 3 Hazard Identification* of the Plan. A sample of the local hazard risk perspective survey is shown below.

Figure 1-2: Local Hazard Risk Perspective Questionnaire



Caroline County 2018 Hazard Mitigation Plan Update
Local Community Hazard Risk Perspective

In preparation of the 2018 Hazard Mitigation Plan Update, a local community hazard risk perspective is valuable. For your reference, the following hazards were identified and profiled in the previous 2011 plan and are as follows:

- Riverine/Flash Flooding
- Coastal Storm Hazard – Tropical Storms/Hurricanes
- Shoreline Erosion
- Winter Storm & Extreme Cold
- Drought & Extreme Heat
- Severe Weather –
  - Thunderstorms
  - Hail
  - Tornados
  - Power Outages
- Human Impacted Hazards
  - Major Fire/Explosion - HazMat Incidents
  - Epidemics

In order to obtain a local hazard risk perspective for this plan update, please complete the survey.

Riverine/Flash Flooding Hazard

Flooding occurs when rivers, creeks, streams, ditches, or other hydrological features receive too much water. Three categories of flood are common in the State of Maryland: flash, riverine, and coastal. Almost 96 percent of the County is located with the Upper Choptank River, Tuckahoe Creek and Marshyhope Creek watersheds. Only about 0.1 percent of Caroline County lies within the Upper Chester River and Nanticoke River watersheds and only four percent in the Lower Choptank River. Please indicate your level of concern specific to the riverine flooding hazard.

- ◯ Very Concerned
- ◯ Concerned
- ◯ Somewhat Concerned
- ◯ Not Concerned

Municipal Risk Perspective

In addition to the county-wide risk perspective, a municipal risk perspective was sought during the Plan update process. Each municipality completed the Local Community Hazard Risk Perspective base upon their individual town perspective. Any municipality that did not complete the survey was given the opportunity during the October 25, 2018 HMPC meeting. These results were presented in Chapter 3 Hazard Identification, Table 3.2.

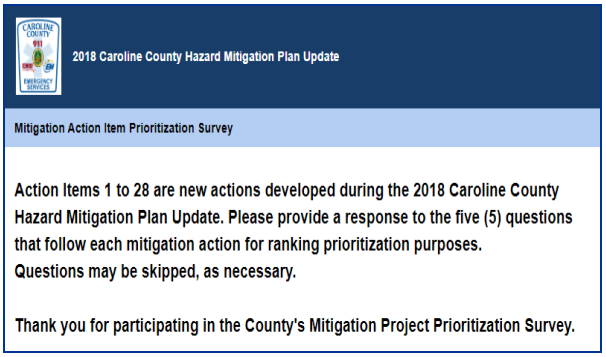
3. Vulnerability Assessment

Vulnerability, specifically, refers to the *susceptibility* of people, properties, and resources to the impacts associated with such hazard events. The level of vulnerability depends on a number of factors, including location, construction, property contents, and the economic value of the function(s) being provided by an individual, facility, or system. Vulnerability may be intensified due to a lack of resources or information. The vulnerability assessments for various hazard were revised and updated during the 2019 Plan development. Jim Bass from the Eastern Shore Land Conservation presented *Risk Management for the 21st Century Floodplain* PowerPoint to the HMPC committee on October 25, 2018. Coastal flood risk including loss estimations and depth of flooding at specific structures were added to the Plan. New hurricane storm surge inundation and depth girds were incorporated into the Plan. Finally, new vulnerability mapping and or data tables using the best available information was added in all hazard specific Plan chapters.

4. Mitigation Strategies

During the Hazard Mitigation Planning Committee held on October 25, 2018, mitigation actions were reviewed. At this meeting, prioritization of mitigation actions was discussed. As a result of the discussion, HMPC members agreed to participated in an online mitigation action items prioritization survey. In order to prioritize the projects, a survey was developed and distributed to 30 individuals. The survey contained the same five questions for each project and was limited to yes/no answers. The mitigation action prioritization survey yielded 9 mitigation actions being rated as a “High” priority by the HMPC.

Figure 1-3: Mitigation Action Items Prioritization Survey



5. Develop a Mitigation Plan

The Plan was assembled, and a working draft document resulted. Various versions of the working draft document were provided to the project manager for review during the Plan development process.

Review of Plan and Plan Revisions

Review and plan revisions occurred throughout the formation of the Plan. Chapters 1-3 were reviewed at meeting two of the HMPC on July 11, 2018. Chapters 4-13 were reviewed at meeting three of the HMPC on October 25, 2018. The County's Local Emergency Planning Committee (LEPC) reviewed the Plan throughout the development process. The Maryland Emergency Management Agency reviewed the Plan in January 2019. All revisions were edited after each review of the Plan.

Public Involvement

In XXX 2019, the draft Plan was presented to the Caroline County Local Emergency Planning Committee (LEPC). In addition, the LEPC for Caroline County reorganized into a group known as the Emergency Preparedness/Response Advisory Committee (EPRAC) and is now led by the Health Department's Emergency Planner. Together, the DES and Health Department Planner will work to reorganize the group to maintain an equal focus on Hazard Mitigation and not health preparedness exclusively. All LEPC meetings are public meetings, as they are open to the public. Public meeting minutes are included in *Appendix C*.

- Caroline County Health Department Emergency Preparedness & Response Program Meeting Dates:
  - September 8, 2015
  - December 15, 2015
  - February 9, 2016
  - June 21, 2016
  - September 13, 2016
  - January 24, 2017
  - April 18, 2017
  - June 20, 2017
  - July 24, 2017
  - April 17, 2018

Agency Review

The Maryland Emergency Management Agency will serve as the State review agency and clearing house. The following agencies will also receive a draft of the Plan for review and comment once the County and the municipalities have adopted the Plan:

- Maryland Emergency Management Agency (FEMA);
- Soil Conservation District;
- Maryland Rural Development Corporation; and
- Eastern Shore Land Conservancy.

Organization of the Plan

The following chapters comprise the *2019 Caroline County Hazard Mitigation Plan*. Chapter 2 includes the County Profile, while Chapter 3 details the Hazard Identification and ranking process. Chapters 4-10 comprise the Vulnerability Analysis for those hazards identified by the 2019 Hazard Mitigation Planning Committee *as Not Concerned, Somewhat Concerned,*

Concerned, or Very Concerned. Chapter 11 details mitigation action items and projects identified in the 2011 Hazard Mitigation Plan that were reviewed by the Hazard Mitigation Planning Committee (HMPC) and representatives from each of the ten municipalities. Chapter 12 details Caroline County's community capabilities, goals and objectives, and new mitigation strategies. Finally, Chapter 13 will have implementation details on how the Plan will be maintained and implemented over the next five-year Plan cycle. An appendix includes information from the meetings, questionnaires, and a detailed description of potential project funding sources.

6. Implement the Plan and Monitor Progress

Chapter 13: Plan Maintenance and Implementation describes the annual update of the Plan and continued public involvement. Annual status reports will be completed on the progress of various mitigation activities. Copies of these status reports will be made available to the public.

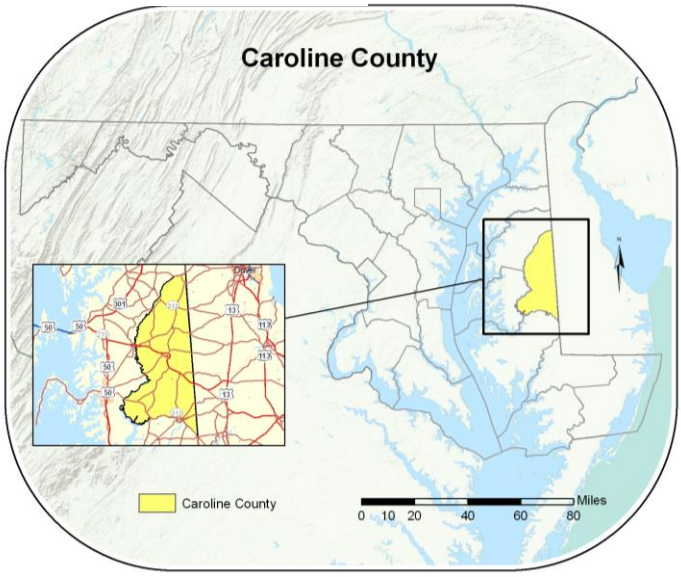
Chapter 2: County Profile

Location

Caroline County is located in the central part of the Eastern Shore and is adjacent to Queen Anne's, Talbot, and Dorchester Counties in Maryland, and Kent and Sussex Counties in Delaware as shown on Map 2-1.

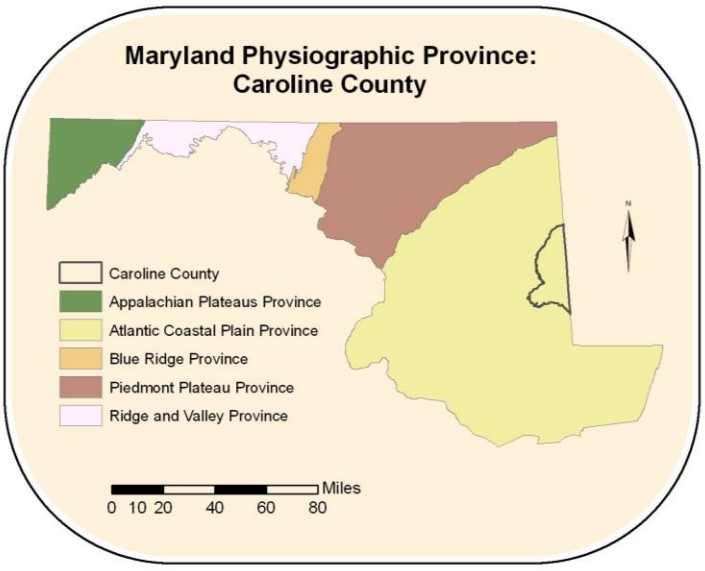
Caroline County was founded in 1773 and was named for Lady Caroline Eden, wife of Robert Eden, Maryland's last Colonial Governor, and daughter of Charles Calvert, 5th Lord Baltimore. Caroline County is one of the smaller counties in Maryland, containing 321 square miles of land. Since the founding of the County, its major industry has been agriculture.

Map 2-1: County Location



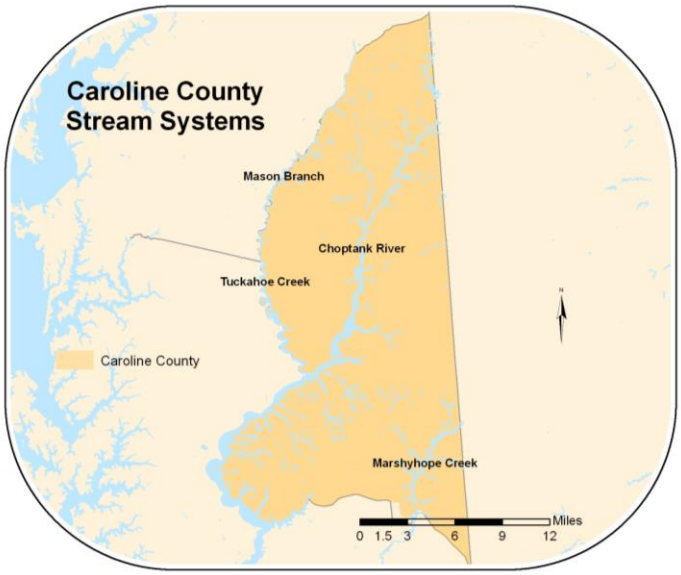
As shown on Map 2-2, Caroline County is located within the Atlantic Coastal Plain Physiographic Province. Mineral resources of this province are mainly composed of sand and gravel, which are used as aggregate material by the construction industry. Plentiful supplies of ground water are available from a number of aquifers throughout much of this region. The Atlantic Continental Shelf contains abundant sand deposits, useful for beach restoration.

Map 2-2: Provinces



The County is situated on the Choptank River and its tributaries, including Tuckahoe Creek, and on the upper stream reaches of Marshyhope Creek, which flows into the Nanticoke River. Stream systems are shown on Map 2-3.

Map 2-3: Stream Systems



Climate

Caroline County is susceptible to high winds and rain during thunderstorms and some

damage to storm surge and wind during the passage of hurricanes either on or near the Eastern Shore due to its nearly level terrain and low elevation (sea level to approximately 79 feet). The County is also vulnerable to tornados that are occasionally spawned by thunderstorms and hurricanes. According to the publication, *Climate and Man*, the County must deal with fog conditions approximately 10-15 times a year, similar to the rest of the Eastern Shore, but much less than in Western Maryland. Since the previous Plan Update, Denton, Maryland no longer has a National Climatic Data Center (NCDC) Station which provides temperature and precipitation Climate Normals for Caroline County. For the purposes of the *2019 Caroline County Hazard Mitigation Plan Update*, we are using the Greenwood 2 NE, Delaware Station; approximately 18 miles east of Denton Maryland. Precipitation averages 45.20 inches annually. Caroline County receives an average of 13.6 inches of snow per year. Most of this snow falls during the passage of the occasional mid-latitude winter storm. Due to its nearly level terrain and its proximity to the Atlantic Ocean, Caroline County receives less snowfall on average than counties to the north and west. Temperatures usually average a few degrees warmer in Caroline County than on the western shore throughout the year. The following table shows average rainfall and average high and low temperatures for Denton, Maryland.

Table 2-1: Average Temperature and Rainfall by Month

DENTON, MARYLAND: AVERAGE TEMPERATURE (F°) & RAINFALL (in.) BY MONTH												
	Jan	**Feb**	**March**	**April**	**May**	**June**	**July**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
High	42.3	44.9	53.6	63.7	72.8	81.6	86.0	84.5	77.9	67.6	57.5	46.7
Low	24.7	25.8	32.8	42.1	51.1	61.3	66.2	64.4	57.1	45.4	36.9	28.2
Rainfall	3.44	2.99	4.27	3.77	3.90	3.79	4.39	3.87	4.40	3.42	3.50	3.46

Source: National Climatic Data Center, Climate Data Online, 1981-2010 Normals based on Greenwood 2 NE, Delaware. This station is the closest to Caroline County, 18-mile East of Denton, Maryland.

Population

According to the U.S. Census Bureau population estimates, July 1, 2017, indicates a total county population of 33,193 people. Portions of the population may be more vulnerable to hazards, such as:

- Persons 65 years of age and over comprise 16% of the total population;
- Households where language other than English is spoken comprise 6.5% of the population;
- Persons living in poverty, 15.3%; and
- Persons living with a disability, under age 65 years, 2012-2016, 11.3%.

Caroline County's population growth has mirrored its economic growth, with periods of high growth rates occurring during the early settlement of the County and since 1970. The following table details the U.S. Census Bureau, 2010 population and the 2017 US Census Population Estimate figures for the ten incorporated communities within Caroline County. The municipality of Denton had a minimal increase in population from 2010 to 2017, while the other nine municipalities had a minimal decrease. The overall population of Caroline County had an increase of 127 from 2010 to 2017.

Table 2-2: Population Figures

POPULATION					
Municipality	**2000**	**2010**	**Rate of Change**	**Percent of Change**	**2017 Population Estimates**
Denton	2,960	4,418	+1,458	↑ 49.3%	4,475
Federalsburg	2,620	2,739	+119	↑ 4.5%	2,666
Goldsboro	216	246	+30	↑13.8%	232
Greensboro	1,632	1,931	+299	↑ 18.3%	1,887
Henderson	118	146	+28	↑ 23.7%	145
Hillsboro	163	161	-2	↓ 1.2%	158
Marydel	147	141	-6	↓ 4.1%	138
Preston	566	719	+153	↑ 27%	709
Ridgely	1,352	1,639	+287	↑ 21.2%	1,638
Templeville	80	138	+58	↑ 72.5%	115
Incorporated	**9,854**	**12,278**	**+2,424**	**↑ 24.6%**	**12,163**
Unincorporated	**19,918**	**20,788**	**+870**	**↑ 4.4%**	**21,030**

Source: U.S. Census Bureau, American Fact Finder Population Estimates, July 1, 2017

According to the 2010 Caroline County Comprehensive Plan, population projections for the unincorporated areas of the County were calculated by the Department of Planning & Codes Administration, Table 2-3. The most current population projections from the Maryland Department of Planning (MDP) is shown in 2-4. The 2010 Caroline County Comprehensive Plan includes more conservative population projections than that of MDP projections. MDP shows the entire County increasing in population from 2025-2045. The largest population growth rate according to MDP is 34,050 in 2020 to 36,250 in 2025, an increase of 1.26%.

Table 2-3: Population Projections

POPULATION PROJECTIONS – UNINCORPORATED AREAS						
Source	**Estimates**	**2010**	**2015**	**2020**	**2025**	**2030**
MDP	Population	22,727	24,517	26,517	28,170	29,686
	Annual % Increase	1.7	1.7	1.5	1.2	1.1
Caroline County	Population	21,992	23,092	24,477	25,946	27,503
	Annual % Increase	1.0	1.0	1.2	1.2	1.2

Source: 2010 Caroline County Comprehensive Plan

Table 2-4: Projected Total Population Projections for Caroline County

POPULATION PROJECTIONS – CAROLINE COUNTY						
Source	**Estimates**	**2025**	**2030**	**2035**	**2040**	**2045**
MDP	Population	36,250	38,450	40,750	42,950	45,250

Source: Maryland Department of Planning, August 2017

Land Use

According to the *2010 Caroline County Comprehensive Plan*, most residential, industrial and commercial development is concentrated within or in close proximity to municipalities. Prior to 2000, growth and development largely occurred in unincorporated areas. Growth and development began concentrating in municipalities in 2003 and by the end of 2004, for the first time since at least 1990,

municipal growth surpassed growth in unincorporated areas. Development shifts are attributed to several factors, including new State and County laws, market trends, and access to public infrastructure and services. This shift in development correlates well with the County's desire to preserve its rural countryside, and the County will strive to continue this trend. The future vision of the County is to direct growth to existing population centers, preserve agriculture, natural resources and the rural character of the County. Countywide land use tabulations show a total of 199,854 acres or 97% of the County consisting of unincorporated areas and incorporated areas totaling 6,865 acres, the remaining 3% of the County.

According to *2017 Caroline County Land Preservation, Parks and Recreations Plan* there is approximately 59,122 acres of forested land in 2010 or 29%. The two largest contiguous forested tracts are in the Idylwild Wildlife Management Area (WMA) north of Federalsburg, and Tuckahoe State Park and Adkins Arboretum north of Hillsboro.

Permit Data

Table 2-5: County Permit Data

Caroline County Permit Data			
Year	**Commercial**	**Residential**	**Mobile Home**
2011	8	18	6
2012	9	24	10
2013	9	23	13
2014	12	31	7
2015	10	41	14
2016	11	35	10
2017	6	41	9
2018	8	39	21

Source: Caroline County Planning and Codes, December 2018

Table 2-6: Municipal Permit Data **Note:** **Blue for Residential** **Red for Commercial**

Municipal Permit Data							
Municipality	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Denton	-	11/111	4/130	8/169	12/177	9/169	-
Federalsburg	-	-	22/8	29/8	11/9	28/12	-
Goldsboro	*(1) residential permit during 2010-2017 but exact year unknown*						
Greensboro	22/1	33/4	20/0	24/3	33/2	20/1	39/8
Henderson	-	-	-	-	-	-	-
Hillsboro	-	-	-	-	-	-	-
Marydel	*(1) commercial permit during 2010-2017 but exact year unknown*						
Preston	-	-	-	-	-	-	-
Ridgely	22/5	23/1	24/1	38/0	60/3	48/1	32/1
Templeville	*(1) residential permit during 2010-2017 but exact year unknown*						

Source: Caroline County Municipalities, 2018

Priority Funding Area – Future Development

State of Maryland 1997 Planning Legislation capitalizes on the state's influence on economic growth and development. This law directs state spending to Priority Funding Areas. Priority Funding Areas are existing communities and places designated by local governments that states where want state investment to support future growth.

Growth-related projects covered by the legislation include most state programs that encourage or support growth and development such as highways, sewer and water construction, economic development assistance and state leases or construction of new office facilities.

The Priority Funding Areas law builds on the foundation of planning visions which were adopted as Maryland policy through 1992 legislation (and updated in 2009). Funding for projects in municipalities, other existing communities, industrial areas and planned growth areas designated by counties receive priority for state funding over other projects. Priority Funding Areas coordinate state and local government efforts to support economic development and new growth.

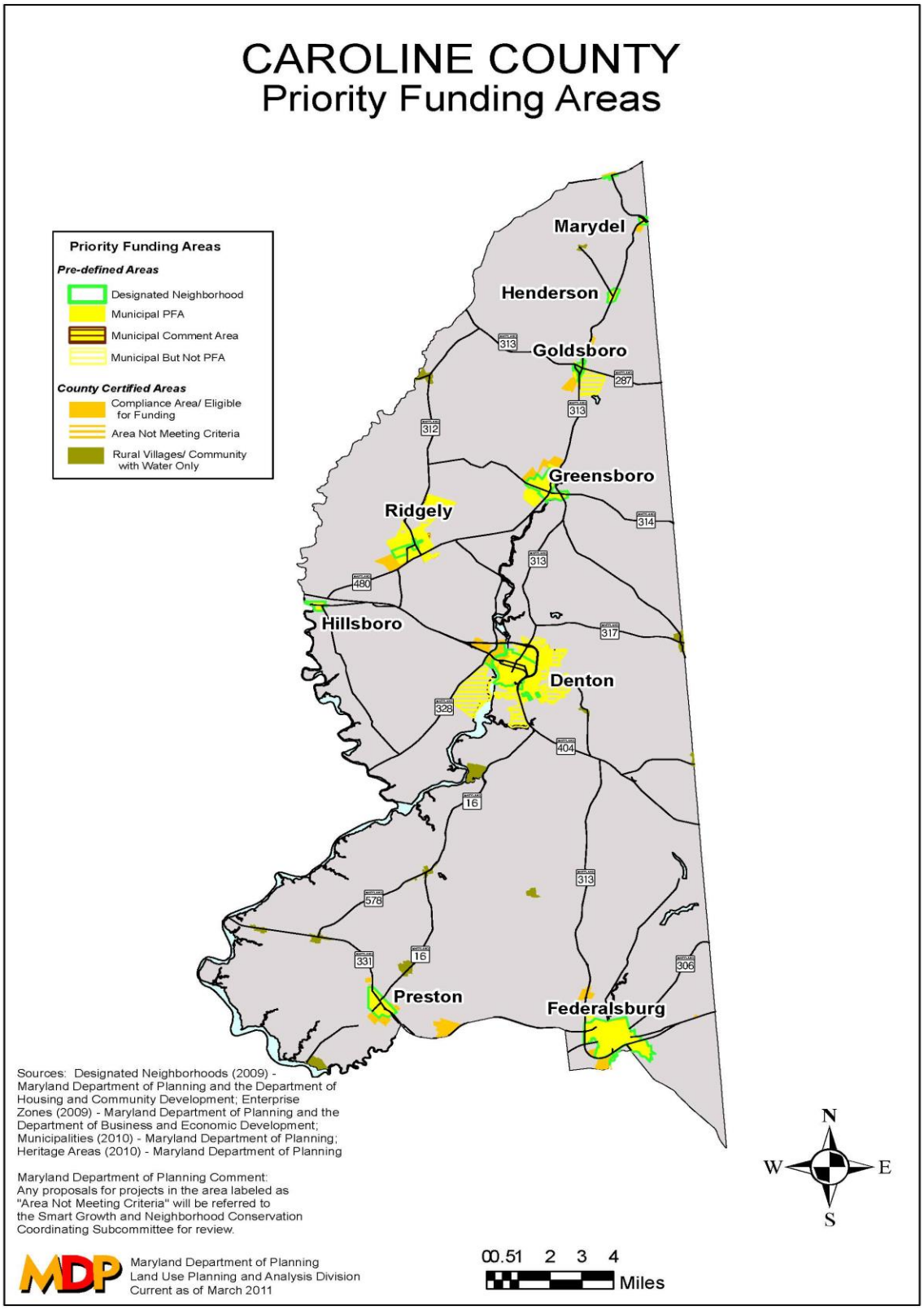
The following areas qualify as Priority Funding Areas:

- Every municipality, as they existed in 1997;
- Areas inside the Washington Beltway and the Baltimore Beltway; and
- Areas already designated as enterprise zones, neighborhood revitalization areas, heritage areas and existing industrial land.

The 1997 planning law recognizes the important role of local governments in managing growth and determining the locations most suitable for state-funded projects. Counties may designate areas as Priority Funding Areas that meet guidelines for intended use, availability of plans for sewer and water systems and permitted residential density. Areas eligible for county designation include existing communities and areas where industrial or other economic development is desired. In addition, counties may designate areas planned for new residential communities which will be served by water and sewer systems and meet density standards.

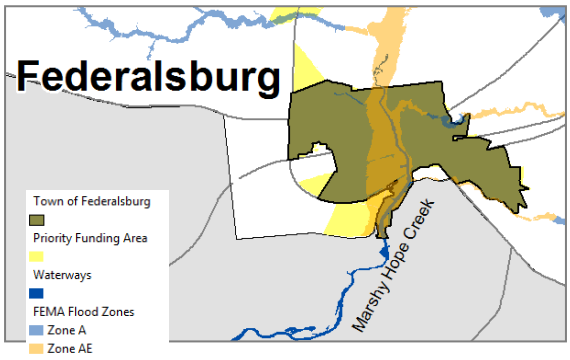
The review of designated Priority Funding Areas (PFA's) in Caroline County as shown on Figure 2-1 indicate that the majority of these areas are located adjacent to existing developed, i.e. municipalities.

Figure 2-1: Priority Funding Areas



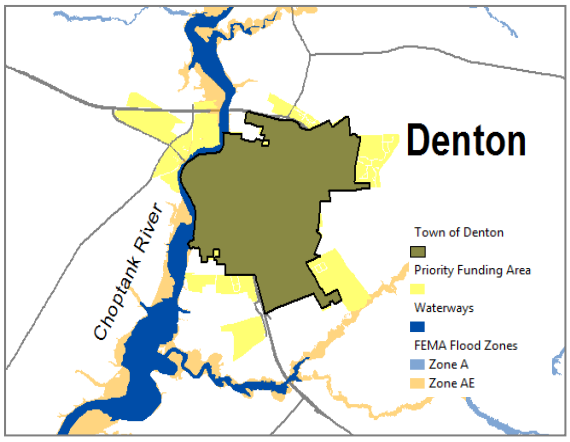
An analysis of the PFA polygons in relation to FEMA Flood Zones revealed that several of the PFA's within Caroline County intersect with FEMA Special Flood Hazard Areas. The PFA located near Federalsburg includes land within FEMA Flood Zone AE. The Marshy Hope Creek flows through the Town of Federalsburg.

Figure 2-2: Priority Funding Areas Federalsburg



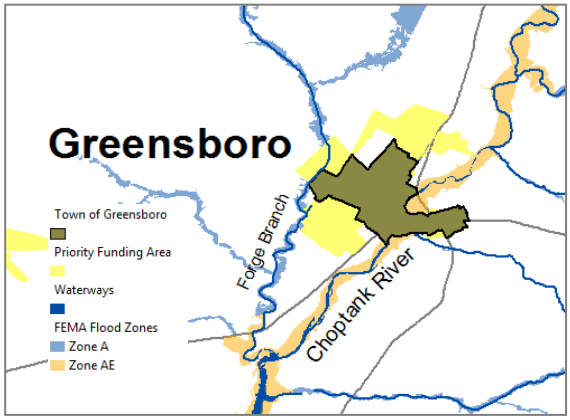
The PFA located northwest of the Town of Denton, is located within FEMA Flood Zone AE. The Choptank River borders the western portion of the Town. The Caroline County Floodplain Ordinance allows for developed within the FEMA Special Flood Hazard Areas, FEMA Flood Zone AE, however development must meet the requirements of the ordinance, which includes two feet of freeboard.

Figure 2-3: Priority Funding Areas Denton



In addition, FEMA Flood Zone A, which does include a detailed flood study, was analyzed relative to PFA's in Caroline County. The PFA located adjacent to Greensboro, on the northwest side, insects with FEMA Flood Zone A. The Forge Branch flows through this PFA area. A detailed flood study of the Forge Branch Floodplain would assist in the siting of future development outside of flood hazard risk areas.

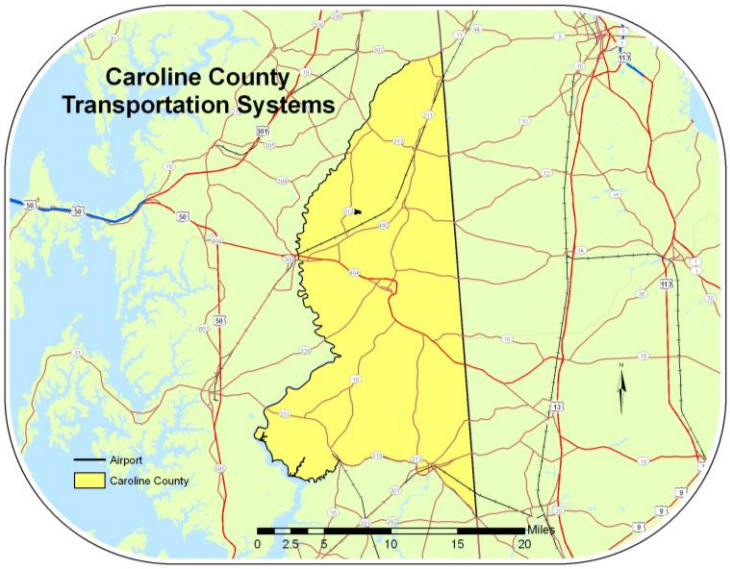
Figure 2-4: Priority Funding Areas Greensboro



Transportation

Route 404 is the major east-west highway corridor through Caroline County and connects the County with Route 50 to the west and Route 13 in Delaware. The other major highway is Route 313, which runs north-south and connects Caroline County with Route 301 in Kent County and with Route 50 in Wicomico County. A number of other State highways and County roads connect the County seat in Denton with other municipalities and smaller communities within the County. Other transportation routes include the Maryland and Delaware (MDDE) Railroad which connects Federalsburg and Preston with the Norfolk Southern Railroad in Delaware. The Ridgely Airpark, which serves the County, is located just to the north and west of Ridgely off Route 312.

Map 2-4: Transportation



Additionally, Public assistance Programs provide transportation for elderly, low income, and physically challenged residents using funding provided by the Maryland Department of Transportation and federal grant programs.

The Choptank River in Caroline County has historically been an inland location for small ports for watermen and for barge traffic. A number of landings serve the Choptank and its tributaries as well as Marshyhope at Federalsburg.

Future Development & Hazard Vulnerability

According to the County's *2010 Comprehensive Plan*, growth is concentrated in existing population and business centers, growth areas adjacent to these centers, or strategically selected new centers. The Smart Growth concept is enacted in the designation of "Priority Funding Areas" (PFAs), which are local areas targeted for growth and eligible for State funding of public water and sewer service. PFAs include municipalities that existed on January 1, 1997, existing rural villages and planned communities (or growth areas) and industrial areas. Areas annexed by municipalities after January 1, 1997 must meet additional density requirements and have water and sewer service to qualify as a PFA.

Hazard inundation areas are examined in *Chapters 4*, *5*, and *6*. According to the *2010 Caroline County Comprehensive Plan*, all future growth in the County will be concentrated in PFAs, located in the already existing municipalities in the County.

In terms of the 100-year floodplain inundation areas, the following municipalities impacted are:

- Federalsburg;
- Greensboro;
- Hillsboro;
- Henderson; and
- Denton.

In terms of hurricane inundation areas, the following municipalities impacted are:

- Hillsboro;
- Denton;
- Greensboro; and
- Federalsburg.

In terms of shoreline erosion risk areas, the following municipalities impacted are:

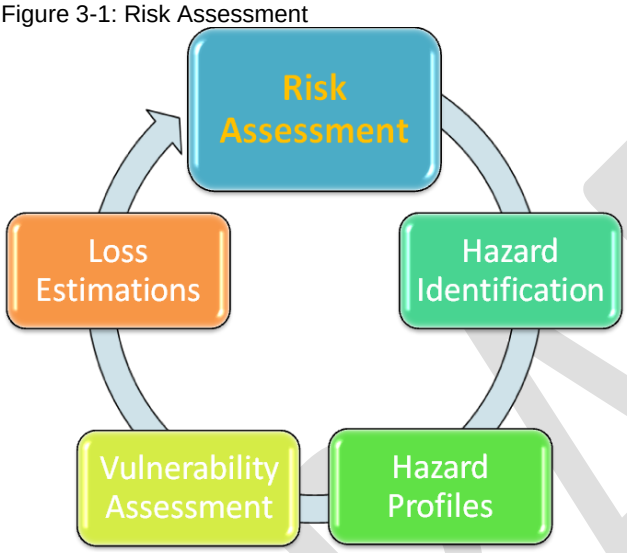
- Greensboro;
- Denton;
- Hillsboro; and
- Federalsburg.

Chapter 3: Hazard Identification

Introduction

In order to revise and update the *2011 Caroline County Hazard Mitigation Plan*, the four major steps in developing a risk assessment for Caroline County must be reviewed and updated during the revision process. The four major steps include:

Figure 3-1: Risk Assessment



This Chapter comprises the first step in the risk assessment process, wherein hazards that may affect Caroline County are identified. The nature of the hazard, history of previous occurrences, and the impact including potential severity of an occurrence has been documented as part of Step 2 Hazard Profiles. Steps 3 and 4 of the Risk Assessment (vulnerability assessment and loss assessment) will be discussed in the Chapters 4-10 that follow.

Hazard Identification Process

The hazard identification process for Caroline County involved investigating various types of hazards faced by the County over the past several decades including new information collected from 2011-Present. Since it is assumed that hazards experienced by the County in the past may be experienced in the future, the hazard identification process includes a history and an examination of various hazards and their occurrences.

During the preparation of the update to the Caroline County Hazard Mitigation Plan, one of the first steps taken by the County Planning Committee was to perform a Hazard Identification and Ranking exercise.

Hazard Mitigation Planning Committee

In order to update the Hazard Identification for purposes of completing the *2019 Caroline County Hazard Mitigation Plan*, a new planning committee included a cross-section of private and public sector members was formed. One of the initial tasks of the HMPC was to complete a hazard identification and risk assessment based upon their agency and/or local community perspective.

HMPC members reviewed previously identified hazards and made minor adjustments for the plan update. During the July 11, 2018 and October 25, 2018 HMPC committee meetings, members were asked to complete a survey. Members completed the Local Community Hazard Risk Perspective Survey, rating their level of concern for identified hazards. Stakeholders not present at these two meetings were given an opportunity to participate in the survey. Jeff Ludwig, Emergency Services Planner for Caroline County, met individually with various stakeholders throughout the planning process continually seeking information to include in the plan update. Results of the Local Community Hazard Risk Perspective Survey are provided on Table 3-1.

Table 3-1: Local Community Hazard Risk Perspective Survey Results

Hazard	Types of Events	Level of Concern
Drought & Excessive Heat	Drought, Excessive Heat, & Heat	**Concerned**
Riverine Flooding	Heavy Rain, Flood, & Flash Flood	**Concerned**
Coastal Flood (Tidal) & Storm	Tropical Storms	**Very Concerned**
Thunderstorm & High Wind	Thunderstorm Wind, High Wind, & Lightning	**Concerned**
Tornado	Funnel Cloud & Tornado	**Somewhat Concerned**
Winter Weather & Extreme Cold	Cold/Wind Chill, Extreme Cold/Wind Chill, Blizzard, Frost/Freeze, Heavy Snow, Sleet, Winter Storm, & Winter Weather	**Concerned**
Shoreline Erosion & Sea Level Rise	Shoreline Erosion & Sea Level Rise	**Somewhat Concerned**
Hail	Hail	**Somewhat Concerned**
Epidemics	Epidemics	**Concerned**
Major Fire/Explosion	Major Fire/Explosion	**Somewhat Concerned**
Power Outages	Power Outages	**Somewhat Concerned**

Source: 2019 Hazard Mitigation Planning Committee

Municipal Perspective

In addition to the Local Community Hazard Risk Perspective completed by the HMPC, each municipality was given an opportunity to complete the survey. Municipalities completed the survey from their individual perspective, not a countywide perspective. The top hazards defined by a hazard ranking of "Very Concerned" for each of the incorporated municipalities are listed below.

Table 3-2: Municipal Local Community Hazard Risk Perspective

	Hail	Mass Power Outage	Extreme Heat/ Drought	Thunder Storms & High Wind	Riverine Flooding	Epidemic	Coastal Storm	Wildfire	Major Fire - Hazmat	Winter Weather	Tornado	Soil Movement – Shoreline Erosion
Municipality												
Denton												
Very Concerned									X			
Concerned	X	X	X	X	X		X					X
Federalsburg												
Very Concerned												
Concerned				X	X	X			X			
Goldsboro												
Very Concerned												
Concerned	X	X				X						
Greensboro												
Very Concerned					X		X					
Concerned		X							X			X
Hillsboro												
Very Concerned												
Concerned					X		X		X	X		
Ridgely												
Very Concerned	X	X		X		X	X		X	X	X	
Concerned			X		X							

Templeville												
Very Concerned		X	X	X		X	X				X	
Concerned	X							X	X			X
Henderson												
Very Concerned		X					X					
Concerned												
Preston												
Very Concerned		X					X		X			
Concerned	X		X	X		X		X			X	
Marydel												
Very Concerned		X		X					X			
Concerned												

Source: 2019 Hazard Mitigation Planning Committee

State Perspective

The Maryland Emergency Management Agency (MEMA) published the *2016 Maryland State Hazard Mitigation Plan Update*, a document designed to show the probability and impact of various hazards across the state. As shown on the following table, Caroline County ranked "Medium-High" for the risk of drought; and "Medium" for coastal, flood, thunderstorm, high wind, and winter storm. The county ranked "Medium-Low" for the tornado and wildfire.

The *2016 Maryland State Hazard Mitigation Plan Update* identified hazards that differed from the 2011 Plan in that hazards were categorized and grouped in a new way. MEMA is encouraging local plan revisions to approach classifying hazards in a similar fashion as done in this revised risk assessment. The table below provides an outline of what types of events could fall within the designated Hazard Identification and Risk Assessment (HIRA) hazard categories.

The following hazards were identified and ranked by MEMA for Caroline County in the *2016 Maryland State Hazard Mitigation Plan Update:*

Table 3-3: 2016 State Hazard Ranking

Identified Hazard	Type of Events	State Ranking
Coastal	Coastal Flooding; Coastal Storms; Storm Surge; Hurricane/Tropical Storm; Nor'easter; Sea Level Rise; Shoreline Erosion; Tsunami	**Medium**
Drought	Drought; Extreme Heat	**Medium-High**
Flood	Flood	**Medium**
Thunderstorm	Thunder-storm; Lightning; Hail	**Medium**
Tornado	Tornado	**Medium-Low**
Wildfire	Wildfire; Brush Fire; Conflagration	**Medium-Low**
High Wind	Thunder-storm winds; Non-thunder-storm wind	**Medium**
Winter Storm	Winter Storm; Extreme Cold; Nor'easter (Snowfall)	**Medium**

Source: 2016 State of Maryland Hazard Mitigation Plan

Conclusion

Probability and Impact

The information obtained from available hazard event data pertaining to frequency and probability of future events, their impact, and factors that may affect severity were analyzed. This assessment of probability and impact resulted in the determination of a composite risk score for those hazards were information was available, as shown on the table below.

As part of this Plan update, the local community risk perspective was added. Based on the hazard history and hazard profiles discussed in the following chapters the aforementioned hazards have been ranked as low, medium, or high priority. The hazards that have a high frequency of occurrence and have caused significant damage to the area will be assessed in the following chapters for their vulnerability.

Table 3-4: Natural Hazard Composite Score

HAZARD	Types of Events	Probability & Frequency	Impact Rating	Local Risk Community Perspective	Composite Score
Drought & Excessive Heat	Drought, Excessive Heat, & Heat	**5 (6.14)**	**3**	**3**	**Medium (11)**
Riverine Flooding	Heavy Rain, Flood, & Flash Flood	**5 (3.41)**	**5**	**3**	**High (13)**
Coastal Flood (Tidal) & Storm	Tropical Storms	**1 (0.20)**	**5**	**4**	**Medium (10)**
Thunderstorm & High Wind	Thunderstorm Wind, High Wind, & Lightning	**4 (1.65)**	**3**	**3**	**Medium (10)**
Tornado	Funnel Cloud & Tornado	**1 (0.11)**	**5**	**2**	**Medium (8)**
Winter Weather & Extreme Cold	Cold/Wind Chill, Extreme Cold/Wind Chill, Blizzard, Frost/Freeze, Heavy Snow, Sleet, Winter Storm, & Winter Weather	**5 (6.5)**	**3**	**3**	**Medium (11)**
Hail	Hail	**2 (0.56)**	**3**	**2**	**Low (7)**

***Composite Scores: 12-15 **High**; 8-11 **Medium**; 1-7 **Low**

***Probability & Frequency**
The events per year risk rating were determined by calculating the average number of occurrences per year and assigning the corresponding risk rating as follows:
0-0.49 events per year = 1
0.5-0.99 events per year = 2
1.0-1.49 events per year = 3
1.5-1.99 events per year = 4
2.0 + events per year = 5

***Impact Rating**
The impact rating was determined by the potential damage and losses that would result from each hazard event.
1 = Low Impact
3 = Medium Impact
5 = High Impact

***Local Risk Community Perspective**
Very Concerned = 4
Concerned = 3
Somewhat Concerned = 2
Not Concerned = 1

Chapter 4: Riverine Flooding

Flooding Hazard Characterization

The FEMA definition for flooding is "a general condition of partial or complete inundation of normally dry land areas from the overflow of inland or tidal waters or the rapid accumulation of runoff of surface waters from any source". Floods can be caused by the passage of thunderstorms, hurricanes, snow melt or some combination of the above events.

The State of Maryland is subject to three types of flooding:

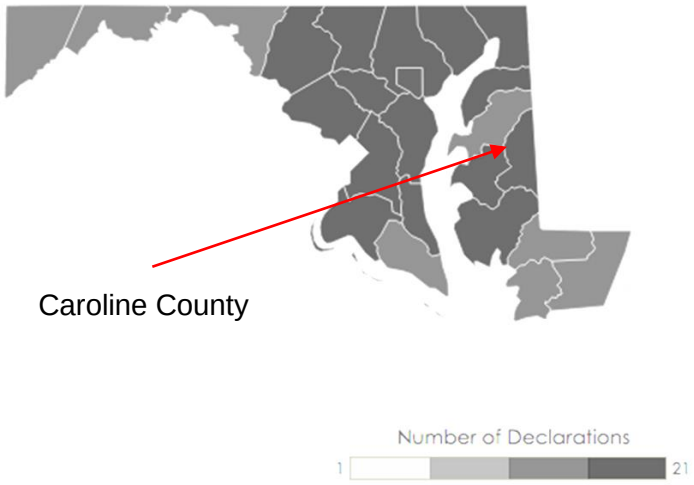
- Nontidal – flooding from rivers and streams (riverine flooding).
- Tidal – flooding from tides and storm surges (discussed in Ch.5: Coastal Flood and Storms).
- Coastal – tidal flooding combined with wave action (discussed in Ch.5: Coastal Flood and Storms).

There are two different types of flooding that are associated with rivers and streams: flash flooding and riverine flooding. Flash flooding occurs from the combination of rainfall intensity and duration. Typically, the determining characteristics that can induce a flash flood include high rainfall intensity over a short time duration. Flash floods can be further influenced by local topography, the ground's capacity to hold water and soil moisture content. The sudden release of water can also cause flash floods, such as the breakup of an ice jam or dam. One of the deadliest flash floods in Maryland killed 14 people. The flood occurred in eastern Baltimore County when 11 inches of rain fell in a 10-hour time span on August 1-2, 1971.

Riverine flooding is caused by persistent moderate or heavy rain over one or more days. Remnants of hurricanes can also cause riverine flooding. Riverine flooding can be combined with snowmelt, causing a river to slowly rise and overflow its banks. This type of flooding can take several days or even weeks to rise out over its banks, which typically provides adequate warning for people to move to higher ground.

Thirty-two disaster declarations have occurred in Maryland since 1953. The flood hazard accounts for more declarations in Maryland than any other hazard. As shown on the graphic below, Caroline County is shaded in the dark grey indicating that the county has a high number of declarations relative to other Maryland jurisdictions. In fact, the county has been included in eighteen of Maryland's Disaster Declarations.

Figure 4-1: Disaster Declaration for Maryland Jurisdictions



Source: https://www.fema.gov/data-visualization-disaster-declarations-states-and-counties

Flooding is the most common type of natural disaster worldwide about 40% of all-natural disasters involve flooding.

Flooding Facts

•75% of all Presidential disaster declarations are associated with flooding.
•Homeowners Insurance typical does not include flood related damage. This means you need a separate flood insurance quote and policy in addition to your homeowner insurance policy.
•It may take up to 30 days for your flood insurance policy to take effect.
•In a 30-year mortgage, a home has a 26% chance of being damaged by a flood compared to a 9% chance of fire.
•Only 12% of U.S. homeowners have flood insurance, according to a 2016 poll conducted by the Insurance Information Institute.

Source: nationalfloodinsurance.org/flood-fact

According to the *2010 Caroline County Comprehensive Plan*, Caroline County is located within six State-designated 8-digit watersheds: Upper Choptank River, Tuckahoe Creek, Marshyhope Creek, Lower Choptank River, Nanticoke River, and Upper Chester River. Almost 96 percent of the County is located with the Upper Choptank River, Tuckahoe Creek and Marshyhope Creek watersheds. The Upper Choptank River, Tuckahoe Creek and Marshyhope Creek watersheds together occupy nearly the entire County. Only about 0.1 percent of Caroline County lies within the Upper Chester River and Nanticoke River watersheds and only four percent in the Lower Choptank River.

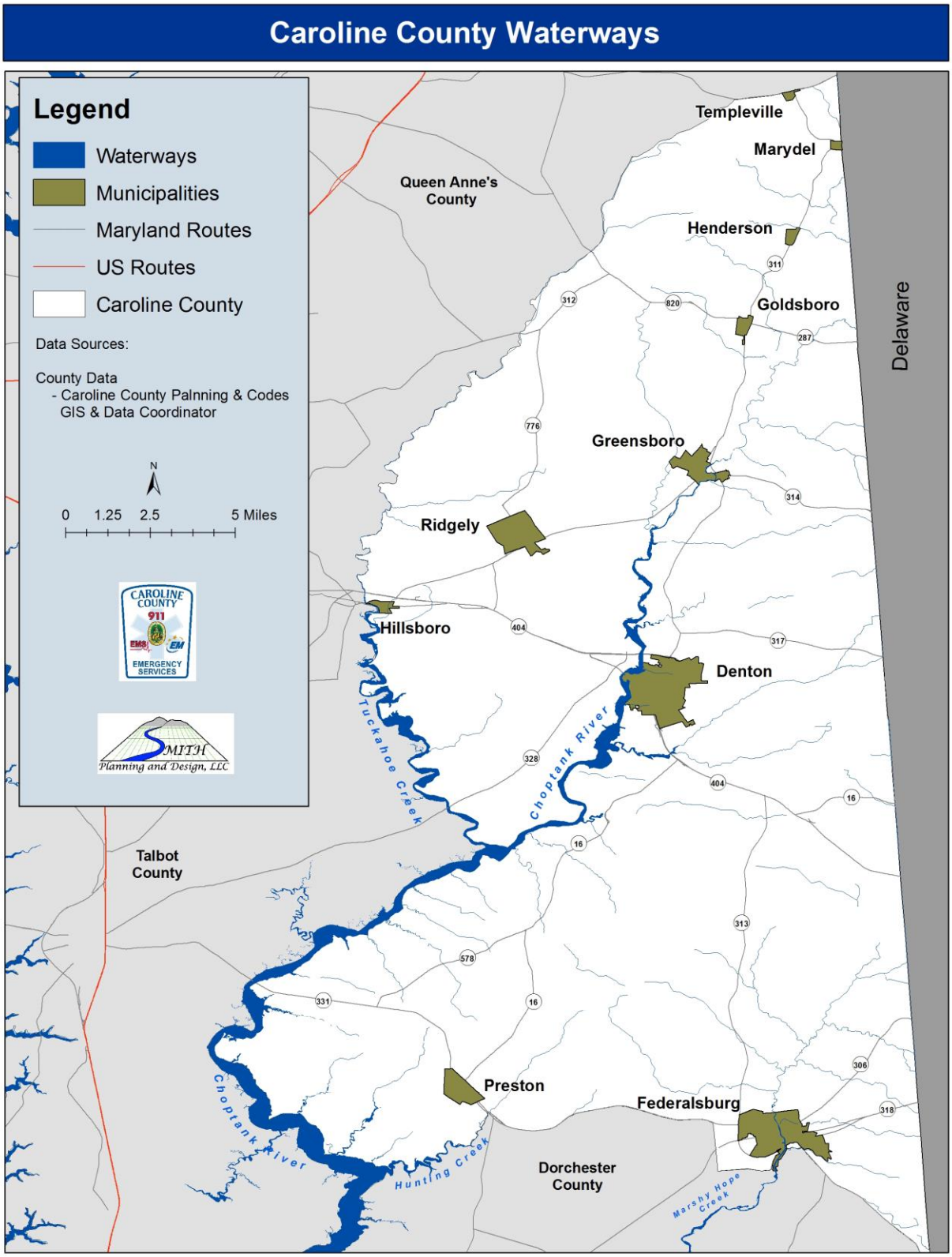
The county encompasses an area of 326 square miles, 4 square miles of which is water. The Choptank River flows through Caroline County and drains into the Chesapeake Bay. Tuckahoe Creek and Hunting Creek, the main tributaries of the Choptank River, form part of the county's western and southern boundaries. A small area in the southeastern part of the county is drained by Marshy Hope Creek, one of the main tributaries of the Nanticoke River, depicted on Map 4.1.

Most of the county lies on a gently upward-sloping plain at an elevation of 40 to 60 feet. In the northern part of Caroline County, the elevation reaches 78 feet. However, the slope of the land seldom exceeds 5 percent and less than 2 percent of the total land area has slopes over 10 percent. The terrace plains on which Caroline County lies are dissected by numerous streams and rivers. In the headlands, the streams are generally straight. In the lower reaches, many streams exhibit meanders. The meanders are found in streams at or below an elevation of 20 feet. At tide level, these streams become meandering estuaries.

Agricultural drainage ditches are also an important part of the waterway system in Caroline County. These ditches are necessary in order to create useable farmland in the County due to the overall drainage in the county tends to be slow, owing to the generally level or gently sloping relief of the land, numerous depressions, and also because the main rivers are tidal streams.

According to the 2015 FEMA Flood Insurance Study drainage characteristics in Caroline County are such that flood conditions are produced by high-intensity rainfall and by storm tides. The flat topography of the county, combined with its humid climate, high seasonal water tables, and generally poorly-drained soils, produce natural flood problems, such as the control and disposal of surface water caused by abnormally high rainfall and conveyance issues.

Map 4-1: Waterways



Flooding Hazard Risk & History

Based on local experience, riverine flooding is ranked as concerned, according to the 2019 Hazard Mitigation Planning Committee (HMPC), due to the potential loss of life and severe property damage inherent with flooding of roadways and bridges in the County. Local climatic conditions can produce large amounts of precipitation at any time of the year, creating no limit to the potential of flooding to any time of year. On June 26, 2006, the worst recorded flooding in the County occurred causing five million dollars in damage. In addition, on August 25, 2011 then Maryland Governor Martin O'Malley declared a state of emergency in preparation for Hurricane Irene. In Caroline County, sections of Maryland State Routes 287, 313, 31 and 311 were among twenty roadways that were closed. Two dozen homes were damaged by the flooding and wind. About 5,500 homes and businesses lost power.

The towns of Denton and Greensboro are located along the floodplain of the Choptank River, while Hillsboro is located on Tuckahoe Creek and Federalsburg is located on Marshyhope Creek.

The following tables list flash flooding, heavy rain events, and flooding that has occurred in the County based on data from the National Centers for Environmental Information.

Heavy Rain Events – 1996-2017				
# Of Events	**Injuries**	**Deaths**	**Damages**	**Frequency**
50	**0**	**0**	**0**	**2.27**

Source: National Centers for Environmental Information (NCEI), Events through April 2018

Table 4-1: Heavy Rain Events

Location	Date	Event Narrative
Countywide	July 12, 1996 to July 13, 1996	Tropical Storm Bertha passed through Southeast Maryland the morning of the 13th. The strongest winds remained near the shore, but wind gusts did become strong enough to take down tree branches across the Eastern Shore. Storm totals averaged between 3 and 5 inches. Most of the rain fell during a twelve to eighteen-hour period, there was some urban and poor drainage flooding, but no major problems.
Countywide	August 12, 1996 to August 13, 1996	Storm totals averaged 2 to 3 inches, but since this was spaced over 24 hours, flooding was generally confined to poor drainage locations.
Countywide	October 8, 1996	Heavy rain associated with the remnants of Tropical Storm Josephine affected the Maryland Eastern Shore primarily during the daylight hours on the 8th. Peak wind gusts reached between 30 and 40 mph in most areas. While the heavy rain did cause the usual poor drainage flooding, recent dry weather and foliage still on the trees prevented further flooding. The wind gusts did pull down some small limbs. Storm totals included 2.40 inches in Federalsburg, 1.90 inches in Newark, Delaware and 0.87 inches in Conowingo.
Countywide	October 18, 1996	N/A
Countywide	December 12, 1996	A slow-moving low-pressure system moved from the central Ohio Valley the morning of the 12th to Williamsburg Virginia the morning of the 13th to about 100 miles east of Fenwick Island Delaware the morning of the 14th and then drifted southeast to about 275 miles southeast of Fenwick Island Delaware the morning of the 15th. This produced about 48 hours of continuous rain from the evening of the 12th through the evening of the 14th. Rain became heavy at times during the night of the 13th. Storm totals averaged between two and three inches. Since the rain was spread over an extended period, only some urban and poor drainage flooding occurred. Precipitation totals included 3.76 inches at Newark Delaware, 2.85 inches at the Baltimore-Washington International Airport and 1.86 inches at Salisbury.
Countywide	December 31, 1996	December 1996 was one of the wettest Decembers on record for the Maryland Eastern Shore. Rainfall amounts were three to five inches above normal.
Countywide	May 25, 1997 to May 26, 1997	Storm totals averaged 1.5 to 2.5 inches, with some locally lower amounts.
Countywide	August 20, 1997	Storm totals averaged between 5 to 8 inches across Caroline County.
Countywide	January 23, 1998	Storm totals averaged between 1.25 inches and 2.25 inches across the Maryland Eastern Shore.
Countywide	January 28, 1998	Storm totals ranged from around 3.5 inches in southern parts of Caroline County. In Caroline County most roads were littered with tree limbs.

Countywide	February 4, 1998 to February 5, 1998	In Caroline County, along tidal sections of the Choptank River, a couple of roads were closed on the 5th.
Countywide	February 23, 1998	Storm totals included 2.40 inches in Federalsburg.
Countywide	March 8, 1998 to March 9, 1998	Storm precipitation totals included 1.50 inches in Federalsburg.
Countywide	March 31, 1998	Continuing a trend that has persisted all year long, March 1998 was unseasonably wet across the Delmarva Peninsula. Monthly precipitation totals on a county weighted average were between 5.2 and 6.3 inches, a departure of about 2.0 to 2.5 inches above normal.
Countywide	May 8, 1998	A series of low-pressure systems that passed through the Middle Atlantic States and then stalled offshore gave the Maryland Eastern Shore nearly five days of continuous rain from when it started early in the morning on Friday the 8th until it exited the state from north to south on Tuesday the 12th. Storm totals averaged between 2.0 to 3.0 inches. Storm totals included 3.09 inches in Conowingo (Cecil County), 2.80 inches in Salisbury, 2.14 inches at the Baltimore -Washington International Airport and 2.00 inches in Federalsburg (Caroline County).
Countywide	October 8, 1998	The storm total in Federalsburg was 3.1 inches.
Countywide	January 3, 1999	Doppler Radar storm total estimates for the entire event averaged between 1.0 and 2.0 inches across the Maryland Eastern Shore.
Countywide	January 15, 1999	There was some poor drainage flooding, but no serious problems were reported. The storm total in Federalsburg was 2.1 inches.
Countywide	January 31, 1999	January 1999 finally broke a string of unseasonably dry months that prevailed during the second half of 1998. Along the Eastern Shore, January monthly precipitation totals averaged around 200% of normal. On a county weighted average, precipitation monthly totals ranged from 5.8 inches in Kent County to 6.8 inches in Caroline County and was about 3 inches above normal.
Countywide	March 21, 1999 to March 22, 1999	No serious flooding or damage was reported. Storm totals included 1.5 inches in Federalsburg.
Central Portion	July 22, 1999	Storm totals included 3.08 inches in Denton.
Countywide	August 25, 1999	A warm front that slowly moved through the Eastern Shore during the evening of the 25th helped trigger thunderstorms with heavy rain. Radar estimated storm totals ranged from one to three inches.
Countywide	September 30, 1999	Courtesy of Hurricane Floyd, September 1999 went down as one of the wettest Septembers on record. In the state of Maryland, the statewide monthly average rainfall of 9.02 inches was the third wettest September on record since 1895. Monthly county weighted rainfall amounts averaged even higher along the Eastern Shore, all in the double digits.
Countywide	December 13, 1999 to December 14, 1999	Storm totals included 1.20 inches in Federalsburg (Caroline County).
Countywide	March 21, 2000 to March 22, 2000	Storm totals included 3.6 inches in Federalsburg (Caroline County).
Federalsburg	June 27, 2000	Thunderstorms dropped heavy rain across southern Caroline County during the late afternoon of the 27th. Storm totals averaged between 1 and 3 inches and caused considerable poor drainage flooding. No serious injuries were reported. The storm total from Federalsburg was 2.80 inches.
Countywide	September 30, 2000	September 2000 continued the trend of unseasonably wet weather for the Maryland Eastern Shore. On a county weighted average, September monthly rainfall totals were all above average and ranged from 4.9 inches in Cecil County to 6.7 inches in Caroline County. Normal monthly rainfall is around 3.7 inches.
Countywide	September 25, 2000 to September 26, 2000	Storm totals included 3.20 inches in Federalsburg (Caroline County).
Countywide	March 21, 2001	Storm totals included 2.20 inches in Federalsburg (Caroline County).
Countywide	May 25, 2001 to May 26, 2001	Storm totals included 2.5 inches in Federalsburg (Caroline County).
Countywide	October 10, 2002 to October 11, 2002	Two-day storm totals were 3.90 inches in Federalsburg (Caroline County).
Countywide	February 22, 2003	Storm totals included 1.50 inches in Federalsburg (Caroline County).
Countywide	May 16, 2003	Storm totals included 3.40 inches in Federalsburg (Caroline County).
Countywide	June 20, 2003	Storm totals included 1.60 inches in Federalsburg (Caroline County).
Countywide	September 18, 2003	Storm totals included 3.40 inches in Federalsburg (Caroline County), 3.13 inches in Denton (Caroline County).
Countywide	February 6, 2004	Storm totals included 1.20 inches in Federalsburg (Caroline County).
Countywide	April 12, 2004 to April 13, 2004	Specific storm totals included 2.50 inches in Federalsburg (Caroline County)
Countywide	May 20, 2005	Specific storm totals included 4.30 inches in Federalsburg (Caroline County).

Countywide	October 7, 2005 to October 8, 2005	Remnants of Tropical Storm Tammy produced very heavy rain across the Maryland Eastern Shore from the late evening on the 7th into the afternoon of the 8th. Doppler Radar storm total estimates averaged between three and six inches with the highest amounts in Caroline County.
Federalsburg	March 16, 2007	Precipitation storm totals included 3.00 inches in Federalsburg (Caroline County).
Federalsburg	April 15, 2007 to April 16, 2007	The gusty northwest winds on Monday the 16th caused scattered power outages for both Delmarva Power and Choptank Electric Cooperative. Storm totals included 5.63 inches in American Corner (Caroline County), 3.80 inches in Federalsburg (Caroline County).
Denton & Greensboro	December 11, 2008 to December 12, 2008	Event precipitation totals included 3.16 inches in Greensboro and 3.12 inches in Denton.
Choptank	November 12, 2009 to November 13, 2009	Event precipitation totals included 2.99 inches in Denton (Caroline County), 2.90 inches in Greensboro (Caroline County)
2019 HMP Update		
Mt. Zion	March 13, 2010	Event precipitation totals included 3.47 inches in Greensboro and 3.03 inches in Denton.
Hillsboro	September 19, 2016	The remnants of tropical storm Julia and a frontal boundary interacted leading to several rounds of rainfall over the region. Two three quarters of an inch of rainfall was measured.
Greensboro	September 19, 2016	The remnants of tropical storm Julia and a frontal boundary interacted leading to several rounds of rainfall over the region. Over five and a half inches of rain was measured with 4 inches in two hours.
American Corners	September 19, 2016	The remnants of tropical storm Julia and a frontal boundary interacted leading to several rounds of rainfall over the region. Just over 5 inches of rain was measured with 4 inches in 3 hours.
Williston	September 19, 2016	The remnants of tropical storm Julia and a frontal boundary interacted leading to several rounds of rainfall over the region. Three and a half inches of rain fell in 90 minutes.
Greensboro	September 29, 2016	A slow-moving frontal boundary coupled with tropical moisture advecting northward ahead of the front led to rounds of heavy showers in Maryland from the 27th into the next couple of days. Several occurrences of both nuisance and flash flooding were also reported. Three inches of rain fell.
Federalsburg	September 29, 2016	A slow-moving frontal boundary coupled with tropical moisture advecting northward ahead of the front led to rounds of heavy showers in Maryland from the 27th into the next couple of days. Several occurrences of both nuisance and flash flooding were also reported. Four and a half inches of rain fell.

Source: National Centers for Environmental Information (NCEI), Events through April 2018

In terms of number of occurrences, the NCEI listed a total of 50 heavy rainfall events affecting Caroline County from 1996-2017. Therefore, Caroline County experiences 2.27 heavy rainfall events per year.

Flood Events– 2006-2017				
# Of Events	**Injuries**	**Deaths**	**Damages**	**Frequency**
7	0	0	1.050M	0.58

Source: National Centers for Environmental Information (NCEI), Events through April 2018

Table 4-2: Flood Events

Location	Date	Event Narrative	Property Damage
Countywide	September 1, 2006	The combination of the remnants of Tropical Storm Ernnesto and a large high-pressure system over eastern Canada produced heavy rain and strong winds along the Maryland Eastern Shore. Actual storm totals included 5.50 inches in American Corner (Caroline County), 4.90 inches in Federalsburg (Caroline County),	Not Available
Hillsboro	December 9, 2009 to December 10, 2009	The heavy rain caused flooding along the three main waterways in Caroline County and forced traveling detours into the 10th. The Tuckahoe Creek flooded near Maryland State Route 404 in Queen Anne and Hillsboro. In Federalsburg, flooding along the Marshy Hope Creek flooded the marina and park. Sheds, outbuildings and fields were flooded. Roadways were also closed in Ridgely and Denton. Event precipitation totals included 2.80 inches in Federalsburg, 2.59 inches in Denton and 2.58 inches in Greensboro.	Not Available
2019 HMP Update			

Dessard	August 28, 2011	In Caroline County, about two dozen homes and businesses were damaged by flooding and wind. Flooding occurred along the Choptank River in Greensboro. Flooding also occurred along the Marshyhope Creek in Federalsburg. Flooding rains forced the closure of sections of Maryland State Routes 313, 619, 314 and 480. In all the combination of wind and flooding rain closed twenty roadways in the county. Auction Road near Harmony was hardest hit and took weeks to re-open. Event rainfall totals included 11.68 inches in Denton, 10.50 inches in Hickman and 9.58 inches in Greensboro.	250.00K
Choptank	October 29, 2012	The heavy rain that fell across Caroline County not only caused poor drainage flooding but exacerbated the tidal flooding along the Chesapeake Bay. Event precipitation totals included 10.55 inches in American Corner, 9.93 inches in Greensboro and 8.93 inches in Denton.	800.00K
Newton	May 2, 2016	High water was reported near Rabbit Hill Rd and Route 309.	Not Available
Denton	May, 2016	Heavy rain from thunderstorms resulted in some high water on roadways with no road closures.	Not Available
Choptank	September 29, 2016	Intersection of Waterstreet and Choptank roads closed due to flooding.	Not Available

Source: National Centers for Environmental Information (NCEI), Events through April 2018

In terms of number of occurrences, the *NCEI* listed a total of 7 flood events affecting Caroline County from 1996-2017. Therefore, Caroline County experiences 0.58 flood events per year.

As reported in the Star Democrat Newspaper, the following are recent flooding events:

- June 2006 – *Flooding* – residents who suffered flood damage are eligible for federal assistance.

- September 3, 2006 –*Remnants of Hurricane Ernesto* – Steady rain all day resulted in flooding that evening during high tide. Wind gusts in Denton averaged between 20 and 25 mph with gusts up to 43 mph. A total of 3.5 inches of rain were measured at Denton.

Photo by Clay Owens

Alexander Sullivan of Ridgely excitedly points to where Ofc. Kenneth Carroll of the Ridgely Police Department has part of Central Avenue blocked to traffic. Police had the road blocked between Third and Fourth streets due to flooding from Tuesday afternoon's storm and an overhead power wire being knocked loose. Crews from Choptank Electric Cooperative repaired the wire, which did not cause any major damage.

Source: Star Democrat

- April 24, 2006 - *Heavy Rains* - Part of Caroline County, near Denton received more than a couple inches of rain.

- November 16, 2006 - *Heavy Rains* – Afterschool activities were canceled.

- December 8, 2009 – Flooding - 2.95 inches of rain were recorded at American Corner. All four lanes in both directions on Route 619 at Shore Highway closed. Corkell Road in Denton and Crouse Mill Road in Ridgely were closed. Three school buses in the county were forced to take detours around 3 closed roads.

- July 12, 2017 – *Street Flooding* – Parts of Central Avenue blocked to traffic and road blocked between Third and Fourth Streets due to flooding and overhead power wire being knocked loose. Photo shown to the left.

Flash Flood Events– 1996-2017				
# Of Events	**Injuries**	**Deaths**	**Damages**	**Frequency**
18	1	0	8.370M	0.82

Source: National Centers for Environmental Information (NCEI), Events through April 2018

Table 4-3: Flash Flooding Events

Location	Date	Event Narrative	Property Damage
Western	June 20, 1996	N/A	Not Available
Countywide	September 16, 1999 to September 17, 1999	In Caroline County, towns near rivers (Denton, Federalsburg, Greensboro and Hillsboro) bore the brunt of the damage. Six roads and thirty bridges were in need of repairs. About 20 people were in shelters throughout the county. A dam break near Harmony closed Maryland State Route 16. Other dam failures or spillovers occurred on Lake Bonnie near Goldsboro, Crouse Mill in Tuckahoe State Park and Chambers Lake near Federalsburg. Three schools suffered water damage. Large pieces of roadways collapsed on Maryland State Route 480 and Second Street in Denton. Infrastructure damage alone was estimated as high as 2.5 million.	$3.25Million
West Portion	July 15, 2000	Doppler Radar Storm total estimates reached between 3 and 4 inches around western Caroline County. Storm totals included 2.7 inches in Federalsburg (Caroline County).	Not Available
Countywide	June 17, 2001	Showers and thunderstorms associated with the remnants of Tropical Storm Allison dropped heavy rain across Caroline County during the early morning of the 17th. The heavy rain caused flash flooding of streams as well as damage to crops in the county. Forty-one roads had washouts and eleven roads were closed. Three roads remained closed into the start of the work week (the 18th) and one bridge needed to be inspected for possible damage. Five percent of the agricultural land within the county was damaged by the flooding. No serious injuries were reported. Storm totals included 7.50 inches in Denton, 5.80 inches in American Corner and 4.80 inches in Federalsburg. The remnants of Allison had lesser effect elsewhere across the Maryland Eastern Shore, where Doppler Radar storm total estimates were mainly between one and two inches.	$10K
Southern Portion	August 11, 2001	Doppler Radar storm total estimates reached between 3 and 5 inches across southern Caroline County. Along the Caroline and Talbot County border, Maryland State Route 328 was flooded near the Tuckahoe Creek. Federalsburg (Caroline County) reported 3.50 inches of rain.	Not Available
Southern Portion	June 25, 2006	Repeating thunderstorms with torrential downpours dropped up to around one foot of rain across southern parts of Caroline County. This caused extensive roadway, field and stream flooding. Hardest hit was Federalsburg where 11.5 inches of rain fell. An emergency was declared the morning of the 25th. About 40 people were evacuated along the Marshyhope Creek where the worst flooding occurred. President George W. Bush declared Caroline and County a disaster area.	5 Million
Northeast Portion	June 26, 2006	Slow moving thunderstorms with heavy rain caused roadway, low lying area and creek flooding mainly in the eastern parts of Caroline County. Doppler Radar storm total estimates averaged between two and five inches for the day. A Skywarn spotter reported 4.61 inches of rain for the calendar day in Denton (Caroline County).	Not Available
Ridgely	August 25, 2007 to August 26, 2007	Thunderstorms with torrential downpours caused flooding of smaller streams, fields and poor drainage areas in west central Caroline County. Doppler Radar storm total estimates were 3 to 5 inches.	Not Available
Baltimore Corner	August 22, 2009	Torrential downpours from nearly stationary thunderstorms caused major damage to several roads and properties in Ridgely, Greensboro and Goldsboro in Caroline County. A rainfall measurement from Ridgely came in with a storm total of 9.55 inches of rain. In Ridgely, seven roads including Maryland State Road 480 were closed due to flooding and three (Central Avenue, Holly Road and Peaviner Road) of them are	$110,00

		expected to be closed for a while due to roadway damage.	
Ridgely	August 22, 2009	Thunderstorms with torrential downpours rapidly caused flash flooding of smaller streams and roadways in central Caroline County. Event precipitation totals included 13.13 inches in Ridgely and 6.65 inches in Denton.	Not Available
Denton	August 28, 2009	Thunderstorms with heavy downpours caused flash flooding within the Choptank River Basin in Caroline County. A couple of roadways were closed in Ridgely and also between Ridgely and Denton.	Not Available
2019 HMP Update			
Marydel	August 27, 2011 to August 28, 2011	Hurricane Irene produced heavy flooding rain, tropical storm force wind gusts and caused one wind related death across the Eastern Shore. Tropical storm force wind gusts overspread the Eastern Shore during the afternoon and early evening of the 27th and persisted into the afternoon of the 28th. Peak wind gusts averaged 50 to 60 mph. The strongest winds associated with Irene occurred at two distinct times. The first surge occurred during bands of heavier rain during the evening and late night of the 27th. The second peak occurred during the late morning and early afternoon of the 28th when skies were clearing, and deeper mixing of the atmosphere brought stronger winds to the ground. The rain associated with Irene overspread the Eastern Shore between 7 a.m. EDT and Noon EDT on the 27th, fell at its heaviest from the late afternoon of the 27th into the early morning of the 28th and ended around Noon EDT on the 28th. Event precipitation totals averaged 6 to 12 inches and caused widespread field and roadway flooding. Because the flash flooding and flooding blended into one, all flooding related county entries were combined into one under flood events. On August 25, Maryland Governor Martin O'Malley declared a state of emergency in preparation for Irene. In Caroline County, sections of Maryland State Routes 287, 313, 31 and 311 were among twenty roadways that were closed. Two dozen homes were damaged by the flooding and wind. About 5,500 homes and businesses lost power.	Not Available
Harmony	August 26, 2012	Thunderstorms with torrential downpours caused flash flooding in western Caroline County. Doppler Radar storm total estimates were around 8 inches.	Not Available
Harmony	August 26, 2012	Thunderstorms with torrential downpours caused small stream and drainage flash flooding in northern Caroline County. Doppler Radar storm total estimates were around 7 inches. Event precipitation totals included 5.30 inches in Denton.	Not Available
Dessard	September 2, 2012	Thunderstorms with torrential downpours caused flash flooding in Federalsburg. A few roadways were flooded and closed.	Not Available
Mt Zion	June 7, 2013	Heavy rain caused flash flooding along several roadways and along small streams in Caroline County from the late afternoon through the night of the 7th. High water led to several road closures near Denton; including River Road, the intersection of New Bridge Road and Saulsbury Road, and the intersection of Burrsville Road and Baker Road. A section of Sunset Boulevard in Ridgely and a stretch of American Corner Road in Harmony were also closed for a time due to flooding. In addition, four trees were downed in the county due to the combination of heavy rain and saturated ground. The locations for the downed trees are as follows: County Farm Road near Denton, the intersection of Craft Road and Seaman Road in Preston, and the intersection of Jarrell Road and Drapers Mill Road in Goldsboro. Event precipitation totals included 5.52 inches in Denton, 5.18 inches in Greensboro, 5.05 inches in Hillsboro, and 2.78 inches in Newton.	Not Available
Hillsboro	July 12, 2013	Thunderstorms with torrential downpours caused flash flooding of creeks and roadways in southwestern Caroline County near the Tuckahoe River. Event precipitation totals included 3.42 inches in Henderson, 2.66 inches in Greensboro and 1.80 inches in Federalsburg. Doppler Radar storm total estimates reached 4 inches in the heaviest band in the county.	Not Available
Denton	September 29, 2016	Three to five inches of rain fell mostly in a short duration. Flooding closed River landing road.	Not Available

Source: National Centers for Environmental Information (NCEI), Events through April 2018

In terms of number of occurrences, the *NCEI* listed a total of 18 flash flood events affecting Caroline County from 1999-2017. Therefore, Caroline County experiences 0.82 flash flood events per year.

Flooding Vulnerability

Drainage characteristics in Caroline County are such that flood conditions are produced by high-intensity rainfall and by storm tides. The flat topography of the county, combined with its humid climate, high seasonal water tables, and generally poorly-drained soils, produce natural flood problems, such as the conveyance, control and disposal of surface water caused by abnormally high rainfall.

The most recent FEMA Flood Insurance Study (FIS) and associated Digital Flood Insurance Rate Maps (DFIRM's) became effective on January 16, 2015. The FIS includes:

- Caroline County (Unincorporated Areas);
- Town of Denton;
- Town of Federalsburg- *Please note, that the Town of Federalsburg is geographically located in Caroline and Dorchester Counties;*
- Town of Goldsboro;
- Town of Greensboro;
- Town of Henderson;
- Town of Hillsboro;
- Town of Marydel;
- Town of Preston;
- Town of Ridgely; and
- Town of Templeville- *Please note, that the Town of Templeville is geographically located in Queen Anne's and Caroline Counties.*

Please note that on the effective date of this study, the Towns of Henderson, Marydel, Preston, Ridgeley, and Templeville have no mapped Special Flood Hazard Areas (SFHA). This does not preclude future determinations of SFHAs that could be necessitated by changed conditions affecting the community (i.e. annexation of new lands) or the availability of new scientific or technical data about flood hazards.

Flooding sources studied within the FIS included:

- Broadway Branch;
- Marshy Hope Creek;
- Chapel Branch;
- Miles Branch;
- Choptank River;
- Smithville Ditch;
- Henderson Creek;
- Tanyard Branch;
- Herring Run;
- Tidy Island Creek;
- Hunting Creek; and
- Watts Creek.

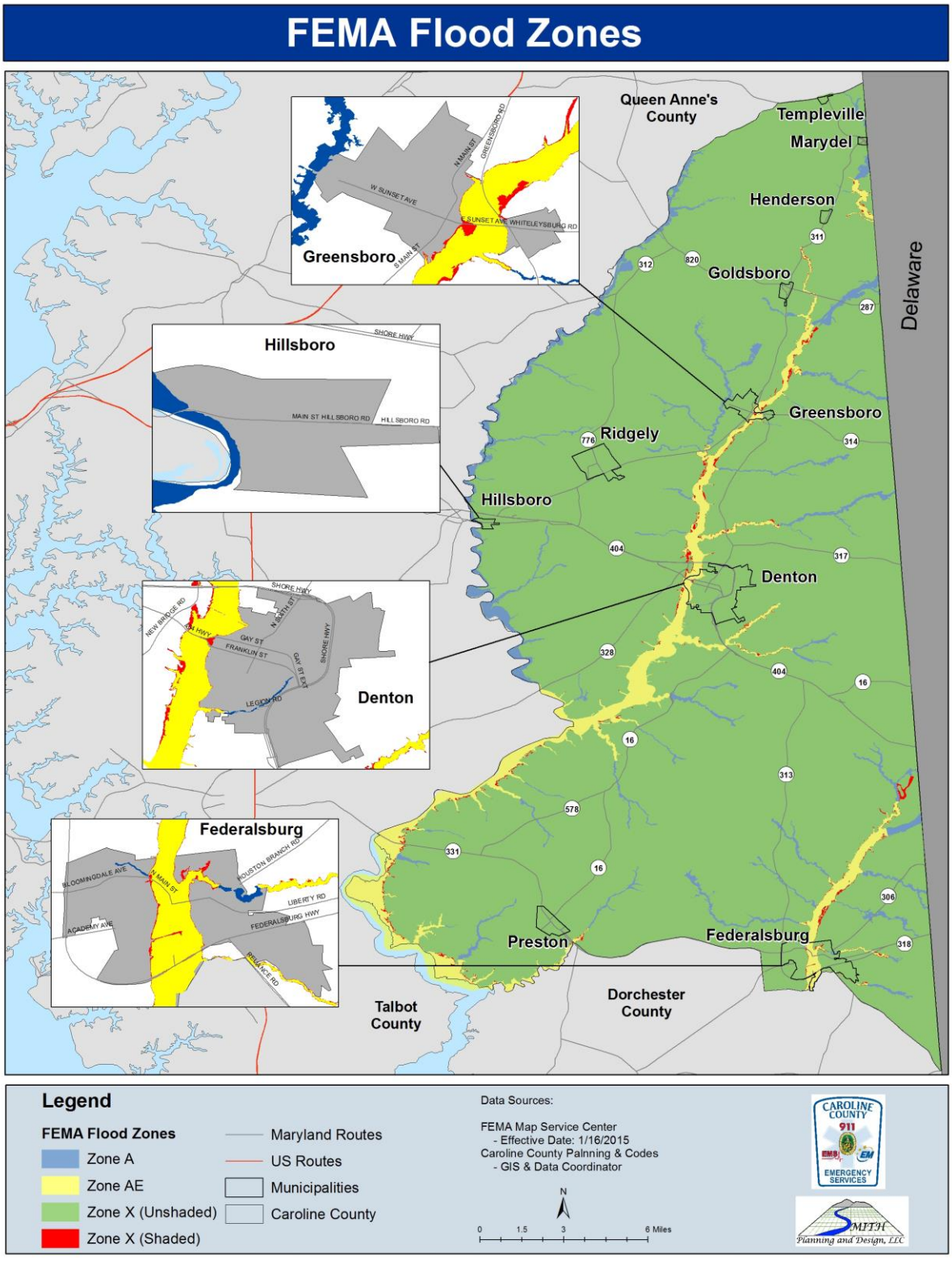
Flood zones are the geographic areas that FEMA has defined according to their varying levels of flood risk. The flood zones for Caroline County are described in Table 4-4 and depicted on Map 4-2: Flood Zones.

Table 4-4: Flood Zone Descriptions

Flood Zone	Description
High Risk Areas	
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	The base floodplain where base flood elevations are provided. AE Zones are now used on new format FIRMs instead of A1-A30 Zones.
Moderate Risk Areas	
X (Shaded) 0.2% or 500 yr.	Moderate flood area(s), shaded area(s) shown on FIRM, are the areas between the limits of the base flood and the 0.2-percent-annual-chance (or 500-year) flood.
Minimum Risk Areas	
X (Un-shaded)	The areas of minimal flood hazard, which are areas outside the SFHA and higher than the elevation of the 0.2 percent-annual-chance flood, are labeled Zone X (un-shaded).

Source: FEMA

Map 4-2: FEMA Flood Zones



According to the 2015 FEMA Flood Insurance Study (FIS), The Choptank River floodplain located in the city limits of Denton and Greensboro is too swampy for most types of development. Although there is some residential development in the flood plain, the majority has generally been above the higher flood levels. Anticipated development is expected to continue at a slow rate. It will probably not occur in the floodplain areas since suitable land for development is available elsewhere.

The Town of Denton located on the Maryland eastern shore in Caroline County lies at the intersection of Maryland Route 404 and the Choptank River. The town is situated on the east bank of the Choptank River with the river forming a common boundary between the town and Caroline County. At Denton, the Choptank River drains an area of approximately 200 square miles, most of which lies within Caroline County. The Choptank River is also influenced by tides from the Chesapeake Bay as far upstream as Greensboro, Maryland. At Denton, the tidal range for the Choptank River is approximately 2.2 feet for the mean tide and 2.5 feet for the spring tide.

The principal source of flooding in the Town of Denton is the Choptank River. The flood elevations of the river are influenced by the magnitude of flood flows from the drainage basins in Caroline County, upstream from Denton and the tide levels in the Chesapeake Bay. High intensity rainfall over prolonged periods and storm tides on the Chesapeake both singly and in combination have led to flood elevations on the Choptank River which have inundated the low-lying river banks in the Denton vicinity. In areas of flat topography and poorly drained soils, high intensity rainfall has led to local flooding problems.

The Town of Federalsburg, Maryland, is located in the eastern part of the state, near the Delaware border and adjacent to the border between Caroline and Dorchester Counties. Marshy Hope Creek flows through Federalsburg, with approximately 148 square miles of its 218 square mile watershed contributing at that point. The principal flooding source in the Town of Federalsburg is Marshy Hope Creek. The drainage area characteristics of Marshy Hope Creek are such that flood conditions are produced by high intensity rainfall. Floodwater damages and problems related to agricultural water management occur in the same areas due to the flatness of the watershed and the extent of poorly drained soils. Floodwater problems include the conveyance, control, and disposal of surface water caused by abnormally high direct precipitation. Drainage problems occur where, under natural conditions, excess water keeps the soil too wet for sustained agricultural use. Land owners in the watershed have experienced complete crop losses in large areas during seasons with heavy rains, occurring approximately once every five years. Flooding occurs most often in the late summer and early autumn. Large portions of the business district of Federalsburg lie on the west bank of the floodplain subject to storm overflow.

The Town of Greensboro lies in the Atlantic Coastal Plain Province. The majority of the town lies above an elevation of 20 feet on a flat terrace plain. Two small areas of the town lie above the 40-foot elevation. Low elevations of two to three feet can be found in the swampy region in the southern sectors of the town near Sunset Avenue the overbank elevations are generally higher with a minimum elevation of six to seven feet. Near Park and Riverview Lane which separate the areas of higher 20 feet elevations in the west from the lower areas near the Choptank River the land slopes toward the Choptank River with gradients in the order of 5 to 10 percent. The Choptank

River is influenced by tides from the Chesapeake Bay. The principal source of flooding around the Town of Greensboro is the Choptank River. The flood elevations on the river are influenced by the magnitude of flood flows from the drainage areas in Caroline County upstream from Greensboro and the tide levels in the Chesapeake Bay. High intensity rainfall over prolonged periods and storm tides on the Chesapeake both singly or in combination have led to flood elevations on the Choptank River which have inundated the low-lying riverbank areas in the Greensboro vicinity. The low-lying areas bordering Forge Branch may also experience flooding during high intensity rainstorms, especially during higher than normal flows on the Choptank River.

Essential Facilities At-Risk

In May 2015, the State of Maryland published the *Local Hazard Mitigation Plan Guidance* to ensure continuity between local and State Hazard Mitigation Plan documents. As part of the local guidance, the State determined at a minimum the following essential 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).

These facilities are vital to the health and safety of the county and must continue to operate before, during, and after a hazard event. The essential facility listing for Caroline County was vetted by committee members during the plan development process to ensure accuracy. As a result, a combined total of 41 essential facilities are located within Caroline County; Map 4-3. Table 4-5 details each facility type, number of facilities and estimated building value. Values are based on improvement values obtained through the 2015 Maryland Department of Planning Property View Data for Caroline County.

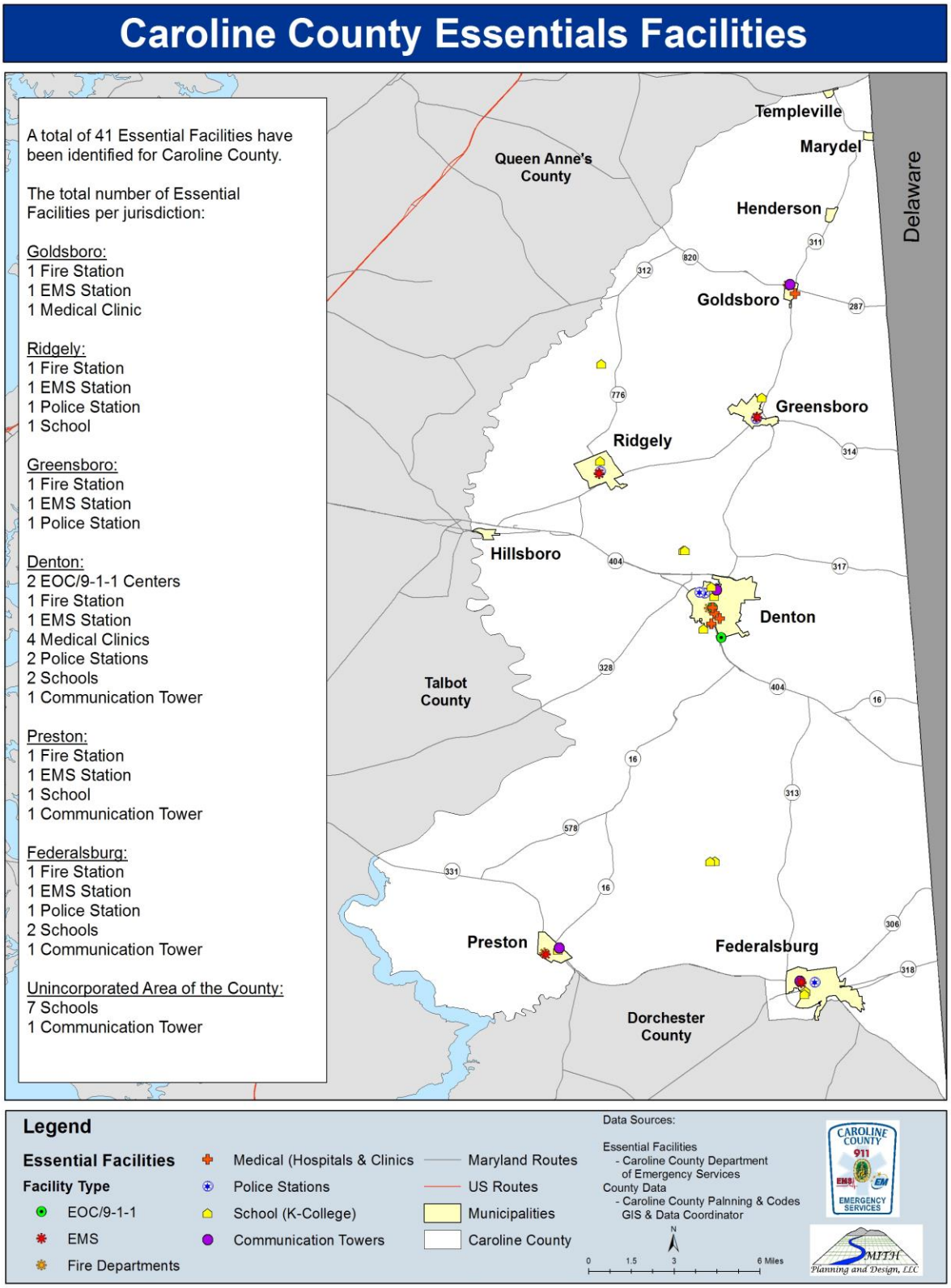
Table 4-5: Essential Facilities

Facility Type	Number of Structure	Estimated Building Value
Emergency Operations Center (EOC) & 9-1-1	2	$3,548,900
Fire/Rescue Stations	12	$5,533,300
Hospital & Medical Clinics	5	$18,224,700
Police Stations	5	$2,193,100
Schools (K-12 & Colleges)	13	$86,536,700
Communication Towers	4	$903,200
Total	**41**	**$116,939,900**

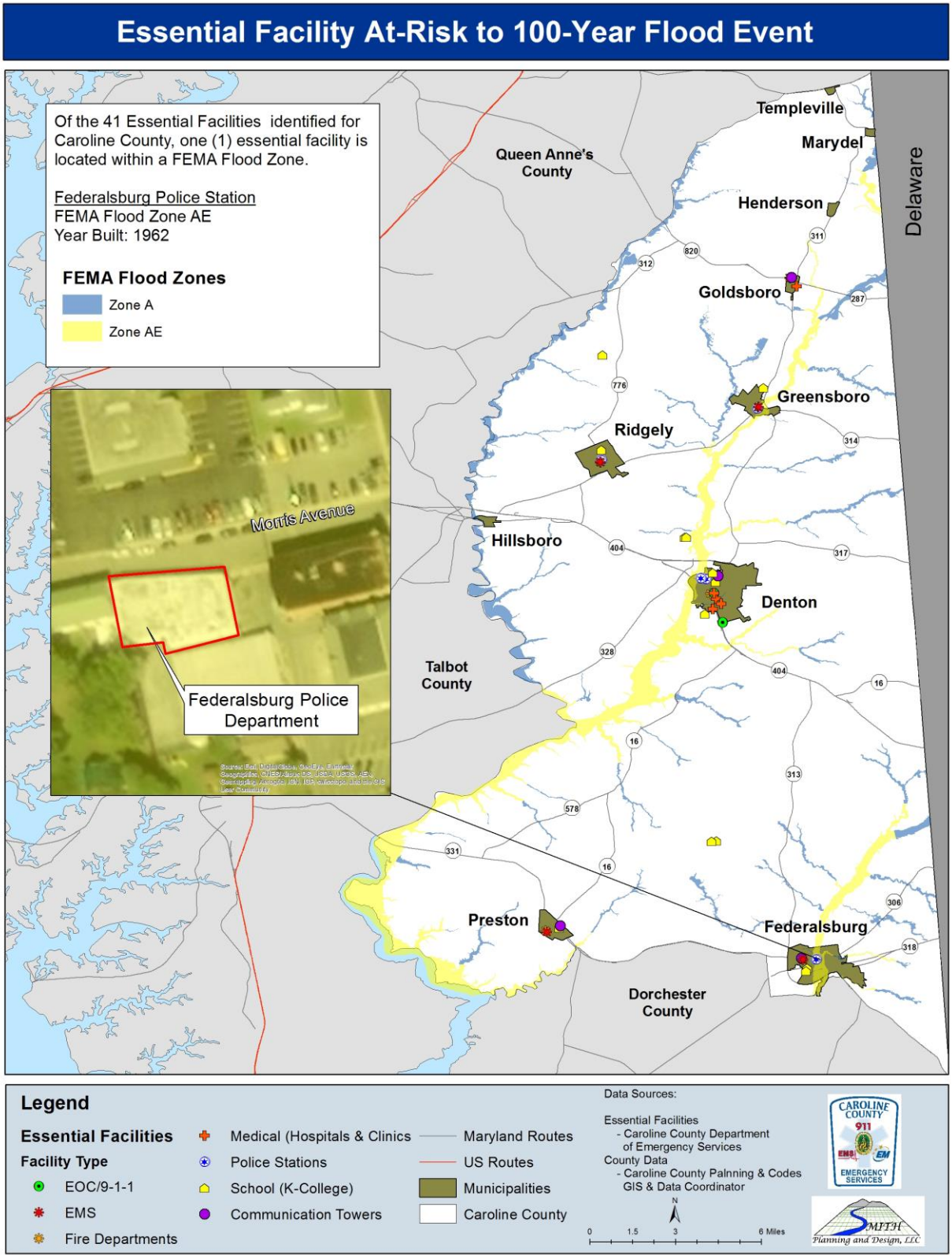
Source: Caroline County Department of Emergency Services
Note: the 2015 Maryland Department of Planning Property View Data for Caroline County is the most recent version of the dataset at the time in which this plan was updated.

Following review of the 41 Essential Facilities and FEMA flood zones, one (1) facilities is located within the FEMA Flood Zone A. The Federalsburg Police Station is located within the 100-year floodplain of Marshy Hope Creek, depicted on Map 4-4. In addition, the Caroline County Sheriff's Office located on 101 Gay Street is within a moderate flood risk area, known as the 500-year floodplain.

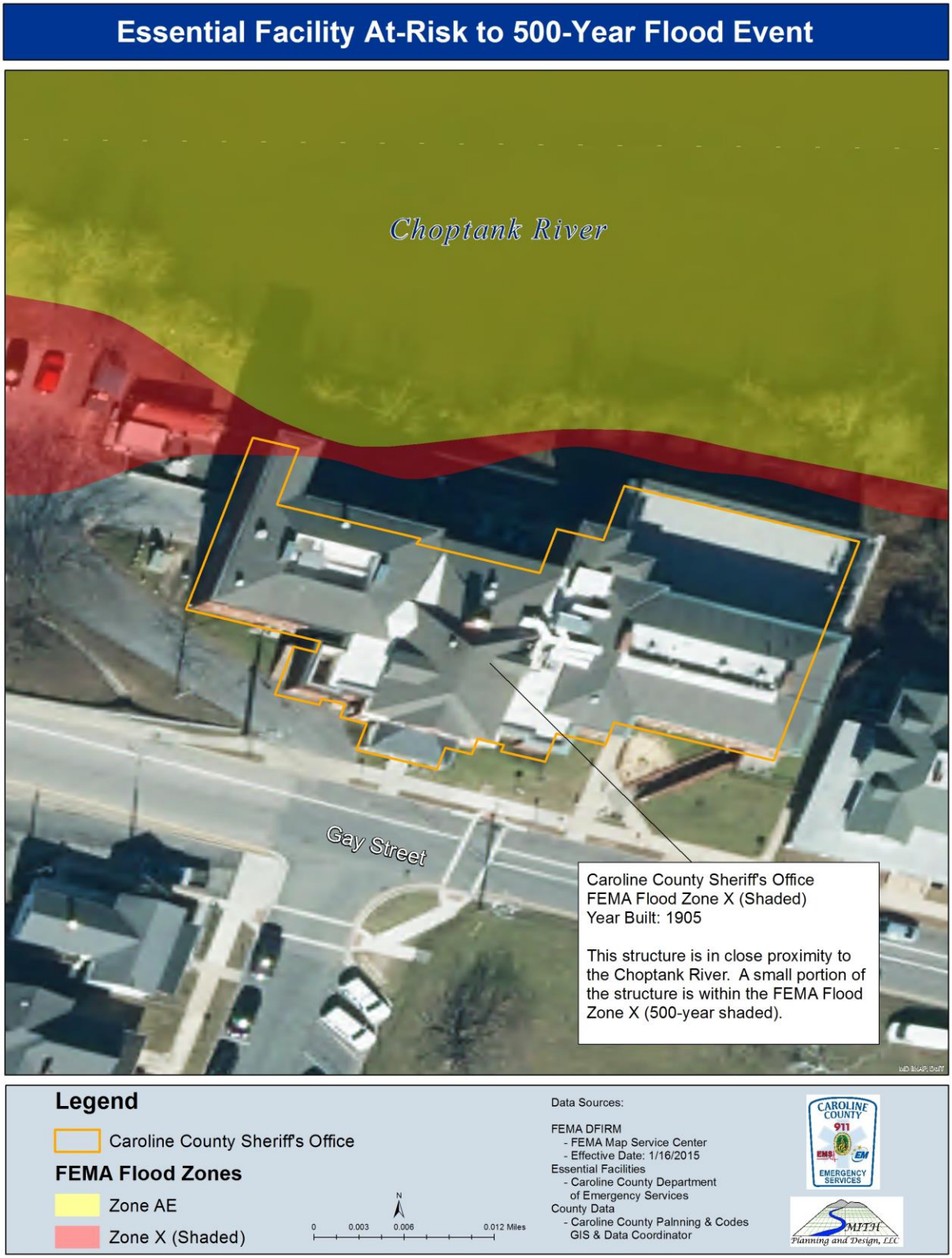
Map 4-3: Essential Facilities



Map 4-4: Essential Facilities At-Risk to 100-Year Flood Event



Map 4-5: Essential Facilities At-Risk to 500-Year Flood Event



Other Critical and Public Facilities At-Risk

Other critical and public facilities that warrant special attention in preparing for a disaster and are of vital importance in maintaining the function of the community were identified by Caroline County in previous versions of the Hazard Mitigation Plan. These facilities include: county owned, storage tanks, marina, municipally owned, storage tanks, and utility. Utilizing the FEMA DFIRM, effective January 2015, an updated analysis of facilities located within flood zones was completed. Facilities located within Flood Zones A, AE and X 500 (shaded) have been included (highlighted in blue). Facilities no longer in these flood zones have been removed.

Table 4-6: Other Critical and Public Facilities in Flood Zone A

Facility Type	Number of Facilities	Detail of Facility	Address of Facility
Storage Tanks	2	Underground Storage Tank	FEDERALSBURG HWY
		Underground Storage Tank	21908 MAIN ST
Total Facilities		**2**	

Source: 2012 Critical & Public Facilities Database and FEMA DFIRM – Effective Date: January 2015

Table 4-7: Other Critical and Public Facilities in Flood Zone AE

Facility Type	Number of Facilities	Detail of Facility	Address of Facility
Marina	6	Choptank Marina	21843 WATER ST
		Federalsburg Marina	999 MARINA RD
		Ganeys Wharf Boat Ramp	7200 GANEYS WHARF RD
		Martinak State Park Boat Ramp	137 DEEP SHORE ROAD
		Crouse Park Boat Ramp	199 CROUSE PARK LANE
		Choptank River Yacht Club	10287 RIVER LANDING ROAD
Municipally Owned	2	Town of Federalsburg Town Hall	118 N MAIN ST
		Greensboro Fair Grounds/ Boat Ramp	222 E SUNSET AVE
Storage Tanks	17	Underground Storage Tank	2642 CHOPTANK MAIN ST
		Underground Storage Tank	515 S MAIN ST
		Underground Storage Tank	218 S MAIN ST
		Underground Storage Tank	320 HOLT ST
		Underground Storage Tank	404 RAILROAD AVE
		Underground Storage Tank	105 E CENTRAL AVE
		Underground Storage Tank	115 N MAIN ST
		Underground Storage Tank	123 N MAIN ST
		Underground Storage Tank	101 S MAIN ST
		Underground Storage Tank	109 MORRIS AVE
		Underground Storage Tank	117 N MAIN ST
		Underground Storage Tank	110 MORRIS AVE
		Underground Storage Tank	102 N MAIN ST
		Underground Storage Tank	N MAIN ST
		Underground Storage Tank	314 N MAIN ST
		Underground Storage Tank	301 N MAIN ST
		Above Ground Storage Tank	10264 RIVER LANDING ROAD
Utility	2	Federalsburg WWTP	311 RELIANCE AVE
		Greensboro WWTP	13514 GREENSBORO RD
Total Facilities		**24**	

Source: 2012 Critical & Public Facilities Database and FEMA DFIRM – Effective Date: January 2015

Federalsburg Marina after the 25 June 2006 Flood

Facilities at-risk to flood located in Flood Zone AE include the Town Hall and two waste water treatment plants.

Source: Emergency Services Website

Table 4-8: Other Critical and Public Facilities in Flood Zone X500

Facility Type	Number of Facilities	Detail of Facility	Address of Facility
Storage Tanks	2	Underground Storage Tank	404 RAILROAD AVE
		Above Ground Storage Tank	10264 RIVER LANDING ROAD
Total Facilities		**2**	

Source: 2012 Critical & Public Facilities Database and FEMA DFIRM – Effective Date: January 2015

Flood Zone X Shaded is defined as a moderate flood risk area, previously known as the 500-year flood. Flood Zone X Shaded contains 2 critical facilities.

Essential Facilities Loss Estimates

As shown in the table below, loss estimations were calculated using percent of loss for damage.

Table 4-9: Loss Estimations for Essential Facilities

Facility Type	Facility Name	Estimated Building Value	20% Loss Estimate	50% Loss Estimate
Police Station	Federalsburg Police Station	$743,800	$148,760	$371,900
Police Station	Caroline County Sheriff's Office	$239,500	$47,900	$119,750

Source: Caroline County Department of Emergency Services
Note: the 2015 Maryland Department of Planning Property View Data for Caroline County is the most recent version of the dataset at the time in which this plan was updated.

Other Critical and Public Facilities Loss Estimates

Loss estimates for critical and facilities located within flood zones were calculated during the plan update. These calculations were derived from 2015 Maryland Tax Assessment values. Total loss estimates for Flood Zones A, AE, and X500 totaled $5,943,000.

Table 4-10: Loss Estimates for Critical and Public Facilities

Loss Estimates			
Facility Type	**Flood Zone**		
	A	**AE**	**X500**
Airport	0	0	0
County Owned	0	0	0
Marina/Dock	0	$ 2,063,100	0
Municipally Owned	0	$ 1,553,300	0
Trailer Park	0	0	0
Utility	0	$ 2,326,600	0
Total	**0**	**$5,943,000.00**	**0**

Source: Prepared by Maryland Department of Planning. 2015 Maryland Property View Data for Caroline County. 2015.

Loss estimates in dollars for all facilities, including critical facilities by land use were also calculated during the plan update from the 2015 Maryland Property View Tax Assessment values. Land use category estimates were also separated out by Flood Zone.

Table 4-11: Loss Estimates for All Facilities by Land Use

Loss Estimates			
Land Use	**Flood Zone**		
	A	**AE**	**X500**
Agricultural	$ 188,600	$ 1,903,200	$ 1,467,500
Apartments	0	$ 1,573,700	0
Commercial	$ 284,500	$ 8,279,400	$ 1,373,400
Commercial Residential	0	$ 196,000	$ 91,200
Exempt	$ 31,800	$ 171,800	$ 83,600
Exempt Commercial	0	$ 6,687,700	$ 1,809,500
Industrial	0	$ 274,800	$ 205,600
Marsh Land	0	$ 166,200	0
Residential	$ 1,651,600	$ 18,222,200	$ 11,375,900
Residential Commercial	0	$ 177,700	0
Total	**$2,156,500.00**	**$37,652,700.00**	**$16,406,700.00**

Source: Prepared by Maryland Department of Planning. 2015 Maryland Property View Data for Caroline County. 2015.

FEMA Reports & Statistics

Communities can voluntarily participate in the National Flood Insurance Program (NFIP) by adopting and enforcing floodplain management ordinances to reduce future flood damage. By doing this, the NFIP makes Federally backed flood insurance available to homeowners, renters, and business owners in these communities.

Table 4-12: NFIP Insurance Report

Location	Number of Policies	Total Coverage	Total Claims Since 1978	Total Paid Since 1978
Town of Denton	4	$ 1,330,000	0	$0
Town of Federalsburg	55	$ 10,031,000	21	$176,904.18
Town of Greensboro	21	$ 4,252,200	24	$677,683.57

Town of Hillsboro	1	$ 350,000	1	$0
Town of Ridgley	2	$630,000	0	$0
Remaining part of Caroline County	105	$29,368,300	28	$422,549.01
County Total	**188**	**$45,961,500**	**73**	**$1,277,136.76**

Source: FEMA Policy & Claim Statistics for Flood Insurance, as of June 30, 2018

As of December 2018, there is one residential repetitive loss property in Caroline County. This residential property is located in Greensboro at Cedar Lane. No new residential properties were identified during the 2019 Plan update. FEMA defines a repetitive loss property as:

- A property that has at least four NFIP claim payments (including building and contents) over $5,000 each, and the cumulative amount of such claims payments exceeds $20,000; or
- A property for which at least two separate claims payments (building payments only) have been made with the cumulative amount of the building portion of such claims exceeding the market value of the building.

Repetitive loss properties are those properties that should be listed as a priority potential mitigation project.

The Community Rating System (CRS) can be an important part of any town, city, or entire County with floodplains. According to FEMA, the CRS is a voluntary incentive program that recognizes and encourages community floodplain management activities that exceed the minimum National Flood Insurance Program (NFIP) requirements.

For CRS participating communities, flood insurance premium rates are discounted in increments of five percent. For example, a Class 1 community would receive a forty-five percent premium discount; while a Class 9 would receive a five percent discount (a Class 10 is not participating in the CRS and does not receive discounts). The CRS classes for local communities are based on 18 creditable activities, organized under four categories:

- Public Information;
- Mapping and Regulations;
- Flood Damage Reduction; and

As a result, flood insurance premium rates are discounted to reflect the reduced flood risk resulting from the community actions meeting the three goals of the CRS:

- Reduce flood losses;
- Facilitate accurate insurance rating; and
- Promote the awareness of flood insurance.
- Flood Preparedness.

Currently, Caroline County has a CRS rating of a Class 8. Caroline County was recently reclassified on May 1, 2017. This gives residents of the County 5% off their flood insurance polices. Undertaking mitigation activities and projects, as specified in this planning document will give Caroline County the opportunity to lower their CRS rating by added credit points.

Repetitive Flooded Roads

As part of the Hazard Mitigation Plan update, flooded roadways were examined using information from the 2011 Plan. Modifications and updates were made to the table during the July 11th and October 25, 2018 Hazard Mitigation Planning Committee meetings. In addition, all ten municipalities were provided the 2011 repetitive roadway flooding table, as well as Bryan North, Public Works Director, for review. Municipalities updated and modified those roadway issues that directly impacted their jurisdiction. Bryan North ranked the roads that fell under County maintenance and used a scale ranking as follows: 1-highest, 2-medium, and 3-little or no priority. There are thirteen County roads that appear in red text that are of the highest importance for mitigation as determined by Public Works. The results are shown table below 4-13 below.

Table 4-13: Flood Related Issues

Flood Related Issue	Evacuation Issue (Y/N)	State, County, or Municipal	Priority for Mitigation
Town of Ridgely Liberty Street	N/A	Municipal	
Town of Denton Second Street	Y	Municipal	
Town of Federalsburg Railroad Ave	N/A	Municipal	
Town of Greensboro Bridge	N/A	Municipal	
Town of Denton Seventh at Sunnyside Ave	N/A	Municipal	
5th & Legion	Y	Municipal	
Smugglers Way	Y	Municipal	
Mill Street	Y	Municipal	
Riverview Lane	Y	Municipal	
Bernard Avenue	N	Municipal	
Corkell Rd	N/A	County	3
Long Swamp Rd	N/A	County	3
Crouse Mill Rd	N/A	County	2
Holly Rd	N/A	County	1
Peaviner Rd	N/A	County	3
Nagel Road	N	County	3
Seward Rd near Hog Lot Rd	N	County	
Flooded Areas with Posted Flood Signs			
River Rd by North Caroline High School	Yes, Undersized pipes & Elevation	County	1
Noble Rd	N	County	2
Veteran's Drive	N	County	2
River Landing Rd	N	County	1
Main Street Choptank	N	County	1
Poplar Neck Rd	N	County	2
Blades Rd	N	County	1
Maryland Ave	N	County	1
Other Roads with Isolated Flooding			
Sunset Ave	N	County	2
Harper Rd	N	County	3
Old Denton Rd over tops bridge	Yes - Elevation	County	2
Hickory Hill Rd	N	County	2
Central Ave	N	County	2
Sparks Rd	N	County	2

Flood Related Issue	Evacuation Issue (Y/N)	State, County, or Municipal	Priority for Mitigation
Bradley Rd	N	County	3
Reed Road	N	County	2
Log Cabin Rd	N	County	2
Red Bridges Rd	N	County	3
Sawmill Rd	N	County	3
Roads that may need type II Barricades for washout (Road Closures)			
Poplar Neck Rd	N	County	3
Tanyard Rd	N	County	2
Smithville Rd	N	County	1
Gregg Rd	N	County	3
Knife Box Rd	N	County	1
Boyce Mill Rd	N	County	1
River Rd (Dirt Part)	N	County	3 (Bridge is Closed)
Tuckahoe Rd	N	County	1
Ellwanger Rd	N	County	3
Garland Rd	N	County	1
Cherry Lane	N	County	1
Crouse Mill	N	County	1
State Roads			
Route 404 near Hillsboro	Y	State	
Route 328 near Tuckahoe Creek	Y	State	
Route 480	Y	State	
W. Sunset Avenue	N	State	
Bridge	N	State	

Source: Caroline County Public Work

According to the Public Works Department-Roads Division, the most frequent causes of road closures in Caroline County are flooding and wash outs. The roads division will close roads for public safety as warranted.

Photo Source: Caroline County Website: https://www.carolinemd.org/227/Road-or-Bridge-Closures

Chapter 5: Coastal Flood and Storms

Coastal Flood Hazard Characterization

The State of Maryland is subject to three types of flooding:

- Nontidal – flooding from rivers and streams (riverine flooding - discussed in Ch.4: Riverine Flooding);
- Tidal – flooding from tides and storm surges; and
- Coastal – tidal flooding combined with wave action.

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.

Causes of Coastal Flooding

- Storm Surges - Storm surges are sudden rises in sea level caused by very strong winds, normally those found in hurricanes and cyclones;
- Rising Sea Levels;
- Tsunamis;
- Reclaimed Land;
- Social Impacts;
- Economic Impacts; and
- Environmental Impacts.

Coastal areas are also vulnerable to increases in the intensity of storm surge and heavy precipitation. Storm surges flood low-lying areas, damage property, disrupt transportation systems, destroy habitat, and threaten human health and safety. Coastal inundation is particularly likely when high tides, storm surge and/or large waves occur at the same time. At these times, areas where rivers or creeks meet the sea are more vulnerable because high seas can cause the rivers to back up inland.

Coastal Storm Hazard Characterization

As defined by the National Hurricane Center, a major hurricane, hurricane, tropical storm, and tropical depression are all examples of a tropical cyclone. The categories and associated characteristics are as follows:

- **Major Hurricane:** A tropical cyclone with maximum sustained winds of 111 mph (96 knots) or higher, corresponding to a Category 3, 4 or 5 on the Saffir-Simpson Hurricane Wind Scale;
- **Hurricane:** maximum sustained surface wind speed exceeds 74 mph;
- **Tropical Storm:** maximum sustained surface wind speed from 39-73 mph; and
- **Tropical Depression:** maximum sustained wind speed is less than 38 mph.

Tropical cyclones, a general term for tropical storms and hurricanes, are low pressure systems that usually form over the tropics, referred to as "cyclones" due to their rotation. Tropical cyclones are among the most powerful and destructive meteorological systems on earth. In terms of impact, high winds, heavy rain, lightning, tornados, hail, and storm surge are all associated with tropical cyclones. In addition, as tropical cyclones move inland, they can cause severe flooding, downed trees and power lines, and structural damage.

Hurricanes are rated for intensity by using the Saffir-Simpson Scale, which gives an estimate of the potential damage that a hurricane may cause. This scale is based upon both wind speed and surface pressure. Scale categories range from Category 1 to 5, with Category 1 having winds from 74-95 mph and pressure greater than 980 mb, while a Category 5 hurricane can have winds more than 157 mph and pressure of less than 920 mb. Table depicts the five categories of hurricane strength. Some notable hurricanes that have affected Maryland include Hazel in 1954; Donna in 1960; Camille in 1969; David in 1979; Fran in 1996; Floyd in 1999; Isabel in 2003; Ernesto in 2006; Irene in 2011; and Hurricane Sandy in 2012.

The most common coastal storms that impact Caroline County are Category One Hurricanes and Tropical Storms. While at sea notable hurricanes have been classified as Category 4 or 5, they typically are downgraded to a Category 1 or Tropical Storm by the time they make landfall in Maryland. Heavy rain from Category 1 hurricanes and tropical storms have been known to cause 500-year floods (which have a 0.2% chance of occurring each year) and greater flooding in inland communities. In addition, coastal erosion can also be a major problem created from coastal storms. Coastal erosion may impact man-made structures and human activities such as shore protection structures and dredging.

Although high winds and excessive amounts of precipitation are common and may cause tremendous damage, the most serious effect of hurricanes is coastal destruction caused by storm waves or storm surge. In India more than 300,000 people died in 1737 as a result of a 40-foot storm surge accompanying a severe tropical

Table 5-1: Saffir-Simpson Hurricane Categories

Saffir-Simpson Hurricane Wind Scale	
Category Wind Speed Storm Surge	**Effects**
Category 1-Weak 74-95 mph	Very dangerous winds will produce some damage: Well-constructed frame homes could have damage to roof, shingles, and vinyl siding and gutters. Large branches of trees will snap, and shallowly rooted trees may be toppled. Extensive damage to power lines and poles likely will result in power outages that could last a few to several days.
Category 2-Moderate 96-110 mph	Extremely dangerous winds will cause extensive damage: Well-constructed frame homes could sustain major roof and siding damage. Many shallowly rooted trees will be snapped or uprooted and block numerous roads. Near-total power loss is expected with outages that could last from several days to weeks.
Category 3-Major 111-129 mph	Devastating damage will occur: Well-built framed homes may incur major damage or removal of roof decking and gable ends. Many trees will be snapped or uprooted, blocking numerous roads. Electricity and water will be unavailable for several days to weeks after the storm passes.
Category 4-Major 130-156 mph	Catastrophic damage will occur: Well-built framed homes can sustain severe damage with loss of most of the roof structure and/or some exterior walls. Most trees will be snapped or uprooted, and power poles downed. Fallen trees and power poles will isolate residential areas. Power outages will last weeks to possible months. Most of the area will be uninhabitable for weeks or months.
Category 5-Major >157 mph	Catastrophic damage will occur: A high percentage of framed homes will be destroyed, with total roof failure and wall collapse. Fallen trees and power poles will isolate residential areas. Power outages will last for weeks to possibly months. Most of the area will be uninhabitable for weeks or months

Source: National Hurricane Center, 2012

cyclone in the Bay of Bengal. If a hurricane strikes at high tide, the storm surge can be devastating as was the case in Galveston, Texas in 1900 when more than 6,000 people drowned in a hurricane generated storm surge. Damage estimates for the 1900 Galveston hurricane topped $30,000,000 in 1998 dollars.

On Maryland's Eastern Shore, particularly on the Bay side, storm surge is also related to rising sea level and to shoreline subsidence. Counties fronting on the east side of the Bay are facing shoreline submergence that has been ongoing since the last glacial period when sea level was approximately 400 feet lower than today. While the process has been continuing for approximately 10,000 years, sea level is still rising at a rate of plus one foot or so every century. This rise in sea level will certainly affect the relative height of future storm surge events.

Several factors point to the potential for increased danger from severe tropical cyclones in Maryland. Population growth and continuing near-shore development increases the risk of human injury and property loss. Additionally, there is a widespread agreement among climatologists that gradual global warming is occurring. Potential effects include the melting of polar ice, expansion of the oceans, and an overall rise in sea levels. The slow sinking of land in the Chesapeake region, due to the combined effects of ground water withdrawal and post-glacial rebound, effectively doubles the global rate of sea level rise in Maryland's coastal areas. These factors increase the vulnerability of coastal areas to storm surge.

Coastal Flood Hazard Risk & History

According to the 2015 FEMA Coastal Flood Risk Report, Caroline County is largely rural, but does contain some smaller urban centers such as Denton and Federalsburg. Much of the land in the county outside of these smaller urban centers is used for agriculture, primarily in the form of poultry farming and corn and soybean production. Caroline County has a continental climate, temperatures are moderated due to its close proximity Chesapeake Bay and Atlantic Ocean. The county annually averages 43.2 inches of rainfall and 18.5 inches of snowfall. The average temperature is 75°F in summer and 37°F winter. In general, the county has flat terrain and poorly-draining soils, leading to problems with flooding during larger storm events. Coastal flooding in Caroline County primary occurs in areas along the Choptank River, Hunting Creek, Tuckahoe Creek, and Watts Creek. (FEMA, 2014; U.S. Census Bureau, 2015) Caroline County, located in Maryland, includes the following communities within the coastal region.

Table 5-2: Overview of Floodplain Management Program Information

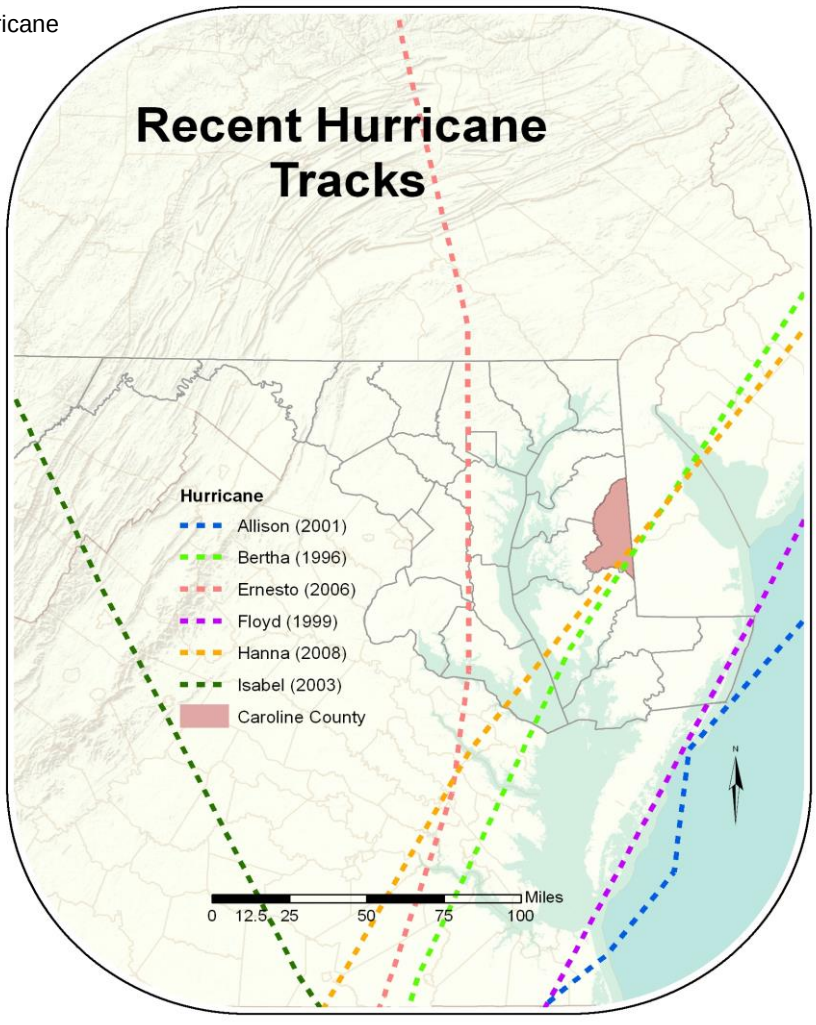
Community Name	CID	Total Community Population[1]	Percent of Population in County (Coastal)	Total Community Land Area (sq mi)	Percent of Land Area in County (Coastal)	NFIP	CRS Rating	Mitigation Plan
Town of Denton	240104	4,418	72	5.3	89	Y	10	Y
Caroline County (Unincorporated Areas)	240130	20,858	42	309.5	37	Y	9	Y

[1]Population according to 2010 U.S. Census
Source: 2015 FEMA Flood Risk Report-Caroline County, MD Coastal Study; July 17, 2015

Coastal Storm Hazard Risk & History

Caroline County has been affected over the years by the passage of hurricanes, including an unnamed hurricane in 1929, Hurricane Hazel in 1954, Hurricane Connie in 1955, Hurricane Floyd in 1999, Hurricane Isabel in 2003, and others shown on Map 5-1 below. Potential storm surge can occur on the Choptank River, Tuckahoe Creek, and Marshyhope Creek in the passage of a hurricane. Hurricanes can affect Caroline County from either the Gulf of Mexico or the Atlantic. Normally the greatest damage results from hurricanes that come ashore in the Tidewater area of Virginia or the Carolina Capes.

Map 5-1: Hurricane Tracks



According to the Nation Centers for Environmental Information (NCEI), there were no hurricane events for Caroline County during the update period. However, tropical storm events have been documented by NCEI. They are shown on the Tables 5-3.

Tropical Storm Events – 2003-2017				
# Of Events	**Injuries**	**Deaths**	**Damages**	**Frequency**
3	0	0	135.00K	0.20

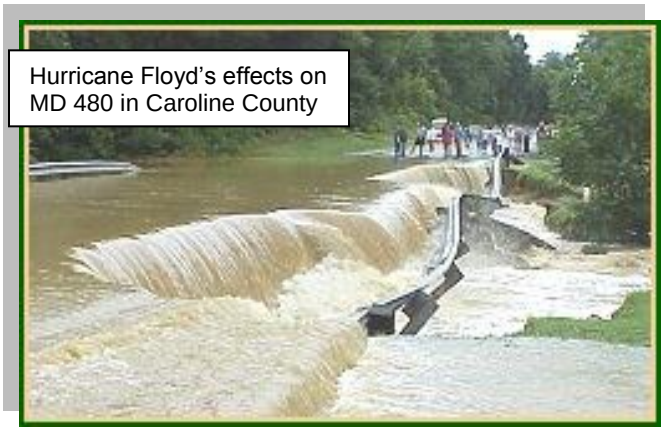
Source: National Centers for Environmental Information (NCEI), Events through April 2018

Table 5-3: Recent Tropical Storm Events

Storm Event	Date	Event Narrative	Property Damage
Tropical Storm Isabel	September 18 to September 19, 2003	Storm totals included 3.40 inches in Federalsburg (Caroline County), 3.13 inches in Denton (Caroline County)	Not Available
Tropical Storm Hanna	September 6, 2008	Tidal flooding occurred during the early evening as the surge averaged two to three feet and affected mainly Talbot and Caroline Counties. Peak wind gusts included 37 mph in Ridgely (Caroline County). Precipitation totals included 1.99 inches in American Corner (Caroline County), 1.61 inches in Denton (Caroline County). The storm surge was estimated to reach 4 feet above normal in the Choptank River in Caroline County.	Not Available
2019 HMP Update			
Tropical Storm Irene	August 28 to August 29, 2011	Hurricane Irene produced heavy flooding rain, tropical storm force wind gusts and caused one wind related death across the Eastern Shore. Preliminary damage estimates were around three million dollars and approximately 85,000 homes and businesses lost power. Power was not fully restored until September 1st. The combination of heavy rain and wind closed numerous roadways across the Eastern Shore and downed thousands of trees. Some schools were unable to open on Monday August 29th. There was a temporary ban on harvesting shellfish along Chesapeake Bay because of the excessive runoff. Some tomato, corn, watermelon and cantaloupe crops were destroyed. It was estimated that 30,000 chickens were also killed by the effects of Irene. Tropical storm force wind gusts overspread the Eastern Shore during the afternoon and early evening of the 27th and persisted into the afternoon of the 28th. Peak wind gusts averaged 50 to 60 mph. The strongest winds associated with Irene occurred at two distinct times. The first surge occurred during bands of heavier rain during the evening and late night of the 27th. The second peak occurred during the late morning and early afternoon of the 28th when skies were clearing, and deeper mixing of the atmosphere brought stronger winds to the ground. The rain associated with Irene overspread the Eastern Shore between 7 a.m. EDT and Noon EDT on the 27th, fell at its heaviest from the late afternoon of the 27th into the early morning of the 28th and ended around Noon EDT on the 28th. Event precipitation totals averaged 6 to 12 inches and caused widespread field and roadway flooding. Because the flash flooding and flooding blended into one, all flooding related county entries were combined into one under flood events. On August 25, Maryland Governor Martin O'Malley declared a state of emergency in preparation for Irene In Caroline County, sections of Maryland State Routes 287, 313, 31 and 311 were among twenty roadways that were closed. Two dozen homes were damaged by the flooding and wind. About 5,500 homes and businesses lost power.	$135,000

Source: National Centers for Environmental Information (NCEI), Events through April 2018

In terms of number of occurrences, the *NCEI* listed a total of 3 tropical storm events affecting Caroline County from 2003-2017. Based on this data, Caroline County experiences 0.20 tropical storm events per year.

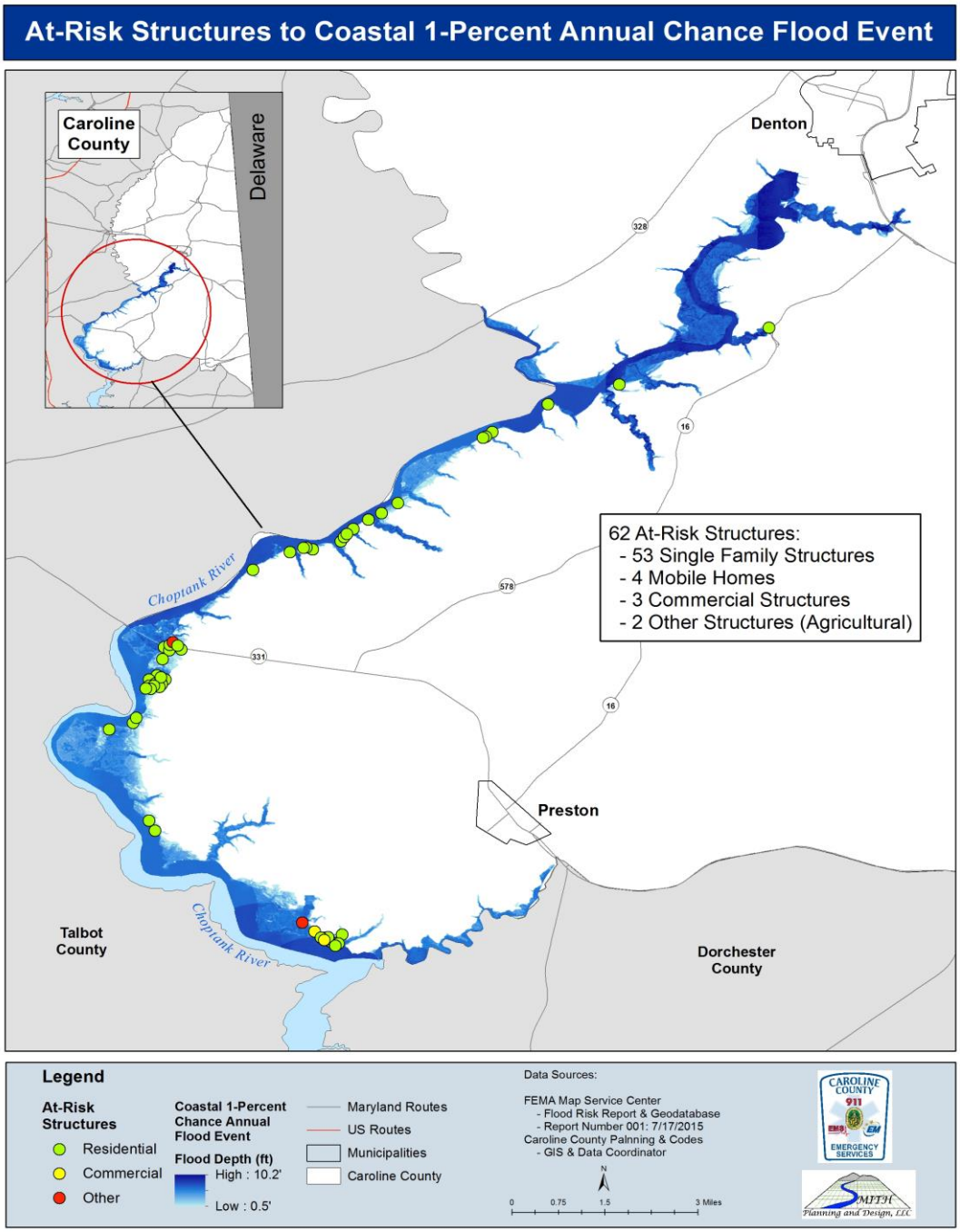


Source: Emergency Services Website

Coastal Flood Vulnerability

Special Flood Hazard Area (SFHA) are a portion of the floodplain subject to inundation by the 1-percent-annnual or base flood, formally know as the 100-year flood event. The SFHA for coastal flooding affects Caroline County, primarily in the areas along the Choptank River and to some extent its tributaries. The risk area for coastal flooding and structures at-risk have been identified and displayed on Map 5-2.

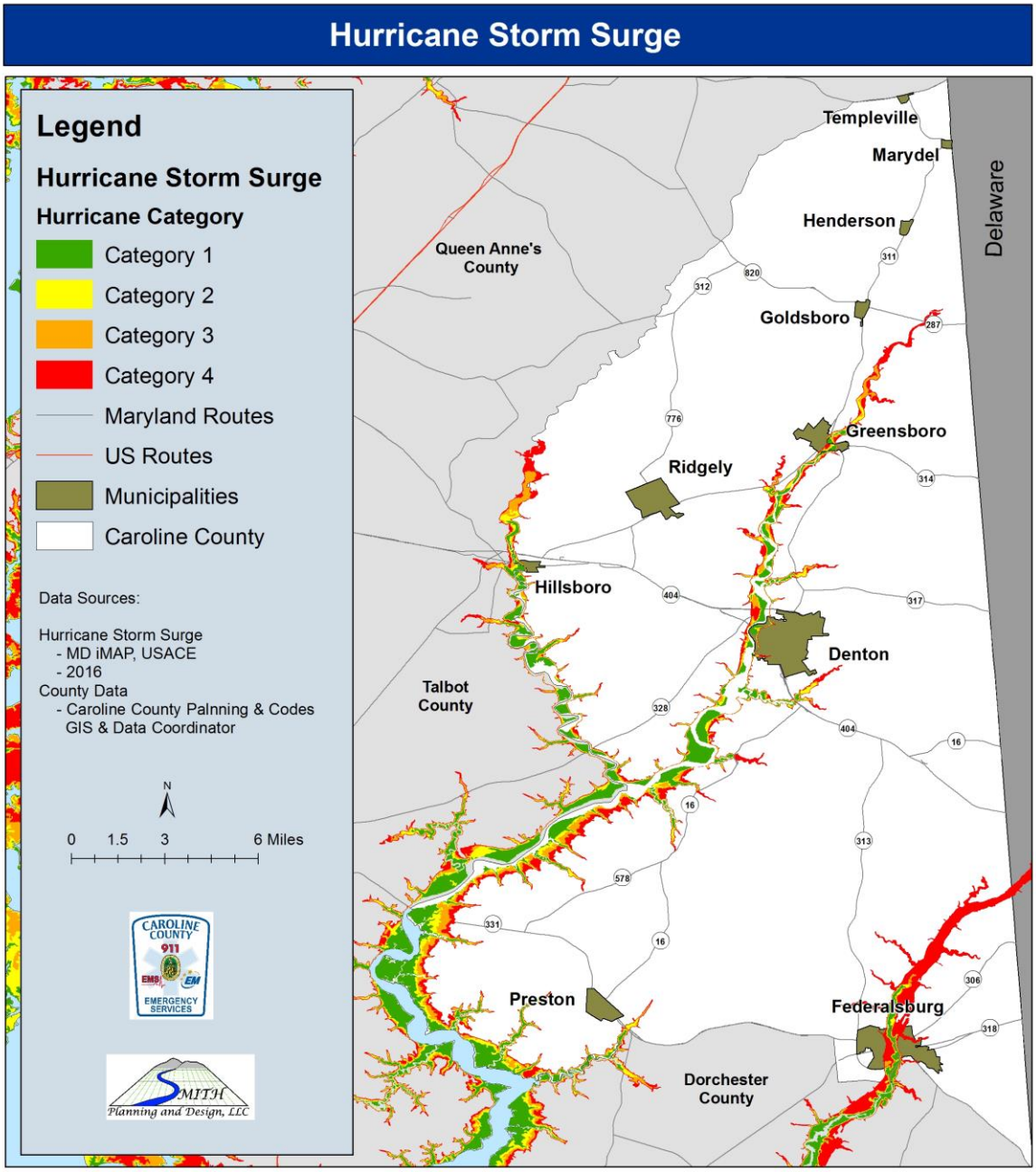
Map 5-2: At-Risk Structure to Coastal 1-Percent Annual Chance Flood Event



Coastal Storm Vulnerability

Caroline County is located in Maryland's Eastern Shore and is bordered by Delaware. The southwest portion of the County is most vulnerable to storm surge inundation. The towns of Denton and Greensboro face more danger from flooding associated with the passage of a hurricane because of their location partially in the storm surge area of the Choptank River; The Town of Federalsburg is partially located in the storm surge area of Marshyhope Creek. A part of Hillsboro is in the storm surge area of the Tuckahoe Creek. Storm surge maximums for Caroline County range from 5 feet for Category 1 storms to 8 feet for Category 2 storms, and from 11 feet for Category 3 storms to 16 feet for Category 4 storms.

Map 5-3: Storm Surge



Based on the SLOSH Model, the percent of land area inundated by Category 1-4 were calculated for Caroline County, shown in Table 5-4.

Table 5-4: SLOSH Model Storm Surge Coverage Area

Jurisdiction	Percent Category One	Percent Category Two	Percent Category Three	Percent Category Four
Caroline County	1.73	1.75	1.96	3.38

Source: Maryland Hazard Mitigation Plan

Essential Facilities At-Risk

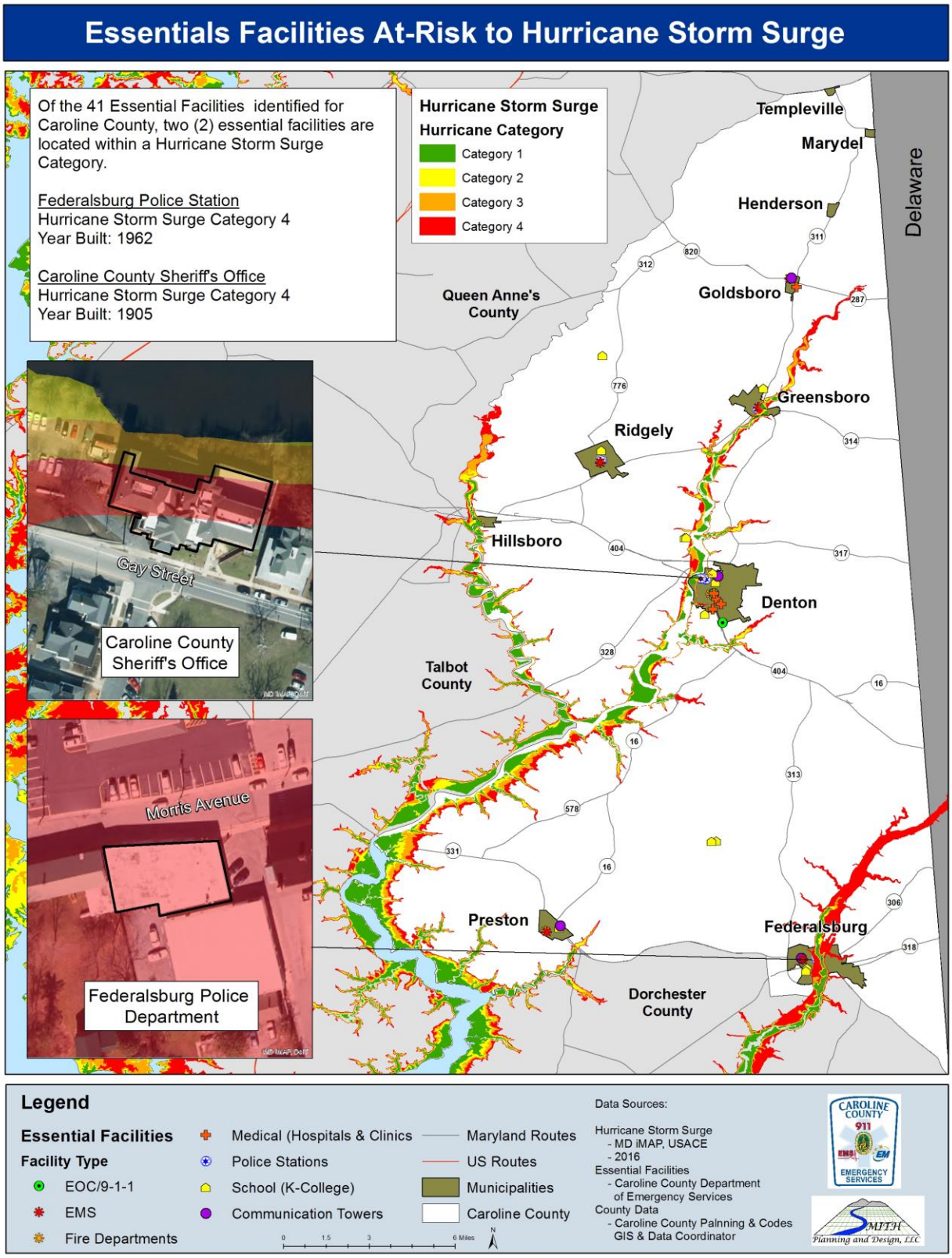
As discussed in Chapter 4 – Riverine Flooding, both the Federalsburg Police Station and the Caroline County Sheriff's Office are vulnerable to flood. It is not surprising that both of these facilities are vulnerable to storm surge, as well. However, given that a hurricane category 4 storm would need to make landfall in Maryland. The likelihood of impacts to these facilities is low. Please note this does not take into account sea-level rise.

Table 5-5: Essential Facilities At-Risk to Storm Surge

Facility Type	Facility Name	Estimated Building Value	Hurricane Storm Surge Category	Projected Flood Depth (feet)
Police Station	Federalsburg Police Station	$743,800	4	10.13'
Police Station	Caroline County Sheriff's Office	$239,500	4	3.16'

Source: 2018 Essential Facilities Database

Map 5-4: Essential Facilities in Storm Surge Areas



Other Critical and Public Facilities At-Risk

Critical and public facilities warrant special attention in preparing for a disaster and are important in ensuring the resiliency of the community.

Category 1 storm surge has the most likelihood of occurrence based on historical data. Critical and public facilities located in all four Storm Surge inundation areas were analyzed during the plan update utilizing the storm surge data prepared by the U.S. Army Corps of Engineers, Baltimore District, Planning Division in January 2016. Table 5-6 lists the critical and public facilities located within the storm surge areas.

Table 5-6: Critical and Public Facilities in Storm Surge Areas

Facility Category	Number of Facilities	Detail of Facility	Address	Category
County Owned	3	Board of County Commissioners	105 GAY ST	3 4
		Federalsburg Branch Library	123 MORRIS AVE	4
		County Historical Society	3395 LINCHESTER ROAD	4
Marina	6	Choptank Marina	21843 WATER ST	1 2 3 4
		Federalsburg Marina	999 MARINA RD	1 2 3 4
		Ganeys Wharf Boat Ramp	7200 GANEYS WHARF RD	1 2 3 4
		Martinak State Park Boat Ramp	137 DEEP SHORE ROAD	1 2 3 4
		Choptank River Yacht Club	10287 RIVER LANDING ROAD	1 2 3 4
		Crouse Park Boat Ramp	199 CROUSE PARK LANE	1 2 3 4
Municipally Owned	3	Greensboro Fair Grounds/ Boat Ramp	222 E SUNSET AVE	1 2 3 4
		Town of Federalsburg Main Office	118 N MAIN ST	4
		Mayor and Council of Federalsburg	104 MORRIS AVE	4
Storage Tanks	27	Underground Storage Tank	2642 CHOPTANK MAIN ST	2 3 4
		Underground Storage Tank	218 S MAIN ST	2 3 4
		Underground Storage Tank	123 N MAIN ST	3 4
		Underground Storage Tank	325 OLD DENTON ROAD	3 4
		Underground Storage Tank	105 DEEP SHORE ROAD	4
		Underground Storage Tank	105 GAY ST	3 4
		Underground Storage Tank	21908 MAIN ST	2 3 4
		Underground Storage Tank	515 S MAIN ST	4
		Underground Storage Tank	105 E CENTRAL AVE	2 3 4
		Underground Storage Tank	115 N MAIN ST	3 4
		Underground Storage Tank	101 S MAIN ST	4
		Underground Storage Tank	109 MORRIS AVE	4
		Underground Storage Tank	117 N MAIN ST	2 3 4
		Underground Storage Tank	102 N MAIN ST	4
		Underground Storage Tank	N MAIN ST	3 4
		Underground Storage Tank	314 N MAIN ST	4
		Underground Storage Tank	301 N MAIN ST	2 3 4
		Underground Storage Tank	20949 DOVER BRIDGE ROAD	3 4
		Underground Storage Tank	2539 VETERANS DR	4
		Underground Storage Tank	320 HOLT ST	4
		Underground Storage Tank	404 RAILROAD AVE	4
		Underground Storage Tank	110 MORRIS AVE	4
		Underground Storage Tank	FEDERALSBURG HWY	4
		Tri Gas & Oil Tank Farm	3945 FEDERALSBURG HWY	4
		Above Ground Storage Tank	10264 RIVER LANDING ROAD	3 4
		Underground Storage Tank	251 E CENTRAL AVE	4
		Underground Storage Tank	10413 RIVER LANDING ROAD	4

Trailer Park	2	Trailer Park	NEWTON ROAD	4
		Trailer Park	MARSH CREEK ROAD	4
Utility	2	Federalsburg WWTP	311 RELIANCE AVE	4
		Greensboro WWTP	13514 GREENSBORO RD	3 4
Total	**43**			

Source: 2012 Critical & Public Facilities Database and 2016 Hurricane Storm Surge Category Database

The table below depicts how many critical and public facilities would be affected by each storm surge category, if that storm was to occur.

Table 5-7: Critical and Public Facilities in Storm Surge Inundation Areas

Storm Surge	County Owned	Marina	Municipally Owned	Storage Tanks	Trailer Park	Utility	Total
Category 1	0	6	1	0	0	0	**7**
Category 2	0	6	1	6	0	0	**13**
Category 3	1	6	1	13	0	1	**22**
Category 4	3	6	3	27	2	2	**43**

Source: 2012 Critical & Public Facilities Database and 2016 Hurricane Storm Surge Category Database

Coastal Flood Loss Estimates

Estimated flood loss estimations have been integrated into the plan update using the 2015 FEMA Flood Risk Report-Caroline County, MD Coastal Study. Through Risk MAP, FEMA provides communities with updated Flood Insurance Rate Maps (FIRMs) and Flood Insurance Studies (FISs) that focus on the probability of floods and that show where flooding may occur as well as the calculated 1% annual chance flood elevation. The1% annual chance flood, also known as the base flood or formerly as the 100-year flood event, has a 1% chance of being equaled or exceeded in any given year. FEMA understands that flood risk is dynamic—that flooding does not stop at a line on a map—and as such, provides the following flood risk products:

- Flood Risk Report (FRR);
- Flood Risk Map (FRM); and
- Flood Risk Database (FRD).

After the Flood Risk Project is complete, the data can be used in many ways to visualize and communicate flood risk within the Flood Risk Project and other outreach initiatives.

The goal of this report is to help inform and enable communities to take action to reduce flood risk. Possible users of this report include:

- Local elected officials;
- Floodplain managers;
- Community planners;
- Emergency managers;
- Public works officials; and
- Others with special interests (e.g., watershed conservation groups, environmental awareness organizations, etc.).

The risk products may be used to:

- Update local hazard mitigation plans;
- Update community comprehensive plans;
- Update emergency operations and response plans;
- Develop hazard mitigation projects;
- Communicate flood risk; and
- Inform the modification of development standards.

The 2015 FEMA Flood Risk Report-Caroline County, MD Coastal Study has been included as part of the update as intended by FEMA. This information has informed the mitigation strategies within the plan and will continue to be of use throughout the plan implementation process. Flood loss estimates provided in the FRR were developed using a FEMA flood loss estimation tool, Hazus. Caroline County's coastal flood risk analysis incorporates results from a Hazus (FEMA version 2.1 & 2.2) analysis, which accounts for newly modeled areas in the Coastal Flood Risk Project and newly modeled depths for the 1-percent-annual-chance flood event.

Potential losses were compared with updated Hazus General Building Stock (GBS) exposure data to estimate loss ratios for the 1- percent-annual-chance flood scenario. The following data layer provided within the FRD should be used to further analyze potential losses and areas where they are likely to occur.

- **Flood Risk Project Refined Data:** This set of tables in the FRD stores the updated Hazus GBS inventory data and resulting losses for this 'Refined' study.

Refined losses for coastal flooding were calculated for the total project area, which included the unincorporated area of Caroline County. The coastal 1- percent-annual-chance flood scenario does not affect any of the communities within Caroline County. Please note that despite the presence of the 1% annual chance coastal flood hazard within Denton's community boundary, no refined flood losses had resulted from the UDF inventory.

Estimated refined loss data is presented on the following data table, Table 5-8.

Table 5-8: Caroline County (Total Project Area) Estimated Potential Losses for Flood Event Scenarios- Refined Losses

Type	Inventory Estimated Value	% Of Total	1% (100 Yr.) Dollar Losses
Residential Building & Contents	$10,3000,000	88%	$800,000
Commercial Building & Contents	$900,000	88%	$300,000
Other Building & Contents	$400,000	4%	$200,000
Total Building & Contents	$11,600,000	100%	$1,300,000
Business Disruption	N/A	N/A	$200,000
Total	$11,600,000	N/A	$1,500,000

Source: 2015 FEMA Flood Risk Report-Caroline County, MD Coastal Study; July 17, 2015
Note: Flood Loss Project Refined Losses calculated using Hazus Version 2.2
Business Disruption=Inventory Loss=Relocation Cost+Income Loss+Rental Income Loss+Wages Loss+Direct Output Loss

Coastal Storm Loss Estimates

Loss estimates for critical and public facilities located within storm surge inundation areas were calculated. These calculations were derived from 2015 Maryland Property View Tax Assessment values.

Table 5-9: Loss Estimates for Critical and Public Facilities

Loss Estimates				
Facility Type	**Hurricane Category**			
	1	**2**	**3**	**4**
County Owned	0	0	$ 239,500	$ 870,000
Marina/Dock	$ 2,063,100	$ 2,063,100	$ 2,063,100	$ 2,063,100
Municipally Owned	$ 189,500	$ 189,500	$ 189,500	$ 1,553,300
Trailer Park	0	0	0	$ 230,200
Utility	0	0	$ 277,400	$ 2,604,000
Total	**$2,252,600**	**$2,252,600**	**$2,769,500**	**$7,320,600**

Loss estimates in dollars for all facilities, including critical facilities by land use were also calculated from 2015 Maryland Property View Tax Assessment values. Land use category estimates were also separated out by storm surge category.

Table 5-10: Loss Estimates for All Facilities by Land Use

Loss Estimates				
Land Use	**Hurricane Category**			
	1	**2**	**3**	**4**
Agricultural	$ 20,737,500	$ 23,337,300	$ 25,953,900	$ 34,711,700
Apartments	$ 113 600	$ 834,300	$ 2,266,700	$ 10,431,900
Commercial	$ 3,628,000	$ 5,911,400	$ 7,154,400	$ 21,821,300
Commercial Residential	$ 351,000	$ 662,400	$ 790,900	$ 894,400
Exempt	$ 312,600	$ 692,100	$ 585,100	$ 1,041,700
Exempt Commercial	$ 8,242,200	$ 14,204,800	$ 14,569,100	$ 26,540,300
Industrial	$ 69,200	$ 202,600	$ 371,100	$ 3,744,400
Marsh Land	$ 166,200	0	0	0
Residential	$ 40,133,800	$ 81,731,900	$ 105,402,000	$ 140,835,400
Residential Commercial	$ 230,400	$ 230,400	$ 264,300	$ 355,800
Total	**$53,133,400**	**$127,807,202**	**$157,357,503**	**$240,376,904**

Chapter 6: Shoreline Erosion & Sea Level Rise

Information on both Sea Leve Rise and Shoreline Erosion has been updated throughout this chapter. Shoreline Erosion is presented first followed by Sea Level Rise.

Shoreline Erosion Hazard Characterization

Shoreline erosion in Caroline County is influenced by natural conditions, which include soil composition, weather, topography, water depth, fetch, surface water/groundwater conditions. Shores consisting of very fine or unconsolidated silts, clays, or lighter organic material, such as marshes are particularly at risk.

Expansive soils have a very slow infiltration rate (high runoff potential) when wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high-water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Sea level rise is another factor contributing to shore erosion in Maryland. Sea level rise contributes to shoreline erosion by influencing and exacerbating on-going coastal processes, making coastal areas more vulnerable to extreme events. The rise in sea level creates a higher baseline for storm surge. In fact, a 1-meter rise in sea level would turn 15-year flood areas into 100-year flood areas (Kana et al., 1984; Leatherman, 1984). Tide gauge measurements in the Chesapeake Bay show that sea level rates are rising almost twice as fast as the global average.

Although shoreline erosion is a natural process, man-made factors can exacerbate its effects. These factors include, land use, shoreline reinforcement activities, surface water usage, ground water usage, and the placement of buildings, roads, and other infrastructure. In general, erosion problems tend to be the greatest where sediments are unconsolidated; fetch is greater than one-mile, upland areas that generate significant runoff of saturated soils and adjacent shorelines are hardened with protective structures. It is important to note that no documentation/data exists stating that structures in Caroline County have had damaged due to shoreline erosion.

Shoreline Erosion Risk & History

According to Arthur Strahler's *Physical Geography* text, the Chesapeake Bay is an estuary that was formerly the river valley for the Susquehanna River and its tributaries. During the peak period of glaciations, sea level was approximately 400 feet lower than today. As sea level has risen over the past 10,000 years, the Chesapeake has grown and essentially created the features associated with a shoreline of submergence. This produces a highly irregular, embayed shoreline typical of the eastern shore. In geologic terms, the Bay shoreline is still in youthful form with small bays, long peninsulas and offshore islands. Eventually, as sea level continues to rise, these bays, peninsulas and islands will be submerged, leaving a smoother, nearly straight shoreline.

The average rate of sea level rise on Maryland coastlines has been approximately 3-4 mm/yr, or one foot per century. Scientists predict that with global warming, sea levels may rise as much as 2-3 feet in the Chesapeake Bay by 2100. Ongoing research suggests that land subsidence in the region due to post-glacial crust movement and groundwater withdraws is the contributing factor to the increased rate of sea level rise in Maryland.

Approximately 260 acres of tidal shoreline are lost each year to shoreline erosion. This degrades water quality in the Bay by adding approximately 5.7 million pounds of nitrogen and 4.2 million pounds of phosphorus into the Bay. Table 6-1 provides the results of a study released in 2000 by the U.S. Army Corps of Engineers which calculated that erosion rates for coastal counties in 1990 in the State of Maryland. Although shoreline erosion in Caroline County is low, it does occur due to its elevation relative to sea level.

Table 6-1: Rate of Shoreline Erosion

Rate of Shoreline Erosion					
Caroline County			***Maryland (16 coastal counties and Baltimore City, excluding Smith Island, South Marsh Island, Poplar Island, Bloodsworth Island, and several other large Bay Islands)***		
Erosion Category	**Average Erosion Rate (ft/yr)**	**Shoreline Length (Miles)**	**Erosion Category**	**Average Erosion Rate (ft/yr)**	**Shoreline Length (Miles)**
Accretion	+0.5	1.4	Accretion	+0.5	294
Protected	0	6	Protected	0	978
No Change	0	99.3	No Change	0	3,851
Slight	-1	9.1	Slight	-1	1,157
Low	-3	3.0	Low	-3	182
Moderate	-6	.84	Moderate	-6	59
High	-	-	High	-11	11
Unknown	-	-	Unknown	0 or -1	65
Total		**119.64**	**Total**		**6,597**

Source: U.S. Army Corps of Engineers, 2010

According to Clem Gaines, Corporate Communication, U.S. Army Corps of Engineers, Baltimore District, in 2010, the U.S. Army Corps of Engineers, Baltimore District (USACE), in partnership with Maryland Department of Natural Resources, completed Chesapeake Bay Shoreline Erosion in Maryland: A Management Guide. This study was authorized by a resolution of the U.S. Senate Committee on Environment and Public Works in 2001. The resolution directed USACE to review and update the 1990 Chesapeake Bay Shoreline Erosion Study, previously completed as a joint effort by the Baltimore and Norfolk Districts. The rates of shoreline erosion that were forwarded were based on the 1990 study.

Updated shoreline erosion rates are provided below. The erosion categories have been changed, and due to different mapping techniques, the measured shoreline has changed. The Virginia Institute of Marine Science (VIMS) produced the updated shorelines and erosion rates based on Maryland Geological Survey (MGS) data. Please see the explanation below for the dates of the shorelines. Please also note that the dataset on which the tables below were produced does not include many large Bay island such as Smith Island, South Marsh Island, Poplar Island, and Bloodsworth Island.

Using a series of recent shorelines (1988-1995), the Maryland Geological Survey

(MGS) produced a recent shoreline coded with erosion rates. This shoreline was updated by the Center for Coastal Resources Management (CCRM), Virginia Institute of Marine Science to reflect the current status (2002-2006) of shoreline protection ("protected" category) and improve on the shoreline segments previously classified as "unknown" or "no data". The Maryland Shoreline Inventories use a different shoreline as a base, so the attribute information was transferred to the MGS shoreline using ArcGIS 9.2.

Shoreline Erosion Vulnerability

This shoreline erosion risk assessment examines Caroline County's critical and publically owned/operated facilities along tidal shorelines that are located within the 100-foot risk zone. The shoreline data was derived form Maryland DNR shoreline inventory.

Shoreline Erosion Facilities At-Risk

Critical and public facilities are facilities that are critical to the health and welfare of the population and are important to the type of hazard event such as shelters, police and fire stations, and hospitals. These facilities warrant special attention in preparing for a disaster and are of vital importance in maintaining the function of the community.

No Essential Facilities are along or near the shoreline. However, two (2) Public Facilities are located near the Low Erosion Rate Area:

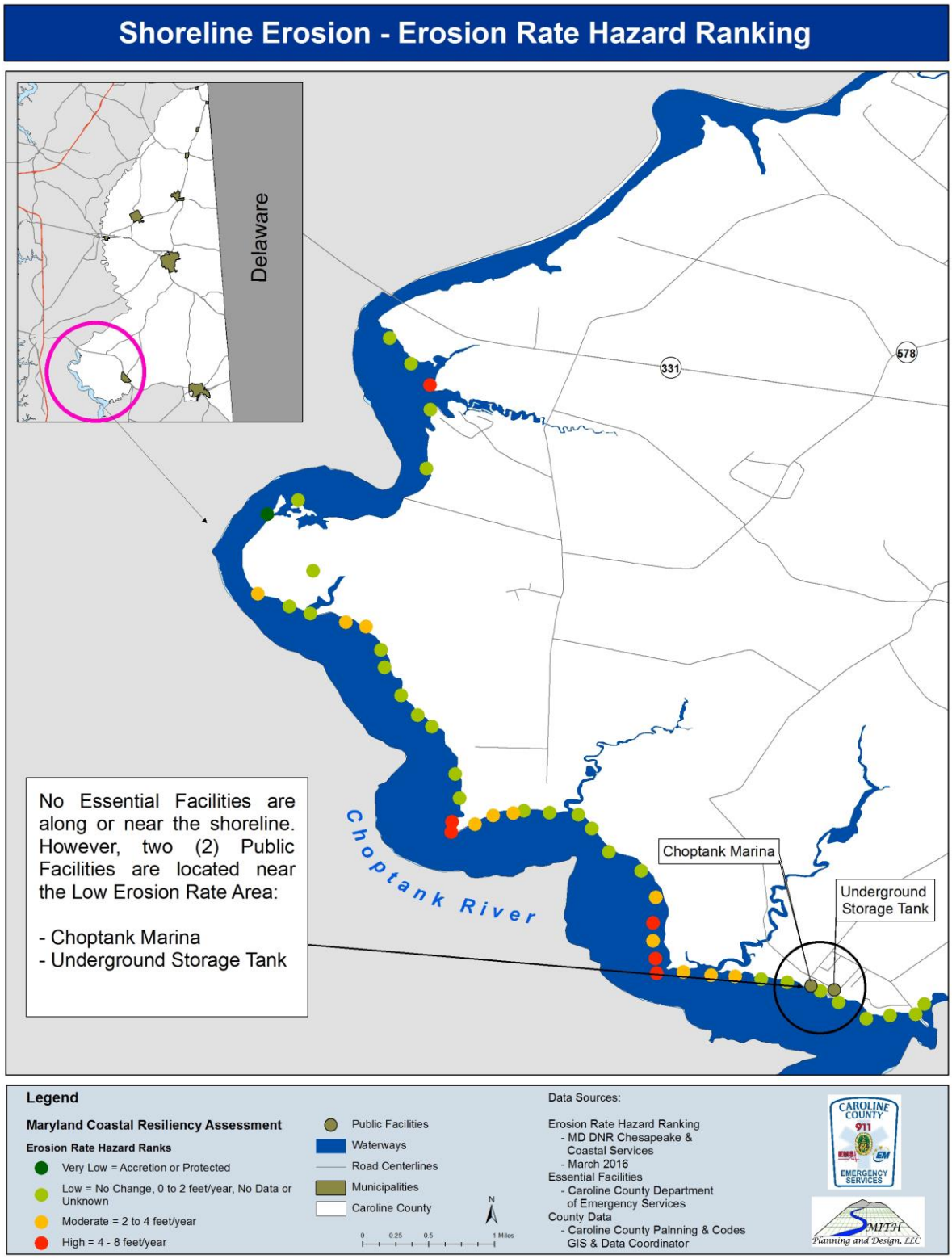
- Choptank Marina
- Underground Storage Tank

Table 6-2: Other Critical and Public Facilities in Erosion Risk Zone

Facility Category	Number of Facilities	Detail of Facility	Address
Marina	1	Choptank Marina	21843 Water St
Storage Tanks	1	Underground Storage Tank	2642 Choptank Main St
Total	**2**		

Source: Caroline County Other Critical and Public Facilities Database

Map 6-1: Shoreline Erosion



Erosion Rate Hazard Ranks were assigned as follows, based on categories used by the Maryland Geological Survey (MGS): Very Low (1)=Accretion or Protected; Low (2)=No Change, 0 to 2 feet/year, No Data or Unknown; Moderate (3)=2 to 4 feet/year; High (4)= 4 to 8 feet/year; and Very High (5)= >8 feet/year.

Shoreline Erosion Loss Estimates

Loss estimates for critical and public facilities located within the erosion risk zone areas were calculated. These calculations were derived from Maryland Tax Assessment values. Total loss estimates totaled $ 1,149,520.

Table 6-3: Loss Estimates for Facilities

Facility Type	Loss Estimates
Marina	$ 1,058,320
Storage Tank	$91,200
Total	**$ 1,149,520**

Source: Maryland Coastal Resiliency Assessment March, 2016

Loss estimates in dollars for all facilities, including critical facilities by land use were also calculated from Maryland Tax Assessment values.

Table 6-4: Loss Estimates for All Facilities by Land Use

Land Use	Loss Estimates
Agricultural	$1,155,600
Apartments	0
Commercial	0
Commercial Residential	0
Exempt	0
Exempt Commercial	$590,000
Industrial	0
Marsh Land	$166,200
Residential	$5,126,800
Residential Commercial	0

Source: Maryland Coastal Resiliency Assessment March, 2016

Sea Leve Rise Hazard Characterization

According to the *2016 State of Maryland Hazard Mitigation Plan*, sea-level rise within the Maryland Coastal Resiliency Assessment is the vulnerability of the coast to long-tern sea-level change. Results of the Sea Level Rise rank by County within the Maryland Coastal Resiliency Assessment indicated that Caroline County was ranked as "High Risk".

Sea Level Rise Risk & Projections

According to the Updating Maryland's Sea-Level Rise Projections, a 2013 technical report, developing projections for relative sea-level rise along Maryland's coasts requires consideration of the many factors that will affect:

1) the rise in global mean sea level (GMSL);

2) regional differences in sea level with regard to the global mean;

3) vertical land movement (VLM); and

4) changes in tidal range and storm surges due to inundation.

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 2100, with a best-estimate projection of 1.1 meters.

According to the *GIS Data Products to Support Climate Change Adaptation Planning Caroline County Maryland, Summer 2018*, in general, Caroline County is resistant to the impacts of sea-level change through 2050. However, by 2100, rising levels of the Bay and subsidence of the land surface will create some local negative impacts. Caroline County is located in a Flood Plain with low lying elevations. Areas such as Federalsburg and Greensboro will see significant negative impacts, particularly during higher tides.

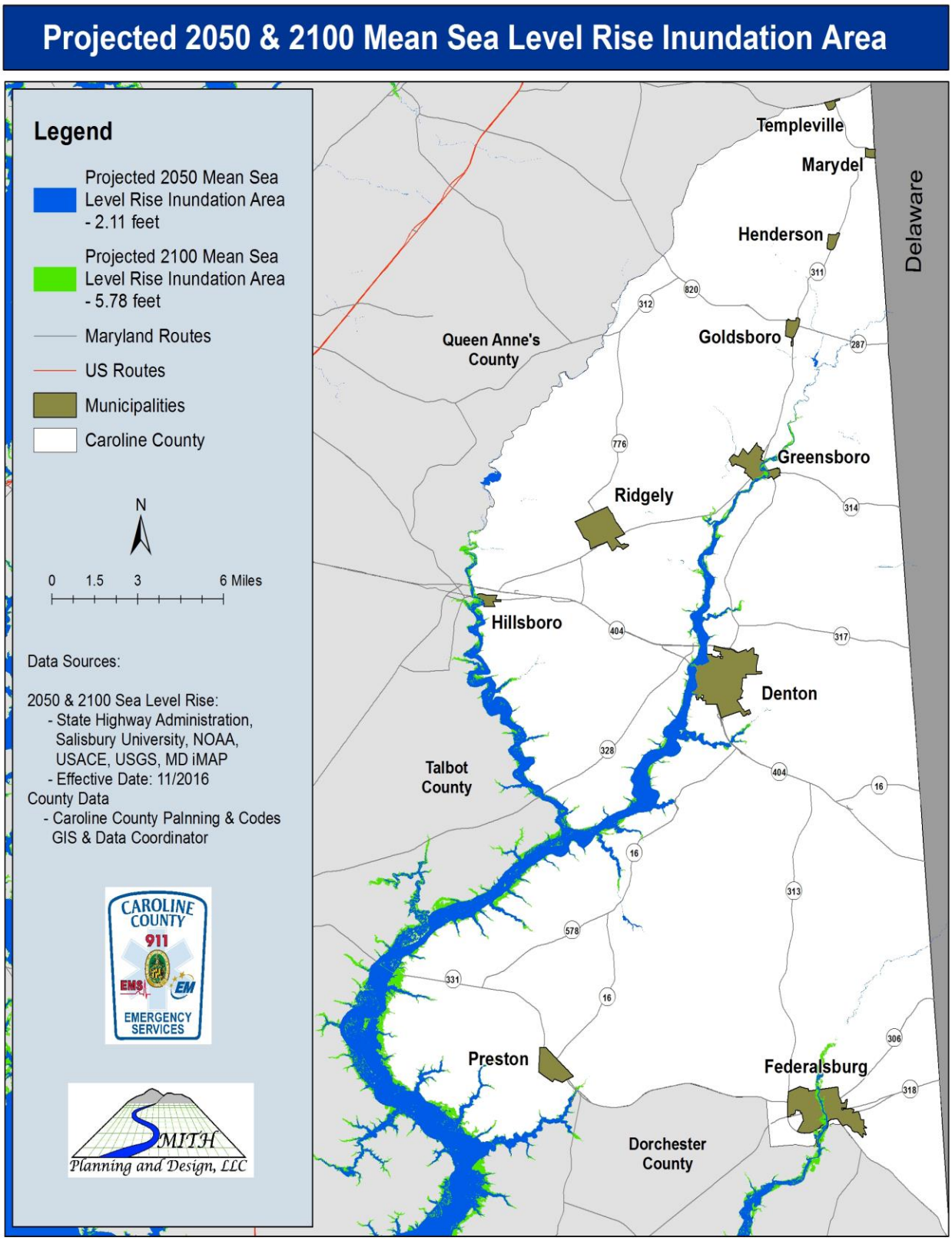
MARYLAND COASTAL RESILIENCY ASSESSMENT

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, March 2016

Map 6-2: 2050 & 2100 Mean Sea Level Rise



Sea Level Rise Vulnerability

According to data developed by the Maryland State Highway Administration (MDSHA), the projected flood depth for the 2050 Mean Sea Level Rise is 2.11 feet, while the 2100 Mean Sea Level Rise is 5.78 feet for Caroline County. The vulnerability assessment for Essential Facilities indicated that Essential Facilities are not located within either projected Mean Sea Level Rise inundation areas, as shown on Map 6-2 in blue and green. However, one (1) facility is located within close proximity to both projected 2050 and 2100 Mean Sea Level Rise. The Caroline County Sheriff's Office, located on 101 Gay Street, is adjacent to the Choptank River. This facility is within a moderate flood risk area, known as the 0.2 percent chance annual flood event (500-year floodplain). The Sheriff's Office would be at-risk to flooding if the projected 2050 and 2100 Sea Level Rise inundation areas were coupled with the 0.2 percent chance annual flood event (500-year floodplain).

Map 6-3: Essential Facility At-Risk to Projected 2050 & 2100 Mean Sea Level Rise Inundation Area

Sea Level Rise Vulnerability- Eastern Shore Land Conservancy-Risk Management for the 21st Century Floodplain

Jim Bass, Eastern Shore Land Conservancy (ESLC), presented results of a recent planning initiative undertaken by the ESLC in coordination with the Eastern Shore Climate Adaptation Partnership (ESCAP) at the October 25, 2018 meeting of the Hazard Mitigation Planning Committee (HMPC). During the meeting, Mr. Bass provided information on flood risk planning scenarios and potential mitigation strategies. HMPC members were able to review and discuss this information during the meeting. Highlights from the presentation have been incorporated herein.

The Eastern Shore Climate Adaptation Partnership (ESCAP) was established in 2016 to assist vulnerable communities with preparing for climate change impacts. The partnership is an informal regional collaboration of staff from seven local governments, state agencies, academic institutions, and nonprofit organizations.

Vulnerability Analysis: Sea Level Scenarios

Planning for the next flood-not the last

The vulnerability analysis conducted included:

- 2015 (baseline, 1% chance (previously known as the 100-year flood event), and the 0.2% chance (previously known as the 500-year flood event); and,
- Maryland 2050 and 2100 Sea Level Rise (SRL) projections, plus 1% chance flood.

As shown on Figures 6-1 through 6-3, using Maryland Sea Level Rise Projections for both 2050 and 2100 and flood depth from the 1% chance flood event, shown in both blue and pink, respectively, the extent of flooding increases significantly from that of 2015 1% chance flood event, the current level of risk planning, shown in green. The extent of inland flooding is substantially increased in both scenarios. *Note the additional buildings at-risk to these flood scenarios, as shown in yellow.*

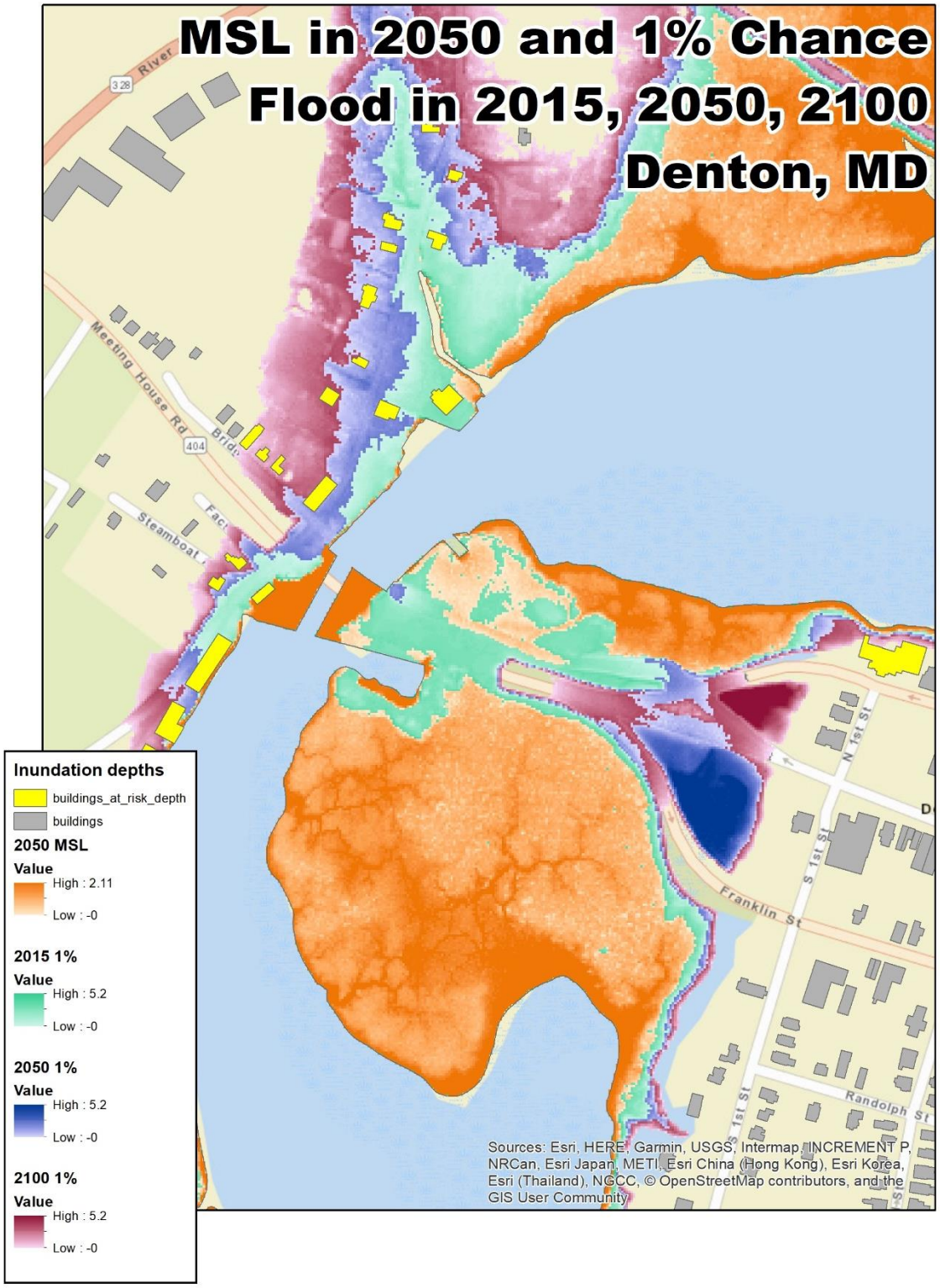
In addition, a comparison between structures at-risk presently to the 1% chance (previously known as the 100-year flood event) and those in 2050 are shown on Table 6-5.

Table 6-5: Vulnerability Analysis: Sea Level Scenarios-Structure Analysis

	1% CHANCE FLOOD EVENT TODAY	1% CHANCE FLOOD EVENT Plus 2050 SLR S
# Buildings Flooded	82	**184 (2.25x increase)**
Cumulative Damage	$643K	**$2.4 M (4x increase)**
Residential	$306K	**$1.5 M (5x increase)**
Commercial	$230K	**$300 K (1.3x increase)**
Damage estimates are for structures and contents. Excludes loss of revenues, etc.		

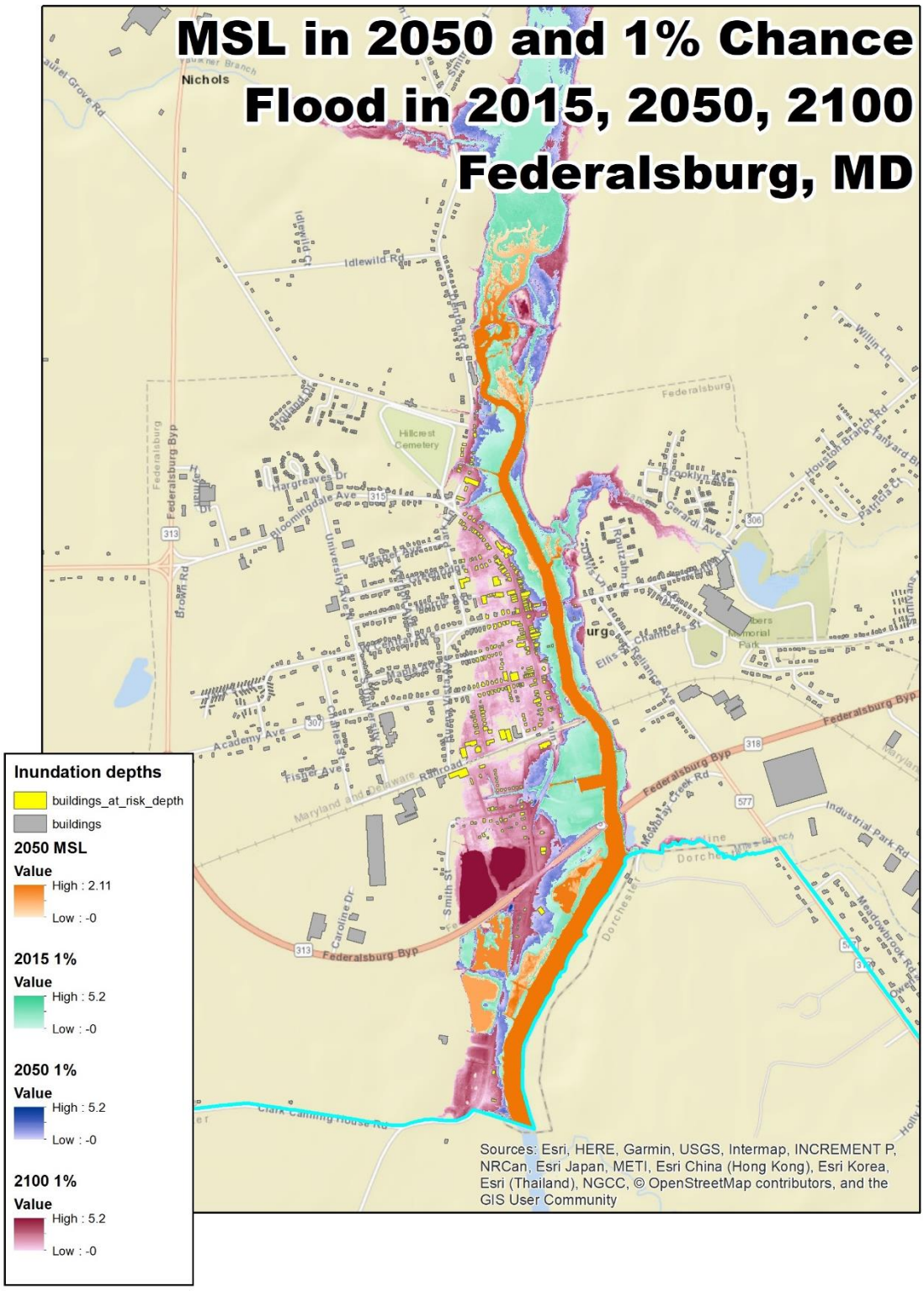
Source: PowerPoint Presentation by Jim Bass, Eastern Shore Land Conservancy (ESLC) during the October 25, 2018 HMPC meeting.

Figure 6-1



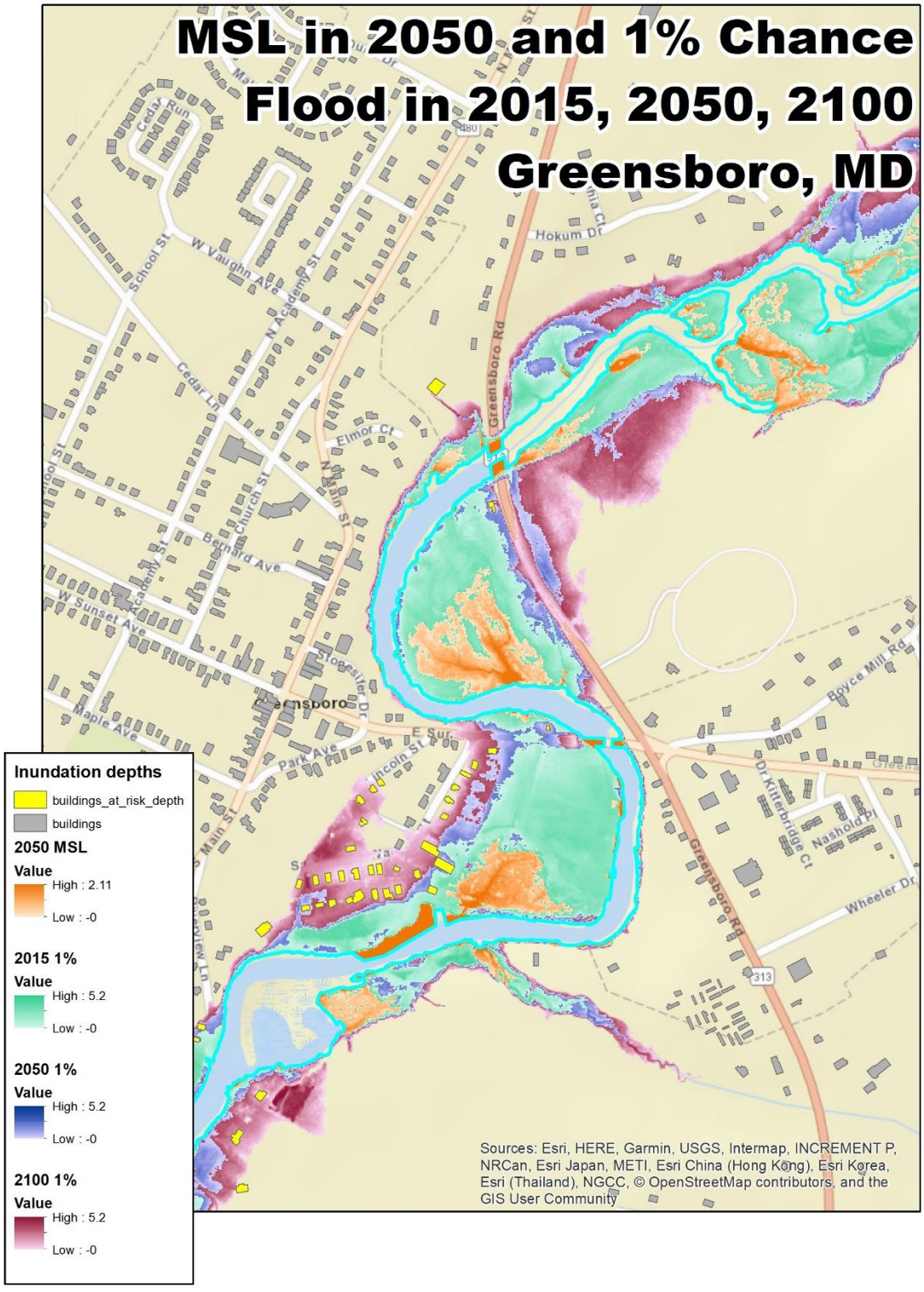
Source: PowerPoint Presentation by Jim Bass, Eastern Shore Land Conservancy (ESLC) during the October 25, 2018 HMPC meeting.

Figure 6-2



Source: PowerPoint Presentation by Jim Bass, Eastern Shore Land Conservancy (ESLC) during the October 25, 2018 HMPC meeting.

Figure 6-3



Source: PowerPoint Presentation by Jim Bass, Eastern Shore Land Conservancy (ESLC) during the October 25, 2018 HMPC meeting.

Sea Level Rise Mitigation Strategies- Eastern Shore Land Conservancy-Risk Management for the 21st Century Floodplain

Jim Bass, Eastern Shore Land Conservancy (ESLC), presented results of a recent planning initiative undertaken by the ESLC in coordination with the Eastern Shore Climate Adaptation Partnership (ESCAP) at the October 25, 2018 meeting of the Hazard Mitigation Planning Committee. In addition to the information provided on flood risk planning scenarios, potential mitigation strategies were reviewed and discussed.

Mitigation Strategy #1: Higher Floodplain Standards

- Regulate the height and extent of the 2050 SLR plus the 1% chance flood rather than the 1% chance flood only.
  - # of buildings within the FEMA 1% chance floodplain: approximately **80**
  - # of buildings within the FEMA 0.2% chance floodplain: approximately **120**
  - # of buildings within the modeled 1% chance floodplain and 2050 SLR risk area: approximately **200**
- Consider higher freeboard requirements, especially for critical and county/municipal – owned facilities.
- Map Coastal A Zones based on SLR models.

Freeboard is a factor of safety usually expressed in feet above a flood level for purposes of floodplain management. "Freeboard" tends to compensate for the many unknown factors that could contribute to flood heights greater than the height calculated for a selected size flood and floodway conditions, such as wave action, bridge openings, and the hydrological effect of urbanization of the watershed. Freeboard is not required by NFIP standards, but communities are encouraged to adopt at least a one-foot freeboard to account for the one-foot rise built into the concept of designating a floodway and the encroachment requirements where floodways have not been designated. Freeboard results in significantly lower flood insurance rates due to lower flood risk.

Source: Floridadisaster.org

Mitigation Strategy #2: Nuisance Flooding Plan

By July 1, 2019, a local jurisdiction that experiences nuisance flooding shall:

- Develop a plan to address nuisance flooding.
- Update the plan at least once every 5 years.
- Publish the plan on the local jurisdiction's website.
- Submit a copy of the plan to the Maryland Department of Planning.

Definition: "high-tide flooding that causes a public inconvenience"

Note: ESLC and the ESCAP are developing guidance packages to assist communities with implementing higher floodplain standards and creating a nuisance flood plan. Both packages will be available in early 2019.

Mitigation Strategy #3: Post Disaster Redevelopment Plan

- A long-term rebuilding plan that guides smarter rebuilding after a disaster.
- Required for local governments in Florida.
- Benefits: Faster and More Efficient Recovery.
  - Plans are already in place.
  - Take advantage of disaster recovery funds quickly. Develop competitive grant proposals.
- Opportunities to Build Back Better Superstorm Sandy in NJ illustrated the rush to rebuild the same things in the same place, missed opportunity to build smarter.
- Local Control Over Recovery.

Chapter 7: Winter Storms

Winter Storm Hazard Characterization

A wide variety of impacts from winter storms may result including:

- School;
- Government and business closings,
- Traffic accidents;
- Power outages;
- Loss of communication; and
- Damage to buildings such as a roof collapse.

Sleet, freezing rain, snow, and extremely cold temperatures are all associated with winter storms. Flooding and flash flooding may also occur from warming temperatures that result from rapid snowmelt.

A winter storm warning is issued when snowfall is expected to accumulate more than 6 inches in 12 hours or 8 inches in 24 hours is expected. The most snow by month in Maryland is February, according to the National Weather Service.

Winter Storm Hazard Risk & History

In Caroline County winter storms occur with less frequency than in other areas of the State and are usually less severe in terms of cold temperature, snow accumulation, and the amount of time snow is on the ground. Caroline County normally receives an average of 12 inches of snow per year. In addition, the County sometimes receives freezing rain during storms that produce snow to the north and west. Caroline County has an average January low temperature of 26.3 degrees.

While each winter seasons brings with it the possibility of major snow and ice storms, including nor'easters, some winter storms do stand out due to their severity and duration. Recent storms that stand out include an ice storm in February 1994 that resulted in widespread power outages in Caroline County, the President's Day storm in 2003 that resulted in more than 16 inches of snow in Denton, and two major storms in the same week in February 2010 that dropped a combined total of 30 inches in the Town of Denton. Furthermore, a major nor'easter, producing record snowfall in parts of Maryland on January 23, 2016. It then moved out to sea after passing by the mid-Atlantic coast early on January 24, 2016. Snowfall totals were 16.0 inches in Newton and 15.7 inches in Denton. Maryland Governor Larry Hogan declared a State of Emergency on Friday, January 22, 2016 as well as a presidential disaster declaration. On March 4, 2016, President Obama declared the following counties federal disaster areas: Caroline, Cecil, Kent, and Queen Anne's.

Presidential Declarations for Caroline County over the past decade:

- Maryland Severe Winter Storm and Snowstorm (DR-1875) – February 19, 2010
- Maryland Severe Winter Storms and Snowstorms (DR-1910) – May 6, 2010
- Maryland Hurricane Irene (DR-4034) – September 16, 2011
- Maryland Hurricane Sandy (DR-4091) – November 20, 2012
- Maryland Severe Winter Storm and Snowstorm (DR-4261) – March 4, 2016

Source: FEMA

As far as added extreme cold weather is concerned, in 1912, temperatures dropped to nearly -20 F over much of the state. During a prolonged cold spell in 1977, much of the Chesapeake Bay froze over for an extended period. A more recent event, one

of the harshest arctic outbreaks in years occurred across the Eastern Shore on the 7th. Record breaking calendar day low temperatures occurred and combined with strong northwest winds produced wind chill factors as low as 10 to 20 degrees below zero throughout the County. High temperatures struggled to reach double digits that day.

The *National Weather Service, National Centers for Environmental Information (NCEI)* operating under *National Oceanic and Atmospheric Administration* reported 25 cold/wind chill and 1 extreme cold/wind chill events and 32 significant snow or ice events for the County; their descriptions are provided in Table 7-1 and 7-2, respectively. In addition, 118 winter snow and ice events occurred within the County. These events include: blizzard, frost/freeze, heavy snow, sleet, winter storm, winter weather. Of these, thirty-two significant events that produced 6 inches or more snow is provided on Table 7-2.

Cold/Wind Chill Events – 1996-2017				
# Of Events	**Injuries**	**Deaths**	**Damages**	**Frequency**
24	0	0	0	1.09
Extreme Cold/Wind Chill Events – 2014-2017				
# Of Events	**Injuries**	**Deaths**	**Damages**	**Frequency**
1	0	0	0	0.25

Source: National Centers for Environmental Information (NCEI), Events through April 2018
Note:
***Cold/Wind Chill (Z)** - Period of low temperatures or wind chill temperatures reaching or exceeding locally/regionally defined advisory (typical value is -180 F or colder) conditions. If the event that occurred is considered significant, even though it affected a small area, it should be entered into Storm Data. There can be situations where advisory criteria are not met, but the combination of seasonably cold temperatures and low wind chill values (roughly 150 F below normal) may result in a fatality.*
***Extreme Cold/Wind Chill (Z**) - A period of extremely low temperatures or wind chill temperatures reaching or exceeding locally/regionally defined warning criteria (typical value around -350 F or colder). If the event that occurred is considered significant, even though it affected a small area, it should be entered into Storm Data. Normally these conditions should cause significant human and/or economic impact. However, if fatalities occur with cold temperatures/wind chills but extreme cold/wind chill criteria are not met, the event should also be included in Storm Data as a Cold/Wind Chill event and the fatalities are direct.*

Table 7-1: Cold/Wind Chill and Extreme Cold/Wind Chill Events

Date	Type of Event	Event Narrative
February 4, 1996 to February 6, 1996	Cold/Wind Chill	Some schools along the Eastern Shore were closed on Monday the 5th, the result of both the dangerously cold wind chill and the ongoing snow removal. Low temperatures on both the 5th and 6th hovered around zero degrees.
January 17, 1997 to January 20, 1997	Cold/Wind Chill	The coldest air mass of the winter season moved into the Maryland Eastern Shore on Friday the 17th. Strong gusty northwest winds brought wind chill factors well below zero on the 17th and 18th. The coldest morning was the 19th. For most places this was the coldest day of the winter season.
April 9, 1997 to April 11, 1997	Cold/Wind Chill	An unseasonably cold air mass from Canada moved across the Maryland Eastern Shore from April 9th through the 11th. Low temperatures those three mornings were below the freezing mark in most areas.
May 31, 1997	Cold/Wind Chill	May 1997 was an unseasonably cool month. For most locations, it was the coolest May since 1967. Monthly departures averaged 3 to 4 degrees below normal.
July 31, 2000	Cold/Wind Chill	July 2000 was one of the coolest and wettest Julys on record for the Maryland Eastern Shore.
July 31, 2001	Cold/Wind Chill	July 2001 was an unseasonably cool month for the state of Maryland. The preliminary monthly state mean temperature was 71.7 degrees, the 3rd coolest July on record since 1895.
January 14, 2003 to January 28, 2003	Cold/Wind Chill	A cold frontal passage on the 13th initiated about a two-week run of unseasonably cold weather, even by January standards across the Delmarva Peninsula. The coldest morning was the morning of the 18th where low temperatures dipped into the single numbers.
January 9, 2004 to January 11, 2004	Cold/Wind Chill	An arctic air mass brought some of the coldest weather in years to the Delmarva Peninsula from the evening of the 9th through the morning of the 11th.

January 15, 2004 to January 16, 2004	Cold/Wind Chill	Most low temperatures were in the teens and the lowest hourly wind chill factors averaged around five degrees below zero.
December 20, 2004	Cold/Wind Chill	A high-pressure system of arctic origin built into the Eastern Shore on the 20th. This was one of the coldest air masses of the entire winter season. The strong northwest winds produced wind chill factors as cold as 10 degrees below zero during the morning of the 20th.
January 18, 2005	Cold/Wind Chill	An unseasonably cold air mass that originated in Siberia poured across the Middle Atlantic States on the 18th. Actual low temperatures during the morning of the 18th were in the teens.
January 23, 2005 to January 24, 2005	Cold/Wind Chill	The combination of wind and unseasonably cold temperatures produced wind chill factors of around 5 degrees below zero across the Eastern Shore from the evening of the 23rd into the morning of the 24th. Actual low temperatures the morning of the 24th were in the single numbers (above zero).
January 28, 2005	Cold/Wind Chill	Low temperatures were around 10 degrees above zero. The unseasonably cold weather led to an increase in the number of calls for dead vehicle batteries.
February 5, 2007 to February 6, 2007	Cold/Wind Chill	The combination of the unseasonably cold air and gusty northwest winds produced wind chill factors as low as 0 to 10 degrees below 0 during the mornings of the 5th and 6th. The lowest temperatures occurred during the morning of the 6th and were around 10 degrees.
February 6, 2007	Cold/Wind Chill	An arctic air mass that originated near the North Pole invaded the Maryland Eastern Shore on the 5th and 6th. The combination of the unseasonably cold air and gusty northwest winds produced wind chill factors as low as zero to 10 degrees below zero during the mornings of the 5th and 6th. The lowest temperatures occurred during the morning of the 6th and were around 10 degrees. The unseasonably cold weather caused many pipes and water meters to freeze across the Eastern Shore.
March 6, 2007	Cold/Wind Chill	The combination of the strong northwest winds and an unseasonably cold air mass-produced wind-chill factors in the single numbers across the Eastern Shore on the morning of the 6th. Actual low temperatures were close to 20 degrees.
January 16, 2009 to January 18, 2009	Cold/Wind Chill	A large arctic high-pressure system moved toward the area during the 16th and 17th. The extent of the arctic air mass kept maximum temperatures only in the teens and 20s, with minimum temperatures down into the single digits.
2019 HMP UPDATE		
January 4, 2014	Extreme Cold/Wind Chill	A high-pressure system that moved over the Eastern Shore coupled with fresh snow cover from the winter storm on the 2nd and 3rd gave the area one of its coldest winter morning in years. This was the first of three arctic blasts in the state during the month. While this was the coldest morning of the winter for more rural areas that are normally colder on calm wind nights, it was not the harshest. Because the high-pressure system was over the region, wind chill factors and actual air temperatures were nearly the same. This was not the case a few days later and again around the 22nd of January. Low temperatures included 3 degrees in Tuckahoe (Caroline County).
January 7, 2014	Cold/Wind Chill	One of the harshest arctic outbreaks in years occurred across the Eastern Shore on the 7th. Record breaking calendar day low temperatures occurred and combined with strong northwest winds produced wind chill factors as low as 10 to 20 degrees below zero in most areas that morning. High temperatures struggled to reach double digits. The excessive cold caused many schools to have delayed openings. AAA Mid-Atlantic reported an 81 percent increase in service calls, mainly for dead batteries. Amtrak reported extensive delays in its rail service. The cold weather also affected power supplies. PJM Interconnection, the agency that oversees the electric grid supplying the region, said electricity suppliers were struggling to keep up with surging demand as the cold forced some power plants to shut. An all-time winter record usage was recorded at 8 a.m. EST on the 7th, 138,600 megawatts surpassing the previous record from 2007. Utilities asked their customers where possible to switch to diesel or fuel oil. Actual low temperatures included 6 degrees in Tuckahoe (Caroline County.
January 22, 2014	Cold/Wind Chill	Strong northwest winds behind the departing strong low-pressure system coupled with another arctic air mass dropped low temperatures on the morning of the 22nd into the single numbers to around 10 degrees along the Eastern Shore and produced wind chill factors as low as around 10 degrees below zero. In some places, low temperatures were as cold as January 7th and wind chill factors came close to matching that morning. Actual low temperatures included 5 degrees above zero in Tuckahoe (Caroline County).
January 7 to January 8, 2015	Cold/Wind Chill	The arrival of an arctic air mass brought one of the coldest mornings of the month of January to the Eastern Shore. Morning low temperatures were near 10 degrees above zero. In addition, gusty northwest winds continued into the morning and lowest hourly wind chill factors reached around 5 degrees below zero throughout the Eastern Shore. Actual low temperatures included 10 degrees in Preston (Caroline County.

February 15, 2015	Cold/Wind Chill	The combination of strong to high winds and an approaching arctic air mass-produced wind-chill factors as low as 10 to 15 degrees below zero during the first half of the day on the 15th on the Eastern Shore. Actual morning low temperatures were around 10 degrees above zero.
February 16, 2015	Cold/Wind Chill	The near arrival of the center of the arctic air mass brought some of the lowest wind chills and temperatures of the winter season to the Eastern Shore on the 16th. While winds by the morning of the 16th were not as strong as they were on the morning of the 15th, air temperatures were lower. This produced wind chill factors as cold as around 10 degrees below zero during the morning. Actual low temperatures were in the single numbers above zero. Lowest hourly wind chill factors included 6 degrees in Tuckahoe (Caroline County).
February 20, 2015	Cold/Wind Chill	The arrival of another arctic air mass brought the lowest wind chills as well as temperatures of the winter season to the Eastern Shore on the 20th and 21st. As far as wind chill factors went, the first half of the day on the 20th was colder with wind chill factors as low as around 15 degrees below zero during the morning. Actual low temperatures were in the single numbers above zero. On the morning of the 21st, little, if any, wind was present as the arctic high-pressure system was nearby. Low temperatures in some more rural inland areas were lower, some were below zero. But, because of the lack of wind, wind chill factors nearly matched the air temperatures. Lowest temperatures on either the 20th or 21st included 3 degrees below zero in Tuckahoe (Caroline County).
February 24, 2015	Cold/Wind Chill	The high-pressure system responsible for third and last arctic blast of the month of February arrived in the Eastern Shore on the morning of the 24th. Unlike the two previous arctic outbreaks earlier this month, this one was not accompanied by strong winds during the first half of the day. Consequently, air and wind chill temperatures were nearly the same. Nevertheless, many low temperatures away from Chesapeake Bay were in the single numbers (a couple even below zero) and generally in the lower teens along Chesapeake Bay. These were approximately 20 degrees colder than normal. Lowest temperatures included 8 degrees above zero in Tuckahoe (Caroline County). Since 1895, this February ranked as the 6th coldest February on record for Maryland with an average statewide temperature of 25.4 degrees (10.3 degrees below average).

Source: National Centers for Environmental Information (NCEI), Events through April 2018

In terms of number of occurrences, the *NWS, NCEI* listed a total of 24 cold/wind chill and 1 extreme cold event affecting Caroline County from 1996-2017. Therefore, Caroline County experiences 1.09 cold/wind chill events per year for and 0.25 extreme cold/wind chill events per year.

Blizzard Events– 2010-2017				
# Of Events	**Injuries**	**Deaths**	**Damages**	**Frequency**
1	0	0	0	0.13
Frost/Freeze Events– 2007-2017				
# Of Events	**Injuries**	**Deaths**	**Damages**	**Frequency**
1	0	0	0	0.09
Heavy Snow Events– 1996-2017				
# Of Events	**Injuries**	**Deaths**	**Damages**	**Frequency**
24	0	0	0	1.09
Sleet Events– 1997-2017				
# Of Events	**Injuries**	**Deaths**	**Damages**	**Frequency**
4	0	0	0	0.19
Winter Storm Events– 1996-2017				
# Of Events	**Injuries**	**Deaths**	**Damages**	**Frequency**
22	0	0	200.00k	1
Winter Weather Events– 1996-2017				
# Of Events	**Injuries**	**Deaths**	**Damages**	**Frequency**
66	0	0	0	0.33

Source: National Centers for Environmental Information (NCEI), Events through April 2018

Note:

Winter Storm (Z) - *A winter weather event that has more than one significant hazard (i.e., heavy snow and blowing snow; snow and ice; snow and sleet; sleet and ice; or snow, sleet and ice) and meets or exceeds locally/regionally defined 12 and/or 24-hour warning criteria for at least one of the precipitation elements. If the event that occurred is considered significant, even though it affected a small area, it should be entered into Storm Data. Normally, a Winter Storm would pose a threat to life or property. In cases of winter storms, the preparer should be careful to classify the event properly in Storm Data. In general, the event should be*

classified as a Winter Storm event (rather than an Ice Storm event or a Heavy Snow event) only if more than one winter precipitation type presented a significant hazard. Some Winter Storm and Blizzard events may have had sustained or maximum wind gusts that met or exceeded High Wind criteria. Rather than document an additional High Wind event, the Storm Data preparer should just mention the time, location, and wind value in the Winter Storm or Blizzard event narrative. This is permissible even if only light snow and minor blowing snow (no serious reduction in visibility below 3 miles) occurred with the high winds, as long as the high wind report is deemed reliable and was generated by the same synoptic storm system that resulted in the Winter Storm or Blizzard event. This scenario would be most likely in the mountains of the western United States.

***Winter Weather (Z)** - A winter precipitation event that causes a death, injury, or a significant impact to commerce or transportation, but does not meet locally/regionally defined warning criteria. A Winter Weather event could result from one or more winter precipitation types (snow, or blowing/drifting snow, or freezing rain/drizzle). The Winter Weather event can also be used to document out-of-season and other unusual or rare occurrences of snow, or blowing/drifting snow, or freezing rain/drizzle. If the event that occurred is considered significant, even though it affected a small area, it should be entered into Storm Data. Note that, in Storm Data, Blizzard events should cover a time period of 3 hours or more. Therefore, if blizzard-like conditions occur for less than 3 hours, the event should be entered as a Winter Storm, Heavy Snow, or Winter Weather, noting in the event narrative that near-blizzard or blizzard-like conditions were observed at the height of the event.*

The *National Weather Service, National Centers for Environmental Information (NCEI)* operating under *National Oceanic and Atmospheric Administration* reported 118 winter snow and ice events for the County. Thirty-two significant events that produced 6 inches or more snow is provided on the table below.

Table 7-2: Significant Winter Snow & Ice Events

Date	Event	Event Narrative
February 16, 1996	Heavy Snow	Accumulations averaged 7 inches in Talbot County, 8 inches in Caroline County, 9 inches in Cecil and Queen Anne's Counties and 12 inches in Kent County.
February 8, 1997	Heavy Snow	The snow ended during the evening hours. Accumulations were fairly uniform and averaged 4 to 6 inches across the Eastern Shore.
March 9, 1999	Heavy Snow	Caroline County accumulations ranged from around 3.5 inches in the northern part to around 5 inches in the southern part of the county.
January 20, 2000	Heavy Snow	Accumulations included 5.0 inches in Goldsboro (Caroline County).
January 25, 2000	Winter Storm	Total Accumulations included: Caroline County 10 inches in Denton and 8 inches in Federalsburg.
February 22, 2001	Heavy Snow	Specific accumulations included 7 inches in Preston (Caroline County) and 5.5 inches in Denton (Caroline County)
December 5, 2002	Winter Storm	In Caroline County alone, there were twenty-eight reported accidents. Accumulations included 7 inches Greensboro (Caroline County) and 4 inches in Denton (Caroline County).
January 16, 2003	Winter Storm	Schools were closed on the 17th in Caroline County. Specific accumulations included 3 inches in Federalsburg (Caroline County), and 1.0 inch in Denton (Caroline County).
February 6, 2003	Winter Storm	A winter storm that lasted about eighteen hours dropped about 5 to 8 inches of snow across most of the Eastern Shore. Specific accumulations included 8.5 inches in Greensboro (Caroline County) and 4.0 inches in Federalsburg (Caroline County).
February 16, 2003	Winter Storm	In Caroline County, problems with snow drifts kept many back roads blocked through the 18th. Government offices did not reopen until the 19th and schools were closed all week. 20.0 inches in Denton (Caroline County).
February 27, 2003	Heavy Snow	Schools were closed and after school activities were cancelled. Specific accumulations included 5.5 inches in Denton (Caroline County),
January 25, 2004	Heavy Snow	Schools were closed on the 26th and the 27th in Caroline County. Untreated roads were slippery. Specific accumulations included 5.0 inches in Denton and Federalsburg (Caroline County).
January 22, 2005	Winter Storm	The snow mixed with sleet in Talbot and Caroline Counties and reduced accumulations. Specific snowfall accumulation, 6 inches in Denton (Caroline County)
February 25, 2005	Heavy Snow	Specific accumulations included 6.0 inches in Denton (Caroline County) and 5.0 inches in Greensboro (Caroline County)
February 12, 2006	Winter Storm	The Eastern Shore picked up a significant amount of snow, especially locations farther to the north. Some specific amounts include, 8.0 inches in Ridgely (Caroline County), and 7.5 inches in Cordova (Talbot County).
February 25, 2007	Winter Storm	A winter storm that featured mixed precipitation affected the Maryland Eastern Shore on the 25th. Snowfall accumulations averaged 2 to 5 inches. Snowfall accumulations included 4.5 inches in Henderson (Caroline County).
March 1, 2009	Winter Storm	In Caroline County, 28 accidents were reported. Snowfall totals included 8.8 inches in Ridgely (Caroline County), and 5.5 inches in Denton (Caroline County). For some places this was the heaviest single snow event since February of 2003.

December 19, 2009	Winter Storm	Many municipalities declared states of emergency. Many school districts either closed schools or had two hour delayed openings on the 21st. Some churches cancelled services on the 20th. Trash pick-ups were delayed. Representative snowfall included 17.0 inches in Denton (Caroline County).
January 30 to January 31, 2010	Heavy Snow	Heavy snow fell across the Eastern Shore from the morning of the 30th into the early morning of the 31st. Snowfall averaged 4 to 10 inches with the highest amounts in the southern part of the Eastern Shore. Snow spread from south to north from 9 a.m. EST to Noon EST during the morning of the 30th. It fell at its heaviest during the afternoon and evening and ended from north to south between Midnight EST and 4 a.m. EST on the 31st. Representative snowfall included 7.5 inches in Greensboro (Caroline County).
February 5 to February 6, 2010	Winter Storm	A major winter storm dropped 20 to 30 inches of snow across the Maryland Eastern Shore from the afternoon of the 5th into the afternoon of the 6th. The snow fell at its heaviest during the first half of the day on the 6th. Many businesses and stores were closed on the 6th. Many states of emergencies were declared on both the township and county level. There were fender bender accidents on the 5th, but because this event ended on a Saturday (the 6th), the total number of accidents was relatively lower. Representative snowfall included 23.0 inches in Denton (Caroline County).
February 9 to February 10, 2010	Winter Storm	For the second time within a week a major winter storm, this one with blizzard conditions at times, affected the Maryland Eastern Shore. Many city, federal, social and county offices as well as courthouses were closed on the 10th. Schools were closed on the 10th and 11th, some even on the 12th. Representative snowfall included 16.3 inches in Greensboro (Caroline County), and 7.0 inches at Denton (Caroline County).
2019 HMP UPDATE		
February 10, 2010	Blizzard	For the second time within a week a major winter storm, this one with blizzard conditions at times, affected the Maryland Eastern Shore. Blizzard conditions occurred at times during the late morning and the first half of the afternoon on the 10th. Representative snowfall included 16.3 inches in Greensboro (Caroline County) and 7.0 inches at Denton (Caroline County).
January 2 to January 3, 2014	Heavy Snow	A winter storm dropped 4 to 7 inches of snow across the Maryland Eastern Shore from the late afternoon of the 2nd into the early morning of the 3rd. Representative snowfall totals included 7.0 inches in Greensboro (Caroline County)
January 21 to January 22, 2014	Heavy Snow	A winter storm dropped heavy snow across the Maryland Eastern Shore from the morning of the 21st into the morning of the 22nd. Representative snowfall totals included Henderson (Caroline County) and also in Denton (Caroline County) 4.0 and in Greensboro (Caroline County)
February 12 to February 14, 2014	Winter Storm	A winter storm dropped heavy snow and sleet across most of the Eastern Shore. Snowfall and sleet averaged 3 to 8 inches, except 8 to 15 inches in Cecil County which was most affected by heavy snow bands during the morning of the 13th. Representative snowfall included 6.0 inches in Greensboro (Caroline County), 5.7 inches in Henderson (Caroline County), 4.2 inches in Denton (Caroline County).
March 3, 2014	Winter Storm	A low-pressure system exiting the South Carolina coast brought a winter storm of freezing rain, sleet as well as heavy snow to the Eastern Shore on the 3rd. Representative snowfall included 5.1 inches in Denton (Caroline County).
March 16 to March 17, 2014	Heavy Snow	A low-pressure system that traversed across the southern United States brought heavy snow to the Maryland Eastern Shore on the 16th and 17th. Snowfall averaged 4 to 7 inches. Representative snowfall included 6.8 inches in Greensboro and Denton (Caroline County).
February 16 to February 17, 2015	Heavy Snow	A low-pressure system emerged east off the North Carolina coast and brought snow to Cecil and Kent Counties and heavy snow to Queen Anne's, Talbot, and Caroline Counties from the evening of the 16th into the morning of the 17th. Snowfall totals ranged mainly between 3 to 7 inches, with the highest totals being recorded in Queen Anne's, Talbot, and Caroline Counties. Representative snowfall totals included 6.0 inches in Greensboro (Caroline County) and 4.7 inches in Henderson (Caroline County).
March 5, 2015	Winter Storm	Waves of low pressure that formed along a sinking cold front brought the Eastern Shore its heaviest snow of the season on the 5th. Snowfall averaged 4.5 to 8.5 inches with the highest amounts in Cecil County. Representative snowfall included 7.2 inches in Greensboro (Caroline County).
January 22 to January 24, 2016	Winter Storm	An impulse from the west coast traversed the midsection of the country, then developed into a low-pressure system as it tracked across the Gulf states before intensifying along the Carolina coast into a major nor'easter, producing record snowfall in parts of Maryland on January 23rd. It then moved out to sea after passing by the mid-Atlantic coast early on January 24th. Some representative snowfall totals include: 16.0 inches in Newton, and 15.7 inches in Denton (both in

		Caroline County). Maryland Governor Larry Hogan declared a State of Emergency on Friday, January 22nd for the duration of the event. The Governor also requested a presidential disaster declaration. On March 4, 2016, President Obama declared the following counties federal disaster areas: Caroline, Cecil, Kent, and Queen Anne's. This declaration makes federal funding available on a cost-sharing basis for emergency work and the repair or replacement of facilities damaged by the severe winter storm. Federal funding is also available on a cost-sharing basis for hazard mitigation measures statewide.
January 7, 2017	Winter Storm	Snow began during the early morning hours on the 7th, then continued, heavy at times through the late afternoon hours, ending by sunset. Generally, 5 to 9 inches of snow fell in Caroline County during the storm, with the highest totals in the south. Some representative snowfall reports include 8.5 inches in Ridgely, 7.5 inches in Marydel, 7.0 inches in Federalsburg, 6.5 inches in Denton, and 5.2 inches in Greensboro.
March 21 to March 22, 2018	Winter Storm	Precipitation began as rain during the morning hours of Tuesday, March 20th. After a lull during the overnight hours, snow began falling by late morning on the 21st following some early sleet and freezing rain. Snow became heavy at times during the afternoon and evening hours. Some snowfall reports include: 7.5 inches in Griffin, and 6.8 inches in Greensboro.

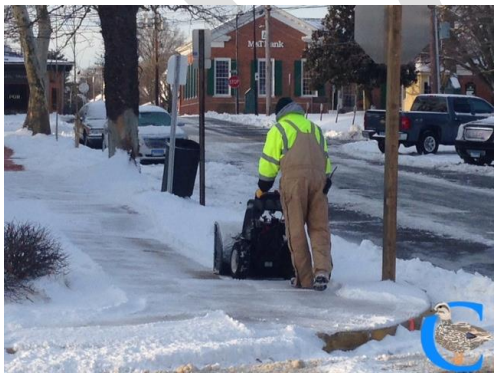
Source: NWS, NCDC(NOAA)

In terms of number of occurrences, the *NWS, NCEI* listed a total of 32 significant winter storm events affecting Caroline County from 1996-2017. Therefore, Caroline County experiences 1.45 significant (6 inches +) winter storm events per year.

In addition to NCEI data, MyEasternShoreMD.com reported the following recent winter storm events:

- February 10, 2010 – Blizzard conditions sweep through the area;
- January 3, 2014 - Frigid temperatures sticking around after winter storm;
- March 4, 2015 - Snowstorm to hit overnight;
- January 22, 2016 - Weekend storm may bring 12-18 inches of snow; and
- March 21, 2018 – Snowstorm closes Caroline schools for Thursday.

Winter Storm Vulnerability



Snow Clean Up – 3/4/14 – Denton, Maryland
Source: http://carolinecircle.com

The impacts associated with a winter storm are previously described in the hazard characterization of this chapter. The main impact that a winter storm will have on critical and public facilities is closure of operations and power outages. Generators are necessary for critical facilities to continue to operate during power outages. Facilities such as emergency management, police, fire, and EMS stations must be able to operate during winter storm power outages in order to provide their services to the public.

In addition, critical facilities built in or prior to 1967 with flat roofs may be susceptible to damage caused by heavy snow loads. There are fifteen (15) critical facilities built in or prior to 1967 within Caroline County. Roof geometry affects the ability of structure to shed snow. Simple roofs with steep slopes shed snow most easily. Roofs with geometric irregularities and obstructions collect snowdrifts in an unbalanced pattern. These roof geometries include flat roofs with parapets, stepped roofs, saw-tooth roofs, and roofs with obstructions such as equipment or chimneys. Note: there are eleven (11) critical facilities, which are aging structures, built in or prior to 1967, all having flat roofs, denoted on the table below.

Table 7-3: Critical Facilities Constructed 1967 & Prior

Facility Type	Facility Name	Municipality	Year Built	Flat Roof
1. EMS	Greensboro EMS- Station 16	Greensboro	1930	✓
2. EMS	Ridgely EMS – Station 14	Ridgely	1961	✓
3. EMS	Federalsburg EMS – Station 11	Federalsburg	1964	✓
4. Fire	Federalsburg VFD – Station 100	Federalsburg	1964	✓
5. Fire	Greensboro VFD – Station 600	Greensboro	1930	
6. Fire	Ridgely VFD – Station 400	Ridgely	1930	✓
7. Police	Ridgeley Police Department	Ridgely	1890	
8. Police	Federalsburg Police Station	Federalsburg	1962	Partial ✓
9. Police	Greensboro Police Department	Greensboro	1924	
10. Police	Caroline County Sheriff's Office	Denton	1905	
11. School	The Benedictine School	Ridgeley	1900	Partial ✓
12. School	Career & Technology Center	Ridgeley	1955	✓
13. School	Federalsburg Elementary	Federalsburg	1935	✓
14. School	North Caroline High	Ridgeley	1955	✓
15. Tower	Denton Transmitter Building	Denton	1954	✓

Source: 2018 Critical Facility Database

Vulnerable Populations

Elderly populations are considered particularly vulnerable to cold weather as a person's ability to thermoregulate can become impaired with age. Underlying diseases, such as diabetes, and medications can modify blood pressure, circulation, perspiration rates, and some mental capacities such as warmth perception, thus complicating people's ability to identify when they are experiencing cold.

Persons 65 years and older comprise 16% of the total population of Caroline County. Cold weather conditions can also be associated with other types of health impacts. For example, icy and snowy weather can increase the number of slips and falls, leading to injuries. During wintertime power outages, cases of carbon monoxide poisoning often increase, as people use devices such as barbeques or portable generators indoors for cooking or heating. People who are fuel deficient oftentimes experiences problems due to extreme cold events, particularly extended prolonged events. U.S. Census Data Population Estimates, July 2017, indicate that 15.3% of Caroline County population is living in poverty.

Home weatherization attached housing and energy assistance programs are examples of cold weather adaptation and mitigation strategies that may be encouraged by local government.

February 10, 2010 - A school bus sits Wednesday on Denton's Gay Street next to a two-story shed, the roof of which collapsed earlier in the day under the weight of fallen snow and ice. Caroline County officials said no was injured when the roof caved in.
Source: MyEasternShoreMD.com

Chapter 8: Drought & Extreme Heat

Drought Hazard Characterization

Drought is a normal part of virtually all climates, including areas with high and low average rainfall. 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. Although maintaining water supplies for human use is an important aspect of drought management, drought can also have many other dramatic and detrimental effects on the environment and wildlife.

The simplest definition of a drought is "an extended period of dry weather"; there are four different types of drought including:

- **Meteorological drought:** A measure of departure from normal precipitation due to climatic differences. What is considered a drought in one location may not be in another location.
- **Agricultural drought:** The amount of moisture in the soil no longer meets the needs of a particular crop.
- **Hydrological drought:** Surface and subsurface water levels are below normal.
- **Socioeconomic drought:** This occurs when physical water shortage begins to affect people.

Droughts may result in damage to crops, livestock, wildlife, and wildfires. During a prolonged drought, land values may decrease, and unemployment may increase. Negative economic impacts on water-dependent businesses may occur as well due to water restrictions implemented during a drought.

Extended drought damages leaves and berries on holly

Source:https://extension.umd.edu/hgic/topics/drought-conditions

According to the University of Maryland Extension, Home & Garden Center webpage, when drought conditions are prolonged, landscape plants, trees and lawns may suffer temporary or permanent damage.

Wayne Palmer in the 1960s and uses temperature and rainfall information in a formula to determine dryness developed the Palmer Drought Severity Index (PDSI). It has become the semi-official drought index. The Palmer Index is most effective in determining long-term drought—a matter of several months—and is not as good with short-term forecasts (a matter of weeks). It uses a 0 as normal, and drought is shown in terms of minus numbers; for example, minus 2 is moderate drought, minus 3 is severe drought, and minus 4 is extreme drought.

Table 8-1: Drought Severity Classification

DROUGHT SEVERITY	RETURN PERIOD (YEARS)	DESCRIPTION OF POSSIBLE IMPACTS	DROUGHT MONITORING INDICES		
			Standardized Precipitation Index (SPI)	NDMC* Drought Category	Palmer Drought Index
Minor Drought	3 to 4	Going into drought; short-term dryness slowing growth of crops or pastures; fire risk above average. Coming out of drought; some lingering water deficits; pastures or crops not fully recovered.	-0.5 to -0.7	D0	-1.0 to -1.9
Moderate Drought	5 to 9	Some damage to crops or pastures; fire risk high; streams, reservoirs, or wells low, some water shortages developing, or imminent, voluntary water use restrictions requested.	-0.8 to -1.2	D1	-2.0 to -2.9
Severe Drought	10 to 17	Crop or pasture losses likely; fire risk very high; water shortages common; water restrictions imposed	-1.3 to -1.5	D2	-3.0 to -3.9
Extreme Drought	18 to 43	Major crop and pasture losses; extreme fire danger; widespread water shortages or restrictions	-1.6 to -1.9	D3	-4.0 to -4.9
Exceptional Drought	44 +	Exceptional and widespread crop and pasture losses; exceptional fire risk; shortages of water in reservoirs, streams, and wells creating water emergencies	Less than -2	D4	-5.0 or less

Source: National Drought Mitigation Center

Drought Hazard Risk & History

The 2016 State of Maryland Hazard Mitigation Plan ranks Caroline County as "Medium-High" for drought. The Hazard Mitigation Planning Committee ranks drought as "Medium" and urges caution on days when the heat index approaches 105 degrees. Caroline County was one of four counties within Maryland with the highest number of recorded drought hazard events within the NCEI database. Dry conditions can impact water service to County residents and businesses.

The worst drought in Maryland occurred from December 1929 to February 1931, with 1930 being the driest year since 1869 (U.S. Weather Bureau 1930). During the 15-month agricultural drought, rainfall was 21.5 inches below normal. Crop losses in 1930 dollars were estimated at $40 million. In June 2010, unseasonably hot weather made June the second hottest June on record in Maryland. In addition, on September 9, 2010, the Maryland Department of the Environment issued a drought watch for the Maryland Eastern Shore except Cecil County. Furthermore, the Maryland Department of Natural Resources Forest Service advised against outdoor burning until the state received significant steady rainfall of one inch or more. It was the hottest summer on record in the State of Maryland. The drought and summer heat took its toll on Eastern Shore farmers and the United States Secretary of Agriculture Thomas Vilsack declared all counties in the Eastern Shore natural disaster areas.

More recently, the most oppressive hot spell of the summer season affected the Eastern Shore from July 15, 2015 through July 20, 2015. Widespread high temperatures reached into the mid-90s and the most oppressive days (combination of heat and

humidity) occurred on the 18th and 19th. Afternoon heat indices reached near 110 degrees.

Maryland generally experiences average to higher-than-average stream flow. However, it is normal for Maryland to experience drought cycles as well. In 2002, 72 average monthly low stream flow records were set across Maryland. In 2000, more wells broke monthly record lows than any other recorded period. In 1966, the worst year of the 1958-1971 droughts, 32 monthly low stream flow records were set. Between the years of 1951 -1999, stream flow into the Chesapeake Bay in 1999 had the fourth lowest annual flow. Lower flows were experienced only in 1963, 1965, and 1966.

The primary effect of these prolonged dry periods has been felt by the agricultural community. Water supply has also been affected, particularly where ground water is relied on to supply community systems as well as for the agricultural industry which relies on ground water for crop irrigation. Agriculture is the largest commercial industry in Maryland, employing about 350,000 people, on almost 13,000 farms covering two million acres. Maryland is expected to experience an increase in short-term droughts in the summer.

Warming temperatures will affect the farming industry, such as poultry. According to the Maryland Food System Map, 14% of Maryland's poultry farms are located in Caroline County.

Poultry in Peril

Poultry is the number one agriculture industry in the state and eighth in the nation, bringing in $640 million in 2009. While warming temperatures will require less heat in the winter, the need for better cooling systems is increasing, with record temperatures seen in the summers of 2010 and 2011. Increased temperatures reduce growth rates, increase mortality, and potentially increase the prevalence of *Salmonella*. More intense storms and sea level rise place poultry houses at risk of flooding. In September 1999, Hurricane Floyd flooded the Butler farm on the Pocomoke River, resulting in the loss of 25,000 chickens. Indirect impacts on poultry farmers may arise from changes in food supply. Warmer night temperatures, higher maximum temperatures, and a likely increase in fungal prevalence may impact poultry feed in the state, reducing profit margins.

Credit: Flickr (hmc_fabulous)

Poultry farms will feel the impacts of climate change.

Drought – 1997-2017				
# Of Events	**Injuries**	**Deaths**	**Damages**	**Frequency**
60	0	0	0	2.86

Source: NWS, National Centers for Environmental Information (NCEI), as of April 2018.

The NWS, NCEI also reported the following drought events for Caroline County.

Table 8-2: Drought Events

Date	Event Narrative
June 30, 1997 to October 31, 1997	June 1997 was drier than normal throughout the Maryland Eastern shore. On a county weighted average, deficits averaged between 1 and 2 inches. Only Talbot County was within an inch of normal. Coupled with the hot weather from June 21st onward, the lack of rain started to stress growing areas.
	The unseasonably hot and dry summer of 1997 caused the United States Secretary of Agriculture, Dan Glickman, to declare the state of Maryland a primary disaster area. Along the Maryland Eastern Shore, the corn crop was expected to be about 60 percent below normal and the soybean crop about 40 percent below normal.
	Yearly precipitation totals through October 31st on a county weighted average were below normal in all the Maryland Eastern Shore Counties
December 3, 1998 to December 31, 1998	The run of unseasonably dry weather that began in July started to take its toll on water supplies throughout the Middle Atlantic States. The commission urged the public and water suppliers to voluntarily conserve water, particularly indoor uses.

	December brought another month of below normal precipitation, especially in the northern part of the Maryland Eastern Shore.
January 1, 1999 to September 21, 1999	Monthly precipitation totals were 6.8 inches in Caroline County, about 3 inches above normal. Despite this, a drought warning was still in effect for the state as of January 31st.
	On a county weighted average February 1999 precipitation totals along the Eastern Shore ranged between 2.2 and 2.8 inches. However, additional precipitation was still needed to overcome longer-term water shortages as ground water levels were still below normal in most parts of the state. A drought warning remained in effect for the state of Maryland.
	March continued the trend of above normal precipitation during 1999 across the Maryland Eastern Shore. However, more precipitation was needed to overcome the long-term water shortages. The drought warning for the state of Maryland remained in effect through March.
	On a county weighted average April monthly precipitation across the Eastern Shore was close to normal as 3.1 to 3.5 inches of precipitation fell. While ground-water levels improved across the Eastern Shore, they were still below normal for April.
	On a county weighted average, monthly rainfall totals ranged from 0.6 inches in Talbot County (only .7 of an inch in Caroline County) to 2.7 inches in Cecil County. This was only around 15 percent of normal for Talbot and Caroline Counties.
	The drought intensified during the month of June across the Maryland Eastern Shore. The drought warning for the state of Maryland remained in effect. Several municipalities started implementing water restrictions including Centreville, Saint Michaels and Preston. On June 8th, the Maryland Department of Natural Resources (DNR) issued a warning of high fire danger across the Eastern Shore. About 35 acres have burned the first week of June.
	The April 1st through July 31st four-month period was the driest on record over the past 105 years in the state of Maryland. Farmers in Maryland were feeling a double pinch. Irrigation, if possible, was driving up the costs of farming. Meanwhile, ideal growing conditions elsewhere in the country kept crop prices low.
	July 1999 continued the trend of extremely warm and dry weather across the Maryland Eastern Shore and for the state of Maryland as a whole. The July 1999 statewide average temperature of 78.0 degrees was the 6th warmest July on record dating back to 1895. The statewide average rainfall total of 2.51 inches was only 64 percent of normal and was the 15th driest July on record.
	The first half of August continued the dire drought conditions across the Eastern Shore. A statewide drought emergency was already in effect.
	On September 1st Governor Parris N. Glendening lifted the mandatory watering and open burning restrictions across the Eastern Shore. The drought for all intents and purposes ended with the arrival of rain associated with Hurricane Floyd on the 16th. As much as 14 inches of rain (or about 4 months' worth of normal rainfall) fell from Floyd across the Eastern Shore.
October 31, 2000	October 2000 was one of the driest Octobers and month on record for the Maryland Eastern Shore. On a county weighted average monthly precipitation totals ranged from 0 (zero) in Caroline County to 0.4 inches in Cecil County. Normal monthly precipitation is around 3.1 inches. While the dry weather did minimal agricultural damage, it left the region susceptible to brush and forest fires because of the newly fallen leaves.
April 30, 2001	April 2001 was an unseasonably dry month for the Maryland Eastern Shore, especially during the second half of the month when very little rain fell. On a county weighted average, April monthly rainfall totals ranged from 1.5 inches in Queen Anne's County to 2.0 inches in Cecil County. This was about 50 percent of normal and most of the precipitation fell prior to April 14th. In addition to raising the fire danger, the unseasonably dry weather, if it persists, will threaten the growing season.
May 1 to May 19, 2001	Unseasonably dry weather continued across the Maryland Eastern Shore through May 18th. Little, if any, precipitation fell during the first 18 days of the month. It continued a trend that had prevailed since the second half of April. The lack of precipitation forced farmers to delay planting soybeans. May crops (grains/grasses) were either stunted or grew at a slow pace. Rain associated with a warm front brought the heaviest rain since early April to the Eastern Shore on the 19th and ushered a change in the weather pattern. For the rest of the month, precipitation totals were wetter than normal.
October 1, 2001 to December 31, 2001	October 2001 was an unseasonably dry month across the Maryland Eastern Shore. On a county weighted average, monthly precipitation totals ranged between 0.8 and 1.0 inches, about 33 percent of normal. Normal monthly precipitation is around 3.1 inches.
	N/A
	December 2001 continued the dry pattern that established itself during the latter half of the year in Maryland. On a county weighted average, monthly precipitation totals ranged from 1.7 inches in Kent County to 2.1 inches in Caroline County. Normal is around 3.6 inches.
January 1, 2002 to November 25, 2002	The Eastern Shore has received only 41 percent of normal precipitation since September 1st.
	For many locations, February 2002 was the driest February on record. On a county weighted average, monthly precipitation totals ranged from 0.5 inches in Cecil and Kent Counties to 0.8 inches in Caroline County. Normal is around 2.9 inches.
	The Maryland Department of the Environment continued its drought warning for all of the Maryland Eastern Shore.

	The rest of the Eastern Shore remained under a drought warning.
	Precipitation during May of 2002 was drier than normal in Talbot and Caroline Counties. The rest of the Eastern Shore remained under a drought warning.
	Precipitation during June of 2002 once again was drier than normal throughout the Maryland Eastern Shore.
	The combination of unseasonably warm weather and below normal precipitation intensified the drought across the Maryland Eastern Shore in July.
	The combination of unseasonably warm weather and below normal precipitation continued to intensify the drought across the Maryland Eastern Shore in August. The continued lack of precipitation prompted Governor Glendening to declare a drought emergency across the entire Eastern Shore and implemented level two water restrictions on August 27th.
	There was an increase in brush fires. Other than late planted soybeans, it was too late to help most crops. In early September stream flow and groundwater levels set many daily, monthly and even some record low levels.
	On the 18th United States Department of Agriculture Secretary Ann Veneman declared a drought disaster in several states including Maryland, Delaware and New Jersey.
	An unseasonably wet November ended the meteorological drought across the Maryland Eastern Shore.
September 1 to September 30, 2005	Dating back to 1895, it was the eight warmest and the driest September on record for the state of Maryland. Across the Eastern Shore, monthly county precipitation averages ranged from 0.4 inches in Caroline County to 0.7 inches in Kent County. Normal is about 3.6 inches.
July 24, 2007 to December 31, 2007	An unseasonably dry July was taking its toll on non-irrigated crops across the Maryland Eastern Shore from Kent County southward. Farmers were estimating their losses at 30 to 60 percent.
	Unseasonably dry weather into August took its toll on non-irrigated crops across the Maryland Eastern Shore. While the drought for the most part has been an agricultural concern, Preston (Caroline County) imposed odd/even watering restrictions.
	Unseasonably dry weather in September continued to take its toll on non-irrigated crops across the Maryland Eastern Shore. For the state of Maryland, it was the 3rd driest September on record dating back to 1895.
	The summer of 2007 was the second driest summer on record for the state since 1895. The entire Christmas tree planting was lost in Caroline County. Established trees survived, but the new plantings did not.
	November 2007 brought the return of below normal precipitation to the Maryland Eastern Shore. On a county weighted average, November rainfall ranged from 0.7 inches in Caroline County to 2.2 inches in Cecil County. Normal is around 3.4 inches.
	The unseasonably dry November led to the drought watch being upgraded to a drought warning for Caroline, Kent, Queen Anne's and Talbot Counties.
January 1, 2008 to June 11, 2008	January 2008 was unseasonably dry across the Eastern Shore as the drought watch remained in effect. January precipitation ranged from 1.6 inches in Cecil County to 1.9 inches in Caroline County. Normal is around 3.3 inches.
	February 2008 was slightly wetter than normal across the Eastern Shore, but the drought watch remained in effect.
	March 2008 was slightly drier than normal across the Eastern Shore. The drought watch remained in effect.
	April 2008 was slightly wetter than normal across most of the Eastern Shore. The drought watch remained in effect. A drought watch calls for a voluntary reduction in water consumption of five percent. On a county weighted average, April precipitation ranged from 3.3 inches in Kent County to 3.7 inches in Caroline County. Normal is around 3.3 inches.
	The drought watch remained in effect for most of the Eastern Shore.
	The above normal rainfall during the month of May and into the first part of June was sufficient to replenish groundwater and stream flow. The drought watch for Kent, Queen Anne's, Talbot and Caroline Counties was discontinued.
August 1 to August 31, 2008	An unseasonably dry August occurred across the Eastern Shore and could cause problems for crops if it persists into September and October.
2019 HMP UPDATE	
September 9, 2010 to November 1, 2010	The Maryland Department of the Environment issued a drought watch for the Maryland Eastern Shore except for Cecil County on September 9th. The Maryland Department of Natural Resources Forest Service strongly encouraged homeowners not to do any outdoor burning until the state received significant steady rainfall of one inch or more. The drought conditions were caused by the hottest summer on record in the state of Maryland as well as a drier than normal (about 80 percent of normal rainfall) summer. September 2010 was also warmer than normal (statewide average 1.9F higher than average) and until the last day of the month was also drier than normal. The heavy rain that fell on September 30th gave the state on average a wetter than normal September.
	The wet weather on September 30th and October 1st started to recharge water supplies in the state of Maryland. Even so, the Maryland Department of the Environment maintained a drought watch for

	all of the Eastern Shore except for Cecil County. The statewide October monthly precipitation average for Maryland was 4.48 inches, about one hundred thirty percent of normal and 1.10 inches wetter than average. Across the Eastern Shore, on a county weighted average, October monthly precipitation ranged from 4.5 inches in Cecil County to 5.9 inches in Caroline County. Normal is about 3.2 inches.
	The continuation of near normal precipitation and the drop-in water demand with the end of the growing season permitted the Maryland Department of the Environment to cancel all drought watches for the Maryland Eastern Shore. The drought and summer heat took its toll on Eastern Shore farmers and the United States Secretary of Agriculture Thomas Vilsack declared all counties in the Eastern Shore natural disaster areas. The declaration permitted affected farmers, ranchers and other agricultural producers eligible to apply for low interest emergency loans from the Farm Service Agency.
April 10, 2012 to October 31, 2012	The unseasonably dry weather in 2012, was even drier in March and continued during the first three weeks of April. The Drought Monitor was raised to D2 (severe drought) from Kent County southward along the Eastern Shore on April 10th. The Maryland Department of the Environment issued a drought watch for the Eastern Shore from Kent County southward on April 13th. Groundwater and streamflow levels were below normal. The Department of the Environment recommended that homeowners, farmers and businesses conserve water and reduce water usage where possible for irrigation. In addition, it was recommended that leaks be actively pursued and fixed. While around two inches of rain fell on the 22nd, it did improve conditions slightly. The drought status was lowered to D1 (Moderate Drought) on April 24th. The Drought Watch remained in effect. The rain on the 22nd and 23rd helped April return to near normal precipitation amounts across the Eastern Shore. On a county weighted average,
	On May 8th, the Maryland Department of the Environment extended the drought watch into Cecil County while maintaining the drought watch for the rest of the Eastern Shore. Through the end of April, yearly to date average precipitation across Maryland was about 64.5 percent of normal, the driest start to a year on record for the state dating back through 1895. Stream flow and groundwater levels were below normal through much of the state. During a drought watch, there is an increase in oversight of water supply conditions and the Maryland Department of the Environment encourages citizens to become more aware of their water use and to conserve it. The hope is that voluntary conservation will cut water usage by 5 to 10 percent in drought watch areas. Homeowners, government facilities, businesses and industry were asked to reduce water use for irrigation. The drought was already having an impact on farming as some farmers have waited to plant crops due to low soil moisture levels while others have had to start irrigating, a practice not typically needed during spring. The United States Drought Monitor depicted all the Eastern Shore in moderate drought (D1 status) as May began. Cecil County's drought level improved to D0 (abnormally dry) with the May 22nd monitor release. The drought watch for the county remained in effect through May. During the month of May, the state of Maryland averaged 82 percent of its normal rainfall. Across the Eastern Shore, county monthly weighted precipitation averages for May ranged from 2.4 inches in Caroline County to 2.7 inches in Cecil County. This averaged around 1.3 inches less than normal.
	The drought watch remained in effect for Eastern Maryland through June. Conditions improved somewhat during the month, especially in the northern part of the Eastern Shore. During the drought watch phase, there is an increase in oversight of water supply conditions and the Maryland Department of the Environment encourages citizens to become more aware of their water use and to conserve it. The hope is that voluntary conservation will cut water usage by 5 to 10 percent in drought watch areas. Homeowners, government facilities, businesses and industry were asked to reduce water use for irrigation. Stream flow and groundwater levels were below normal through much of the state at the start of the month, but stream flow levels recovered somewhat as the month progressed. As June started, the United States Drought Monitor depicted Cecil County as unusually dry and moderate drought (D1 status) for the rest of the Eastern Shore. During the month, showers and thunderstorms were more widespread in the northern part of the Eastern Shore than southern. On a county weighted average, June monthly precipitation ranged from 1.9 inches in Caroline County, to 2.5 inches in Talbot and Queen Anne's County, to 3.4 inches in Kent County and 5.1 inches in Cecil County. Normal is around 3.6 inches. By the end of the month, most of Cecil County returned to normal status, with Kent County was a mixture of abnormally dry and moderate drought (D1) status and the rest of the Eastern Shore remained in severe drought (D2) status.
	The drought watch remained in effect for Eastern Maryland through July. During the drought watch phase, there is an increase in oversight of water supply conditions and the Maryland Department of the Environment encourages citizens to become more aware of their water use and to conserve it. The hope is that voluntary conservation will cut water usage by 5 to 10 percent in drought watch areas. Homeowners, government facilities, businesses and industry were asked to reduce water use for irrigation. July began with moderate drought conditions (level D1 on the Drought Monitor) across all of the Eastern Shore except Cecil County. As the unseasonably hot and dry weather continued during the month, Talbot and Caroline were upgraded to severe drought status (level D2 on the Drought Monitor) on July 24th and continued at that level for the rest of the month. Fields that did not have the capability of being irrigated were suffering. On a county weighted basis, all of the Eastern Shore counties were drier than average during July with Caroline County the driest. County averaged precipitation amounts ranged from 2.3 inches in Caroline County to 3.1 inches in Talbot County. Normal is around 4.1 inches. It was also the third hottest July on record for the state of

	Maryland dating back to 1895.
	Drought conditions persisted over most of the Maryland Eastern Shore during most of August. The Maryland Department of the Environment issued a drought warning for Kent, Queen Anne's, Talbot and Caroline Counties on August 6th. The warning set a goal of reducing water usage by ten to fifteen percent. Drought relief arrived late in the month, but not in time to help the crops, especially corn. Crop losses in Caroline County reached up to 75 percent. On August 29th, the United States Department of Agriculture Secretary Tom Vilsack issued a Disaster Designation for Maryland. Farmers are now able to get some financial relief from the drought. The declaration covered all of the Eastern Shore counties. Because of the last week of the month, the state averaged above normal precipitation for the month of August.
	Improving drought conditions that started in late August continued throughout the month of September as the state of Maryland received (on a statewide average) near normal precipitation. According to the Drought Monitor, except for extreme eastern Caroline County (severe drought, level D2), drought conditions on the Eastern Shore improved to abnormally dry (level D0) in Kent County with moderate drought conditions (level D1) reported for Talbot and Queen Anne's Counties and most of Caroline County. Because of the improving conditions, the Maryland Department of the Environment upgraded the drought warning to a drought watch for Kent, Queen Anne's, Talbot and Caroline Counties on September 12th. The drought watch was continued because rainfall and ground water levels were still below normal for the year. The goal is for voluntary conservation to cut water usage by 5 to 10 percent in drought watch areas. Homeowners, government facilities, businesses and industry were asked to reduce water use for irrigation. Drought relief did not arrive in time to help the crops, especially corn. Crop losses in Caroline County reached up to 75 percent. On August 29th, the United States Department of Agriculture Secretary Tom Vilsack issued a Disaster Designation for Maryland. Farmers are now able to get some financial relief from the drought. The declaration covered all the Eastern Shore counties.
	The flooding rains associated with Sandy ended drought conditions along the Maryland Eastern Shore. The Maryland Department of the Environment lifted the drought watch for the area.

Source: NWS, National Centers for Environmental Information (NCEI), as of April 2018.

In terms of number of occurrences, the NWS, NCEI listed a total of 60 drought events affecting Caroline County from 1997-2017. Therefore, Caroline County experiences 2.9 drought events per year.

Drought Vulnerability

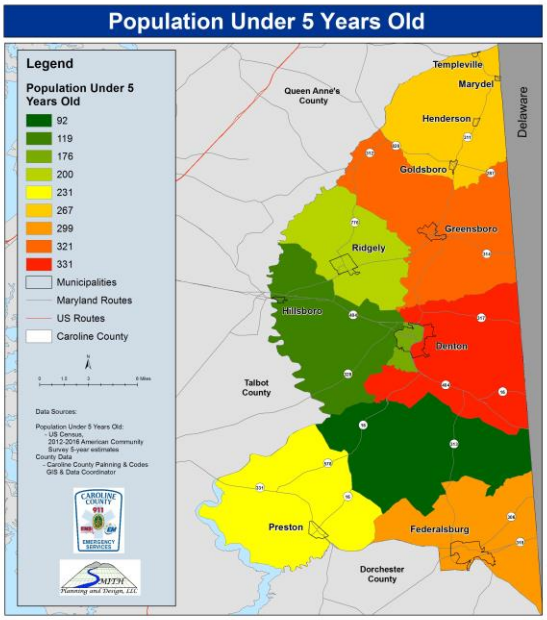
According to the *2010 Caroline County Comprehensive Plan*, groundwater sources in Caroline County include the Piney Point, Columbia, and Aquia Aquifers, and the Chesapeake Group, which includes aquifers within the Calvert and Choptank Formations. Aquifers within the Choptank and Calvert Formations yield small amounts of water, primarily to shallow; domestic wells. The Columbia aquifer is the surficial aquifer on most of the Eastern Shore. The Piney Point aquifer is tapped by wells in an area about 40 miles wide between Caroline and St. Mary's Counties and is a major water source for Caroline County. The Aquia Aquifer is a major water source for parts of the Eastern Shore (including northern Caroline County), southern Maryland, and Anne Arundel County.

In the western half of Caroline County, which contains gently rolling, well-drained land, the water table lies between 10 and 30 feet below the surface. The eastern half of the County is comparatively flat with poorly drained land, and the water table is generally within 10 feet of the surface.

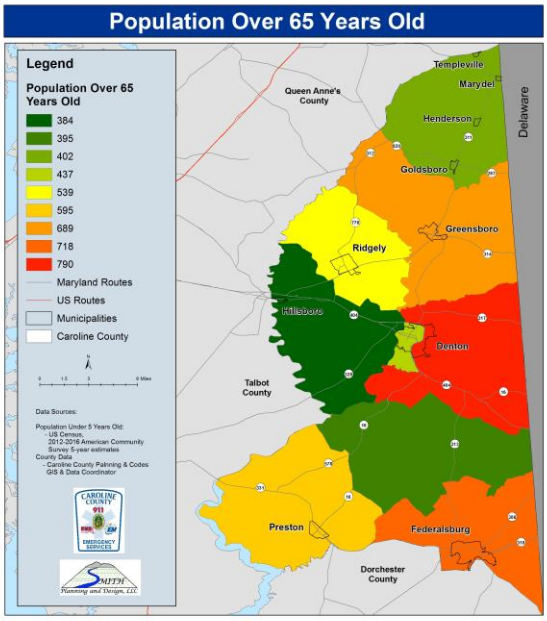
There are no impoundments used for water supply in Caroline County; residents rely exclusively on groundwater for water supply. While not frequent, extended periods of little or no precipitation are not uncommon in Caroline County, resulting in decreased stream flows and groundwater levels.

The two age groups most vulnerable to extreme temperatures are the elderly and younger populations. The two maps on the previous page depict the highest concentrated areas of these two groups in the County based on the estimated 2016 Census Tracts.

Map 8-1: Under Age 5



Map 8-2: 65 and Older



Source: Estimated 2016 Census Tracts

Extreme Heat Hazard Characterization

NOAA defines extreme heat as a combination of high temperatures (significantly above normal) and high humidity. At certain levels, the human body cannot maintain proper internal temperatures and may experience heat stroke. The "Heat Index" is a measure of the effect of the combined elements on the body. NOAA also states that heat is the number one weather-related killer in the United States, resulting in hundreds of fatalities each year. In fact, on average, excessive heat claims more lives each year than floods, lightning, tornadoes and hurricanes combined. In the disastrous heat wave of 1980, more than 1,250 people died. In the heat wave of 1995 more than 700 deaths in the Chicago area were attributed to heat. In August 2003, a record heat wave in Europe claimed an estimated 50,000 lives.

Figure 8-1 is from the National Weather Service Forecast Office and shows the possible effects of heat on these higher risk groups.

Heat Index	Possible heat disorders for people in higher risk groups
130 or higher	Heatstroke/sunstroke highly likely with continued exposure.
105-130	Sunstroke, heat cramps or heat exhaustion likely, and heat stroke possible with prolonged exposure and/or physical activity.
90-105	Sunstroke, heat cramps and heat exhaustion possible with prolonged exposure and/or physical activity.
80-90	Fatigue possible with prolonged exposure and/or physical activity.

Source: NOAA

Extreme Heat Hazard Risk & History

The *National Weather Service, National Centers for Environmental Information (NCEI)* operating under *National Oceanic and Atmospheric Administration* reported the following excessive heat and heat events for Caroline County.

Heat Events – 1996-2017				
# Of Events	**Injuries**	**Deaths**	**Damages**	**Frequency**
59	9	0	0	2.68
Excessive Heat Events – 2000-2017				
# of Events	Injuries	Deaths	Damages	Frequency
16	0	0	0	1.45

Source: NWS, National Centers for Environmental Information (NCEI), as of April 2018.

Table 8-3: Excessive Heat Events

Date	Type of Event	Event Narrative
March 31, 2000	Excessive Heat	March 2000 was an unseasonably warm and wet month across the Maryland Eastern Shore. The statewide monthly average temperature of 47.6 degrees was the 7th warmest March on record since 1895.
May 2 to May 4, 2001	Excessive Heat	High temperatures reached around 90 degrees on both the 3rd and the 4th.
June 26 to June 28, 2007	Excessive Heat	The first heat wave of the season (loosely defined as three consecutive days with high temperatures of 90 degrees or higher) occurred across most of the Maryland Eastern Shore from the 26th through the 28th.
July 8 to July 10, 2007	Excessive Heat	A heat wave brought unseasonably hot weather to the Eastern Shore on July 8th through the 10th. The combination of the heat and humidity produced afternoon heat indices of around 100F both afternoons.
August 7 to August 8, 2007	Excessive Heat	Highest temperatures were close to 100 degrees in most areas.
August 25, 2007	Excessive Heat	Heat indices of 105F to 110F which were similar only to August 8th as the highest of the summer.
June 7 to June 10, 2008	Excessive Heat	The combination of high temperatures well into the 90s and dew point temperatures in the 70s produced apparent temperatures or heat indices values as high as 105 to 110.
July 16 to July 23, 2008	Excessive Heat	The longest heat wave of the summer affected the Maryland Eastern Shore from July 16th through the 23rd. The combination of the temperatures and dew points produced apparent temperatures or heat indices of around 100F.
August 10, 2009	Excessive Heat	The heat index at Easton peaked at 105 degrees as the dew point was at 77 degrees. High temperatures were mainly in the mid 90s.
2019 HMP UPDATE		
June 23 to June 24, 2010	Excessive Heat	Unseasonably hot and humid weather enveloped the Maryland Eastern Shore on the 23rd and 24th. It culminated on the 24th with maximum temperatures of 95 to 100 degrees and afternoon heat indices of around 105F.
June 27 to June 28, 2010	Excessive Heat	Two more days of unseasonably hot and humid weather affected Eastern Maryland on the 27th and 28th. High temperatures reached 95 to 100 again and combined with the humid air mass to produce afternoon heat indices of around 105F on the 28th.
July 5 to July 7, 2010	Excessive Heat	The hottest weather of the summer season occurred on July 5th through the 7th throughout the state of Maryland. Some high temperatures on the 6th and 7th exceeded 100 degrees. For those places that reached 100 degrees, this was the first time since August of 2001 than high temperatures exceeded 100 degrees. Humidity levels were relatively low and in many places the afternoon heat index was only slightly higher than the actual temperature.
July 23 to July 25, 2010	Excessive Heat	The last heat wave in July culminated with some of the highest heat indices of the summer on the 24th and numerous high temperatures around 100 degrees. The combination of the heat and humidity produced heat index values of 105 to 110 degrees on the 24th. The heat wave ended with the passage of severe thunderstorms and a strong cold front during the afternoon of the 25th.
July 21 to July 24, 2011	Excessive Heat	One of the most oppressive heat waves since mid-July 1995 enveloped the Eastern Shore from July 21st through the 24th. Many locations had high temperatures that reached into the 100s. The most oppressive day was July 22nd when the combination of temperature and dew points pushed afternoon heat index values to between 110F and 125F.

June 29, 2012	Excessive Heat	An unseasonably hot and humid day produced high temperatures of around 100 degrees along the Eastern Shore on the 29th. Combined with the humidity levels, maximum hourly heat indices reached around 110F (for example 111 degrees at the Baltimore-Washington International Airport and 109 degrees in Salisbury). The heat and humidity then set the stage for the powerful derecho that moved through the Eastern Shore later that evening.
July 18 to July 19, 2013	Excessive Heat	The most oppressive hot spell of the summer season affected the Eastern Shore from July 15th through the 20th. Widespread high temperatures reached into the mid-90s and the most oppressive days (combination of heat and humidity) occurred on the 18th and 19th. Afternoon heat indices reached near 110 degrees.

Source: NWS, National Centers for Environmental Information (NCEI), as of April 2018.

In terms of number of occurrences, the *NWS, NCEI* listed a total of 16 excessive heat events affecting Caroline County from 2000-2017. Therefore, Caroline County experiences 1.45 extreme heat events per year. The *NWS, NCEI* also reported 9 injuries from the extreme heat events.

Extreme Heat Vulnerability

It is evident from past events that extreme heat is dangerous and can cause human related illnesses and death. As temperatures go up so do the number of people hospitalized for heat related illnesses. Therefore, it is important to understand how many people are exposed to such conditions, and how many buildings exist, where potential problems could arise should power be lost. Additionally, extreme heat can cause damage to buildings or contents by overheating HVAC or air conditioning systems, contributing to jurisdictional losses. It is unlikely that an entire building would be impacted in an extreme heat event, though.

The elderly, just like small children, are more susceptible to temperature extremes. Additionally, buildings of significant age may be more susceptible to temperature extremes from extreme heat. Facilities need to be maintained to ensure that they operate in appropriate conditions for people. Temporary periods of extreme hot temperatures typically do not have significant environmental impact. However, prolonged periods of hot temperatures may be associated with drought conditions and can damage or destroy vegetation, dry up rivers and streams, and reduce water quality.

Chapter 9: Severe Weather

Introduction

Severe weather as described herein includes thunderstorms, tornados, lightning, and hail. The effects of thunderstorms, tornados, hail, lightning, and wind may cause many types of hazards including power outages, communication failures, road closures, and loss of infrastructure. These hazards are random in nature and can occur Countywide due to the lack of predictable hazard zones.

Thunderstorm Wind Hazard Characterization

Thunderstorms are usually high intensity storms of short duration originating in a warm moist air mass that is either forced to rise by mountainous terrain or by colliding with a cooler dense air mass. The process of convection in the atmosphere brings about the release of moisture from the warm air mass as it rises, cools and condenses. This condensation proceeds until most of the moisture in the air mass has been precipitated.

Since the motion of the air is nearly vertical, and attains high velocities, rainfall is intense and generally concentrated over a small area in a short time frame. Thunderstorms can be 10-15 miles in diameter and normally last 20-30 minutes.

The National Weather Service considers a thunderstorm severe only if produces wind gusts of at least 58 mph or higher, hail and/or at least (1 in. diameter), or tornados. Furthermore, “downbursts” cause the high winds in a thunderstorm. Downburst winds result from the sudden descent of cool or cold air toward the ground. As the air hits the ground, it spreads outward, creating high winds. Unlike tornadoes, downburst winds move in a straight line, without rotation.

Thunderstorm Wind Hazard Risk & History

Between 1956 and 2017, the *National Weather Service, National Centers for Environmental Information (NCEI)* reported 88 thunderstorm wind events that have occurred in Caroline County. Thunderstorm wind events with reported property damage are shown in Table 9-1.

Thunderstorm Wind Events– 1956-2017				
# Of Events	**Injuries**	**Deaths**	**Damages**	**Frequency**
88	0	0	405.00K	1.42

Table 9-1: Thunderstorm Wind Events with Reported Property Damage

Location	Date	Event Narrative	Property Damage
Preston	June 4, 2008	A squall line of severe thunderstorms plus an EF0 tornado caused wind damage across southwestern Caroline County. The combination of the squall line and the tornado caused about $500,000 in damage to about 30 homes and businesses in and around Preston.	$200,000
2019 HMP UPDATE			
Denton	July 25, 2010	A severe thunderstorm caused wind damage across several municipalities in Caroline County. Numerous trees and wires were knocked down, some were greater than 100 years old. Choptank Electric and Delmarva Power and Light reported about 3,000 homes and businesses lost power in the county. Power was not fully restored until 5 a.m. EDT on the 26th. In Denton, the porch railings were ripped away from one home and porch furniture was tossed two hundred feet. Numerous trees were knocked down from Asbury off of Maryland State Route 328 southeast through the Caroline	$100,000

		Country Club. In Federalsburg, the damaging winds caused roof damage to one home and Henry's Furniture Store. Dover Doppler Radar was measuring winds of around 85 mph at 1,300 feet above Denton.	
Harmony	June 29, 2012	A gust front outrunning a cluster of severe thunderstorms entered near Harmony in western Caroline County at approximately 11:40 pm EDT on the 29th. This gust front produced damaging wind gusts estimated at 65 mph as it traversed eastward across the county. Within approximately 20 minutes of the gust front passage, a potent line of severe thunderstorms tracked eastward through Caroline County, producing another round of destructive wind gust, estimated at 65 mph. Trees and electric wires were reported down across the county. Severe thunderstorms exited eastern Caroline County, including the town of Henderson, at approximately 12:49 am EDT on the 30th.	$50,000
Preston	September 8, 2012	A severe thunderstorm caused roof damage to a home on Payne Road in Preston.	$5,000
Preston	February 21, 2014	A severe thunderstorm badly damaged a home in Preston. The winds lifted the house's front porch over the back of it. A window air-conditioning unit was blown into the house. Two sliding glass doors were torn away, and the effects of the wind badly damaged the home's kitchen and living room. The American Red Cross provided a hotel room for the home owner. No injuries occurred.	$25,000
Preston	October 7, 2014	A severe thunderstorm caused tree and home wind damage in Preston. Multiple residents suffered minor damage to their homes, yards and outdoor items. In the Hughlett Road and Tidewater Circle area, several trees were knocked down. Several fences were damaged. Multiple trampolines and yard ornaments were blown into other yards. Several homes suffered damage to soffits and one heat pump was knocked over. A resident in the area had a measured wind gust of 77 mph. Street signs were also blown down. In the Williamson Street area, multiple residents also had whole trees knocked down.	$25,000

Source: National Centers for Environmental Information (NCEI), Events through April 2018

Thunderstorms can also produce lightning and high winds. The *National Weather Service, National Centers for Environmental Information (NCEI)* reported the following lightning and high wind events for Caroline County.

Lightning Events – 1996-2017				
# Of Events	**Injuries**	**Deaths**	**Damages**	**Frequency**
7	1	0	59.00k	0.32

Table 9-2: Lightning Events

Location	Date	Event Narrative	Property Damage
Denton	January 19, 1996	A person was struck and injured by lightning in Denton.	Not Available
Henderson	August 19, 1999	Thunderstorms with frequent lightning caused 10,000 homes and businesses to lose power on the Maryland Eastern Shore. Power outages also occurred in northern Caroline County.	Not Available
Denton	May 13, 2000	Lightning struck the ground near the Caroline County Courthouse and entered the building. The lightning damaged the County's and State's computer and phone systems.	$28,000
Federalsburg	June 30, 2001	Lightning struck and ignited a fire in a Federalsburg house. No serious injuries were reported.	Not Available
Baltimore Corner	April 6, 2009	A lightning strike and the ensuing fire destroyed an abandoned barn outside of Henderson along Bee Tree Road in Caroline County. A nearby tree was initially struck by the lightning. The two-story barn was destroyed.	$25,000
Preston	April 21, 2009	A lightning strike caused 31 homes to lose power in Preston. Power was restored to all homes by 11 p.m. EDT that evening.	$1,000
2019 HMP UPDATE			
Hillsboro	June 1, 2010	A house in Hillsboro was struck by lightning.	$5,000

Source: National Centers for Environmental Information (NCEI), Events through April 2018

In terms of number of occurrences, the *NWS, NCEI* listed a total of 7 lightning events affecting Caroline County from 1996-2017. Therefore, Caroline County experiences 0.32 lightning events per year.

High Wind – 1999-2017 *High Wind Events 50kts Or Stronger*				
# Of Events	**Injuries**	**Deaths**	**Damages**	**Frequency**
7	0	0	26.50K	0.37

Source: National Centers for Environmental Information (NCEI), Events through April 2018

Table 9-3: High Wind Events

Date	Event Narrative	Property Damage
September 16, 1999	Hurricane Floyd battered the Maryland Eastern Shore on September 16th and brought with it torrential rains and damaging winds. President Clinton declared all of the Maryland Eastern Shore a disaster area. Wind gusts rarely exceeded 50 mph, but all the flooding rains made it easy for trees to be knocked over. Ten homes and several businesses along the Tuckahoe Creek were badly flooded. In Caroline County, towns near rivers (Denton, Federalsburg, Greensboro and Hillsboro) bore the brunt of the damage. Six roads and thirty bridges were in need of repairs. About 20 people were in shelters throughout the County. Other dam failures or spillovers occurred on Lake Bonnie near Goldsboro, Crouse Mill in Tuckahoe State Park and Chambers Lake near Federalsburg. Three schools suffered water damage. Large pieces of roadways collapsed on Maryland State Route 480 and Second Street in Denton. Infrastructure damage alone was estimated as high as 2.5 million. A truck driver was injured when his vehicle overturned on a flooded Maryland State Route 312. Storm totals included 11.20 inches in Federalsburg (Caroline County.	$500,000
November 2, 1999	An unseasonably humid air mass spread across the Middle Atlantic States on November 2nd. This produced wind damage across the Maryland Eastern Shore mainly in the form of downed trees, tree limbs and wires.	Not Available
December 12, 2000	Peak wind gusts ranged between 50 and 60 mph and knocked down trees, tree limbs and power lines. About 11,000 homes and businesses lost power. The worst reported wind damage occurred in Caroline County where seven municipalities reported wind damage. The worst damage within the county occurred in the northern part around Henderson where downed trees blocked several roads.	Not Available
December 31, 2008	High winds buffeted the Eastern Shore during the afternoon of the 31st. Numerous tree limbs, trees and power lines were knocked down. Delmarva Power and Light reported about 40,000 homes and businesses lost power in their service area including the Eastern Shore. A large garage fire in Denton (Caroline County) was tough to contain and battle because of the high winds. The fire spread to three other buildings and went to six alarms. All four structures were destroyed, and an old elementary school suffered heat damage.	$4,000
February 12, 2009	Peak wind gusts averaged around 50 mph and knocked down several tree limbs, weak trees and power lines. In Preston, the single support post of a roof covering at a Valero gas station snapped at 2 p.m. EST. Peak wind gusts included 47 mph in Ridgely (Caroline County.	$10,000
2019 HMP UPDATE		
February 15, 2015	The increasing pressure difference (gradient) between a rapidly intensifying low-pressure system offshore and an arctic high-pressure system moving east from the Great Lakes caused strong to high damaging northwest winds to occur on the Eastern Shore from the evening of the 14th into the early afternoon on the 15th. Strong wind gusts started during the second half of the evening on the 14th, peaked overnight and continued into the early afternoon of the 15th. Peak wind gusts averaged around 55 mph and knocked down or snapped trees and tree limbs. This caused downed wires and widely scattered power outages. The strong to high winds also hampered road crews trying to keep roadways clear from the snow that fell on the 14th. It also ushered into the Eastern Shore one of the coldest air masses of the entire winter season.	$12,500
March 2, 2018	Downed trees were reported throughout the county. A wind gust of 48 mph was recorded by the AWOS unit at Easton Airport at 0750EST on March 2nd.	Not Available

Source: National Centers for Environmental Information (NCEI), Events through April 2018

In terms of number of occurrences, the *NWS, NCEI* listed a total of 7 high wind events 50kts or stronger affecting Caroline County from 1995-2017. Therefore, Caroline County experiences 0.37 high wind events (50kts or stronger) per year.

In terms of number of occurrences, the *NWS, NCEI* listed a total of 88 thunderstorm events affecting Caroline County from 1956-2017. Therefore, Caroline County experiences 1.42 thunderstorm events per year.

Thunderstorm Wind Vulnerability

Thunderstorms can cause damage to buildings, downed trees which can block roads, and power outages from downed poles and lines. The events per year rate for this hazard are high when compared to other hazards; most events cause little or no damage to buildings such as critical and public facilities.

Tornado Hazard Characterization

A tornado is defined by *Strahler* in his *Physical Geography* Text as a violently rotating column of air extending from a thunderstorm to the ground. Normally thunderstorms and tornados develop in warm, moist air in advance of strong eastward moving cold fronts in late winter and early spring. Tornados can also occur along a "dryline" which separates very warm, moist air to the east from hot, dry air to the west. Under the right temperature and moisture conditions, intense thunderstorms can produce tornados in areas of differential heating, which occurs on the Eastern Shore.

According to NOAA, tornados were previously measured on the Fujita Scale (F-Scale), named for Dr. Tetsuya Theodore Fujita. The operational Fujita scale ranges from an F0 to an F5. The strongest tornadoes observed to date have been F5 (winds between 261-318 mph). A new Enhanced Fujita Scale (EF Scale) was developed and employed by the National Weather Service (NWS) in 2007. The EF Scale is a set of wind estimates (not measurements) based on damage. The new scale uses three-second gusts estimated at the point of damage based on 28 detailed damage indicators.

Table 9-4: Fujita Scale and Enhanced Fujita Scale

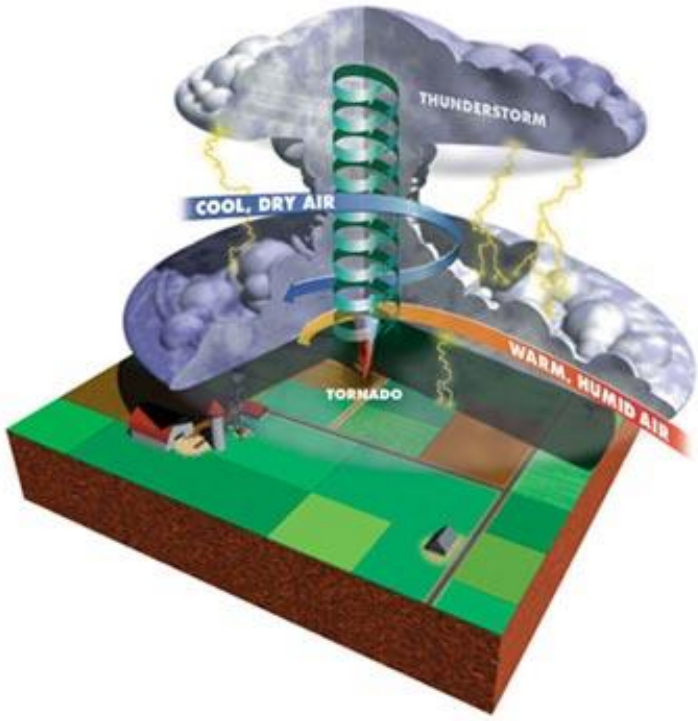
Fujita Scale			Enhanced Fujita Scale	
F Number	**Fastest ¼ mile (mph)**	**3 Second Gust (mph)**	**EF Number**	**3 Second Gust (mph)**
0	40-72	45-78	0	65-85
1	73-112	79-117	1	86-110
2	113-157	118-161	2	111-135
3	158-207	162-209	3	136-165
4	208-260	210-261	4	166-200
5	261-318	262-317	5	Over 200

Source: NOAA

Local *National Weather Service* (NWS) offices are responsible for issuing tornado warnings. Tornado warnings indicate that a tornado has been spotted or that Doppler radar detects a thunderstorm circulation capable of spawning a tornado. Nationally, tornado season is from March through August.

According to the *2008 Maryland Hazard Mitigation Plan*, July is the peak month for activity in Maryland. Maryland averages about four and a half tornado events annually, although, in 1995 there were 24 reported tornados for the State. Counties west of the Chesapeake Bay generally experience a higher frequency of tornados than those on the Eastern Shore.

Figure 9-1: Tornado Formation

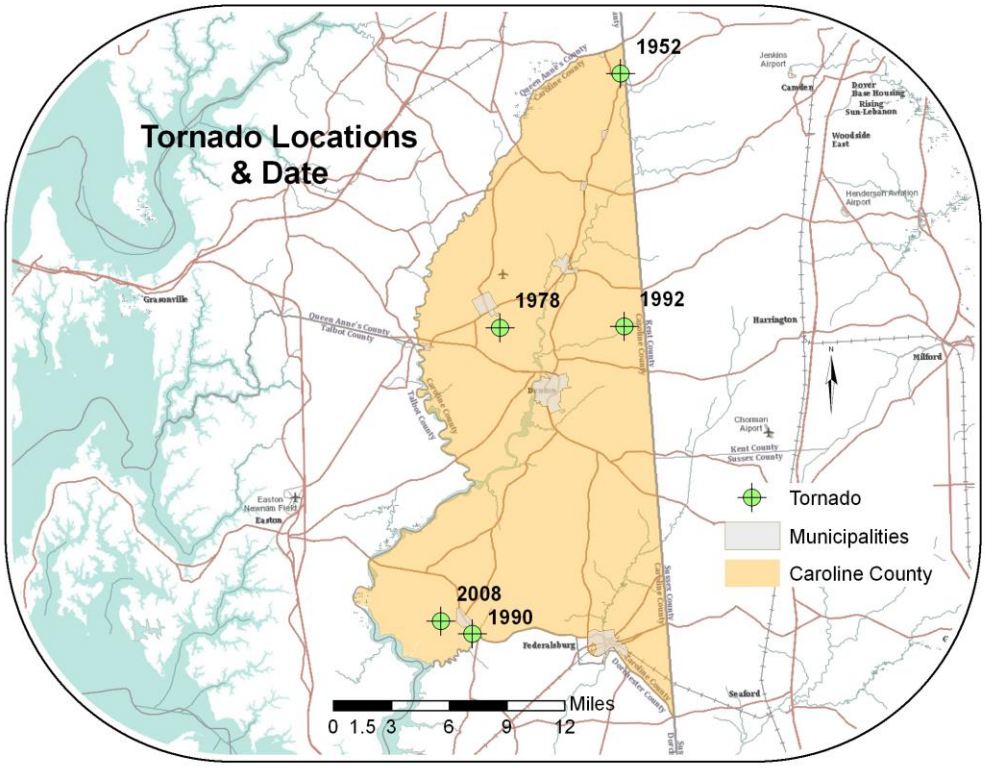


Source: Federation of American Scientists

Tornado Hazard Risk & History

Between 1952 and 2017, there have been a total of five tornados reported in Caroline County and one funnel cloud. Tables 9-5 and 9-6 provide additional information on these events.

Map 9-1: Tornado Locations



Funnel Cloud Events – 2002-2017				
# of Events	Injuries	Deaths	Damages	Frequency
2	0	0	0	0.13

Source: National Centers for Environmental Information (NCEI), Events through April 2018

Table 9-5: Funnel Cloud Event

Location	Date	Event Narrative	Property Damage
Denton	June 13, 2009	A Skywarn spotter saw a funnel cloud northwest of Denton.	Not Available
No New Events Reported			

Source: National Centers for Environmental Information (NCEI), Events through April 2018

Tornado Events – 1952-2017				
# Of Events	Injuries	Deaths	Damages	Frequency
5	0	0	375.25K	0.08

Source: National Centers for Environmental Information (NCEI), Events through April 2018

Table 9-6: Tornado Events

Location	Date	Event Narrative	Magnitude	Width	Property Damage
Caroline	April 5, 1952	No Report	F0	33 Yards	$300
Caroline	April 18, 1978	No Report	F1	10 Yards	$25,000
Caroline	July 14, 1990	No Report	F0	20 Yards	$25,000
Caroline	July 31, 1992	No Report	F1	183 Yards	$25,000
Bethlehem	June 4, 2008	An F0 tornado touched down west of Preston and moved through the city before lifting. The combination of the squall line and the tornado caused about $500,000 in damage to about 30 homes and businesses in and around Preston.	F0	50 Yards	$300,000
No New Events Reported					

Source: National Centers for Environmental Information (NCEI), Events through April 2018

In terms of number of occurrences, the *NWS, NCEI* listed a total of 5 tornado events affecting Caroline County from 1952-2017. Therefore, Caroline County experiences 0.08 tornado events per year.

Tornado Vulnerability

According to the information from the *NWS, NCEI*, there has been $375,300 in property damage due to tornado activity. The entire state of Maryland is subject to the possibility of strong tornados. Even though the possibility of such a tornado occurring in Caroline County is low, it is a real danger and can occur at almost any time, anywhere in the County. However, all new development within Caroline County is required to withstand 100 mph wind speeds.

Hail Hazard Characterization

According to *NOAA*, hail is a form of precipitation that occurs when updrafts in thunderstorms carry raindrops upward into extremely cold areas of the atmosphere where they form into ice. Hail is only formed during a thunderstorm event. Property damage specifically crop damage can be caused because of hail. Nationally hail causes approximately $1 billion in damage to property and crops each year. In fact, on April 10, 2001 hail caused $2 billion in damages to Kansas City. Due to the complexities and various factors involved in the formation of hail particle size and weight can vary tremendously. The

typical size of hail is less than 2 inches in diameter; however, hail size may be up to seven inches in diameter as recorded in Nebraska.

Hail Hazard Risk & History

Property damage of $50,000 was reported from a hail event in 1993 by the *National Weather Service, National Centers for Environmental Information* for Caroline County. No crop damage was reported. As shown in Table 9-7, most hail events that have occurred in Caroline County are before the peak of the growing season.

Hail Events – 1991-2017				
# Of Events	**Injuries**	**Deaths**	**Damages**	**Frequency**
15	0	0	50.00k	0.56

Source: National Centers for Environmental Information (NCEI), Events through April 2018

Table 9-7: Hail Events

Location	Date	Event Narrative	Magnitude	Property Damage
Caroline	2/24/1991	No Report	1.75 in.	0
Caroline	4/01/1993	No Report	2.75 in.	$50,000
Greensboro	5/13/2000	A severe thunderstorm knocked over a couple of trees in Ridgely and produced quarter size hail in Greensboro. Lightning from the same storm struck the ground near the Caroline County Courthouse and entered the building. The lightning damaged the county's and state's computer and phone systems.	1.00 in.	0
Greensboro	5/27/2001	Hail as large as hen eggs (about 2 inches in diameter) fell in Greensboro.	2.00 in.	0
Goldsboro	6/19/2002	No Report	0.75 in.	0
Henderson	4/24/2006	A severe thunderstorm produced nickel size hail in Templeville.	0.88 in.	0
Denton	7/10/2007	A severe thunderstorm dropped penny size hail in central Caroline County in and around Denton.	0.75 in.	0
Greensboro	7/10/2007	A severe thunderstorm dropped penny size hail in central Caroline County in and around Denton.	0.75 in.	0
Denton	5/31/2008	Thunderstorms rolled across Eastern Maryland during the afternoon hours. The more intense storms produced hail to the size of pennies and nickels in Denton between about 2:25 PM and 2:30 PM EDT.	0.88 in.	0
Denton	6/13/2009	Penny size hail fell from a severe thunderstorm near Denton.	0.75 in.	0
2019 HMP UPDATE				
Greensboro	May 23, 2011	A severe thunderstorm dropped golf ball size hail in Greensboro.	1.75 in.	0
Preston	July 28, 2012	A thunderstorm dropped nickel size hail in Preston.	0.88 in.	0
Federalsburg	July 28, 012	A thunderstorm also dropped nickel size hail in Federalsburg.	0.88 in.	0
Denton	May 2, 2016	Hail reached the size of 1.25 inches with thunderstorms that moved through the area.	1.25 in.	0
Hillsboro	May 23, 2016	Thunderstorms associated with an offshore low-pressure system moved through Caroline County during the late afternoon hours on the 23rd. While these storms had a history of producing pea-size hail earlier in their lifespan, one report from social media indicated nickel-size hail near Griffin.	0.88 in.	0

Source: National Centers for Environmental Information (NCEI), Events through April 2018

In terms of number of occurrences, the NWS, NCEI listed a total of 15 hail events affecting Caroline County from 1991-2017. Therefore, Caroline County experiences 0.56 hail events per year.

Hail Vulnerability

As shown in Table 9-7, the May 13, 2000 hail event caused problems at the County's Courthouse by damaging the County and State phone and computer system. If this were to happen to the County's EOC, especially during a hazard event, the result could be much more detrimental. Damage to crops is also a significant concern during a hail event. Caroline County has had the majority of its recorded hail events either before or at the beginning of the growing season, reducing the amount of crop damage for the County.

Mass Power Outage Risk & Characterization

Power outages may last seconds, hours or days depending upon the cause. The most common causes of power outages are: natural causes, human error and equipment failure. Natural causes include: strong storms, heat, and sometimes small animals. Strong storms may result in trees or branches falling on power lines. Lightning strikes can damage substations, power lines and equipment. High winds, heavy rains, salt, snow and ice can damage equipment as well.

In terms of heat, there are several reasons why high temperatures can cause outages. For instance, equipment may overheat, cables may expand and stretch due to the demand for air conditioning resulting in high current and finally some equipment shuts down to protect itself from high temperatures.

Mass Power Outages occur over a widespread area and are one of the typical impacts of major disaster events. Therefore, depending on the severity of the disaster event coupled with mass power outage, poses significant public health and safety risk prompting local emergency management to coordinate resources such as, opening shelters and distributing food and water.

Two utility companies provide power to Caroline County: Delmarva Power and Choptank Electric Cooperative. During mass power outages, each utility company compiles an average of interruption time. CAIDI, Customer Average Interruption Duration Index, is an index utilized by electric companies to compute the average outage time period. This method is capable of measuring in units of minutes or hours by calculating the sum of all customer interruption durations then dividing by the total number of customer interruptions. The outcome would be the average time length that any given customer would experience during a power outage.

Mass Power Outage History & Vulnerability

Power outages in Caroline County reported by the Star Democrat, MyEasternShore.com and the County Planning Department that have occurred in recent years include:

- February 7, 2010 – *Snow Storm* – Weekend snow storm caused the County to open an emergency shelter and more than 3,000 businesses and residences were without power.
- June 23, 2011 – *Thunderstorm* – caused power outages across the County.
- June 30, 2012 – *Severe Storms* – toppled trees cause 1,600 Caroline County Delmarva Power customers to go without power Saturday morning as well as 562 Caroline Choptank Electric customers.

- October 30, 2012 – *Hurricane Sandy* - about 30 roads were closed, 2,400 residents were still without power and residents of one village were under an advisory to boil water for health concerns.

The average Customer Average Interruption Duration Index (CAIDI) and System Average Interruption Duration Index (SADI) numbers for Caroline County were calculated by Choptank Electric. It is estimated that Choptank Electric provides 7,699 service accounts in Caroline County out of their 53,875 memberships.

Table 9-8: CAIDI Average Restoration Time & SADI Average Outage Duration by Year

Year	CAIDI Average Restoration Time	SAIDI Average Outage Duration
2010	110.94	169.39
2011	153.12	394.3
2012	240.06	650.03
2013	128.78	336.51
2014	95.93	119.95
2015	87.26	161.74
2016	113.7	183.8
2017	89.51	150.52

Source: Choptank Electric
Note: Customer Average Interruption Duration Index (CAIDI)
CAIDI gives the average outage duration that any given customer would experience.
CAIDI can also be viewed as the average restoration time.
System Average Interruption Duration Index (SAIDI)
SAIDI is commonly used as a reliability indicator by electric power utilities.
SAIDI is the average outage duration for each customer served.

According to *Choptank Electric*, the average CAIDI over the past seven years was 127.41 for the Caroline County region. The most significant impact that a power outage can have is the inability of businesses and government offices to function properly. Because most power outages occur during severe weather storms, when public emergency services are depended upon by the citizens of the County, it is extremely important that these buildings and offices be equipped with generators to ensure public safety.

Chapter 10: Human Impacted Hazards

Introduction

Human impacted hazards as described herein include, fire/explosion and epidemics. The effects of human impacted hazards include power outages, communication failures, road closures, loss of infrastructure, evacuation, and loss of life. The location of their occurrence and effects may be predicted to some degree by past incidents.

Major Fire/Explosion Characterization

In this document, fire/explosion refers to major incident involving a commercial/industrial or transportation fire or explosion. Fire is defined as the state, process, or instance of combustion in which fuel or other material is ignited and combined with oxygen, giving off heat, light and flame. An explosion is defined as an expansion with violet force of materials through a chemical change or though decomposition. The field of Emergency Management was developed to coordinate fire activities. Fire insurance itself dates back to attempts to alleviate the damage from fires during the early settlement of the colonies in New England.

Major Fire/Explosion Risk, History & Vulnerability

Caroline County is no different than other rural counties throughout the country, having a network of volunteer fire companies whose primary role historically has been to suppress fires and minimize damage to life and property as a result of these fires. Although Caroline County has had few major fires, several commercial fires that stand out include a fire at Choptank Electric and a fire at a yacht building facility.

All municipalities in Caroline County share the same threat of fire to commercial, residential, and other structures. Denton, Federalsburg, and Ridgely have a higher threat of fire to industrial because they are the only towns in the County with industrial or technological parks. Federalsburg and Preston face the threat of fire or explosion from a railway transportation incident. Denton, Greensboro, Goldsboro, and Federalsburg all share the possibility of a transportation incident along major highways including Routes 404 and 313. Due to the age of structures and less building setback in older communities, the threat of fire spreading to other structures is greater than in newly developed areas.

In 2019, according to the *United States Fire Administration* groups at increased risk of fire-related injuries and death include:

- Males;
- People ages 30-34 have the highest fire injury rate;
- People ages 85 and older have the highest fire death rate;
- African-Americans males have the highest fire death rate per million population; and
- American-Indians males have the highest fire death rate per million population.

The Maryland State Fire Marshal Office reports on fire statistics for each County. Available data is depicted in the tables on the following page.

Table 10-1: Fire Deaths

County	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Caroline	0	0	0	0	0	0	0	0	1	0

Source: Maryland State Fire Marshal Office

Table 10-2: Fire Statistics

Type of Event	2016	2017
Residential Fire	40	29
Other Fire	9	13
Total Structure Fire	49	42
Vehicle Fire	29	18
Brush Fire	12	19
Refuse Fire	14	16
Other Fires	21	17
Total Number of Fires	**125**	**112**
Civilian Injuries	1	0
Civilian Deaths	1	0
Fire Service Injuries	0	1
Fire Service Deaths	0	0
Estimated Fire Loss	**$767,250**	**$383,000**

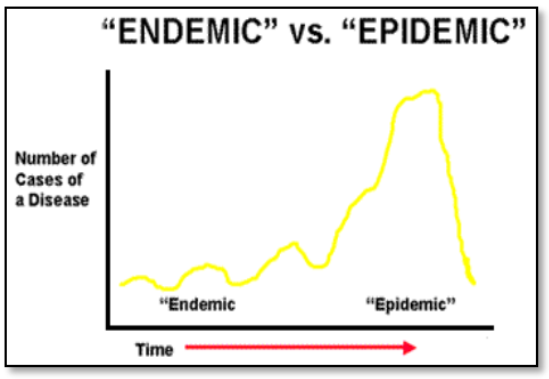
Source: Maryland State Fire Marshal Office

Epidemic Characterization

The amount of a particular disease that is usually present in a community is referred to as the baseline or endemic level of the disease. This term refers to the constant presence and/or usual prevalence of a disease or infectious agent in a population within a geographic area, such as Caroline County. According to the Centers for Disease Control and Prevention (CDC), sometimes the amount of disease in a community rises above the expected level; this is known as an epidemic. Epidemics are characterized by an increase, often sudden, in the number of cases of a disease above what is normally expected in that population in that area. While some diseases are so rare in a given population that a single case warrants an epidemiologic investigation (e.g., rabies, plague, polio), other diseases occur more commonly so that only deviations from the norm warrant investigation. Figure10-1 provides a visual representation of the difference between endemic and epidemic.

Epidemics may also take the form of large-scale incidents of food or water contamination, infestations of disease bearing insects or rodents, or extended periods without adequate water or sewer service. An epidemic may also be a secondary effect from other disasters such as flooding, tornadoes, hurricanes, or hazmat incidents.

Figure 10-1: Endemic vs. Epidemic



Source: health.mo.gov

The surveillance and reporting of these diseases are the responsibility of the local health department, which investigates and

completes reporting both electronically and manually as per Maryland's Department of Health (MDH) regulations. Notable epidemics include measles, hepatitis B, AIDS, salmonellosis, giardiasis, malaria, lyme disease, rabies, and avian influenza.

Epidemic Risk, History & Vulnerability

The Maryland Infectious Disease Bureau collect statistics from the County. Table 46 depicts Caroline County's reportable conditions over the past 5 years. According to CDC, nearly 2.3 million cases of chlamydia, gonorrhea, and syphilis were diagnosed in the United States in 2017, surpassing the previous record set in 2016 by more than 200,000 cases.
As reported in the August 28, 2018 CDC press release, *New CDC analysis shows steep and sustained increases in STDs in recent years*, the analysis of STD cases for 2013 and preliminary data for 2017 shows steep, sustained increases:

- Gonorrhea diagnoses increased 67 percent overall (from 333,004 to 555,608 cases according to preliminary 2017 data) and nearly doubled among men (from 169,130 to 322,169). Increases in diagnoses among women — and the speed with which they are increasing — are also concerning, with cases going up for the third year in a row (from 197,499 to 232,587).
- Primary and secondary syphilis diagnoses increased 76 percent (from 17,375 to 30,644 cases). Gay, bisexual and other men who have sex with men (MSM) made up almost 70 percent of primary and secondary syphilis cases where the gender of the sex partner is known in 2017. Primary and secondary syphilis are the most infectious stages of the disease.
- Chlamydia remained the most common condition reported to CDC. More than 1.7 million cases were diagnosed in 2017, with 45 percent among 15- to 24-year-old females.

Table 10-3: Reportable Conditions

Condition	2012	2013	2014	2015	2016
Animal Bites	88	97	113	106	101
Babesiosis	0	1	0	0	0
Campylobacteriosis	3	5	8	9	8
Chlamydia	122	106	106	95	108
Coccidioidomycosis	0	1	0	0	0
Cryptosporidiosis	0	1	1	3	0
Ehrlichiosis	0	2	0	1	0
Encephalitis - non-Arboviral	1	0	0	0	0
Giardiasis	0	2	0	1	1
Gonorrhea	21	17	16	44	33
H. influenzae - Invasive Disease	1	1	1	1	1
Hepatitis A (Acute-Symptomatic)	0	0	1	0	0
Hepatitis B (Acute-Symptomatic)	0	0	0	0	2
Hepatitis C (Acute-Symptomatic)	2	1	2	2	0
Listeriosis	1	0	0	0	0
Lyme Disease	39	20	20	14	12
Meningitis, Aseptic	0	0	0	0	1
Mycobacteriosis, Other than TB & Leprosy	1	0	4	4	1
Pertussis	1	9	4	2	4
Rabies - Animal	6	12	4	2	9
Salmonellosis - Other than Typhoid Fever	8	9	8	6	8

Shigellosis	3	0	2	0	0
Strep Group A - Invasive Disease	0	0	1	0	0
Strep Group B - Invasive Disease	3	2	4	8	2
Syphilis - Primary and Secondary	0	0	0	1	1
Trichinellosis	0	0	0	1	0
Tuberculosis	0	3	1	2	2
Vibriosis (Non-Cholera)	1	0	0	0	0

Source: Maryland Infectious Disease and Health Administration, Database is current as of December 16, 2013

The Caroline County Health Department website has an extensive amount of information available to the public, some of which includes:

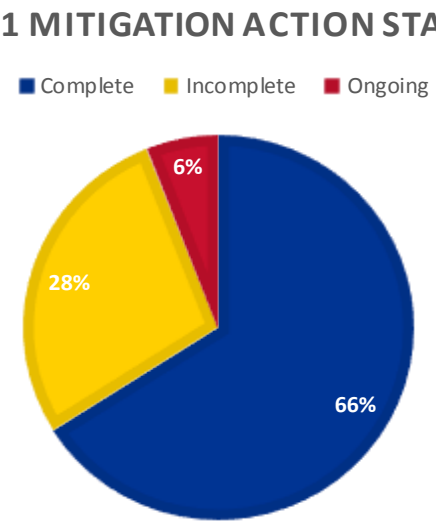
- Emergency Preparedness;
- Terrorism Preparedness;
- Pandemic Influenza/Avian Flu;
- Environmental Health;
- Rabies;
- Narcan Training; and
- Infectious and Communicable Diseases.

This is a great resource for anyone in the County to inquire about not only epidemic information, but all health-related topics including how to prevent and prepare different types of disasters.

Chapter 11: Mitigation Status Report

Mitigation Strategies Introduction

Mitigation action items and projects identified in the 2011 Hazard Mitigation Plan were reviewed by the Hazard Mitigation Planning Committee (HMPC) and representatives from each of the ten municipalities.



Caroline County completed more than half of the 2011 mitigation action items. In fact, 32 items were completed, while 3 items are on-going actions. The remaining twenty-three incomplete action items were assessed by the HMPC for inclusion within the 2019 Plan update. Of those items, 15 were included, however modified by the planning committee during the October 25, 2019 HMPC meeting. In addition, municipalities provided status updates and new mitigation action items. Finally, municipalities were asked to provide information on mitigation actions items that were not listed within the 2011 Plan. The towns of Federalsburg, Denton, Greensboro, and Preston provided the following Information shown below.

Additional Action Items Not Listed in the 2011 Plan	
Municipality	**Action Item**
Federalsburg	• Annual clean-ups of riverbanks; • Recent dredging of river channel completed by state; • Various flood plain management activities.
Denton	• Currently in the process of upgrading six water waste treatment plant for ultra violet technology vs. chorine/sulfur dioxide system; • New hydrant is being installed at Crouse Park as well as 2nd Street & Market.
Greensboro	• Shoreline project; • Park (Riverside Project); • Moved water waste treatment plant to higher ground.
Preston	• Outfitting hydrants with quick-connect “Storz” fittings which will allow interoperable hookups from mutual-aid companies. • Preston Public Works preparing to connect water service between two areas of the municipality via a 2” line. This will constitute a complete loop system.

2019 MITIGATION ACTION STATUS UPDATE

Note: Those items listed in red are Mitigation Action Items status updates. Additionally, for those action items that do not specify municipality or location, those action items should be considered as County-wide.

Table 11-1: Mitigations Actions Status Update

ACTION	GOALS	OBJECTIVES	TIMEFRAME	HAZARD	STATUS
Prevention					
Continue updating parcels in hazard areas based on changing development using GIS. **Status:** GIS is utilized to maintain information on land use changes for parcels located in hazard areas.	1 5	1.3; 1.4 5.1; 5.4	Long-term	All	Complete
The County should develop a plan for improving the floodplain review process, as well as develop a plan for improving the County's community rating in the National Flood Insurance Program. **Status:** As reported by the Floodplain Coordinator, latest update to the Floodplain Ordinance was effective March 20, 2015. It addressed Accessory Structures: Accessory structures larger than 300 square feet in area (footprint) are not permitted unless built in accordance with elevation requirements found in Section 108-34 and Section 108-35.	1 4 5	1.1; 1.3 4.1; 4.3 5.1;5.4	Complete	Flood	Complete
The NFIP requires structures built within the floodplain to have first floor elevations determined. The County's GIS department could partner with building inspector's/permit administrators to maintain a database of new structures with their first-floor elevations. These elevations can be used with forecasting software such as HAZUS to predict vulnerable structures during a specific hazard event. **Status:** As reported by Planning & Codes, Caroline County does not maintain an independent vertical data set. Open source data from the state is used. New LiDAR data with digital elevation model is available on MD iMaps.	1 4 5	1.3; 1.4 4.1 5.1	Long-term	Flood	Ongoing

ACTION	GOALS	OBJECTIVES	TIMEFRAME	HAZARD	STATUS
Utilizing FEMA's Flood Mitigation Assistance Program create a Flood Mitigation Plan for the County. **Status:** • As reported by Planning & Codes, while a flood mitigation plan for the county does not exist by this title, a Floodplain ordinance is in effect and succeeds at curbing development in floodplains. • As reported by DES, they will begin a new planning process to meet new legislative requirements on nuisance flooding.	1 5	1.3; 1.4 5.1; 5.4	Long-term	Flood	Incomplete
Consider placing restrictions on land use for vacant parcels for future development in hazard areas. **Status:** As reported by Planning & Codes, while a flood mitigation plan for the county does not exist by this title, a Floodplain ordinance is in effect and succeeds at curbing development in floodplains.	7	7.3	Long-term	All	Complete
Consider working with utility companies to identify problem areas and the possibility of changing to underground lines in those areas. **Status:** As reported by Public Works, DES would like to carry this action item over to our 2019 Plan and explore the possibility of a public outreach campaign. Residents/homeowners will be encouraged to adopt a preparedness mentality by monitoring utility lines at risk of interruption from overgrowth, wind damage, etc. DES and Public Works must meet with all utility providers as a collective group to discuss right-of-way regarding these issues. All new development is built and will be serviced by underground utilities. This will ideally be a collaborative effort that Utility Co.'s takes the lead on.	3	3.3	Long-term	Winter Storms, Severe Weather & Power Outages	Ongoing
Create a LEPC link from the Emergency Services website. **Status:** This project has not been completed.	4	4.1	Short-term	All	Incomplete

ACTION	GOALS	OBJECTIVES	TIMEFRAME	HAZARD	STATUS
Expand the mission of the Local Emergency Planning Committee to include All Hazards disaster planning. **Status:** The role of the LEPC has expanded to include all hazards.	1 3	1.1; 1.2 3.1; 3.2	Complete	All	Complete
Work with FEMA, MEMA, and MDE to develop digital FIRMS and identify areas for revision of FIRMS. **Status:** DFIRM for County is due out in 2012.	1 4 5 6	1.1; 1.2; 1.3 4.1; 4.3 5.1; 5.2 6.5	Complete	Flood	Complete
Conduct a Hazardous Materials Survey to identify all hazardous materials that are either stored or traveling through the county. **Status:** As reported by DES, the EM division has discussed whether a transportation commodity study is necessary, or if data can be extracted from other sources such as Tier II or open business relationships. This project has not been completed.	4	4.1; 4.2	Long-term	HazMat	Incomplete
Using Hazardous Materials Survey results, develop a plan to mitigate any identified risks. **Status:** This project has not been completed.	4	4.1; 4.2	Long-term	HazMat	Incomplete
Allocate County resources and assistance to mitigation projects when possible. Include mitigation projects in Capital Improvement Plan. **Status:** Depending on the type of project, some mitigation projects are included in the Capital Improvement Plan.	2 6	2.2 6.1; 6.2; 6.3; 6.4	Ongoing	All	Complete

ACTION	GOALS	OBJECTIVES	TIMEFRAME	HAZARD	STATUS
Work with DNR, Delmarva Power, Choptank Coop. and other utilities to promote an ongoing tree-trimming program. **Status:** All utility companies must be licensed by the State and obtain roadside tree cutting permits. State Highway Administration and the County Roads Department work with all utility companies to mitigate the effects of severe weather disrupting their services. As reported by Public Works, this action ties into the public outreach campaign and could be combined with the above action item: *Consider working with utility companies to identify problem areas and the possibility of changing to underground lines in those areas.*	1 3 6	1.1 3.1; 3.3 6.4	Ongoing	Power Outage	Complete
Initiate a program to install, inspect and ensure operation of power generators at pre-identified critical facilities. **Status:** Generators are inspected prior to hurricane season.	1 3 4	1.1 3.3 4.3	Complete	Power Outage	Complete
Using the critical facilities list from this Plan for County and Municipally owned buildings identify which facilities are most in need of generators. **Status:** Facilities in need of a generator have been identified and are included in the 2019 Mitigation Action Items (Table 12-1).	2 4 5	2.3 4.1 5.1	Short-term	Power Outage	Ongoing
Work with DNR to identify areas of high risk for wildfire in the Urban Wildland Interface and monitor and warn residents of Wildfires dangers. **Status:** The Maryland DNR Forest Service develops and maintains a list of qualified personnel who meet or exceed the minimum requirements necessary in order to be eligible for dispatch. The agency actively recruits department and fire service personnel to participate in this program with many of the participants returning year after year for fire duty. High risk areas are identified by DNR forest assessment.	3 8	3.1; 3.3 8.1; 8.2	Complete	Wildfire	Complete

ACTION	GOALS	OBJECTIVES	TIMEFRAME	HAZARD	STATUS
Property Protection					
About 13 percent of all septic systems in the County are located within the Critical Area. Upgrade these systems using Bay Restoration Funds. **Status:** As reported by Public Works, DES and Public Works would like to re-work this action item.	4 7	4.3 7.2	Long-term	Flood & Coastal Storm	Incomplete
Perform a detailed analysis of structures in the floodplain for the towns of Henderson, Greensboro, Hillsboro, and Federalsburg to determine first floor elevation for mitigation project purposes. **Status:** • As reported by the Town of Greensboro, the towns now require new buildings to provide elevations. • As reported by the Town of Federalsburg, this is an ongoing action item and will carry over to the next planning cycle. • As reported by the Town of Hillsboro, the town relies on the work of Caroline County Planning & Codes to evaluate structures located within the floodplain. Please refer to the Floodplain Manager's survey responses.	5	5.1; 5.4	Ongoing	Flood	Incomplete
Asses existing multilevel structures such as hospitals and apartment complexes for their wind load capacities. **Status:** • As reported by Planning & Codes, this will be redirected to the municipalities to verify what structures exist and if a study is viable and at what cost. • As reported by Public Works, this action item could be posed to municipalities. A list of 3+ story structures in their area would need to be inventoried.	4 5	4.1 5.1	Long-term	Coastal Storm, Tornado, & High Wind	Incomplete

ACTION	GOALS	OBJECTIVES	TIMEFRAME	HAZARD	STATUS
Identify older homes and Pre-FIRM residential structures in the floodplain that need mitigation measures in order to bring them into compliance when funding is available. **Status:** As reported by Planning & Codes, all pre-FIRM structures are identified with Planning & Codes. This is no legal mandate for their participation in NFIP unless the structure is modified, added to, or renovated by a 50% increase in value.	4 5	4.3 5.1; 5.4	Complete	Flood	Complete
Mitigate and upgrade flooded roads when funding is available, specifically evacuation routes, based on areas that the HMPC identified as "high" in the following table. **Status:** As reported by Public Works, DES and Public Works may seek to carry this item over into the 2019 update as discussions on ditches.	9	9.1; 9.2; 9.3	Long-term	Flood	Incomplete
The North County Water and Sewer Authority must find available grant funds in order to complete their wastewater collection and treatment system to replace failing septic systems. **Status:** According to the Greensboro 2018 Fact Sheet, the Regional Wastewater System Project consisted of 5 phases. Phases 1-4 were completed between 2015-2018 and Phase 5 to be completed in early 2019.	5 7	5.1; 5.2;5.3 7.2	Long-term	Flood	Complete
Elevate or acquire residential properties affected by flooding in targeted areas including the Storm Surge area in Federalsburg. The town of Federalsburg purchased the property at 122 South Main Street which was affected by flooding and converted it to open space. **Status:** As reported by the Town of Federalsburg, this action item is complete.	1 2 5 6	1.1; 1.3 2.1; 2.2; 2.3 5.1; 5.3 6.2; 6.3; 6.4; 6.5		Coastal Storm	Complete

ACTION	GOALS	OBJECTIVES	TIMEFRAME	HAZARD	STATUS
For the critical facilities listed as having a high vulnerability in the risk assessment and identified by the planning committee as a high priority, a technical report should be completed to provide information on Mitigation alternatives such as the installation of a berm or related measures. Detailed cost/benefit analyses need to be completed for each structural project. Specifically, the Federalsburg Police Station and the Board of County Commissioners. **Status:** • As reported by the Town of Greensboro, wastewater treatment plan has been relocated and rebuilt at a new location – Complete. • As reported by the town of Federalsburg, critical facilities have been identified and the technical report is still being developed.	2 5 6	2.3 5.4 6.2; 6.4	Long-term	All	Complete
Public Education and Awareness					
Distribute annual mitigation informational brochure or newsletter to residents and business owners. Distribute with local water/sewer bills or tax or other utility bills. **Status:** As per Planning & Codes, Development Coordinator and Floodplain Manager distributes information to residents on a regular basis regarding new NFIP regulation, mitigation tips and general information. DES could match this effort by contributing information to be mailed with planning & codes together.	4 6	4.2; 4.4 6.5	Complete	All	Complete
Work with the County Visitors/Tourism Bureau, MD DNR to alert tourists to potential hazard areas and what to do in the event that a man-made or natural hazard event occurs. This would include brochures to be left at hotels, visitor centers, and attractions to inform visitors about evacuation routes, and sheltering info. **Status:** This information is available at the County and Emergency Services Website.	4 8	4.2 8.1; 8.2	Complete	All	Complete

ACTION	GOALS	OBJECTIVES	TIMEFRAME	HAZARD	STATUS
Work with the County Health Department to provide information to citizens on infectious diseases. **Status:** The Caroline County Health Department website provides citizens with information pertaining to all types of infectious diseases including prevention and treatment.	4	4.1; 4.2; 4.3	Complete	Epidemic	Complete
Incorporate information about disaster preparedness and mitigation activities and opportunities on the County's website. **Status:** Information on activities related to disaster preparedness is available online at the County's Department of Emergency Services website.	4 6	4.1; 4.2 6.5	Complete	All	Complete
Work with representatives from the National Flood Insurance Program to hold courses in the County for real estate and flood insurance agents. **Status:** The National Flood Insurance Program holds training, workshops and conferences for adjusters, agents, and lenders to hold courses on flood insurance and real estate. A realtor class is also held every year that covers various laws that the Planning and Zoning Department enforces.	3 4	3.1; 3.3 4.1; 4.2; 4.4; 4.5	Complete	Flood	Complete
Work with FEMA & MEMA to hold Business Continuity Training Workshops. **Status:** Information on business continuity can be found on the MEMA's website.	3 4	3.1 4.1; 4.2; 4.3; 4.4; 4.5	Complete	All	Complete
Partner with the National Weather Service to provide training to people throughout the county on Storm Spotting. **Status:** The National Weather Service conducts free classes on its SWYWARN program regularly for citizens of the County. One of the locations for this training is in Salisbury.	3 4	3.1 4.1; 4.2	Ongoing	Winter & Severe Weather	Complete
Develop a one-page handout on flood insurance and distribute to local insurance agencies. **Status:** As reported by Planning & Codes, this action item is complete, and brochures are available and distributed as opportunity arises.	4	4.1; 4.2	Complete	Flood	Complete

ACTION	GOALS	OBJECTIVES	TIMEFRAME	HAZARD	STATUS
Natural Resource Protection					
Develop guidelines for County road ditches and for designated priority areas with sensitive environmental conditions. Using GIS to identify potential priority areas including ditches located in these areas and use recommended types of vegetation for buffers, restrictions on scraping or clearing ditches of vegetation, filtration systems, or use of drainage control structures. **Status:** As reported by Public Works, refer this action item to Soil Conservation Bureau.	7 9	7.2 9.1; 9.3	Short-term	Flood	Incomplete
According to a 2004 State water resources report, Eastern Shore agricultural water withdraws will likely conflict with increased water demand as a result of future population growth. Working with MDE and MDA find the most efficient crop irrigation methods. **Status:** As reported by Public Works, refer this action item to Soil Conservation Bureau.	1 6 7	1.3 6.2 7.2	Long-term	Drought	Incomplete
Encourage 100 percent of implementation of nutrient management plans for farming operations through public outreach programs. **Status:** As reported by Public Works, refer this action item to Soil Conservation Bureau.	1 7	1.3 7.2	Long-term	Flood	Incomplete
Pursue vegetation and restoration practices that assist in enhancing and restoring the natural and beneficial functions of watersheds. **Status:** Many programs initiated by Maryland are used to help accomplish these goals, including the Maryland Agriculture Land Preservation Foundation (MALFP) and the Chesapeake Bay Critical Area program. As reported by Planning & Codes, No Update	1 7	1.3 7.1; 7.2; 7.3	Complete	Flood	Complete

ACTION	GOALS	OBJECTIVES	TIMEFRAME	HAZARD	STATUS
Promote community & neighborhood planning for wildfire protection and for access for emergency vehicles. **Status:** The County has an Open-Air Burning Regulations, Permits brochure and a community education trailer.	8	8.1; 8.2	Complete	Wildfire	Complete
Emergency Services					
Assess all shelters and their ability to sustain damage for specific hazard types and identify retrofitting projects based on this assessment.	1 2 5	1.3 2.1; 2.3 5.1	Long-term	All	Incomplete
Explore options for a 24-hour medical clinic or commercial urgent care facility in the County through tax incentives. **Status:** During the planning cycle several urgent care facilities were established, specifically in the Town of Denton.	6	6.2; 6.4	Short-term	Epidemic	Complete
Coordinate with the American Red Cross to upgrade all shelter resources. **Status:** As reported by Shelters, the American Red Cross is no longer directly involved with sheltering in the county. The Department of Emergency Services in the lead, with Department of Social Services, with the Health Department's assistance.	1 3	1.2 3.1	Ongoing	All	Incomplete
Teach CERT (Community Emergency Response Training) classes to interested citizens to assist first responders at specified emergencies throughout the county. **Status:** CERT team established.	1 3 4	1.2 3.1; 3.2 4.1	Complete	All	Complete
Hold disaster exercises in various areas of the county. Types of exercise: flood, high wind, winter storm. Hazardous Materials spills, Weapons of Mass Destruction, and Bio-Terrorism exercises. **Status:** Various exercises including Defense Security Services, laptop, EOC alert/notification of ingestion zone from Calvert Cliffs, HazMat, school shooting, and power outage exercises.	1 2 3 4	1.1; 1.2; 1.3 2.1 3.1; 3.2 4.1	Complete	All	Complete

ACTION	GOALS	OBJECTIVES	TIMEFRAME	HAZARD	STATUS
Develop list of all training opportunities and distribute to all local emergency responders. **Status:** • All municipalities report this is complete.	1 3	1.1; 1.2 3.1; 3.3	Complete	All	Complete
Review and update all annexes in the County Emergency Operations Plan. Include participation from all municipalities. **Status:** County EOP Updated in 2010.	1 2 3	1.1; 1.2 2.1 3.2	Complete	All	Complete
Utilize and where necessary update hazard warning systems. **Status:** Reverse 9-1-1, Tri-County Warning Siren, and all fire Chiefs receive text messages.	1 6 8	1.2; 1.3 6.4 8.1	Complete	All	Complete
Create HazMat Team for Caroline County. Status: **Status:** Regional HazMat team established in 2008 includes Dorchester, Kent, Talbot, Caroline, and Queen Anne's Counties.	1 6	1.1; 1.2; 1.3 6.4	Complete	HazMat	Complete
Structural Projects					
Completion of the town of Federalsburg's project to separate storm water and sanitary lines which will reduce infiltration problems by 25-30 percent. **Status:** This action item is complete.	1 2 3 6	1.2; 1.3 2.1; 2.2 3.1 6.1; 6.2; 6.4	Complete	Flood	Complete

ACTION	GOALS	OBJECTIVES	TIMEFRAME	HAZARD	STATUS
Work with Municipalities to upgrade undersized water lines for fire suppression. **Status:** • As reported by the Town of Greensboro, it would like to begin with this project, but needs to acquire funds. • As reported by the Town of Ridgely and the Town of Hillsboro, it has no issues regarding undersized lines. • As reported by the Town of Federalsburg, in process of pursuing a grant for improved water service to Denton Road. • As reported by the Town of Denton, the process for upgraded water lines on Franklin Street has been completed and is preparing for work. Gay Street's design process for upgraded lines are next. Currently, some areas feature water service lines as small as 2" in diameter. Lincoln & 6th Street lines are also being upgraded in 2019, with a new dry-barrel hydrant being installed as well. A supplemental water service line is being added on 6th Street to improve service for fire suppression activity based on high risk occupancies (hotel/motel) located adjacent to the existing lines. • As reported by the Town of Marydel, Town of Templeville, Town of Henderson, and the Town of Henderson, no applicable projects for undersized water lines for suppression. • As reported by the Town of Preston, Preston Public Works reports that this is a frequent concern of the Volunteer Fire Company. Currently, static pressure from all hydrants meets an acceptable threshold of 55 psi. The VFC has raised their concerns to the town about their water supply falling in-line with common standards across the state, but this would require a second water tower to be erected in the town.	1 2 3 6	1.2; 1.3 2.1; 2.2 3.1 6.1; 6.2; 6.4	Ongoing	Wildfire & Major Fire/Explosion	Incomplete

ACTION	GOALS	OBJECTIVES	TIMEFRAME	HAZARD	STATUS
Install dry hydrants for improved water supply for fire suppression at strategic locations. Some Dry Hydrants have been installed but according to the County GIS data no dry hydrants exist in the northern portion of the County. **Status:** • As reported by the Town of Greensboro, Town of Preston, Town of Hillsboro, Town of Marydel, Town of Templeville, Town of Henderson, and the Town of Goldsboro, N/A • As reported by the Town of Ridgely, none located in Ridgely. • As reported by the Town of Federalsburg, there are primarily wet barrel hydrants in Federalsburg. • As reported by the Town of Denton, a new hydrant is being installed at Crouse Park as well as 2nd Street & Market for fire protection	1 2 3 6	1.2; 1.3 2.1; 2.2 3.1 6.1; 6.2; 6.4	Complete	Wildfire & Major Fire/Explosion	Complete

Chapter 12: Capability & New Mitigation Strategies

Community Capability Overview

The Caroline County Emergency Operations Plan (EOP) is currently being revised during this Plan update. The last date of revision was October 2016. A core planning team has been assembled and will begin revisions to the EOP, followed by each annex. The Debris Management Plan and the Emergency Shelter and Mass care Annex will both be updated as part of the revised EOP.

The County has mutual aid agreements with surrounding counties for emergency services. In addition, the 2010 Maryland Code Public Safety Title 14-Subtitle 8-Section 14-803, Maryland Emergency Management Assistance Compact (MEMAC) enables jurisdictions to provide and receive mutual aid in managing emergencies. The compact also provides for mutual cooperation in emergency-related training and exercises.

MEMAC provides the county with access to a network of trained agency and volunteer personnel including State agencies such as the Maryland State Police, Department of Natural Resources, Department of the Environment, Department of Health, State Highway Administration and the Maryland Emergency Management Agency.

In addition to mutual aid, another capability that has been enhanced over the years is regional cooperation and collaboration. Eastern Shore jurisdictions have formed a regional planner's group. Caroline County participates in the regional planner's group, which meets several times per year. The hazard mitigation plan update was discussed at both the May and October 2018 meetings. Best practices and mitigation ideas were shared at these meetings.

Caroline County maintains open communication with private utility companies. The pre-existing lines of communication and collaboration have steadily improved, as evidenced during the hazard mitigation planning process.

Finally, in terms of training and exercise, Caroline County has conducted sheltering and community point of distribution exercises during the previous planning cycle. During this planning cycle, the county will continue to maintain and enhance capabilities through training and exercises. In January of 2019, a damage assessment was conducted for the Department of Emergency Services and other departments. The training was extended to Public Schools, Planning & Codes Administration, Public Works, and neighboring jurisdictions to build capacity on the Middle Shore.

Flooding Capability

Caroline County's capabilities are similar to other counties that deal with flooding. Usually local roads are blocked to some extent and when warranted, residents are asked to evacuate from the area.

The Department of Emergency Services has a plan which coordinates evacuation activities with the Public Works Department and State Highway Administration and with local police, fire and rescue units, the Health Department and the Red Cross. While Caroline County makes a great effort to mitigate flood events, the character of the natural environment, lends itself to further mitigation efforts, particularly that of moving people and structures from harm's way.

The County also has the capability to mitigate future flood losses through its Subdivision Regulations, Floodplain Management Ordinance and Building Code. In October 1980, Caroline County adopted regulations, which require any new development to have sufficient area outside

the floodplain to accommodate all construction, including wells and septic systems. All development located in the 100-year floodplain is subject to strict flood protection measures. Since 1995, Caroline County has participated in the Community Rating System (CRS) program. The CRS program is a voluntary program administered by the Federal Emergency Management Agency (FEMA) and provides discounts for flood insurance policy holders within participating communities. The most recent version of the Floodplain Ordinance became effective on November 25, 2014.

The Planning and Codes Department is responsible for floodplain administration and maintains elevation certificates. The floodplain ordinance includes:

- **Flood Protection Elevation** – The base flood elevation plus two feet freeboard. "Freeboard" is a factor of safety that compensates for uncertainty in factors that could contribute to flood heights greater than the height calculated for a selected size flood and floodway conditions, such as wave action, obstructed bridge openings, debris and ice jams, climate change, and hydraulic effect of urbanization in a watershed.

- **Flood Protection Setback A –** Along nontidal waters of the state, the flood protection setback is:
    A. One hundred feet, if the watercourse has special flood hazard area shown on the FIRM, except where the setback extends beyond the boundary of the special hazard area; or
    B. Fifty-feet, if the watercourse does not have special flood hazard areas shown on the FIRM.

Planning & Codes answer all questions regarding floodplain determinizations using the effective DFIRMS and FIS. The Caroline County Floodplain Ordinance follows the Maryland State Model Floodplain Ordinance, which has many higher regulatory standards that exceed minimum NFIP requirements. The most current DFIRM/FIRM and Flood Insurance Study was adopted January 16, 2015.

To further assist citizens in understanding their flood risk, the Caroline County website, under Floodplain Management, contains a link to the Maryland DFIRM Outreach tool.

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).

Multi Hazard Capability-Building Codes

The International Building Code as published by the International Code Council, Inc., and as modified by the Maryland Building Performance Standards, COMAR 05.02.07, was adopted as the Building Code for Caroline County, Maryland. The code includes the following climatic and geographic design criteria:

- Flat-Roof Design Snow Load: 25 pounds/square foot;

- Wind Speed: 100 mph;

- Seismic Design Category: C;

- Subject to Damage from Weathering: Severe;
- Subject to Damage from Frost Line Depth: 24 inches;
- Subject to Damage from Termite: Heavy;
- Subject to Damage from Decay: Moderate;
- Winter Design Temp: 10 degrees Fahrenheit, and
- Flood Hazards: See FIRM and FBFM.

Addition Protection/ Preservation Programs

Caroline County's Transferable Development Rights Program was amended, adopted and made effective on April 1, 2006 allowing for the identification, sale, purchase and utilization of development rights as necessary and desirable to promote essential county-wide growth planning and to preserve Caroline County's farmland, woodland, rural landscape, and rural way of life. The program provides for the assignment of Receiving Areas for rural-residential development in the R-Rural zoning district (maximum 50 lots) in areas of the county that are most suited for residential growth. All other areas of the county in the R-Rural zoning district are rural/farming areas and are considered Sending Areas whereby development rights may be transferred off the property. Since the adoption of the new regulations in April 2006, 181 development rights have been approved for transfer according to the county website.

The Chesapeake Bay Critical Area Act, passed in 1984, was significant and far-reaching, and marked the first time that the State and local governments jointly addressed the impacts of land development on habitat and aquatic resources. The law identifies the "Critical Area" as all land within 1,000 feet of the Mean High-Water Line of tidal waters or the landward edge of tidal wetlands and all waters of and lands under the Chesapeake Bay and its tributaries. The law created a statewide Critical Area Commission to oversee the development and implementation of local land use programs directed towards the Critical Area that met the following goals:

- Minimize adverse impacts on water quality that result from pollutants that are discharged from structures or conveyances or that have run off from surrounding lands;
- Conserve fish, wildlife, and plant habitat in the Critical Area; and
- Establish land use policies for development in the Critical Area which accommodate growth and address the fact that, even if pollution is controlled, the number, movement, and activities of persons in the Critical Area can create adverse environmental impacts.

In Caroline County, the Chesapeake Bay Critical Area Law affects all properties within 1000 feet of the Choptank River and the Tuckahoe and Marshyhope Creeks and their tributaries.

The Maryland Forest Conservation Act (Natural Resources Article Section 5-1601 through 5-1613) enacted in 1991 to minimize the loss of Maryland's forest resources during land development by making the identification and protection of forests and other sensitive areas an integral part of the site planning process. Although the Maryland DNR Forest Service administers the FCA, it is implemented on a local level. Caroline County amended its Code of Local Public Laws in October 2000 to include Chapter 109, Forest Conservation.

Winter Storm Capability

As noted in the Hazard Risk and History, Caroline County normally receives 13.6 inches of snow annually. The Public Works Department, the Public Schools and local municipalities, along with the State Highway Regional Office are equipped to deal with the occasional snow storm or ice storm during the winter months. The Public Works Department – Roads Division maintains 450 miles of roadway and 39 bridge crossings. The Roads Division has developed a plan for plowing roads.

In addition to the Public Works Department and State Highway Administration, the Department of Emergency Services has close ties with Choptank Electric and Verizon which provide electrical and telephone service to the citizens of the County. These utility companies clear dead or overhanging trees from utility right-of-ways during summer months so that ice and wind damage is minimized during winter storms.

Drought Capability

As noted in the Drought Hazard Characterization, heat and drought can be a severe problem in Caroline County. When dry conditions disrupt water service in an area of the County, the Department of Emergency Services can request the Maryland Emergency Management Agency through the Maryland National Guard to provide temporary water storage tanks. Additionally, the County Health Department monitors well development through the building permit process and has access to well records through the Department of the Environment to monitor ground water use and replenishment. The Department of Agriculture also monitors soil moisture conditions and provides farmers with information on crop development through the Soil Conservation District during low soil moisture conditions.

Major Fire/Explosion Capability

As noted in the Fire/Explosion Characterization, Caroline County developed its fire and rescue capability as a response to fire hazard early in the 20th Century. More recently, fire prevention measures such as regulatory requirements mandated through the County's Building Code and the dissemination of public information through the State Fire Marshall's office have become the norm. Safety requirements for explosive materials in containers being shipped by rail or truck are enforced by the Department of Transportation. In the event of an emergency, the Department of Emergency Services will communicate and work with the Maryland Department of the Environment Emergency Response Division for complex HAZMAT incidents.

The County is also working with municipalities that have water systems to bring these systems up to a common standard in terms of hydrant pressure and flow capacity. The municipality of Federalsburg has installed dry hydrants along Marshyhope Creek to reduce its reliance on the municipal system in the event of fire. Other dry hydrants include:

- Fowling Creek/Nagel Road;
- Howard Road;
- Tuckahoe Road over Deep Branch; and
- Hillsboro Boat Ramps.

Epidemic Capability

As noted in the Epidemic Characterization, the Maryland Department of Health administers the County Health Department. This administrative setup allows the full capabilities of the State to be utilized to mitigate an epidemic or other outbreak of disease in Caroline County.

Emergency Alert Notification

The Caroline Connect CodeRED system allows residents and businesses to subscribe to important notifications regarding Caroline County. There are over 13,000 active subscribers to emergency alerts throughout the county.

The Caroline County website emergency service page contains a citizen sign-up link: https://public.coderedweb.com/CNE/en-US/97D4F5E4B408.

Mitigation Strategies Introduction

The 2019 Caroline County Hazard Mitigation Planning Committee reviewed and modified the 2011 mitigation strategies, which includes a set of goals and objectives that serve as the basis for new mitigation projects. The ten goals and accompanying objectives are listed in this section.

Goals as identified in this Plan are broad-based and long-term. The following goals identify what the community expects to accomplish through mitigation actions during the next five years. Objectives as identified in this Plan are more specific and narrow in scope than goals. They expand upon goals and provide more details on how to accomplish them.

Note: *These goals, objectives, and mitigation action items apply to municipal participants as well as the unincorporated parts of the County.*

Goal 1 Maintain and enhance Caroline County's Department of Emergency Service's capacity to continuously make Caroline County less vulnerable to hazards.

Objective 1.1 Institutionalize hazard mitigation.
Objective 1.2 Improve organizational efficiency.
Objective 1.3 Maximize utilization of best technology.
Objective 1.4 Maximize utilization of GIS software.

Goal 2 Build and support municipal capacity and commitment to become continuously less vulnerable to hazards.

Objective 2.1 Increase awareness and knowledge of hazard mitigation principles and practice among local and municipal public officials.
Objective 2.2 Provide assistance to municipal officials and help municipalities obtain funding for mitigation planning and project activities.
Objective 2.3 Prepare technical reports for critical facilities as necessary.

Goal 3 Improve coordination and communication with other relevant organizations.

Objective 3.1 Establish and maintain lasting partnerships.
Objective 3.2 Streamline policies to eliminate conflicts and duplication of effort.
Objective 3.3 Incorporate hazard mitigation into activities of other organizations.

Goal 4 Increase public understanding, support, and demand for hazard mitigation.

Objective 4.1 Identify hazard specific issues and needs.
Objective 4.2 Heighten public awareness of natural hazards.
Objective 4.3 Publicize and encourage the adoption of appropriate hazard mitigation actions.
Objective 4.4 Increase the number of businesses that have developed a business risk reduction plan.
Objective 4.5 Increase the proportion of businesses and residences that have flood insurance.

Goal 5 Protect existing and future properties (residential, commercial, public, and critical facilities).

Objective 5.1 Utilize the most effective approaches to protect buildings from hazards, including acquisition and elevation.
Objective 5.2 Enact and enforce regulatory measures to ensure that new development will not increase hazard threats from riverine flooding, storm surge or the threat of wildfire at the urban/forest interface.
Objective 5.3 Review and update Building Codes to ensure that manufactured housing, including mobile homes, are constructed and installed in a manner to minimize wind and storm surge damage.
Objective 5.4 Reduce the number of houses in the floodplain that are subject to flooding.
Objective 5.5 Increase the number of critical facilities that have carried out mitigation measures to ensure their functionality in a 100-year flood event.
Objective 5.6 Ensure continuous power supply to critical and public facilities.

Goal 6 Ensure that public funds are used in the most efficient manner.

Objective 6.1 Prioritize new mitigation projects, starting with sites facing the greatest threat to life, health, and property.
Objective 6.2 Use public funding to protect public services, and critical and public facilities.
Objective 6.3 Use public funding on private property where benefits exceed costs.
Objective 6.4 Maximize the use of outside funding sources.
Objective 6.5 Encourage property-owner self-protection measures.

Goal 7 Promote sustainable development to improve the quality of life.

Objective 7.1 Establish open space parks and recreational areas in flood hazard areas.
Objective 7.2 Provide for the conservation and preservation of natural resources.
Objective 7.3 Limit additional housing (especially elderly and high density) in areas of high hazard risk.

Goal 8 Prevent destruction of forests and structures in the Urban Wildland Interface.

Objective 8.1 Improve communications capability between municipal and County emergency services and law enforcement personnel.
Objective 8.2 Identify specific high hazard areas in the Urban Wildland Interface and notify residents of means to protect their property from wildfire damage.
Objective 8.3 Develop evacuation procedures to enable residents near forested areas to evacuate safely.

Goal 9 Protect public infrastructure, especially evacuation routes.

Objective 9.1 Upgrade or replace public roads and storm water management features to include mitigation into the project design and construction.
Objective 9.2 Improve evacuation routes utilized in flood hazard events to mitigate life-threatening road conditions and road closures.
Objective 9.3 Mitigate problem road sections within the County and municipalities.

Goal 10 Integrate plan and policies across disciplines and agencies within the County through the consideration of potential hazards and future development.

Objective 10.1 Integrate hazard mitigation into areas such as land use, transportation, climate change, natural and cultural resource protection, water resources, and economic development.
Objective 10.2 Solicit participation and offer opportunities for various departments to work together on a regular basis.
Objective 10.3 Clearly define roles of, and improve intergovernmental coordination

between planners, emergency managers, engineers, and other staff, and municipal and regional partners in improving disaster resiliency.

Mitigation Actions

In an effort to update the 2011 Caroline County Hazard Mitigation Plan, mitigation strategies from the previous plan iterations were reviewed. Status updates were provided by members of the Hazard Mitigation Planning Committee. Previous mitigation projects were separated into six broad categories including: Prevention, Property Protection, Public Education and Awareness, Natural Resource Protection, Emergency Services and Structural Projects.

1. **Prevention.** Government administrative or regulatory actions or processes that influence the way land and buildings are developed and built. These actions also include public activities to reduce hazard losses. Examples include planning and zoning, building codes, capital improvement programs, open space preservation, and storm water management regulations.

2. **Property Protection.** Actions that involve the modification of existing critical and public facilities, buildings, structures, and public infrastructure to protect them from hazards. Examples include acquisition, elevation, relocation, structural retrofits, storm shutters, and infrastructure modification.

3. **Public Education and Awareness.** Actions to inform and educate citizens, elected officials, and property owners about potential ways to mitigate for hazards that can occur in the County. Such actions include outreach programs, projects, real estate disclosure, hazard information centers, and school-age and adult education programs.

4. **Natural Resource Protection.** Actions that, in addition to minimizing hazard losses also preserve or restore the functions of natural protection systems. These actions include sediment and erosion control, stream corridor restoration, watershed management, forest and vegetation management, and wetland restoration preservation.

5. **Emergency Services.** Actions that protect people and property during and immediately after a disaster or hazard event. Services include warning systems and emergency response services.

6. **Structural Projects.** Actions that involve the construction of structures to reduce the impact of a hazard event. Such structures include dams, levees, floodwalls, seawalls, retaining walls, barrier islands, and safe rooms.

2019 New Mitigation Actions

Mitigation projects have been identified by the Hazard Mitigation Planning Committee during the plan update. Several projects have been carried over from the 2011 plan, however, most of the projects have been identified during the 2017 plan update. Those actions associated with flooding that may be addressed and documented for the National Flood Insurance Program (NFIP) – Community Rating System have an *(asterisk) beside their action. Project sheets have been developed to fully expand upon mitigation ideas identified throughout the planning process.

Overall there are 9 new action items rated as “High” and are shown on the table. Specially related to the 9 “High” actions items, 2 are prevention related, 1 is property protection related, 1 is public education and awareness related, and 5 are related to Emergency Services. These actions were ranked by the HMPC by their importance, (high, medium, and low) which focused on

which mitigation projects were the most beneficial.

2019 Mitigation Actions

2019 Mitigation Actions & Ratings

Note: Those action items that do not specify municipality or location, those action items should be considered as County-wide.

Table 12-1: New Mitigation Actions & Ratings

#	ACTION	GOALS	OBJECTIVES	TIMEFRAME	HAZARD	RATING
			Prevention			
1	The NFIP requires structures built within the floodplain to have first floor elevations determined. The County's GIS department could partner with building inspectors/permit administrators to maintain a database of new structures with their first-floor elevations. These elevations can be used with forecasting software such as HAZUS to predict vulnerable structures during a specific hazard event. Currently, Caroline County uses the State's open source data and HAZUS data has not been utilized.	1 4 5	1.3; 1.4 4.1 5.1	Long-term	Flood	Low
2	Utilizing FEMA's Flood Mitigation Assistance Program create a Flood Mitigation Plan for the County. This plan will assist the county in obtaining Floodplain Management planning points for the NFIP Community Rating System, thereby lowering flood insurance premiums for homeowners.	1 5	1.3; 1.4 5.1; 5.4	Long-term	Flood	Medium
3	Consider working with utility companies to identify problem areas and the possibility of changing to underground lines in those areas.	3	3.3	Long-term	Winter Storms, Severe Weather & Power Outages	**High**

#	ACTION	GOALS	OBJECTIVES	TIMEFRAME	HAZARD	RATING
4	Create a LEPC link from the Emergency Services website. The Emergency Services entire department website is undergoing redesign in the near future. Proposed updates include: live feeds, widgets, and a wealth of new information from Emergency Management partners at all levels.	4	4.1	Short-term	All	**High**
5	Conduct a Hazardous Materials Survey to identify all hazardous materials that are either stored or traveling through the county.	4	4.1; 4.2	Long-term	HazMat	Medium
6	Using Hazardous Materials Survey results, develop a plan to mitigate any identified risks.	4	4.1; 4.2	Long-term	HazMat	Medium
7	Integrate elements of the Hazard Mitigation Plan into the 10-year Comprehensive Plan update. • 2010 Caroline County Master Plan • 2009 Federalsburg Comprehensive Plan • 2009 Goldsboro Comprehensive Plan • 2010 Greensboro Comprehensive Plan • 2009 Henderson Comprehensive Plan • 2010 Hillsboro Comprehensive Plan • 2009 Marydel Comprehensive Plan • 2005 Preston Comprehensive Plan & 2012 Municipal Growth Element • 2009 Ridgely Comprehensive Plan • 2009 Templeville Comprehensive Plan	3 10	3.2 10.12; 10.2; 10.3	Long-term	All	Medium
Property Protection						
8	About 13 percent of all septic systems in the County are located within the Critical Area. Upgrade these systems using Bay Restoration Funds.	4 7	4.3 7.2	Long-term	Flood & Coastal Storm	Medium

#	ACTION	GOALS	OBJECTIVES	TIMEFRAME	HAZARD	RATING
9	Perform a detailed analysis of structures in the floodplain for the towns of **Henderson**, **Greensboro**, **Hillsboro**, and **Federalsburg** to determine first floor elevation for mitigation project purposes. Develop a Flood Mitigation Plan for Caroline County.	5	5.1; 5.4	Ongoing	Flood	Medium
10	Asses existing multilevel structures such as hospitals and apartment complexes for their wind load capacities, specifically in municipalities. A list of 3+ story structures in their town would need to be inventoried.	4 5	4.1 5.1	Long-term	Coastal Storm, Tornado, & High Wind	Low
11	Mitigate and upgrade flooded roads and ditches when funding is available, specifically evacuation routes.	9	9.1; 9.2; 9.3	Long-term	Flood	**High**
12	Evaluate Garland Road bridge and the Route 404 Bypass Bridge near **Hillsboro** to conclude if the elevation is higher after recent road construction.	9	9.2; 9.3	Long-term	Flood & Severe Weather	Low
13	Complete a detailed flood study of the Forge Branch. The Forge Branch flows through the Priority Funding Area adjacent to the Town of **Greensboro** on the North West Side. This area is slated for future development.	4 5	4.1 5.2; 5.4	Long-term	Flood	Low
14	Identify Pre-FIRM structures that are in the floodplain and need substantial improvements (50% value increase) to be brought to compliance.	5	5.3; 5.4	Long-term	Flood & Severe Weather	Low
15	Prioritize mitigation of Repetitive Loss Properties discussed in Chapter 4: Riverine Flooding. Look for opportunities to create open space/recreation space in flood hazard areas. Consider current and future flood conditions.	1 2 5 7	1.1 2.2 5.1; 5.4 7.1	Long-term	Flood	Low

#	ACTION	GOALS	OBJECTIVES	TIMEFRAME	HAZARD	RATING
Public Education and Awareness						
16	Provide information to citizens focusing on fire resistant wildfire zones around structures. Zones should be free of leaves, debris, or flammable materials for at least 30-foot perimeter.	8	8.1	Short-term	Wildfire	Low
17	Continue to promote Caroline County Connect CodeRED system, which allows residents and businesses to subscribe to important notifications including hazard alerts.	1 8	1.3 8.2	Long-term	All	**High**
Natural Resource Protection						
18	Develop guidelines for County road ditches and for designated priority areas with sensitive environmental conditions. Using GIS to identify potential priority areas including ditches located in these areas and use recommended types of vegetation for buffers, restrictions on scraping or clearing ditches of vegetation, filtration systems, or use of drainage control structures.	7 9	7.2 9.1; 9.3	Short-term	Flood	Medium
19	According to a 2004 State water resources report, Eastern Shore agricultural water withdraws will likely conflict with increased water demand as a result of future population growth. Working with MDE and MDA find the most efficient crop irrigation methods.	1 6 7	1.3 6.2 7.2	Long-term	Drought	Medium
20	Encourage 100 percent of implementation of nutrient management plans for farming operations through public outreach programs.	1 7	1.3 7.2	Long-term	Flood	Medium
Emergency Services						
21	Assess all shelters and their ability to sustain damage for specific hazard types and identify retrofitting projects based on this assessment.	1 2 5	1.3 2.1; 2.3 5.1	Long-term	All	**High**

#	ACTION	GOALS	OBJECTIVES	TIMEFRAME	HAZARD	RATING
22	Coordinate with the Department of Emergency Services and the Department of Social Services to upgrade all shelter resources.	1 3	1.2 3.1	Ongoing	All	**High**
23	Install three fixed weather monitoring stations for the entire jurisdiction resulting in real-time data of precipitation amounts, and wind speed/direction that are critical to the decision-making process for DES. Live data would be available to DES and 9-1-1 dispatch center.	1 6	1.3 6.2; 6.3	Short-term	All	**High**
24	Purchase and install a new generator in the Caroline County Department of Emergency Services located on 9391 Double Hills Road, **Denton**	1 5 6	1.3 5.5 6.1; 6.2	Short-term	All	**High**
25	Install generator transfer switch at Caroline County Courthouse located on 109 Market Street, **Denton**	1 5 6	1.3 5.5 6.1; 6.2	Short-term	All	Low
26	Replace generator at County Corrections/Sheriff's Department located on 101 Gay Street, **Denton**	1 5 6	1.3 5.5 6.1; 6.2	Short-term	All	Low
27	Install a transfer switch in the 4H buildings for back-up point of dispensing, shelters, or other emergencies.	1 5 6	1.3 5.5 6.1; 6.2	Short-term	All	Medium
28	Develop a formal agreement between Department of Emergency Services (DES) and Public Works to establish formal protocols for the placement and removal of signage for shelters and movement of trailers. In addition, develop Standard Operating Procedures between DES and Public Works to identify shared resources and capabilities, as well as gaps.	1	1.1; 1.2; 1.3	Short-term	All	**High**
Structural Projects						

#	ACTION	GOALS	OBJECTIVES	TIMEFRAME	HAZARD	RATING
29	Work with the Town of Greensboro to upgrade undersized water lines for fire suppression.	1 2 3 6	1.2; 1.3 2.1; 2.2 3.1 6.1; 6.2; 6.4	Ongoing	Wildfire & Major Fire/ Explosion	Medium
30	Update floodplain management ordinance to address sea level change, using a standard of 2050 Sea Level Change projection, 2.11 feet, plus 1% chance flood inundation (previously known as the 100-year flood event).	1 5 9	13.; 1.4 5.2 9.1	Short-term	Flood & Sea Level Rise	Low
31	Develop capital improvement guidelines to assist in the review of Capital Improvement Projects (CIP) at the department and County level, encouraging resilience to future hazards as criteria in siting and design of capital projects.	6 10	6.1 10.2; 10.3	Short-term	All	Medium
32	Encourage capital improvement program to include funding for hazard mitigation projects.	6 10	6.1, 6.2; 6.4 10.1	Short-term	All	Low

During the planning process, a questionnaire was provided to municipalities requesting information. As part of the questionnaire, municipalities were given the opportunity to provide mitigation actions. Mitigation action items provided by municipalities are listed in the following table.

Table 12-2: New Municipal Mitigation Actions

ACTION	GOALS	OBJECTIVES	TIMEFRAME	HAZARD
Property Protection				
Consider flood mitigation options for the **Federalsburg** Police Station located in FEMA Flood Zone AE.	2 5 6	2.2 5.5 6.1; 6.2	Long-term	Flood
Consider flood mitigation options for the **Federalsburg** Wastewater Treatment Plant located in FEMA Flood Zone AE.	2 5 6	2.2 5.5 6.1; 6.2	Long-term	Flood
Consider flood mitigation options for the **Greensboro** Wastewater Treatment Plant located in FEMA Flood Zone AE.	2 5 6	2.2 5.5 6.1; 6.2	Long-term	Flood

ACTION	GOALS	OBJECTIVES	TIMEFRAME	HAZARD
Consider flood mitigation options for the **Federalsburg** Town Hall located in FEMA Flood Zone AE.	2 5 6	2.2 5.5 6.1; 6.2	Long-term	Flood
Raise controls at East Lift Station and (3) pump stations for preventative measures for future flooding events in the Town of **Greensboro**.	2 5 6	2.2 5.1; 5.5 6.1; 6.2; 6.4	Long-term	Flood
Negotiate the extension of service from the North County Water and Sewer Authority to The Town of **Marydel** and the Town of **Henderson**.	2 6	2.2 6.2; 6.4	Long-term	All
Research feasibility and cost benefit analysis for the addition of a second water tower or a method to replenish the supply in the existing tower in the Town of **Preston.**	2 5	2.2 5.1	Long-term	All
Maintain and/or improve culvert on Church Street within the Town of **Hillsboro** which has a sediment issue. The accumulation of sediment at this location leads to regular nuisance flooding. The surrounding area will be modified to accompany a dog park, adjust and enhance the flow through the culvert, etc.	2 5 6	2.2 5.5 6.1; 6.2	Long-term	Flood
Establish a staging area for the Queen Anne-Hillsboro Volunteer Fire Company to stage equipment at **Hillsboro** Town Hall. Construction of an auxiliary building will be necessary. This action will improve response time of the Hillsboro first responders. They will not have to drive around the bridge via MD-404 due to flooded road conditions in that area.	2 5 6	2.2 5.5 6.1; 6.2	Long-term	Flood
Public Education and Awareness				
Encourage the Town of **Federalsburg** to participate in the FEMA FloodSmart – National Flood Insurance Program (NFIP) Campaign to help raise awareness in reaching new customers in high-risk flood areas and to encouraging existing customers to renew their policies.	2 3 6	2.1 3.3 6.5	Short-term	Flood
Natural Resource Protection				
Implement a Strategic Plan for the Town of **Denton**, which provides the breakdown for Public Works, e.g., Sewer vs. Water.	2 3 6	2.3 3.1; 3.2 6.2; 6.4	Long-term	Flood

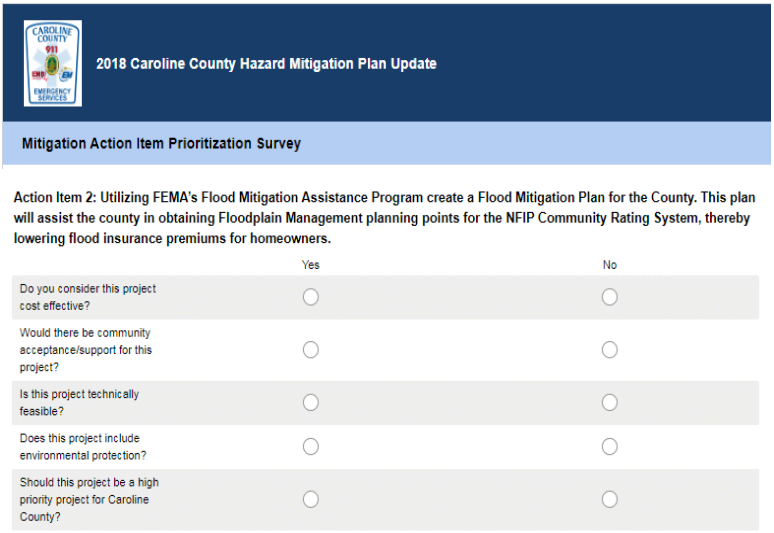
ACTION	GOALS	OBJECTIVES	TIMEFRAME	HAZARD
Emergency Services				
Purchase watercraft for rescue situation in the Town of **Greensboro**.	2	2.2	Short-term	Flood & Severe Weather
Develop emergency kits - Meals Ready to Eat (MRE) to hand out in an emergency in the Town of **Greensboro**.	2	2.2	Short-term	All
Purchase generators to operate wells in the Town of **Greensboro**.	1 5 6	1.3 5.5 6.1; 6.2	Short-term	All
Purchase generator for the water tower pump house in the Town of **Preston.**	1 5 6	1.3 5.5 6.1; 6.2	Short-term	All

2019 Mitigation Strategies

2019 Mitigation Strategies

At the fourth Hazard Mitigation Planning Committee held on October 25, 2018, mitigation actions were reviewed. During this meeting, prioritization of mitigation actions was discussed. As a result of the discussion, HMPC members agreed to participated in an online mitigation action items prioritization survey. In order to prioritize the projects, a survey was developed and distributed to 30 individuals. The survey contained the same five questions for each project and was limited to yes/no answers. The five questions included:

1. Do you consider this project cost effective?
2. Would there be community acceptance/support for this project?
3. Is this project technically feasible?
4. Does this project include environmental protection?
5. Should this project be a high priority project for Caroline County?



2018 Caroline County Hazard Mitigation Plan Update

Mitigation Action Item Prioritization Survey

Action Item 2: Utilizing FEMA's Flood Mitigation Assistance Program create a Flood Mitigation Plan for the County. This plan will assist the county in obtaining Floodplain Management planning points for the NFIP Community Rating System, thereby lowering flood insurance premiums for homeowners.

	Yes	No
Do you consider this project cost effective?	○	○
Would there be community acceptance/support for this project?	○	○
Is this project technically feasible?	○	○
Does this project include environmental protection?	○	○
Should this project be a high priority project for Caroline County?	○	○

As a result of the mitigation action prioritization survey, 9 out of the 32 mitigation actions were rated as a "High" priority by the HMPC; Table 12-3. High priority mitigation actions were further developed into mitigation strategies. Each of the 9 mitigation strategies are comprised of associated action item, discussion and project details. The final pages of this chapter include a matrix detailing responsible entity(s), estimated cost, and potential grant funding sources for each mitigation strategy; Table 12-5.

Table 12-3: High Priority Mitigation Action Items

ACTION #	HIGH PRIORITY MITIGATION ACTION ITEMS
3	Consider working with utility companies to identify problem areas associated with overhead electric lines and the possibility of converting them underground lines in those areas.
4	Create a LEPC link from the Emergency Services website.
11	Mitigate and upgrade flooded roads when funding is available, specifically evacuation routes, based on areas that the HMPC identified as "High" in the following table.
17	Continue to promote Caroline County Connect CodeRED system, which allows residents and businesses to subscribe to important notifications including hazard alerts.
21	Assess all shelters and their ability to sustain damage for specific hazard types and identify retrofitting projects based on this assessment.
22	Coordinate with the Department of Emergency Services and the Department of Social Services to upgrade all shelter resources.
23	Install three fixed weather monitoring stations for the entire jurisdiction resulting in real-time data of precipitation amounts, and wind speed/direction that are critical to the decision-making process for DES. Live data would be available to DES and 9-1-1 dispatch center.
24	Purchase and install a new generator in the Caroline County Department of Emergency Services located on 9391 Double Hills Road, Denton.

ACTION #	HIGH PRIORITY MITIGATION ACTION ITEMS
28	Develop a formal agreement between Department of Emergency Services (DES) and Public Works to establish formal protocols for the placement and removal of signage for shelters and movement of trailers. In addition, develop Standard Operating Procedures between DES and Public Works to identify shared resources and capabilities, as well as gaps.

Action #3: Consider working with utility companies to identify problem areas associated with overhead electric lines and the possibility of converting them underground lines in those areas.

Installation of Underground Power Lines

Source: Hooper Corporation

Discussion: Storm hazards cause damage to overhead electrical power lines. In specific areas and situations, it may be appropriate to install these lines underground. There are pros and cons to installing power lines underground. Underground lines are more expensive and for this reason, priority should be assigned to converting underground lines where necessary, such as, areas that experience a high frequency of storms and outages or areas which have little protection from the elements due to loss of wind and rain buffers are more suitable for underground lines. Underground lines also experience fewer outages. A five-year survey by Duke Energy, Progress Carolinas and Dominion North Caroline Power indicated that underground lines have 50 percent less outages than overhead lines.

Project: The Department of Emergency Services (DES) and Public Works would like to carry this action item over and explore the possibility of a public outreach campaign. The outreach campaign would target residents and business and encouraged adoption of a preparedness mentality by monitoring utility lines at risk of interruption from overgrowth, wind damage, etc. DES and Public Works must meet with all utility providers as a collective group to discuss right-of-way regarding these issues. All new development is built and will be serviced by underground utilities. This will ideally be a collaborative effort with the Utility Companies being the project lead.

Action #4: Create a LEPC link from the Emergency Services website.

Discussion: Along with this action being rated as "High**"** by the HMPC, it was also noted during the third HMPC meeting that members advocated for an update of the County's website. Redesigning the website to include more user-friendly features will encourage community participation, especially from younger generations. Including more links, such as a LEPC link/tab in the Emergency Services website could also increase organization of the LEPC and promote public information dissemination.

Project: Redesign the Caroline County Department of Emergency Services website and update information and links. This project will present all hazards preparedness and mitigation content to the public and allow for easy navigation to important topics of interest. It will have a secure login section where employees of the department can access files. Improving the design and functionality of the County's website, especially the Emergency Services section will increase the community's knowledge and what to do in the event of a hazard or storm event. A LEPC link on the Emergency Services website will provide members, as well as the public with important information. The LEPC website should provide County residents with information

such as news, events, recycling, an events calendar, emergency preparedness and notification, training classes, CERT, other helpful links, contact information, and additional information. Providing minutes on the website is also an excellent idea. This will not only provide current members who may have missed a meeting, information on what was discussed, it also gives community members an inside look.

Action #11: Mitigate and upgrade flooded roads when funding is available, specifically evacuation routes, based on areas that the HMPC identified as "High" in the following table.

Discussion: During the planning process, flooded roads were examined by using the table below. Roads that appear in red text are the roads of highest importance for mitigation as determined by the HMPC.

Table 12-4: Flood Related Issues

Flood Related Issue	Evacuation Issue (Y/N)	State, County, or Municipal
Town of Ridgely Liberty Street	N/A	Municipal
Town of Denton Second Street	Y	Municipal
Town of Federalsburg Railroad Ave	N/A	Municipal
Town of Greensboro Bridge	N/A	Municipal
Town of Denton Seventh at Sunnyside Ave	N/A	Municipal
5th & Legion	Y	Municipal
Smugglers Way	Y	Municipal
Mill Street	Y	Municipal
Riverview Lane	Y	Municipal
Bernard Avenue	N	Municipal
Corkell Rd	N/A	County
Long Swamp Rd	N/A	County
Crouse Mill Rd	N/A	County
Holly Rd	N/A	County
Peaviner Rd	N/A	County
Nagel Road	N	County
Seward Rd near Hog Lot Rd	N	County
Flooded Areas with Posted Flood Signs		
River Rd by North Caroline High School	Yes, Undersized pipes & Elevation	County
Noble Rd	N	County
Veteran's Drive	N	County
River Landing Rd	N	County
Main Street Choptank	N	County
Poplar Neck Rd	N	County
Blades Rd	N	County
Maryland Ave	N	County
Other Roads with Isolated Flooding		
Sunset Ave	N	County
Harper Rd	N	County
Old Denton Rd over tops bridge	Yes - Elevation	County
Hickory Hill Rd	N	County
Central Ave	N	County
Sparks Rd	N	County
Bradley Rd	N	County

Flood Related Issue	Evacuation Issue (Y/N)	State, County, or Municipal
Reed Road	N	County
Log Cabin Rd	N	County
Red Bridges Rd	N	County
Sawmill Rd	N	County
Roads that may need type II Barricades for washout (Road Closures)		
Poplar Neck Rd	N	County
Tanyard Rd	N	County
Smithville Rd	N	County
Gregg Rd	N	County
Knife Box Rd	N	County
Boyce Mill Rd	N	County
River Rd (Dirt Part)	N	County
Tuckahoe Rd	N	County
Ellwanger Rd	N	County
Garland Rd	N	County
Cherry Lane	N	County
Crouse Mill	N	County
State Roads		
Route 404 near Hillsboro	Y	State
Route 328 near Tuckahoe Creek	Y	State
Route 480	Y	State
W. Sunset Avenue	N	State
Bridge	N	State

Project: Out of the 53 roads identified as having flooding issues, one evacuation route was determined by the HMPC to be of high importance for mitigation:

- River Road by North Caoline High School.

In addition, the following roads were also rated high importance for mitigation:

- Holly Road
- River Landing Road
- Main Street Choptank
- Blades Road
- Maryland Avenue
- Smithville Road
- Knife Box Road
- Boyce Mill Road
- Tuckahoe Road
- Garland Road
- Cherry Lane; and,
- Crouse Mill

Flooding at Seventh Street in Federalsburg

Including the roads determined as high importance for mitigation as projects in the County's Capital Improvement Plan could be a possibility.

Action #17: Continue to promote Caroline County Connect CodeRED system, which allows residents and businesses to subscribe to important notifications including hazard alerts.

Discussion: CodeRED enables the Department of Emergency Services deliver geo-targeted, time-sensitive information to those in need, via a multi-modal approach. The fully redundant platform is designed to deliver millions of messages at a time, through a backbone that provides the highest levels of reliability and speed in the industry. Currently, the Caroline Connect CodeRED system allows residents and businesses to subscribe to important notifications regarding Caroline County. Residents must go to the Department of Emergency Services homepage in order to sign up for notifications; https://www.carolinemd.org/181/Emergency-Services.

Project: Promote the Caroline County Connect CodeRED via various media outlets. Utilize the Department of Emergency Services' Facebook and Twitter accounts to encourage residents and businesses to subscribe to receive notifications.

Action #21: Assess all shelters and their ability to sustain damage for specific hazard types and identify retrofitting projects based on this assessment.

Discussion: A list of shelters (schools, community centers, and fire departments, etc.) throughout Caroline County is available. The Caroline County Department of Social Services is the primary lead for mass care and sheltering, as stated within the County Emergency Operations Plan. Schools and fire halls designed to withstand high winds and the impact of windborne debris during tornadoes, hurricanes, or other extreme-wind events should be designed as primary shelters, as opposed to shelters that are not designed to these standards.

Project: Examine all shelters, prioritizing designated primary shelters to determine mitigation techniques, such as, building retrofits. These mitigation techniques may include damage resistance from multi-hazards such as winds, floods, etc. Also, inspections of these shelters should be conducted by qualified staff, on a regular basis, to ensure safety standards and generator functionally.

Action #22: Coordinate with the Department of Emergency Services and the Department of Social Services to upgrade all shelter resources.

Discussion: During a hazard event, **i**t is especially relevant that care and shelter is provided for temporary emergency relief to disaster victims. Providing temporary emergency relief involves a range of emergency human services (e.g., food, shelter, health care, mental health support, etc.). To that end, the Department of Emergency Services and the Department of Social Services need to able to provide for people seeking care and shelter immediately after a disaster by ensuring shelter resources are upgraded and sufficient.

Project: Inventory current shelter resources and determine if resources are adequate or need to be upgraded. An inventory listing detailing what shelter resources are available and the date the resources where obtained should be maintained. The catalog, *Commonly Used Shelter Items & Services Listing Catalog*, developed by FEMA in March 2013 could be utilized as a guide for developing an inventory listing, identifying any resource gaps, and determine resources in need of an upgrade.

Action #23: Install three fixed weather monitoring stations for the entire jurisdiction resulting in real-time data of precipitation amounts, and wind speed/direction that are critical to the decision-making process for DES. Live data would be available to DES and 9-1-1 dispatch center.

Discussion: Caroline DES is interested in the installation of three (3) fixed weather monitoring stations for the entire jurisdiction. Currently, meteorological data for Caroline County is obtained from Dover Air Force Base (KDOV), the nearest radar site. While temperature and heat index conditions do not fluctuate between KDOV and the county-seat of Denton, having real-time data of precipitation amounts, wind speed/direction, are crucial to the decision-making process for DES. These fixed stations would submit live data to our offices and 9-1-1 dispatch center.
Project: Obtain funding to install three (3) fixed weather monitoring stations at the following locations:

- Goldsboro Volunteer Fire Company
  700 Old Line Road Goldsboro, MD 21636
- Federalsburg EMS Station
  407 N. University Avenue Federalsburg, MD 21632
- Caroline County Department of Emergency Services
  9391 Double Hills Road Denton, MD, 21629

Action #24: Purchase and install a new generator in the Caroline County Department of Emergency Services located on 9391 Double Hills Road, Denton

Discussion: In January 2015, the Caroline County Department of Emergency Services administrative offices and an Emergency Medical Services station relocated to a new facility located on 9391 Double Hills Road in Denton. The Department of Emergency Services (DES) provides high quality Emergency Communications, Hazard Planning, Risk Management and Emergency Medical Services to the residents, governmental departments, agencies and visitors of Caroline County. DES is responsible for:

- Advanced Emergency Medical Services to the citizens and visitors;
- Emergency planning and coordination for County government;
- Emergency Communications, including 911;
- Police communications for the Sheriff's Office and four town police departments; and,
- Fire and Rescue communications for nine volunteer Fire / EMS departments.

Therefore, during a hazard event, it is essential that this facility be operational at all times in order to assist during a hazard event. It is critical to the welfare of the population, especially important following hazard events. Therefore, it is necessary to ensure services can continue to be provided to Caroline County citizens.

Project: Assess the Caroline County Department of Emergency Services facility for vulnerability, capacity, facility resources, and back-up power (generator). The project deliverable would include a final technical report based on FEMA 361 guidelines. Based upon this report, apply for grant funding to purchase and install an emergency generator that meets the needs of the community. During the Plan update process, the 4H Park was determined to be an ideal location for mass sheltering. Due to the size of the structure, a wide variety of shelters can be established here, primarily access and functional needs populations. DES will seek to install an automatic transfer switch at this location to allow generator power integration.

Action #28: Develop a formal agreement between Department of Emergency Services (DES) and Public Works to establish formal protocols for the placement and removal of signage for shelters and movement of trailers. In addition, develop Standard Operating Procedures between DES and Public Works to identify shared resources and capabilities, as well as gaps.

Discussion: As stated in the Shelter/Mass Care EOP Annex, "DES maintains roll up emergency shelter direction signs. In the event of the opening of shelters, the DES Director will instruct the Department of Public Works to place the signage in pre-determined locations to direct residents to the shelter sites." This annex states the placement of signage, however not the removal of signage. In addition, how shelter trailers will be transported to specific locations and who is responsible for transportation should be determined. Shared resources and capabilities between the Department of Emergency Services and Public Works should be identified and documented within a Standard Operating Procedures plan.
Project: Establish formal protocols between Department of Emergency Services and Department of Public Works for the placement and removal of signage for shelters. In addition, the Department of Public Works assist shelter operations by transporting the shelter trailer to the appropriate location. In order to ensure efficient and proper placement and usage of shelter resources, establish Standard Operating Procedures.

Mitigation Strategies Breakdown & Potential Funding

Table 12-5: Mitigation Strategies Breakdown & Potential Funding

Project/Action	Responsible Organizations	Estimated Costs	Possible Funding Sources	Approximate Timeline (Years)
Action # 3 Underground Lines Project	-Caroline County Public Works -Caroline County Planning and Codes -Power Companies with Coverage in the County	-2-8 times the cost of overhead lines depending on the size/location of the line -Staff Time	-FEMA Hazard Mitigation Grant Program -Economic Development Administration, Public Works and Development Facilities -Power Companies	2 - 3
Action # 4 LEPC Website Project	-Caroline County Department of Emergency Services -Caroline County Office of Technologies -Website Builder/ Consultant (Optional)	Free if completed by County or $1,000-$4,000 if completed by website designer	FEMA Hazard Mitigation Grant Program	> 1
Action #11 Repetitive Roadway Flooding	-Caroline County Public Works -Private Engineering Firm -Caroline County Department of Emergency Services	To be Determined during the conceptual design phase process.	-FEMA Hazard Mitigation Grant Program -FEMA Pre-Disaster Mitigation Grant Program -Emergency Advance Measures for Flood Prevention	3-5

Action #17 CodeRED	-Caroline County Department of Emergency Services	Staff Time	N/A	> 1
Action # 21 Assessment of Shelters	-Caroline County Public Works -Contracted Engineering Company -American Red Cross	To be Determined	-FEMA Hazard Mitigation Grant Program -FEMA Pre-Disaster Mitigation Grant Program -Economic Development Administration, Economic Adjustment Program	1 - 2
Action #22 Shelter Resources	-Caroline County Department of Emergency Services -Caroline County Department of Social Services	-Staff Time -Resource Cost to be determined	Homeland Security Grant Program	1-2
Action #23 Weather Monitoring Stations	-Caroline County Department of Emergency Services	$10,000	-FEMA Pre-Disaster Mitigation Grant Program	1
Action #24 Generator at DES Facility	-Caroline County Department of Emergency Services -Caroline County Public Works	To be Determined	-FEMA Hazard Mitigation Assistance Grant Program -Pre-Disaster Mitigation Grant	1-2
Action #28 DES & PW Shelter Protocol & SOP	-Caroline County Department of Emergency Services -Caroline County Public Works	Staff Time	N/A	1

Chapter 13: Plan Maintenance & Implementation

Plan Adoption

The Disaster Mitigation Act of 2000 requires that local Hazard Mitigation Plans and any updates be formally adopted by the Caroline County Commissioners following review by the Maryland Emergency Management Agency and Federal Emergency Management Agency. The Plan and any updates will be subject to a public hearing prior to adoption by the County Commissioners.

Plan Update & Continued Public Involvement

The Disaster Mitigation Act of 2000 requires Local Hazard Mitigation Plans to be monitored, evaluated, and updated during a five-year cycle. The County's Local Emergency Planning Committee (LEPC), which was instrumental in developing this Hazard Mitigation Plan, will continue to meet on a regular basis during the five-year cycle to monitor and evaluate mitigation projects and to keep the Plan current. Annual status reports will be completed on the progress of various mitigation activities. Copies of these status reports will be made available to the public.

The annual status report will detail mitigation activities undertaken over the course of the year and will highlight completed activities. The report will also address the following points:

- Evaluate the goals and objectives to ensure they address current and expected conditions.
- Determine if the nature or magnitude of risk as changed.
- Evaluate whether current resources are adequate for implementing the Plan.
- Document any technical, legal, or coordination issues.
- Document agency and partner participation along with public involvement.

Copies of the annual report will be made available to LEPC members, local governments, participating agencies and partners, and citizens.

The Hazard Mitigation Plan is to be updated and readopted at the end of each five-year cycle. In the event of a significant disaster or any substantial changes in land use or regulations that impact mitigation efforts, more frequent updates may be required. The LEPC and the Department of Emergency Services will be responsible for overseeing the update to the Hazard Mitigation Plan. The process used to update the plan would follow the procedure used to prepare the original Plan. This would include participation by the Hazard Mitigation Planning Committee and would also include municipal and citizen involvement.

Implementation

The Disaster Mitigation Act of 2000 also requires that the County implement the Plan through existing programs. This can be accomplished through inclusion of mitigation measures in the Comprehensive Plan, the Land Use and Building Codes, the Floodplain Ordinance and through Federal grant programs which are identified in the previous section. As these documents are updated, reference to the mitigation measures included in the Hazard Mitigation Plan can be amended into various plans and regulations.

Appendix A - Essential Facilities

Facility Type	Name	Address	City	Year Built	Assessment Value
EOC/9-1-1	Emergency Operations Center	403 S 7th St	Denton	1998	3348900
	Caroline County DES Headquarters	9391 Double Hills Road	Denton	2015	200000
EMS	Denton EMS - Station 13	9391 Double Hills Road	Denton	2015	487800
	Preston EMS - Station 12	3690 Choptank Road	Preston	2014	410700
	Greensboro EMS - Station 16	116 N Main St	Greensboro	1930	134900
	Ridgely EMS - Station 14	101 Sunset Blvd	Ridgely	1961	49400
	GOLDBORO EMS - Station 17	700 Old Line Rd	Goldsboro	1984	0
	FEDERALSBURG EMS - Station 11	208 N University Ave	Federalsburg	1964	0
Fire	Denton VFD - Station 300	400 S 5th Ave	Denton	1972	956400
	Preston VFD - Station 200	3680 Choptank Road	Preston	1999	1223000
	Federalsburg VFD - Station 100	208 N University Ave	Federalsburg	1964	1278800
	Goldsboro VFD - Station 700	700 Old Line Rd	Goldsboro	1984	442400
	Greensboro VFD - Station 600	116 N Main St	Greensboro	1930	134900
	Ridgely VFD - Station 400	101 Sunset Blvd	Ridgely	1930	415000
Medical	SRHC Medical Pavilion	838 S 5th Ave	Denton	1998	2389400
	Choptank Community Health Services	609 Daffin Lane	Denton	1979	490700
	Choptank Community Health Care	316 Railroad Ave	Goldsboro	2006	2123000
	Choice One Urgent	8 Denton Plaza	Denton	2016	9872700
	Caroline County Health Department	403 S 7th St	Denton	1998	3348900
Police	Denton Police Department	100 N 3rd St	Denton	2004	844400
	Ridgely Police Department	2 Central Ave	Ridgely	1890	281800
	Federalsburg Police Station	704 Morris Ave	Federalsburg	1962	743800
	Greensboro Police Department	104 E Sunset Ave	Greensboro	1924	83600
	Caroline County Sheriff's Office	101 Gay St	Denton	1905	239500
School	Caroline County Family Support Center	100 N 6th St	Denton	1995	723400
	The Benedictine School	14374 Benedictine Lane	Ridgely	1900	11685600
	Lockermen Middle	410 Lockerman St	Denton	1978	6008200
	Preston Elementary	225 Main St	Preston	1971	5817500
	Greensboro Elementary	625 N Main St	Greensboro	1974	4913100
	Colonel Richardson Middle School	25320 Richardson Road	Federalsburg	1973	8032950
	Career & Technology Center	10990 River Road	Ridgely	1955	12141500
	Denton Elementary	303 Sharp Road	Denton	1975	5525700
	Federalsburg Elementary	302 S University Ave	Federalsburg	1935	5964200
	Federalsburg Judy Center	323 S University Ave	Federalsburg	2004	731800
	Ridgely Elementary	118 N Central Ave	Ridgely	1978	4818300
	North Caroline High	10990 River Road	Ridgely	1955	12141500
	Colonel Richardson High School	25320 Richardson Road	Federalsburg	1973	8032950
Tower	Denton Transmitter Building	508 Caroline St	Denton	1954	753400
	Preston Transmitter Building	225 Main St	Preston		39500
	Federalsburg Transmitter Building	302 N University Ave	Federalsburg		10300
	Goldsboro Radio Tower	700 Old Line Rd	Goldsboro	1984	100000

Other Critical and Public Facilities Listing

Facility Category	Name	Address	Assessment Value
Airport	Ridgely Airport	24030 Race Track Road	$854,200
County Owned	Federalsburg Branch Library	123 Morris Ave	$171,000
	County Historical Society	3395 Linchester Road	$36,970
	County Commissioners	23459 Grove Road	$19,750
	Park and Recreation	8230 Detour Road	$453,000
	County Commissioners	8847 Harmony Road	$31,000
	County Developmental Center	610 Daffin Lane	$214,000
	County Soil Conservation	640 Legion Road	$575,000
	Caroline County Recreation & Parks	107 S 4th St	$477,500
	County Health and Public Services Building	403 S 7th St	$3,514,000
	Caroline County Counseling Center	104 Franklin St	$359,900
	Board of Education	204 Franklin St	$961,700
	County Maintenance & Transportation	414 Gay St	$172,300
	Denton Family Support Center	100 N Sixth St	$560,600
	Central Library	100 Market St	$1,498,400
	Board of County Commissioners	105 Gay St	$149,800
	Department of Public Works Building	520 Wilmuth St	$576,600
	County Commissioners	109 Market St	$2,560,700
	Warehouse	10502 Greensboro Road	$306,900
	County Commissioners Apartments	12050 School St	$1,124,700
	The Caroline Center	12061 School St	$536,400
	County Commissioners Apartments	School St	$1,117,500
	County Commissioners Apartments	12050 School St	$1,124,700
	Humane Society	407 W Belle Road	$408,600
	North County Library	101 Cedar Lane	$1,384,800
	County Historical Society	114 W Sunset Ave	$55,900
Marina	Choptank Marina	21843 Water St	$457,300
	Federalsburg Marina	999 Marina Rd	$54,800
	Ganeys Wharf Boat Ramp	7200 Ganeys Wharf Rd	$13,120
	Martinak State Park Boat Ramp	137 Deep Shore Road	$378,800
	Choptank River Yacht Club	10287 River Landing Road	$154,300
	Crouse Park Boat Ramp	199 Crouse Park Lane	$0
Medical	Choptank Community Health Systems	215 Bloomingdale Ave	$496,700
	Federalsburg Medical Center	3304 Hayman Dr	$90,800
	Private Medical Office	319 N Main St	$87,800
	Private Medical Office	136 Lednum Ave	$576,000
	The Caroline Center	8287 Haven St	$133,460
	Private Medical Office	505 Kerr Ave	$131,600
	Private Medical Office	200 S 7th St	$127,000
	Easton Memorial Hospital	920 Market St	$1,118,800
	The Caroline Center	109 S Eighth St	$161,990
	Private Medical Office	318 Market St	$96,100
	Private Medical Office	405 Market St	$83,400
	Choptank Community Health Systems	301 Randolph St	$143,500
	Caroline County Health Department	411 Franklin St	$114,700
	Private Medical Office	10646 River Road	$573,900
	Private Medical Office	13155 Greensboro Road	$123,800
Municipally Owned	Town of Federalsburg Community Center	223 Kinder St	$198,500
	Mayor and Council of Federalsburg	104 Morris Ave	$57,400
	Mayor and Council of Federalsburg	704 Morris Ave	$175,300
	Town of Federalsburg Main Office	118 N Main St	$403,800
	Commissioners of Preston	105 Back Landing Road	$61,500
	Town of Preston	3690 Choptank Road	$75,000
	Town of Preston Office	172 Main St	$115,700
	Commissioners of Preston	Chambers St	$38,000

	Denton Self Storage	24 Engerman Ave	$7,100
	Town of Denton	512 Franklin St	$118,200
	Town of Denton	7 N 4th St	$16,600
	Town of Denton	8 N 4th St	$45,400
	Commissioners of Denton	313 Market St	$106,400
	Town of Denton	11 N Fourth St	$55,700
	Commissioners of Denton	16 N 2nd St	$295,300
	Town of Denton	414 High St	$170,600
	Town of Denton Office	13 N Third St	$242,800
	Hillsboro Town Office	22043 Church St	$19,000
	Town of Hillsboro	22004 Main St	$13,800
	Rec Fields/Park	W Forth St	$105,600
	Town of Ridgely Office	2 Central Ave	$193,000
	Town of Greensboro Office	111 Main St	$140,600
	Commissioners of Greensboro	118 N Main St	$21,100
	Greensboro Fair Grounds/ Boat Ramp	222 E Sunset Ave	$22,900
	Goldsboro Post Office	507 Old Town Rd	$68,000
	Marydel Community Hall	130 Halltown Road	$89,700
	Town of Marydel Office	319 Main St	$34,800
Storage Tank	Underground Storage Tank	2642 Choptank Main St	
	Underground Storage Tank	515 S Main St	
	Underground Storage Tank	2539 Veterans Dr	
	Underground Storage Tank	1300 Industrial Park Dr	
	Underground Storage Tank	1100 Industrial Park Dr	
	2 Underground Storage Tanks	412 Railroad Ave	
	Underground Storage Tank	123 Ellis St	
	Underground Storage Tank	218 S Main St	
	Underground Storage Tank	319 S University Ave	
	Underground Storage Tank	320 Holt St	
	Underground Storage Tank	500 Academy Ave	
	Underground Storage Tank	404 Railroad Ave	
	Underground Storage Tank	1000 Industrial Park Rd	
	Underground Storage Tank	105 E Central Ave	
	Underground Storage Tank	304 E Central Ave	
	Underground Storage Tank	115 N Main St	
	Underground Storage Tank	123 N Main St	
	Underground Storage Tank	101 S Main St	
	Underground Storage Tank	109 Morris Ave	
	Underground Storage Tank	117 N Main St	
	Underground Storage Tank	110 Morris Ave	
	Underground Storage Tank	102 N Main St	
	Underground Storage Tank	N Main St	
	Underground Storage Tank	305 Bloomingdale Ave	
	Underground Storage Tank	312 Bloomingdale Ave	
	Underground Storage Tank	315 Bloomingdale Ave	
	Underground Storage Tank	616 Liberty Road	
	Underground Storage Tank	314 N Main St	
	Underground Storage Tank	301 Bloomingdale Ave	
	Underground Storage Tank	310 Bloomingdale Ave	
	Underground Storage Tank	251 E Central Ave	
	Underground Storage Tank	307 Bloomingdale Ave	
	Underground Storage Tank	301 N Main St	
	Underground Storage Tank	107 Back Landing Road	
	Underground Storage Tank	28298 Bridgeville Road	
	Underground Storage Tank	3601 Choptank Road	
	Underground Storage Tank	3424 Gallagher Road	
	Underground Storage Tank	242 Main St	
	Underground Storage Tank	325 Old Denton Road	
	Underground Storage Tank	100 Chambers St	

	Underground Storage Tank	24003 Friendship Road	
	Underground Storage Tank	100 Harmony Road	
	Underground Storage Tank	145 Main St	
	Underground Storage Tank	155 Main St	
	Underground Storage Tank	163 Main St	
	Underground Storage Tank	239 Main St	
	Underground Storage Tank	243 Main St	
	Underground Storage Tank	3835 Old Denton Road	
	Underground Storage Tank	3922 Old Denton Road	
	Underground Storage Tank	3725 Payne Road	
	Underground Storage Tank	101 Maple Ave	
	Underground Storage Tank	151 Lednum Ave	
	Underground Storage Tank	Federalsburg Hwy	
	Underground Storage Tank	22925 Dover Bridge Road	
	Tri Gas & Oil Tank Farm	3945 Federalsburg Hwy	
	Underground Storage Tank & AGST	3946 Federalsburg Hwy	
	Underground Storage Tank	3975 Gallagher Road	
	Above Ground Storage Tank	3922 Old Denton Rd	
	Underground Storage Tank	20949 Dover Bridge Road	
	Underground Storage Tank	21891 Dover Bridge Road	
	Underground Storage Tank	5295 Federalsburg Hwy	
	Underground Storage Tank	5821 American Corner Road	
	Underground Storage Tank	5940 Bell Creek Road	
	Underground Storage Tank	6221 Bethlehem Road	
	Underground Storage Tank	6229 Harmony Road	
	Underground Storage Tank	6240 Harmony Road	
	Underground Storage Tank	5821 Noble Road	
	Underground Storage Tank	7849 Harmony Road	
	Underground Storage Tank	27700 Possum Hill Road	
	Underground Storage Tank	26203 Beauchamp Branch Road	
	Underground Storage Tank	7275 Federalsburg Hwy	
	Underground Storage Tank	24820 Pealiquor Road	
	Underground Storage Tank	25623 Shore Hwy	
	Underground Storage Tank	Harmony Rd	
	Underground Storage Tank	105 Deep Shore Road	
	Underground Storage Tank	1207 Double Hills Road	
	Above Ground Storage Tank	1105 Park Ln	
	Underground Storage Tank	8912 Fisher Road	
	Underground Storage Tank	26425 Hobbs Road	
	Underground Storage Tank	1103 Industrial Park Way	
	Underground Storage Tank	1123 Industrial Park Way	
	Underground Storage Tank	9238 Legion Road	
	Underground Storage Tank	405 S 5th Ave	
	Underground Storage Tank	408 S 5th Ave	
	Underground Storage Tank	408 S 5th Ave	
	Underground Storage Tank	610 Legion Road	
	Underground Storage Tank	520 Kerr Ave	
	Underground Storage Tank	101 S 7th St	
	Underground Storage Tank	1004 Hobbs Road	
	Underground Storage Tank	408 N 10th St	
	Underground Storage Tank	4 N 5th St	
	Underground Storage Tank	12 N 5th St	
	Underground Storage Tank	12 N 6th St	
	Underground Storage Tank	101 N 6th St	
	Underground Storage Tank	907 Crystal Ave	
	Underground Storage Tank	100 Franklin St	
	Underground Storage Tank	105 Franklin St	
	Underground Storage Tank	110 Franklin St	
	Underground Storage Tank	205 Market St	

	Underground Storage Tank	300 Market St	
	Underground Storage Tank	303 Market St	
	Underground Storage Tank	502 Market St	
	Underground Storage Tank	507 Market St	
	Underground Storage Tank	Franklin St	
	Underground Storage Tank	126 Market St	
	Underground Storage Tank	503 Market St	
	Underground Storage Tank	214 Market St	
	Underground Storage Tank	8 N 2nd St	
	Underground Storage Tank	422 N 6th St	
	Underground Storage Tank	105 Gay St	
	Above Ground Storage Tank	10264 River Landing Road	
	Underground Storage Tank	700 N 6th St	
	Underground Storage Tank	27733 Burrsville Road	
	Underground Storage Tank	420 Colonial Dr	
	Underground Storage Tank	10518 Greensboro Road	
	Underground Storage Tank	10602 Knife Box Road	
	Underground Storage Tank	24562 Meeting House Road	
	Underground Storage Tank	24778 Meeting House Road	
	Underground Storage Tank & AGST	24820 Meeting House Road	
	Underground Storage Tank	10413 River Landing Road	
	Underground Storage Tank	Shore Hwy	
	Underground Storage Tank	Shore Hwy	
	Underground Storage Tank	10833 Greensboro Road	
	Underground Storage Tank	11005 Greensboro Road	
	Underground Storage Tank	24131 Shore Hwy	
	Underground Storage Tank	11348 Greensboro Road	
	Underground Storage Tank	21908 Main St	
	Underground Storage Tank	21991 Main St	
	Underground Storage Tank	22145 Shore Hwy	
	Underground Storage Tank	25430 Smith Landing Road	
	Underground Storage Tank	11813 Holly Road	
	Underground Storage Tank	11575 Ridgely Road	
	Underground Storage Tank	23501 Henry Road	
	Underground Storage Tank	503 Sunrise Ave	
	Underground Storage Tank	202 E 6th St	
	Underground Storage Tank	408 Central Ave	
	Underground Storage Tank	2 N Maple Ave	
	Underground Storage Tank	102 W Railroad Ave	
	Underground Storage Tank	1 W Belle St	
	Underground Storage Tank	Factory Ave	
	Underground Storage Tank	421 W Belle St	
	Underground Storage Tank	13301 Greensboro Road	
	Underground Storage Tank	216 S Main St	
	Underground Storage Tank	100 N Main St	
	Underground Storage Tank	401 W Sunset Ave	
	Underground Storage Tank	517 W Sunset Ave	
	Underground Storage Tank	104 W Sunset Av	
	Underground Storage Tank	201 N Main St	
	Underground Storage Tank	106 W Sunset Ave	
	2 Underground Storage Tanks	211 Cedar Ln	
	Underground Storage Tank	106 E Sunset Ave	
	Underground Storage Tank	304 W Sunset Ave	
	Underground Storage Tank	13730 Greensboro Road	
	Underground Storage Tank	720 Industry Ln	
	Above Ground Storage Tank	702 Sunset Ave	
	Underground Storage Tank	13967 Cedar Lane	
	Underground Storage Tank	24870 E Cherry Lane	
	Underground Storage Tank	501 Oldtown Road	

	Underground Storage Tank	15950 Henderson Road	
	Underground Storage Tank	Bee Tree Rd	
	Underground Storage Tank	500 Main St	
	Underground Storage Tank	324 Henderson Road	
	Underground Storage Tank	16800 Henderson Road	
	Underground Storage Tank	Henderson Rd	
	Underground Storage Tank	26827 Barclay Road	
	Underground Storage Tank	325 Crown Stone Road	
	Underground Storage Tank	18230 Henderson Road	
Trailer Park		Liberty Road	$175,700
		Ischer Road	$51,100
		Nichols Road	$191,300
		Nichols Rd	$23,500
		Nelpine Road	$468,400
		Dover Bridge Road	$1,322,100
		Dover Bridge Road	$474,000
		Hrynko Road	$324,500
		Marsh Creek Road	$159,100
		Newton Road	$189,100
		Burrsville Road	$415,800
		Greensboro Road	$196,700
		Henderson Road	$2,086,400
		Henderson Road	$2,086,400
		Henderson Road	$127,000
		Henderson Road	$26,000
		Lepore Rd	$939,500
		Lepore Road	$483,100
Utility	Town of Federalsburg WWTP	125 Kerney St	$2,359,000
	Federalsburg WWTP	311 Reliance Ave	$60,470
	Telecommunications Tower	21759 Marsh Creek Road	$64,170
	Telecommunications Tower	4850 Smithville Road	$14,600
	Verizon Telecommunications Tower	23573 Grove Road	$13,800
	Telecommunications Tower	23663 Grove Road	$178,470
	Subcarrier Communications Inc.	27620 Bloomery Rd	$0
	Telecommunications Tower	26629 Shore Hwy	$81,700
	Denton WWTP	650 Legion Rd	$12,100
	Verizon	306 Franklin St	$85,100
	Choptank Electric	24820 Meeting House Road	$127,600
	Crown Atlantic Company LLC Tower	10384 River Rd	$0
	Telecommunications Tower	26349 Burrsville Road	$28,600
	Choptank Electric Substation	10675 Greensboro Road	$87,530
	Telecommunications Tower	23204 Shore Hwy	$356,850
	Telecommunications Tower	23204 Shore Hwy	$356,850
	Telecommunications Tower	23204 Shore Hwy	$356,850
	Telecommunications Tower	23204 Shore Hwy	$356,850
	Ridgely WWTP	23236 W Belle Rd	$796,200
	Greensboro WWTP	13514 Greensboro Rd	$286,000
	American Towers Inc.	14374 Benedictine Lane	$10,212,500
	Telecommunications Tower	14299 Benedictine Lane	$117,700
	Henderson Water Tower	Henderson Rd	$0
	American Tower Inc.	26289 Barclay Road	$0
	TowerCo Assets LLC	522 Main St	$501,900
	Ridgely Airport Communication Tower	24030 Race Track Road	$282,200

Appendix B – Hazard Mitigation Planning Committee Minutes

CAROLINE COUNTY DEPARTMENT OF EMERGENCY SERVICES

COUNTY COMMISSIONERS
DANIEL J. FRANKLIN LEVENGOOD, JR. COMMISSIONER PRESIDENT
LARRY C. PORTER PRESIDENT
WILBUR VICE-

KEN DECKER, COUNTY ADMINISTRATOR BRYAN C. EBLING, DIRECTOR

Hazard Mitigation Planning Committee Meeting Minutes
June 4th, 2018

I. Summary

The first meeting of the Hazard Mitigation Planning Committee, herein referred to as HMPC, was called to order on June 4th, 2018 at approximately 9:10 AM. This meeting was held at the Caroline County Health and Public Safety Building (HAPS) located at 403 South 7th Street in the town of Denton, Maryland. The attendance roster is included on the following page and consists of local officials, key stakeholders, and partner agencies of the Caroline County Department of Emergency Services (DES). This gathering aimed to introduce and/or reorient members of the HMPC to the 2018 Hazard Mitigation Plan Update, a multi-phase project underway which will near completion by late Fall, 2018.
Hosted by DES personnel Jeff Ludwig and Cindy Towers, the meeting and associated presentation briefly explained the goals of the County, a review of the existing 2011 Hazard Mitigation Plan, the project proposal from the contractor (Smith Planning & Design, LLC), and relevant material supporting the planning process. At the close of the meeting, attendees provided their contact information which will be used for future gatherings of the HMPC and inclusion in the finalized 2018 plan. Please limit distribution of these minutes to essential members of the HMPC for business purposes.

II. Attendance

Bryan Ebling
Director
Caroline County DES
bcebling@carolinemd.org

Cindy Towers
Assistant Director
Caroline County DES
ctowers@carolinemd.org

Jeff Ludwig
Emergency Planner
Caroline County DES
jludwig@carolinemd.org

Don Mulrine
Town Administrator
Town of Denton
dmulrine@dentonmaryland.com

Seth Hampton
Codes Enforcement Officer
Caroline County Planning & Codes Administration
shampton@carolinemd.org

Chris Kephart
GIS & Data Coordinator
Caroline County Planning & Codes Administration
ckephart@carolinemd.org

Kat Stork
Deputy Director
Caroline County Recreation & Parks
kstork@carolinemd.org

Jeannette DeLude
Town Manager
Town of Greensboro
jdelude@greensboromd.com

Stephanie Berkey
Clerk/Treasurer
Town of Ridgely
sberkey@ridgelymd.org

Cindy Burns
Circuit Rider
Templeville/Goldsboro
Maryland Rural Development Corporation
cburns@mrdc.net

John Garlick
Code Enforcement Department
Town of Federalsburg
jgarlick@federalsburg.org

Theresa Bond
Caroline County Department of Social Services
*On behalf of Dina Daly
Theresa.bond@maryland.gov
Dina.daly@maryland.gov

John Shepard
District Manager
Soil Conservation Caroline District
John.shepard@maryland.gov

Jeff Dean
Soil Conservation Caroline District
Jeffreyr.dean@maryland.gov

Virginia Albers
Maryland Rural Development Corporation
vlalbers@yahoo.com

III. Agenda

- Brief reception held
- Introductions of DES Staff Bryan Ebling, Cindy Towers, Jeff Ludwig, and Virginia "Ginny" Smith of Smith Planning & Design
- Committee member introductions
- Brief overview of Hazard Mitigation Planning (HMP)
- Review of current HMP (dated 2011)
- Case study of Seaside Heights, New Jersey and Super Storm Sandy (2012)
- Introduction of 2018 HMP Proposal, scope of work, timeline
- Open discussion (Paraphrased)

i. John Garlick: Hazardous materials/industrial and agricultural agents often pass through and are even located in Federalsburg at some facilities. Mr. Garlick hopes to incorporate these hazards into our final product.

ii. John Shepard: Caroline County Soil Conservation District looks forward to participating on the HMP; Their participation will add great value to geologic/soil hazards planning.

- Meeting closes

On behalf of Caroline County Department of Emergency Services, I express my gratitude and excitement that you are a member of this committee. Caroline DES looks forward to your involvement and participation at the next gathering of the HMPC! Please follow the link contained in the email to vote on our next meeting date.

-Jeff Ludwig DES Emergency Planner

Caroline County Hazard Mitigation Plan Committee (HMPC)

Minutes

Meeting:	**HMPC Meeting #2**		
Date of Meeting:	July 11, 2018	**Time:**	9 am - 11 am
Meeting Facilitator:	Virginia Smith – Smith Planning & Design	**Location:**	Caroline County Health & Public Safety Building (HAPS) Room 110/111

Meeting Topics Discussed

Agenda Topics

- ✓ **Project Schedule**
- ✓ **Guiding Principles for Plan Development**
- ✓ **Hazard Identification & Risk Assessment**
- ✓ **Group Session**
- ✓ **Next Steps**

Attendees

Name	Organization	Name	Organization
Jeffrey Ludwig	Department of Emergency Services	Jeannette DeLude	Town of Greensboro
Cindy Towers	Department of Emergency Services	John Garlick	Town of Federalsburg
Chris Kephart	Department of P&C-GIS	Don Mulrine	Town of Denton
Jake Jacobs	Department of Public Works	Jeff Dean	Caroline Soil Conservation District
Linda Woodall	Caroline County Health Department	Jim Bass	Eastern Shore Land Conservancy
Bill Hildebrand	MEMA	Virginia Smith	Smith Planning & Design
Jihane Ambroise	MEMA	Michele King	Smith Planning & Design

Project Schedule

Virginia Smith, meeting facilitator, reviewed hazard mitigation planning and discussed the project schedule with the Committee.

Guiding Principles for Plan Development

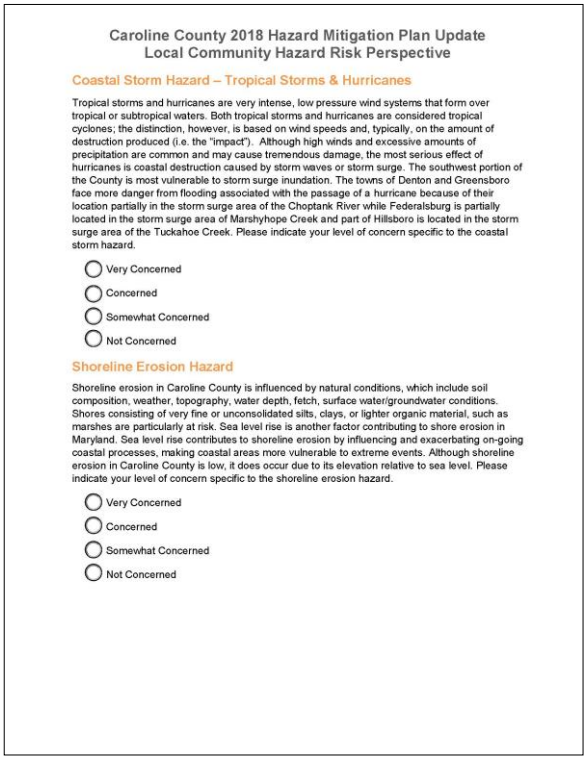
Ms. Smith emphasized the guiding principles for plan development, which are as follows:

- Focus on the mitigation strategy. The mitigation strategy is the plan's primary purpose. All other sections contribute to and inform the mitigation strategy and specific hazard mitigation actions.
- Process is as important as the Plan itself. In mitigation planning, as with most other planning efforts, the plan is only as good as the process and people involved in its development. The plan should also serve as the written record, or documentation, of the planning process.
- This is Caroline County's Plan. To have value, the plan must represent the current needs and values of the community and be useful for local officials and stakeholders. Develop the mitigation plan in a way that best serves your community's purpose and people.

Hazard Identification & Risk Assessment

In preparation of the 2018 Hazard Mitigation Plan Update, a local community hazard risk perspective is valuable. For HMPC member's reference, the following hazards were identified and profiled in the previous 2011 plan and are as follows:

- Riverine/Flash Flooding
- Coastal Storm Hazard – Tropical Storms/Hurricanes
- Shoreline Erosion
- Winter Storm & Extreme Cold
- Drought & Extreme Heat
- Severe Weather –
  - Thunderstorms
  - Hail
  - Tornados
  - Power Outages
- Human Impacted Hazards
  - Major Fire/Explosion - HazMat Incidents
  - Epidemics



Caroline County 2018 Hazard Mitigation Plan Update
Local Community Hazard Risk Perspective

Coastal Storm Hazard – Tropical Storms & Hurricanes

Tropical storms and hurricanes are very intense, low pressure wind systems that form over tropical or subtropical waters. Both tropical storms and hurricanes are considered tropical cyclones; the distinction, however, is based on wind speeds and, typically, on the amount of destruction produced (i.e. the "impact"). Although high winds and excessive amounts of precipitation are common and may cause tremendous damage, the most serious effect of hurricanes is coastal destruction caused by storm waves or storm surge. The southwest portion of the County is most vulnerable to storm surge inundation. The towns of Denton and Greensboro face more danger from flooding associated with the passage of a hurricane because of their location partially in the storm surge area of the Choptank River while Federalsburg is partially located in the storm surge area of Marshyhope Creek and part of Hillsboro is located in the storm surge area of the Tuckahoe Creek. Please indicate your level of concern specific to the coastal storm hazard.

- ◯ Very Concerned
- ◯ Concerned
- ◯ Somewhat Concerned
- ◯ Not Concerned

Shoreline Erosion Hazard

Shoreline erosion in Caroline County is influenced by natural conditions, which include soil composition, weather, topography, water depth, fetch, surface water/groundwater conditions. Shores consisting of very fine or unconsolidated silts, clays, or lighter organic material, such as marshes are particularly at risk. Sea level rise is another factor contributing to shore erosion in Maryland. Sea level rise contributes to shoreline erosion by influencing and exacerbating on-going coastal processes, making coastal areas more vulnerable to extreme events. Although shoreline erosion in Caroline County is low, it does occur due to its elevation relative to sea level. Please indicate your level of concern specific to the shoreline erosion hazard.

- ◯ Very Concerned
- ◯ Concerned
- ◯ Somewhat Concerned
- ◯ Not Concerned

In order to obtain a local hazard risk perspective for this plan update, Committee members were asked to complete the survey. Those committee members not in attendance will receive a fillable PDF survey for completion.

Group Session

In order to obtain information on past hazard mitigation related plans, policies, and projects, a questionnaire was developed. The questionnaires were specific to agencies, departments or organizations, requesting mitigation action status, current capabilities and possible new mitigation actions to be included in the Plan Update. Questionnaires were developed for:

- Budget & Finance
- Emergency Services
- Fire Departments
- Floodplain Coordinator
- GIS
- Health & Medical
- Planning & Codes
- Police
- Private Utilities Companies
- Public Works
- Schools
- Shelter
- Denton
- Federalsburg
- Goldsboro
- Greensboro
- Henderson
- Hillsboro
- Marydel
- Preston
- Ridgely
- Templeville

For those departments present, questionnaires were provided for completion. Members unable to complete the survey during the meeting were asked to submit completed questionnaires to SP&D. Uncompleted questionnaires will be distributed to corresponding agencies, departments or organizations via email for completion.

Next Steps

- Local Community Hazard Risk Perspective Survey
- Municipal Questionnaires – distribute to those not in attendance
- Distribute HIRA Results
- Distribute Draft Capabilities for Review
- SP&D Vulnerability Assessment Presentation – HMPC Meeting #3
- Eastern Shore Land Conservancy Sea Level Change Presentation – HMPC Meeting #3
- New Mitigation Strategies & Prioritization Work Session – HMPC Meeting #3
- Municipalities Association Meeting – TBD
- HMPC Meeting #3
    - Date: September 13, 2018
    - Time: 10:00 am – 12:00 pm
    - Location: TBD

Caroline County Hazard Mitigation Plan Committee (HMPC)

Minutes

Meeting:	**HMPC Meeting #3**		
Date of Meeting:	October 25, 2018	**Time:**	10:30 am – 12:30 pm
Meeting Facilitator:	Virginia Smith – Smith Planning & Design	**Location:**	Wharves of Choptank Visitor & Heritage Center

Meeting Topics Discussed

Agenda Topics

- ✓ **Project Schedule**
- ✓ **Preliminary HIRA Results**
- ✓ **Vulnerability Assessment Presentations**
- ✓ **Work Session**
- ✓ **Next Steps**

Attendees

Name	Organization	Name	Organization
Jeffrey Ludwig	Department of Emergency Services	Sandy Cook	Town of Henderson
Cindy Towers	Department of Emergency Services	John Garlick	Town of Federalsburg
Jennifer Shull	Department of Planning & Codes	Don Mulrine	Town of Denton
Jake Jacobs	Department of Public Works	Jeff Dean	Caroline Soil Conservation District
Susan Simmons	Department of Recreation & Parks	Jim Bass	Eastern Shore Land Conservancy
Virginia Albers	Maryland Rural Development Corporation	Virginia Smith	Smith Planning & Design
		Michele King	Smith Planning & Design

Project Schedule

Virginia Smith, meeting facilitator, reviewed hazard mitigation planning and discussed the project schedule with the Committee. The draft plan will be available for local review and comment in November 2018. Following local review and comment, both Maryland Emergency Management Agency (MEMA) and Federal Emergency Management Agency (FEMA) will review and comment on the plan. The final step in the process will include adoption by the county and all participating municipalities.

Preliminary Hazard Identification & Risk Assessment (HIRA) Results

Ms. Smith reviewed the preliminary results from the Local Community Hazard Risk Perspective completed by the 2018 Hazard Mitigation Planning Committee (HMPC).

Table 3-1: Local Community Hazard Risk Perspective Survey Results

Hazard	Types of Events	Level of Concern
Drought & Extreme Heat	Drought, Excessive Heat, & Heat	Concerned
Riverine Flooding	Heavy Rain, Flood, & Flash Flood	Concerned
Coastal Flood (Tidal) & Storm	Tropical Storms	Very Concerned
Thunderstorm	Thunderstorm Wind, High Wind, & Lightning	Concerned
Tornado	Funnel Cloud & Tornado	Somewhat Concerned
Winter Weather & Extreme Cold	Cold/Wind Chill, Extreme Cold/Wind Chill, Blizzard, Frost/Freeze, Heavy Snow, Sleet, Winter Storm, & Winter Weather	Concerned
Shoreline Erosion	Shoreline Erosion & Sea Level Rise	Somewhat Concerned
Hail	Hail	Somewhat Concerned
Epidemics	Epidemics	Concerned
Major Fire/Explosion	Major Fire/Explosion	Somewhat Concerned
Power Outages	Power Outages	Somewhat Concerned

Vulnerability Assessment Presentations

Both Jim Bass from the Eastern Shore Land Conservation and Michele King from Smith Planning & Design presented. **PowerPoint slides from both presentations are attached.**

Work Session

Mitigation Goals and Objectives were distributed for review and comment. One new goal and four objectives were added as part of the plan update process. ***Mitigation Goals and Objectives are attached.***

Previous 2012 Mitigation Actions that require a status update were distributed. Of the 53 actions, 11 are in need of a status, all other action items include a status update. **Action Items that do not include a status are attached.**

New Mitigation Actions for the plan update (2018) were distributed for review and comment. **New Mitigation Action Items are attached.**

For those HMPC members not present at the meeting, please review and comment on all attachments, as necessary.

Next Steps

- New Mitigation Action Prioritization HMPC Survey
- Develop Mitigation Project Sheets
- Incorporate Additional Sea Level Change Data
- Local Review – Draft Plan
- MEMA Review
- FEMA Review
- Local Adoption

Appendix C – Public Meeting Minutes

UNIVERSITY of MARYLAND SHORE REGIONAL HEALTH

OPIOID TASK FORCE MEETING

March 5, 2018 1300
605 Port Street- Conference Room

Presiding: Walt Atha, MD and Roger Harrell
Present: Carol Masden; Kathleen McGrath; Judy Micheliche; Johanna Norris; Anne George, RN; Ginger Gregg; Ruth Ann Jones, RN; Brian LeCates; Mary Alice Vanhoy, RN; Anna Sierra; Ron Lewis; Scott LeRoy; Dr. Fredia Wadley; Katie Dilley; John Mistrangelo; Dr. Spencer
Excused: Scott Haas; Don D'Aquila; Cathy Weber, RN; Erin Hill; Allison Wood; Megan Pinder; Sara Rich; Andy Robertson; John Barto; Wayne Darrell; Patti Willis; Kevin Chapple; Dr Ciotola; Bryan Ebling; Diane Walbridge, RN; Sharon Dundon; Kathy Stevens; Lynn Gurley
Recording: Ruth Ann Jones, RN

TOPIC	DISCUSSION	ACTION	RESPONSIBLE PARTY
Minutes of January 22, 2018	Minutes approved.	*Approved*	*Committee members*
Operations Update	Dr. Walt Atha gave update on Naloxone use remains on par with average, perhaps slightly higher than average (typically 12-15 per month- Data below show 32 dispenses in 2 months). <u>Naloxone Nasal Activity- 1/1/18 through 2/28/18</u> **Chestertown**- Dispensed 11; Average age 30; Age range 22-57. **Dorchester**- Dispensed 6; Average age 30; Age range 24-39. **Easton**- Dispensed 11; Average age 37; Age range 24-63. **Queenstown**- Dispensed 4; Average age 35; Age range 21-51. **Totals**- Dispensed 32; Average age 33; Age		

TOPIC	DISCUSSION	ACTION	RESPONSIBLE PARTY
	range 21-63. • Period activity represents slightly above average use (Average is approximately 12-15 per month) • One patient received 2 doses in 2 separate visits during time period (One Easton, One Dorchester)		
OD Queen Anne's County	7 OD's in Queen Anne's County in a 24-hour period with 1 fatality. UM SEC at Queenstown had difficulty placing a patient at Whitsitt Center. Dr. Spencer would like to have SRH call him directly on his cell phone (410-382-9193) if problems arise.	*Team will look into this situation and do deep dive into this particular situation.*	*Dr. Atha and Mary Alice Vanhoy*
Peer Support Program at Dorchester	Cathy Weber gave an update on the peer support program at Dorchester. When 911 is notified of an OD call, they call peer support person and the peer support individual goes directly to the ED. The program began December 2017. 10-12 OD patients have been seen since that start date.	*Information only.*	*Cathy Weber*
Peer Support Personnel	There is a challenge to get certification programs for peer support counselors. Most number of counselors are available at any one time at SRH is 2-3. Katie Dilley discussed that the Peer Support Program is meeting barriers getting people into positions. Suggestion was made to send email out to ask for other volunteers to serve on Task Force. Brian LeCates reported hours that the Talbot County Safe Stations will go live on March 19, 2018: • 9am-11pm • Talbot County locations- o EM Center in Easton o Fire Department in St.	*Ruth Ann Jones will coordinate setting up meeting:* • *Katie Dilley* • *John Mistrangelo* • *Sharon Dundon* • *Fredia Wadley* • *Carol Masden* • *Dr. Ciotola*	*John Mistrangelo*

TOPIC	DISCUSSION	ACTION	RESPONSIBLE PARTY
	Michaels OOCC Regional has grant and money in amount of $100,000 available. Opioid Intervention Team has $100,000. Brian LeCates reported requirements for money is a one-page description of request (s). Roger Harrell agreed and said that the money must be spent by June 30, 2018. John Mistrangelo suggested community and staff education and communication. Katie Dilley reported supporting SAFE station initiatives for Talbot County. Carol Masden also reported supporting SAFE station initiatives for Talbot County. Suggested that stations could benefit from Grant money to the tune of $36,000 for call at a Center (Station). ED not aware or familiar with Peer Support Counselors. There is a Chestertown need for a plan to operationalize.		
Whitsitt Beds	Whitsitt Center: • 4 Crisis beds • 4 days maximum length of stay (LOS) • Have a person on call 24 hrs./ day • Average 20-25 people per month • Does not matter if you have insurance- not an eligibility requirement.		
Adjournment	Meeting adjourned at 2:00pm.		

TOPIC	DISCUSSION	ACTION	RESPONSIBLE PARTY
Next Meeting	Next meeting May 7, 2018 at 1300 at: Talbot County Operations Center 605 Port Street Easton, MD 21601		*Dr Walt Atha and Roger Harrell*

LDAAC Meeting Minutes
Meeting Date: 8/23/18
(7:30am-9:00am adjourn)

Old Business:

- Meeting minutes from July approved with a motion and second of that motion.

New Business:

I. Introductions/Welcome

II. Caroline Goes Purple
   a. Sarah shared the success of the Caroline Goes Purple Booth at the Caroline Summerfest. Lt. Governor Boyd purchased t-shirts from the booth. The Governors House is going purple also. The Deterra bags were a huge draw for the Summerfest attendees. The booth also featured Purple Games…
   b. Greensboro, September 22nd event for Community Awareness Day
   c. Goldsborough Fire Department, September 29th event
   d. The Caroline Prevention booth provided 32 Narcan trainings at Summer Fest. The website is up and running. All materials are available for distribution.
   e. The planning committee has radio interviews and newspaper articles to promote the Purple agenda.

III. Fed Up Rally Update
   a. August 31st and Denton Elementary 6-8 pm. Volunteers needed for the Caroline Goes Purple Booth. There will be 15 resource tables at the Rally.
   b. "Echos of Mercy" will provide music at the event. There will be a bounce house, face painting, a memory walk and emergency vehicles that will allow children to…, food
   c. Mid Shore Restoring Hope and Women
   d. Share the Fed-Up page on Facebook.

IV. MSBH Update-State Opioid Grant and Harm Reduction Meeting
   a. Katie shared that SAMHSA has released the second wave federal funds for the MORR beds, due to MD being in the top 10 states affected by the Opioid Epidemic. BHA responded to the grants which are notated as S.O.R. (State Opioid Response). The priority of these funds are for 24/7 Crisis Response, Safe Stations and MAT in Detention. Caroline Co Behavioral responded to the grant, by the August 13th due date.
   b. Secretary Neall shared interest in having 1 crisis center for the 5 mid shore counties, not considering there's 2200 sq miles to cover. To date, no one has used the Talbot Co Safe Station. Discussion re what we can learn from this to ensure that Caroline Co Safe Station is effective? We can use peers, offer transportation, have an on-call supervisor, be conscious of the location and efficient staff.
   c. Sherone Thompson with MSBH also shared flyers and information re upcoming 5th annual Sequential Intercept Model. Attendees urged to RSVP.
   d. Andrew Bell will present a Harm Reduction presentation on September 26th at Dri Dock in Cambridge, 1-4pm, it's free and will feature a panel of testimonials.

V. Affiliated Santé-Crisis Response & CIT

a. Carol Masden shared data from FY 17 and FY 18, with regards to the # of total call, # of mobile crisis dispatches and the average cost savings due to ESCR services. There was an increase in the # of calls (new, existing and follow up) for Caroline county from 9.9% to 12.5%. This upward trend also corresponds with Mobile Crisis Team engagement in Caroline County. Carol referenced the Healthcare Blue Book for the $2.7 million potential savings due to 1260 diversions from the hospital system.
b. Carol shared history of how the funding of ESCR came with the closure of Upper Shore Hospital and in 2012 after the Sandy Hook tragedy; MSBH provides additional funding.
c. Brandy James, CIT Coordinator shared a brief history of CIT and the progress of the program in the Mid Shore region (currently *281??* Officers/EMT/Dispatchers trained). The CIT partnership with law enforcement has been positive. Caroline County has 19.35% of their officers trained in CIT. The next CIT training in the mid shore will be in March 2019. Trained officers wear their CIT pins while on duty to be easily identified.
d. Brandy, Carol, Katie from MSBH and several officers from the mid shore region attended the International CIT Conference in Kansas City, MO last week. Since the Conference, Brandy has been asked to provide training for officer self-care, mindfulness and information re officer suicide.
e. Sheriff Bounds shared an incident with a community member where a CIT trained officer was able to defuse a situation using the CIT training. Brian Ebling will be sending more EMS dispatchers for CIT training.
f. The biggest barrier to CIT training is that staffing of local police offices don't allow for…
g. The CIT Advisory Board is seeking members to participate in their quarterly meeting.

VI. Problem Solving Discussion- S. Visintainer

a. Mobile Crisis Stakeholder Meeting-Jeff Ludwig, Emergency Services (OIT survey) concern re Emergency management transporting consumers to/from DE.
b. Joe Riley-There were 21 non-fatal and 1 Heroin related fatal death in FY18. Joe praised attendees and their agencies for doing great work in Caroline County.
c. Strategic Plan Requirement…Executive Strategic Planning.
d. The Alcohol Inspector-Alcohol Compliance codes, this past year there was a decrease in DUI and Compliance with sales to minors. There will be "buyers" from Salisbury University to see if local stores will sell alcohol between 2-6am, which isn't permitted.
e. MSBH is working with Santé for their expansion of Mobile Crisis teams to 24 hours, beginning January 2019. Much consideration is being given to team composition.

VII. Adjourn

*****Next meeting is scheduled for September 27, 2018 7:30am @ The Culinary Center**

Caroline County Health Department

EMERGENCY PREPAREDNESS & RESPONSE PROGRAM

LELAND D. SPENCER. M.D., M.P.H.
HEALTH OFFICER

ATTILLIO ZARRELLA, Th.D
DEPUTY HEALTH OFFICER

LINDA WOODALL
EMERGENCY PREPAREDNESS COORDINATOR
410-479-8006

CCHD EMERGENCY PREPAREDNESS & RESPONSE ADVISORY COMMITTEE
September 8, 2015
(**All Hazards, Pandemic Influenza & LEPC**)

PRESENT: Linda Woodall, CCHD; Dina Daly, DSS; Anne Russell, CCHD; Terri Abegglen, ARC; James Henning, CCSO; Bill Hildebrand, MEMA; Kristin McMenamin, DHMH; Val Laureska, CCHD; Rick Garner, DES.

1. Welcome and Introductions.

2. Review of last meeting's minutes was omitted.

3. **Update on Region Activities (Old Business).**

- Pet Sheltering – All paperwork and payment has been submitted for trailer. We need to figure out the logos and the writing on the trailer.
- Titling and insurance. Most likely Public Works.
- Write an MOU, myself.
- Generator for 4H Building. Still waiting for 3 quotes.
- As mentioned before, DSS will not have enough people to staff 3 shelters. ARC will help provide staff for the human section. It will have to be written in the MOU.
- The 4H building needs to be inspected to ensure it is acceptable as a shelter. We will plan a meeting in the very near future.
- Shelter Signs - Dina will send me a list of signs to be made.

- Ham Radio – The Sheriff's office has ordered 4 handheld HAM radios. You do not have to be an Amateur Radio Operator in order to use them. I will contact Al Fitzsimons, the MEMA RACES Officer, on what exactly we need to do to get onboard with MEMA testing, ie. channels for the monthly testing.
- Active Shooter Exercise – Held at Greensboro Elementary for all officers in the county. They are trying to exercise at every school, so all officers know the layout of each school. Full Scale Exercise coming in 2016.
- All officers are now fitted with CBRNE PPE. Need to do a CBRNE exercise.

4. Infectious Disease Update by Anne Russell. Nothing going on at this time. Flu season is coming up. She has a couple of Active TB cases. Anne gave a great outline on Tuberculosis (TB) and the process of taking care of a person exposed.

5. Annual Education Review. As an annual requirement, Val Laureska passed out clinic education materials for members to review.

6. New Business.

- QAC Flu Exercise Oct 16th 2-8 at KIHS -- The Queen Anne's County Department of Health will be combining an Emergency Preparedness exercise with a flu clinic at Kent Island Highs School. This is a day where the community comes together to immunize as many people as possible. The clinic is a drill,

typical of what we would do if there was an incident in the county that required everyone to receive medication or be vaccinated. This flu clinic benefits not only our staff and volunteers but the community as well. We are looking for medical professionals and non-medical persons to work our clinic. You must be available from 2 pm to 8 pm. Please leave a message at 410-758-0720 ext 4451 to sign up or request additional information.

- Upper Eastern Shore will be having an Infectious Disease TTX held Dec 2nd. Counties included are Kent, QAC, Caroline, Talbot and Dorchester. Invites will be sent to community partners to participate.

- Caroline County Infectious Disease Full Scale Exercise will be held on March 25th, 2016. I will need lots of participation from community partners, to include the health department staff, Department of Emergency Services, Emergency Medical Service, Sheriff's office, Department of Public Works, the Board of Education, Choptank Health, and local volunteers. This exercise will be an HSEEP (Homeland Security Exercise and Evaluation Program) exercise and designed by a vendor. I am in the very beginning of the planning stage. Invites will be sent out to be on the planning committee.

5. Partner Updates.

- Kristen McMenamin reported on regional activities with DrHMAG. The Regional Medical Station (RMS) will be restocked on September 23rd. This will be using HPP Funds (Hospital Preparedness).

- The next MSAT drill (satellite phone) will be held on Sept. 24th.

- The next DrHMAG (Delmarva Regional Healthcare Mutual Aid Group) meeting will be via conference call on Oct 13.

- The 2015 HPP-PHEP Fall Regional Preparedness Conference will be held at the Princess Royal Conference Center in Ocean City on Oct 23rd.

- Rick Garner reported the next named storm, Greta, is in the Atlantic.

- Bryan Ebling is doing well. He should be back to work in a couple of weeks.

- Ryan Todd is out of the hospital and recuperating from a collapsed lung.

- A Debris Management TTX is being scheduled. It is an educational opportunity to learn the different rolls needed in case we ever have a major debris producing event.

- EOC Exercise was held Sept 3rd. Tested notification and how to quickly set up the EOC.

- Oct 15th – Volunteer Management Class.

- We now have a second shelter trailer. Rick and Linda will be picking up another Medical Station for shelter use.

6. MEMA Update.

Theme for National Preparedness Month:

"Don't Wait. Communicate. Make Your Emergency Plan Today."

MEMA Webpage

Please visit MEMA's webpage to get the latest information on Emergency Management and programs at the agency' There is a Homepage with a lot of good general information; a Citizens page with a lot information for the general public; an Emergency Management page with a lot of information on programs at MEMA and Emergency Management throughout the state; and a Business and Non-profit page that includes a section on "Preparedness resources for Business", "Private Sector Integration Program", and "Osprey Business".

Statewide Resource Coordination Group

This group was formed several years ago to address the issue of requesting resources from other jurisdictions during emergencies. It is made up of people from MEMA, MEIMSS, and jurisdictional representatives. Each county can have a rep on the as part of the group.
The events in Baltimore in early May tested the MEMAC system as well as EMAC and one of the takeaways was the need for training on the system, how to use it and the forms. So MEMA will be developing timely drills for the jurisdictions to become familiar with the process and filling out the form.
August 11 was our first drill and I want to thank all of those who participated. If there were any issues, please pass them along to me so I can pass them on to be addressed. Any jurisdictions that did not participate, I will be contacting to check on the issues.
The drill involved notification and filling out part 1 of the Req-A and sending it back to MEMA. The Req-A, MEMAC Manual, Req-A User Guide and a MEMAC slick Sheet can be found in WebEOC in the File Library in the MEMAC tab.
There will be a follow up drill sometime in the first part of September.

Active Learning and Exercise

1) **MEMA Learning Management System -** Training and exercise events will be posted on the MEMA LMS Events Calendar, similar to the current training and exercise calendar. To register for an upcoming event, you will need to be registered with the LMS; registration requires a Federal Emergency Management Agency (FEMA) Student Identification (SID) Number.
    a. FEMA SID Number: https://cdp.dhs.gov/femasid/
    b. MEMA LMS: https://memamaryland.csod.com

2) **Training request for 2015**- Training scheduled on the Upper Eastern Shore is list below. ***These classes have been requested but to date we have had issues filling the classes and have had to cancel several. Please promote and get students to sign up***. Please go to MEMA's LMS sight to view other training being offered in Maryland.

    G288 Local Volunteer and Donations Management (2 Days) - QA - **3Q 9/15-16 @ MFRI**

    G108 Community Mass Care (2 Days) - QA - 4Q **- 10/13-14 @ MFRI**

    G557 Rapid Needs Assessment- Caroline County- **10/27 @ the Health and Public Safety Building in Denton from 8-1**

    ICS 300/400- Cecil County- **10/6-9 @ Cecil County DES.**

3) **2015 TEPW**- The date for the 2015 Upper Eastern Shore TEPW has been set for October 22. The location will be MFRI Upper Eastern Shore in Centreville from 8-12.

4) **Maryland Preparedness Planning Certificate Program**-The new revised program is now available. "The Maryland Preparedness Planning Certificate Program (MPPCP) professional development series is designed to provide planners with the skills and knowledge needed to conduct effective preparedness and emergency planning on the way to becoming a "Maryland Preparedness Planner." This Program will serve as a

credentialing program for all planners in the State to help properly implement the Maryland Emergency Preparedness Program (MEPP)." For Information go to MEMA's webpage under Emergency Community. In the middle of the page you will find "The Maryland Preparedness Planning Certificate Program where you can download the program document with the guidelines.

5) **Avian Flu (HPAI) Table Top Exercise**- MEMA has taken the lead on planning and exercise for the Avian Flu. Kyle Overly is heading the planning effort at MEMA and Adaptive Learning and Exercise is developing a Table Top Exercise to be held at the Queen Anne's County Health Department at 101 Commerce Street in Centreville. The date is September 29, 2015 from 9-2. You can register through LMS. There has been a White Paper produced by MEMA.

Adaptive Planning

1) **Upper Eastern Shore Regional Recovery Pilot**- The UES Directors have agreed on a pilot planning program. It will be the first of its kind in the state to use the new National Planning process and MEPP to develop a Regional Plan. This is an ongoing project and the Planners are meeting regularly.

Private Sector Integration Program

In an effort to provide a voice to the business community during emergencies and to increase the information sharing between the private and public sectors, MEMA has developed the Private Sector Integration Program (PSIP) to achieve this goal.

To learn more about this program go to our website. This is a very good program to promote to get your community businesses more involved in recovery. A good program to push with local Chambers of Commerce and MEMA is glad to help. Contact me, Jessica Nusbaum or Christina Fabac.

Additionally, here are some useful links
Osprey Business Tutorial Video: http: //youtu.be/GEd8n57yuAs
PSIP Page: http: //mema.maryland.gov/community/Pages/PSIPWelcome.aspx
PSIP Sign-up: http: //mema.maryland.gov/community/Pages/PSIPsignup.aspx

Regional Topics

a) ***Shelter Supply Container***- DHR in an effort to check supplies and finally get an inventory and guidelines out for the use of the containers, conducted inspections on the container at 50/404. During the inspection they found condensation and mice. So, they will be taking those supplies out of the container and sanitizing them. They will abandon that container. That all being said, we are in need of a place to store shelter supplies. There were 500 each of coats, blankets and pillows in the container. I am guessing we will need approximately a 12 X 20, 240 Sq. Ft. or more. I know that DHR will be reaching out to the local DSS to try to find a place and **I am asking you to check on any available**

space that could be used for storage. I am waiting to hear from two inquiries, and if they are not successful in acquiring a location, I will ask DHR/DSS to remove the supplies from the trailer and relocate them where ever they need in the state in order to prevent further deterioration of the supplies.

Personnel Updates in the region

Caroline County- Bryan Elbing continues to improve and get stronger after his by-pass surgery. He is home and getting stronger each day. Please keep him in your thoughts and prayers.

Planning effort and projects in the Region

a. Caroline County is working on a new Donations and Volunteer Management Plan. They are planning a Table Top Exercise in October to exercise the plan.
b. Caroline County is having an EOC Exercise on September 3.
c. Cecil County is updating their Hazard Mitigation Plan which will include a THIRA in the process.
d. Talbot County is in the early stages of updating their Mitigation Plan and which will include completing a county THIRA. Also working on a Debris Management Plan and contract.
e. Kent is updating their EOP and COOP.
f. Queen Anne's County is beginning their planning efforts for a Debris management plan.
g. Regional Recovery Plan

Mitigation Projects

a. Cecil County has two elevation projects approved. Both in the Northeast area.
b. Queen Anne's County has one acquisition project on the Chester River that has begun.

Regional Issues

Sassafras River Bridge in Georgetown is scheduled for closure for renovations from September 19- October 9, 2015. The project is scheduled to take 3 to 4 weeks with detours for the entire period. The Chester River Bridge project in Chestertown has been rescheduled for July 16 – August 12, 2016.

For everyone's awareness the second JLEN balloon has been launched at Aberdeen. This one is tethered closer to the bay on the Proving Grounds.

Regional Events

11/8/15- 10 K Across the Bay at the Bay Bridge.

11/13-15- Waterfowl Festival in Easton.

7. Closing. Next meeting will be December 8th, 2015 at 1:30, room 206 in the HAPS Building.

Respectfully Submitted by;

Linda Woodall

Caroline County Health Department

EMERGENCY PREPAREDNESS & RESPONSE PROGRAM

LELAND D. SPENCER. M.D., M.P.H.
HEALTH OFFICER

ATTILLIO ZARRELLA, Th.D
DEPUTY HEALTH OFFICER

LINDA WOODALL
EMERGENCY PREPAREDNESS COORDINATOR
410-479-8006

CCHD EMERGENCY PREPAREDNESS & RESPONSE ADVISORY COMMITTEE
December 15, 2015
(**All Hazards, Pandemic Influenza & LEPC**)

PRESENT: Linda Woodall, CCHD; Dina Gomes Daly, DSS; Anne Russell, CCHD; Bill Hildebrand, MEMA; Kristin McMenamin, DHMH/OP&R; Val Laureska, CCHD; Rick Garner, DES; Heather Guerien, Compass Regional Hospice; Allison Wood, Compass Regional Hospice; Attillio Zarrella, CCHD; Mary Beth Brennaman, Mid-Shore Mental Health System; Bryan Ebling, DES; Renee Stephens, Delmarva Power; Amanda Showell, CC Humane Society.

1. Welcome and Introductions.

2. Last meeting's minutes were reviewed.

3. **Update on Region Activities (Old Business).**

- Pet Shelter – The Pet Shelter trailer should be here the end of January. The updated/revised County Pet Sheltering Plan should be done in March. Planning an exercise for spring 2016.
- 5 County Infectious Disease Tabletop Exercise. Held a very successful and informative tabletop on December 2nd at the Chesapeake Bay Environmental Center.

4. **Infectious Disease Update by Anne Russell.**

County has had only 2 cases of the flu. Recently had a resident come back from Liberia who went to one of the local clinics because they were ill. Had a little scare, but they were not infectious, and nothing came out of it. It was an eye opener to those involved and made everyone revisit their PPE stash and plans. It just goes to show you, always be aware and prepared.

5. **Presentation from Compass Regional Hospice.**

Compass Regional Hospice is a non-profit organization that provides hospice care and grief support in Queen Anne's, Caroline and Kent Counties. The Caroline Hospice Foundation does all the fundraising for services for Shore Health and hospice. Recently they took on Caroline and Kent Counties. Caroline Hospice Home opened in September for patient care. The Caroline Hospice Foundation owns the building, and which is a residential hospice center. The Home, located at 613 5th St in Denton, includes 3 private rooms, which are almost always full, and the Caroline Hospice Foundation has their offices on the other side of the building and overseas the clinical operations.

There is a program called "Bridges" which is for patients who have a life-limiting illness but are not quite ready for hospice. They offer a grief program through the "Hope and Healing Center" to anyone that has experienced a loss. There is no charge because it operates on 100% donations. Counselors have trauma counseling. They will go into the school systems if there has been a loss, either individual or a group setting.

6. **New Items and Upcoming Events.**

- The date for the Caroline County Infectious Disease Full Scale Exercise has been changed to April 26th, 2016.

- Active Shooter Training will be held at the HAPS building for Health Department staff in January. The Sheriff's office is planning additional training sessions for county employees in the upcoming months.

7. **Partner Updates.**

- Kristen McMenamin, the Region IV Hospital Preparedness Coordinator, reported on regional activities with DrHMAG.

- Last week, a group from the region's healthcare coalition, the Delmarva Regional Healthcare Mutual Advisory Group (DrHMAG), toured the Alternate Care Site in Region III. We heard how it came to be, how to activate it, and saw all that is stored there for quicker activation. The next stop was the State Emergency Operations Center. Bill Hildebrand gave the group a quick tour of the operations center, and then we met with Mr. Strickland, the Executive Director of MEMA, who actually asked us a lot of questions. He was excited to see a wide range of people in the coalition. We then got a very informative tour of the Maryland Joint Operations Center (MJOC), where Maryland's emergency operations are coordinated, and is the communications hub for emergency responders and alerts decision makers when a situation warrants.

- A System Wide Regional Gap in Pediatric Preparedness, identified in the Regional Medical Surge Workshop and AAR, as well as through the National Pediatric Readiness Survey is being narrowed by the continuation of the BabyPod Transportation Units from FirstLine technologies. The BP4 HPP Funds will be used to purchase the remaining 5 pods and will see all 7 of the Acute Care Facilities and 1 Free Standing ED, in the region, equipped with these units.
A CONOPS (Concept of Operations) for these units and a Pediatric Surge Annex (to our Regional Medical Surge Plan) is also being developed.

- We will continue with the contract for the Regional Medical Station (RMS). It will have 2 deployable trainings per year.

- Rick Garner – He has revised the Caroline County RACES (Radio Amateur Civil Emergency Service). Deputy Cathy Jones is the county's RACES officer.

- The Regional Recovery Plan. All planners got together with MEMA and will work as a region for coordination purposes. Should be completed early next year.

- He will be working on revising the County Pet Shelter Plan.

- Bryan Ebling – He met with the Department of Agriculture about the Highly Pathogenic Avian Influenza. The water fowl from the north are the carriers that affect the chickens. The Department of Ag is the lead if this type of event happens on one of the farms. The procedure is to euthanize and compost on the farm. The Ag Center on Legion Rd could be one of the hubs on the Eastern Shore (Upper and Mid). If this happens on the shore, but not necessarily in Caroline County, we could still be involved because the Euthanizing /Compost farm is local. The involvement would include the media and traffic issues. The entire farm would have to be euthanized.

- They are finishing up the Volunteer Management Plan

- The Caroline Connect system (AKA Code Red) allows residents and businesses to subscribe to important notifications regarding Caroline County. To learn more and sign up, please go to https://public.coderedweb.com/cne/en-US/97D4F5E4B408

- The county has two shelter trailers. In the event we need to open a shelter, one will be deployed to each north and south county. They are equipped with cots and bedding and other items that might be needed in a shelter. Rick will be getting these trailers ready.

- The County Public Information Plan is in the process of being updated by Sara Visintainer and Jennifer Farina at the commissioner's office. Projected completion date is in the spring.

- We welcome Renee Stephens, Senior Public Affairs Manager for Delmarva Power to the committee. She introduced herself and gave a brief introduction of her extensive background. She is an Eastern Shore native and has storm, recovery and disaster training, so I am sure she will be a great asset to us all. She serves Talbot, Queen Anne's, Caroline, Kent and Kent County, DE. She would like to be included in any key meetings related to utilities and infrastructure issues. Her contact information is renee.stephens@delmarva.com, 410-430-8255.

8. MEMA Update, Bill Hildebrand.

1) Director Strickland believes in a comprehensive approach to emergency management in Maryland and wants MEMA to facilitate that. He looks at interoperability as more then common communication throughout the state. He feels that it includes plan sharing and a move to have all jurisdictions approaching emergency management with a more universal approach.

2) MEMA is now back under one roof. We have shut down the Painters Mill offices and moved everyone back to headquarters. Thus, is a lot of rearranging going on at headquarters to accommodate everyone.

3) Nicole Lanigan is back at MEMA as a Training and Exercise Administrator.

4) Maryland Emergency Management Assistance Teams (MEMAT) is a new concept being proposed at MEMA. There is a draft Concept Paper that will be presented to the Local Emergency Managers. "MEMAT's, similar to Federal Incident Management Assistance Teams (IMAT) focus on supporting local and state coordination and operations support to disasters. MEMAT's are not intended to manage incidents, rather, the focus is supporting EOC operations."

MEMA Webpage

Please visit MEMA's webpage to get the latest information on Emergency Management and programs at the agency' There is a Homepage with a lot of good general information; a Citizens page with a lot information for the general public; an Emergency Community page with a lot of information on programs at MEMA and Emergency Management throughout the state; and a Business and Non-profit page that includes a section on "Preparedness resources for Business", "Private Sector Integration Program", and "Osprey Business". While on the website go to the Emergency Community Page and click on the MEMA 101 video to get a good overview of MEMA.

Statewide Resource Coordination Group

This group was formed several years ago to address the issue of requesting resources from other jurisdictions during emergencies. It is made up of people from MEMA, MEIMSS, and jurisdictional representatives. Each county can have a rep on the as part of the group.

The events in Baltimore in early May tested the MEMAC system as well as EMAC and one of the takeaways was the need for training on the system, how to use it and the forms. So MEMA will be developing timely drills for the jurisdictions to become familiar with the process and filling out the form.

Active Learning and Exercise

6) **MEMA Learning Management System -** Training and exercise events will be posted on the MEMA LMS Events Calendar, similar to the current training and exercise calendar. To register for an upcoming event, you will need to be registered with the LMS; registration requires a Federal Emergency Management Agency (FEMA) Student Identification (SID) Number.

a. FEMA SID Number: https://cdp.dhs.gov/femasid/
b. MEMA LMS: https://memamaryland.csod.com

7) **Maryland Preparedness Planning Certificate Program**-The new revised program is now available. "The Maryland Preparedness Planning Certificate Program (MPPCP) professional development series is designed to provide planners with the skills and knowledge needed to conduct effective preparedness and emergency planning on the way to becoming a "Maryland Preparedness Planner." This Program will serve as a credentialing program for all planners in the State to help properly implement the Maryland Emergency Preparedness Program (MEPP)." For Information go to MEMA's webpage under Emergency Community. In the middle of the page you will find "The Maryland Preparedness Planning Certificate Program where you can download the program document with the guidelines.
8) **WebEOC Drills-** MEMA is conducting monthly WebEOC drills. I urge you to take part in these drills.
9) **Training in January 2016** (All are listed on LMS)
   a. January 11-13, 2016 – Science of Disasters at Partnership Hall in Laurel
   b. January 12 and 13- WebEOC Training at Queen Anne's County EOC. This is for Queen Anne's County. If interested, please contact Dave Rivett at QA Co. DES to see if space is available.
   c. January 19-22-L143 Situational Awareness/Common Operating Picture at MEMA.

Maryland National Guard

CoLTs, County Liaison Teams, are being revitalized. Due to a decrease in personnel, they are changing the way they operate. They used to have one or two personnel assigned to each jurisdiction as jurisdictional teams. Now they will have regional teams. In the UES region when there is a Declaration and EOC's are activated, their primary location will be Cecil County's EOC and their secondary EOC will be Talbot's.

Adaptive Planning

2) **Upper Eastern Shore Regional Recovery Pilot**- The UES Directors have agreed on a pilot planning program. It will be the first of its kind in the state to use the new National Planning process and MEPP to develop a Regional Plan. This is an ongoing project and the Planners are meeting regularly.
3) **HPAI**- MEMA has developed a contingency plan for Highly Pathogenic Avian Influenza in coordination with the MDA. The plan outlines the roles and responsibilities of State agencies with roles in monitoring, responding to and recovering from HAPI incidents. It has been signed off by both MDA and MEMA.

Hazard Mitigation

The State Hazard Mitigation Plan is due for it revision August, 2016. As part of the process there will be 6 regional multiagency outreach meetings.
Planning, Public Works, Engineering and Transportation, Fire and Police, Emergency Management, and Finance from all jurisdictions will be invited. The one for the UES will be January 21, 2016 in the afternoon. As soon as the location is determined, I will let everyone know. There will be other information and invitations after the first of the year.

Private Sector Integration Program

In an effort to provide a voice to the business community during emergencies and to increase the information sharing between the private and public sectors, MEMA has developed the Private Sector Integration Program (PSIP) to achieve this goal.

To learn more about this program go to our website. This is a very good program to promote to get your community businesses more involved in recovery. A good program to push with local Chambers of Commerce and MEMA is glad to help. Contact me, Jessica Nusbaum or Christina Fabac.

Additionally, here are some useful links
Osprey Business Tutorial Video: http: //youtu.be/GEd8n57yuAs
PSIP Page: http: //mema.maryland.gov/community/Pages/PSIPWelcome.aspx
PSIP Sign-up: http: //mema.maryland.gov/community/Pages/PSIPsignup.aspx
Regional Topics

Planning effort and projects in the Region

h. Caroline County is working on a new Donations and Volunteer Management Plan.
i. Cecil County is updating their Hazard Mitigation Plan which will include a THIRA in the process.
j. Talbot County is in the early stages of updating their Mitigation Plan and which will include completing a county THIRA. Also working on a Debris Management Plan and contract.
k. Kent is updating their EOP and COOP.
l. Queen Anne's County is beginning their planning efforts for a Debris management plan.
m. Regional Recovery Plan
n. Kent and Caroline County will be getting a SPCA Pet Sheltering Trailer and will be the third County on the UES to get the trailer. Cecil and Queen Anne's currently have the trailers.
o. Kent County OES has partnered with Kent Planning & Zoning in a Land Conservancy Grant. They will be reaching out to community groups discussing environmental changes, how they are effecting the county, and ways to address it.
p. Talbot County has started a completed renovation of their PSAP and offices and the Project is expected to take most of 2016. Beginning the first of the year DES will be located as follows:
    a. PSAP (911) will relocate to Easton PD.
    b. James Bass the Emergency Planner will be relocated to Planning and Zoning at 215 Bay Street.
    c. EMS will be at the EMS facility at Easton Airport
    d. Director Stamp will be downtown at the Court House

Mitigation Projects

c. Cecil County has two elevation projects approved. Both in the Northeast area.
d. Queen Anne's County has one acquisition project on the Chester River that has begun.

9. Closing. Next meeting will be February 9th, 2016 at 1:30, room 206 in the HAPS Building.

Respectfully Submitted by;

Linda Woodall

Caroline County Health Department

EMERGENCY PREPAREDNESS & RESPONSE PROGRAM

LELAND D. SPENCER. M.D., M.P.H.
HEALTH OFFICER

ATTILLIO ZARRELLA, Th.D
DEPUTY HEALTH OFFICER

LINDA WOODALL
EMERGENCY PREPAREDNESS COORDINATOR
410-479-8006

CCHD EMERGENCY PREPAREDNESS & RESPONSE ADVISORY COMMITTEE
February 9, 2016
(**All Hazards, Pandemic Influenza & LEPC**)

PRESENT: Linda Woodall, CCHD; Anne Russell, CCHD; Bill Hildebrand, MEMA; Val Laureska, CCHD; Rick Garner, DES; Mary Beth Brennaman, Mid-Shore Mental Health System; Bryan Ebling, DES; Amanda Showell, CC Humane Society; Michael Boldosser, Shore Health; Trish Chapman, DSS; Anna Sierra, MIEMSS.

1. Welcome and Introductions.

2. Last meeting's minutes were reviewed.

3. **Update on Region Activities (Old Business).**

-Health Department Upcoming Exercise. Looking for people to participate in the mass prophylaxis exercise held on April 26, 2016. All information and registration can be found at the below link. Please have people register as an Actor.
https://ess.ascenttra.com/Registration/SterlingConcordActor/index.cfm

4. **Infectious Disease Update by Anne Russell.**

Zika Virus is a virus transmitted through mosquito bites. These type of mosquitos ar out during the day. The most common symptoms are fever, rash joint pain, and conjunctivitis. The Zika virus can be spread from the mother to the unborn child and there have been reports of birth defects, etc. in babies whose mother was infected.

Be careful when traveling and cover up. People go on cruises and forget, and start having flu-like symptoms and can spread it when they get home. For more information, go to www.cdc.gov.

5. **Partner Updates.**

Bryan Ebling – LEPC Update: Tier II reports due in March (Hazardous chemical inventory) from local businesses.

- If there are any reimbursements due from the Blizzard, let Bryan know.

Rick Garner – Working on Pet Shelter Plan, which is now called "The Pet-Friendly Shelter Plan."

-Linda will set up photo op.

- Caroline county DES sent local staff to Anne Arundel County to help after the Blizzard.
- Asked for review of "Hazardous Material Incidents" plan from members.

Amanda Showell – Working on how the Humane Society staff is going to manage the pet friendly shelter.

- They have a request in for funding to re-grade the property because it is very wet and will flood the kennels during heavy rains.

Anna Sierra – Talbot county held Winterfest on Tilghman Island for EMT Skills refresher.

- DRHMAG just received their Award letter from the Hospital Preparedness Program. Working hard to finish projects by June.

- Alternate Care Site Tabletop upcoming. Will reach out to Long Term Care Facilities.

Michael Boldosser – Shore Health received lots of help during the blizzard. Mostly in transporting patients and driving staff home and to work. The hospitals but in a great team effort!

Mary Beth Brennaman – Mid Shore Mental Health will be getting a long-awaited Deputy Director.

6. MEMA Update, Bill Hildebrand.

5) Director Strickland believes in a comprehensive approach to emergency management in Maryland and wants MEMA to facilitate that. He looks at interoperability as more then common communication throughout the state. He feels that it includes plan sharing and a move to have all jurisdictions approaching emergency management with a more universal approach.

After being in his position as Executive Director and analyzing MEMA's role in emergency management in the state, he is now starting to institute changes he feels are needed to make MEMA stronger in a comprehensive approach. February will be the transitional month where the changes will be implemented. These include:

a) Adding a third Directorate
b) Bob Thomas is now with MEMA as the third Director and will be in charge of the Administrative Directorate.
c) Maryland Emergency Management Assistance Teams (MEMAT). There is a concept paper on these teams and feedback has been received from the local Directors. This also will be a topic of discussion at the February retreat.

6) For Winter Storm Event 21 January 2016, MEMA has submitted a letter of intent to FEMA to pursue Disaster Assistance. Guidance has been sent out to all counties and FEMA has already done PDA's in parts of the state.

MEMA Webpage

Please visit MEMA's webpage to get the latest information on Emergency Management and programs at the agency. The Homepage has a lot of good general information; a Citizens page has good preparedness information for the general public; an Emergency Community page has information on programs at MEMA and Emergency Management throughout the state; and a Business and Non-profit page that includes a section on "Preparedness resources for Business", "Private Sector Integration Program", and "Osprey Business". **While on the website go to the Emergency Community Page and click on the MEMA 101 video to get a good overview of MEMA.**

Active Learning and Exercise

10) **MEMA Learning Management System -** Training and exercise events will be posted on the MEMA LMS Events Calendar, similar to the current training and exercise calendar. To register for an upcoming event, you will need to be registered with the LMS; registration requires a Federal Emergency Management Agency (FEMA) Student Identification (SID) Number.
    a. FEMA SID Number: https://cdp.dhs.gov/femasid/
    b. MEMA LMS: https://memamaryland.csod.com

11) **WebEOC Drills-** MEMA is conducting monthly WebEOC drills. I urge you to take part in these drills.

12) **Training** (All are listed on LMS)
    a. G 191-ICS/EOC Interface- MFRI Upper Eastern Shore-March 15
    b. G 393 – Mitigation for Emergency Managers-Worcester County-February 23,24, 2016
    c. ICS 300- Anne Arundel County-March 1,2,3,2016

Adaptive Planning

4) **Upper Eastern Shore Regional Recovery Pilot**- The UES Directors have agreed on a pilot planning program. It will be the first of its kind in the state to use the new National Planning process and MEPP to develop a Regional Plan. This is an ongoing project and the Planners are meeting regularly.
5)

Private Sector Integration Program

In an effort to provide a voice to the business community during emergencies and to increase the information sharing between the private and public sectors, MEMA has developed the Private Sector Integration Program (PSIP) to achieve this goal.

To learn more about this program go to our website. This is a very good program to promote to get your community businesses more involved in recovery. A good program to push with local Chambers of Commerce and MEMA is glad to help. Contact me, Jessica Nusbaum or Christina Fabac.

MEMA is instituting a PSIP in the Box program for use by the local jurisdictions to use to develop their own Private Sector Integration Program. Also, as mentioned under training, there is a webinar on this program on January 28.

Regional Topics

Planning effort and projects in the Region

q. Caroline County is working to update the Pet Sheltering Plan now that they have the SPCA Pet Sheltering Trailer.
r. Talbot County is updating their Mitigation Plan. Also working on a Debris Management Plan and contract.
s. Kent is updating their EOP and COOP.
t. Queen Anne's County is beginning their planning efforts for a Debris management plan.
u. Regional Recovery Plan
v. Kent and Talbot County will be getting a SPCA Pet Sheltering Trailer. Currently Cecil, Queen Anne's and Caroline Counties have one.
w. Kent County OES has partnered with Kent Planning & Zoning in a Land Conservancy Grant. They will be conducting two Kent County Coastal Vulnerability Study Workshops on February 23 AND 24.
x. Talbot County has started a completed renovation of their PSAP and offices and the Project is expected to take most of 2016. Beginning the first of the year DES will be located as follows:
    a. PSAP (911) will relocate to Easton PD.
    b. James Bass the Emergency Planner will be relocated to Planning and Zoning at 215 Bay Street.
    c. EMS will be at the EMS facility at Easton Airport
    d. Director Stamp will be downtown at the Court House

Mitigation Projects

e. Cecil County has two elevation projects approved. Both in the Northeast area.
f. Queen Anne's County has one acquisition project on the Chester River that has begun.

Chester River Bridge

The scheduled Closing of the Chester River Bridge is July 18 through August 14.

7. Closing. Next meeting will be April 12th, 2016 at 1:30, room 206 in the HAPS Building.

Respectfully Submitted by;

Linda Woodall

Caroline County Health Department

EMERGENCY PREPAREDNESS & RESPONSE PROGRAM

LELAND D. SPENCER. M.D., M.P.H.
HEALTH OFFICER

ATTILLIO ZARRELLA, Th.D
DEPUTY HEALTH OFFICER

LINDA WOODALL
EMERGENCY PREPAREDNESS COORDINATOR
410-479-8006

CCHD EMERGENCY PREPAREDNESS & RESPONSE ADVISORY COMMITTEE
June 21, 2016
(**All Hazards, Pandemic Influenza & LEPC**)

PRESENT: Linda Woodall, CCHD; Valerie Laureska, CCHD; Don Wilson, CCHD- Env Health; James Henning, CCSO, Sara Visintainer, Commissioner's Office; Rick Garner, DES

1. Welcome.

2. Last meeting's minutes were reviewed.

3. **Update on Region Activities (Old Business).**

- Upcoming Pet Shelter Trailer dedication will be held on June 28th at 1:00 at the Humane Society.
- CCHD EP Funds has purchased a Variable Message Sign (VMS). It will be stored at DES and be available for county use with shelters, Point of Dispensing locations, or any other emergency use.
- Thanks to everyone that gave feedback for the Mass Prophylaxis exercise in April. The Mass Dispensing plan will be rewritten, and certain partners will be asked to review.

4. **Infectious Disease Update by Valerie Laureska.**

- Anne Arundel County has had about 6 cases and has been participating in Mosquito Control Operations. They have devised 3 triggers for to start control operations.
  1. There is ongoing surveillance already.
  2. If anyone reports seeing an abundance of *Aedes aegypti* or aedes albopictus. (these mosquitoes bite during the day and like small containers of water)
  3. If there is a positive confirmed case.
- A Zika awareness billboard will soon be put on Rt 404 in Caroline County.

-See the CDC website for great information and travel advisories. http://www.cdc.gov/zika/index.html. CDC also has a travel app that helps you plan for safe and health international travel. Check it out here: http://wwwnc.cdc.gov/travel/page/apps-about

-As of 6/23/2016, there are 26 travel related cases in Maryland.

5. **Partner Updates.**

-Rick Garner - reported that FEMA has awarded the following from the last snow storm:

- -Choptank Electric $4704.38
- - Town of Ridgely $9052.09
- -Town of Greensboro $4638.22
- - Town of Federalsburg $9302.36

- It is time to update the hazard plan and DES has applied for a grant through FEMA.

- In a year long process, the annexes of the County Emergency Operations Plan will be converted to Emergency Support functions.

- DES has been engaged with the Upper Eastern Shore in Recovery Planning to develop county plans and then regionalize them.

- An Active Assailant plan is being developed for the county that will be geared towards working EMS into what the Sheriff's Office does.

- Debris Removal – now have 2 signed contracts.

- DES will be working on the future CALVEX exercise, which is a nuclear power plan exercise with Calvert Cliffs Nuclear Facility because we are in the 50-mile plume.

Don Wilson – Brought up the point that with all hype with the Zika virus, everyone will become complacent. The emphasis in on sexual transmission.

Sara Vistintainer – Reported that Jenn Farina and herself attended the PIO training at DEMA. It was held by the Rural Domestic Preparedness Consortium, www.ruraltraining.org. She said it was excellent training and future PIO's would benefit if they attend.

6. **Training:**

- Homeland Security Exercise and Evaluation Program (HSEEP) course. Free training course that will be held at Queen Anne's County Department of Health on August 2 & 3. The course will be conducted by the president of Ascenttra, Derek Rowan; a leading preparedness and training specialist as well as one of the original trainers of the HSEEP program. Class size is limited to 20 persons. The registration link is: https://ess.ascenttra.com/Registration/mdhseep/index.cfm

- Queen Anne's County – PPE Level C training for Biological Events wo be held on July 21, 2016 at QACDOH. Please contact the QACDOH for more information.

7. MEMA Report:

7) Current initiatives at MEMA:

a) A move to change from federal ESF numbers to a system that works better for Maryland. Two being worked on and plans revised are ESF 9 (Search and Rescue) and ESF 4 Fire. For more information on these plans contact me.

b) MEMA will be reorganizing the MEPP process and reduces the planning areas from 4 to two. The "new Planning Model is also being worked out; It will split the plans into two areas; the first is **Response Planning** which will house both response and recovery planning; the second being **Disaster Reduction Planning** this area will cover preparedness, mitigation, with attention added to social/economic impacts as well as traditional planning criteria."

c) Resource List- In conjunction with the two workgroups mentioned above, MEMA is again developing resource lists that will be maintained at MEMA. This initiative will include credentialing and defining equipment and personnel (specialized teams) and developing lists to be maintained at MEMA in the MJOC and the SEOC. Search and Rescue asset lists are well on the way to being completed and fire and emergency services is next.

d) Standardization of activation levels- One thing Director Strickland feels is necessary for Maryland to better handle emergencies in the state is for there to be a degree of standardization to the approach. This starts with the activations and we are

working with local jurisdiction to make all activation levels the same and define what each level means.

MEMA Webpage

Please visit MEMA's webpage to get the latest information on Emergency Management and programs at the agency. The Homepage has a lot of good general information; a Citizens page has good preparedness information for the general public; an Emergency Community page has information on programs at MEMA and Emergency Management throughout the state; and a Business and Non-profit page that includes a section on "Preparedness resources for Business", "Private Sector Integration Program", and "Osprey Business".

Exercise and Training

13) **MEMA Learning Management System -** Training and exercise events will be posted on the MEMA LMS Events Calendar, similar to the current training and exercise calendar. To register for an upcoming event, you will need to be registered with the LMS; registration requires a Federal Emergency Management Agency (FEMA) Student Identification (SID) Number.
    a. FEMA SID Number: https://cdp.dhs.gov/femasid/
    b. MEMA LMS: https://memamaryland.csod.com

14) **WebEOC Drills-** MEMA is conducting monthly WebEOC drills. I urge you to take part in these drills.

15) **Training** – Please check the MEMA LMS Events Calendar for available training. The listing below includes offering at DEMA:

    a. HSEEP Class sponsored by the Queen Anne's County Health Department on Aug 2 and 3.
    b. WebEOC training for local jurisdictions at MEMA on July 7, 2016 -8:30-12. Register by emailing Will Melville at will.melville@marylan.gov .
    c. ICS 300/400 Combined at MEMA SEOC-June 20-23, 2016
    d. Maturing Public-Private Partnerships at Partnership Hall, Laurel, MD- June 28-30, 2016.
    e. HURREVAC Training at MEMA SEOC-June 29, 2016.
    f. MGT-417 Crisis Management for School-Based Incidents, Key Decision Makers course scheduled for 28-29 June 2016 being sponsored by DEMA at the Delaware Fire School. Register through DEMA.
    g. MGT-417 Crisis Management for School-Based Incidents, Key Decision Makers course scheduled for 28-29 June 2016 being sponsored by DEMA at the Delaware Fire School. Register through DEMA.
    h. FEMA Procurement Disaster Assistance Team Training-MFRI Upper Eastern Shore, 6014 Safety Drive, Centreville, MD- Thursday, July 28, 2016 from 8:00 to 12:00.
    i. DEMA is offering a COOP, Implementing Continuity of Operations Planning course on July 19-20, 2016. Check their website for information.

16) **MEMAC Drils**- These will be quarterly and the date for the rest of the year will be: June 14, Sept. 20, and Dec. 6.

Regional Topics

Personnel News

Cecil County has named Pat Symthe as the new Emergency Planner for the County. Please join me in welcoming Pat to our team.

Congratulation to Cecil County Director Richard Brooks for being awarded the "Stevie Marshall Memorial Maryland Emergency Manager of the Year" 2016 at the Maryland Emergency Management Association Symposium.

Upper Eastern Shore Regional Recovery Pilot- The UES Directors have agreed on a pilot planning program. It will be the first of its kind in the state to use the new National Planning process and MEPP to develop a Regional Plan. This is an ongoing project and the Planners are meeting regularly. The final draft of the basic Plan has been sent to the Directors for comments. The local county annexes are been developed now,

Eastern Shore Calvex Ingestion Pathway Exercise Concept and Operations Meeting- In preparation for the upcoming ingestion Pathway Exercise for Calvert Cliff Nuclear plant, the Concept and Operations meeting is scheduled for June 23, 2016 at Talbot County Community Center, 10028 Ocean Gateway, Easton, MD. The meeting will be in the Wye Oak Room from 10:00am to 12:00pm. All counties involved should have a representative at this meeting.

Planning effort and projects in the Region

y. **Caroline County** is working on updating their EOP and switching to ESF's. They have completed their Pet portion, ESF 16. Also working on an Active Assailant Plan for the county. They are planning on conducting an Active Shooter Exercise in July or August; a Pet Sheltering Exercise in August; and a Debris Exercise.
z. **Talbot County** is updating their Mitigation Plan and developing a "County Hazard Mitigation & Resiliency Plan. They have completed County Crisis Communication/Notification plan for employees and is currently working on the messaging portion. As for exercises and drills they are planning a POD Drill, Shelter Exercise, and will be beginning the planning process fo a Hazardous Materials TTX and Functional exercise. They have a very robust CERT program with their next class starting in September.
aa. **Kent County** is updating their EOP and COOP.
bb. **Queen Anne's County** is beginning their planning efforts for a Debris management plan and their Hazard Mitigation Plan update. They are also working with Civic Organizations in the county forming a COAD, Community Organizations Active in Disasters.
cc. **Cecil County** is awaiting FEMA approval of their update to their Mitigation Plan and revising their REP Plan. The have developed a Long-Term Disaster Recovery Committee for the county.
dd. Kent County OES and Talbot County are participating in the Eastern Shore Land Conservancy Grant for a Coastal Vulnerability Study looking at the effects of climate change and sea level rise on our communities.

Mitigation Projects

g. Cecil County has two elevation projects approved. Both in the Northeast area.
h. Queen Anne's County has one acquisition project on the Chester River that has begun.

Chester River Bridge

The scheduled Closing of the Chester River Bridge for cleaning and painting has been postponed until 2017. The off-peak steel repair will continue through the summer.

213 C&D Canal Bridge

This is a reminder that beginning Monday morning June 6, 2016 the U.S. Army Corps of Engineers will begin an extension project to paint the Rt. 213 C&D Canal Bridge. Traffic will be altered to one lane only beginning at 0900 Monday and remain that way for the duration of the project. Be aware that this traffic alteration will involve substantial delays in crossing the bridge.

7. Closing. Next meeting will be September 13th, 2016 at 1:30, room 206 in the HAPS Building.

Respectfully Submitted by;

Linda Woodall

Caroline County Health Department

EMERGENCY PREPAREDNESS & RESPONSE PROGRAM

LELAND D. SPENCER. M.D., M.P.H.
HEALTH OFFICER

ATTILLIO ZARRELLA, Th.D
DEPUTY HEALTH OFFICER

LINDA WOODALL
EMERGENCY PREPAREDNESS COORDINATOR
410-479-8006

CCHD EMERGENCY PREPAREDNESS & RESPONSE ADVISORY COMMITTEE
September 13, 2016
(**All Hazards, Pandemic Influenza & LEPC**)

PRESENT: Linda Woodall, CCHD; Valerie Laureska, CCHD; Rick Garner, DES: Michael Boldosser, Shore Regional Health; Kristin McMenamin, OP&R/DHMH; Amanda Showell, CC Humane Society; Dina Gomes Daly, DSS.

1. Welcome.

2. Last meeting's minutes were briefly reviewed.

3. **Update on Region Activities (Old Business).**

- The Caroline County Pet Trailer was officially unveiled to the public on June 28th.
- The Health Department is planning a Zika Response Tabletop in the near future.
- QAC is planning a regional Zika Response Functional exercise. More info to come.
- Zika commercials are running on Comcast for Caroline and Dorchester counties til end of October.
- The Health Department is in the process of procuring transport caravans and vans, 2 of which will be handicap accessible. Working on agreement to use them as shelter transportation if needed.

4. **Infectious Disease Update.**

- Zika update: As of Sept 8th: U.S. has 2964 confirmed cases, 43 locally acquired, 671 pregnant with Zika. Maryland has 89 travel related cases, 0 of which on the Eastern Shore.
-See the CDC website for great information and travel advisories. http://www.cdc.gov/zika/index.html. CDC also has a travel app that helps you plan for safe and health international travel. Check it out here: http://wwwnc.cdc.gov/travel/page/apps-about
- Val reported that they have 2 active TB cases, and they are responding well.

5. **Partner Updates.**

-Michael Boldosser was asked to participate in the proof of concept of flying emergency medications to remote locations with UAV's. They flew the drone from St. Mary's County to a remote location in Dorchester, then drove the medication to the hospital. The only issue was that the FAA requires the UAV be kept in sight, therefore it had to be followed by a helicopter. They are working on sending up a UAV for Radiation Detection.

-Kristin McMenamin reported on the Delmarva Regional Healthcare Advisory Group (DRHMAG). She reviewed the dates for the MSAT (Satellite phone) test and meeting dates for next year – we will meet 8 times during the year, whether in person or via phone conference/GotoMeeting. DRHMAG encompasses the entire Delmarva Region. We have purchased GotoMeeting which will make it easier for partners to attend the meetings. The past year had 5 deployments of the Regional Medical Station.

We also took two field trips – one to an alternate care facility in Baltimore County and the other to the Johns Hopkins Biocontainment Unit.

- The Fall Regional Public Health and Medical Preparedness Conferences date for Region IV is **October 21, 2016** (8:30am - 4pm) at Chesapeake College, 1000 College Circle, Wye Mills, MD 21679 Registration: https://goo.gl/forms/HUi47pq37NEWgRPN2

-Rick Garner – Reported on the upcoming Pet Shelter Exercise. It will be held on September 27th from 9-12 at the Federalsburg Fire Department. We will be exercising the pet and human side of the shelter. If anyone would like to volunteer to walk through the exercise, please contact Rick at 410-479-5834.

- The Sheriff's Office and EMS participated in a joint training on Active Assailants. This is the first time EMS has been involved with this type of exercise.

- There was a National Response in Federalsburg on July 8th. The fire department set a controlled fire on a house, but the house had asbestos in it. Fire had to be stopped until the EPA arrived.

- Rick is very involved with the Regional Recovery Plan. All the directors of the Upper Eastern Shore have given their approval. He is now working on a county wide plan. When all if completed, he will get everyone together and work out what to do in certain instances.

- A lot of training is available. If you are in need of a specific course, please contact Rick.

- Cindy Towers worked at the Emergency Operations Center in Ellicott City during the flooding incident. She went over everything that happened with DES and added pertinent items to the county plan.

- The new American Red Cross Contact for the Delmarva Region: Director: Theresa Young – W 302-472-6243, cell 302943-4150, Theresa.young@redcross.org. Disaster Specialist: Katy Filkins , 302-383-7003, Kathryn.filkins@redcross.org. Disaster Program Manager: Sharon Jefferson – 302-472-6244, sharon.jefferson@redcross.org

-Amanda Showell – The first draft of the Caroline County Humane Society Pet Shelter Plan is finished.

-They will be holding their third annual Block Party Downtown Denton, Saturday October 15th from 11-3. A rabies clinic will be available.

- There have been several incidents of rabid raccoons in the county. One was inside a house and attacked a Chihuahua.

- Animal Infectious Disease.

-Ringworm is really bad in animals this year in shelters and rescues. It is much more contagious in cats than in dogs and can spread to humans.

-Feline Panleukopenia-highly contagious and extremely resistant to disinfectants and temperature extremes. Strains of the virus can infect not only domestic cats but also all other members of the feline family as well as raccoons and minks.

- Canine Influenza - cause a respiratory infection in dogs and highly contagious.

6. MEMA Report:

8) Current initiatives at MEMA:

e) A move to change from federal ESF **numbers** to a system that works better for Maryland. Two being worked on and plans revised are ESF 9 (Search and Rescue) and ESF 4 Fire. For more information on these plans contact me.

f) Resource List- In conjunction with the two workgroups mentioned above, MEMA is again developing resource lists that will be maintained at MEMA. This initiative will include

credentialing and defining equipment and personnel (specialized teams) and developing lists to be maintained at MEMA in the MJOC and the SEOC. Search and Rescue asset lists are well on the way to being completed and fire and emergency services is next.

g) Standardization of activation levels- One thing Director Strickland feels is necessary for Maryland to better handle emergencies in the state is for there to be a degree of standardization to the approach. This starts with the activations and we are working with local jurisdiction to make all activation levels the same and define what each level means.
h) The State Hazard Mitigation Plan has been approved by FEMA.

MEMA Webpage

Please visit MEMA's webpage to get the latest information on Emergency Management and programs at the agency. The Homepage has a lot of good general information; a Citizens page has good preparedness information for the general public; an Emergency Community page has information on programs at MEMA and Emergency Management throughout the state; and a Business and Non-profit page that includes a section on "Preparedness resources for Business", "Private Sector Integration Program", and "Osprey Business".

Exercise and Training

17) **MEMA Learning Management System -** Training and exercise events will be posted on the MEMA LMS Events Calendar, similar to the current training and exercise calendar. To register for an upcoming event, you will need to be registered with the LMS; registration requires a Federal Emergency Management Agency (FEMA) Student Identification (SID) Number.
    a. FEMA SID Number: https://cdp.dhs.gov/femasid/
    b. MEMA LMS: https://memamaryland.csod.com

18) **WebEOC Drills-** MEMA is conducting monthly WebEOC drills. I urge you to take part in these drills.

19) **Training** – Please check the MEMA LMS Events Calendar for available training. The listing below includes offering at DEMA:

    a. AWR-343 Hurricane Awareness course at MEMA October 4, 2016 from 8:30-12:30.
    b. HSEEP class October 13-14, 2016 at Cecil County Office of Emergency Services from 9AM to 3PM. Register on line on our Learning Management System.
    c. Hurrevac Class September 20, 2016 at Wicomico County Library, 122 S Division Street, Salisbury, MD 21801 from 8:30AM to 4:30PM. Register on line on our Learning Management System.
    d. NIMS 300/400 classes will be held November 14-18, 2016 at the Tri County Building, 31901 Tri County Way Salisbury, MD 21804. Classes are 8:30AM to 4:30PM. Register on line on our Learning Management System.
    e. ICS 200 Basic ICS: Single Resources and Initial Action Incidents class at DEMA, 165 Brick Store Landing Road, Smyrna, DE 19977 on September 28-29, 2016 from 09:00AM to 4:30PM.
    f. E0449-Incident Command System Curricula Train the Trainer is being offered at EMI on October 3-6,2016 and in 2017 on the following dates: January 9-12, May 1-4, June 5-8, and July 31 –August 3.
    g. G270.4 Recovery from Disaster: The Local Government Role is being held at MFRI Upper Eastern Shore in Centreville on November 1-2, 2016 from 8:30AM to 4:30PM. Register on line on our Learning Management System.

h. Leadership Seminar- Sponsored by the Maryland Fire Chiefs' Association on November 5, 2016 at Howard County Public Safety Center. Key note speakers are Captain Wesley S. Huey, US Naval Academy and Chief Daniel Linskey, Boston PD, Retired. Register on the MFCA website.
i. WebEOC Training- Cecil County Department of Emergency Services, September 29, 2016.
j. Flood Fight Operations- This course covers both riverine and coastal flooding issues. Being held in Somerset County September 23 and at MEMA on September 29. Register through LMS.
k. TRI-AUXCOMM: Auxiliary Communications Workshop- This is a weekend workshop being held at Delaware State Fire Scholl October 29-30, 2016. This class is being sponsored by the Delaware Division of Communications, Office of State-Wide Interoperability Coordinator (SWIC) and is being presented by the Department of Homeland Security Office of Emergency Communications as part of their Interoperable Communications Technical Assistance Program (ICTAP) to provide communications unit training assistance. To meet the federal training requirements, the class must be presented as (2) 10-hour days.
l. PER-230 Incident Response to Terrorist Bombings and PER-231 Prevention of and Response to Suicide Bombing Incidents- These are being held at the Delaware State Fire School on October 19, 2016 with PER-230 in the morning and PER-231 in the afternoon. Register on DEMA's website.
m. MGT – 453 REP Post Plume Plan Review Course- This is being held at MEMA January 24-26, 2017. Register through LMS.

20) **MEMAC Drills**- These will be quarterly and the date for the rest of the year will be: Sept. 20, and Dec. 6.

Regional Topics

Upper Eastern Shore Regional Recovery Pilot- The UES Directors have agreed on a pilot planning program. It will be the first of its kind in the state to use the new National Planning process and MEPP to develop a Regional Plan. This is an ongoing project and the Planners are meeting regularly. The final draft of the basic Plan has been signed by all the Directors. The local county annexes are been developed now.

Planning effort and projects in the Region

ee. **Caroline County** is working on updating their EOP and switching to ESF's. They have completed their Pet portion, ESF 16. Also working on an Active Assailant Plan for the county. They had an Active Shooter Exercise with law enforcement and EMS in August; will have a Pet Sheltering Exercise on September 27, 2016. Also, they are considering the MEMA Damage Assesment Ap.to get training on the damage assessment ap.
ff. **Talbot County** is updating their Mitigation Plan and developing a "County Hazard Mitigation & Resiliency Plan. They have completed County Crisis Communication/Notification plan for employees and is currently working on the messaging portion. As for exercises and drills they are planning
Shelter Exercise and will be beginning the planning process for a Hazardous Materials TTX and Functional exercise. They have a very robust CERT program with their next class starting in September.

gg. **Kent County** is updating their EOP and COOP. They conducted a very successful shelter exercise to include pet sheltering and using their Pet Shelter Trailer. They conduct quarterly meeting with their Faith base groups.
hh. **Queen Anne's County** is beginning their planning efforts for a Debris management plan and their Hazard Mitigation Plan update.
They are working on preparation and planning for this year's 10K Across the Bay.
ii. **Cecil County** is awaiting FEMA approval of their update to their Mitigation Plan and revising their REP Plan. The have developed a Long-Term Disaster Recovery Committee for the county.
jj. Kent County OES and Talbot County are participating in the Eastern Shore Land Conservancy Grant for a Coastal Vulnerability Study looking at the effects of climate change and sea level rise on our communities.
kk. We finally have progress with the shelter supply at 50/404. The present container is being replaced with a new with proper ventilation.

Mitigation Projects

i. Cecil County has two elevation projects approved. Both in the Northeast area and currently both are on hold.
j. Queen Anne's County has one acquisition project on the Chester River that has begun.

Chester River Bridge

The scheduled Closing of the Chester River Bridge for cleaning and painting has been postponed until 2017. The off-peak steel repair will continue through the summer.

213 C&D Canal Bridge

This is a reminder that beginning Monday morning June 6, 2016 the U.S. Army Corps of Engineers will begin an extension project to paint the Rt. 213 C&D Canal Bridge. Traffic will be altered to one lane only beginning at 0900 Monday and remain that way for the duration of the project. Be aware that this traffic alteration will involve substantial delays in crossing the bridge.

7. Closing. Next meeting will be November 22nd, 2016 at 1:30, room 206 in the HAPS Building.

Respectfully Submitted by;

Linda Woodall

Caroline County Health Department

EMERGENCY PREPAREDNESS & RESPONSE PROGRAM

LELAND D. SPENCER. M.D., M.P.H.
HEALTH OFFICER

ATTILLIO ZARRELLA, Th.D
DEPUTY HEALTH OFFICER

LINDA WOODALL
EMERGENCY PREPAREDNESS COORDINATOR
410-479-8006

CCHD EMERGENCY PREPAREDNESS & RESPONSE ADVISORY COMMITTEE
January 25, 2017
(**All Hazards, Pandemic Influenza & LEPC**)

PRESENT: Linda Woodall, CCHD; Rick Garner, DES; Attillio Zarrella, CCHD; Sharon Jefferson, ARC.; Debbie Rementer, Choptank Electric; Don Wilson, CCHD EH; Valerie Laureska, CCHD CD; Mary Beth Brennaman, Mid Shore Behavioral Health

1. Welcome.

2. Last meeting's minutes were sent in separate email to review.

3. **Infectious Disease Update.** Val Laureska gave an update on Zika cases as per the CDC website. www.cdc.gov/zika. She informed the group that there was a recent gastroenteritis outbreak at a local nursing home. There were 24 total sick causing the home to close its doors to new clients.

4. **Special Presentation by Debbie Rementer from Choptank Electric Cooperative.** She showed us a video on safety around downed power lines and what to do if you see any. It was a very interesting demonstration for adults and kids alike. Also, a great idea for Driving Schools. If any organization would like a speaker to come and talk on any aspect of Choptank Electric's operation, please call Debbie at 877-892-0001. http://choptankelectric.com/content/presentations-and-demonstrations.

5. **Update on Region Activities (Old Business).**

- Michael Boldosser from Shore Health has moved back to Emergency Management. He is now in Montgomery County. Kristin McMenamin, HPP Region IV Coordinator has taken a position at DHMH.
- CCHD now has a Letter of Understanding with Best Care Ambulance out of Trappe to use them in needed during emergencies. If you would like a copy, please let me know.
- Attached is the contact list for Emergency Preparedness Advisory Committee members. **Please update as necessary.**

6. **Upcoming Events, new business and open discussion.**

- CCHD has a **new Health Officer**. His name is Scott LeRoy and he will be starting on February 15th.
- Invitations for the **CCHD Zika Tabletop** have gone out. I am in the process of putting together Zika Response kits that will be kept in Environmental Health in the event they have to go out and inspect properties.

- Asked the group for **ideas for exercises** to be held in the county to encompass as many partners as possible. A couple of ideas were a school bus accident or active shooter incident. If you have any ideas, please forward them to me.

- I proposed to the group about putting **Hemorrhage kits** in the schools. These are bleeding control kits that can be utilized by the general public to take action as immediate responders in stopping life threatening bleeding (ie. Active Shooter event). There are 2 types, one has 8 kits and can be sealed until needed with no expiration date; and there are individual kits that could be put in smaller offices or in ambulances, for example.

- Department of Homeland Security **Active Shooter Preparedness Workshop**. Please see attached training announcement. This event is open to:

- Corporate and facility security professionals from the private and public sectors;
- Human resource managers;
- Community response officials;
- Law Enforcement;
- Supervisory first responders; and
- Homeland security representatives.

- **Ham Radio Training.** Held at Nanticoke Hospital in Seaford, DE on Feb 25-26. Please see the attached for more information.

- Debbie informed everyone of an opportunity for community assistance that Choptank Electric offers. Taken from the website: "Operated as the non-profit Choptank Electric Trust, Inc., this is a simple and rewarding way to enable members to contribute funds for local charities, needy individuals, and service organizations." Please visit the their website for more information. http://choptankelectric.com/content/operation-roundup-choptank-electric-trust

- Sharon informed everyone that the Red Cross is in the process of updating all their contacts for food services and shelters.

- Rick has all except 2 sections of the Emergency Operations Plan updated.

-There will be upcoming Radiation Ingestion Zone training.

-Caroline County requested and has been awarded a federal grant to revise and update the County's Hazard Mitigation Plan.

- The Department of Emergency Services is being redesigned. In the near future, a national search for an assistant director will be initiated. Emergency Management will be going down to one person.

- The county received a brand-new ambulance. Now we have a total of 7.

- Ridgely Fire Department is getting a new building.

- The old Federalsburg fire house building will soon house the EMS.

- MEMA Update:

9) Current initiatives at MEMA:

a) Maryland Emergency Management System - "the proposed replacement to MEPP. The system more accurately reflects the current way we do business and reduces burdens on our EM stakeholders. Key changes include: moving from 4 operations plans to 2; instituting cross-cutting State Coordinating Functions (replacing ESF/RSF); and a focus on daily management and emergency management coordination beyond physical face to face coordination in an EOC." ESF Numbers will go away and the actual Function will be specified. A standardization of EOC activation levels is also a part of the new system.

b) Resource List- MEMA is again developing resource lists that will be maintained at MEMA. This initiative will include credentialing and defining equipment and personnel (specialized teams) and developing lists to be maintained at MEMA in the MJOC and the SEOC. Search and Rescue asset lists are well on the way to being completed and fire and emergency services is next.
c) Local Emergency Managers Guide- MEMA is developing this guide "to assist new Emergency managers with their orientation to the support MEMA can provide through the MJOC/SEOC and provide them with reference information and documents that may be used during activation."

MEMA Webpage

Please visit MEMA's webpage to get the latest information on Emergency Management and programs at the agency. The Homepage has a lot of good general information; a Citizens page has good preparedness information for the general public; an Emergency Community page has information on programs at MEMA and Emergency Management throughout the state; and a Business and Non-profit page that includes a section on "Preparedness resources for Business", "Private Sector Integration Program", and "Osprey Business".

Exercise and Training

21) **MEMA Learning Management System -** Training and exercise events will be posted on the MEMA LMS Events Calendar, similar to the current training and exercise calendar. To register for an upcoming event, you will need to be registered with the LMS; registration requires a Federal Emergency Management Agency (FEMA) Student Identification (SID) Number.
    a. FEMA SID Number: https://cdp.dhs.gov/femasid/
    b. MEMA LMS: https://memamaryland.csod.com

22) **WebEOC Drills-** MEMA is conducting monthly WebEOC drills. I urge you to take part in these drills.

23) **Training** – Please check the MEMA LMS Events Calendar for available training. The listing below includes offering at DEMA, EMI, and others:

    a. L0962 NIMS ICS All-Hazards Planning Section Chief Course- January 23 - 26, 20 at Montgomery County Fire Station 34, 20633 Boland Farm Road, Germantown, MD 20876
    b. G557 Rapid Needs Assessment Class will be held at MFRI Upper Eastern Shore on February 7, 2017.
    c. MGT – 453 REP Post Plume Plan Review Course- This is being held at City of Annapolis Police, Office of Emergency Management, 199 Taylor Ave., Annapolis on January 24-26, 2017. Register through LMS.
    d. Threat Considerations for the Eastern Shore and Faith-Based Communities at Salisbury Fire Department, 325 Cypress Street,

Salisbury, MD 21801 on Fri, January 27, 2017 from 8:00 AM – 3:30 PM. "This seminar is particularly designed for leadership, facilitator, administrator, and supervisory roles of schools, churches, businesses, and first responder roles while also open to interested personnel." There is a $25 charge and breakfast and lunch will be provided. Register at:
https://threatconsiderationseasternshore2017.eventbrite.com/

    e. G-290- Basic Public Information Officer Training (APS Course) at DEMA on February 15-16, 2017, 0830 to 1630 Hours.

f. SAT-2/AWR-160- Weapons of Mass Destruction (WMD) Standardized Awareness Training (AWR) at DEMA on February 28, 2017, 0800-1700 Hours.
g. AWR-147 Rail Car Incident Response Coarse at Delaware State Fire School, 1461 Chestnut Grove Road, Dover, DE. On February 14, 2017 from 0800 to 1630 hours.

24) **MEMAC Drills**- These will continue to be quarterly in 2017.

Regional Topics

Upper Eastern Shore Regional Recovery Pilot- The UES Directors have agreed on a pilot planning program. It will be the first of its kind in the state to use the new National Planning process and MEPP to develop a Regional Plan. This is an ongoing project and the Planners are meeting regularly. The final draft of the basic Plan has been signed by all the Directors. The local county annexes are been developed now.

Shelter Supply Trailer at 50/404 is being replaced with a new one with ventilation. On 1/10/17 the equipment will be removed and cleaned; on
1/11/17 the old container will be replaced with new container; and on
1/12/17 they will return cleaned equipment to new container.

Planning effort and projects in the Region

ll. **Caroline County** is working on updating their EOP and switching to ESF's. Their county radio system has switched to the MD First 700Mhz.
mm. **Talbot County** is updating their Mitigation Plan and developing a "County Hazard Mitigation & Resiliency Plan. They have a very robust CERT program. They are in the process of moving into their newly remodeled and expanded offices and will transition the 911 Center back on January 17, 2017.
nn. **Kent County** is updating their EOP and COOP. They conduct quarterly meeting with their Faith base groups.
oo. **Queen Anne's County** is beginning their planning efforts for a Debris management plan and their Hazard Mitigation Plan update. Queen Anne's county radio system has switched to the MDFirst 700Mhz system.
pp. **Cecil County** –Have updated their 2017 THIRA and EOP

All UES counties are working on their RAD plan in preparation for 2017 Ingestion Zone exercises.

7. Closing. Next meeting will be April 18th, 2017 at 1:30, room 206 in the HAPS Building.

Respectfully Submitted by;

Linda Woodall

Caroline County Health Department

EMERGENCY PREPAREDNESS & RESPONSE PROGRAM

SCOTT LEROY
HEALTH OFFICER

ATTILLIO ZARRELLA, Th.D
DEPUTY HEALTH OFFICER

LINDA WOODALL
EMERGENCY PREPAREDNESS COORDINATOR
410-479-8006

CCHD EMERGENCY PREPAREDNESS & RESPONSE ADVISORY COMMITTEE
April 18, 2017
(**All Hazards, Pandemic Influenza & LEPC**)

PRESENT: Linda Woodall, CCHD; Rick Garner, DES; Attillio Zarrella, CCHD; Sharon Jefferson-Hawkins, ARC; Bill Hildebrand, MEMA; James Henning CCSO; Dina Gomes Daly, DSS.

1. Welcome.

2. Last meeting's minutes were sent in separate email to review.

3. **Infectious Disease Update.** Val was not able to attend, therefore gave an update Opioid Epidemic response. Please see attached flyers for more information.

4. **Update on Region Activities (Old Business).**

- **Beth Copp** is the new Shore Health Emergency

- **Zika Tabletop** went very well. The After-Action Report had many strengths noted. Some of the weaknesses noted are listed below:
  - Media release consistency throughout region
  - Improve communication and information sharing mechanisms between DHMH, The Maryland Emergency Management Agency (MEMA) and MDA
  - Explore alternate and innovative ways to gain access to at-risk-populations
  - Improve information and situational awareness sharing with community members
  - Review/revise CCHD Zika response plan to better utilize the county personnel resources

- Public Access Bleeding Kits - Purchased 12 kits with 8 sealed cases in each one. Will be installed in the schools and county buildings. School nurses have been trained. Committee has been formed to work out a plan for county. Also purchased sealed individual kits for school nurses to put in their "Grab and Go" bag.

- Variable Messaging Sign – Purchasing a trailer and web services so you can program it from where ever you are. For county use.

6. **Upcoming Events, new business and open discussion.**

- **Zika Update** – DHMH has revised the Interim Maryland *Aedes* Surveillance and Control Plan.
  - In the revised plan, **local health department** (LHD) roles shift to educating residents and conducting community-wide source reduction campaigns. To summarize:

- LHD's are not expect5ed to participate in the MDA response around individual travel-associated Zika patient residences;

- LHDs should initiate and support community-wide source reduction campaigns;

- LHDs should identify at least one individual in the LHD to become certified to apply larvicide.

- **Training:** Excellent training available for those that deal with patients. Self-Protection When Dealing With High Risk Patients. Please see attached flyer.

- **Exercise in FY 2018** – Active shooter. I would like to do a Functional exercise to be held at one of the schools. Will need lots of planning involvement from community partners – Sheriff's Office, DES, EMS, Police, BOE, and CCHD. Will have to wait till FY2018 budget is approved, so I don't think it will be during the summer.

- Dina informed us that they held shelter training for shelter managers and DSS staff. Consisted of a basic review.

- Captain Henning informed us that NARCAN training will be held in Federalsburg and Denton. They have 3 saves so far since the program started. They will be holding a mass training and fit testing on CBRNE (Chemical, biological, radiological and nuclear) defense.

-There was a big discussion on the Opioid response. Here are some items discussed (I was intently listening, so hopefully I got the facts correct):

-MEMA has established an Opioid Operational Command Center (OOCC). MEMA is the coordinating agency and the Health Departments are the lead.

- Law Enforcement reports to a drug task force and sends stats to the **Eastern Shore Information Center (ESIC).** Anyone can get the stats. NARCAN - has to be reported if used (Poison Control Center). ESIC will not report an Opioid overdose if many things are involved, ie. Heroin, cocaine and alcohol.

- DES is the lead on the Overdose map. This is a DEA funded program. It's a pilot program that gives real time information/intelligence to the health department and DES. You can get ahead of where the bad drugs are trending and that they are coming our way. There is also an upcoming App for your phone – OD Map. This just lists overdoses, not just heroin. But if NARCAN is administered, come back to map and the location will be "red" on the map. Caroline County is the second county to come onboard with this.

- Attillio reported that he has been tasked by the health officer to collect information related to the Opioid crisis which are related to certain events. He attends the LDAC (Local Drug and Alcohol Abuse Council) meetings.

- Rick informed us that the Tier II reporting session is over. Tier II reporting captures information about the types, quantities and locations of hazardous chemicals at a given facility. This year, more businesses in Caroline County did not report than last year.

- Every 8 years, FEMA requires those counties in the 10-mile radiation plume and the 50-mile ingestion zones participate in the CALVEX exercise. Caroline county is in the ingestion zone. May 10th is the Eastern Shore regional tabletop. July 18-20 is the dress rehearsal, and September 12-14 is the graded exercise.

- The Basic Recovery Plan is done.

- The Hazard Mitigation Plan is in the works and has a lot of new items.

- Sharon reported that the Red Cross responded to two fires in Preston and Federalsburg. They are training new volunteers.

- MEMA Update:

1) Current initiatives at MEMA:

d) Opioid Operational Command Center (OOCC) has been established at MEMA. "The Governor declared a state of emergency for the Heroin & Opioid Crisis in Maryland and appointed Clay Stamp to lead the Opioid Operational Command Center (OOCC). The OOCC is a multi-agency effort physically located at MEMA within the SEOC. Since January, Jennifer Gray has been working with staff from the Department of Health and Mental Hygiene (DHMH) and the Governor's Office of Crime Control and Prevention (GOCCP) to develop a structure and concept of operations for the OOCC to address this crisis."

e) Maryland Emergency Management System- "MEMA is in the process of implementing the Maryland Emergency Management System, the replacement for the MEPP. Currently the Consequence Management Operations Plan (CMOP) is being developed with a goal of sending it out for comment in the next few weeks. The CMOP addresses the Prevention, Response, and Recovery mission areas. The other component of MEMS, the Disaster Risk Reduction Program is currently being developed. The program will seek ways to reduce risk in the state and to align a number of similar programs throughout the state. The official roll out date of the DRR program is not yet set."

f) MEMA has changed the Office phone system. The main number 517-3600 is still a direct line to MEMA but a lot of individual numbers will change. Switch over date was March 20.

g) MEMA, MDA, and the MDNG have been meeting and discussing the MD HPAI Tactical Plan and what support will be needed if the plan has to be implemented.

h) WebEOC- In an effort to make webEOC more efficient and user friendly the following changes/upgrades have been made to the Jurisdictional Situation Status Board:1) 4 additional columns have been added to capture information on resources, evacuation orders and sheltering; 2) One click updates; and 3) the added ability to upload situation Reports and other incident dependent documents.

i) State Incident Management Team Stakeholders Workshop- This workshop was held on March 29 to address the need for IMT's in the state defining the problems we have in the state to address the need to have support for "complex multi-operational period incidents or special events." These teams would be trained to handle managing the incident or providing support for the local EOC.

MEMA Webpage

Please visit MEMA's webpage to get the latest information on Emergency Management and programs at the agency. The Homepage has a lot of good general information; a Citizens page has good preparedness information for the general public; an Emergency Community page has information on programs at MEMA and Emergency Management throughout the state; and a Business and Non-profit

page that includes a section on “Preparedness resources for Business”, “Private Sector Integration Program”, and “Osprey Business”.

Exercise and Training

25) **MEMA Learning Management System -** Training and exercise events will be posted on the MEMA LMS Events Calendar, similar to the current training and exercise calendar. To register for an upcoming event, you will need to be registered with the LMS; registration requires a Federal Emergency Management Agency (FEMA) Student Identification (SID) Number.
    a. FEMA SID Number: https://cdp.dhs.gov/femasid/
    b. MEMA LMS: https://memamaryland.csod.com

26) **WebEOC Drills-** MEMA is conducting monthly WebEOC drills. I urge you to take part in these drills. March’s drill is out.

27) **MEMA Training Course List-** "This is a comprehensive list of training courses that MEMA can either offer to instruct ourselves or coordinate to offer with the lead agency." This list was sent to all the Directors and Emergency Planners.

28) **Training & Exercises** – Please check the MEMA LMS Events Calendar for available training. The listing below includes offering at DEMA, EMI, and others:

    a. Hurricane Awareness-AWR 343- “This four-hour awareness-level course provides emergency managers, first responders, and community members across all sectors with a basic understanding of the latest knowledge in hurricane science, forecasting, warning, and preparedness.” There are two classes scheduled for the Eastern shore. One is May 2 at MFRI, 12148 John Wilson Lane, Princess Anne, MD 21853 and the other is May 4, at Dorchester Emergency Management in Cambridge (**this is a change in location from Talbot County Emergency Services).** Both are from 8:30-12:30 and you can register through the MEMA learning Management System.
    b. Amateur Radio Technician Level Class- Location is Chestertown Volunteer Fire Company, 211 Maple Avenue, Chestertown, MD 21620, April 22-23 from 8-5. You can register through the MEMA learning Management System.
    c. DHMH Radiation Emergency Preparedness Symposium for all Health Department Emergency Planners as well as Emergency Management Planners on April 19th at Loyola University Maryland, 8890 McGaw Road, Suite 130, Columbia, MD 21045. Register at https://goo.gl/forms/XxyeqROPooWp723 .
    d. CALVEX Regional Workshops/Tabletop Exercises to be held May 10, 2017from 10:00AM to 3:00PM at MFRI Upper Eastern Shore Regional Training Center.
    e. MDEMA Symposium on May 30 – June 2, 2017 in Ocean City at the Clarion Fontainebleau. Registration is now open.
    f. HSEEP training to be held on June 6th-7th 8 am-5 pm with breakfast and lunch supplied being in Somerset County at Somerset County Health Department, Sign Post Road, Westover. The details can be found by clicking on the link https://ess.ascenttra.com/Registration/mdhseep/ .
    g. Listed here are other training opportunities that are being sponsored by DEMA. Be advised that DEMA has a new Learning Management System and a new way of registering for their classes. The last page of this report describes the new system. Other classes are:

G-288 Local volunteer and Donations Management on June 7-8, 2017 from 9:00AM to 4:30PM at DEMA.

AWR-136 Essentials of Community Cybersecurity Course- A 6 June from 0800-1200 and the MGT- 384 Community Preparedness for Cyber Incidents course 6 June 1:00-4:00 – 7 Jun 8:00-4:00 is being held at Delaware Fire School. Register through the DEMA LMS.

29) **MEMAC Drills**- These will continue to be quarterly in 2017. The dates for the drills in 2017 are: 2nd Quarter-June 12-16; 3rd Quarter-Sept. 18-22; and 4th Quarter-Dec. 4-8.

Regional Topics

Upper Eastern Shore Regional Recovery Pilot- This is an ongoing project and the Planners are meeting regularly. The final draft of the basic Plan has been signed by all the Directors. The local county annexes are been developed now.

Shelter Supply Trailer- The trailer at 50/404 has been replaced. Currently it only has 330 cots in and no other supplies. I am not sure of the time line for other supplies.

Planning effort and projects in the Region

qq. **Caroline County** is working on updating their EOP and switching to ESF's. Their county radio system has switched to the MD First 700Mhz. Have been awarded Hazard Mitigation Planning Grant for updating their County Hazard Mitigation Plan. Their Ingestion Zone Radiological Plan is complete.
rr. **Talbot County**-Their "County Hazard Mitigation & Resiliency Plan" is at FEMA for approval. They have a very robust CERT program.
ss. **Kent County** is updating their EOP and COOP. They conduct quarterly meeting with their Faith base groups.
tt. **Queen Anne's County-** Have been awarded Hazard Mitigation Planning Grant for updating their County Hazard Mitigation Plan.
uu. **Cecil County** –Have updated their 2017 THIRA and EOP. The actual work on a mitigation project, an elevation, has started in the town of Northeast.

7. Closing. Next meeting will be June 20th, 2017 at 1:30, room 206 in the HAPS Building.

Respectfully Submitted by;

Linda Woodall

CCHD EMERGENCY PREPAREDNESS & RESPONSE ADVISORY COMMITTEE
June 20, 2017
(All Hazards, Pandemic Influenza & LEPC)

PRESENT: Linda Woodall, CCHD; Rick Garner, DES; Beth Copp, UofM Shore Regional Health; Val Laureska, CCHD; Scott LeRoy, CCHD Health Officer.

1. Welcome and introductions.

2. **Update on Region Activities (Old Business).**

- Health Department happenings – As you can see, we have a new logo.

- The Health Department was represented at the Strawberry Fest with a booth and in the parade. Wellness provided outreach on smoking cessation, Zika Bags with OFF was given away, and Narcan training was done by Addictions.

- DHMH is now the Maryland Department of Health.

- Public Access Bleeding Kits. Chuck Petrick is installing them next to the AEDs in the schools this summer. 2 more kits will be installed at the Family Support Center and the Judy Hoyer Center.

- Opioid update – During October-January, we will have a Billboard concerning Opioid response on 404 in Denton. There are currently 2 PSA's being broadcast on Comcast. Here they are if you haven't seen them yet.


spot 1.mov


spot 2.mov

- Regional Update – **Beth Copp**. The Delmarva Regional Healthcare Mutual Aid Group (DRHMAG) is procuring a Support Trailer for regional storage for the next budget period. We are also discussing having a regional Community Reception Center plan for radiation decontamination because it is required for Local Health Departments this year. The Coalition would buy the decontaminating equipment and establish MOU's and the equipment would be stored in the support trailer. But there will only be enough equipment to operate one Reception Center

-Working on a resource management plan for the region. Will let everyone know who has what.

- Workgroup has been organized for the Maryland Department of Health that is chaired by the Maryland Hospital Association to develop a framework for the allocation of scarce resources. They are trying to establish criteria of what is available quantitatively.

-Shore Health is in the beginning phases of building a new medical campus at Cambridge Marketplace. There are also plans for a new hospital in Easton.

Rick Garner – The Federalsburg new EMS station opens this week.

- The Calvert Cliffs Exercise (CALVEX) dress rehearsal will be July 18-20 and the evaluated exercise will be September 12-14.

- Rick has written the county Radiological Emergency Response Ingestion Exposure Pathway Zone Emergency Operations Plan and it has been approved by FEMA. MEMA has sent it out to other counties as a role model. He is also working on a checklist for Radioactive response for DES.

- He is updating the contacts in the Debris Management Plan.

- DES is in the beginning stages of the Hazard Mitigation Plan

- The Shelter Trailers are now at DES. He is working on getting an inventory of all cots in the county.

Val Laureska – Infectious Disease update. Zika has been quiet. Only travel related cases. STD Chlamydia rose 40% in 2016 so everyone is keeping an eye on the numbers.

- Tick borne diseases are on the rise, including Lyme disease and Rocky Mountain Spotted Fever.

3. **Fentanyl: A Briefing Guide for First Responders (attached).** In order to address the deadly fentanyl dangers first responders are increasingly facing, the Drug Enforcement Agency (DEA) released the June 2017 version of "Fentanyl: A Briefing Guide for First Responders" (PDF, 7.7 MB). This is a comprehensive guide all fire, EMS and law enforcement agencies should have on hand as reference, and it can be used to develop and support departmental policy. The guide details recommendations pertaining to safe handling of fentanyl or substances that could contain fentanyl, overdoses, evidence collection and decontamination. It also details types of exposure risks and how to manage an accidental exposure. https://content.govdelivery.com/attachments/USDHSFACIR/2017/06/08/file_attachments/828867/June%2B8%252C%2B2017%2BInfoGram.pdf

4. Upcoming Events. Summerfest. Planning is underway with the Caroline County Counseling Center/Addictions to provide outreach and information on the Opioid problem. Hoping to make this a joint partnership effort.

5. MEMA Update from Mr. **Bill Hildebrand**.

2) Current initiatives at MEMA:

j) Opioid Operational Command Center (OOCC)- Then Governor's launched the "Before It's Too Late" web portal to provide resources and raise awareness of the opioid crisis. The website link is: http://beforeitstoolate.maryland.gov/ .

k) Maryland Emergency Management System-MEMA has implemented the Maryland Emergency Management System, to replace the MEPP. Currently the Consequence Management Operations Plan (CMOP) is being developed and is out for comment. "The CMOP addresses the Prevention, Response, and Recovery mission areas. The other component of MEMS, the Disaster Risk Reduction Program is currently being developed. The program will seek ways to reduce risk in the state and to align a number of similar programs throughout the state. The official roll out date of the DRR program is not yet set."

l) Maryland Cyber Disruption Contingency Plan- "This plan describes the processes the State will undertake to resolve a significant cyber disruption incident to either a State network or a non-governmental Maryland organization. The plan is located in WebEOC in the File Library --> Operational Plans --> State."

m) Local Plans Drive-For years copies of local plans have been on a drive in our Gateway, which was hard to access. We are in the process of migrating them to WebEOC 2017 in the file library. In the process it has become aware that the plans MEMA has are out dated. Thus, we are in the process of getting the most current local EOP, Hazard Mitigation, and REPP (Radiological Emergency Preparedness Program) from all Counties.

n) Maryland Emergency Management Agency Partners with Nextdoor, the Private Social Network for neighborhoods. MEMA is the "first state emergency management agency able to post emergency alert and Notification information to neighborhood network. Nextdoor (www.nextdoor.com) is a "private social network for neighborhoods to improve statewide communications and safety at the community level." There is a Nextdoor App as well.

o) Personnel Notes- Kelly Devilbiss will be leaving MEMA and moving back to DHMH.

MEMA Webpage

Please visit MEMA's webpage to get the latest information on Emergency Management and programs at the agency. The Homepage has a lot of good general information; a Citizens page has good preparedness information for the general public; an Emergency Community page has information on programs at MEMA and Emergency Management throughout the state; and a Business and Non-profit page that includes a section on "Preparedness resources for Business", "Private Sector Integration Program", and "Osprey Business".

Exercise and Training

30) **MEMA Learning Management System -** Training and exercise events will be posted on the MEMA LMS Events Calendar, similar to the current training and exercise calendar. To register for an upcoming event, you will need to be registered with the LMS; registration requires a Federal Emergency Management Agency (FEMA) Student Identification (SID) Number.
   a. FEMA SID Number: https://cdp.dhs.gov/femasid/
   b. MEMA LMS: https://memamaryland.csod.com

31) **WebEOC Drills-** MEMA is conducting monthly WebEOC drills. I urge you to take part in these drills.

32) **Training & Exercises** – Please check the MEMA LMS Events Calendar for available training. The listing below includes offering at DEMA, EMI, and others:
   a. Fundamentals of Grants Management-E705 is being offered at EMI on August 7-10, 2017. Interested parties should complete the FEMA 119 application (attached) and submit your application in PDF format to: netcadmissions@fema.dhs.gov .
   b. FEMA Region III Staging Area Workshop is being held Anne Arundel County, Maryland in the vicinity of Baltimore/Washington International Airport June 27-29, 2017. Register at https://www.eventbrite.com/e/fema-region-iii-joint-staging-workshop-tickets-33850136670
   c. HURREVAC 2017 class is being held at Talbot County Emergency Operations Center on June 28, 2017. Register through LMS.
   d. Listed here are other training opportunities that are being sponsored by DEMA. Be advised that DEMA has a new Learning Management System and a new way of registering for their classes. Classes being offered are:

-AWR-148- Crisis Management for School-Based Incidents: Partnering Rural Law Enforcement and Local School Systems course on June 27, 2017.
-MGT-417 Crisis Management for School-Based Incidents for Key Decision Makers: Being held at Clayton Fire Department August 8-9, 2017.
-PER-304 Social Media for Natural Disaster Response and Recovery is being held at Clayton Fire Department on August 23, 2017.
Registration is through the DEMA LMS.

33) **MEMAC Drills-** These will continue to be quarterly in 2017. The dates for the drills in 2017 are: 2nd Quarter-June 12-16; 3rd Quarter-Sept. 18-22; and 4th Quarter-Dec. 4-8.

Regional Topics

Upper Eastern Shore Regional Recovery Pilot- This is an ongoing project and the Planners are meeting regularly. The final draft of the basic Plan has been signed by all the Directors. The local county annexes are been developed now.

Shelter Supply Trailer- The trailer at 50/404 has been replaced. It is scheduled to be repainted as well as stocking with more supplies this week and more in July. Currently it only has 494 cots in it.

Planning effort and projects in the Region

vv. **Caroline County** has updated their EOP and switched to ESF's. They are updating their hazard Mitigation Plan. Their Ingestion Zone Radiological Plan is complete.

ww. **Talbot County**-Their "County Hazard Mitigation & Resiliency Plan" has been approved by FEMA and will be present to their County Council for adoption and then to the municipalities. They have a very robust CERT program.

xx. **Kent County** is updating their EOP and COOP. They conduct quarterly meeting with their Faith base groups.

yy. **Queen Anne's County-** Have been awarded Hazard Mitigation Planning Grant for updating their County Hazard Mitigation Plan.

zz. **Cecil County** –Have updated their 2017 THIRA and EOP. The actual work on a mitigation project, an elevation, has started in the town of Northeast.

6. Closing. Next meeting will be Aug 15th, 2017 at 1:30 in HAPS building, room 206. (Hopefully, pending vacations, etc.).

Respectfully submitted,

Linda Woodall

CCHD EMERGENCY PREPAREDNESS & RESPONSE ADVISORY COMMITTEE
April 17, 2018
(All Hazards, Pandemic Influenza & LEPC)

PRESENT: Linda Woodall, CCHD; Cindy Towers, DES; Attillio Zarrella, CCHD; Sharon Jefferson-Hawkins, Red Cross; Val Laureska, CCHD; Gwendolyn Fox, Brinton Woods; Bob Richcreek, Brinton Woods; Don Wilson, CCHD; Beth Copp, UMSRH; Brett Meyers, Choptank Health.

1. **Welcome and introductions**

2. **Roundtable.**

- The Maryland Department of Human Services has purchased what they are calling "Isolation & Quarantine Push-packs." These supplies were specifically purchased for use by a jurisdiction in the event that the jurisdiction needs to provide support to someone who is at risk for contracting a deadly infectious disease, such as Ebola, and is being quarantined. This "push-pack" is designed to keep one household healthy and safe for the first few days after the quarantine notification. These push-packs will be delivered in the near future and stored at the Health Department.

- Additional Public Access Bleeding Control kits have been purchased and will be installed in the larger schools, the Court House and the HAPS building. This is in support of the Stop the Bleed Campaign.

- Brett Meyers is actively pursuing training for an Active Shooter event to present to the staff at Choptank. He met with the Sheriff's Office to get ideas for teaching the basics of what to do in that situation because everyone will react differently. His predicament is closing down services to present the training to the entire staff in three counties.

- Sharon Jefferson-Hawkins wanted to know if anyone from the county was participating in the Atlantic Fury Exercise. This is a FEMA led national-level exercise and will take place from May 2nd to May 9th. The scenario involves a major hurricane that makes landfall near Hampton Roads, VA, and travels up the coast. Cindy contacted Bill Hildebrand at MEMA and was told that the Atlantic Fury Exercise is mainly a State Exercise. Only two counties in the state are playing, one of which is Dorchester. This explains why we had no information about this exercise.

- Bob Richcreek and Gwen Fox from Brinton Woods Health and Rehabilitation Center are part of the new Centers for Medicare & Medicaid Services (CMS) requirements for Emergency Preparedness. Their Emergency Preparedness plan is being finalized and one of the CMS requirements is to conduct one community based full-scale exercise, and a second exercise of their choice. A discussion ensued about a planning a community-wide evacuation exercise. This affects all healthcare providers in the county that accept Medicare/Medicaid. Cindy and Linda will discuss and start planning.
- Bob also asked about the Health Department radios being deployed the nursing homes. I will have to look further into this, as we only have five radios.

- Rabies Clinics will be held May 22nd at Greensboro Elementary School and June 5th at the HAPS building from 5 pm to 7 pm. Rain date will be June 12th at the HAPS building.

- Valerie reported that they have lost the Women's Health grant that funded the OB Clinics in the county. Now there is no access in the county and women have to go to Easton.

- A new problem to add to the Opioid epidemic is the use of Synthetic cannabinoids. The Maryland Poison Center and the Maryland Department of Health encourage health care professionals to be mindful of patients presenting with the following symptoms:

- Bruising
- Nosebleeds
- Bleeding of the gums
- Bleeding out of proportion to the level of injury
- Vomiting blood
- Blood in the urine or stool
- Excessively heavy menstrual bleeding
- Excessive back pain

Should you see patients with the above symptoms who also report using synthetic cannabinoid, please contact the Maryland Poison Center at 1-800-222-1222 for consultation on appropriate treatment.

- Brett reported that Choptank bid on a new building in Denton next to the PNC Bank on 5th Ave. They will be expanding family practice; have extended hours and include pediatric dentistry. Groundbreaking is in June/July. They are also expanding in Tilghman Island.

- Sharon reported that the Red Cross has been very busy attending events at churches and getting leads for volunteers. They have responded to a fire in a Hispanic Community and provided assistance. They will be participating in Cecil County's Radiation Exercise. They will be providing shelter after the decontamination procedure.

- Cindy joyfully reported that Emergency Services has hired a Planner!! They could start as early as next week! Since there were a few new faces at the meeting, she explained the responsibilities of the Department of Emergency Services.

-She attended the Delmarva Hurricane Evacuation Workshop and learned a lot about what Puerto Rico went through. One thing she mentioned is that there was nowhere to take Dialysis patients. Communications were the hardest. They had to go back to basics by using pen and paper.

- The Emergency Planning and Community Right-to-Know Act (EPCRA) requires the Local Emergency Planning Committee (LEPC) provide information about chemicals in the community to citizens. Tier II reports are Emergency and Hazardous Chemical Inventory Reports. These reports now have online access, which makes it so much easier to get information. If you have a need to get access, you have to sign up through Cindy. She has all the information in hard copy if you ever need to look at it.

- The AAR for the EOC exercise held in February is almost finished.

- Attillio will be listening to a presentation regarding the State of Maryland Incident Management Team on April 24th.

The state is looking to build a team, deployable within three hours from receiving a resource request, from anywhere in the State, to potentially go anywhere in the country.

The Maryland IMT requires commitment from a diverse set of public safety disciplines from across the State, including but not limited to: emergency management, fire and emergency medical services, law enforcement, public works, transportation, health and medical, agricultural, environmental, finance, and communications. The state is seeking employees from the Maryland Department of Health willing to make a serious commitment to be a part of this team.

To be a member of this team involves time and true commitment. There will be extensive trainings, exercises, drills, and various preparations for conducting deployments. Department employees who serve on this important team will be paid their normal salary while participating in any Maryland IMT related activities—including deployment.

- Beth Copp has been very busy with the following:

- hosted a FEMA Emergency Preparedness Course back in March. This course was to provide providers and suppliers with training in achieving the four core emergency preparedness elements outlines in the CMS Emergency Preparedness Requirements.

- Reviewing and revising the Evacuation Plan

- Planning the upcoming Regional Evacuation and Surge Exercise. Hospitals and local health departments are involved.

- Working on the notification protocol for Emerging Infectious Diseases.

- Participated in and Infectious Disease exercise in order to find gaps in existing equipment (ie. Replacing PPE) and rebuilding their HAZMAT Teams.

-Participated in University of Maryland Medical System (UMMS) Crisis Communication Workshop. Working on coordinating communication shared service.

- MEMA news and notes from Bill Hildebrand for March and April

MEMA NEWS

3) Current initiatives at MEMA:

p) **Opioid Operational Command Center (OOCC)-** Then Governor's launched the "Before It's Too Late" web portal to provide resources and raise awareness of the opioid crisis. The website link is: http://beforeitstoolate.maryland.gov/ . The OOCC will be preparing a report on progress to date and recommendations going forward. The Declaration is still in effect.

q) **Grants-** The FY2017 SHGP awards have been announced. MEMA has requested the Investment Justifications for the State Homeland Security Grant Program (SHSGP) for FY2018.

r) **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. MEMA has built the Private Sector Integration Program (PSIP) to effectuate this goal. The PSIP will include a Business Operations Center (BOC) housed within the State Emergency Operations Center (SEOC) to better facilitate communication, situational awareness, and information sharing." MEMA is more than happy to do presentations on the PSIP. Please reach out to Charissa Cooper. Her email is charissa.cooper@maryland.gov and her office phone is 410-517-3618.
Find out more at http://mema.maryland.gov/community/Pages/PSIPWelcom.aspx

s) CERT- MEMA is working to revamp the State's efforts in supporting the local CERT groups. Tasha McNutt is the new External Outreach Specialist heading up this effort.

t) Personnel News- Jenn Ryan has left MEMA and Jeremy Scheinker has assumed the role of the State EMAC/MEMAC Coordinator. Also new at MEMA are Kiona Black a new Training & Exercise Administrator and Robert Poler, the new Fiscal Services Branch Manager.

MEMA Webpage

Please visit MEMA's webpage to get the latest information on Emergency Management and programs at the agency. The Homepage has a lot of good general information; a Citizens page has good preparedness information for the general public; an Emergency Community page has information on programs at MEMA and Emergency Management throughout the state; and a Business and Non-profit page that includes a section on "Preparedness resources for Business", "Private Sector Integration Program", and "Osprey Business".

Exercise and Training

34) **MEMA Learning Management System -** Training and exercise events will be posted on the MEMA LMS Events Calendar, similar to the current training and exercise calendar. To register for an upcoming event, you will need to be registered with the LMS; registration requires a Federal Emergency Management Agency (FEMA) Student Identification (SID) Number.

a. FEMA SID Number: https://cdp.dhs.gov/femasid/
b. MEMA LMS: https://memamaryland.csod.com

35) **WebEOC Drills-** MEMA is conducting monthly WebEOC drills. I urge you to take part in these drills. Be aware that is you have had an account and have not signed on in one and half years, you will be removed as a user.

36) **Training & Exercises** – Please check the MEMA LMS Events Calendar for available training. The listing below includes offering at DEMA, EMI, and others:

a. **MEMA Training Courses List for 2018-** This is a list of G courses and IS courses that MEMA can assist with delivering and it has been provided to the local EM offices. Please contact them or me for a copy. Also, if there is a FEMA course you may be interested and you don't see it, contact the local EM office and they will contact MEMA to check on availability.

b. **Rapid Needs Assessment Class-G 557** will be hosted by Queen Anne's County DES at MFRI Upper Eastern Shore on May 23, 2018.

c. Maryland Planners Course – The newly revamped two-day course will be held in Dorchester County on October 23-24, 2018. The class will be held both days from 8-4 at the City of Cambridge Public Safety Building, 8 Washington Street, Cambridge, MD.

d. Building Whole Community Engagement will be held at MFRI Upper Eastern Shore on June 4, 2018 from 8-4 **and not March 19 as previously advertised. Cecil County is hosting this class on Saturday June 2. 2018 as well**. This class "details the responsibilities and interests of key stakeholders and collectively preparing for how hazardous materials incidents impact them and the community."

e. **On Scene Crisis Leadership and Decision Making** will be held at MFRI Upper Eastern Shore on June 5, 2018 from 8-4 **and not on March 20 as previously advertised. Cecil County is hosting this class on Sunday June 3, 2018 as well**. This class "reviews roles and responsibilities of a leader and discusses critical thinking, situational awareness and various decision-making models."

f. Maryland Emergency Response System (MDERS) 2018 Symposium - The theme of this year's symposium will center around ***Multi-disciplinary Response to Terror & Mass Casualty Incidents (MCI)*** and will feature presentations on the 2017 Las Vegas Mass Casualty Shooting Incident. For more information regarding the event. Being held at the College Park Marriott Hotel and Conference Center on May 2, 2018 from 8-2. Register at https://www.mders.org/2018-mders-symposium/ .

37) Listed here are other training opportunities that are being sponsored by **DEMA**. Be advised that DEMA has a new Learning Management System and a new way of registering for their classes. Classes being offered are:

- **AWR-209 Working with the media-**is being held at the Delaware State Fire School, 1463 Chestnut Grove Rd., Dover, DE on April 26, 2018. Time is 8-4:30.

38) **MEMAC Drills**-The 2018 tentative schedule is: Quarter 2-Week of June 18; Quarter 3-Week of September 24; and Quarter 4-Week of December 3.

Regional Topics

Personnel News Please join me in welcoming Lori Morris in Queen Anne's County who is the Acting Asst. Chief of Special Operation, which oversees the EM Division.

Planning effort and projects in the Region

aaa. **Caroline County** They are currently going through the process of updating their hazard Mitigation Plan.

bbb. **Talbot County**- Their AMBO Bus is being upgraded through a grant. Their Board of Election is updating their Emergency Plans. They had a sheltering training for CERT volunteers, emergency services and the ARC that went very well. They are reviewing and updating their EOP. As they continue to deal with the Opioid Crises they will be initiating the "Safe Stations Program".

ccc. **Kent County** is updating their EOP and COOP. They will be developing a full-scale Active Assailant Exercise as a follow up to their Table Top Exercise earlier this year. They are moving ahead with their County Recovery Plan. The Town of Betterton has a serious erosion problem on the cliffs along the Chesapeake Bay. The Citizens submitted through the Mitigation Branch at MEMA for a grant to mitigate the problem. As with everyone, they are attaching the Opioid epidemic. I the efforts the Sheriff's Office they have bought a trailer that will be made to look like an Addicts bedroom. This will be taken to community events to be on display to give parents and others an Idea of where to look in the bedroom for drug paraphernalia.

ddd. **Queen Anne's County-** They have awarded the bid for updating their Hazard Mitigation Plan and are moving forward. Queen Anne's Public Works is developing a Debris Plan with input from Emergency Management. They are hosting several classes with one being the Skywarn Class mentioned earlier.

Cecil County – In the process of replacing their Radio System. They have received a grant to form an Infectious Disease Transport Team that will be available to the Eastern Shore. They are also in the process of filling Planners position.

5. Closing. Because of vacations happening in June, the next meeting will be July 24th, 2018 at 1:30 in HAPS building, room 206. As always, feel free to contact me if you have any Emergency Preparedness issues.

Respectfully submitted,
Linda Woodall

CCHD EMERGENCY PREPAREDNESS & RESPONSE ADVISORY COMMITTEE
July 24th, 2018
(All Hazards, Pandemic Influenza & LEPC)

PRESENT: Linda Woodall, CCHD; Jeff Ludwig, DES; Scott LeRoy, CCHD; Rick Baker, Brinton Woods; Brett Meyers, Choptank Health; Jamison Huntley, Burris Logistics; Philip Ranalli, Burris Logistics; Dina Daly, DSS; Chris Kephart, Planning and Codes; Katie Dilley, Mid-Shore Behavioral Health.

1. **Welcome and introductions**

2. **Health Department Passdown.**

- Working on setting up drills with the Behavioral Health Department.
- Meeting with DES later this week to plan an Evacuation Drill for Assisted Living Facilities.
- Maryland Department of Health received Federal funds for Opioid Training kits. The Behavioral Health Division is in possession of this kit and will be assessing the training program included.
- FDA advises consumers to avoid potentially contaminated Fresh Crab Meat imported from Venezuela due to Vibrio parahaemolyticus. Check the labels and ask restaurants where the crab meat is from. See the full article here: https://www.fda.gov/Food/RecallsOutbreaksEmergencies/Outbreaks/UCM613500.htm
- Jeff Ludwig informed us about an invasive plant called Giant Hogweed that can cause severe burns and blisters. Please see more information about it here: https://www.goodhousekeeping.com/home/gardening/a21598753/giant-hogweed/
- The Maryland Safe at Home Address Confidentiality Program (ACP) is a mail forwarding service administered by the Office of the Secretary of State. The ACP helps individuals who are victims of domestic violence and/or human trafficking that have relocated or will be relocating by keeping their perpetrators from finding them. The ACP provides a substitute address for victims who have moved or are about to move to a new location unknown to their abuser and provides participants with free confidential mail-forwarding service. ACP participants can use their ACP substitute address to access in-state and local services without compromising the confidentiality of their residential address.

Maryland law requires that State and local government agencies accept the ACP substitute address as a participant's legal address.

3. **Roundtable.**

- **Sharon Jefferson-Hawkins** from the Red Cross was unable to attend but wanted to bring the following to the group's attention.

-She is looking to expand their preparedness programs in Caroline county this fiscal year with Citizen CPR, Community Disaster Education and The Pillowcase Project, which teaches children coping skills to help them deal with an emergency situation and also offers tips and tools to help them prepare for emergencies.

- She is also looking for caterers to partner with in feeding. The Feeding coordinator started making calls in Caroline County.
- They have participated in two exercises and goals to practice feeding capabilities with the new Emergency Response Vehicle.

- **Jeff Ludwig** report from DES.

Planning Objectives

- Hazard Mitigation Planning Continues. Phase 1 completion estimated by late Fall or Winter. Currently conducting local risk perception surveys; a required step in the planning process to

build participation and create eligibility should the county or any municipality require mitigation funding in the future. *Surveys will be sent to certain partners to help assess what you perceive the risks to be in the jurisdiction.

- Active Assailant Planning continues. Pre-existing document is being revised to reflect the changes we have observed across the nation, shooter -> assailant terminology
  - This effort will transition to a review of school crisis plans with our SRO (School Resource Officer) in the late summer to reassess school preparedness and prevention measures.

- EOP has been reviewed closely. Almost activated Heat Emergency Index plan for the high-pressure trough Caroline experienced 3 weeks prior.

Response Objectives

- Active Assailant Training Series was held in Caroline County this past June. This was a combined training session coordinated by CCSO and DES. Participants were CCSO, Federalsburg PD, Denton PD, Ridgely PD, MSP and all full time DES staff including EM, Communications and EMS divisions. The training was by large a success which demonstrated that our public safety personnel are trained and properly equipped to respond to these incidents. We found that there are lessons to be learned about and are incorporating them into future trainings and the overall Response to Active Assailant Incidents plan. The Emergency Operations Center Quick Response Team Activation is on deck. Although not present for the prior drill, I will be reviewing the notes from that day and working to address considerations for the next occurrence, whether in real life, or training.

- DES is reevaluating public warning and our service, Caroline Connect, to make sweeping improvements as well as adding new features. Currently, over 14,000 registered recipients. This ties into our efforts to improve situational awareness operations by other divisions such as the 911 center, who will soon be equipped and trained on launching alerts in support of emergency management. Discuss our plans and my expectation on testing the system regularly. He wants someone testing/training on the system at least weekly. To register for Caroline Connect, please go here: https://public.coderedweb.com/CNE/en-US/97D4F5E4B408

General Projects

- Social Media presence has increased with new outreach methods being employed by DES. Using many of the tools that were presented by Get Social Delmarva in April. Please continue to share our posts and invite residents you know to like our page. Emergency Management NEEDS to have the max potential reach across as many platforms as possible.

- To help combat the Opioid Epidemic, regional safe stations have started to open around Maryland. The goal of Safe Stations is to provide safe and low-stress options for individuals seeking treatment for drug addiction.

DES and the Behavioral Health Clinic at the Health Department have **Deterra Kits** available. These are single kits that can be distributed to the public to safely deactivate prescription drugs kept at home that are not needed any more. This solution uses activated carbon that reacts with the drugs and neutralizes them and makes them unavailable to misuse and safe for the environment. Please contact Jeff Ludwig at 410-479-5834 or the Clinic at 410-479-8000 for more information and to receive the kits.

- DES is investigating additional sources of help in emergency situations, including the state IMT type 3 team. More news to follow by next EPRAC.

- **Dina Daly –** Suggested we start planning a shelter exercise because we haven't had one since 2016.

- **Jamison Huntly and Phil Ranalli–** New Safety Manager at Burris Logistics and wanted to introduce themselves. They are working on getting their Emergency Action Plan together and their annual fire drill. They do all their own exercises.

- **Katie Dilly** – Suggested bringing in Behavioral Health to tabletop exercises (should be all disaster/public health themed exercises).

- She does a lot of support for the Mobile Crisis Team. As of January 1st, they are a 24/7 service. The 24 hour hotline is 1-888-407-8018. Please see this link for more information and phone numbers: https://www.midshorebehavioralhealth.org/resources-links

- She would like to meet with the planners to figure out and plan what to do if problems arise during the overnight hours.

- **Brett Meyers** reported that all Choptank Community Health buildings have enhanced their security by using proximity cards. They have been programmed so not everyone has all access to all sites. They have also installed security cameras for the first time!

- He has been diligently working on training the entire staff of Choptank in all counties for an Active Shooter Event. He is using an educational approach by using training videos based on the Run, Hide, Fight tactic, emphasizing to everyone to think about what you would do in this situation and how you would evacuate. He has done an excellent job with this as it impossible to have everyone stop what they are doing to participate in an exercise. Well done!

- **Rick Baker** – Asked how to get active assailant information. Jeff is working on creating products to distribute to the jurisdiction's businesses. The Sheriff's Office will come out and do training.

- Jeff will also give Rick resources for fire drills.

- Linda will be doing a communication drill with radios in the near future.

4. **MEMA NEWS**

4) Current initiatives at MEMA:

u) **Opioid Operational Command Center (OOCC)-** Then Governor's launched the "Before It's Too Late" web portal to provide resources and raise awareness of the opioid crisis. The website link is: http://beforeitstoolate.maryland.gov/ . The Declaration is still in effect.

v) **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. MEMA has built the Private Sector Integration Program (PSIP) to effectuate this goal. The PSIP will include a Business Operations Center (BOC) housed within the State Emergency Operations Center (SEOC) to better facilitate communication, situational awareness, and information sharing." MEMA is more than happy to do presentations on the PSIP. Please reach out to Charissa Cooper. Her email is charissa.cooper@maryland.gov and her office phone is 410-517-3618. Find out more at http://mema.maryland.gov/community/Pages/PSIPWelcom.aspx

w) **CERT**- MEMA is working to revamp the State's efforts in supporting the local CERT groups. Tasha McNutt is the new External Outreach Specialist heading up this effort.

x) MEMA, in collaboration with Carroll County has developed an **Emergency Preparedness for the Homeless Population Workbook**. Please let Jessica Nusbaum (jessica.nusbaum@maryland.gov), the lead coordinator/developer of the workbook, know if you have any questions about how to use.

y) **Know Your Zone Campaign**- As we move along latest Hurricane Evacuation Study and the inundation zone have been established, MEMA is launching the Know Your Zone Campaign. We have had the initial kick off meeting for the Upper Shore. Counties in the effected zones are starting to develop their own local campaigns. To view what has been developed to date, visit http://mema.maryland.gov/Pages/know-your-zone-md.aspx .
There will be a lot more to follow.

MEMA Webpage

Please visit MEMA's webpage to get the latest information on Emergency Management and programs at the agency. The Homepage has a lot of good general information; a Citizens page has good preparedness information for the general public; an Emergency Community page has information on programs at MEMA and Emergency Management throughout the state; and a Business and Non-profit page that includes a section on "Preparedness resources for Business", "Private Sector Integration Program", and "Osprey Business".

Exercise and Training

39) **MEMA Learning Management System -** Training and exercise events will be posted on the MEMA LMS Events Calendar, similar to the current training and exercise calendar. To register for an upcoming event, you will need to be registered with the LMS; registration requires a Federal Emergency Management Agency (FEMA) Student Identification (SID) Number.

a. FEMA SID Number: https://cdp.dhs.gov/femasid/
b. MEMA LMS: https://memamaryland.csod.com

40) **WebEOC Drills-** MEMA is conducting monthly WebEOC drills. I urge you to take part in these drills. Be aware that is you have had an account and have not signed on in one and half years, you will be removed as a user.

41) **Training & Exercises** – Please check the MEMA LMS Events Calendar for available training. The listing below includes offering at DEMA, EMI, and others:

a. **MEMA Training Courses List for 2018-** This is a list of G courses and IS courses that MEMA can assist with delivering and it has been provided to the local EM offices. Please contact them or me for a copy. Also, if there is a FEMA course you may be interested and you don't see it, contact the local EM office and they will contact MEMA to check on availability.

b. **Maryland Planners Course –** The newly revamped two-day course will be held in Dorchester County on October 23-24, 2018. The class will be held both days from 8-4 at the City of Cambridge Public Safety Building, 8 Washington Street, Cambridge, MD.

c. **Active Shooter Response Training Instructor Course** is being held at Harford County Department of Emergency services on August 23-24, 2018 from 8-4. The class description is: ALICE (Alert, Lockdown, Inform, Counter, Evacuate) is a set of proactive, options-based strategies that increase your chances of survival during a violent intruder or Active Shooter event. For 14 years, the ALICE Training Institute has provided violent intruder response training to individuals and organizations across the nation. This 2-Day Instructor training course is designed to teach law enforcement as well as school, church, hospital and workplace administrators and employees' skills and strategies that bridge the gap between the times a violent event begins and law enforcement arrives. Sign up at: http://www.alicetraining.com/ .

d. G0318 Mitigation Planning for Local and Tribal Communities-This course is scheduled for September 5-6 at MRFI UES. The course is not yet list in LMS, so please keep checking the website and sign up when it is available.

e. National Emergency Management Basic Academy-This is the same course offered on campus at EMI, will be held at MEMA. There are five (5) courses that make up the Basic Academy. Each course builds upon the next course, so to complete the Basic Academy, **YOU MUST TAKE ALL 5 COURSES IN ORDER.** Here are the dates/times for the 5 courses:

i. L0101: Oct. 15-19 and Oct. 22-26, 2018 (Fundamentals of Emergency Management) - 10 days
ii. L0102: Nov. 5-7, 2018 (Science of Disaster) - 3 days
iii. L0103: Nov. 26-27, 2018 (Planning: Emergency Operations) - 2 days
iv. K0146: Dec. 19-20, 2018 (HSEEP) - 2 days*
v. L0105: Jan 16-17, 2019 (Public Information and Warning) - 2 days

*Please note that if you have already taken the HSEEP course separately, you DO NOT have to retake the course. Your previous completion certificate is adequate.

Register though MEMA's LMS.

b. Search and Rescue in Community Disasters Training PER-334 – This TEEX course is being sponsored by Dorchester DES at the City of Cambridge Public Safety Training Room, 8 Washington St., Cambridge, MD on October 10-11,2018. Register through MEMA's LMS.

c. **IS 1160 Damage Assessment Operations**- This is now available through FEMA online. The overall time to complete the course will vary for each individual. It takes approximately 8 hours to complete.

42) Listed here are other training opportunities that are being sponsored by **DEMA**. DEMA has a new Learning Management System and a new way of registering for their classes. Classes being offered are:

a. **MGT-417 Crisis Management for School-Based Incidents, Key Decision Makers course scheduled for 17-18 July 2018.** Visit DEMA Training Calendar and register prior to July 3, 2018.

43) **MEMAC Drills**-The 2018 tentative schedule is: Quarter 3-Week of September 24; and Quarter 4-Week of December 3.

Regional Topics

Planning effort and projects in the Region

eee. **Caroline County** They are currently going through the process of updating their hazard Mitigation Plan.

fff. **Talbot County**- Their AMBO Bus is being upgraded through a grant. ** They are in the process of replacing Jim Bass.

ggg. **Kent County** is updating their EOP and COOP. ** The Town of Betterton has a serious erosion problem on the cliffs along the Chesapeake Bay. The Citizens submitted through the Mitigation Branch at MEMA for a grant to mitigate the problem. ** As with everyone they are attaching the Opioid epidemic. To enhance the efforts the Sheriff's Office they have bought a trailer that will be made to look like an Addicts bedroom. This will be taken to community events to be on display to give parents and others an Idea of where to look in the bedroom for drug paraphernalia. ** Have sent an initial draft of a debris plan to public works.

hhh. **Queen Anne's County-** They are in the process of updating their Hazard Mitigation Plan and have had the kick off meeting with the contractor. ** Queen Anne's Public Works is developing a Debris Plan with input from Emergency Management. ** Using the new evacuation zone maps they have developed a "Know Your Zone" campaign that they plan to push out the same time MEMA does the state campaign. ** In their fight of the Opioid Crisis, the Sheriff's department will be initiating a Queen Anne's Go Purple Campaign for September through November. ** They are revitalizing their CERT program in the County and currently have two classes lined up.

iii. **Cecil County** – In the process of replacing their Radio System. ** They have received a grant to form an Infectious Disease Transport Team that will be available to the Eastern Shore. ** They are also in the process of filling planners' position.

5. **Closing.** The next meeting will be September 25th, 2018 at 1:30 in HAPS building, room 206. As always, feel free to contact me if you have any Emergency Preparedness issues.

Respectfully submitted,
Linda Woodall

Appendix D – Grant Funding Sources

Federal & State Grant Funding Sources

The following is a list of Federal and State Grants that may assist in implementing local All Hazard Mitigation Plans. This information is subject to change at any time; contact the federal or state agency for current grant status. (Last Updated: November 2018)

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 (HMGP)	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% State - 25%	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

Grant Program Name	Address and Telephone Contact Information	Eligible Activities	Federal, State and Local Cost Share Requirements	Other Program Characteristics	Grant Application Due Date
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
Increased Cost of Compliance	Maryland Emergency Management Agency 5401Rue Saint Lo Drive Reisterstown, MD 21136	ICC coverage provides payment to help cover the cost of mitigation activities that will reduce the risk of future flood damage to a building. If a Flood Insurance Policy Holder suffers a flood loss and is declared to be substantially or repetitively damaged, ICC will pay up to 30,000 to bring the building into compliance with State or community floodplain management laws or ordinances. Usually this means elevating or relocating the building so that it is above the base flood elevation (BFE).	Varies	Once the local jurisdiction determines the building is substantially or repetitively damaged, the policy holder can contact insurance agent to file an ICC claim.	Anytime

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, 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
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.	

Grant Program Name	Address and Telephone Contact Information	Eligible Activities	Federal, State and Local Cost Share Requirements	Other Program Characteristics	Grant Application Due Date
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 (f 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 from 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

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 Transit Authority, FHWA, DOT, 1200 New Jersey Avenue Washington, DC 20590; 202-366-4043	Provides aid for the repair of Federal-aid roads and roads on Federal lands.	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 (CRP0 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

Grant Program Name	Address and Telephone Contact Information	Eligible Activities	Federal, State and Local Cost Share Requirements	Other Program Characteristics	Grant Application Due Date
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
Emergency Advance Measures for Flood Prevention (Public Law 84-99 (Section 5 of the Flood Control Act of 1941))	USACE, Baltimore District Emergency Management 2 Hopkins Plaza, Baltimore, MD 21202 410-962-2013	Assistance may be provided in order to prevent or reduce damages when there is an imminent threat of unusual flooding. Technical Assistance may be provided when there is a significant potential that an imminent threat of unusual flooding will develop.	No information	Advance Measures projects are temporary projects that provide measures necessary to prevent or reduce impacts of floods that (1) pose a significant threat to life and/or improved property, and (2) are beyond the technical capability of Tribe/State/local interests to perform in a timely manner. Advance Measures projects must be engineering- feasible and capable of being constructed in time to meet the anticipated threat	Governor of State must request assistance

Grant Program Name	Address and Telephone Contact Information	Eligible Activities	Federal, State and Local Cost Share Requirements	Other Program Characteristics	Grant Application Due Date
Continuing Authorities Program (CAP) Section 14 - Emergency Streambank and Shoreline Protection	USACE, Baltimore District Emergency Management 2 Hopkins Plaza, Baltimore, MD 21202 410-962-2013	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.	Feasibility: 100%/0% Fed/Local for initial $100,000; 50%/50% remaining cost; Implementation: 65%/35% Fed/Local; Federal Project Limit: $5M	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.	Anytime
Continuing Authorities Program (CAP) Section 205 - Flood Damage Reduction	USACE, Baltimore District Emergency Management 2 Hopkins Plaza, Baltimore, MD 21202 410-962-2013	Authorizes the construction of small flood control projects that have not already been specifically authorized by Congress	Feasibility: 100%/0% Fed/Local for initial $100,000; 50%/50% remaining cost; Implementation: 65%/35% Fed/Local; Federal Project Limit: $10M	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 may include flood proofing, the relocation of structures, and flood warning systems.	Anytime
Continuing Authorities Program (CAP) Section 103- Hurricane and Storm Damage Reduction (Beach Erosion)	USACE, Baltimore District Emergency Management 2 Hopkins Plaza, Baltimore, MD 21202 410-962-2013	Development and construction small beach erosion control projects. A potential project must provide benefits other than for the purposes of recreation, such as beach stabilization to reduce flooding or to provide protection to public facilities	Feasibility: 100%/0% Fed/Local for initial $100,000; 50%/50% remaining cost; Implementation: 65%/35% Fed/Local; Federal Project Limit: $10M	Protection of privately owned shorelines which offer no benefits to the public are not eligible for Federal cost sharing	Anytime

Grant Program Name	Address and Telephone Contact Information	Eligible Activities	Federal, State and Local Cost Share Requirements	Other Program Characteristics	Grant Application Due Date
USACE Rehabilitation and Inspection Program (RIP) & Inspection of Completed Works (ICW) Program)	USACE, Baltimore District Emergency Management 2 Hopkins Plaza, Baltimore, MD 21202 410-962-2013	Provides for inspection of flood control projects, rehabilitation of damaged flood control projects, and the rehabilitation of federally authorized and constructed hurricane or shore protection projects	100% Federal for projects built by USACE and properly maintained; 80%/20% Fed/Sponsor for projects rehabbed by USACE	Projects initially constructed by the Corps, including hurricane and shore protection projects, and turned over to the local sponsor for maintenance are inspected under authority of the Inspection of Completed Works (ICW) program	After flood or storm event
USACE General Investigation (GI)	USACE, Baltimore District Emergency Management 2 Hopkins Plaza, Baltimore, MD 21202 410-962-2013	Congress can authorize USACE to study, design and construct major flood risk management projects	Feasibility: 50%/50%Fed/Local; Implementation 65%/35%	Generally large scale projects that cost more than $10 million	Anytime
USACE Flood Plain Management Services Program (FPMS)	USACE, Baltimore District Emergency Management 2 Hopkins Plaza, Baltimore, MD 21202 410-962-2013	The program allows USACE to compile and disseminate information on floods and flood damages, including identification of areas subject to inundation by floods, and general criteria for guidance in the use of floodplain areas.	Upon request, program services are provided to the State, regional, and local governments, Native American Tribes, and other non-federal public agencies without charge. Per Section 202 of WRDA 1999, USACE may accept funds voluntarily contributed by sponsor with the purpose of expanding the scope of services.	USACE can provide engineering advice to local interests in planning to reduce flood hazard.	Anytime

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 21401	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
Assistant to Firefighters Grant	Source: U.S. Fire Administration CFDA Number: 97.044	Vehicles, safety equipment, protective equipment, etc.	Federal Grant Funds match depended upon population served by Fire Departments and nonaffiliated EMS organizations	Provides assistance to local fire department to protect citizens and firefighters against the effects of fire and fire-related incidents.	Annually in September projects are due.

Grant Program Name	Address and Telephone Contact Information	Eligible Activities	Federal, State and Local Cost Share Requirements	Other Program Characteristics	Grant Application Due Date
Maryland Program Open Space	Department of Natural Resources 580 Taylor Ave. Annapolis, MD 21401 410-260-8445	Local provides financial and technical assistance to local subdivisions for the planning, acquisition, and/or development of recreation land or open space areas.	A local governing body may use up to $25,000 annually from its 100% (Acquisition) money to fund planning projects that update the Local Land Preservation and Recreation Plans.	Acquires outdoor recreation and open space areas for public use. Administers funds made available to local communities for open and recreational space by the Outdoor Recreation Land Loan of 1969 and from the Land and Water Conservation Fund of the National Park Service, U.S. Department of the Interior.	July 1st

Grant Program Name	Address and Telephone Contact Information	Eligible Activities	Federal, State and Local Cost Share Requirements	Other Program Characteristics	Grant Application Due Date
Maryland Recreational Trails Program	Maryland Scenic Byways /Recreational Trails Program* Office of Planning & Preliminary Engineering State Highway Administration 707 N Calvert Street Baltimore, MD 21201 (p) 410.545.8637 (f) 410.209-5012 tmaxwell@sha.state.md.us	Maintenance and restoration of existing recreational trail; Development and rehabilitation of trailside facilities and trail linkages; Purchase and lease of trail construction equipment; Construction of new trails; Acquisition of easements or property for recreational trails or recreational trail corridors; and Implementation of interpretive/educational programs to promote intrinsic qualities, safety, and environmental protection, as those objectives relate to the use of recreational trails.	Administered by the State Highway Administration (SHA), this program matches federal funds with local funds or in-kind contributions to implement trail projects. Projects can be sponsored by a county or municipal government, a private non-profit agency, a community group or an individual (non-governmental agencies must secure an appropriate government agency as a co-sponsor). Federal funds administered by the State Highway Administration are available for up to 80% of the project cost, matched by at least 20% funding from the project sponsor. Matching funds must be committed and documented in the local jurisdiction's budget.	Projects must meet state and federal environmental regulatory requirements (NEPA, MEPA, Section 106, Section 4(f)). SHA will provide assistance to the project sponsor to acquire these approvals.	July 1st

Grant Program Name	Address and Telephone Contact Information	Eligible Activities	Federal, State and Local Cost Share Requirements	Other Program Characteristics	Grant Application Due Date
CoastSmart Communities Grant (CCG) Program	Maryland Department of Natural Resources Chesapeake and Coastal Service (p) 410.260.8718 (f) 410.260.8739 sasha.land@maryland.gov	Municipalities and counties in the coastal zone are eligible to apply for and receive funds: Anne Arundel, Baltimore, Calvert, Caroline, Cecil, Charles, Dorchester, Harford, Kent, Prince George's, Queen Anne's, St. Mary's, Somerset, Talbot, Wicomico, and Worcester counties and Baltimore City. Funding for a one-year project that contributes to understanding, planning for, or implementing planning and outreach measures to address coastal hazard issues.	Up to $75,000 annually	Track A can fund flood vulnerability and risk assessments, updates to planning documents (e.g. hazard mitigation plans, zoning ordinances, building codes, floodplain ordinances, comprehensive plans), education and outreach campaigns and materials, applications to FEMA's Community Rating System in concert with other task outcomes, support for adopting an updated plan and integrating the plan into day-to-day existing planning processes that reduce overall flood risk due to tidal events or stormwater and rain events.	TBD

Grant Program Name	Address and Telephone Contact Information	Eligible Activities	Federal, State and Local Cost Share Requirements	Other Program Characteristics	Grant Application Due Date
Green Infrastructure Resiliency Grant Program	Maryland Department of Natural Resources Chesapeake and Coastal Service (p) 410.260.8799 (f) 410.260.8739 (e) megan.granato@maryland.gov	Municipalities and counties within the Maryland portion of the Chesapeake Bay watershed are eligible to apply for and receive funds. Please note that projects proposed in Cecil, Garrett and Worcester counties must be located within the portions of those counties that are within the watershed in order to be eligible. Funding for one year for Phase 1 and Phase 2 projects and up to 2 years for Phase 3 projects that will assess stormwater management needs associated with localized flooding and design or construct targeted green infrastructure practices to address those needs.	Up to $100,000 per project	Track B can fund watershed assessments that focus on determining local flood risks and how green infrastructure can be used to address those risks, site or watershed-level green infrastructure implementation plans, and green infrastructure project designs. This track can also fund construction of green infrastructure projects. In order to apply for construction funding, all applicable permit preapplication meetings must be complete.	TBD

Grant Program Name	Address and Telephone Contact Information	Eligible Activities	Federal, State and Local Cost Share Requirements	Other Program Characteristics	Grant Application Due Date
Maryland Community Parks and Playgrounds Program	Department of Natural Resources 580 Taylor Ave. Annapolis, MD 21401 410-260-8445	1) development of new parks 2) rehabilitation of existing parks 3) expansion or improvement of existing parks 4) purchase and installation of playground equipment 5) development of environmentally oriented parks and recreation projects 6) development of new trails or extension of existing trails 7) creation of access points to water recreation resources 8) acquisition of land to create new parks.	The source of funds for this program is primarily State General Obligation Bonds, which may be authorized on an annual basis. The Community Parks and Playgrounds Program provides funding to incorporated municipalities and Baltimore City. Grants may be for up to 100% of the project cost and are selected on a competitive basis. Each applicant will be limited to one (1) Grant Proposal List submission package, which may contain several prioritized projects, per award cycle.	The Department of Natural Resources works to provide opportunities for Marylanders, especially our children, to experience nature. The Department has developed a website that provides information about Nature Play Spaces. Nature Play Spaces are one of the many types of public recreation projects eligible for consideration for Community Parks and Playgrounds grant funding. While land acquisition costs may be considered for project funding, the highest priority will be placed on capital costs associated with park development and improvement.	TBD

Appendix E – Sources

Chapter 1 – County Introduction

Prepared by Federal Emergency Management Agency. Disaster Mitigation Act of 2000. 2000.

Prepared by Federal Emergency Management Agency. 2015 Hazard Mitigation Assistance Unified Guidance. 2015.

Chapter 2 – County Profile

2018 U.S. Climate Data. Available at http://www.usclimatedata.com/.

"U.S. Census Bureau-American Fact Finder Population Estimates." Available at: www.census.gov. July 1, 2017.

Caroline County Comprehensive Development Plan. April 2010.

Maryland Department of Planning, Planning Data Services. August 2017.

Caroline County Planning and Codes. Permit Data 2010-2017.

Prepared by the Maryland Department of Natural Resources. 2017 Caroline County Land Preservation, Parks and Recreation Plan. 2017.

Prepared by Maryland Geological Survey. GIS Data Layers – Geology. Available at http://www.mgs.md.gov/coastal/data/physprovgis.html.

Prepared by Maryland Department of Planning Land Use Planning and Analysis Division, March 2011.

Chapter 3 – Hazard Identification

Prepared by Maryland Emergency Management Agency. 2016 State of Maryland Hazard Mitigation Plan. Available at: https://mema.maryland.gov/community/Documents/2016%20Maryland%20Hazard%20Mitigation%20Plan%20final%202.pdf. August 2016.

Chapter 4 – Riverine Flooding

Prepared by Federal Emergency Management Agency. Data Visualization: Disaster Declarations for States and Counties. 2018. Available at: https://www.fema.gov/data-visualization-disaster-declarations-states-and-counties. 2018.

National Oceanic and Atmospheric Administration - National Weather Service. National Centers for Environmental Information – Storm Events. Available at: https://www.ncdc.noaa.gov/stormevents/. 2018.

Prepared by National Flood Insurance. Nationwide Flooding Facts. 2018. Available at: https://nationalfloodinsurance.org/flood-facts. 2018.

Prepared by Federal Emergency Management Agency. 2015 FEMA Flood Insurance Study. Available at: https://www.fema.gov/flood-insurance-study. 2015.

The Star Democrat Newspaper. Various Articles and Years. 2006-2017. Available at: https://www.stardem.com/.

"Definitions of FEMA Flood Zone Designations". Available at http://msc.fema.gov/. 2018.

Prepared by Federal Emergency Management Agency. 2015 Hazard Mitigation Assistance Unified Guidance. 2015.

Prepared by Maryland Department of Planning. 2015 Maryland Property View Data for Caroline County. 2015.

Prepared by FEMA. National Flood Insurance Report of Maryland. National Flood Insurance Program. Received by National Flood Insurance Program Coordinator for the Maryland Department of Natural Resources.

Repetitive loss properties in Caroline County. Received by Flood Insurance Program Coordinator for the Maryland Department of Natural Resources. December 2018.

Chapter 5 – Coastal Flood and Storms

Prepared by Maryland Emergency Management Agency. 2016 State of Maryland Hazard Mitigation Plan. Available at: https://mema.maryland.gov/community/Documents/2016%20Maryland%20Hazard%20Mitigation%20Plan%20final%202.pdf. August 2016.

National Oceanic and Atmospheric Administration - National Weather Service. National Centers for Environmental Information – Storm Events. Available at: https://www.ncdc.noaa.gov/stormevents/. 2018.

National Hurricane Center – Saffir-Simpson Hurricane Wind Scale, 2012. Available at: http://www.nhc.noaa.gov/aboutsshws.php.

Prepared by Federal Emergency Management Agency. 2015 FEMA Flood Risk Report-Caroline County, MD Coastal Study. July 17, 2015.

U.S. Census Bureau. 2010. Available at: www.census.gov. 2010.

Prepared by United States Army Corps of Engineers. GIS Data Layers- Maryland Hurricane Storm Surge. 2016.

Prepared by the National Oceanic and Atmospheric Administration – Coastal Services Center. GIS Data Layers-atl_hurtrack. Available at http://csc-s-maps-9.csc.noaa.gov/hurricanes/download.jsp 2010.

Chapter 6 – Shoreline Erosion & Sea Level Rise

Prepared by Maryland Emergency Management Agency. 2016 State of Maryland Hazard Mitigation Plan. Available at:

https://mema.maryland.gov/community/Documents/2016%20Maryland%20Hazard%20Mitigation%20Plan%20final%202.pdf. August 2016.

Prepared by the Center for Coastal Resources Management, Virginia Institute of Marine Science. Shoreline Protections. 2002-2006.

Prepared by U.S. Army Corps of Engineers. Rate of Shoreline Erosion. 2010.

Prepared by Maryland Department of Natural Resources. The Maryland Coastal Resiliency Assessment. March 2016.

Jim Bass, Eastern Shore Land Conservancy (ESLC). PowerPoint Presentation on Flood Risk Planning Scenarios and Mitigation Strategies – Caroline County, Maryland. October 25, 2018 HMPC Meeting.

Prepared by the Maryland State Highway Administration. GIS Data Products To Support Climate Change Adaption Planning – Caroline County, Maryland. Summer 2018.

Chapter 7 – Winter Storms

National Oceanic and Atmospheric Administration - National Weather Service. National Centers for Environmental Information – Storm Events. Available at: https://www.ncdc.noaa.gov/stormevents/. 2018.

Federal Emergency Management Agency. Presidential and Emergency Declarations by State. Available at: https://www.fema.gov/disasters.

MyEasternShoreMD website. Various Articles and Years. 2010-2018.

The Caroline Circle Newspaper. Snow Clean Up – Denton, Maryland. March 4, 2014. Available at: http://carolinecircle.com. 2014.

Chapter 8 – Drought & Extreme Heat

National Oceanic and Atmospheric Administration - National Weather Service. National Centers for Environmental Information – Storm Events. Available at: https://www.ncdc.noaa.gov/stormevents/. 2018.

University of Maryland Extension, Home & Garden Center. Drought Conditions. Available at: https://extension.umd.edu/hgic/topics/drought-conditions.

National Drought Mitigation Center. U.S. Drought Monitor. Website: https://drought.unl.edu/.

US Department of Agriculture-Census of Agriculture. National Agriculture Statistics Service. Website: www.agcensus.usda.gov.

Prepared by United States Census Bureau – Cartographic Boundary Files. GIS Data Layers-Estimated 2016 Census Tracts. 2016.

Maryland Food System Map. Available at: http://mdfoodsystemmap.org/.

Caroline County Comprehensive Development Plan. April 2010.

National Oceanic and Atmospheric Administration - National Weather Service. Heat Index. Website: https://www.weather.gov/safety/heat-index.

Chapter 9 – Severe Weather

National Oceanic and Atmospheric Administration - National Weather Service. National Centers for Environmental Information – Storm Events. Available at: https://www.ncdc.noaa.gov/stormevents/. 2018.

"Fujita Tornado Damage Scale". Available at http://www.spc.noaa.gov/faq/tornado/f-scale.html.

"National Oceanic and Atmospheric Administration – National Severe Storms Laboratory". Available at http://www.nssl.noaa.gov/. 2010.

Prepared by National Oceanic and Atmospheric Administration. GIS Data Layer – Tornado Touchdown Storm Prediction Center. June 2009.

Prepared by Choptank Electric. CAIDI and SAIDI Data. 2010-2017.

MyEasternShoreMD website. Various Articles and Years. 2010-2012.

The Star Democrat Newspaper. Various Articles and Years. 2010-2012. Available at: https://www.stardem.com/.

Chapter 10 – Human Impacted Hazards

Prepared by United States Fire Administration. U.S Fire Deaths. 2018.

Prepared by the Maryland State Fire Marshalls Office. Fire Deaths. 2008-2017.

Prepared by the Maryland State Fire Marshalls Office. Fire Statistics. 2016-2017.

Center for Disease Control and Prevention (CDC). Available at: https://www.cdc.gov/. 2017.

Maryland Department of Health (MDH). Available at: https://health.maryland.gov/pages/index.aspx. 2017.

Prepared by The Maryland Infectious Disease and Health Administration. Reportable Conditions. 2012-2016.

Caroline County Health Department Website. Available at http://www.carolinehd.org/. 2018.

Chapter 12 – Capability and New Mitigation Strategies

Board of County Commissioners of Caroline County. Floodplain Ordinance - Ord. No. 20144. November 25, 2014. Available at: https://www.carolinemd.org/DocumentCenter/View/2015/2014-4-Floodplain-Management-Ordinance?bidId=.

Prepared by Federal Emergency Management Agency. 2015 FEMA Flood Insurance Study. Available at: https://www.fema.gov/flood-insurance-study. 2015.

Caroline County Department of Planning and Codes. Maryland Building Performance Standards. Effective Date – January 1, 2015. Available at: https://www.carolinemd.org/DocumentCenter/View/179/37_Current-Building-Codes?bidId=.

Caroline County Department of Planning and Codes. Transferable Development Rights Program. Adoption date – April 2006. View a map of the county showing the TDR Receiving Area. Available at: https://www.carolinemd.org/DocumentCenter/View/232/Map1_TDR-Area?bidId=.

Caroline County Department of Planning and Codes. Chesapeake Bay Critical Area Act. 1984. Information available at: https://www.carolinemd.org/244/Critical-Areas-Program.

Caroline County Department of Planning and Codes. The Maryland Forest Conservation Act. Enacted in 1991. Information available at: https://www.carolinemd.org/243/Forest-Conservation-Program.

Caroline County Emergency Services. Caroline Connect CodeRED. Available at: https://www.carolinemd.org/181/Emergency-Services.

GIS Data Utilized

FEMA Flood Zones	FEMA Map Service Center Effective Date: 1/16/2015
Coastal Depth Grid	FEMA Map Service Center
Coastal User Defined Points	FEMA Map Service Center
County Centerlines (NG911_Centerlines)	Caroline County GIS Department *In the process of being updated
Building Footprints	Caroline County GIS Department 2012 Shapefile *2018 Status - Incomplete and potential anomalies
Address Points	Caroline County GIS Department *In the process of being updated
Dry Hydrants	Caroline County GIS Department *Data potentially out dated
Critical Area (CriticalArea_8222017)	Caroline County GIS Department
2015 Maryland Property View Data Points	Maryland Department of Planning
2100 Mean Sea Level Rise	State Highway Administration, Salisbury University, NOAA, USACE, USGS, MD iMAP
Hurricane Storm Surge - January 2016	U.S. Army Corps of Engineers, Baltimore District, Planning Division

Appendix F – National Flood Insurance Program (NFIP) Survey

JURISDICTION: CAROLINE COUNTY

1. FLOODPLAIN IDENTIFICATION AND MAPPING			
Requirement	**Recommended Action**	**Yes/No**	**Comments**
a. Does the jurisdiction maintain accessible copies of an effective Flood Insurance Rate Map (FIRM)/Digital Flood Insurance Rate Map (DFIRM)? Does the jurisdiction maintain accessible copies of the most recent Flood Insurance Study (FIS)?	Place these documents in the local libraries or make available publicly.	YES	
b. Has the jurisdiction adopted the most current DFIRM/FIRM and FIS?	State the date of adoption, if approved.	YES	January 16, 2015
c. Does the jurisdiction support request for map updates?	If yes, state how.	YES	If a map update is warranted, yes, we would support an update
d. Does the jurisdiction share with Federal Emergency Management Agency (FEMA) any new technical or scientific data that could result in map revisions within 6 months of creation or identification of new data?	If yes, specify how.	YES	If new data is available, we would confirm with the State if this data would support a map revision, and whether they agree with our determination that a revision is needed. If this is agreed upon then we would submit to FEMA.
e. Does the jurisdiction provide assistance with local floodplain determinations?	If yes, specify how.	YES	We answer all questions regarding floodplain determinations using the effective DFIRMS and FIS. If elevation data is not available for a specific structure, we provide a list of surveyors for residents to call so that they may obtain an elevation certificate. We will review the supplied elevation certificates and make the determination of flood risk.
f. Does the jurisdiction maintain a record of approved Letters of Map Change?	If yes, specify the responsible office.	YES	The Planning and Codes Department is responsible for maintaining effective DFIRMS/FIRMS, FIS, elevation certificates, etc.

2. FLOODPLAIN MANAGEMENT			
Requirement	**Recommended Action**	**Yes/No**	**Comments**
a. Has the jurisdiction adopted a compliant floodplain management ordinance that, at a minimum, regulates the following:	If yes, answer questions (1) through (4) below.	YES	
(1) Does the jurisdiction issue permits for all proposed development in the Special Flood Hazard Areas (SFHAs)?	If yes, specify the office responsible.	YES	Planning and Codes Department
(2) Does the jurisdiction obtain, review, and utilize any Base Flood Elevation (BFE) and floodway data, and/or require BFE data for subdivision proposals and other development proposals larger than 50 lots or 5 acres?	If yes, specify the office responsible.	YES	Planning and Codes Department
(3) Does the jurisdiction identify measures to keep all new and substantially improved construction reasonably safe from flooding to or above the BFE, including anchoring, using flood-resistant materials, and designing or locating utilities and service facilities to prevent water damage?	If yes, specify the office responsible.	YES	Planning and Codes Department
(4) Does the jurisdiction document and maintain records of elevation data that document lowest floor elevation for new or substantially improved structures?	If yes, specify the office responsible.	YES	Planning and Codes Department
b. If a compliant floodplain ordinance was adopted, does the jurisdiction enforce the ordinance by monitoring compliance and taking remedial action to correct violations?	If yes, specify how.	YES	Any violations can be enforced through a civil infraction process. All known violations of the floodplain ordinance are required to be remedied by make any necessary changes to come into compliance with the floodplain ordinance.

c. Has the jurisdiction considered adopting activities that extend beyond the minimum requirements? Examples include: • Participation in the Community Rating System • Prohibition of production or storage of chemicals in SFHA • Prohibition of certain types of structures, such as hospitals, nursing homes, and jails in SFHA • Prohibition of certain types of residential housing (manufactured homes) in SFHA • Floodplain ordinances that prohibit any new residential or nonresidential structures in SFHA	If yes, specify activities.	YES	• Caroline County has participated in the CRS Program since 1996. We were recently reclassified as a Class 8 on May 1,2017 • The Caroline County Floodplain Ordinance follows the Maryland State Model Floodplain Ordinance, which has many higher regulatory standards that exceed minimum NFIP requirements

3. FLOOD INSURANCE

Requirement	Recommended Action	Yes/No	Comments
a. Does the jurisdiction educate community members about the availability and value of flood insurance?	If yes, specify how.	YES	As part of the CRS Program we are required to provide outreach. Outreach is made through letters annually to Realtors, Insurance Companies, Banks and other Lending Agencies and residents.
b. Does the jurisdiction inform community property owners about changes to the DFIRM/FIRM that would impact their insurance rates?	If yes, specify how.	YES	Updates to any regulations require residents to be informed through letters, as well as multiple public meetings.
c. Does the jurisdiction provide general assistance to community members regarding insurance issues?	If yes, specify how.	YES	The Planning and Codes Department fields calls regularly about flood insurance information. We provide general guidance on what may be expected of an insurance policy and how their rates are determined. We will review elevation data as well as make site visits to properties when we feel as though there may be ways a homeowner may reduce their flood risk as well as reduce their flood insurance premium.

Town of Denton

Accounting Procedures

Forest Conservation Fund

Per Senate Bill 234, the Town of Denton is submitting the following detailed accounting procedures for accurately tracking money received into and expended out of the Forest Conservation Fund:

1. Payment is received by the Finance Department by mail or person.
2. Payment is confirmed by the Planning and Codes Department by means of the approved Forest Conservation Plan.
3. The Planning and Codes Department completes a Fee Transmittal Form which includes the date received, person or corporation received from and address, check number, project name, project property address, project number, and amount received filled in the Forest Mitigation line item.
4. The Finance Department enters the information from the Fee Transmittal Form into the cash register system.
5. The cash register system will debit General Ledger #15-0000-11932/Cash, LGIP Forest Mitigation and credit General Ledger #15-1452-40932/Revenue, In Lieu of Trees.
6. The LGIP Forest Mitigation check is deposited into the LGIP Forest Mitigation bank account.
7. The LGIP Forest Mitigation bank account is reconciled monthly.
8. A requisition and/or voucher is submitted to the Finance Department for funds expended from the General Ledger #15-0000-11932/Cash, LGIP Forest Mitigation account for approved forest conservation items to include reforestation and afforestation, costs directly related to site identification, acquisition, prepurchase, and preparation, maintenance of existing forests, and achieving urban canopy goals.
9. The Finance Department enters the voucher into the InCode Accounting Software System crediting General Ledger #15-0000-11932/Cash, LGIP Forest Mitigation account and debiting General Ledger #15-1452-58900 Project Cost, Accounts Payable/Vendor.
10. The Finance Department prints checks reducing the cash account and accounts payable account for the amount expended from the LGIP Forest Mitigation account.
11. The Finance Department mails the payment to the vendor.